

Environmental Impact Assessment Pursuant to Bylaw 7188

Riverside Trail Realignment

Final Report



Prepared for:
City of Edmonton, Integrated Infrastructure Services
Edmonton, Alberta

Under Contract to:
EDA Planning + Urban Design Inc.
Edmonton, Alberta

Project Number EP-893
September 2020

Prepared by:
**Spencer Environmental
Management Services Ltd.**
Edmonton, Alberta





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Edmonton, Alberta T6B 3T4

1 September 2020
EP893

Dear Mr. Packolyk,

**Re: Environmental Impact Assessment Pursuant to Bylaw 7188 for Riverside Trail
Realignment - FINAL REPORT**

As requested, please find enclosed a pdf copy of the above-mentioned final Environmental Impact Assessment for submission to City Planning for City Council approval pursuant to Bylaw 7188. Hard copies of the report will be prepared on request.

A Site Location Study (SLS) has been completed for the proposed project and is provided under separate cover.

Please contact either of the undersigned if you require additional information.

Sincerely,

**Spencer Environmental
Management Services Ltd.**

Stephanie Jean, M.Sc., BIT
Environmental Scientist

Andra Bismanis, M.Sc., P.Biol.
Vice-President, Science Practice



cc: Ted Muller, EDA Planning + Urban Design

**City of Edmonton Bylaw 7188 Review Comments Summary
Riverside Trail Realignment Site Location Study and
Environmental Impact Assessment – Draft Reports
Revised 26 August 2020**

City of Edmonton—Initial Circulation Comments (August 2020)

Review Comment	Response Approach	EIA Report Section Reference
EPCOR Drainage Services (Drainage Planning and Engineering)		
<i>Environmental Impact Assessment</i>		
My only comment is, dewatering is mentioned in relation to Bylaw 18100 but isn't mentioned anywhere else, is dewatering likely to be required?	<ul style="list-style-type: none"> Dewatering is not anticipated for this project. Table 2.1 and Appendix B list applicable legislation that <u>may</u> apply to the project. 	Section 2.3; Appendix B
City Planning (Open Space Network and Assembly, Urban Growth and Open Space Strategy)		
<i>Environmental Impact Assessment</i>		
<p>Assessment: It appears that total impact on tree removal will be approximately 950 sq meter, please provide an extended map showing the limit of vegetation removal, detailed information on tree removal (total number of trees, size, dbh, canopy) and number of matured trees that have potential for wildlife habitat.</p> <p>Please provide a map showing potential impact area including 5m on each side (potential root damage from construction) and tentative analysis showing the extent of impact including the status of wildlife trees within the impacted area.</p>	<ul style="list-style-type: none"> Vegetation removal will be limited to the new 3.5 m wide trail corridor sections only, which includes trees ranging in size between 60 – 210 mm DBH. The 3.5 m footprint of the new trail corridor sections are shown on air photos on Figures 2b – 2e in Appendix A of the draft EIA. The above-noted drawings in the draft EIA can be updated during finalization of the EIA to show an additional 5.0 m setback on either side of the 3.5 m trail footprint to account for potential indirect impacts. As was the case when constructing the City's East End Trails in similar riparian forested habitat along the NSR, we expect direct impacts related to clearing to occur within the 3.5 m width of the trail and immediately adjacent trees only. As noted in Section 3.6.2.1 in the draft EIA, "Several wildlife trees (i.e., trees with visible nests or cavities) were observed scattered throughout the 	Appendix A, Figures 2b-2e, Section 3.6.2.1, Section 4.1

Review Comment	Response Approach	EIA Report Section Reference
	<p>local study area (Plate 3.2) and are expected to occur in the expanded study area owing to the mature age of the forest in this portion of the river valley.” These trees ranged in DBH as noted above and exhibited varying numbers and sizes of cavities as is typical of mature riparian forest habitat along the NSR.</p> <ul style="list-style-type: none"> • The site reconnaissance level of site visit as required by the EIA ToR did not include a detailed survey of each wildlife tree in the study area. If a detailed survey of wildlife trees is required, this would result in a scope change. 	
<p>Mitigation: mitigation measures to avoid, minimize tree removal including avoidance of habitat or matured tree species, potential retention of trees, options to reduce the potential width of trail in certain locations if feasible to protect tree species. Identification of construction best practices to minimize impact on the riverbank and tree species within the periphery. Selection of native species that is also suitable for the bank stabilization is preferred .</p>	<ul style="list-style-type: none"> • These mitigation measures have been added to Section 5.2.2.1. of the EIA. • Tender will require contractor to manually clear trail alignment with on-site trail adjustments made to avoid any larger trees of value. 	Section 5.2.2.1
<p>Restoration: Details of restoration/Landscaping plan to the abandoned trail area should be developed and shared for review. We recommend the plan will ensure a bioengineering approach in handling the bank failure and erosion in the existing trail location. Confirmation of Tree protection and preservation plan or procedure to develop such plan if not feasible to provide with the EIA report.</p>	<ul style="list-style-type: none"> • Detailed restoration plans will be included with the Tender documents and involve the use of native planting with a bio-engineering approach to help stabilize the abandoned trail and slump locations. • A vegetation protection plan will be identified with the restoration plans. 	Sections 4.2, 4.5, 5.2.2.1, 8.3

Executive Summary

The City of Edmonton proposes to realign and rehabilitate portions of Riverside Trail where slumping along the south bank of the North Saskatchewan River has created safety concerns. Riverside Trail is a granular trail located in the River Valley Riverside Neighbourhood, adjacent the Riverside Golf Course in the North Saskatchewan River Valley. In total, seven (7) areas were identified as needing realignment due to slumping and unsafe conditions along an approximate 700 m section of Riverside Trail. Along that same section of trail, three (3) additional low spots in the trail were identified for upgrading. Riverside Trail is located wholly within the boundaries of the City of Edmonton's North Saskatchewan River Valley Area Redevelopment Plan (NSRV ARP) (Bylaw 7188) and, therefore, triggers the need for an environmental review pursuant to that Bylaw. City of Edmonton ecological planners have determined that the appropriate level of review for this project is an Environmental Impact Assessment (EIA) subject to approval by City Council. A Site Location Study (SLS) must also be prepared (under separate cover). The City has retained EDA Planning + Urban Design Inc. (EDA) to provide prime consulting services for the rehabilitation of Riverside Trail. EDA has retained Spencer Environmental Management Services Ltd. (Spencer Environmental) as environmental consultant for this project, and to complete the EIA and SLS (under separate cover).

General methodology used to prepare this EIA included a desktop review of existing project information, a review of aerial photographic imagery, review of legislation, a field reconnaissance with the EDA project team to document existing conditions, mapping of relevant resources and sensitivities and an analysis of potential impacts from the proposed project on identified environmental sensitivities. Thurber Engineering Ltd. undertook geotechnical assessments, which were reviewed and integrated into the EIA. Circle CRM Group Inc. undertook a historical resource assessment and applied for *Historical Resources Act* Approval, which was received on 29 July 2020 (Appendix F).

Existing conditions in the project area were typical of a Mixed Deciduous forest in the North Saskatchewan River valley comprising a mature forest canopy overstorey, typically 10 - 20 m in height, dominated by balsam poplar and trembling aspen. The understorey canopy was composed of a dense shrub layer and a herbaceous layer comprised mostly of forbs with a few grass and sedge species also present. Because of the high degree of habitat complexity and ecological connectivity, the Riverside Trail area is expected to support use by an abundance of native, urban-adapted wildlife species and to function as an important wildlife movement corridor in the river valley. The Riverside Trail project area has been mapped as having high, very high and extremely high value to the City (Solstice 2016).

Several potential impacts were assessed including:

- erosion of trail from river flooding;
- loss or alteration of native forest;
- establishment of invasive or weedy species;
- incidental tree damage;
- loss of terrestrial habitat due to clearing activities;
- habitat alienation during construction and operation;

- breeding wildlife mortality;
- mortality or disturbance of special status species;
- disturbance of existing recreational use during construction activities;
- improved trail integrity;
- release of sediment or other debris on/off site; and
- release of hazardous/deleterious substances on/off site.

With mitigation measures applied most impacts were reduced to negligible including loss or alteration of native forest. The proposed project does, however, require clearing of some portions of native river valley forest to accommodate trail realignment and construction equipment access. Areas where the trail is to be realigned will require a 3.5 m wide area of vegetation to be cleared, resulting in a total area of 962 m² of vegetation loss. Some vegetation immediately adjacent the 3.5 m wide clearing area (i.e., within 5 m on either side of the clearing area) may be indirectly impacted by tree clearing for the new trail due to root damage and windfall along the new trail edge. All trees removed are included in the City's tree inventory and have been assessed by City Forestry. The decommissioned existing trail will be revegetated with native trees and shrubs, resulting in a gain of 554 m² of new forest. The total loss of native forest is, therefore, 408 m². Efforts will be made to minimize tree removal along the new trail alignment as much as possible. On-site trail adjustments will be made during vegetation clearing to avoid larger trees as much as possible. Detailed restoration plans will be included in the Tender documents. Restoration will involve the use of native plantings with a bio-engineering approach to help stabilize abandoned trail and slump locations. A vegetation protection plan will be included in the restoration plans.

One impact related to habitat alienation during construction could not be fully mitigated and resulted in a residual impact was Construction activities and related noise have the potential to result in wildlife habitat alienation in adjacent areas. Activities and noise associated with construction phases have potential to disrupt wildlife species using adjacent habitat, leading to habitat alienation in those areas. This effectively reduces the amount of usable habitat available to individuals. Few mitigation measures are available, however, work crews will be instructed not to harass wildlife and the contractor's ECO plan will include worker/wildlife encounter protocols.

