

RIVER VALLEY PLANNING MODERNIZATION

Ribbon of Green & River Valley ARP

Planning Guidance Report

March 2022

The logo for the City of Edmonton, featuring the word "Edmonton" in white text on a dark blue square background. A decorative green ribbon graphic runs vertically along the right side of the page, starting from the bottom and extending to the top.

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Introduction

This document provides initial planning guidance for the Ribbon of Green area (excluding the SW+NE lands that have recently been planned), providing draft Land Management Classifications, Amenity Nodes, Trailheads, and Top of Bank Trails, and the Recommended Ecological Network.

Land Management Classifications

The draft Land Management Classifications identify appropriate uses and management approaches based on the contributions lands make to the ecology, celebration, and wellness functions provided by the River Valley and Ravine System.

Amenity Nodes

Amenity Nodes identify important destinations and event spaces which provide opportunities for community gathering and starting points for recreation throughout the Ribbon of Green.

Trailheads and Top of Bank Trails

Trailheads and key Top of Bank Trails provide important entry points and connections throughout the River Valley and Ravine System. Reach Visions and Priorities provide important direction for subsequent finer-scale planning within each reach.

Recommended Ecological Network

Finally the Recommended Ecological Network identifies key environmental factors that should guide management decisions throughout the River Valley and Ravine System, identifying core habitat, flood hazard lands, management considerations for wildlife pinchpoints, potential restoration areas, and the relative wildlife movement importance of lands throughout the Ribbon of Green and its surroundings.

SPATIAL PLANNING GUIDANCE

Land Management Classification

Land Management Classifications define the physical site conditions, operations, activities and amenities within the entire River Valley and Ravine System (the System). These management classifications outline the level of protection or permitted development within each area. In turn, these classifications will guide design and programming decisions to create park amenities and operations standards appropriate to their location within the System.

The Land Management Classifications are based on the original Ribbon of Green Master Plan from 1992, and refined during the creation of the Ribbon of Green SW+NE plan. Initial engagement during this project has helped to confirm the LMC approach, although challenges still exist in implementation in the central portions of the study area, due to existing informal trails, and conflicting usage. Additional site-specific study will be used to refine and confirm the proposed LMCs defined here.

Methodology

The following methodology details the desktop-based analysis and creation of the Land Management Classifications for the Ribbon of Green. It includes classifications for three types of land areas: Preservation, Conservation, and Active Working Landscapes.

Preservation criteria included major landslide areas, flood hazard lands, a 60 m buffer around water bodies (including the North Saskatchewan River, major streams, wetlands, and natural water bodies), any ecology score polygons with a rating of "very high" or habitat type polygons classified as "core" or "habitat" (see the ECW Reach Report) as well as any environmental sensitivity polygons with a rating of "very high" or "extremely high" (from the City's *Environmental Sensitivity Mapping* project). These layers were then combined into a single polygon layer to calculate where the greatest areas of overlap existed between the above-listed preservation criteria. The result was a single merged preservation layer defining the areas of greatest natural and ecological importance to the Ribbon of Green study area.

The Active Working Landscapes (AWL) criteria were established in a similar fashion to the determination of the preservation criteria. The primary criteria for the AWL were derived from the Urban Primary Land and Vegetation Inventory (UPLVI) dataset, including any features where the land class was "Developed". In addition to the UPLVI areas certain heavily used recreation areas such as Fort Edmonton Park, the Valley Zoo, ski hills, golf courses, and various event spaces found in many parks were also included within this classification. Additionally, roads were also used by creating a buffer around them based on their average width. These roads were then split into two classes for those roads within parks (Conservation) and those outside of parks (AWL).

The starting point for conservation was the City-maintained trail network (mostly paved and gravel trails), or "primary" trail connections. This network does not include the network of recreational trails that have been informally created by users, or natural tread trails that have been created by wildlife moving through the system. A 15m Conservation buffer was applied to paved trails, and a 5m Conservation buffer was applied to gravel trails. Additionally, any trails within 30m of the river's edge had a special buffer applied to them to remove the conservation designation on the riverside of the trail to allow for a riparian edge. Other lands which were neither flagged for Preservation nor Active/Working Landscapes were assigned to conservation.

Once the three main areas had been defined the last step was the combination of all these layers into a final Land Management Classification layer for the Ribbon of Green. The first step was to erase any Conservation or Preservation areas that were overlapped by any AWL. This resulted in three individual layers with no overlap that were merged along with a slight buffer surrounding the Ribbon of Green study area to create a complete polygon. The final step was to eliminate any polygons smaller than 2000m and convert them to the class of a neighbor with which they shared the longest border. The final result was a layer representing an uninterrupted surface of Preservation, Conservation, and Active Working Landscapes throughout the Ribbon of Green study area. Initial data-driven LMC categorization is found in Appendix D. The final LMC categorization for each reach is found in the next section of this document.

Manual Edits to the Land Management Classification

Upon completion of the desktop-based analysis, manual edits were made to the Land Management Classifications to ensure alignment with existing approved plans and policies. These manual edits were based on feedback from the team's knowledge of the river valley area and reference to park master plans to better reflect on the ground uses as well as existing documentation. These changes are identified in Appendix E.

Examples of manual edits made include changes made within the central reach to account for existing park master plans, and approved future development. Adjustments were made to better reflect off-leash dog parks in the North Saskatchewan East and West reaches such as Buena vista park. Entire golf course footprints were initially assigned as active working landscapes but were later modified to reflect the important habitats, riparian areas, and existing trails that also exist within those areas. Private parcels classified as AWL that fell within Small Scale Infill Development, or Direct Development Control Provision zoning areas are excluded from the LMC categorization. The remaining areas that are classified as private parcels were symbolized as a hatch to distinguish them as privately owned.

Primary Trail Network

The primary trail network was determined using the city's existing trail linework data covering the Ribbon of Green reaches. Bridges and stairs were also included to ensure a connected network. The trails included those which are maintained by the City, and open for use by the public. Trails were grouped into the categories of paved, gravel and natural based on the trail type.

Amenity Nodes and Trailheads

Amenity Nodes are key destinations within the Ribbon of Green, providing entry points and meeting places for people to experience the area. Existing amenity nodes were identified to highlight areas with significant attractive draw into the River Valley and Ravine System. This includes event spaces, public attractions, sports fields, or large natural areas. Event booking data was used to identify existing use. Further nodes were identified around clusters of existing amenities and other recreational infrastructure. Other important areas were also identified from previous analysis and included major parks, ski hills, and attractions.

Trailheads were identified at major parking lots and where the formal trail network intersects community boundaries. They were broken down into four categories based on trail type including natural, gravel, paved and proposed.

Undeveloped and newly annexed lands contain no existing trails or amenity nodes. High level top-of-bank trails are proposed here. These proposed trails will predominantly follow the reach boundary directly in order to leave the land within these new reaches natural and undisturbed where possible. Similarly, appropriate locations for new amenity nodes are identified where recreation and access infrastructure can be located without ecological impact. Where possible, amenity nodes and other infrastructure should be located outside of the Ribbon of Green boundary, to minimize impervious surfaces and other disturbances in the area.

Potential Restoration Areas

Following the development of the Land Management Classifications, potential restoration areas are identified by intersecting Preservation and Conservation Areas with developed and modified land cover classes (see Appendix A). The resulting set of sites reflect areas which may be beneficially restored to more natural land cover types, increasing the overall supply of natural habitat, and providing potential improvement to the ecological functioning of the existing natural cover. As more detailed site-level plans and comprehensive inventories are conducted, validation and refinement of these potential restoration areas will undoubtedly provide a clearer picture of the most appropriate use of these lands. Similarly, as finer-scale plans are developed, prioritization of these restoration efforts will ensure cost-effective and successful outcomes which maximize the improvement of natural functioning in these landscapes.

Wildlife Movement Importance

Drawing on the City's existing connectivity modelling data, wildlife connectivity paths were calculated using a simulated movement approach that traces likely paths of movement from core habitat into the surrounding landscape (see Appendix B), for Coyote (Summer and Winter models) and Chickadee. These paths show likely routes of movement between identified core habitat (as defined in Appendix C). To provide a simplified overlay for inclusion on planning maps, a Simplified Wildlife Movement Importance using circles of varying sizes to highlight lands that are most likely to see wildlife movement (including areas important across all three models, and areas uniquely important to a particular model. Regardless of the LMC these lands are placed in, management should ensure that use and development of these lands is conducted so as to minimize impacts to wildlife movement.

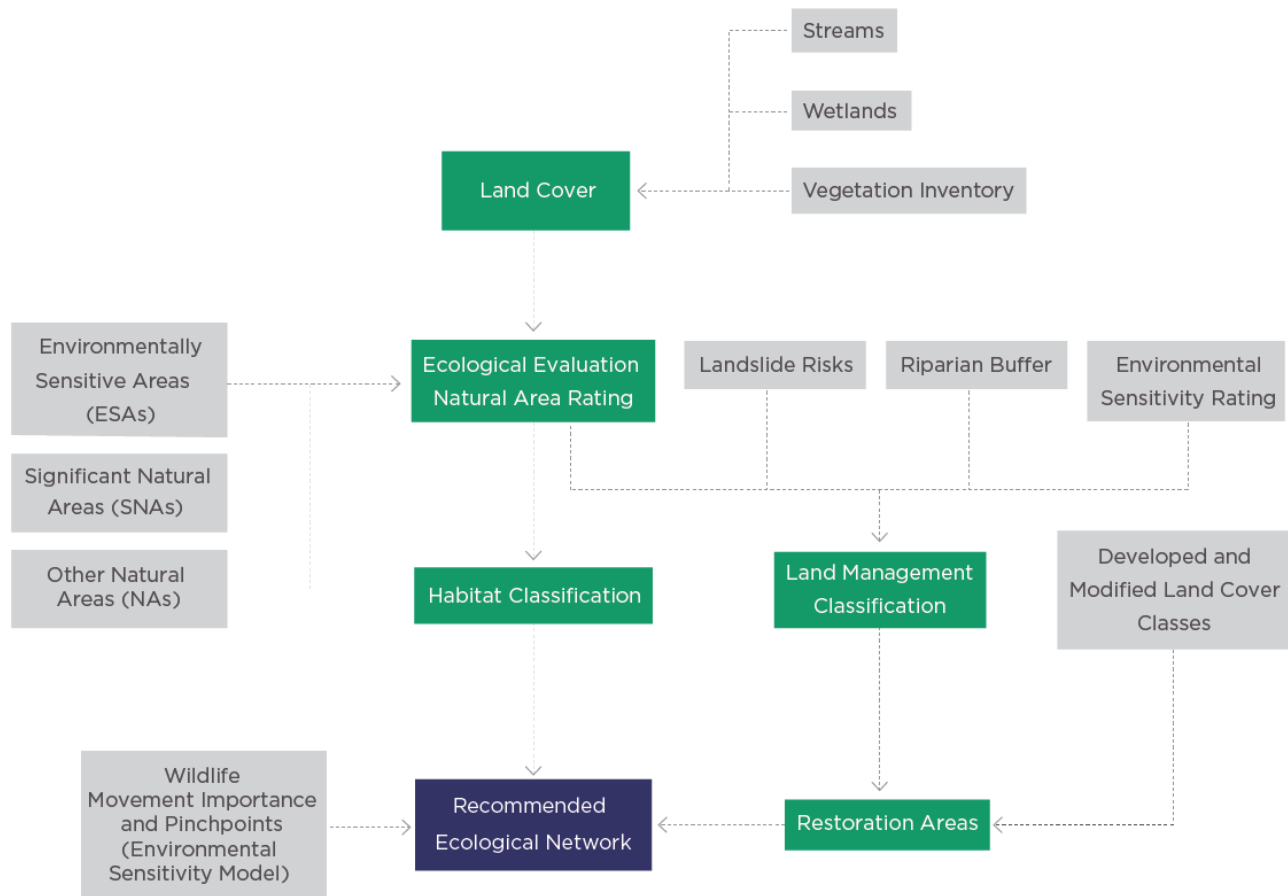
Recommended Ecological Network

The Recommended Ecological Network mapping highlights key considerations for the sustainable management of the natural function of the River Valley and Ravine System. This includes:

- + **Core Habitat polygons:** Large, intact patches of native vegetation which serve important habitat functions and should be maintained and improved.
- + **Flood Hazard Lands:** Floodway and Flood Fringe polygons as defined by the Province.
- + **Streams:** Watercourses and riparian areas that should be maintained to preserve drainage and ensure connectivity.
- + **Restoration Areas:** Human footprints within Preservation and Conservation LMCs where restoration efforts would improve the natural function of the landscape.

- + **Pinchpoint management areas:** Lands where wildlife movement is concentrated due to topography and surrounding disturbances and where special management attention is needed to maintain and improve connectivity.
- + **Simplified Wildlife Movement Importance:** Lands which are likely to see wildlife movement and which should be managed to maintain and improve connectivity.

These factors identify areas where ecological protections are of high importance (regardless of the LMC to which they have been assigned), and unique management approaches should be considered. The following flowchart describes the analysis approach.



REACH VISIONS, PRIORITIES, AND ECOLOGICAL GUIDANCE

Overview

The following section describes the vision and priorities for each reach throughout the Ribbon of Green, as well as the amenity nodes they contain, and ecological guidance to inform management decisions (excluding the SW+NE lands that have been previously planned for). This will inform subsequent finer-scale planning efforts in subsequent phases.

1 – Central Reach

Vision

The North Saskatchewan Central Reach is a vibrant recreational destination and gathering place for the city, providing a diverse range of experiences from large event spaces to natural spaces. Valued cultural spaces are honoured and appropriately interpreted. A well-connected network of sustainable trail connections promotes active travel and recreation while protecting the River Valley's natural features. Restoration efforts and designated preservation areas improve ecological connectivity to and through the reach and provide habitat for the City's biodiversity, while protecting unique landscapes within existing parkland.

Priorities

- + Improve pathway connectivity and signage to ensure wayfinding, public safety, and ecological health, and resolve incompatible trail uses in Preservation areas
- + Ensure that the river valley parks are well-supported with access to public transit
- + Ensure connections to surrounding neighbourhoods to support local access to the river valley and pathway system
- + Improve wildlife connectivity along the north bank of the river, as well as through Hawrelak park, into the slopes below the University of Alberta and in other areas where the steep valley slopes create pinchpoints for movement.
- + Extend River Valley connectivity into adjacent neighbourhoods through Urban Greenways (from MacKinnon and MacKenzie Ravines and Queen Elizabeth Park) and Habitat Greenways (south from Kinsmen Park and north into Downtown)
- + Further explore opportunities to daylight Groat Ravine and Rat Creek, to provide better connected riparian corridors and improved ecological function
- + Promote native vegetation in residential areas
- + Maintain healthy riparian vegetation along the riverbank
- + Ensure protection of unique landscapes (e.g. the Dawson Park hoodoos)
- + Determine possible low-impact enhancements to existing event spaces, or opportunities to shift event activities where ecological function is being compromised
- + Identify and appropriately honour places of cultural significance, including River Crossing and Métis river lots, and align direction with the River Crossing Interpretive Park and Heritage Interpretive Plan
- + Support the "big moves" identified in the Downtown Public Places Plan that about this reach, including Big Moves:
 - + High level bridge north landing (better river connection to Ezio Farone Park and legislature)
 - + Quarters connection to Louise McKinney Riverfront Park (improved access point)
 - + South edge promenade
 - + Rossdale Road and McDougal Hill Road improvements (improve road alignment for better active travel connectivity and ecological function)
 - + Explore low-impact opportunities for limited, permanent and/or temporary (e.g. pop-up) commercial uses to support surrounding recreation/ education/ community gathering activities in amenity nodes
 - + Facilitate high-quality, diverse and accessible recreation experiences throughout the reach

Amenity Nodes

- + Queen Elizabeth Park
- + Kinsmen Park
- + Rossdale Power Plant
- + Hawrelak Park
- + Rossdale Event Areas
- + Emily Murphy Park
- + Victoria Park
- + Ezio Faraone Park
- + Gallagher Park
- + Government House Park
- + Riverdale Park
- + Louise McKinney Park
- + Forest Heights Fields
- + Dawson Park
- + Kinnaird Ravine

Ecological Guidance

- + Significant connectivity pinchpoints exist throughout the Central Reach. Non-vegetated and highly developed pinchpoints (such as in Louise McKinney Park, around the Walterdale Bridge, and Groat Ravine) should be a priority to either restore these lands, or establish alternative paths which minimize the need for wildlife to move through these areas.
- + Management and development approaches should consider the maintenance of existing corridors of utmost importance, and redevelopment projects should ensure that improved connectivity.
- + Recreational uses in and around core habitat should be limited, and accompanied by effective oversight and maintenance to minimize impacts.
- + Golf courses, ravines, and valley slopes are highly important for wildlife movement, and should be managed to maintain consistent corridors.
- + Much of the residential lands through this reach are within the provincial flood hazard boundary. Redevelopment and ongoing use of these lands should be managed to minimize risks and costs associated with flooding events.

NORTH SASKATCHEWAN CENTRAL



LAND MANAGEMENT CLASSIFICATION

- Roads
- City Maintained Trails
- North Saskatchewan River
- Amenity Nodes
- City Boundary
- Proposed Top of Bank Trails

Land Management Classes

City Holdings	Non-City Holdings
Active	Active
Conservation	Conservation
Preservation	Preservation

Trail Heads

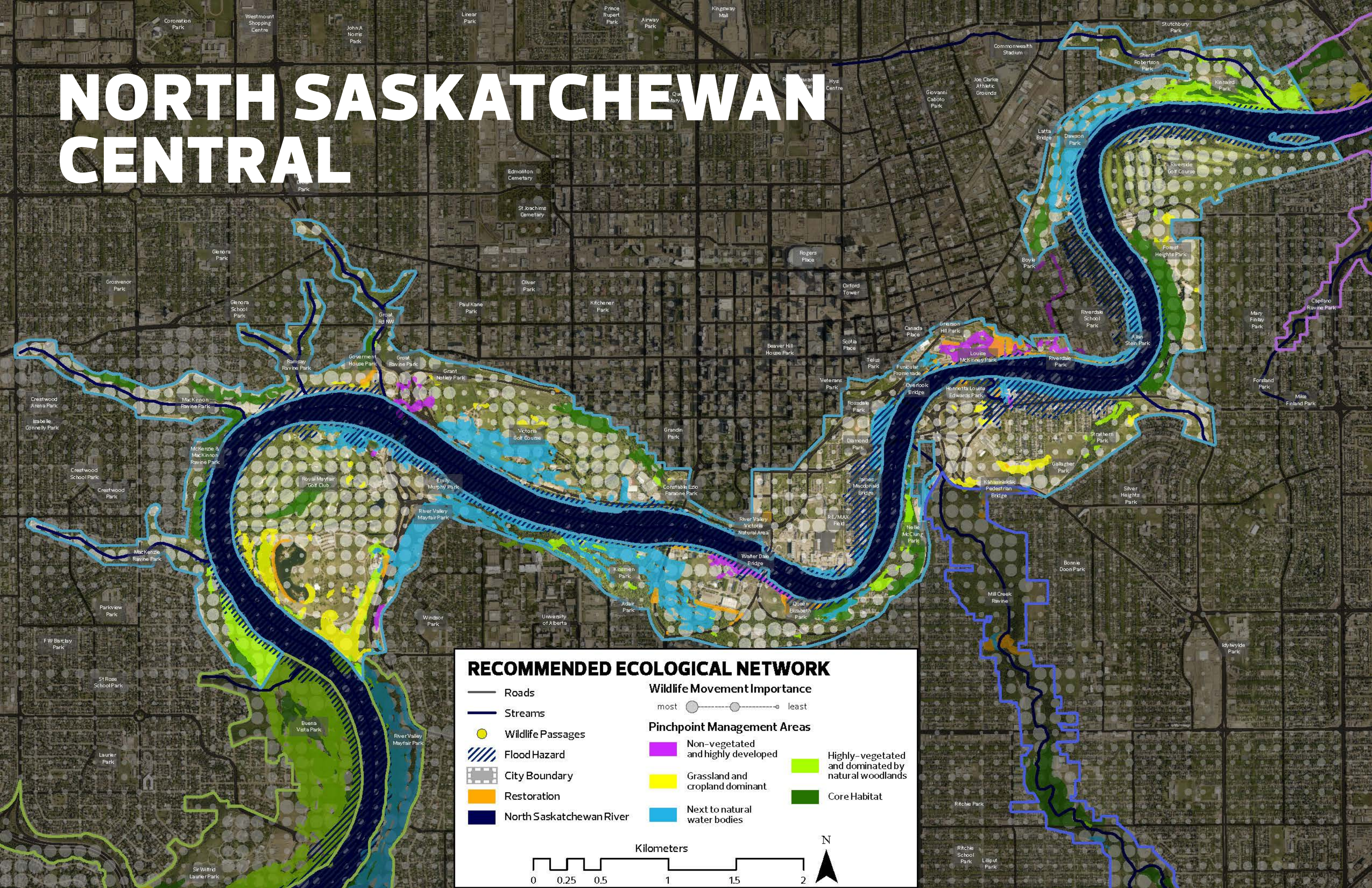
- Trail Head - Natural
- Trail Head - Gravel
- Trail Head - Paved
- Trail Head - Proposed

Kilometers

0 0.25 0.5 1 1.5 2

N

NORTH SASKATCHEWAN CENTRAL



RECOMMENDED ECOLOGICAL NETWORK

- Roads
- Streams
- Wildlife Passages
- Flood Hazard
- City Boundary
- Restoration
- North Saskatchewan River

Wildlife Movement Importance
 most ——— least

Pinchpoint Management Areas

- Non-vegetated and highly developed
- Grassland and cropland dominant
- Next to natural water bodies
- Highly-vegetated and dominated by natural woodlands
- Core Habitat

Kilometers
 0 0.25 0.5 1 1.5 2

N

2 – River Valley West

Vision

The River Valley West reach is an important destination for diverse recreational experiences, while also providing important wildlife connectivity corridors along both sides of the river. Unique attractions such as the Valley Zoo, John Janzen Nature Centre and Fort Edmonton Park provide valuable opportunities to gather and learn about River Valley history, cultural value, natural systems, and are managed to minimize their impact to natural systems. Improved trail connections provide important recreational and active transportation eastwards into the central reach, and westwards as the Southwest reach is further developed.

Priorities

- + Formalize a natural-tread trail network (identify low-impact connections to support recreation, and identify areas where existing use needs to be improved/enhanced or reduced/eliminated)
- + Develop additional pathway linkages under the Anthony Henday and into the Southwest reaches.
- + Develop a future pedestrian bridge into Terwillegar Park providing access from the west (EL Smith/Cameron Heights/Anthony Henday) and providing access to the north (Country Club/Fort Edmonton Park)
- + Promote connections between Terwillegar Park/Fort Edmonton Park and Oleskiw Park to accommodate increased use of the area given limited parking access to Oleskiw Park.
- + Maintain and enhance wildlife connectivity through the core habitat between MacKinnon and MacKenzie Ravines, the riparian lands near Fort Edmonton, and the slopes and riparian lands of Buena Vista Park, through Terwillegar Park, and in other areas where the steep valley slopes create pinchpoints for movement.
- + Promote restoration of a vegetated corridor to mitigate the impact of actively used water accesses in off-leash areas (e.g. Terwillegar Park, Buena Vista Park)
- + Develop opportunities for nature interpretation in large, high-value, well-used core biodiversity areas (e.g. MacKenzie Ravine to Buena Vista Park, Wolf Willow and Patricia Ravines)

- + Explore low-impact opportunities for limited, permanent and/or temporary (e.g. pop-up) commercial uses to support surrounding recreation/education/community gathering activities in amenity nodes
- + Prioritize the development of a washroom facility at Terwillegar Park

Amenity Nodes

- + Terwillegar Park
- + Fort Edmonton
- + Whitemud Equestrian Centre
- + Sir Wilfrid Laurier Park
- + Edmonton Valley Zoo
- + Buena Vista Park

Ecological Guidance

- + Wildlife movement is highly important through this reach. Significant pinchpoints on each side of the river valley must be well-managed to ensure that wildlife movement is maintained.
- + Pinchpoints on the west side of the river through the off-leash areas of Buena Vista Park pose a significant challenge.
- + Narrow valley slopes along the east side of the river valley between Hawrelak Park and the mouth of the Whitemud Ravine are highly important for flow into the river valley from the south. Impacts to these lands will have a disproportionate effect.
- + Core habitat is found in Terwillegar, Wolf Willow and Patricia Ravine Parks, and should be preserved and well-managed.
- + Off-leash dogs and high numbers of trail users in Terwillegar Park will continue to pose challenges to ecological management.
- + Flood hazard lands exist throughout the reach, and lands with extensive recreational use should be well-signed to ensure public safety.

RIVER VALLEY WEST



LAND MANAGEMENT CLASSIFICATION

- Roads
- City Maintained Trails
- North Saskatchewan River

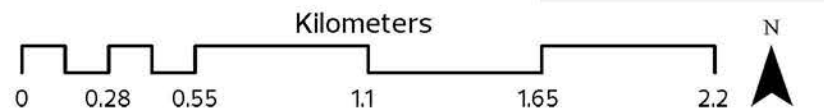
Land Management Classes

City Holdings	Non-City Holdings
Active	Active
Conservation	Conservation
Preservation	Preservation

- Amenity Nodes
- City Boundary
- Proposed Top of Bank Trails

Trail Heads

- Trail Head - Natural
- Trail Head - Gravel
- Trail Head - Paved
- Trail Head - Proposed



RIVER VALLEY WEST



RECOMMENDED ECOLOGICAL NETWORK

- Roads
- Streams
- Wildlife Passages
- Flood Hazard
- City Boundary
- Restoration
- North Saskatchewan River

Wildlife Movement Importance
 most least

Pinchpoint Management Areas

- Non-vegetated and highly developed
- Grassland and cropland dominant
- Highly-vegetated and dominated by natural woodlands
- Core Habitat
- Next to natural water bodies

Kilometers
 0 0.28 0.55 1.1 1.65 2.2

N

3 – River Valley East

Vision

The River Valley East reach provides a well-connected trail network and amenities that support diverse recreation and gathering opportunities for residents of surrounding neighbourhoods and users from across the city. Pathway connections provide excellent access through the River Valley and eastwards into Strathcona County. Wildlife connectivity is strengthened through restoration efforts along the riparian edge of the river and the valley slopes.

Priorities

- + Strengthened trail connections from the east into the Central reach
- + Explore opportunities to connect Fulton Ravine South and associated amenities (e.g. Fulton Ravine Park, Capilano Library) with the River Valley
- + Improve access to Capilano Bridge by removing stair connections and creating non-stair paths instead
- + Improve wildlife connectivity through the pinch point on the south valley slope in Gold Bar Park
- + Restore riparian vegetation along the river's edge of Rundle Park
- + Ensure that amenity nodes provide more diverse recreation opportunities
- + Explore feasibility of increasing use of Capilano Park and Rundle Park as event spaces, while ensuring no undue impact to users
- + Improve road access in Rundle Park to better support event space usage
- + Align planning direction with Alberta Environment and Parks' plans to upgrade Strathcona Science Provincial Park

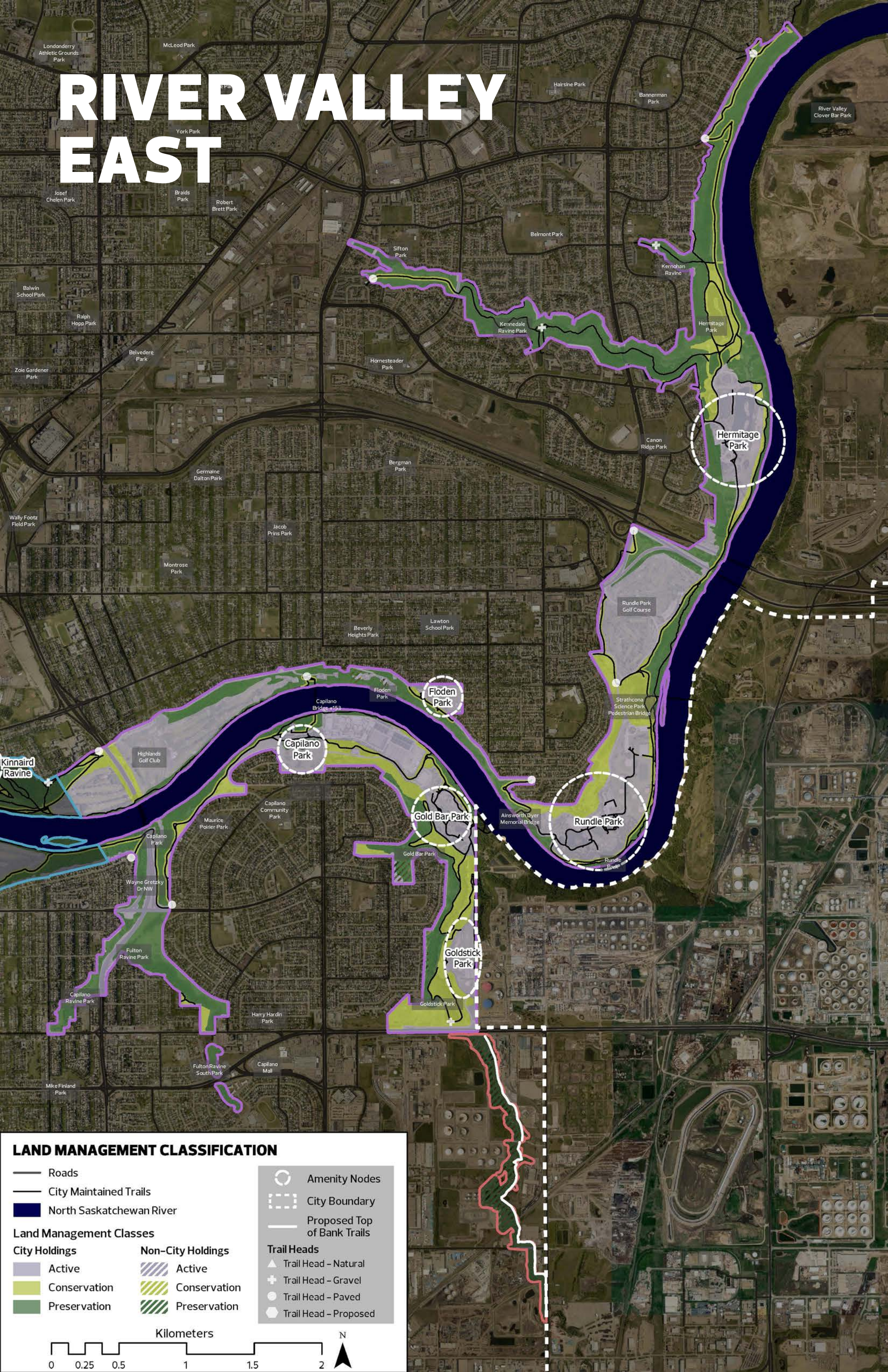
Amenity Nodes

- + Goldstick Park
- + Rundle Park
- + Gold Bar Park
- + Capilano Park
- + Floden Park
- + Hermitage Park

Ecological Guidance

- + Significant connectivity pinchpoints exist through the Highlands Golf Club, Rungle Park Golf Course, Gold Bar, Rundle, and Hermitage Park.
- + Increased use or redevelopment of Rundle Park should look to restore the slope lands to provide an alternate path through this heavily used area.
- + Core habitat is relatively rare through this reach, and riparian and ravine habitats should be preserved.
- + Flood hazards exist in Rundle and Hermitage Park, and should be well-signed.

RIVER VALLEY EAST



LAND MANAGEMENT CLASSIFICATION

- Roads
- City Maintained Trails
- North Saskatchewan River

Land Management Classes

City Holdings	Non-City Holdings
Active	Active
Conservation	Conservation
Preservation	Preservation

Amenity Nodes

- City Boundary
- Proposed Top of Bank Trails

Trail Heads

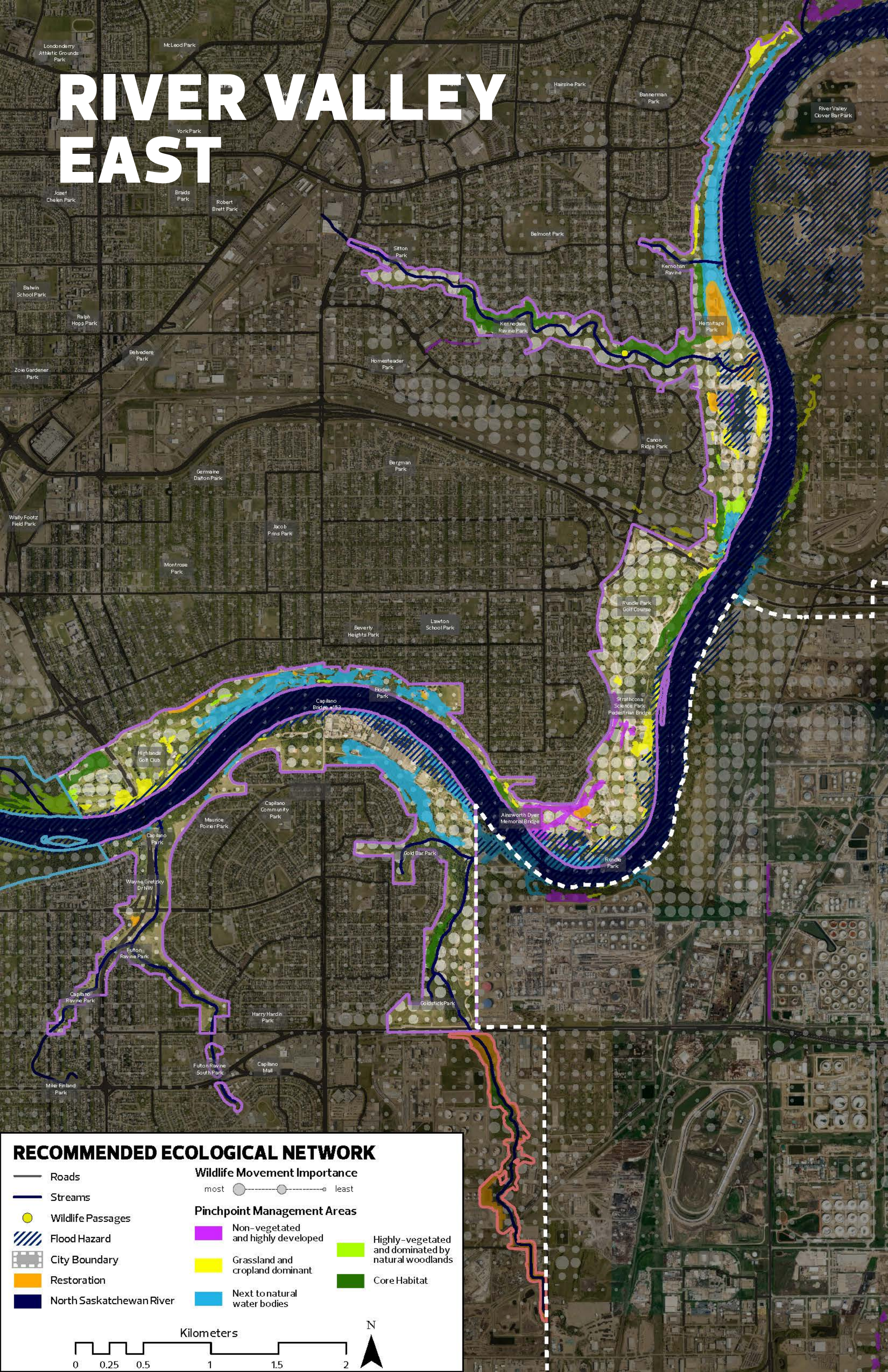
- Trail Head - Natural
- Trail Head - Gravel
- Trail Head - Paved
- Trail Head - Proposed

Kilometers

0 0.25 0.5 1 1.5 2

N

RIVER VALLEY EAST



RECOMMENDED ECOLOGICAL NETWORK

- Roads
- Streams
- Wildlife Passages
- Flood Hazard
- City Boundary
- Restoration
- North Saskatchewan River

Wildlife Movement Importance
 most least

Pinchpoint Management Areas

- Non-vegetated and highly developed
- Grassland and cropland dominant
- Highly-vegetated and dominated by natural woodlands
- Core Habitat
- Next to natural water bodies

Kilometers
 0 0.25 0.5 1 1.5 2

N

4 – Whitemud Ravine North

Vision

The sensitive lands of the Whitemud Ravine North Reach form a well-protected natural area, while providing Edmontonians with a space for relaxation and learning. Preservation remains the overriding priority for the area, ensuring that the creek remains healthy, that surrounding irreplaceable native habitats and unique geological features are protected, and that the area remains a high-functioning wildlife corridor. The creation of Indigenous cultural spaces and interpretive opportunities provides people with the chance to learn and celebrate the long history of these lands, and foster a continued tradition of stewardship.

Priorities

- + Explore opportunities to formalize an active transportation connection between Grandview neighbourhood and River Valley trails
- + Continue to restrict formal and informal trail use to foot travel, and identify and close informal trails which are causing ecological impacts
- + Ensure alignment with pedestrian/cyclist bridge over Whitemud Drive at 142 St, including active mode connections and open space upgrades
- + Explore opportunities to improve access to trailheads for multiple transportation modes
- + Preserve/restore the native vegetation on the creek bed and ravine slopes and ensure signage communicates the need to avoid sensitive banks and prevent erosion.
- + Formally protect, manage and appropriately interpret the Tufa Springs site
- + Protect important fish habitat
- + Promote the cultural interpretive opportunities provided by kihciy askiy, and strengthen interpretation of natural features throughout the ravine

Amenity Nodes

- + Whitemud Staging Area
- + Whitemud Amenity Node
- + Whitemud Park North

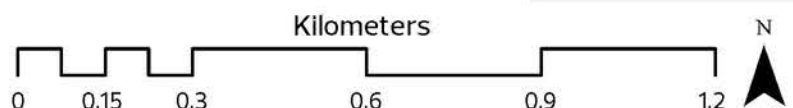
Ecological Guidance

- + Extensive high value core habitat exists throughout this reach, and must be preserved through careful trail management. Trail uses should continue to be restricted to foot-based traffic.
- + Significant pinchpoints are found throughout the ravine bottom, impacted by road-crossings.
- + Flood hazard lands exist in the north of the reach.
- + Restoration opportunities exist around the existing ski hill and campground.

WHITEMUD RAVINE NORTH








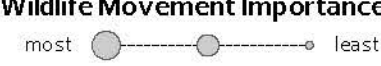



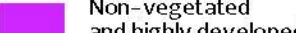


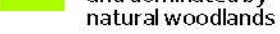

LAND MANAGEMENT CLASSIFICATION

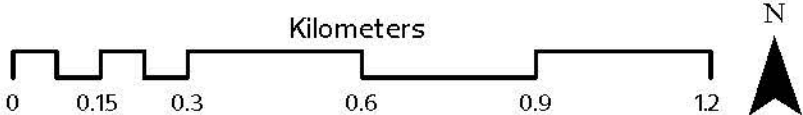
- Roads
 - City Maintained Trails
 - North Saskatchewan River
- Land Management Classes**
- | | |
|----------------------|--------------------------|
| City Holdings | Non-City Holdings |
| ■ Active | ▨ Active |
| ■ Conservation | ▨ Conservation |
| ■ Preservation | ▨ Preservation |
- Amenity Nodes
 - ⋯ City Boundary
 - Proposed Top of Bank Trails
- Trail Heads**
- ▲ Trail Head - Natural
 - ⊕ Trail Head - Gravel
 - Trail Head - Paved
 - ⦿ Trail Head - Proposed



WHITEMUD RAVINE NORTH

RECOMMENDED ECOLOGICAL NETWORK

-  Roads
 -  Streams
 -  Wildlife Passages
 -  Flood Hazard
 -  City Boundary
 -  Restoration
 -  North Saskatchewan River
- Wildlife Movement Importance**
 most    least
 - Pinchpoint Management Areas**
- | | |
|--|--|
|  Non-vegetated and highly developed |  Highly-vegetated and dominated by natural woodlands |
|  Grassland and cropland dominant |  Core Habitat |
|  Next to natural water bodies | |



5 – Whitemud Ravine South

Vision

Whitemud Far South Reach will see development in the coming decades. As industrial development occurs to the east and residential development to the west, effective setbacks and restoration of native riparian vegetation will be prioritized to ensure that this significant natural area continues to function without disturbance. This important natural corridor is the source of much of the native biodiversity found throughout the River Valley and Ravine system, and care must be taken to ensure developments in surrounding lands do not impact the watercourse. A well-designed, connected pathway system will provide low-impact access to these lands from surrounding neighbourhoods, and into the rest of the River Valley and ravines system.

Priorities

- + Protect and promote "Bedrock Park," as an interpretive opportunity to educate the public on this unique geological feature
- + Preserve the streambank as a natural area
- + Set trail connections and recreation amenities well back from the stream banks
- + Preserve the flow of biodiversity into the city, allowing the opportunity for urban biodiversity in other parts of the city
- + As adjacent residential and industrial development occurs, establish a regional recreation corridor providing connections north to the city, south to employment nodes and west towards Rabbit Hill and Devon
- + Ensure that drainage planning for the area maintains flows to the creek

Ecological Guidance

- + Significant core habitat is found in the northern portion of this reach, and development of the surrounding lands must take this into account. Effective setbacks should be established from the stream, and recreational infrastructure should be located on the periphery of the reach.
- + Much of the northern portion of the reach is highly important for wildlife movement. Corridors to the west and the north should be maintained as the area develops.
- + Restoration efforts should minimize invasive plants from the surrounding agricultural lands, and restore riparian vegetation.