Considering the above, and that communication with City stakeholders remains ongoing during project development, we are of the opinion that the proposed project does not require additional modifications to proceed responsibly.

Table of Contents

Chapter	Page
1.0 INTRODUCTION.....	1
2.0 THE PROPERTY.....	1
2.1 Project Area Location, Disposition, Zoning	1
2.2 Historic Conditions	1
2.3 Summary of Environmental Regulatory Approvals	1
2.4 Environmental Site Assessments	3
3.0 ENVIRONMENTAL CONTEXT	4
3.1 Overview of Study Area and Adjacent Lands	4
3.2 Environmental Sensitivities	4
3.2.1 Original (2016) Mapping	4
3.2.2 Refined Mapping	4
3.3 Surface Water and Groundwater.....	5
3.3.1 Methods.....	5
3.3.2 Description.....	5
3.4 Geology/Geomorphology	6
3.4.1 Methods.....	6
3.4.2 Description.....	6
3.5 Vegetation	7
3.5.1 Methods.....	7
3.5.2 Description.....	7
3.6 Wildlife	9
3.6.1 Methods.....	9
3.6.2 Description.....	10
3.7 Historical Resources	12
3.7.1 Methods.....	12
3.7.2 Description.....	12
3.8 Recreation	12
4.0 THE PROJECT	13
4.1 Project Description.....	13
4.2 Landscaping	15
4.3 Construction Schedule	15
4.4 Construction Laydown Area and Access.....	15
4.5 Project Phases and Associated Key Activities.....	16
5.0 PROJECT IMPACTS AND MITIGATION MEASURES.....	18
5.1 Assessing Impacts.....	18
5.1.1 Potential Impact Identification and Analysis	18
5.1.2 Impact Characterization	18
5.1.3 Mitigation Development and Residual Impact Assessment	19

5.2	Impact Assessment Results and Mitigation Measures.....	19
5.2.1	Hydrology/Surface Water Quality	19
5.2.2	Vegetation	20
5.2.3	Wildlife and Wildlife Habitat	22
5.2.4	Recreation	24
5.2.5	Project Incidents.....	25
5.3	Cumulative Effects.....	26
5.3.1	Past Projects	26
5.3.2	Present Projects.....	27
5.3.3	Future Planned Projects	27
5.3.4	Conclusion	27
6.0	ENVIRONMENTAL MONITORING.....	28
7.0	PUBLIC CONSULTATION	29
8.0	CONCLUSIONS	30
8.1	Impact and Sensitivities	30
8.2	EIA Limitations	30
8.3	Summary of Key Mitigation Measures.....	30
9.0	REFERENCES.....	32
9.1	Literature Cited	32
9.1	Personal Communications	33
	APPENDIX A: FIGURES.....	A1
	APPENDIX B: PERMITTING TABLE	B1
	APPENDIX C: CONCEPTUAL DESIGN REVIEW (THURBER 2020)	C1
	APPENDIX D: VEGETATION INVENTORY (JUNE 2020)	D1
	APPENDIX E: WILDLIFE LIST	E1
	APPENDIX F: <i>HISTORICAL RESOURCES ACT</i> APPROVAL	F1
	APPENDIX G: RIVERSIDE TRAIL REALIGNMENT CONCEPT DRAWINGS (EDA 2020)	G1

List of Tables

Table 3.1.	Sensitivity Analysis Refinement.....	5
Table 3.2.	Special Status Wildlife Species with Potential to Occur in the Project Area..	11
Table 4.1.	Riverside Trail rehabilitation components for each location.....	13
Table 5.1:	Impact Descriptor Definitions.	18

List of Plates

Plate 1.1.	Slumping of the south bank of the NSR along Riverside Trail (Location 1) (22 April 2020).....	1
------------	---	---

Plate 1.2. Slumping of the south bank of the NSR along Riverside Trail (Location 6) (22 April 2020)..... 2

Plate 1.3. A low area in the trail identified for upgrading (Upgrade Location 1) (22 April 2020). 2

Plate 3.1. Mixed Deciduous - Mixed Shrubs plant community along Riverside Trail (22 April 2020)..... 8

Plate. 3.2. Example of a wildlife tree with many cavities along Riverside Trail (22 April 2020) 10

Plate 4.1. Vegetation to be cleared for trail realignment (3.5 m wide) at Location 1 (22 April 2020)..... 14

Plate 4.2. Location 5 where a guardrail is proposed, devoid of significant vegetation cover (22 April 2020). 15

1.0 INTRODUCTION

The City of Edmonton proposes to realign and rehabilitate portions of Riverside Trail where slumping along the south bank of the North Saskatchewan River (Plates 1.1 and 1.2) has created safety concerns. Riverside Trail is a granular trail located in the River Valley Riverside Neighbourhood, adjacent the Riverside Golf Course in the North Saskatchewan River Valley (Figure 1, Appendix A). In 2017, EDA Planning + Urban Design Inc. completed the Riverside Trail Rehabilitation Feasibility Study - Conceptual Plan for rehabilitation of two slumping sections (Locations 1 and 6, Figure 2; Appendix A) of Riverside Trail with the preferred concept option being trail realignment for those two locations. In 2019, an additional geotechnical assessment was completed for the entire length of Riverside Trail. That assessment identified five (5) additional high-risk slumping areas on the riverbank. In total, seven (7) areas were identified as needing rehabilitation or realignment due to slumping and unsafe conditions along an approximate 700 m section of Riverside Trail (Figure 2, Appendix A). Along that same section of trail, three (3) additional low spots in the trail were identified for upgrading during a team site reconnaissance on 22 April 2020 (Plate 1.3) (Figure 2, Appendix A).



Plate 1.1. Slumping of the south bank of the NSR along Riverside Trail (Location 1) (22 April 2020).



Plate 1.2. Slumping of the south bank of the NSR along Riverside Trail (Location 6) (22 April 2020).



Plate 1.3. A low area in the trail identified for upgrading (Upgrade Location 1) (22 April 2020).

Riverside Trail is located wholly within the boundaries of the City of Edmonton’s North Saskatchewan River Valley Area Redevelopment Plan (NSRV ARP) (Bylaw 7188) and, therefore, triggers the need for an environmental review pursuant to that Bylaw. City of Edmonton ecological planners have determined that the appropriate level of review for this

project is an Environmental Impact Assessment (EIA) subject to approval by City Council. A Site Location Study (SLS) must also be prepared (under separate cover). The City has retained EDA to provide prime consulting services for the rehabilitation of Riverside Trail. EDA has retained Spencer Environmental Management Services Ltd. (Spencer Environmental) as environmental consultant for this project, and to complete the EIA and SLS (under separate cover).

This report comprises the Bylaw 7188 EIA prepared for the Riverside Trail realignment and upgrading project. The EIA format and content follows a project-specific Terms of Reference developed through scoping discussions held with a City of Edmonton Ecological Planner. This EIA addresses all components of the Riverside Trail project having potential to affect lands within the NSRV ARP.

2.0 THE PROPERTY

2.1 *Project Area Location, Disposition, Zoning*

The section of trail assessed by this EIA is located along the top-of-bank of the south bank of the North Saskatchewan River (NSR) along the fenced perimeter of the Riverside Golf Course, north of Rowland Road and east of Dawson Bridge. It extends from the southwest corner of Riverside Golf Course, immediately north of Dawson Bridge, to the north and east along the top-of-bank on an inside bend of the river. The trail ends at the northeast corner of the Riverside Golf Course and connects to a paved shared use path (SUP). Figure 1 (Appendix A) illustrates Riverside Trail's location in relation to the Bylaw 7188 boundary and adjacent lands. The trail is located on City owned lands within the River Valley Riverside Neighborhood and is zoned Metropolitan Recreation Zone (A). Figure 3 (Appendix A) illustrates land use zones in the project area. Riverside Trail is located within the City of Edmonton's Flood Protection Overlay and within the floodway on Alberta's Flood Hazard Mapping (Figure 4, Appendix A).

2.2 *Historic Conditions*

Historical aerial photograph review was limited to available City of Edmonton pictometry imagery for 2007 and 2013-2018 and Google Earth (2020) imagery that spanned the period 2002 to 2018. Very little change in development was observed on the available aerial photographs in the Riverside Trail area and vicinity during this period as this area of the river valley is located in Central Edmonton and has been developed for decades. River water level fluctuations in this area were visible, however, through different exposure levels of a sandbar adjacent an island near the east end of the Riverside Trail. A sandbar located on the west end of Dawson Bridge can also be seen in October 2016 imagery. That sandbar cannot be seen in any other years, indicating very low water levels in October 2016. While the south riverbank was generally well vegetated, ongoing south riverbank erosion was also visible in the pictometry images for the project area.

2.3 *Summary of Environmental Regulatory Approvals*

All typically relevant federal, provincial and municipal environmental legislation, bylaws and policies were reviewed for their application to this project (Appendix B). As is often the case, several provincial and federal statutes prohibiting harm to select resources are relevant to project construction; however, Bylaw 7188 is the only trigger for an environmental assessment. Table 2.1 presents a summary of environmental legislation and bylaws identified as applicable to this project. Additional legislation/bylaw detail is provided in Appendix B.

Several other municipal permits, such as OSCAM, may be required, depending on proponent activity.