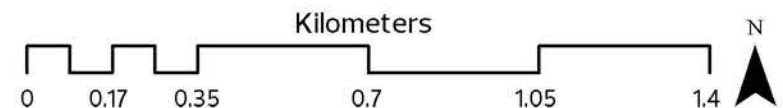
WHITEMUD RAVINE FAR SOUTH



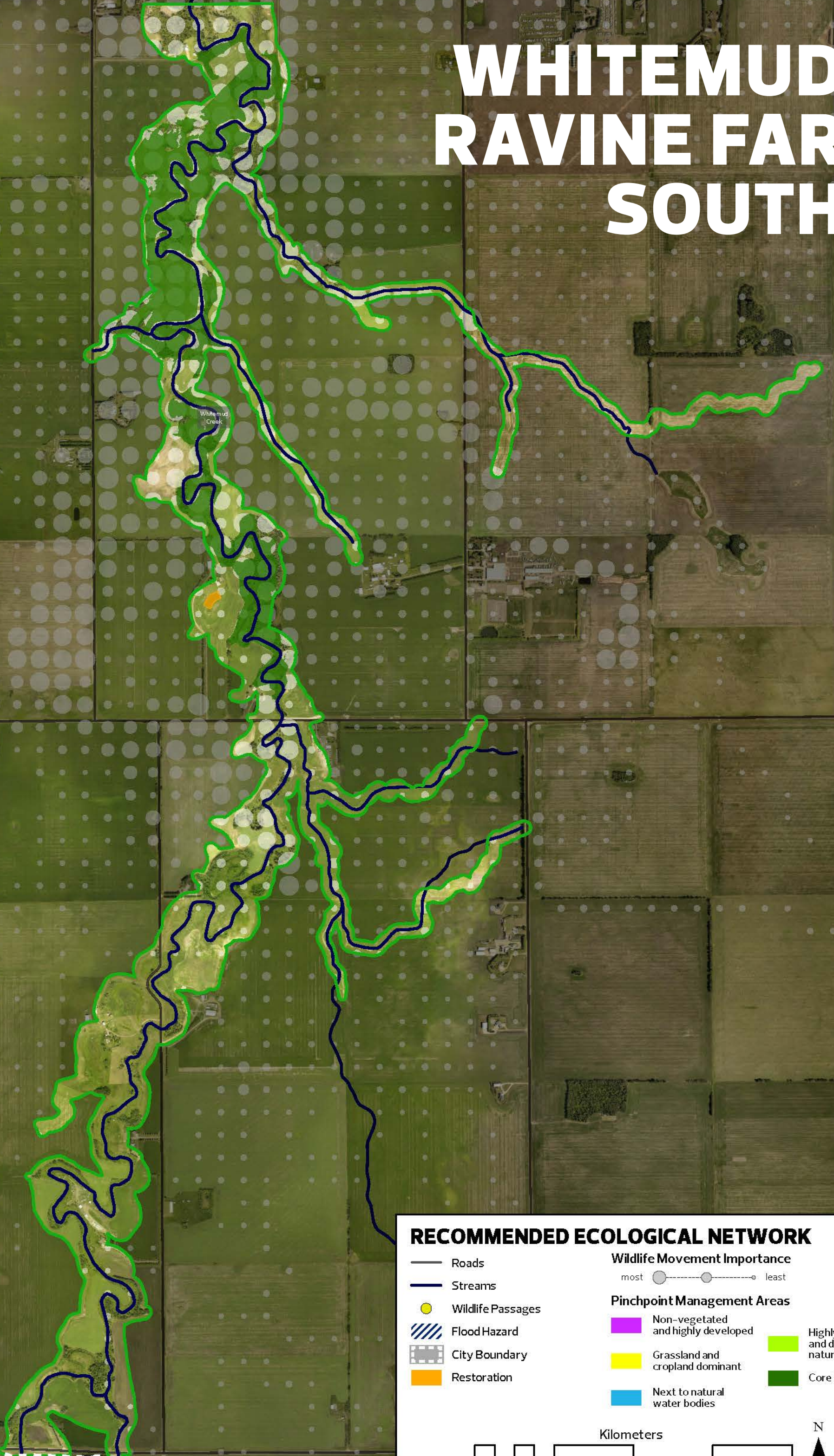
Whitemud
Creek

LAND MANAGEMENT CLASSIFICATION

- Roads
- City Maintained Trails
- City Holdings
 - Active
 - Conservation
 - Preservation
- Non-City Holdings
 - Active
 - Conservation
 - Preservation
- City Boundary
- Proposed Top of Bank Trails
- Trail Heads
 - ▲ Trail Head - Natural
 - + Trail Head - Gravel
 - Trail Head - Paved
 - ◊ Trail Head - Proposed



WHITEMUD RAVINE FAR SOUTH



RECOMMENDED ECOLOGICAL NETWORK

Roads	Wildlife Movement Importance
Streams	most least
Wildlife Passages	Pinchpoint Management Areas
Flood Hazard	Non-vegetated and highly developed
City Boundary	Grassland and cropland dominant
Restoration	Highly-vegetated and dominated by natural woodlands
	Core Habitat
	Next to natural water bodies

Kilometers

0 0.17 0.35 0.7 1.05 1.4

N

6 – Mill Creek Ravine North

Vision

Mill Creek Ravine North is a vibrant connection from south Edmonton to the downtown core, supporting wildlife connectivity, active transportation, recreation and unique events. Potential daylighting of the creek provides exceptional opportunities to re-establish native habitat, foster learning and enable the community to connect with nature.

Priorities

- + Further explore opportunities to daylight the creek, to provide a reconnected riparian corridor and improved ecological function
- + Ensure commuter pathways are well-signed and well-maintained in all seasons, and that detours are clearly communicated, in support of Mill Creek's role as a District Connector (Edmonton Bike Plan)
- + Formalize a network of natural trails and restore informal trails in sensitive areas
- + Strengthen wayfinding and connections into the surrounding residential areas and to the LRT station at the Muttart Conservatory to support the use of this reach as a commuter route.
- + As the Argyll velodrome is retired, these lands should be repurposed into an expanded amenity node and event space, providing space for diverse community events such as theatre, markets, and picnicking.
- + Improved year-round recreational use through cross-country ski tracks and pathway-based nature interpretation.
- + Support the continuation of unique events which bring vibrancy and community connection, while minimizing their impact on surrounding natural areas

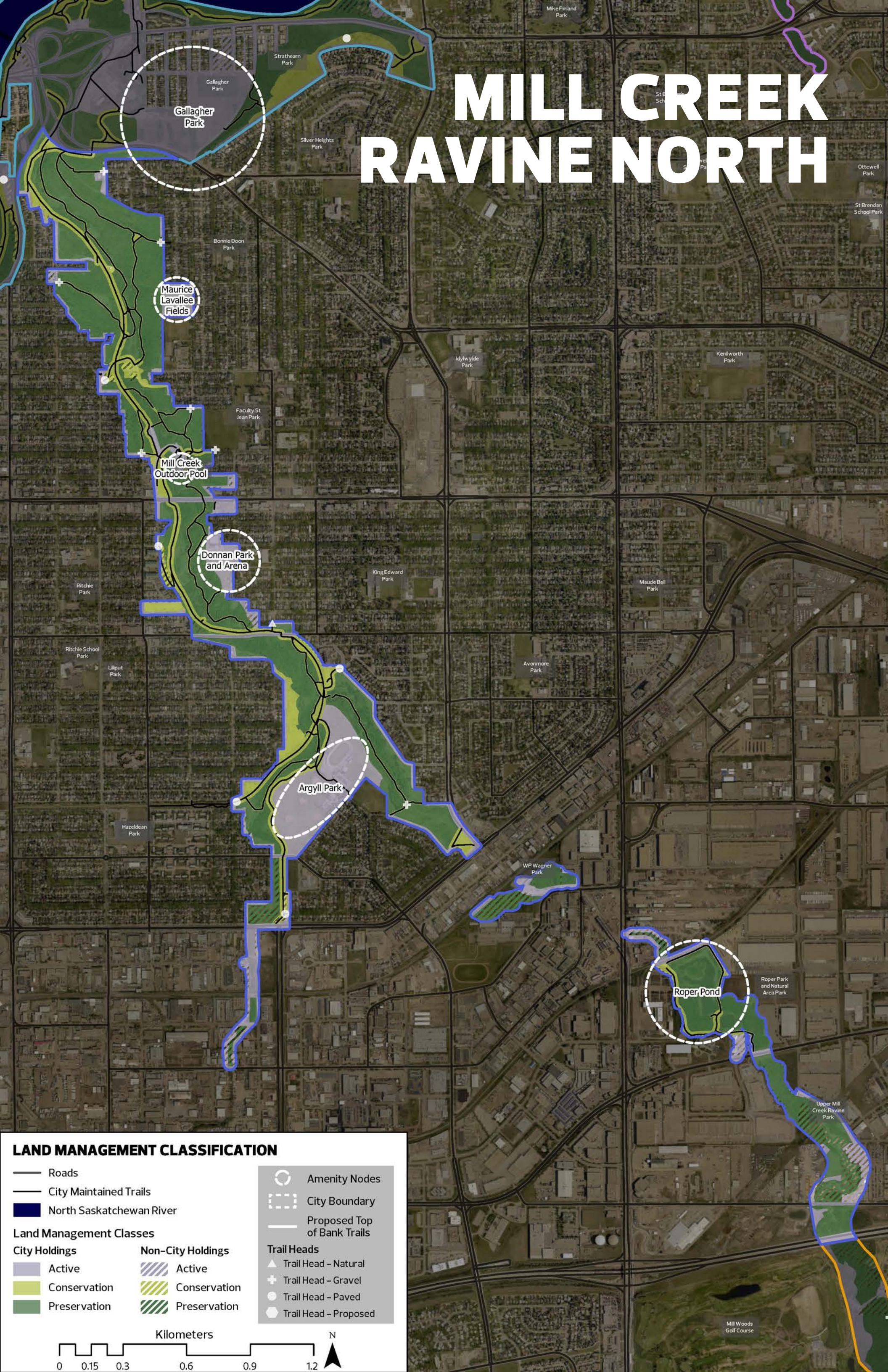
Amenity Nodes

- + Roper Pond
- + Argyll Park
- + Donnan Park and Arena
- + Mill Creek Outdoor Pool
- + Maurice Lavallee Fields

Ecological Guidance

- + Significant core habitat exists in the central portion of this reach that should be preserved as use of these lands increase.
- + Restoration opportunities include existing residential lands, as well as the daylighting on the creek and restoration of industrial lands.
- + The Roper Pond area should also be managed to increase its ecological function and ensure that existing riparian vegetation is not impacted by stormwater runoff.
- + Wildlife movement through this reach is highly important, and is a significant source of biodiversity in the surrounding neighbourhoods.

MILL CREEK RAVINE NORTH



LAND MANAGEMENT CLASSIFICATION

- Roads
- City Maintained Trails
- North Saskatchewan River

Land Management Classes

City Holdings	Non-City Holdings
Active	Active
Conservation	Conservation
Preservation	Preservation

- Amenity Nodes
- City Boundary
- Proposed Top of Bank Trails

Trail Heads

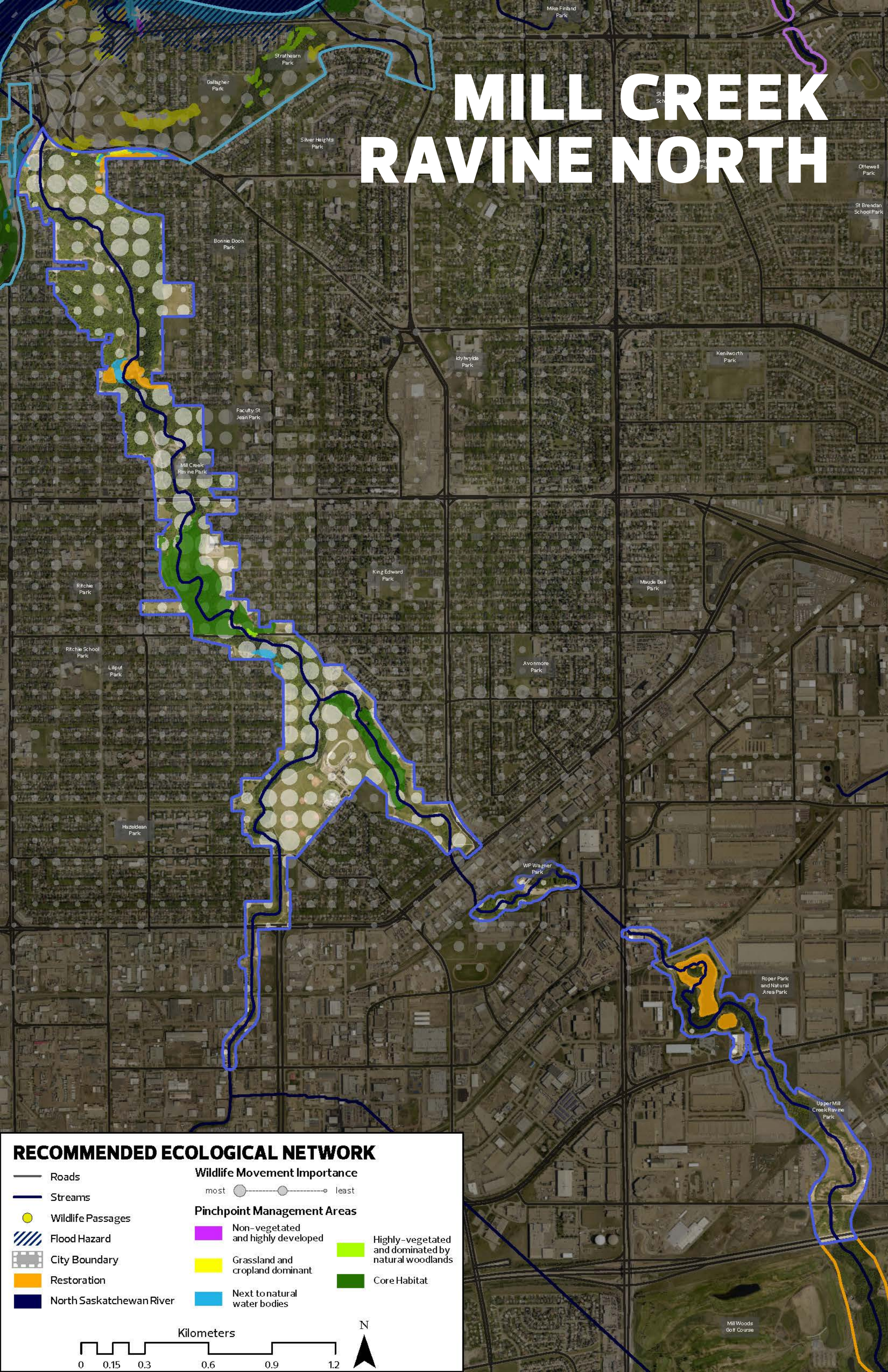
- Trail Head - Natural
- Trail Head - Gravel
- Trail Head - Paved
- Trail Head - Proposed

Kilometers

0 0.15 0.3 0.6 0.9 1.2

N

MILL CREEK RAVINE NORTH



RECOMMENDED ECOLOGICAL NETWORK

- Roads
- Streams
- Wildlife Passages
- Flood Hazard
- City Boundary
- Restoration
- North Saskatchewan River

Wildlife Movement Importance

most least

Pinchpoint Management Areas

- Non-vegetated and highly developed
- Grassland and cropland dominant
- Highly-vegetated and dominated by natural woodlands
- Core Habitat
- Next to natural water bodies

Kilometers

0 0.15 0.3 0.6 0.9 1.2

N

7 – Mill Creek Ravine South

Vision

Mill Creek Ravine South reach is a valued recreational destination for residents of surrounding neighbourhoods. Restoration of riparian vegetation along the creek banks will help mitigate impacts of use, while strengthening wildlife connectivity. As the city continues to develop, important wetlands will be maintained, and natural connections out of the city will be improved. Strong connections with Jackie Parker Park provide an important staging area for use of the ravine, and for larger community events.

Priorities

- + Connections into the surrounding neighbourhoods
- + Strengthened commuter connections northwards
- + Preserved natural connection eastwards out of the city
- + Amenity node development near Anthony Henday Drive
- + Ongoing restoration of creek drainage, reestablishment of the natural hydrologic regime
- + Explore long-term opportunities to provide a pathway connection to Fulton creek.

Amenity Nodes

- + Mill Creek Ravine South Amenity Node

Ecological Guidance

- + Significant core habitat exists in the central and eastern portions of this reach that should be preserved as surrounding lands see increased development.
- + Wildlife movement through these lands is important, but challenged by the impacts of Anthony Henday Drive. Wildlife Passages should be considered.



MILL CREEK RAVINE SOUTH

LAND MANAGEMENT CLASSIFICATION

- Roads
- City Maintained Trails
- Amenity Nodes
- City Boundary
- Proposed Top of Bank Trails

Land Management Classes

City Holdings	Non-City Holdings
Active	Active
Conservation	Conservation
Preservation	Preservation

Trail Heads

- Trail Head - Natural
- Trail Head - Gravel
- Trail Head - Paved
- Trail Head - Proposed















Kilometers

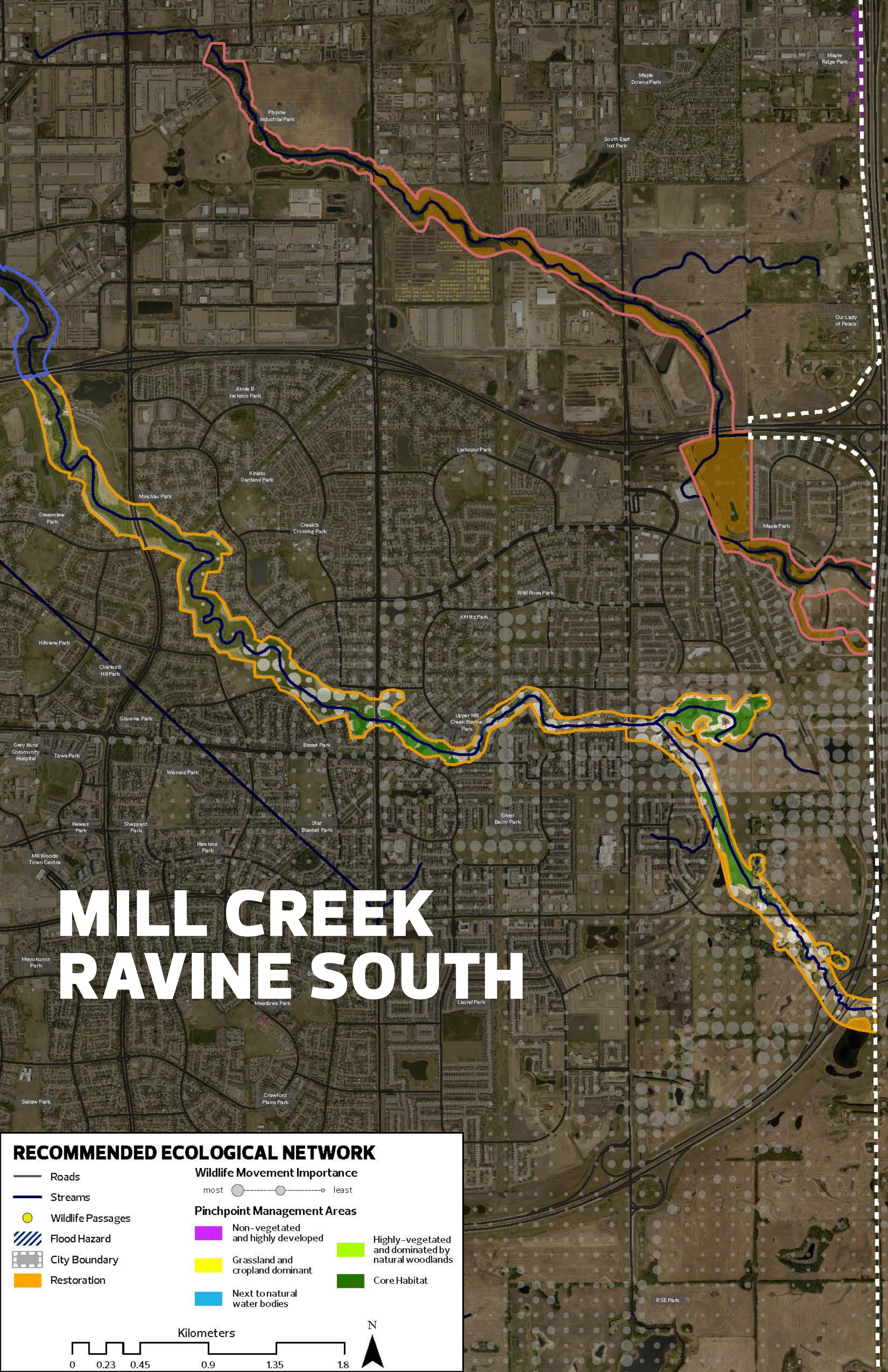
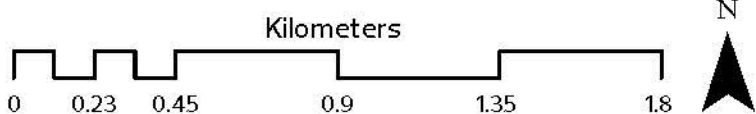
0 0.23 0.45 0.9 1.35 1.8

N

MILL CREEK RAVINE SOUTH

RECOMMENDED ECOLOGICAL NETWORK

-  Roads
 -  Streams
 -  Wildlife Passages
 -  Flood Hazard
 -  City Boundary
 -  Restoration
- Wildlife Movement Importance**
 most  —  —  least
- Pinchpoint Management Areas**
-  Non-vegetated and highly developed
 -  Grassland and cropland dominant
 -  Next to natural water bodies
 -  Highly-vegetated and dominated by natural woodlands
 -  Core Habitat



8 – North Saskatchewan Rabbit Hill

Vision

The North Saskatchewan Rabbit Hill reach will serve as an increasingly popular recreation destination for the city as a whole, and an important regional connection. As the surrounding lands are developed, the important natural areas along the valley slopes will be preserved, providing significant wildlife connectivity to support the biodiversity of the River Valley. The existing recreational amenities will be supported through a top-of-bank trail that will connect the city with the municipality of Devon. Development will be appropriately set back to provide a hydrologic buffer for the river, while supporting wildlife and pathway connections.

Priorities

- + Retain existing recreation amenities
- + Explore mountain biking opportunities southwest of existing development
- + Maintain connectivity through a vegetated connection through the tablelands above Rabbit Hill
- + Ensure that twinning of Highway 19 results in a wildlife crossing structure to improve regional connectivity
- + Target City investment for the protection/restoration of top of bank area that couldn't be dedicated through ER
- + Given existing vehicle access and a planned boat launch and pedestrian bridge (River Valley Alliance Phase II Capital Program), explore opportunities to create a more formal amenity node as the area is built out, including potential to absorb some of the demand for events in the River Valley
- + Promote connectivity through a Habitat Greenway to Whitemud Ravine (City Plan)

Amenity Nodes

- + Rabbit Hill Amenity Node

Ecological Guidance

- + Valley slopes throughout this reach provide important core habitat that should be preserved as the area is developed.
- + Wildlife movement through these lands is incredibly important as a source of biodiversity from upriver habitats. Movement corridors should be maintained along the river (and around the existing recreational amenity footprints), and eastwards towards the Whitemud headwaters.
- + Few pinchpoints exist today due to the relatively undeveloped nature of the reach, and its relatively low visitation. As surrounding lands are developed, maintaining natural vegetation corridors will be important.



NORTH SASKATCHEWAN RABBIT HILL

LAND MANAGEMENT CLASSIFICATION

- Roads
- City Maintained Trails
- North Saskatchewan River

Land Management Classes

City Holdings	Non-City Holdings
■ Active	■ Active
■ Conservation	■ Conservation
■ Preservation	■ Preservation

- Amenity Nodes
- ⋯ City Boundary
- Proposed Top of Bank Trails

Trail Heads












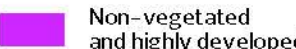

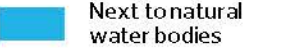
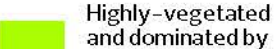

- ▲ Trail Head - Natural
- ⊕ Trail Head - Gravel
- Trail Head - Paved
- Trail Head - Proposed

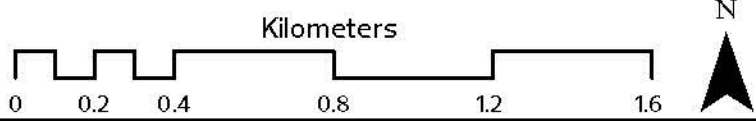
Kilometers

0 0.2 0.4 0.8 1.2 1.6 N

NORTH SASKATCHEWAN RABBIT HILL

RECOMMENDED ECOLOGICAL NETWORK

-  Roads
 -  Streams
 -  Wildlife Passages
 -  Flood Hazard
 -  City Boundary
 -  Restoration
 -  North Saskatchewan River
- Wildlife Movement Importance**
 most    least
 - Pinchpoint Management Areas**
 -  Non-vegetated and highly developed
 -  Grassland and cropland dominant
 -  Next to natural water bodies
 -  Highly-vegetated and dominated by natural woodlands
 -  Core Habitat



9 – Horsehills North

Vision

The development of the lands surrounding the Horsehills North reach provide an opportunity to restore riparian vegetation along the creek banks currently dominated by agriculture. The branching tributary system provides water protection to the overall Horsehills Creek area, and the River Valley downstream. As adjacent development takes place, care will be taken to ensure that the hydrologic regime continues to support the creek and surrounding wetlands. A top-of-bank trail system supported by small footprint access nodes will provide nearby residents with access to the natural creek system, while connecting to the city's pathway network.

Priorities

- + Maintain hydrologic function as surrounding areas are developed
- + Protection and restoration of riparian areas
- + Upgrades to Manning Drive accompanied by wildlife crossing structures to maintain connectivity

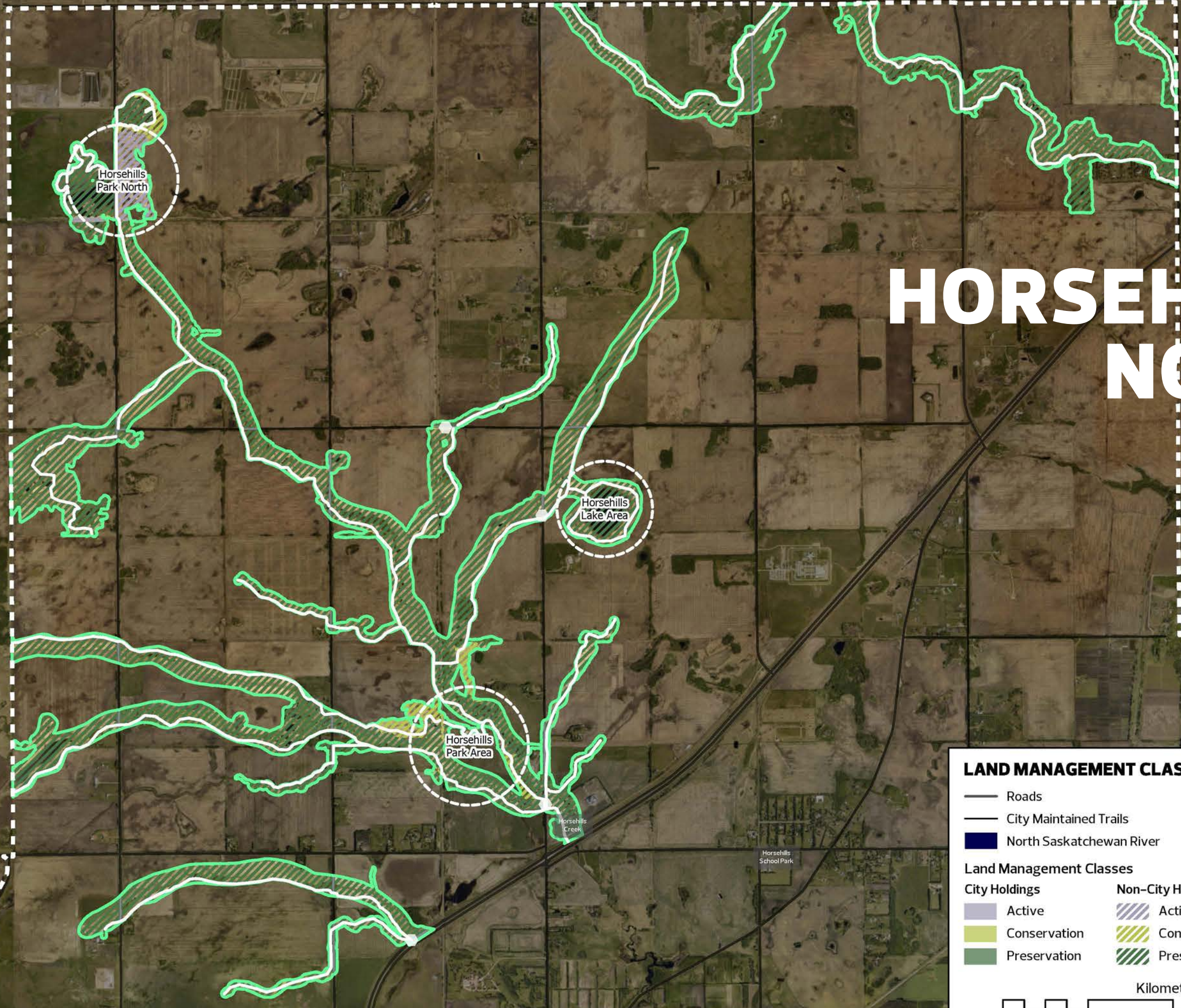
Amenity Nodes

- + Horsehills Lake Area
- + Horsehills Park North

Ecological Guidance

- + Core habitats exist throughout this area that should be maintained as surrounding lands are developed, and as the reach area begins to see increasing recreational use.
- + While the reach area itself shows relatively low importance for wildlife movement today, as development occurs the stream channels will become increasingly important corridors and should be preserved where possible. Recreational infrastructure should be restricted to the periphery of the area, and stream crossings should be minimized.
- + As the lands are developed, restoration opportunities can improve habitat and ensure connectivity is retained.

HORSEHILLS NORTH



LAND MANAGEMENT CLASSIFICATION

- Roads
- City Maintained Trails
- North Saskatchewan River

Land Management Classes

City Holdings	Non-City Holdings
Active	Active
Conservation	Conservation
Preservation	Preservation

- Amenity Nodes
- City Boundary
- Proposed Top of Bank Trails

Trail Heads

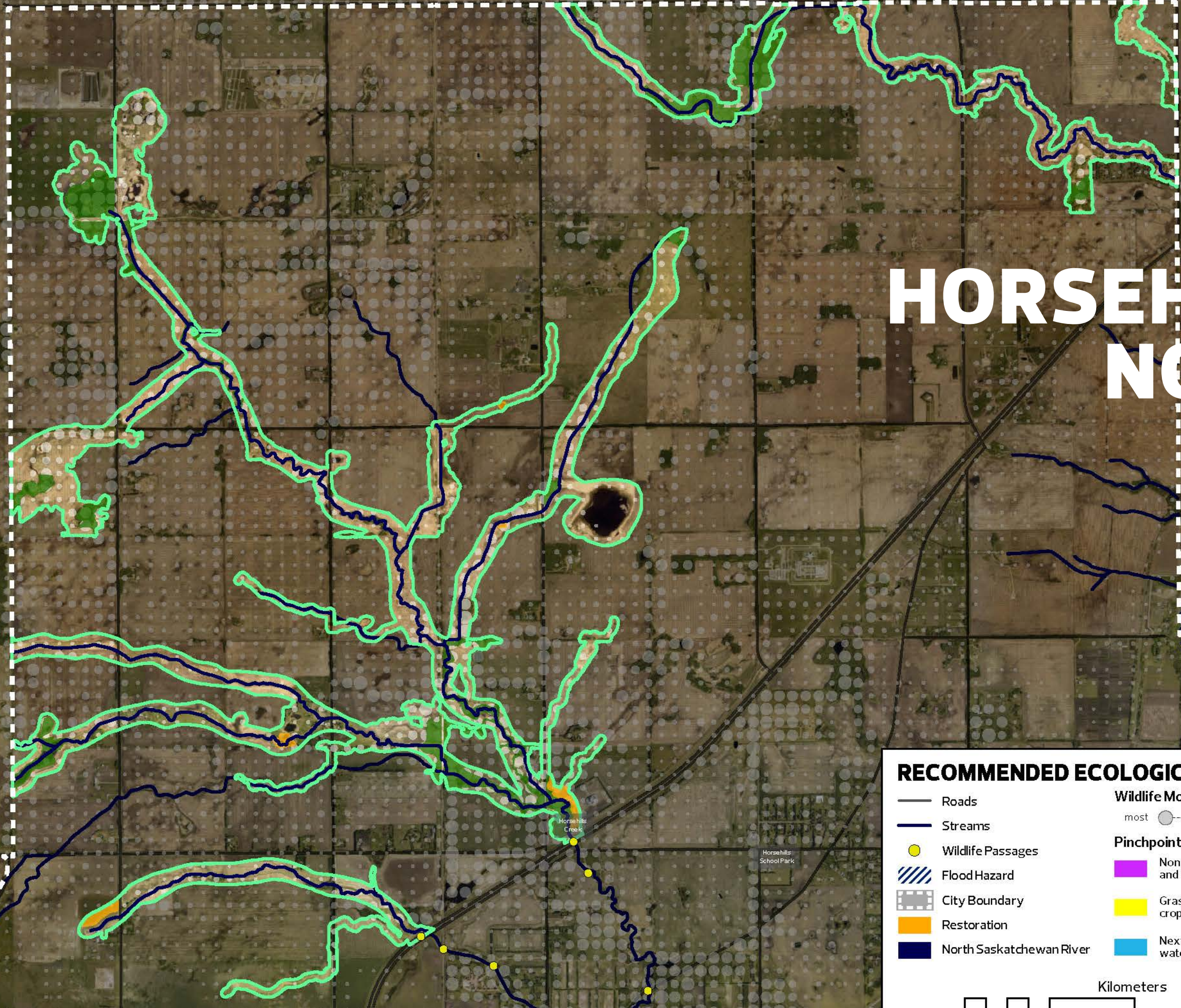
- Trail Head – Natural
- Trail Head – Gravel
- Trail Head – Paved
- Trail Head – Proposed

Kilometers

0 0.33 0.65 1.3 1.95 2.6

N

HORSEHILLS NORTH



RECOMMENDED ECOLOGICAL NETWORK

- Roads
- Streams
- Wildlife Passages
- Flood Hazard
- City Boundary
- Restoration
- North Saskatchewan River

Wildlife Movement Importance
most least

Pinchpoint Management Areas

- Non-vegetated and highly developed
- Grassland and cropland dominant
- Next to natural water bodies
- Highly-vegetated and dominated by natural woodlands
- Core Habitat

Kilometers
0 0.33 0.65 1.3 1.95 2.6

N

10 – Big Lake

Vision

This reach borders on the highly important Big Lake natural area, a regionally important ecosystem. This creates an important recreational draw that must be supported by pathway infrastructure to ensure sustainable use of the area. The ongoing residential development to the south must ensure minimal disruption to the natural functioning of this landscape. Important moose habitat must be maintained, while ensuring that passive recreational uses do not impact connectivity or lead to human-wildlife conflicts.

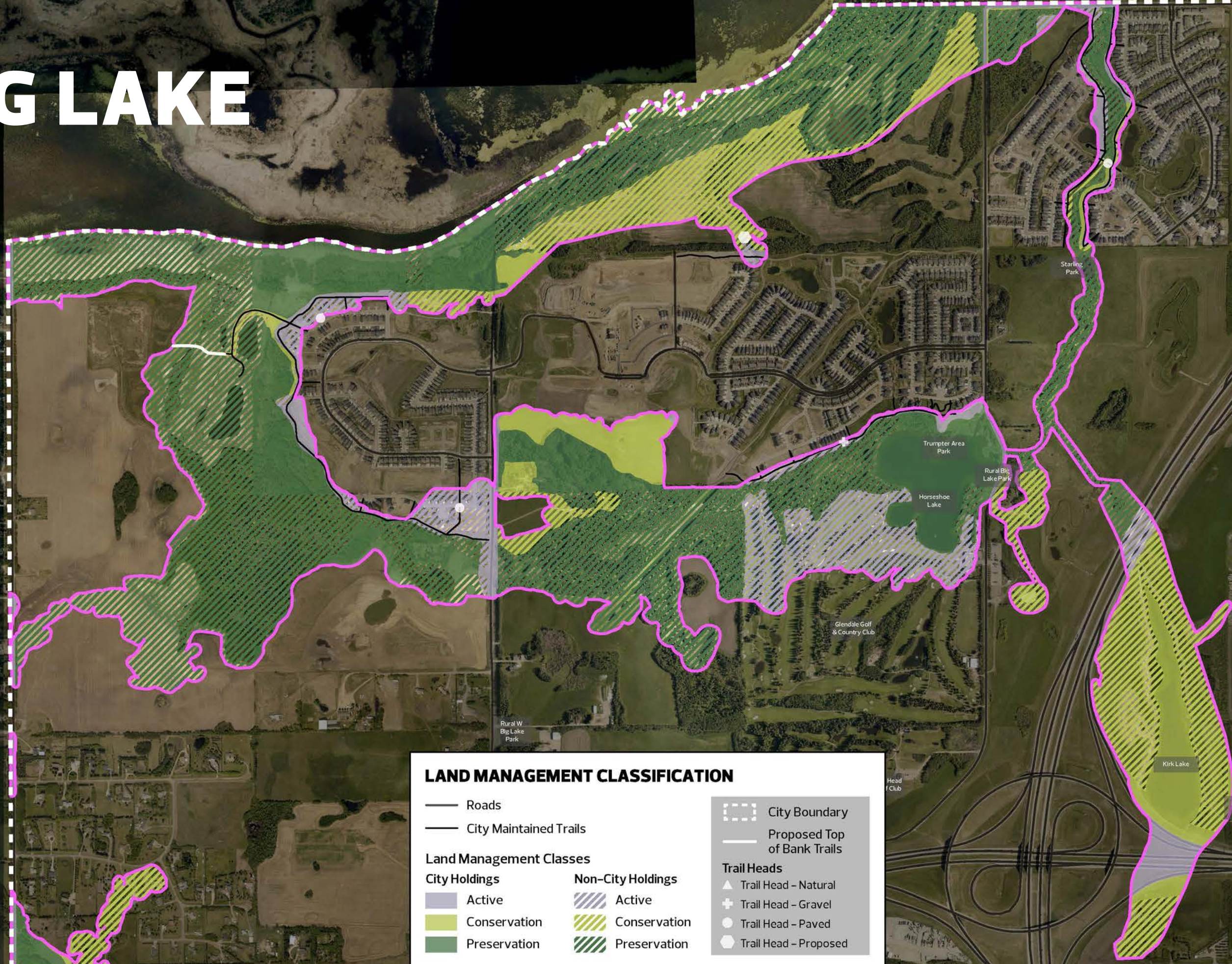
Priorities

- + Maintain hydrologic function as surrounding areas are developed
- + Protection and restoration of riparian areas
- + Align planning and management with the Big Lake Provincial Master Plan
- + Develop pathway connections between new communities and St Albert

Ecological Guidance

- + Important core habitat exists along the riparian edge in the north of this reach, as well as in the southern lands nestled between residential lands. As these lands see increased use and development, preserving these habitats is important.
- + Extensive restoration opportunities exist as well, providing the opportunity to increase the connected landscape of the reach.
- + Few pinchpoints exist today, but much of the land is highly important for wildlife movement, and ongoing development should be mindful that corridors are maintained.

BIG LAKE



LAND MANAGEMENT CLASSIFICATION

— Roads
 — City Maintained Trails

Land Management Classes

City Holdings	Non-City Holdings
Active	Active
Conservation	Conservation
Preservation	Preservation

City Boundary
 Proposed Top of Bank Trails

Trail Heads

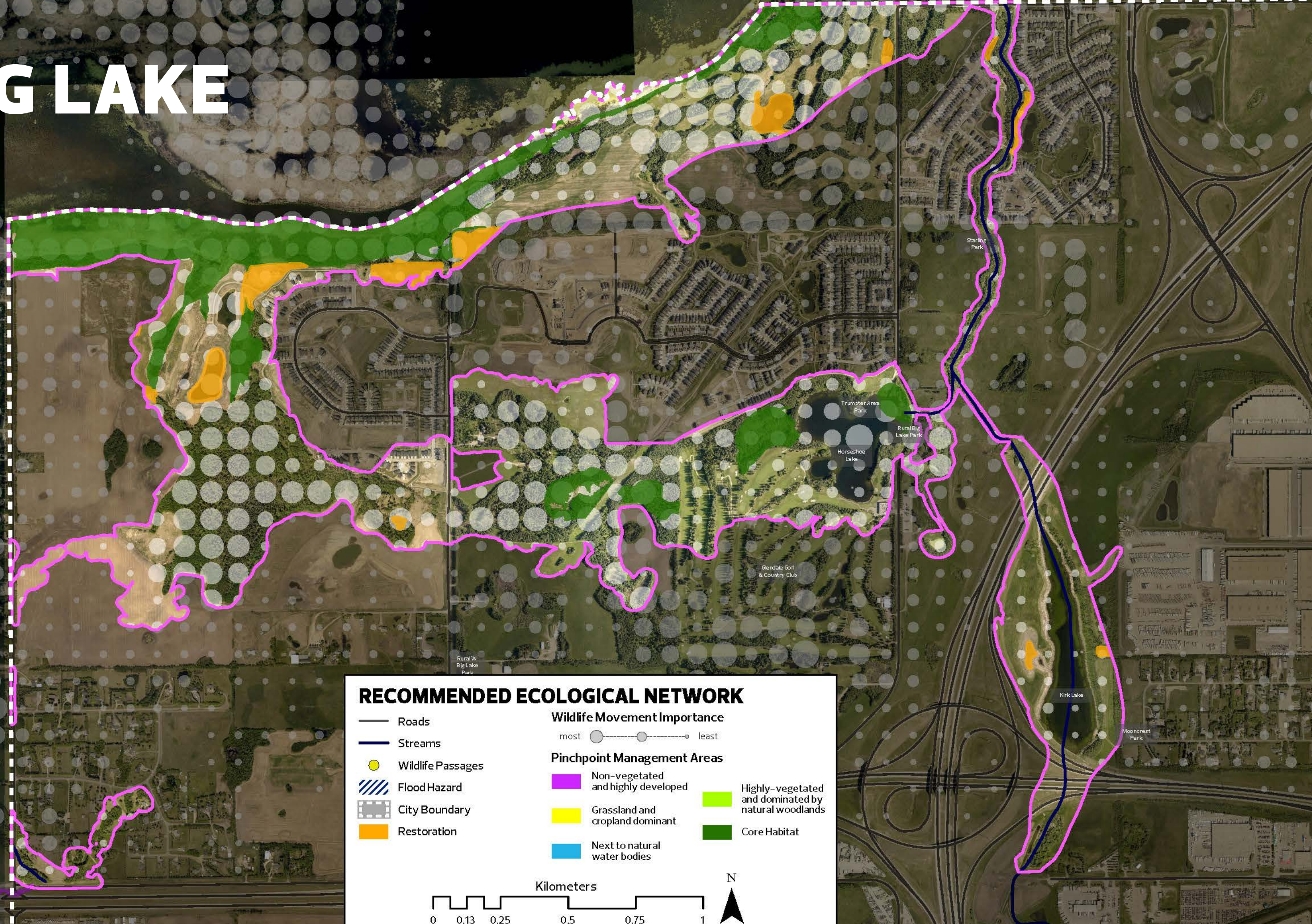
- Trail Head - Natural
- Trail Head - Gravel
- Trail Head - Paved
- Trail Head - Proposed

Kilometers

0 0.13 0.25 0.5 0.75 1

N

BIG LAKE



RECOMMENDED ECOLOGICAL NETWORK

- Roads
- Streams
- Wildlife Passages
- Flood Hazard
- City Boundary
- Restoration

Wildlife Movement Importance
 most least

Pinchpoint Management Areas

- Non-vegetated and highly developed
- Grassland and cropland dominant
- Next to natural water bodies
- Highly-vegetated and dominated by natural woodlands
- Core Habitat

Kilometers

0 0.13 0.25 0.5 0.75 1

N

11 – East Ravines

Vision

The Fulton and Gold Bar Ravines will see improved riparian vegetation along existing watercourses, providing better water filtration of overland runoff into the creeks. A more connected greenway pathway system will provide commuter access, and amenity development will support better recreational access to the surrounding employment lands.