Table 2.1. Summary of Applicable Legislation and Bylaws (details in Appendix B)

Legislation or Policy	Regulatory Agency	Authorization/ Approval/Permit Required	Approval Timeline or Potential Schedule Impact
Bylaws Requiring Approvals - Municipal			
<i>North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188)</i>	City Planning	EIA and SLS required. EIA must be approved by City Council and the project location in the river valley must be deemed essential by City Council	Council date for approval of the EIA anticipated in October/November 2020.
<i>Corporate Tree Management Policy (C456)</i>	City Forestry	Proponent to collaborate with City Forestry regarding City owned trees and shrubs in the project area	City Forestry has been on site with the City project team to assess City owned trees and shrubs and will collaborate with the successful contractor.
<i>City of Edmonton (Bylaw 18100) - EPCOR Drainage Services Bylaw</i>	EPCOR	Permit to discharge into storm sewer system may be required (e.g., staging area)	Proponent responsibility
<i>City of Edmonton Parkland (Bylaw 2202)</i>	City of Edmonton	Permit required to stage for construction	Proponent responsibility
Acts Influencing Construction Methods - Provincial			
<i>Wildlife Act</i>	Alberta Environment and Parks	No permit required; however, the act prohibits disturbing prescribed breeding wildlife such as northern flying squirrels and owls.	Proponent responsibility. Vegetation clearing between 15 February and 20 August may result in nest sweep findings that delay clearing.
<i>Historical Resources Act</i>	Alberta Culture, Multiculturalism and Status of Women (ACMSW)	All projects with potential to disturb historical, archaeological and paleontological resources will require Approval.	~3 months for ACMSW to review an Approval application
Acts Influencing Construction Methods - Federal			
<i>Fisheries Act</i>	Fisheries and Oceans Canada (DFO)	No approval required because no instream works are proposed; however, the act prohibits release of deleterious substances to fish habitat. Ensure project does not release deleterious substances into NSR.	No approval required. Releases of deleterious substances, including sediments, into the river during construction could cause project schedule delays.
<i>Migratory Birds Convention Act</i>	Environment and Climate Change Canada	No permit required; however, violation of the act may result in penalties	Proponent responsibility. Vegetation clearing between 15 February and 20 August may result in nest sweep findings that delay clearing.

Legislation or Policy	Regulatory Agency	Authorization/ Approval/Permit Required	Approval Timeline or Potential Schedule Impact
<i>Species At Risk Act</i>	Environment and Climate Change Canada	No permits required; however, violation of the act may result in penalties	Proponent responsibility. Schedule potentially impacted if species at risk found in the area.

2.4 Environmental Site Assessments

A Phase 1 Environmental Site Assessment was not required for the proposed project.

3.0 ENVIRONMENTAL CONTEXT

3.1 Overview of Study Area and Adjacent Lands

Riverside Trail is a level, granular trail located on a low-level river terrace (elevation approximately 620 m) on the top-of-bank of the south NSR bank. It extends along the perimeter of the Riverside Golf Course, north of Rowland Road and east of Dawson Bridge. The trail connects to the Forest Heights Neighborhood, located south of Rowland Road (Appendix A) and extends to the south to the Cloverdale Neighborhood and to the east to the Capilano Neighborhood. Dawson Park in the River Valley Kinnaird Neighborhood is located across the NSR from the River Valley Trail.

The EIA study area was defined at two scales: local and regional. The local study area comprises the lands and NSR within and adjacent to Riverside Trail that have potential to be directly affected by proposed construction, permanently or temporarily. The local study area was expanded to accommodate construction access and the proposed laydown area. The regional study area included adjacent river valley lands that are structurally connected bylaw lands and may be indirectly affected. The regional study area was relevant to some resources such as environmental sensitivities and wildlife movement.

3.2 Environmental Sensitivities

3.2.1 Original (2016) Mapping

Figure 5 (Appendix A) shows the results of the City of Edmonton environmental sensitivities analysis and classification mapping (Solstice 2016) in the project vicinity, overlaid with the local study area. The majority of the trail alignment area is mapped as being high, very high and extremely high value to the City. The trail alignment extending north from Rowland Road to the inner bend of the NSR is predominantly mapped as high and very high value, with a few patches of extremely high value. From the meander to the eastern extent of the study area the alignment is mostly mapped as extremely high value, with some patches of high and very high value. Beyond the study area the river valley is mapped as high, very high and extremely high value, one exception being the central portion of the Riverside Golf Course, which is mapped as moderate value to the City. The City considers high, very high and extremely high values as lands suitable for protection or conservation.

3.2.2 Refined Mapping

Methods

Using 2020 site-specific vegetation data and mapping, we re-analyzed City of Edmonton's Environmental Sensitivities (2016) GIS layer for the local study area. Specifically, we updated the input Ecological Asset scores for the Natural Vegetation ('AVegNat2' attribute), and for the Non-Native Vegetation ('AVegNoNat1' attribute). Overlay analysis (union function) was used to intersect the 2020 vegetation polygons with the 2016 Environmental Sensitivities polygons. This not only allowed us to update the relevant scores, it also allowed us to break up the larger 2016 mapped polygons to reflect our finer scale 2020 mapped polygons. Scores were updated as shown in Table 3.1.

Table 3.1. Sensitivity Analysis Refinement

Where 2020 Vegetation were observed to be...	...the respective Environmental Sensitivities attribute was updated to:
Mixed Deciduous - Mixed Shrubs (MD.1)	If not originally so, update to: Natural Vegetation ('AVegNat2' attribute) = 2 score; Non-Native Vegetation ('AVegNoNat1' attribute) = 0 score.

With the scores updated, the Environmental Sensitivities analysis – whereby Assets, Threats and Constraints were summed – was re-run using the model formula as per originally prescribed by Solstice Canada (2016) to produce the new cumulative Environmental Sensitivities layer for the study site. The original final score categorical classes were used to bin the new scores.

Description

The revised environmental sensitivities map (Figure 6, Appendix A) shows very little change within the local study area. Two very small patches of very high value lands on the east and west sides of Location 4 have been upgraded to extremely high value. Another two small patches on the east and west sides of Location 6 have also been upgraded from very high value to extremely high value. Little change in sensitivity mapping was anticipated due to the presence of one, continuous native plant community present in the study area.

3.3 Surface Water and Groundwater

3.3.1 Methods

Surface Water

Surface water within the vicinity of the project was described based on examination of topographic maps and field observations. Relevant environmental assessments prepared by Spencer Environmental were also reviewed.

Groundwater

Thurber Engineering Ltd. undertook a preliminary geotechnical assessment (2017) and geotechnical assessment (2019) for the Riverside Trail rehabilitation. As part of Thurber's investigations relevant borehole data in the vicinity of the project were reviewed (Thurber 2017). Thurber's report was reviewed for relevant groundwater information.

3.3.2 Description

Surface Water

The only surface water body located in the vicinity of the project area is the North Saskatchewan River (NSR). The NSR originates at the Saskatchewan Glacier 500 km upstream of Edmonton and flows through the City for 48 km, from southwest to northeast. Several tributary streams flow into the NSR within City limits. Riverside Trail is located immediately adjacent to the NSR along the top-of-bank of the south riverbank.

Groundwater

Thurber (2017 and 2019) noted that a standpipe piezometer was installed adjacent Riverside Trail on 20 October 2003, approximately 350 m upstream of the current trail local study area. At the time of installation, the water level was observed at 9.5 m below the ground surface, and on 20 November 2003 water levels were at 5.7 m below the ground surface (elevation 615.5 m).

3.4 Geology/Geomorphology

3.4.1 Methods

Thurber (2017) previously undertook a preliminary desktop geotechnical assessment for two of the seven slumping sites as well as a site reconnaissance investigation. At the City of Edmonton's request, an additional geotechnical assessment for the entire length of Riverside Trail was completed by Thurber in 2019, which included a desktop review of geological maps, review of available geotechnical information, review of LIDAR and historical photos, and a site reconnaissance on the 12 and 16 September 2019. In June 2020, Thurber subsequently undertook a review of the proposed Riverside Trail realignment and upgrading conceptual design (Appendix C). That review involved a high-level review of the conceptual designs, a site reconnaissance on 16 June 2020 and preparation of a letter report documenting their review comments and recommendations.

3.4.2 Description

In the Riverside Trail project area, the NSR is incised through surficial deposits into the underlying Upper Cretaceous bedrock of the Horseshoe Canyon Formation (Thurber 2019). The elevation of bedrock is expected to range from 608 m and 612 m, which coincides approximately with the bottom of the NSR channel.

Surficial deposits range between 10 m and 14 m thick and form the majority of the exposed riverbank slopes that are immediately adjacent the trail and are susceptible to erosion (Thurber 2019). The surficial deposits are composed of alluvial deposits formed by the depositional action of the NSR. The trail is situated on an alluvial terrace on the inside of a river bend that forms the entire lands of the Riverside Golf Course. This alluvial terrace formed as point-bar deposits that have occurred during historical flooding events. Coarse deposits (gravel and coarse sand) have been deposited at the bottom of the river channel while the riverbank slopes comprise finer materials (silt and clay) (Thurber 2019). In general, coarser deposits are encountered between the bedrock and approximately 614 m. From 614 m to the ground surface (approximately 617 m to 618 m elevation along the trail) are the finer deposits of silts and clays.

Thurber (2019) determined that in recent decades it appears that the riverbank in this area has altered its alignment due to periodic flooding and the accumulation of alluvial deposits. They observed that the river flow regime also appears to have shifted in this time period and has eroded portions of the bank and that the majority of the riverbank along the Riverside Trail has been characterized by continual river erosion and slumping. According to Thurber (2019), riverbank erosion experienced at this site is greatly increased due to the influence of groundwater because coarser alluvial deposits are generally very porous

aquifers. They found that the aquifer at this site is most likely recharged during high river water level events (e.g., spring flooding) and is discharged during periods of lower water levels. Groundwater discharge increases the washing out of fine-grained materials along the riverbank and leads to bank erosion (Thurber 2019). Thurber (2019) determined that it is also probable that the irrigation activities of the adjacent upslope golf course may be increasing the amount of seepage discharges into the river and thus exacerbating these erosional effects. Thurber (2019) identified ten (10) locations affected by erosion and slumping in addition to the two locations identified in their previous 2017 report. Five of the identified locations were given a high-risk level ranking.

Thurber's (2020; Appendix C) conceptual design review found that all proposed trail realignment and upgrading designs to be geotechnically feasible and were expected to provide longer-term protection from riverbank slumping to ensure ongoing operation of the trail. Minor site-specific adjustments to realignment routes were discussed during their site reconnaissance with the design team to avoid larger trees, local drainage paths and take advantage of site topography and grades. The entrance and exit points of each realigned location were also adjusted to accommodate the full extent of the erosion and probable future erosion. Thurber also provided recommendations for the use of screw piles to support the newly constructed guardrails. Screw piles are preferred by the design team for ease of delivery, installation and reduced impact to the top-of-the-bank. Thurber's full letter report can be found in Appendix C.

3.5 Vegetation

3.5.1 Methods

Vegetation in the local study area was characterized by undertaking the following tasks:

- Desktop preliminary plant community delineations using high-resolution remote imagery.
- Plant communities were classified following the *Urban Ecological Field Guide for the City of Edmonton, Alberta, Canada* (City of Edmonton 2015).
- Review of Riverside Trail Feasibility Study - Initial Environmental Overview (Spencer Environmental 2017).
- Site reconnaissance on 22 April 2020 and 13 May 2020 to photograph and verify mapped plant communities.
- A search of the Alberta Conservation Information Management System (ACIMS) (AEP 2020) for all records of special status plant species within the project area. Site accessed on 20 April 2020. The area searched consisted of legal section 3-53-24-W4M.
- Rare plant survey on 19 June 2020 of the local study area. A full species inventory from that survey is available in Appendix D.

3.5.2 Description

One plant community was mapped in the study area: Mixed Deciduous - Mixed Shrubs (MD.1) (Figure 7, Appendix A).

3.5.2.1 Mixed Deciduous - Mixed Shrubs (MD.1)

The plant community in the immediate vicinity of Riverside Trail was typical of a Mixed Deciduous - Mixed Shrubs forest in the NSRV. The forest canopy was a mature overstorey, typically 10 - 20 m in height, dominated by balsam poplar (*Populus balsamifera*) and trembling aspen (*Populus tremuloides*), with lesser amounts of white spruce (*Picea glauca*), white birch (*Betula papyrifera*), Manitoba maple (*Acer negundo*), mountain-ash (*Sorbus aucuparia*) and other ornamental species. The understorey canopy was composed of a dense shrub layer 1 - 4 m in height and a herbaceous layer comprised mostly of forbs with a few grass and sedge species also present. Shrubs included Saskatoon (*Amelanchier alnifolia*), beaked hazelnut (*Corylus cornuta*), buckbrush (*Symphoricarpos occidentalis*), Wood's rose (*Rosa Woodsii*) and prickly rose (*Rosa acicularis*). Forbs included star-flowered Solomon's-seal (*Maianthemum stellatum*), wild sarsaparilla (*Aralia nudicaulis*), northern bedstraw (*Galium boreale*), Canada anemone (*Anemone canadensis*), red and white baneberry (*Actaea rubra*), and wild lily-of-the-valley (*Maianthemum canadense*). Species observed immediately within the slump locations and along trail edges comprised more weed and non-native species compared to the surrounding forest and included common dandelion (*Taraxacum officinale*), Kentucky bluegrass (*Poa pratensis*) and smooth brome (*Elymus repens*). Common buckthorn (*Rhamnus catharticus*), a prohibited noxious weed, was observed scattered throughout this community. Canada thistle, a provincially listed noxious weed, was also observed at slump locations 1 and 6 during a site familiarization visit in 2017 (Spencer Environmental 2017).



Plate 3.1. Mixed Deciduous - Mixed Shrubs plant community along Riverside Trail (22 April 2020).

3.5.2.2 Special Status Species

In the City of Edmonton, rare plant species are considered those having an ACIMS conservation rank of S1, S2 or S3. S1 species are known from five or fewer locations in the province. S2 are species are known from 6-20 occurrences, and S3 species are known from 21-100 occurrences in the province. A search of ACIMS data conducted on 20 April

2020 returned no records of special status vascular plant species in the project area. A rare plant survey required by City Planning was conducted on 19 June 2020; no rare plant species were observed.

3.5.2.3 Weeds

The Alberta *Weed Control Act* defines two categories of weeds: noxious and prohibited noxious. Noxious weeds are generally those that are currently widespread in the province and are considered difficult to eradicate. Provincial legislation requires these species be controlled. Prohibited noxious weeds are those that are currently uncommon or absent in the province but have been identified as noxious due to their potential to invade and damage natural and cultivated systems. Alberta law requires that prohibited noxious weeds be destroyed where they are found.

Prohibited Noxious Species

One prohibited noxious weed was observed during the 19 June 2020 rare plant survey, common buckthorn (*Rhamnus cathartica*). Common buckthorn is widespread throughout Edmonton's river valley. Seeds of common buckthorn germinate readily in disturbed soils. Common buckthorn can be controlled using herbicides, burning, hand pulling and flooding (Alberta Invasive Species Council 2014); however, as with many invasive species, control is difficult and may require a multi-year effort.

Noxious Species

No noxious weed species were observed during the 19 June 2020 rare plant survey. However, creeping thistle (*Cirsium arvense*) was observed on the disturbed soils of the slump locations during the Spencer Environmental (2017) 12 July 2017 site familiarization visit.

3.6 Wildlife

3.6.1 Methods

Wildlife resources in the study area were characterized by undertaking the following tasks:

- Available habitat type, condition and quality was assessed through field observations and examination of study area vegetation data and maps.
- A search of FWMIS for all wildlife records for lands within a one kilometer radius of the local study area centre. FWMIS was accessed on 03 March 2020.
- A list of potential wildlife species present, including special status species, was generated by considering all of the above and our knowledge of Edmonton wildlife communities and occurrences (Appendix E).
- All incidental wildlife and wildlife sign observations during all site visits were recorded.
- Review of Riverside Trail Feasibility Study - Initial Environmental Overview Spencer Environmental (2017).

3.6.2 Description

3.6.2.1 Available Habitat/Connectivity

The NSRV is a regional biological corridor that is critical for wildlife movement and ecological processes within Edmonton and the surrounding areas (City of Edmonton 2007). Major wildlife corridors provide cover and resources, connecting large areas of habitat at a regional scale and can support a high diversity of species. Although the Riverside Trail exists within a relatively narrow band of forest located between the Riverside Golf Course and the NSR, the habitat that is present consists of mature riparian mixedwood forest and is contiguous with larger areas of natural habitat both upstream and downstream along the NSR. Because of the high degree of habitat complexity and ecological connectivity, this Riverside Trail area is expected to support use by an abundance of native wildlife species and to function as an important wildlife movement corridor. Several wildlife trees (i.e., trees with visible nests or cavities) were observed scattered throughout the local study area (Plate 3.2) and are expected to occur in the expanded study area owing to the mature age of the forest in this portion of the river valley.



Plate 3.2. Example of a wildlife tree with many cavities along Riverside Trail (22 April 2020)

3.6.2.2 Documented and Potential Wildlife

City Planning did not require taxa-specific wildlife surveys to be conducted in support of this environmental assessment due to the nature of the project. Based on the habitat present, however, expected species are limited to commonly occurring urban-tolerant species found

in the river valley, such as black-capped chickadee, chipping sparrow, American crow, coyote, deer, white-tailed jackrabbit and deer mice. During the 22 April 2020 site visit, mallards, common goldeneye, black-capped chickadee, red squirrel and least chipmunk were observed in the local study area. Signs (e.g. gnawed trees) of beaver activity were also observed. A list of all wildlife species potentially occurring in the local study area is provided in Appendix E.

3.6.2.3 Special Status Species

Based on species habitat requirements, an understanding of the available habitat in the local study area, provincial species distributions and species records in the FWMIS database, several special status species were identified as having potential to occur in the project area. The following section discusses the potential occurrence of species that are ranked by the Province that are *At Risk* or *May Be At Risk*, or, have been federally assessed by the Committee on the Status of Endangered Wildlife in Canada (COSWIC) as either *Endangered*, *Threatened*, or *Special Concern*, and were rated in this study as having at least a moderate likelihood of occurrence within the study area. In addition, all species on Schedule 1 of the *Species at Risk Act* (SARA) with ranges that include Edmonton and for which suitable habitat is available in the project area are included for discussion. Species having a provincial status of *Sensitive*, but no federal status, hold no potential to trigger project considerations beyond those applicable to wildlife in general, and, thus, are not discussed, even if their potential for occurrence was considered moderate or high.

The FWMIS search returned a record of one special status species within one km of the project area with potential to occur in the project area: northern myotis. We identified one additional species on Schedule 1 of SARA with suitable habitat in the project area: little brown myotis. Table 3.2 includes an overview of each species status, likelihood of occurrence and potential habitat use in the study area.