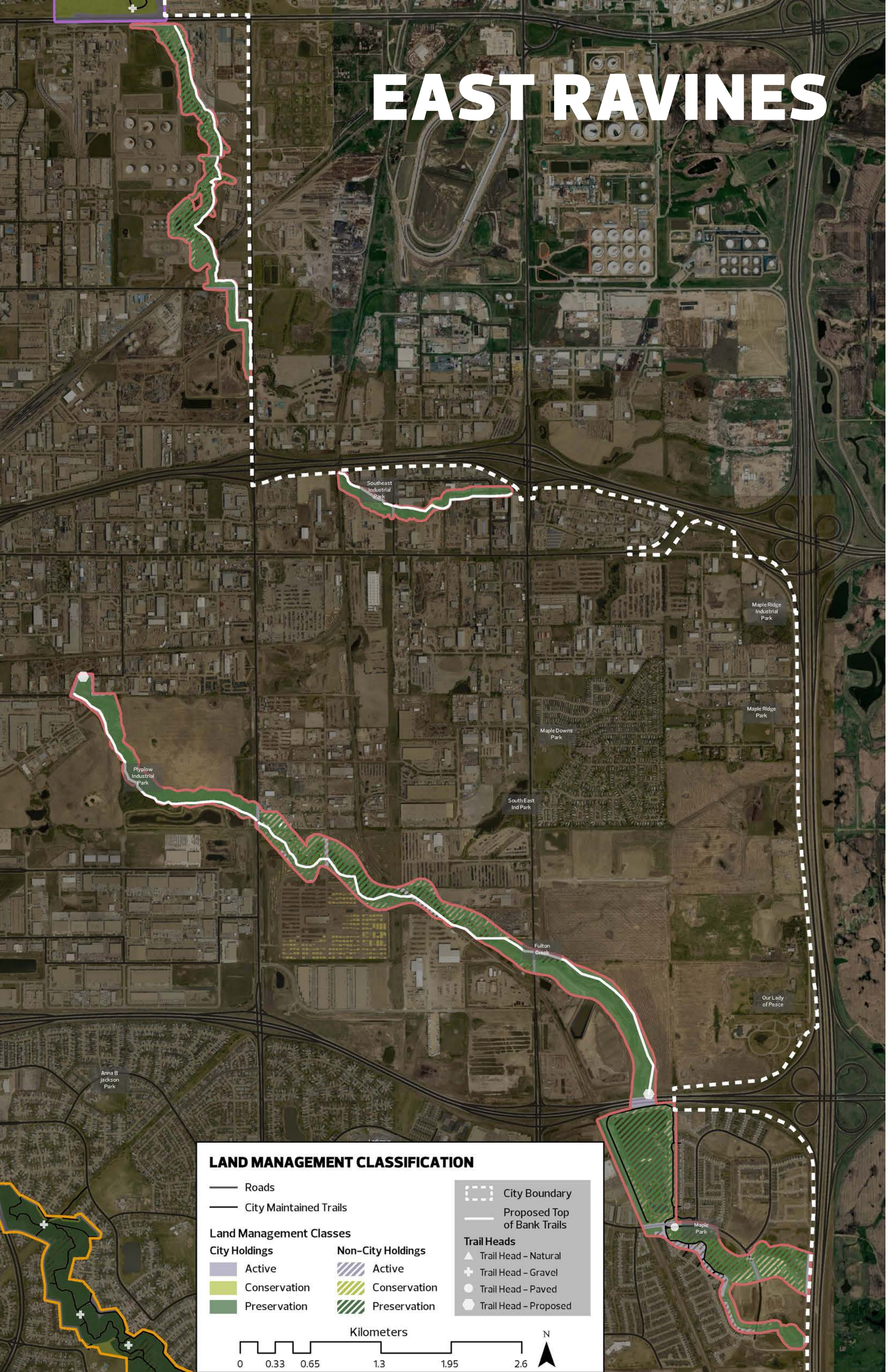
Priorities

- + Restoration of riparian buffers around watercourses
- + Improved pathway connections to surrounding neighbourhoods
- + Amenity development to support local use from the surrounding industrial lands

Ecological Guidance

- + As these lands are highly disturbed and surrounded by industrial development, there are many opportunities for restoration and improvements to habitat and connectivity.
- + Daylighting should be explored to restore the natural connection of this landscape.
- + Wildlife movement through these lands poses a risk due to surrounding activities.

EAST RAVINES



LAND MANAGEMENT CLASSIFICATION

— Roads

— City Maintained Trails

Land Management Classes

City Holdings

- Active
- Conservation
- Preservation

Non-City Holdings

- Active
- Conservation
- Preservation

City Boundary

Proposed Top of Bank Trails

Trail Heads

- Trail Head - Natural
- Trail Head - Gravel
- Trail Head - Paved
- Trail Head - Proposed

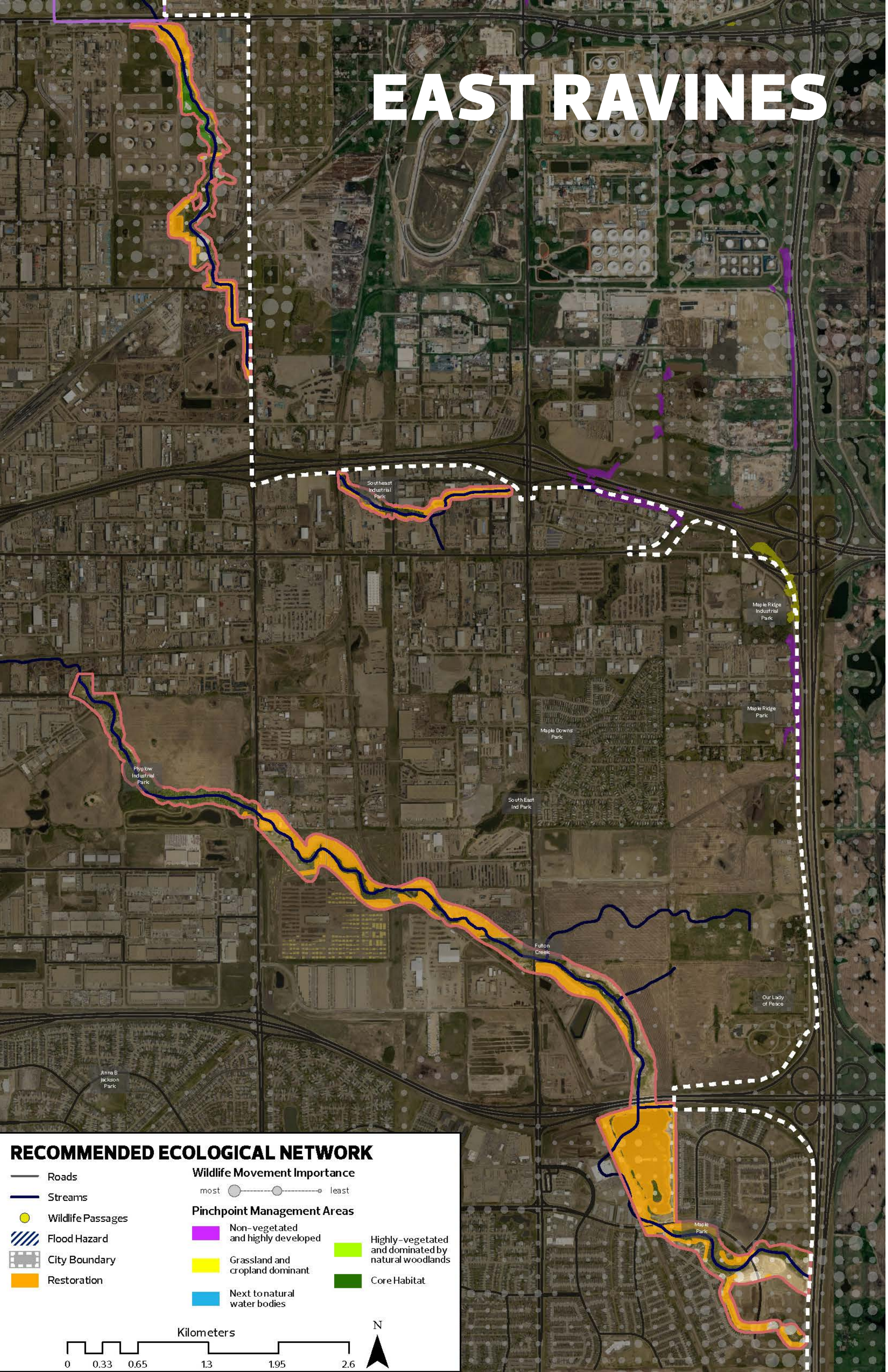
Kilometers



N

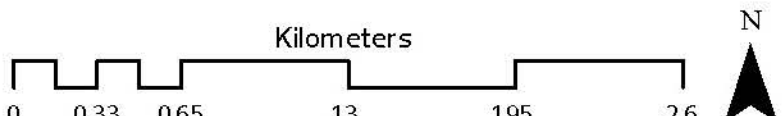


EAST RAVINES



RECOMMENDED ECOLOGICAL NETWORK

- Roads
 - Streams
 - Wildlife Passages
 - Flood Hazard
 - City Boundary
 - Restoration
- Wildlife Movement Importance**
 most — — least
- Pinchpoint Management Areas**
- Non-vegetated and highly developed
 - Grassland and cropland dominant
 - Next to natural water bodies
 - Highly-vegetated and dominated by natural woodlands
 - Core Habitat



12 – Irvine Creek to Blackmud South

Vision

This locally important natural area will see increased importance as the lands around it are developed. Restoration of riparian areas lost due to agricultural activities will improve the water quality of the creek, while providing an important natural amenity to surrounding communities. A natural connection with Cawes Lake will help establish a more natural system in this area. Connectivity corridors will help connect these lands to important natural areas to the south and east. Development of a top-of-bank pathway network will allow the rest of the city to view this reach as a recreational destination.

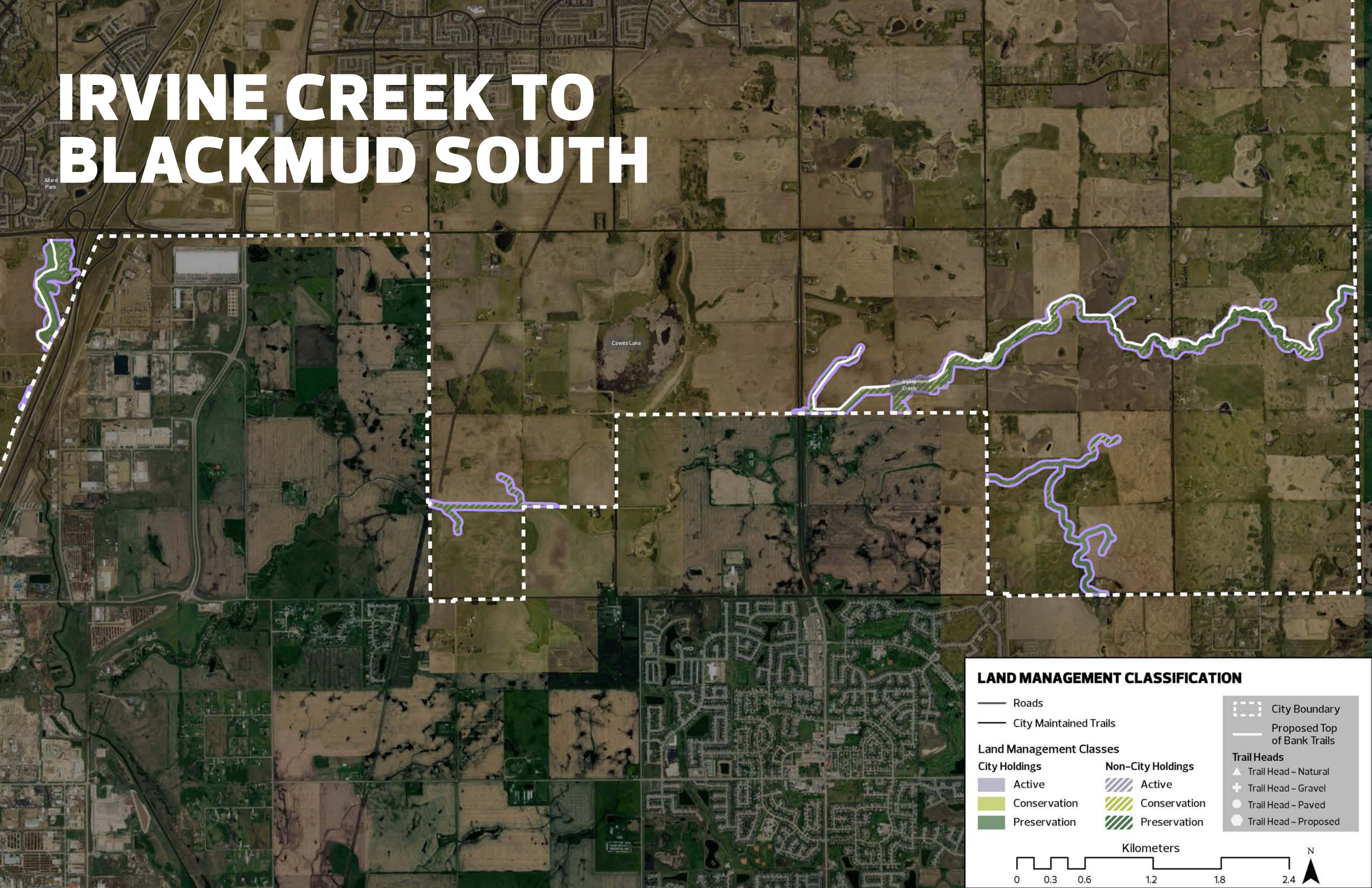
Priorities

- + Coordination with the surrounding municipality to ensure improved water quality and restore the historic meander path of the creek
- + Restoration opportunities to expand riparian buffer
- + Ensure that stormwater is filtered by natural vegetation before entering the stream
- + Development of recreation and pathway connections to surrounding neighbourhoods
- + Greenway connection to Cawes Lake

Ecological Guidance

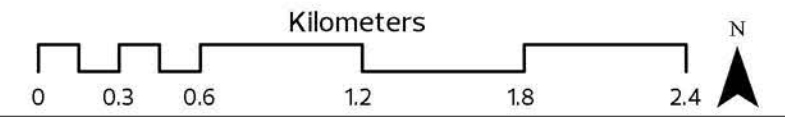
- + Restoration opportunities exist to improve the riparian edge of the creek.
- + As the surrounding landscape is quite permeable to wildlife movement, the reach area itself is not considered to have pinchpoints. However as the surrounding lands are developed, it is imperative that connecting corridors are retained to ensure movement between nearby core habitats.

IRVINE CREEK TO BLACKMUD SOUTH

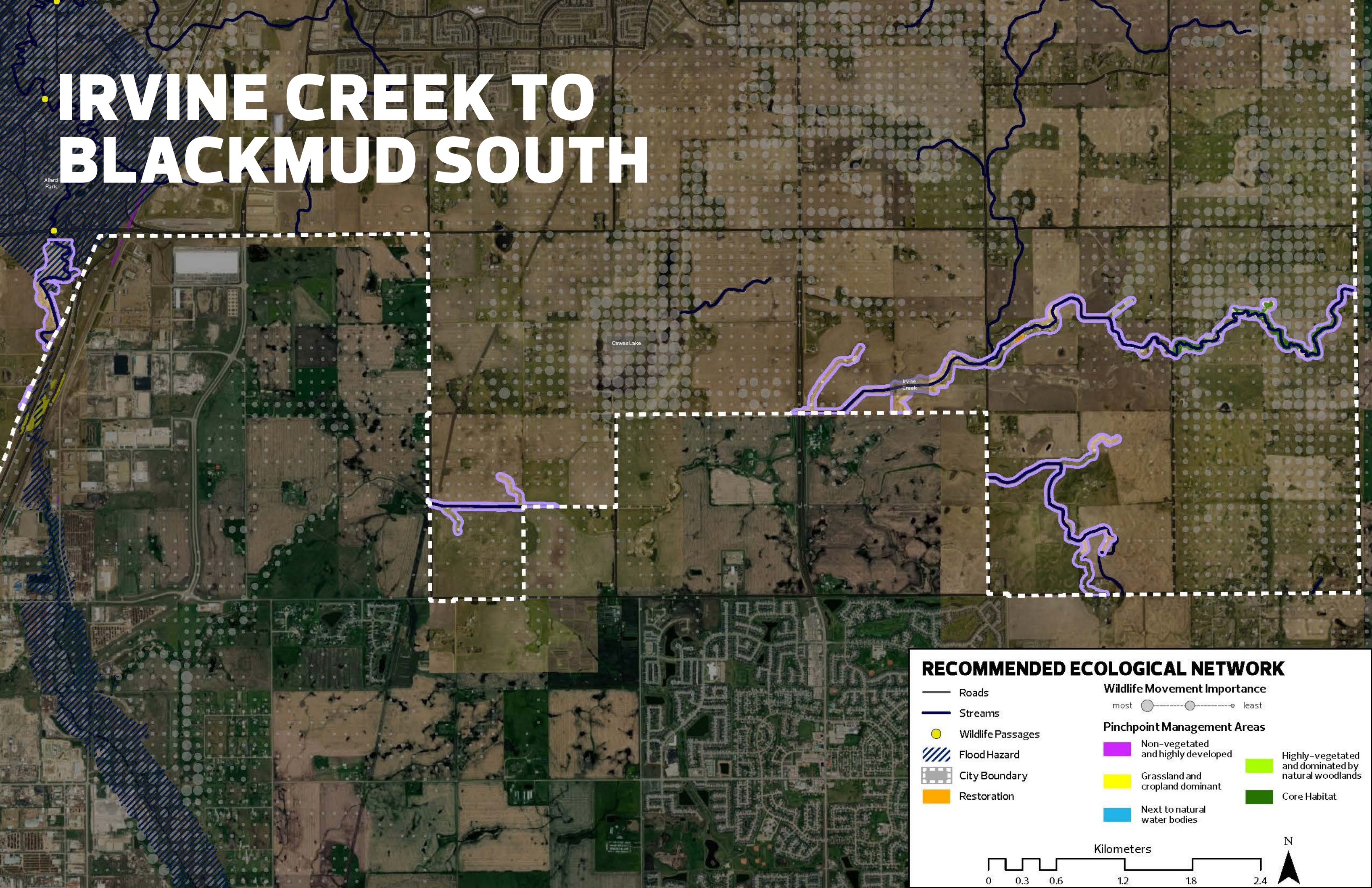


LAND MANAGEMENT CLASSIFICATION

- Roads
 - City Maintained Trails
 - City Boundary
 - Proposed Top of Bank Trails
- Land Management Classes**
- | | |
|----------------------|--------------------------|
| City Holdings | Non-City Holdings |
| Active | Active |
| Conservation | Conservation |
| Preservation | Preservation |
- Trail Heads**
- ▲ Trail Head – Natural
 - ⊕ Trail Head – Gravel
 - Trail Head – Paved
 - ⬢ Trail Head – Proposed



IRVINE CREEK TO BLACKMUD SOUTH



RECOMMENDED ECOLOGICAL NETWORK

Roads	Wildlife Movement Importance most ----- least	
Wildlife Passages	Pinchpoint Management Areas	
Flood Hazard	Non-vegetated and highly developed	Highly-vegetated and dominated by natural woodlands
City Boundary	Grassland and cropland dominant	Core Habitat
Restoration	Next to natural water bodies	

Kilometers

0 0.3 0.6 1.2 1.8 2.4

N

FUTURE TECHNICAL STUDY RECOMMENDATIONS

Overview

The following recommendations include potential studies to inform subsequent finer-scale concept planning prior to detailed design. Specific guidelines should be developed in consultation with City staff.

Relevant Policy and Regulations:

Federal

- + Canadian Environmental Assessment Act
- + Fisheries Act
- + Navigation Protection Act
- + Migratory Birds Convention Act
- + Species at Risk Act
- + Truth and Reconciliation Commission (TRC) report

Provincial

- + Environmental Protection and Enhancement Act
- + Historical Resources Act
- + Public Lands Act
- + Remediation Regulation
- + Water Act
- + Weed Control Act
- + Wetland Policy
- + Wildlife Act

Municipal

- + Open Space Policy
- + Natural Area Systems Policy
- + Corporate Tree Management Policy
- + Urban Forest Management Plan
- + City of Edmonton Indigenous Framework
- + Breathe

GIS Analyses to Support the Trail Strategy

- + Using the existing trailforks data, and LIDAR bare earth data, first split the trailforks data into 3m segments, and assess the slope and cross-slope of individual trail segments. Steep cross-slope areas are more prone to erosion. Steep trails which follow the fall-line of the slope are likely to accumulate rainwater runoff.
- + Identify trails that cross drainage paths (using existing stream inventories and/or hydrographic modelling using LIDAR)
- + Identify trails which pass through or near to core habitat, pinchpoints, or areas important for wildlife movement
- + Identify the network importance of trails, using betweenness or the PageRank algorithm, to identify which trails are most important to maintain connectivity through the network

Recommended Pre-Design Studies

Phase 1 and Phase 2 Environmental Site Assessments

- + A Phase 1 ESA is recommended for newly acquired properties. This desktop assessment identifies past land uses and potential risks for contamination or other impacts.
- + If further studies are required, a Phase 2 ESA may be recommended for on-site assessment of contamination potential, including soil tests and bore hole testing

Human Health & Ecological Risk Assessment

- + A risk assessment that identifies potential for chemical exposures in susceptible human or wildlife populations at levels that would pose a risk to health.
- + Includes potential risks and mitigation measures.

Remedial Action Plan (RAP)

- + For known contaminated sites, a RAP may be developed
- + Follow the Remedial Action Plan Guide put out by Alberta Environment & Parks (AEP)
- + See requirements in the Remediation Regulation for contaminated sites

Electromagnetic Survey

- + May be completed to inform environmental and historical resource assessments
- + Transmits electromagnetic field into the ground then measures the response that returns from the ground to the receiver / equipment
- + Strength of the response is from the various minerals, rock formations, and water and how readily they conduct electricity
- + Data is then processed and mapped to show the composition of the subsurface

Historical Resources Application

- + Province will identify known historical resources in the area and historic resource potential
- + Province will provide recommendations for future development of the site
- + A geophysical survey may help identify potential historic resources below the ground surface without digging, which would help inform the design and potential mitigation measures

Biophysical Assessment

- + Outlines regulatory requirements and applicable legislation
- + Summarizes environmental features (water, soil, vegetation, wildlife, etc.) on the site using information from previous environmental assessments, desktop analysis (e.g. SARA, ACIMS, FWMIS databases), and field survey results
- + Identifies sensitivities on site
- + Provides recommendations for environmental protection and/or restoration

Wetland Assessment (Alberta Wetland Policy / Wetland Replacement Program)

- + Identify and classify wetlands on site
- + Potential for protection or restoration

Invasive species survey

- + On-site survey by a certified biologist to identify weeds and invasive species on site
- + Recommendations for potential mitigation / invasive species management

Geotechnical investigations

- + Desktop and on-site surveys completed by Geotechnical engineers to identify potential hazards relating to subsurface conditions and slope stability
- + Recommendations for mitigation and/or design

Indigenous engagement – Indigenous history and knowledge

- + Engagement with Indigenous groups to identify important plants or locations on site and potential cultural significance
- + Potential for site visits

Potential outcomes:

- + Reclamation Plan
- + Restoration Plan
- + IPM Plan (Integrated Pest Management)
- + Park and Open Space development (concept plans to detailed design)

Potential Post-Design Studies

Environmental Impact Assessment (EIA)

- + Identifies potential environmental risks in relation to proposed design features
- + Looks at subsurface conditions, soil, water, vegetation, wildlife, and more
- + Additional studies (e.g. borehole investigations or on-site surveys) can support findings and recommended mitigation measures of the EIA
- + Could include a snake survey, rare plant survey, wildlife / amphibian survey, among others

Historical Resources Clearance (Alberta Historical Resources Act)

- + Designs will need Historical Resources clearance through the Alberta Historical Resources Act
- + The Province will assess potential impacts of the design features on known or potential historic resources and provide recommendations for mitigation or changes to the design if required

Public Lands Act and Water Act applications (if required)

- + If the bed and shore is impacted by the design, applications through these Acts must be completed
- + Applications may result in further required studies

Soil testing for soil quality / plant suitability

- + Though not required by legislation, soil tests may be performed to assess soil quality for planting or proposed land uses
- + This can help inform the design or restoration plan and required soil amendments
- + Soil tests can also be a requirement for the contractor during construction

Pre-Construction Studies

Most of these requirements would come from City construction standards or recommendations from previous studies (such as the EIA) that need to be completed as part of the project scope.