Table 3.2. Special Status Wildlife Species with Potential to Occur in the Project Area

Common Name	Provincial Status (General Status of AB Wild Species 2015)	Wildlife Act Designation*	COSEWIC Designation	SARA Designation	Observed/ Previous Record	Likelihood of Occurrence	Potential Habitat Use
Northern Myotis	May Be At Risk	Data Deficient	Endangered	Endangered (Sched 1)	FWMIS (2020)	Moderate	Roosting, foraging
Little Brown Myotis	May Be At Risk	None Given	Endangered	Endangered (Sched 1)		Moderate	Roosting, foraging

*Under the Wildlife Act, select species carry a designation of Threatened or Endangered; additional species assessed by the Endangered Species Conservation Committee (ESCC) also have these designations

Little brown myotis utilizes tree crevices (especially old dead or dying trees in mature deciduous forests) for roosting and maternity roosts during the breeding season, they may also utilize buildings or bridges, however, none are present in the local study area. Northern myotis are more dependent on trees for summer roosting and maternity roosts, utilizing a wide range of tree species (deciduous trees preferred) in primarily intact forests (AESRD 2009 and Alberta Community Bat Program 2018). Based on our understanding of species-habitat associations, the combination of mature trees and the proximity of the NSR results in a moderate potential for little brown myotis and northern myotis to occur in the study area during the growing season as a roosting site. Neither species is known to overwinter in the Edmonton area. Legal protection currently only extends to overwintering hibernacula and does not cover individual bats. The protection of individual bats and roost sites exists as a best management practice in line with emerging bat conservation efforts.

3.7 Historical Resources

3.7.1 Methods

Circle CRM Group Inc. (2020) prepared an application pursuant to the *Historical Resources Act* (HRA) in support of the proposed project. They undertook a desktop review of the provincial Listing of Historic Resources (October 2019), project concept drawings and aerial photographs with an overlay of the project footprint. The application was submitted to Alberta Culture, Multiculturalism and Status of Women (ACMSW) on 07 July 2020 for the department's review and comment regarding possible requirements pursuant to the HRA.

3.7.2 Description

Circle CRM (2020) determined that the proposed trail project crosses lands assigned a Historic Resource Value (HRV) of 4 (contains a historic resource that may require avoidance) and 5 (high potential to contain a historic resource) for archaeology owing to the proximity of five known historic resources sites. A sixth known historic site is situated within the project footprint, however it is of limited significance (HRV 0). In addition, the project area is located within a High Archaeological and Palaeontological Resource Sensitivity Zone. Given these designations, Circle CRM determined that *Historical Resource Act* approval would be required prior to proceeding with any construction activities that include ground excavation. *Historical Resources Act* Approval was granted on 29 July 2020 (Appendix F).

3.8 Recreation

Riverside Trail is a granular trail that forms part of City's river valley trail system that extends throughout much of the NSRV. This section of the Riverside Trail connects the Forest Heights Neighbourhood to the NSRV SUP system. This trail is currently temporarily closed to users due to safety concerns, however, the public continues to use the trail.

4.0 THE PROJECT

4.1 Project Description

This project addresses a total of seven (7) trail slump locations. Five sections are to be realigned; two sections are to remain in place with safety concerns addressed through installation of a guardrail. Two of the realigned trail sections will also have guardrails (Table 4.1) (Appendix G). There are an additional three (3) low spots along the trail that have been identified for upgrading (Appendix G).

Table 4.1. Riverside Trail rehabilitation components for each location.

Location #	Realignment (Length)	Fence Line Adjustment (Length)	Revegetation	Guardrail Installation (Length)	Upgrading (Length)
1	✓ (96 m)		✓		
2	✓ (54 m)		✓		
3	✓ (48 m)	✓ (37 m)	✓		
4	✓ (33 m)	✓ (25 m)	✓	✓ (10 m)	
5				✓ (15 m)	
6	✓ (31 m)	✓ (25 m)	✓	✓ (15m)	
7				✓ (25 m)	
Upgrade 1					✓ (10 m)
Upgrade 2					✓ (45 m)
Upgrade 3					✓ (20 m)

Trail and Fence Line Realignments

Trail realignment is proposed for trail locations 1, 2, 3, 4 and 6 for lengths ranging from 31 m to 96 m (Table 4.1). The new trail sections will be 1.5 m wide granular trails and will require a 3.5 m wide clearing width (Appendix G). Trees located within the clearing width range in size between 60 mm and 210 mm diameter at breast height (DBH). Larger trees of higher value will be avoided to the extent possible.

At some locations, the existing Riverside Golf course fence line must be adjusted to accommodate trail realignment (Table 1). Those locations will include installation of new sections of 2 m high black vinyl coated chain link fence along the existing grey chain link fence.

For locations requiring trail realignment, the section of existing trail will be decommissioned and revegetated to discourage use by recreationalists.

Guardrails

New wooden guardrails, ranging in length from 10 m to 25 m, are proposed for trail locations 4, 5, 6 and 7 along the downslope edge of the granular trail (Appendix G). Guardrails will be constructed on screw piles drilled at least 3 m below the ground surface to avoid seasonal frost heave and will be 1.2 m in height.

Trail Upgrading

Trail upgrading of three low spot areas (Figure 2, Appendix A) will comprise clearing, scarifying and compaction the existing 1.5 m trail prior to placement of filter fabric and geogrid on the existing trail surface followed by the addition of 150 mm of granular material. Trail edges will be rehabilitated/graded as needed to ensure surface drainage does not flow over the top-of-bank toward the river.

The majority of tree/vegetation removal for the proposed project will be completed by the City of Edmonton Forestry Department in fall/winter 2020/21 before construction begins in spring 2021 (May). Some selective vegetation removal may need to be completed by the contractor in consultation with City Forestry once construction begins. Vegetation removal will be minimal (approximately 962 m²) for trail rehabilitation (Plate 4.1). No vegetation will need to be cleared for guardrail construction (Plate 4.2).



Plate 4.1. Vegetation to be cleared for trail realignment (3.5 m wide) at Location 1 (22 April 2020).



Plate 4.2. Location 5 where a guardrail is proposed, devoid of significant vegetation cover (22 April 2020).

4.2 Landscaping

Existing trail sections proposed to be decommissioned will be revegetated with native trees and shrubs and seeded with an appropriate seed mix (Table 4.1). The total area to be revegetated is approximately 554 m². To discourage recreationalists from using the old trail large caliper sized trees will be planted and boulders will be placed at each trail entrance points (EDA 2020). In areas where the golf course fence line is adjusted (Table 4.1), a naturalized screen will be planted along the golf course side of the fence, setback by approximately 2 m where possible. Native trees and shrubs will be used to create these screens.

Detailed restoration plans will be included in the Tender documents. Restoration will involve the use of native plantings with a bio-engineering approach to help stabilize abandoned trail and slump locations. A vegetation protection plan will be included in the restoration plans.

4.3 Construction Schedule

Construction is anticipated to begin in May 2021. Construction will take approximately 11 weeks to complete. City of Edmonton Forestry will complete tree clearing for the project in late fall 2020/early winter 2021. Tree clearing will take place before 15 February to avoid disturbance to breeding owls.

4.4 Construction Laydown Area and Access

No construction access is permitted from or through Riverside Golf Course at any time of year so construction access and a laydown area were identified outside the golf course

lands. A fenced construction laydown area will be established in the uppermost portion of the Riverside Golf Course overflow parking lot located on the south side of Rowland Road (EDA 2020). Construction access to the project area will be along the existing Riverside Trail that extends from the overflow parking lot, under Dawson Bridge and north along the riverbank. Small-sized equipment (no more than 2.5 m in width and height) will be used to access the project area and to undertake the trail realignment, rehabilitation and upgrading activities (EDA 2020). Some existing vegetation will need to be trimmed to accommodate construction access in tight areas. An existing guardrail may also need to be temporarily removed during construction to accommodate access. The active construction area along the trail will be closed to recreationalists and will be fenced for security purposes during construction. Minimal access onto the golf course will be required to install new fencing and vegetation screens, care will be taken to avoid damage to the golf course greens in these areas (EDA 2020).

4.5 Project Phases and Associated Key Activities

The project will comprise the following phases (EDA 2020):

Phase 1: Existing Fencing and Vegetation Removal

- Sections of the existing chain link fence will be removed at the proposed trail realignment locations and disposed of off site to allow for vegetation removal.
- Removal of existing vegetation will be completed by the City of Edmonton's Forestry Department in fall 2020/winter 2021 to avoid the breeding bird nesting season (20 April to 20 August) and after the golf course is closed for the season (31 October 2020).
- All cleared vegetation will be removed from site.

Phase 2: Fencing Installation

- The sections of new realigned black chain link fence will be installed to ensure the golf course perimeter remains secure.

Phase 3: New Realigned Trail Construction

- Project construction will begin at the east end of the project area and move in a westward direction.
- Once the chain link fencing has been installed, organic material will be stripped from the cleared trail realignment areas in preparation for granular trail construction.
- New trail construction will comprise placement of granular material, compaction and material testing.

Phase 4: Restoration of Existing Trails and Guard Rail Installations

- Project construction will begin at the east end of the project area and move in a westward direction.

- Existing sections of trail areas that have been realigned will be restored with topsoil, naturalized vegetation and naturalized seed mix. Boulders will be placed at both trail entrance points at each location.
- Guardrails will be installed at four locations in the project following completion of trail restoration activities.

Phase 5: Landscape Screening on Golf Course and Finishing Work

- Prior to the Riverside Golf Course reopening in spring 2021, the proposed screening material and planting bed on the golf course side of the fence will be installed. This will be accomplished by temporarily opening the chain link fence mesh at each location for site access from Riverside Trail.

Phase 6: Project Close-Out/Quality Control

- When all work has been completed the contractor will rectify any noted deficiencies prior to proceeding with a CCC/FAC review and inspection by the City.

5.0 PROJECT IMPACTS AND MITIGATION MEASURES

5.1 Assessing Impacts

5.1.1 Potential Impact Identification and Analysis

Based on the environmental context described in Section 3, the following Valued Ecosystem Components (VECs) were identified for impact assessment: surface water quality, vegetation, wildlife and recreation. For each VEC, potential impacts to be examined were identified by overlaying the project drawings on mapped resources, reviewing project activities, conferring with multidisciplinary project team members, reviewing project reports and applying our professional experience with impact assessment and construction performance auditing in other, similar, projects. This process resulted in identification of specific potential impacts that warranted assessment.