- + Nest sweep
- + Snake sweep
- + Utility/Infrastructure Location
- + Tree survey and tree protection plan
- + Rare plant survey
- + ESC Plan (Erosion and Sedimentation Control Plan)

APPENDIX A: **LAND COVER** **CLASSES**

PRIMARY CLASS	LAND CLASS	SITE TYPE
Vegetated Landscape (VEG)	Modified (MOD)	Maintained Grass Site (MG)
		Transplant Treed Site (TT)
		Non-maintained Grass/Shrub Site (NG)
		Annual Crops (CA)
		Tame Pasture (CP)
		Rough Pasture (CPR)
		Treed Shelterbelt (TS)
		Recent Clearing (CL)
		Acreage Subdivision (AS)
		Farmyard/Acreage Site (FS)
		Nursery/Tree Farm (NT)
		Agriculture Hygric Tillage Site (HT)
	Naturally Wooded (NAW)	Forested (FT)
	Wetland (WET) includes Stewart and Kantrud Classification System	Treed Bog (WT)
		Shrubby Bog (WS)
		Treed Fen (TF)
		Shrubby Fen (SF)
		Grass Fen (GF)
		Marsh (M)
		Swamp (SW)
Naturally Non-Wooded (NNW)		Open Shrub (OS)
	Medial Shrub (MS)	
	Closed Shrub (CS)	
	Native Grass (HG)	
Non-Vegetated (NVE)	Natural (NAT)	Natural Water Bodies (NW)
		Exposed Mineral Soil (EMS)
		Sand (NMS)
	Developed (DEV)	Anthropogenic Water Body (AW)
		Established Residential Community (ERC)
		Residential Development Site (RDS)
		Established Commercial/Industrial Site (ECS)
		Commercial/Industrial Develop. Site (CDS)
		Building and/or Parking Complex (BPC)
		Aggregates and/or Fill Site (AF)
		Oil and/or Gas Field Site (OG)
		Maintained Trails (MT)
		Transportation Surface (AIH)

APPENDIX B:
NATURAL AREA
RATING AND
CLASSIFICATION

ECOLOGICAL EVALUATION AND NATURAL AREAS RATING

Evaluation units

The spatial evaluation units for this analysis are drawn from the City's 2013 mapping of Environmentally Significant Areas (ESAs) and Significant Natural Areas (SNAs), supplemented by all additional Natural Areas, as defined in the Environmental Sensitivity final report, using the urban Primary Land and Vegetation Inventory (uPLVI) dataset (City of Edmonton ESM Final Report 2016). As there is significant overlap between ESAs and SNAs, ESA polygons were allowed to take precedence, and SNA polygons occur only where they are not already covered by ESAs. Similarly, Natural Area polygons were only included when they did not overlap with identified ESAs and SNAs. Contiguous natural land cover polygons were dissolved into a single polygon. Any ESAs containing small gaps and internal holes were filled during this step, to prevent these gaps from skewing the assessment of polygon shape, and ensure that this metric produced intuitive results.

Scoring the Ecological Evaluation

The desktop and bonus components of the Ecological Evaluation Tool (as outlined in the City's Phase II Ecological Network Report Terms of Reference 2014) were assessed for each evaluation unit, providing an estimate of the relative value of each polygon, with respect to biodiversity potential, ecological connectivity, and representative value.

Biodiversity Potential

- > Size
- > Shape
- > Habitat Diversity

Ecological Connectivity

- > Nearby Upland Habitat
- > Nearby Wetland Habitat

Representative Value

- > City-wide Rare/Unique Vegetation
- > Locally Rare/Unique Vegetation
- > Dune Moraine Landforms
- > Riparian Wetlands

As the site level field surveys have not been conducted, this evaluation should be seen as a minimum value, which may be further increased once local components of species richness are included. As a caveat, it should be noted that since the units of evaluation vary in size and shape, the specific score associated with each polygon may not apply to the entire polygon itself. Field verification should always occur before any modifications or impacts are considered.

NATURAL AREA RATING

The resulting summed ecological evaluation score ranged from a high of 53 (in large, compact, highly diverse natural areas), to -5 (in small, elongated and isolated remnants of single natural cover types) and was classified using natural breaks into Low (score < 19), Moderate (19–28), or High (> 28) categories.

FACTOR	VARIABLE	METRIC	CRITERIA	SCORING
Biodiversity Potential	Size	Area (ha)	<0.5	0
			0.5–1	1
			>1– 3	2
			>3 – 6	5
			>6 – 9	8
			>9– 12	11
			>12	15
	Shape	Ratio of Polygon Perimeter to Convex Hull Perimeter	Simple round/square shape (ratio >= 0.75)	0
			A few linear/narrow areas (ratio 0.5 – 0.75)	-2
			Mix of linear/narrow areas and rounder/wider areas (ratio 0.25–0.5)	-4
			Linear/narrow throughout (ratio < 0.25)	-8
	Habitat Diversity	Number of different habitat types (> 0.5 ha) present within the natural area	Open water	3
			Marsh wetland	3
Shrub wetland			2	
Peatland (bog or fen)			4	
Deciduous upland			2	
Coniferous upland			2	
Mixedwood upland			3	
Meadow/Naturalized field			1	
Ecological Connectivity	Presence of Nearby Upland Habitat	Area (ha) of wooded, meadow, or naturalized field habitat within 100 m buffer	0–0.5	0
			>0.5 – 1	1
			>1 – 2	3
			>2 – 3	5
			>3 – 5	7
	>5	10		
	Presence of Nearby Wetland Habitat	Area (ha) of wetland habitat within 100 m buffer	0–1	0
			>1–3	3
			>3–5	5
			>5	10

FACTOR	VARIABLE	METRIC	CRITERIA	SCORING
Representative Value	City-Wide Rarity/ Uniqueness	Presence of rare/unique vegetation types (at a city-wide scale)	Polygons Identified as 'Unique Vegetation' in the Environmental Sensitivity Model	5
	Local Rarity/ Uniqueness	Presence of Rare/unique vegetation types (at the local reach scale)	Natural land cover polygons from the uPLVI that cover less than 20% of the local area	5
			Southwest Site Type Classes: Closed Shrub, Grass Fen, Herbaceous Grass, Marsh, Medial Shrub, Natural Water Body, Open Shrub, Shrub Fen, Exposed Mineral Soil, Sand Stand Type Classes: White Spruce, Deciduous Lead Mixedwood, Conifer Lead Mixedwood Ravines Site Type Classes: Medial Shrub, Herbaceous Grass, Closed Shrub, Natural Water Body, Exposed Mineral Soil, Sand Stand Type Classes: White Spruce, Balsam Poplar, Deciduous Lead Mixedwood, Conifer Lead Mixedwood Northwest Site Type Classes: Closed Shrub, Grass Fen, Herbaceous Grass, Marsh, Natural Water Body, Shrub Fen, Forested, Exposed Mineral Soil, Sand	
	Dune Moraines	Presence of unique and irreplaceable dune moraine landforms	Polygons Identified as 'Unique Landforms' in the Environmental Sensitivity Model	5
Riparian Wetlands	Presence of riparian wetlands (found rarely in the city)	Wetland polygons which fall within the floodplain/floodway extent	5	

Habitat Classification

Following the creation of the the Ecological Evaluation Classification, a Habitat Classification was performed, which allocated natural areas and non-maintained semi-natural areas, such as road verges, into a set of four habitat classes: Core Habitat, Habitat, Corridors, and Stepping Stones. Although the initial classification drew extensively from the formal evaluation scoring results, additional hand-edits were requested by the City's ecological experts in order to arrive at a more fulsome classification that aligned with common-sense. Notable hand edits included merging small patches of habitat (< 2000m²) which bordered or were contained by core habitat, and splitting long corridor polygons which passed through or adjoined core areas. Additionally, non-maintained grass and treed shelterbelts (which are technically identified as 'semi-natural' land cover and thus not included in the ecological evaluation of natural areas) are included here for their functional contribution as habitat and corridors, respectively.

CORE

- + Rating = 'High' and ShapeRatio >= 0.25 and Area >12 ha
- + Rating = 'High' and ShapeRatio <= 0.25 and Area >100 ha
- + Corridor polygons which touch Core polygons

CORRIDOR

- + Rating = 'Low' and ShapeRatio < 0.5 and PolyArea <= 12 ha and PolyArea > 0.5 ha
- + Rating = 'Moderate' and ShapeRatio < 0.25
- + Rating = 'High' and ShapeRatio < 0.25

HABITAT

- + Rating = 'High' and ShapeRatio >= 0.25 and Area <12ha
- + Rating = 'Moderate' AND ShapeRatio >=0.25
- + Rating = 'Low' AND ShapeRatio > 0.5 AND (Physically Connected to Core/Habitat
- + Rating <> 'High' AND PolyArea >= 12 ha
- + site-type = non-maintained grass)

STEPPING STONE

- + Rating = 'Low' AND ShapeRatio > 0.5 AND (Not Physically Connected to Core/Habitat/Corridor)
- + Rating = 'Low' and ShapeRatio < 0.5 and PolyArea < 5000

APPENDIX C:
WILDLIFE
MOVEMENT
MODELLING

ESTIMATING LIKELY WILDLIFE MOVEMENT PATHS USING AGENT-BASED MODELLING

Methodology

The City's existing Circuitscape-based wildlife connectivity modelling work provides valuable insight and has been used to identify key pinchpoints to wildlife movement. However the existing raster-based outputs make it hard to identify the likely routing of individual wildlife movement paths. This results in blindspots when looking at areas where wildlife movement is more rare (such as through the Rossdale area of the Central Reach), or where movement is unrestrained by pinch-points (such as in the newly annexed lands). To provide another lens for visualizing where wildlife movement is likely to occur, an agent-based approach is adopted that draws on the same landscape friction surfaces as the original Circuitscape models to inform how individual paths of movement may occur throughout the city.

This methodology for visualising ecological connectivity uses agents representing a given species type that are expelled from established Core Habitat patches and follow paths of least resistance informed by the resistance raster. The agents move through the friction surface until the longest path(s) reaches a predetermined threshold. The agents are unaware of their surroundings other than within a vision radius and angle around them, thus they do not seek out other patches, rather, they continuously move in whichever direction presents the least resistance to movement.

This analysis is conducted citywide using the Coyote (Summer) friction surface to identify likely movement paths of medium-sized mammals throughout the city and its surroundings (including the newly annexed lands). Additional model runs were also conducted using the Coyote (Winter) and Chickadee friction surfaces to highlight how wildlife movement may change in the winter months, and for more mobile avian species that respond differently to urban landscapes. In all cases, agents are generated with origins in the identified Core Habitat Patches, which may overestimate movement in these areas, and underestimate movement in areas without identified Core Habitat.

Once completed, this simulation visually presents key connections and routes used by the agents moving through the landscape, as well as areas lacking in connectivity or presenting significant barriers. As the modelled paths are incredibly numerous in some areas, a simplified 'wildlife movement importance' analysis is used to calculate the relative path density across the city, which can be displayed using circles of varying size (large circles indicating that the area is more likely to be included in a movement path), which can be more easily overlaid with other data. This simplified surface allows the City to more effectively communicate where wildlife movement concerns are more pressing, informing land use decisions across the river valley.

MODEL PARAMETERS USED:

Agent density: 1 agent every 25m along habitat perimeter

Habitat boundary offset: Agents were expelled from 50m inside the habitat boundary

Maximum path length: 5 km (agents that were slowed by large amounts of resistance may not have reached this length)

Vision radius: 60m

Vision angle: 100 degrees

Initial agent velocity: 4.2 m per frame

APPENDIX D: **DATA-DRIVEN** **LMCS**

NORTH SASKATCHEWAN CENTRAL



LAND MANAGEMENT CLASSIFICATION

- Roads
- North Saskatchewan River
- ▭ City Boundary

Land Management Classes

- Active
- Conservation
- Preservation

Kilometers

0 0.25 0.5 1 1.5 2

N

RIVER VALLEY WEST

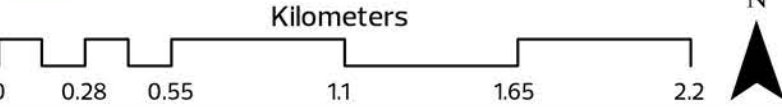


LAND MANAGEMENT CLASSIFICATION

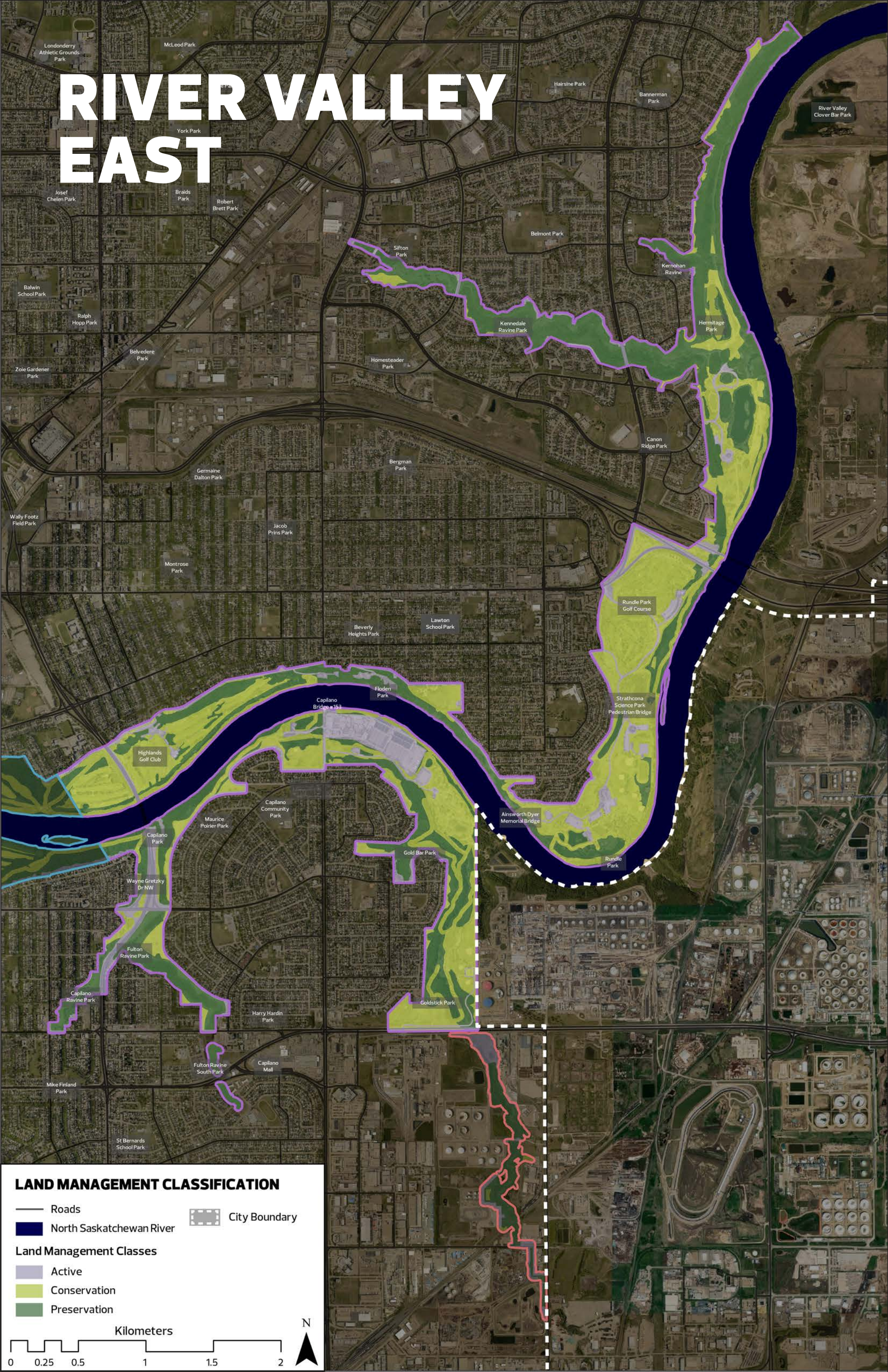
-  Roads
-  North Saskatchewan River
-  City Boundary

Land Management Classes

-  Active
-  Conservation
-  Preservation



RIVER VALLEY EAST



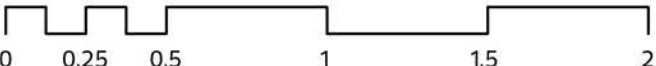
LAND MANAGEMENT CLASSIFICATION

-  Roads
-  North Saskatchewan River
-  City Boundary

Land Management Classes

-  Active
-  Conservation
-  Preservation

Kilometers



N



WHITEMUD RAVINE NORTH

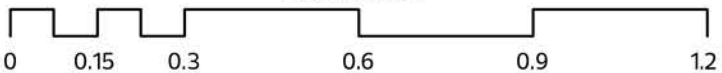
LAND MANAGEMENT CLASSIFICATION

- Roads
- North Saskatchewan River
- ▤ City Boundary

Land Management Classes

- Active
- Conservation
- Preservation

Kilometers



N



WHITEMUD RAVINE FAR SOUTH

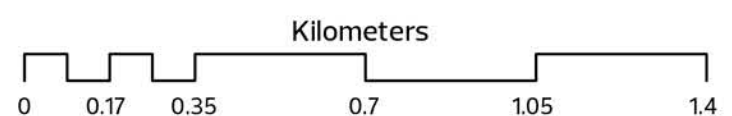
Whitemud
Creek

LAND MANAGEMENT CLASSIFICATION

— Roads [Dashed Box] City Boundary

Land Management Classes

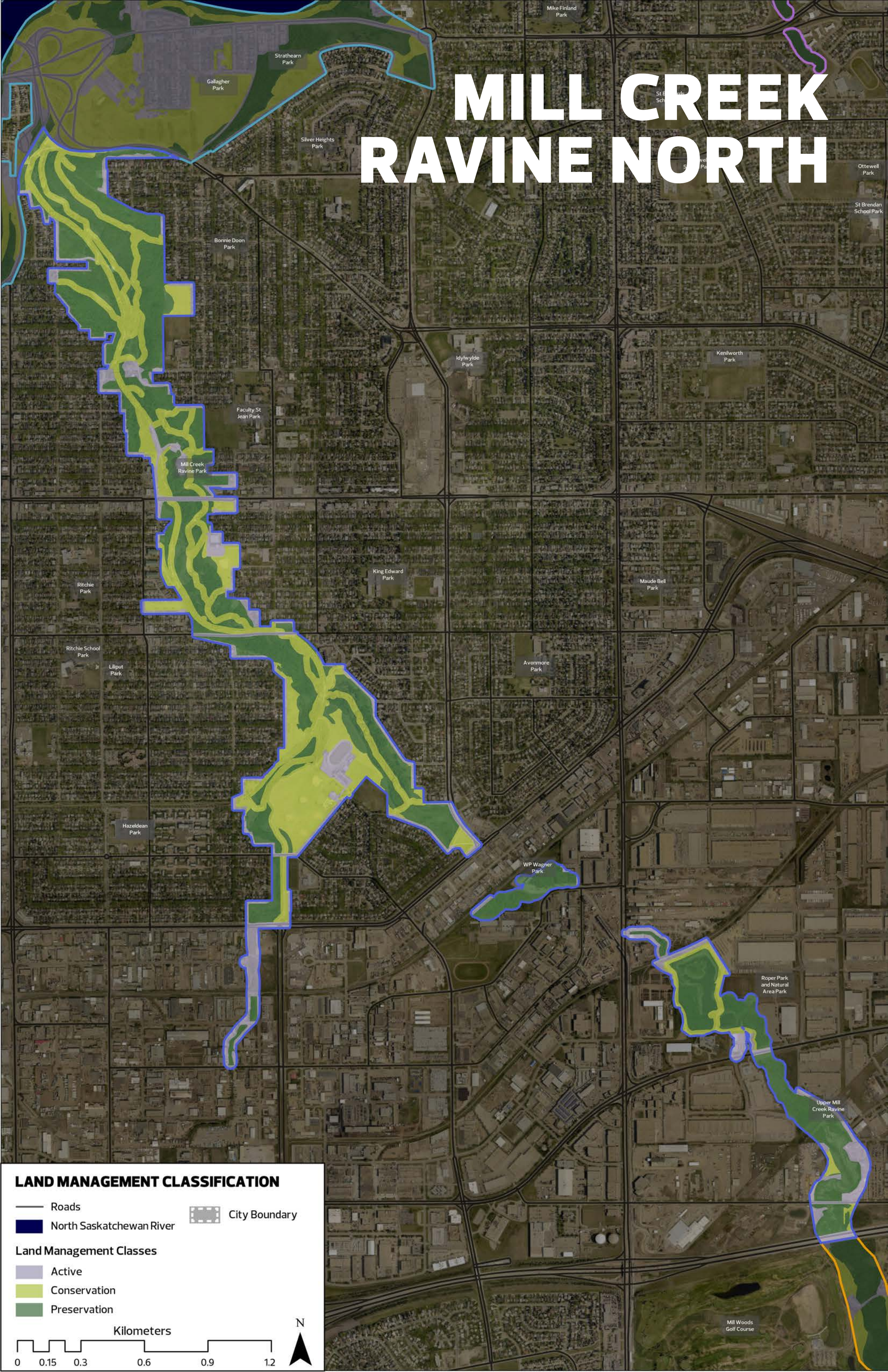
- [Light Green Box] Active
- [Yellow-Green Box] Conservation
- [Dark Green Box] Preservation