In addition, we separately examined the potential for the following select project incidents to occur and impact natural resources:

- Release of hazardous/deleterious substances in or outside of the project area and potential for mitigation off-site.

5.1.2 Impact Characterization

Identified impacts were characterized according to guidance received from the EIA Terms of Reference (Table 5.1). Potential impacts were characterized with respect to nature (positive or negative, direct or indirect), magnitude (negligible, minor, or major), duration and timing (temporary, permanent or seasonal), geographic extent and likelihood. These criteria were defined as shown in Table 5.1:

Table 5.1: Impact Descriptor Definitions.

<i>Nature of Impact</i>	
Positive Impact	An interaction that enhances the quality or abundance of physical features, natural or historical resources.
Negative Impact	An interaction that diminishes the abundance or quality of physical features, natural resources or historical resources.
Direct	An interaction that results in the loss or reduction of a resource/feature.
Indirect	An interaction that results in off-site impacts, such as sedimentation off-site.
<i>Magnitude</i>	
Negligible Impact	An interaction that is determined to have essentially no effect on the resource. (Such impacts are not characterized with respect to direction duration or confidence.)

Minor Impact	An interaction that has a noticeable effect but does not eliminate a local or regional population, physical feature or affect it beyond a defined critical threshold (where that exists).
Major Impact	An interaction that affects a local or regional population, resource, or physical features beyond a defined critical threshold (where that exists) or beyond the normal limits of natural perturbation.
<i>Duration and Timing</i>	
Temporary Impact	A change that does not persist indefinitely.
Permanent Impact	A change that persists indefinitely.
Seasonal Impact	A change that will terminate or diminish significantly after one season.
<i>Geographic Extent</i>	Extent of area affected. Quantify where feasible.
<i>Likelihood</i>	What is the probability that the impact will occur? Is it likely or unlikely?

When applying these descriptors, we considered the project described in Section 4. No additional mitigation measures were applied at the time of potential impact characterization.

5.1.3 Mitigation Development and Residual Impact Assessment

Mitigation measures were developed for all identified negative impacts. Any impact anticipated to remain following mitigation implementation was termed a residual impact. As with potential impacts, residual impacts were characterized with respect to: nature, magnitude, duration and timing, geographic extent and likelihood.

5.2 Impact Assessment Results and Mitigation Measures

5.2.1 Hydrology/Surface Water Quality

Due to the proximity of Riverside Trail to the North Saskatchewan River at the top-of-bank, construction activities related to trail rehabilitation have the potential to create sediments that could enter the NSR. There is also potential for accidental releases into the river. Any spills or mobilized sediment on site could enter the NSR and travel downstream. These types of impacts are assessed below in Section 5.2.6. The following additional potential impact to surface water quality was identified as needing examination:

- Erosion of trail from river flooding

5.2.1.1 North Saskatchewan River Flooding

Impacts

The existing Riverside Trail in the local study area is entirely located in the flood hazard area (1:100 year flood) of the NSR, and, as a result, will experience occasional flooding as it currently does (Figure 4, Appendix A). In order to reduce the risk of ongoing trail damage and erosion from flooding at the slump locations, the proposed trail realignments are located at a relatively higher elevation compared to the existing trail and are located as far back from the top-of-bank as possible given the limitations of the adjacent golf course boundary. While infrequent river flooding is expected to result in continued bank erosion in the project area, realignment of the trail at the slumped locations is expected to improve the integrity of the trail over the short-term and reduce the amount of sediment generated at these locations. The impact to river water quality from trail erosion would be negligible.

Mitigation and Residual Impacts

Space to move the trail further away from the NSR is limited due to the Riverside Golf Course and associated fencing, and the alignment of the existing trail. Portions of the trail may experience infrequent flooding, and subsequent periodic trail maintenance may be required depending on the extent of flooding. In addition, restoration of the decommissioned sections of trail with natural vegetation will further reduce erosion and sedimentation into the river from the trail in the project area. Residual impacts to river water quality from trail erosion, however, remain negligible.

5.2.2 Vegetation

The following potential impacts to vegetation were identified as needing examination:

- Loss or alteration to native forest
- Establishment of invasive or weedy species
- Incidental tree damage

5.2.2.1 Loss or Alteration to Native Forest

Impacts

The proposed project requires clearing of some portions of native river valley forest to accommodate trail realignment and construction equipment access. Areas where the trail is to be realigned will require a 3.5 m wide area of vegetation to be cleared, resulting in a total area of 962 m² of vegetation loss. Some vegetation immediately adjacent the 3.5 m wide clearing area (i.e., within 5 m on either side of the clearing area) may be indirectly impacted by tree clearing for the new trail due to root damage and windfall along the new trail edge. All trees removed are included in the City's tree inventory and have been assessed by City Forestry. The decommissioned existing trail will be revegetated with native trees and shrubs, resulting in a gain of 554 m² of new forest. The total loss of native forest is, therefore, 408 m². Additionally, natural plantings to screen the golf course along adjusted fence lines will also result in a minor gain of vegetation. The newly planted vegetation will also help stabilize the top-of-bank adjacent the NSR further improving the

integrity of the trail area. Removal of a relatively small area of native forest, therefore, is rated as a negative, direct, minor, temporary to permanent, local and likely impact.

Mitigation and Residual Impacts

Prior to construction, marking the project clearing limits with highly visible flagging will minimize the extent of vegetation loss. Efforts will be made to minimize tree removal along the trail alignment as much as possible. On-site trail adjustments will be made during vegetation clearing to avoid larger trees as much as possible. Any trees belonging to Edmonton's tree inventory that are damaged or removed must be replaced pursuant to the City's *Corporate Tree Management Policy*. Replacement plantings will occur on site. Also pursuant to this policy, retained trees in close proximity to construction activities (i.e., within 5 m) will be protected/hoarded as required by City policy and protocols to protect them from damage (e.g. root damage). If, for some reason, plans change and additional trees need to be removed, they will be appraised by the City and replaced according to the *Corporate Tree Management Policy*. With these mitigative measures implemented, the residual impacts will be reduced to negligible as required by policy.

5.2.2.2 Establishment of Invasive or Weedy Species

Impacts

Surface disturbance from construction could create ideal conditions for the establishment and spread of noxious weed species. Weeds could become established following construction through the movement of seeds and rhizomes carried in on equipment as well as by colonization by seeds transported naturally from adjacent weed populations. Weed establishment in the project area is undesirable as weeds may then spread to surrounding native plant communities within the NSR valley. Preventing weed establishment in the first place may be the best and most economical opportunity for weed management. In the absence of mitigation, the spread of weedy species within reclaimed areas will likely occur and will have a negative, direct, minor, local, permanent and likely impact.

Mitigation and Residual Impacts

Precautions such as cleaning equipment before moving into the project area will help reduce the potential transfer and spread of weedy species. Cleared areas will be revegetated with topsoil and an appropriate seed mix approved by the City of Edmonton Facility and Landscape Infrastructure Branch as soon as possible following construction. Some level of weed control will likely be required until desired vegetation becomes established, but the need for such measures can be assessed through monitoring. All short-term weed control measures will be outlined in the contractor's Environmental Construction Operations (ECO) Plan. With proper implementation of these measures, the residual impact will be reduced to negligible.

5.2.2.3 *Incidental Tree Damage*

Impacts

Construction will take place within a native forest putting trees adjacent to the project limits at risk of limb, trunk and root damage during construction. The potential for such tree loss or damage is rated as a negative, indirect, minor, permanent, local and likely impact.

Mitigation and Residual Impacts

Compliant with the City's *Corporate Tree Management Policy*, the proponent's contractor will be required to prepare a Tree Protection Plan. That plan will include measures to physically protect trees or the margins of the project area. Monitoring of tree protection efficiency and recording of incidental damage, will be required of the contractor. With these measures in place, the residual impact is rated as negligible.

5.2.3 *Wildlife and Wildlife Habitat*

The following potential impacts to wildlife and wildlife habitat were identified as warranting examination:

- Loss of terrestrial habitat due to clearing activities
- Habitat alienation during construction and operation
- Breeding wildlife mortality
- Mortality or disturbance of special status species

5.2.3.1 *Loss of Terrestrial Habitat Due to Clearing Activities*

Impacts

Relatively small areas of native vegetation clearing, and, thus, loss of terrestrial wildlife habitat, will be required for the proposed trail alignment project. Despite the required clearing of natural vegetation, relatively abundant terrestrial habitat will be retained in the local study area and will be suitable for all species likely to be present. Clearing of native vegetation along the sections of trail realignment will primarily impact avian and small mammal species with preferences for tall shrub and woodland habitat preferences. Considering the amount and diversity of habitat that will be retained and the amount of clearing that has already occurred from other land uses, the relatively small loss of native habitat is not expected to have detectable impacts on wildlife species diversity (i.e., richness and abundance) or population dynamics in the local study area. The impact of trail realignment construction on the loss of native habitat is rated as negative, direct, minor, temporary to permanent, local and likely.

Mitigation and Residual Impacts

Applying all mitigation measures outlined in Section 5.2.2.1 above will also mitigate habitat loss. Overtime, the residual impact will be negligible.

5.2.3.2 *Habitat Alienation During Construction*

Activities and noise associated with construction phases have potential to disrupt wildlife species using adjacent habitat, leading to habitat alienation in those areas. This effectively reduces the amount of useable habitat available to individuals. However, in this case, this potential impact has been rated as minor for the following reasons:

- Most wildlife species in the area are likely already adapted to human disturbance.
- Additional disturbance caused by construction activity is expected to be a minor contribution to the existing human presence in the study area (e.g. recreational trail users, adjacent golf course).
- Construction disturbance will be periodic over the construction period, and location specific within the project area.
- Construction will typically occur during daylight or early evening hours, leaving adjacent areas relatively undisturbed for nocturnal species.
- The area being impacted is an existing narrow strip of habitat bounded by the NSR and the Riverside Golf Course fence.