N



MILL CREEK RAVINE NORTH

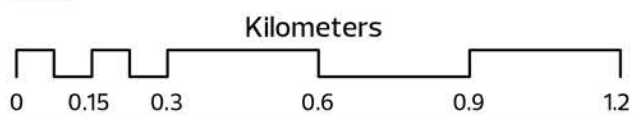


LAND MANAGEMENT CLASSIFICATION

- Roads
- North Saskatchewan River
- ▤ City Boundary

Land Management Classes

- Active
- Conservation
- Preservation





MILL CREEK RAVINE SOUTH

LAND MANAGEMENT CLASSIFICATION

— Roads [Dashed Box] City Boundary

Land Management Classes

- [Purple Box] Active
- [Yellow-Green Box] Conservation
- [Dark Green Box] Preservation

Kilometers

0 0.23 0.45 0.9 1.35 1.8

N

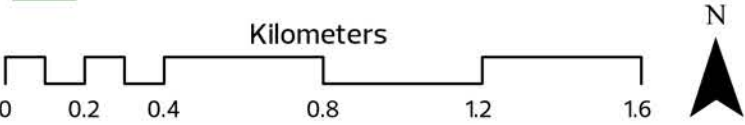
NORTH SASKATCHEWAN RABBIT HILL

LAND MANAGEMENT CLASSIFICATION

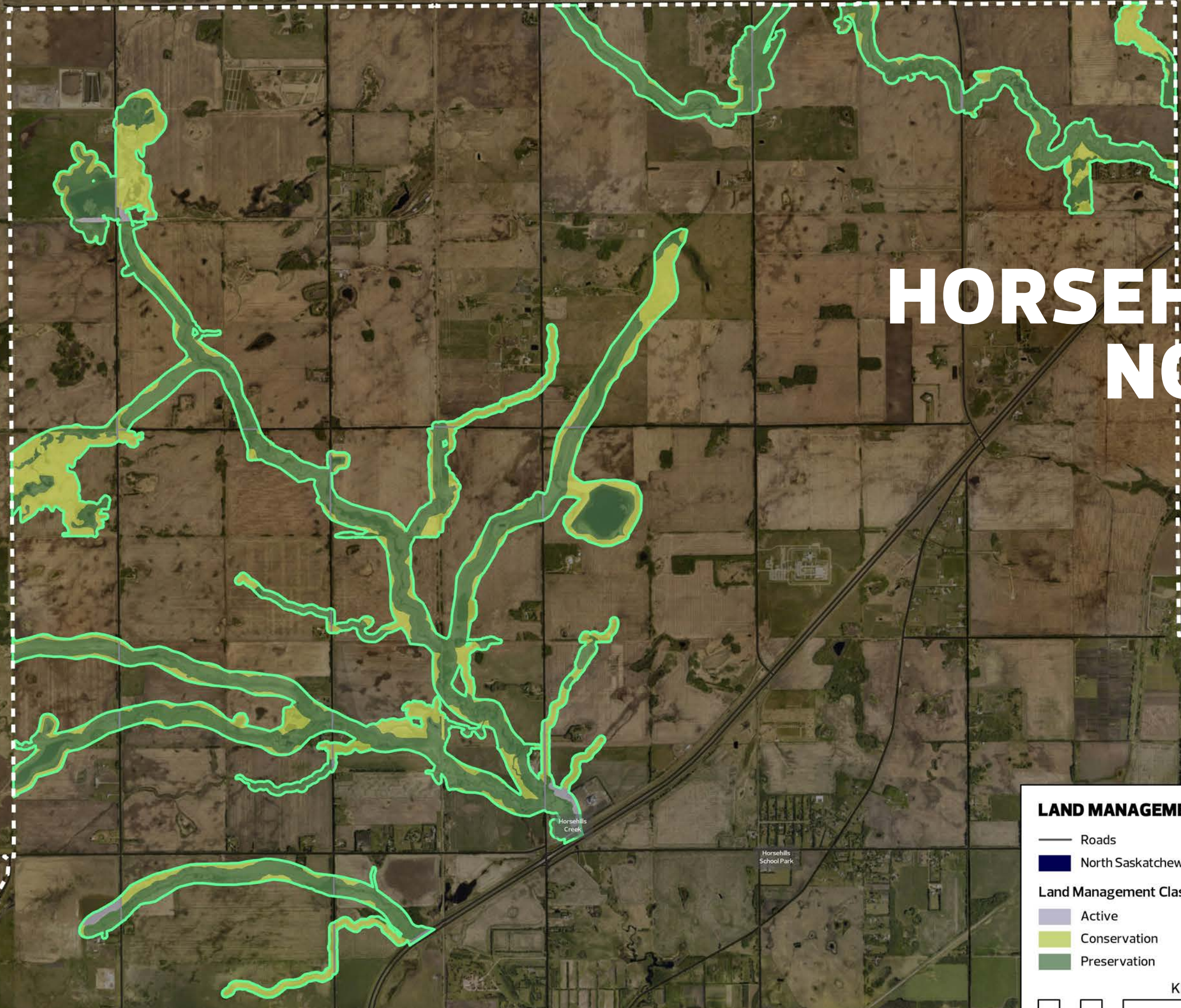
- Roads
- North Saskatchewan River
- ▤ City Boundary

Land Management Classes

- Active
- Conservation
- Preservation

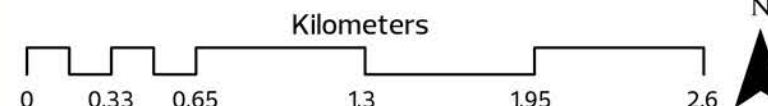


HORSEHILLS NORTH



LAND MANAGEMENT CLASSIFICATION

- Roads
- █ North Saskatchewan River
- █ City Boundary
- Land Management Classes**
- █ Active
- █ Conservation
- █ Preservation

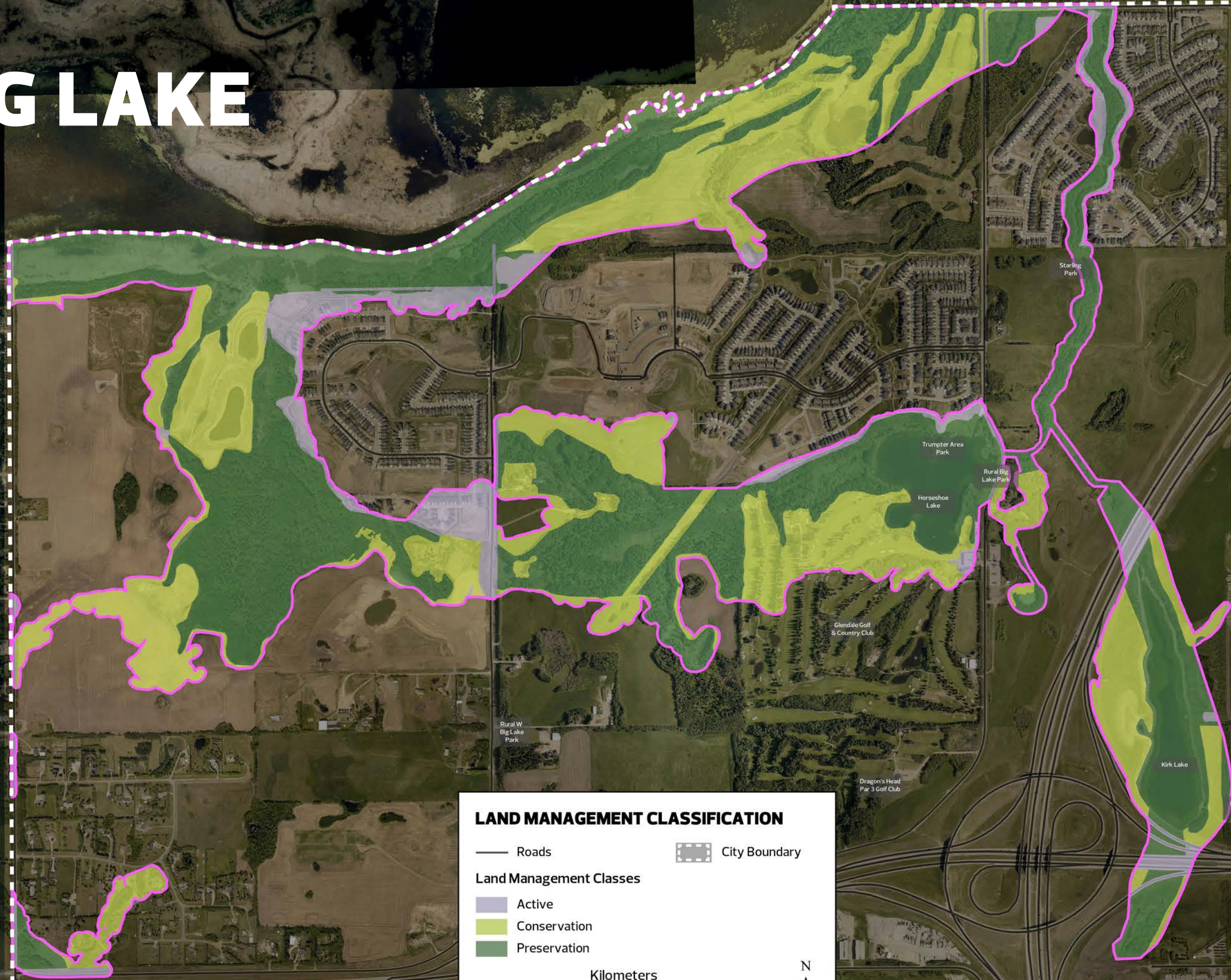


Horsehills Creek

Horsehills School Park

Rural NE Park

BIG LAKE

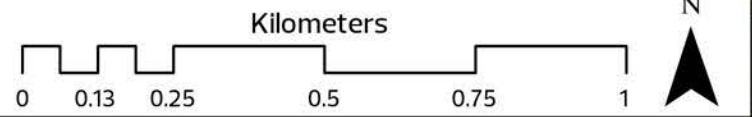


LAND MANAGEMENT CLASSIFICATION

— Roads [Dashed Box] City Boundary

Land Management Classes

- [Purple Box] Active
- [Yellow-Green Box] Conservation
- [Dark Green Box] Preservation



EAST RAVINES

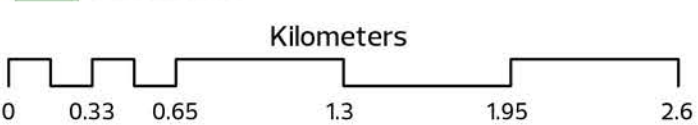


LAND MANAGEMENT CLASSIFICATION

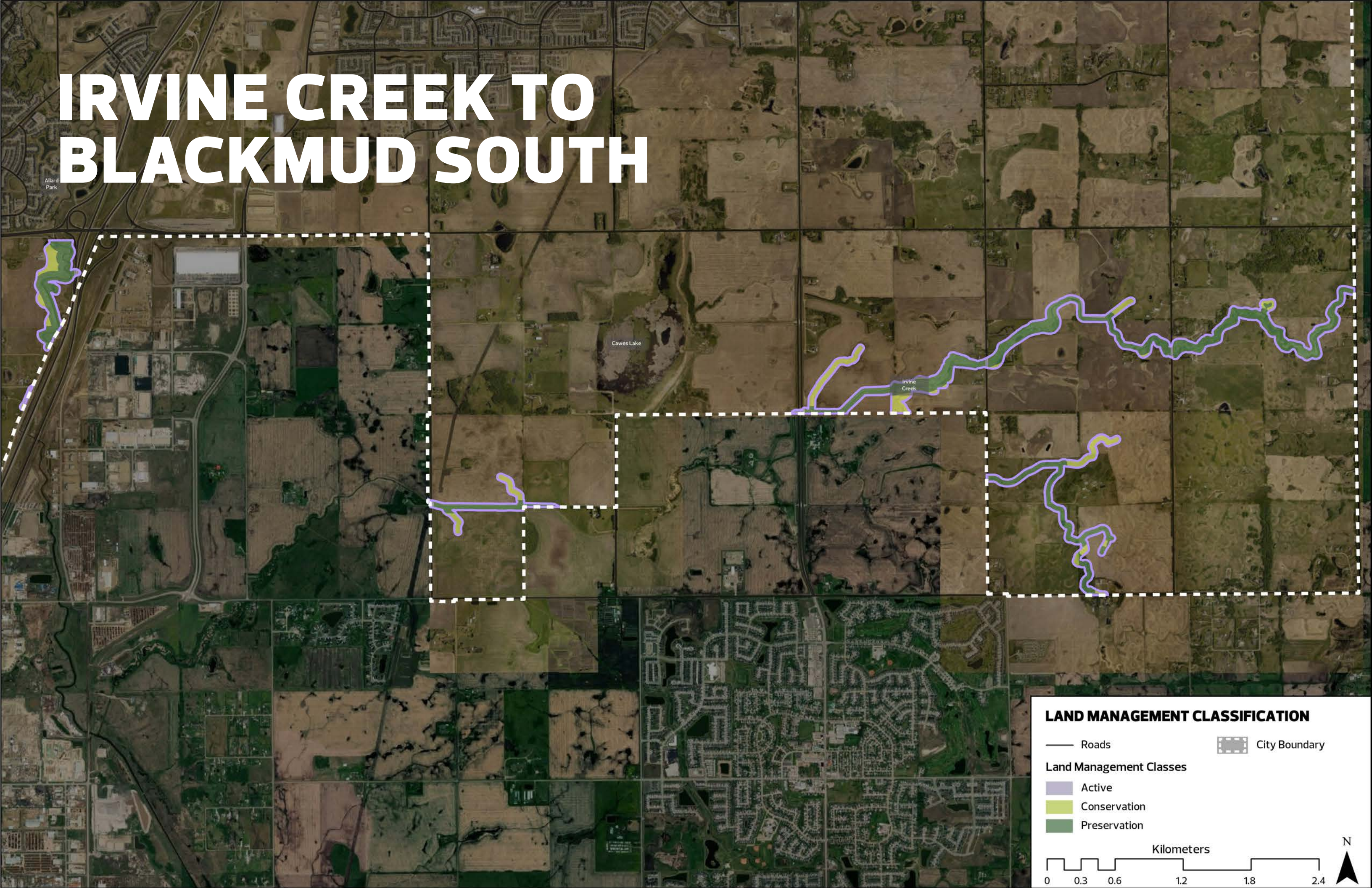
— Roads [Dashed Box] City Boundary

Land Management Classes

- [Purple Box] Active
- [Yellow-Green Box] Conservation
- [Green Box] Preservation



IRVINE CREEK TO BLACKMUD SOUTH

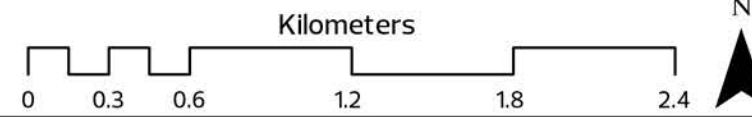


LAND MANAGEMENT CLASSIFICATION

— Roads [Dashed Box] City Boundary

Land Management Classes

- [Light Purple Box] Active
- [Light Green Box] Conservation
- [Dark Green Box] Preservation