Considering all the above, the impact of habitat alienation during construction activities is rated as negative, indirect, minor, temporary, local and likely.

Mitigation and Residual Impacts

Few mitigation measures are available. Work crews will be instructed not to harass wildlife and the contractor's ECO plan will include worker/wildlife encounter protocols. The residual impact is therefore also rated as negative, indirect, minor, temporary, local and likely.

5.2.3.3 *Breeding Wildlife Mortality*

Impacts

Clearing of vegetation, can cause wildlife mortality, particularly during the spring and summer breeding season when the mobility of many species is restricted. During those times, adults remain close to nest sites, and young are restricted to nests or not yet able to move long distances. To protect wildlife, and particularly nesting birds protected by the *Migratory Birds Convention Act* (MBCA) and *Wildlife Act*, current best management practices provided by Environment and Climate Change Canada (ECCC) recommends avoiding vegetation clearing during the period when there is a high probability of nesting activity (i.e., high risk period). This extends to the removal of individual ornamental trees and weedy, grassy areas because commonly occurring species such as the American robin and clay-colored sparrow, which may use those areas for nesting, respectively, are covered by the legislation. When this practice is not adopted and in the absence of other mitigation measures (e.g., nest search), there can be high potential for nest disturbance. Further, owls that occur in Edmonton are protected under the *Wildlife Act* and are early nesters. Clearing during the period 15 February and 20 April without regard for nesting owls can result in owl nest disturbance and nestling mortality. There is high potential for birds to nest in the mature trees throughout the project area. Active nests in trees during removal could be in

conflict with legislation. Should clearing due diligence not be employed, wildlife mortality resulting from clearing could occur. This would be a negative, direct, major, permanent, local, likely impact. It is rated as major because it represents contravention of the law.

Mitigation and Residual Impacts

In this region, wildlife mortality from vegetation clearing (including brush piles and tall grass) is best avoided by scheduling clearing outside the period 20 April to 20 August. In addition, to respect the possibility of nesting owls, clearing of mature trees during the period 15 February and 20 April should be avoided. Therefore, if possible, this project will avoid any tree and shrub clearing/removal during the period 15 February and 20 August. If clearing/removal must occur during this time period, nest sweeps by a qualified biologist will be required to identify active nests and appropriately buffer them until the nest is no longer active. With these measures in place, wildlife mortality should be avoided, and the residual impact would be negligible.

5.2.3.4 Mortality or Disturbance of Special Status Species

Impacts

Northern myotis and little brown myotis both have a moderate likelihood of occurrence in the project area during summer months. Suitable foraging and roosting habitat is available in the project area, as mature deciduous trees are preferred for roosting. While clearing of vegetation can cause bat mortality, the potential for mortality of individual, solitary bats roosting on trees during daylight hours is low and of little concern to bat conservation. In addition, this project is not on federal lands and maternity and individual day roosting sites for these species are not yet identified by SARA as critical habitats nor are they protected by the provincial *Wildlife Act*. Direct impacts to these species from the proposed project are, therefore, ranked as negligible.

Mitigation and Residual Impacts

Best management practices for conservation of this special status species are still warranted. In this case, those practices include following the vegetation clearing best practices described above in 5.2.3.3, namely, by scheduling clearing outside the period 20 April to 20 August to avoid wildlife mortality, including bats. With these measures in place, the residual impact to little brown myotis and northern myotis from the proposed project remains negligible.

5.2.4 Recreation

The following potential impacts to recreation were identified as needing examination:

- Disturbance to existing recreational use from construction activities
- Improved trail integrity

5.2.4.1 *Disturbance to Existing Recreational Use from Construction Activities*

Impacts

The City has temporarily closed the section of Riverside Trail in the project area until trail rehabilitation can be undertaken, however, the public continues to use the closed trail. Trail rehabilitation construction activities will require temporary and fenced closure of Riverside Trail to prevent recreationalists from accessing the active construction area. As a result, recreationalists will be temporarily inconvenienced by detours during construction.

The potential impacts to recreational use from construction activities are rated as a negative, direct, minor, temporary, local and likely impact.

Mitigation and Residual Impacts

Temporary fencing will be installed to prevent public access into active construction areas. Detour routes will be clearly identified. Signage must be clearly posted indicating a project contact person and prime contractor, and shall include project information, construction duration and phone number for inquiries. Signage shall be removed within two weeks of construction completion. With these measures in place, residual impacts will be negligible.

5.2.4.2 *Improved Trail Integrity*

Impacts

Trail integrity in the local study area will be improved from the proposed project compared to existing conditions. The new realigned trail sections will be located away from the slumping riverbank, and guardrails will be installed where the trail will not be realigned to keep trail users away from the edge of the riverbank. The impacts to trail integrity are expected to be positive, direct, major, permanent, local and likely.

Mitigation and Residual Impacts

No additional mitigation measures are required. The residual impact remains positive, direct, major, permanent, local and likely.

5.2.5 *Project Incidents*

5.2.5.1 *Release of Sediment or Other Debris On or Off-site*

Impacts

Trail construction activities will result in the removal of vegetation and exposing of bare soil surfaces, likely for extended periods of time. Construction activities on exposed soils can result in erosion and loss of top-soils and sub-soils, degradation of top-soil quality, weakened slope stability, or introduce sediments directly into the NSR. In areas where existing vegetation cover is cleared, exposed soils are susceptible to fluvial (surface water) erosion in wet conditions, and, to a lesser extent, aeolian (wind) erosion in dry conditions. The clearing of vegetation on steep slopes will expose soils that are especially susceptible to erosion resulting from surface runoff given high slope gradients. Eroded soils can accumulate in downslope undisturbed vegetated areas. If mitigation measures (controls and

clean-up measures) are not put into practice, the impact on vegetation, habitat and the NSR would be negative, direct, minor to major, permanent, local and likely.

Mitigation and Residual Impacts

The contractor will be required to comply with City of Edmonton's Enviso system. In addition, for the construction period, the contractor will be required to prepare a site-specific temporary ESC plan, to City of Edmonton specifications, and a site-specific water management plan. These plans will also include monitoring protocols and frequency. With these plans in place the residual impact of sediment or other debris release off site or to the river should be negligible.

5.2.5.2 Release of Hazardous/Deleterious Substances On or Off-site

Impacts

Fuels, lubricants and other hazardous materials are anticipated on-site. Spills or releases can occur during refueling, as a result of equipment failure (e.g., leaking hose), accidents, or improper storage/containment at sites. While large spills are generally preventable during construction of projects such as this one, incidental, small spills typically occur at most construction sites. Small spills, if uncontrolled, can spread over larger areas. In this case, even localized spills could contaminate soils and plant communities on and off site. This project is located very close to the steep NSR bank, therefore, there is a high potential for spilled material to enter the river.

If appropriate plans and practices are not put into place, there is potential for a hazardous or deleterious substance spill to result in a negative, direct, minor, permanent, local and likely impact on local resources such as plants, soils and river water quality.

Mitigation and Residual Impacts

The contractor will be required to comply with City of Edmonton's Enviso system. In addition, for the construction period, the contractor will be required to provide a spill prevention and emergency response plan. The plans must also include construction monitoring protocols and frequency. With these in place the residual impact should be negligible.

5.3 Cumulative Effects

The cumulative effects study area was defined as the river valley bottom between Dawson Bridge and Capilano Bridge. The assessment considered past projects, known present projects and publicly announced future projects.

5.3.1 Past Projects

Based on a review of aerial photography, the developed footprint in the cumulative effects study area has remained essentially the same since the early 2000's.

5.3.2 Present Projects

There are no known current projects taking place in this area.

5.3.3 Future Planned Projects

The City is planning rehabilitation works on Dawson Bridge within the next 10 years.

5.3.4 Conclusion

As the proposed project represents a stand-alone project and comprises minor realignments of sections of an existing river valley trail, it will not act as a catalyst for additional future development in this area. The proposed project, therefore, has no potential to add to the cumulative impact of past projects, nor contribute to cumulative impacts of present or future projects.

6.0 ENVIRONMENTAL MONITORING

This EIA identifies several monitoring commitments for the City:

- Pursuant to the City of Edmonton's Enviso program, Environmental Construction Operations (ECO) Plan monitoring during site preparation and construction phases of the project must be completed weekly.
- Monitoring is required by the Erosion and Sediment Control Plan, to be undertaken by a Certified Professional in Erosion and Sediment Control (CPESC) or equivalent.

7.0 PUBLIC CONSULTATION

The City of Edmonton Integrated Infrastructure Services held a stakeholder meeting for the Riverside Golf Course golf leagues in September 2019 in support of proposed trail realignment at two locations along Riverside Trail. A representative from one golf league attended and provided feedback to the City.

A second round of stakeholder engagement with all four of the Riverside Golf Course leagues took place from 12 June 2020 to 26 June 2020 by email. The intent of the email was to solicit feedback on five additional trail realignment and upgrading locations and the associated need to realign and replace the golf course fence at three locations, Sites 3, 4 and 6, with black chain link fence and natural vegetation screening (J. Nakonechny, *pers. comm.*). No responses were received.

The City will continue to collaborate with the Riverside Golf Course and respective golf leagues as the trail realignment project advances to the next phases.

8.0 CONCLUSIONS

8.1 *Impact and Sensitivities*

This EIA has shown that with the described mitigation measures applied, all but one impact related to the construction phase of the project can be mitigated such that adverse residual impacts are reduced to negligible.