APPENDIX E: **LMC MANUAL** **EDITS**




NORTH SASKATCHEWAN CENTRAL



LAND MANAGEMENT CLASSIFICATION

-  Roads
-  North Saskatchewan River
-  City Boundary

Land Management Classes

-  Active
-  Conservation
-  Preservation

Kilometers

0 0.25 0.5 1 1.5 2

N

RIVER VALLEY WEST



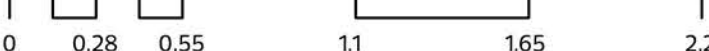
LAND MANAGEMENT CLASSIFICATION

-  Roads
-  North Saskatchewan River
-  City Boundary

Land Management Classes

-  Active
-  Conservation
-  Preservation

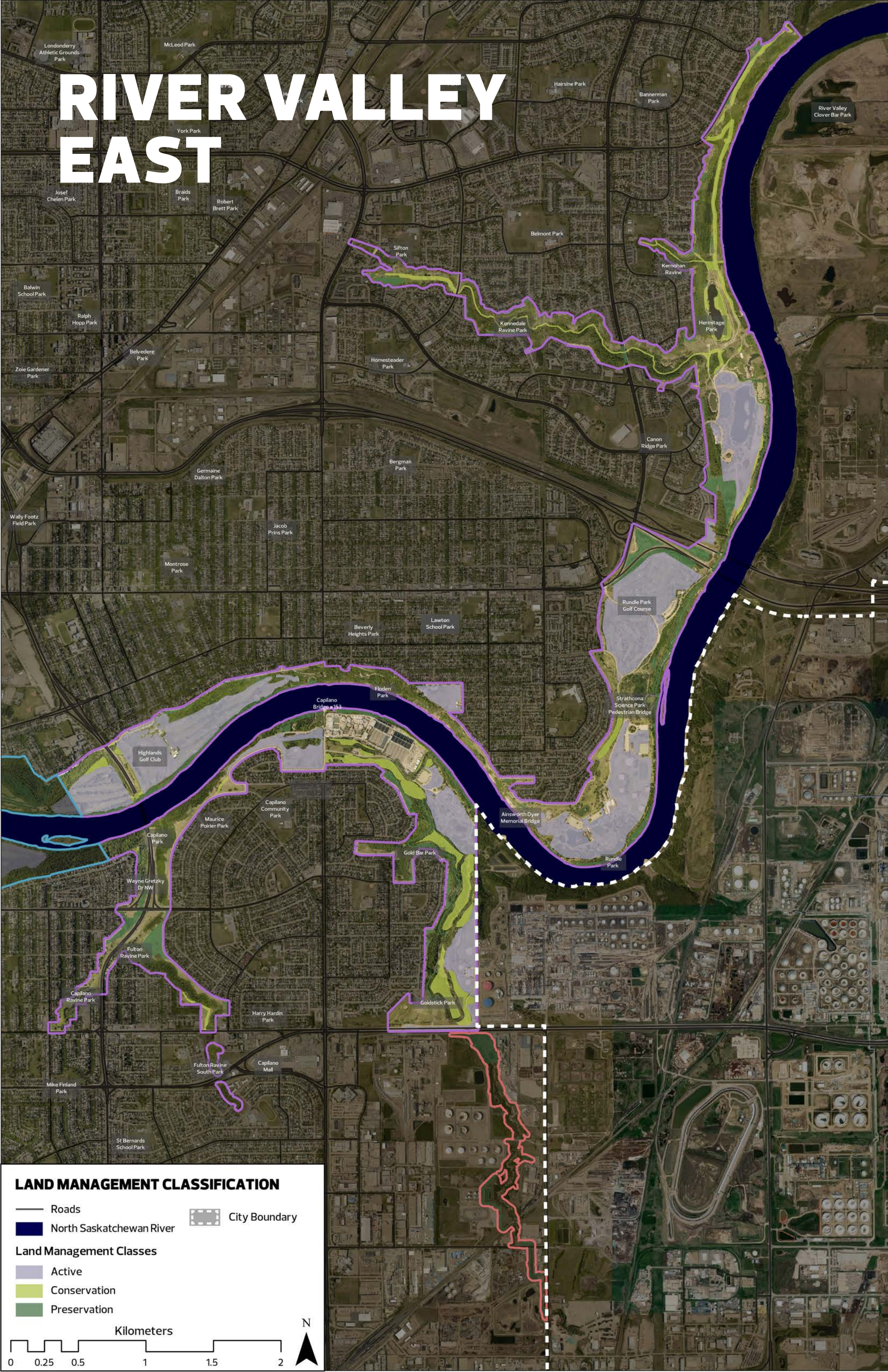
Kilometers



N



RIVER VALLEY EAST



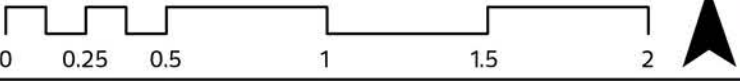
LAND MANAGEMENT CLASSIFICATION

-  Roads
-  North Saskatchewan River
-  City Boundary

Land Management Classes

-  Active
-  Conservation
-  Preservation

Kilometers



WHITEMUD RAVINE NORTH

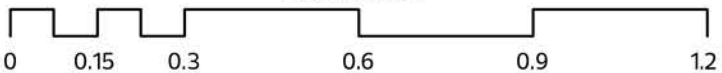
LAND MANAGEMENT CLASSIFICATION

- Roads
- North Saskatchewan River
- ▭ City Boundary

Land Management Classes

- Active
- Conservation
- Preservation

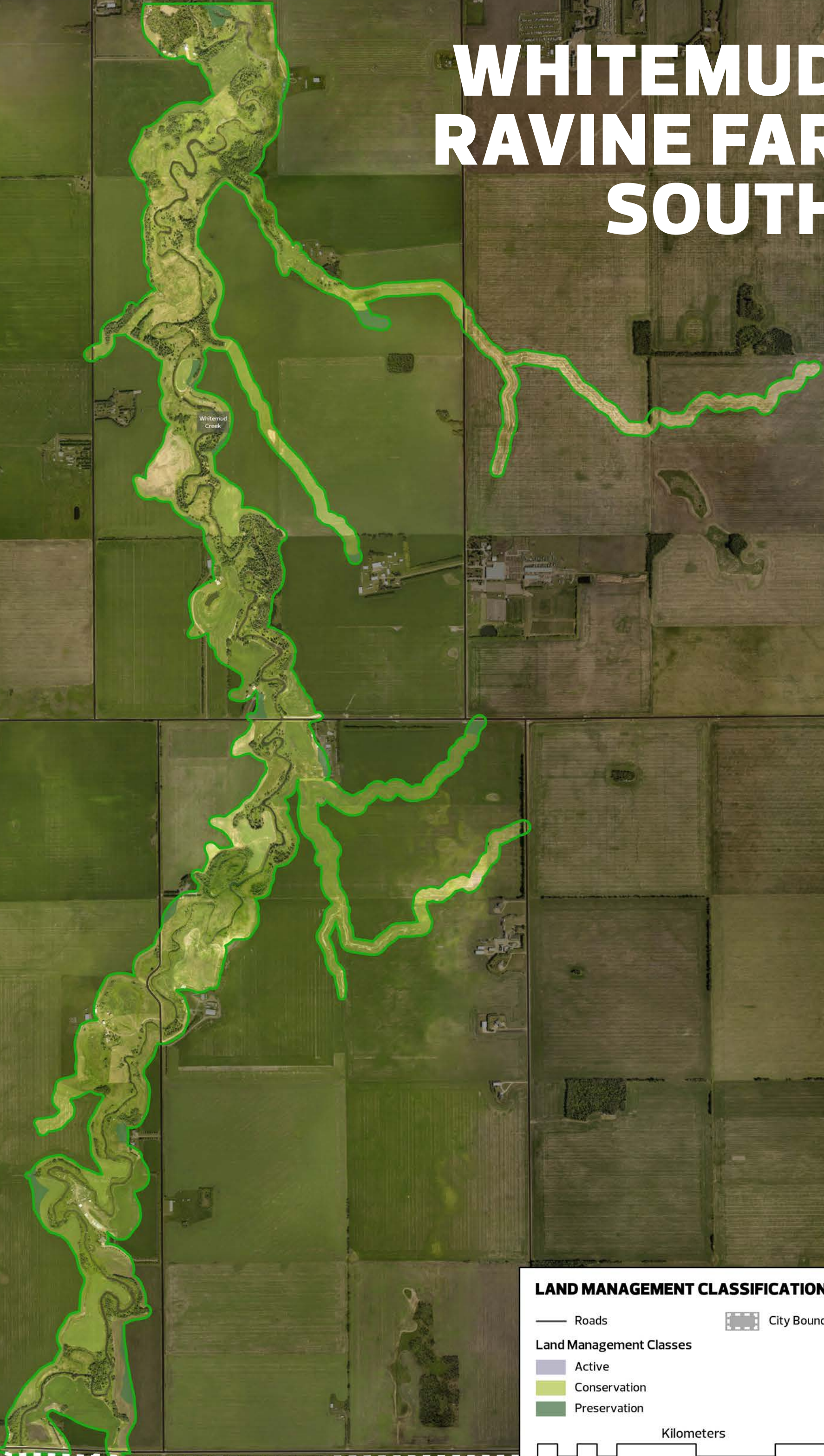
Kilometers



N



WHITEMUD RAVINE FAR SOUTH

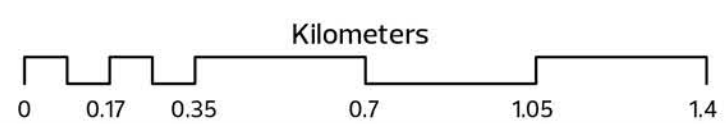


LAND MANAGEMENT CLASSIFICATION

— Roads [Dashed Box] City Boundary

Land Management Classes

- Active
- Conservation
- Preservation



MILL CREEK RAVINE NORTH

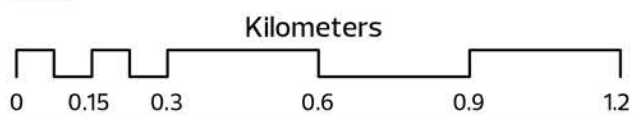


LAND MANAGEMENT CLASSIFICATION

- Roads
- North Saskatchewan River
- ▭ City Boundary

Land Management Classes

- Active
- Conservation
- Preservation





MILL CREEK RAVINE SOUTH

LAND MANAGEMENT CLASSIFICATION

— Roads [Dashed Box] City Boundary

Land Management Classes

- [Purple Box] Active
- [Green Box] Conservation
- [Dark Green Box] Preservation

Kilometers

0 0.23 0.45 0.9 1.35 1.8

N

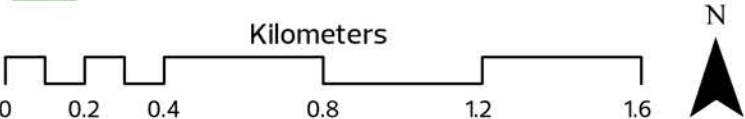
NORTH SASKATCHEWAN RABBIT HILL

LAND MANAGEMENT CLASSIFICATION

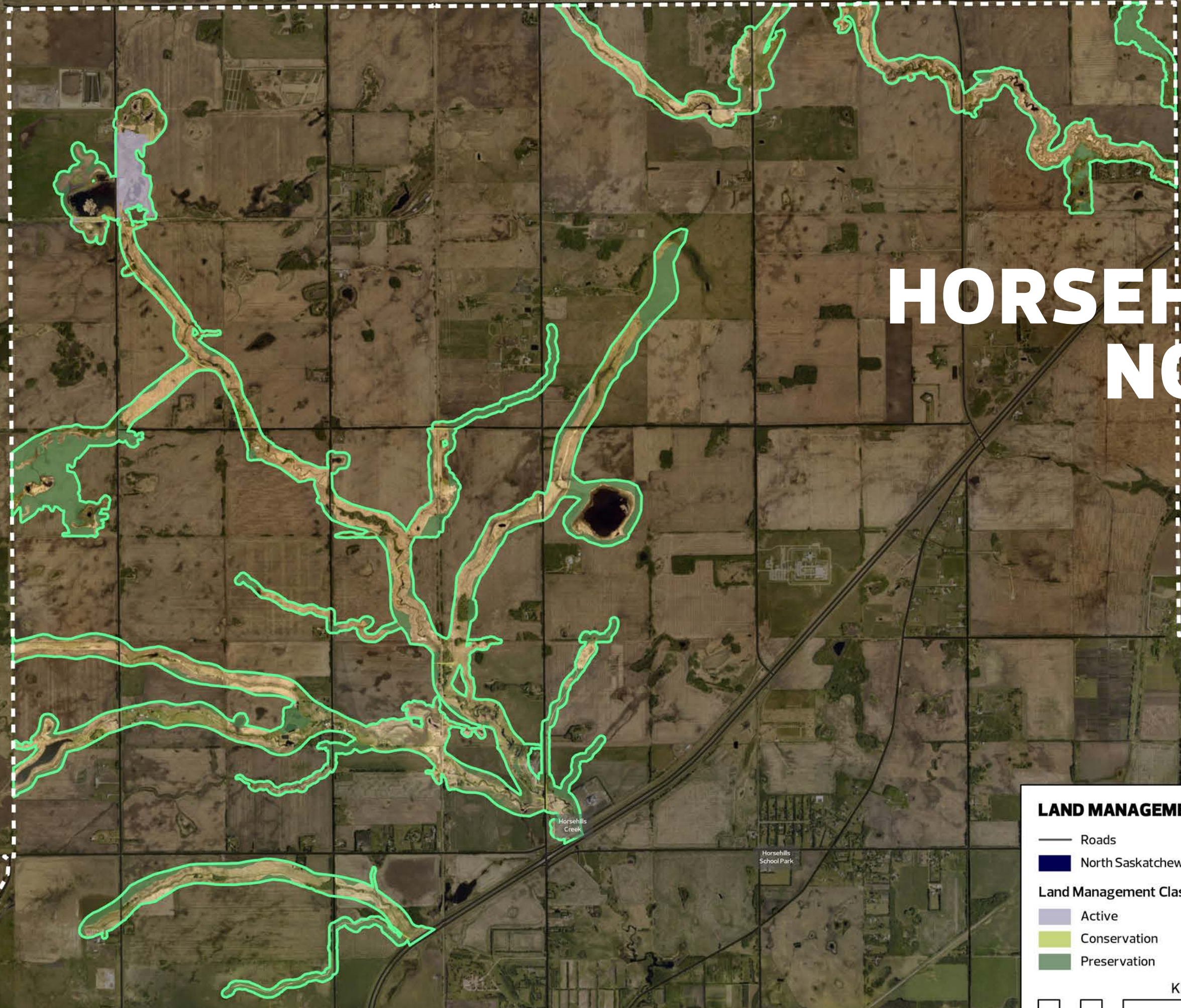
- Roads
- North Saskatchewan River
- ▤ City Boundary

Land Management Classes

- Active
- Conservation
- Preservation

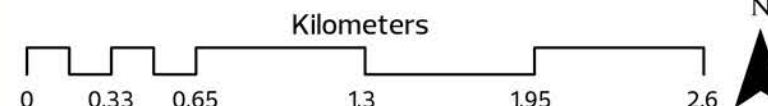


HORSEHILLS NORTH



LAND MANAGEMENT CLASSIFICATION

- Roads
- North Saskatchewan River
- City Boundary
- Land Management Classes**
- Active
- Conservation
- Preservation

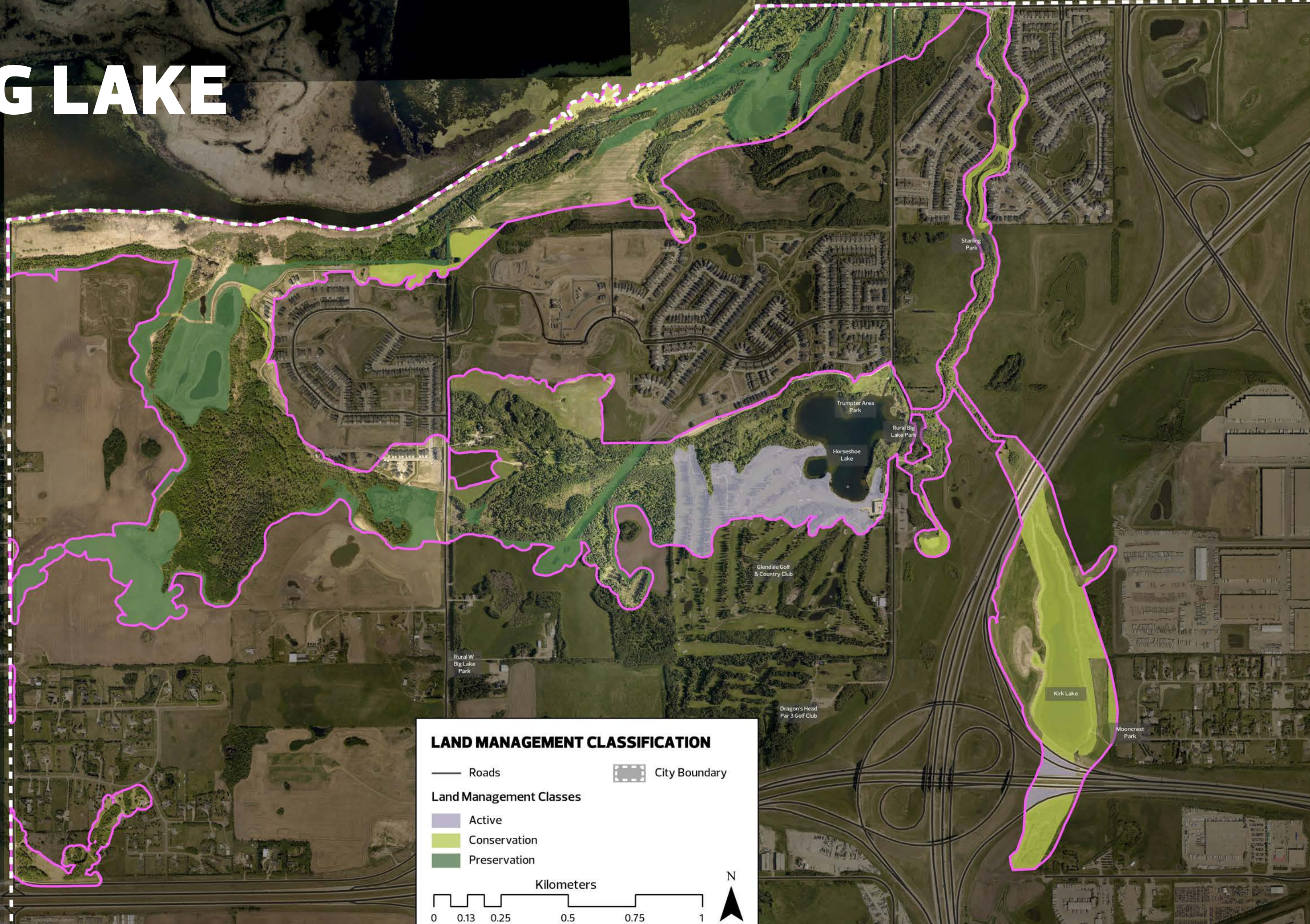


Horsehills Creek

Horsehills School Park

Rural NE Park

BIG LAKE

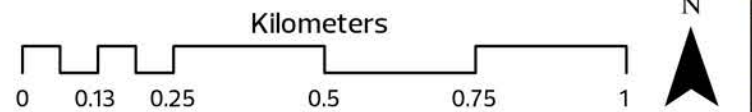


LAND MANAGEMENT CLASSIFICATION

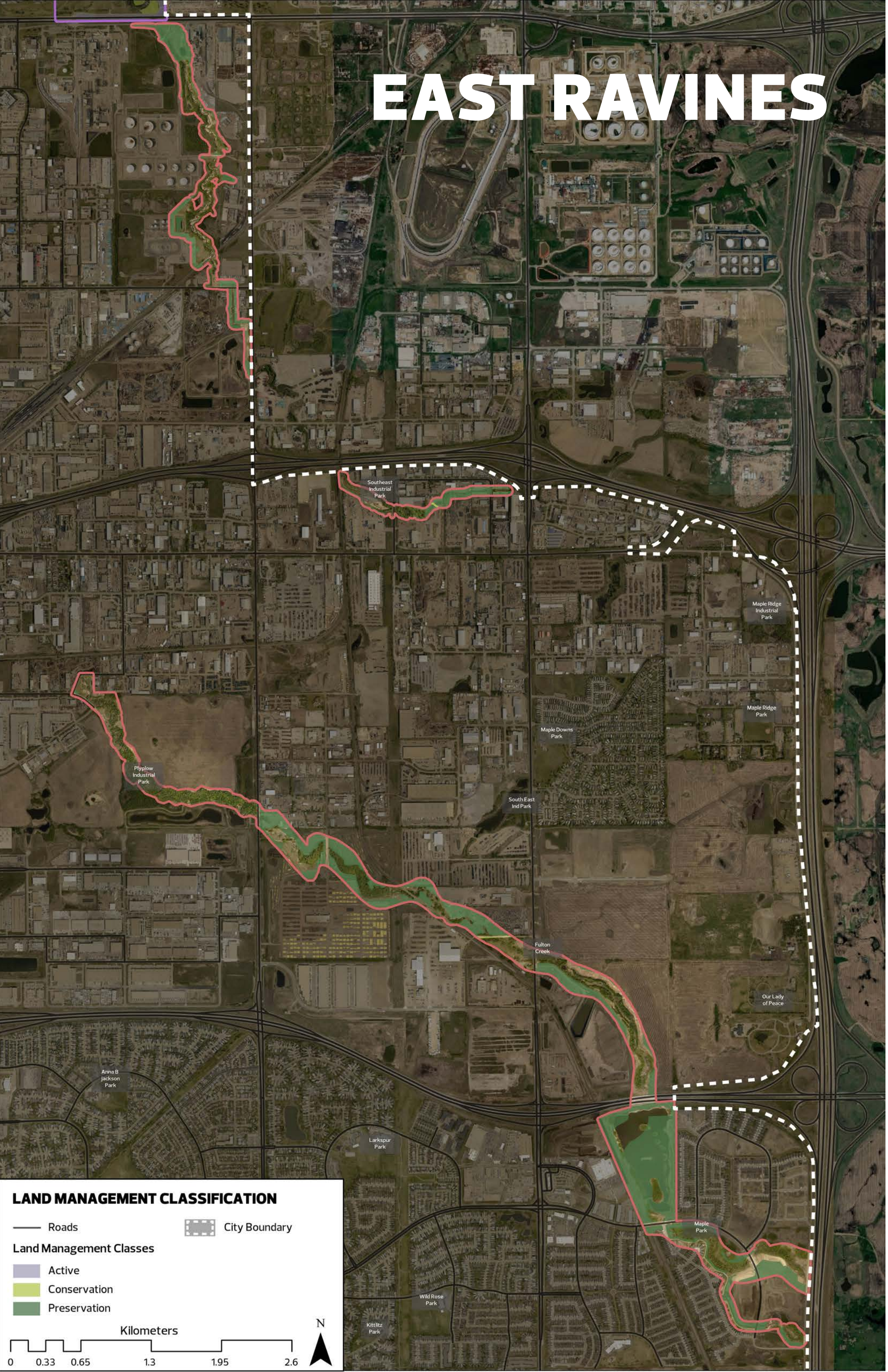
— Roads [Dashed Box] City Boundary

Land Management Classes

- [Light Blue Box] Active
- [Light Green Box] Conservation
- [Dark Green Box] Preservation



EAST RAVINES

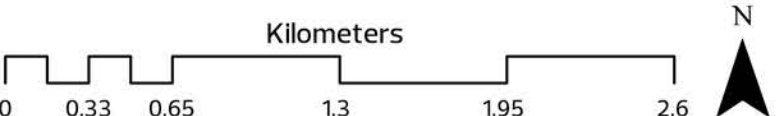


LAND MANAGEMENT CLASSIFICATION

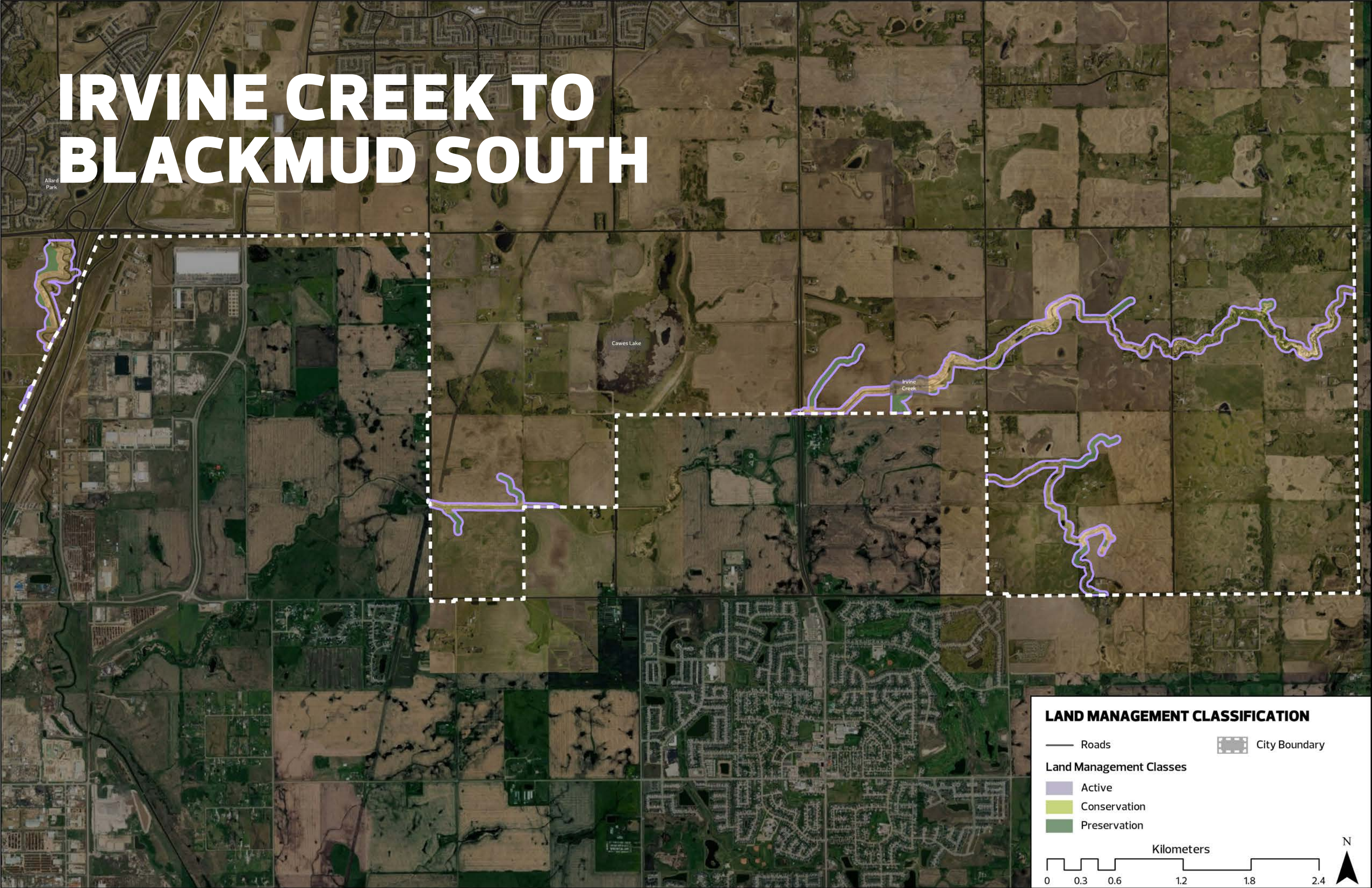
— Roads [Dashed Box] City Boundary

Land Management Classes

- Active
- Conservation
- Preservation



IRVINE CREEK TO BLACKMUD SOUTH



LAND MANAGEMENT CLASSIFICATION

— Roads [Dashed Box] City Boundary

Land Management Classes

- [Light Purple Box] Active
- [Light Green Box] Conservation
- [Dark Green Box] Preservation