The key sensitivities identified for the proposed project, therefore, are:

- habitat alienation during construction

The project is anticipated to result in one temporary negative residual impact related to wildlife during construction. Construction activities and related noise have the potential to result in wildlife habitat alienation in adjacent areas. Activities and noise associated with construction phases have potential to disrupt wildlife species using adjacent habitat, leading to habitat alienation in those areas. This effectively reduces the amount of usable habitat available to individuals. Few mitigation measures are available, however, work crews will be instructed not to harass wildlife and the contractor's ECO plan will include worker/wildlife encounter protocols.

Considering the above, and that communication with City stakeholders remains open during project development, we are of the opinion that the proposed project does not require additional modifications to proceed responsibly.

8.2 *EIA Limitations*

This EIA was founded on conceptual design drawings and reports and limited construction methodology information. The EIA was predicated on the knowledge that the City's construction contractor will develop environmental controls intended to induce excellent environmental performance during construction.

8.3 *Summary of Key Mitigation Measures*

The following represents a list of key mitigation measures selected to itemize important action items for future project stages. All mitigation measures should be included in the Contractor's ECO Plan.

- The City must ensure that the construction contractor adheres to all the mitigation measures listed in Section 5.2.2 and distilled here to address vegetation loss and ensure compliance with the Corporate Tree Management Policy:
 - Prepare a tree protection plan
 - Revegetate exposed soils promptly
 - Discourage weed establishment
 - Implement weed control and monitoring

- The City must ensure that the construction contractor adheres to all mitigation measures listed in section 5.2.3 to mitigate potential wildlife impacts and ensure compliance with all Provincial and Federal Acts pertaining to wildlife. Note that vegetation clearing timing is a critical issue.
- The City must ensure that the construction contractor adheres to all mitigation measures listed in section 5.2.4 to mitigate potential impacts to recreation.
- The City must ensure that the construction contractor adheres to all mitigation measures listed in Section 5.2.5 and distilled here to mitigate impacts to project incidents.
 - Prepare a detailed spill prevention and emergency response plan
 - Prepare a detailed ESC Plan
 - Prepare a Water management Plan

9.0 REFERENCES

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9.1 Personal Communications

J. Nakonechny. Project Manager, Integrated Infrastructure Services, City of Edmonton. Edmonton, Alberta.

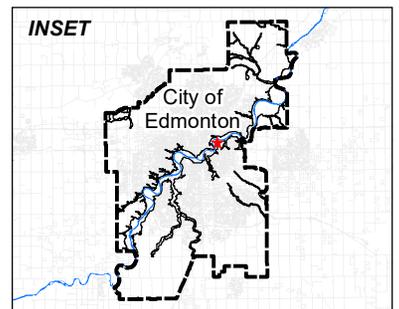
Appendix A: Figures

Figure 1.
Project Overview
Riverside Trail
Realignment
and Upgrading



Legend

- Local Study Area
- Expanded Study Area
- Bylaw 7188 Boundary (COE, 2010)
- Proposed Construction Laydown & Access Route

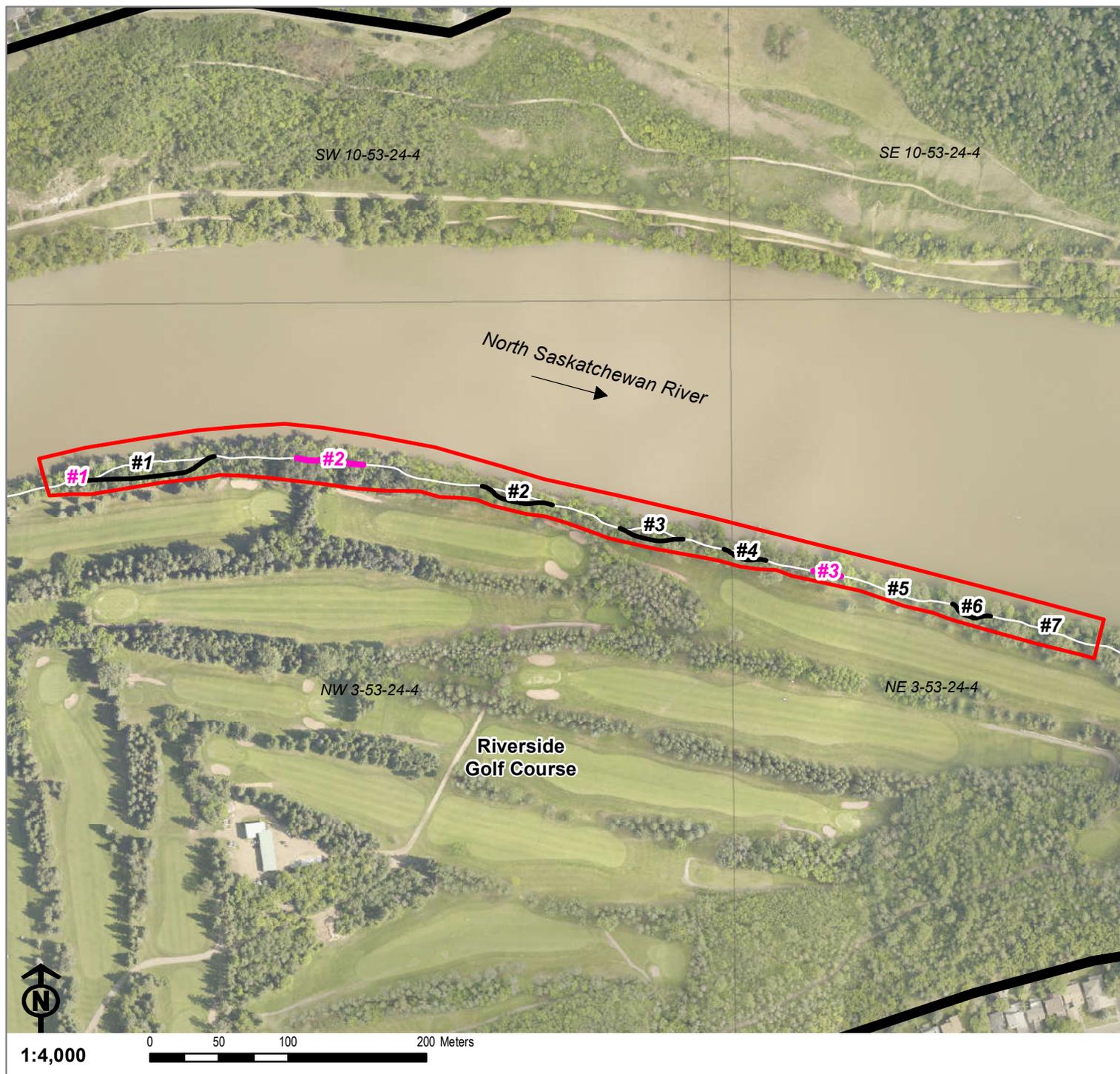


Map Date: 3 July 2020
 Mosaic Imagery Date: May-July 2019



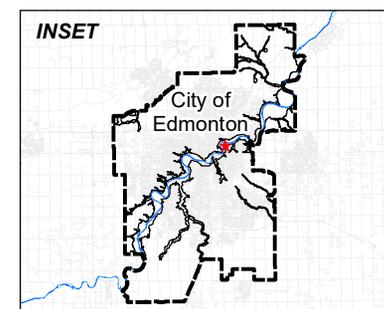
*Conceptual design provided by EDA Planning + Urban Design (2020).

Figure 2a.
Site Overview
Riverside Trail
Realignment
and Upgrading



Legend

- Local Study Area
- Bylaw 7188 Boundary (COE, 2010)
- #1 Proposed Trail Realignment Location
- #1 Proposed Trail Low Point Upgrade Location
- Existing Trail Centerline



Map Date: 3 July 2020
 Mosaic Imagery Date: May-July 2019



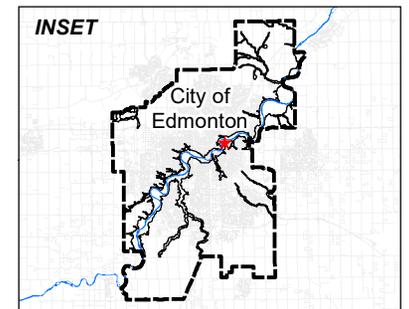
*Conceptual design provided by EDA Planning + Urban Design (2020).

Figure 2b.
Trail Realignment and Upgrading
Riverside Trail Realignment and Upgrading



Legend

- Local Study Area
- #1 Proposed Trail Realignment Location
- #1 Proposed Trail Low Point Upgrade Location
- Existing Trail Centerline
- Proposed Trail Clearing Width (3.5m)*
- Indirect Construction Impact (5m Setback)
- Proposed Fence Removal
- Proposed Fence Relocation
- Existing Fence
- Proposed Guard Rail
- Proposed Naturalized Vegetation
- Contours (COE, 2018)



Map Date: 27 August 2020
 Mosaic Imagery Date: May-July 2019



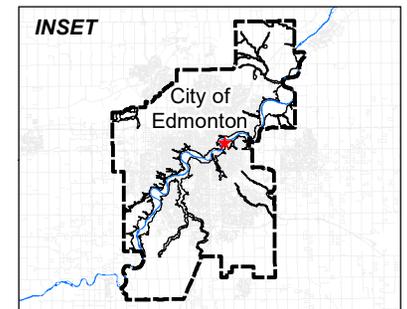
*Conceptual design provided by EDA Planning + Urban Design (2020).

Figure 2c.
Trail Realignment and Upgrading
Riverside Trail Realignment and Upgrading



Legend

- Local Study Area
- #1 Proposed Trail Realignment Location
- #1 Proposed Trail Low Point Upgrade Location
- Existing Trail Centerline
- Proposed Trail Clearing Width (3.5m)*
- Indirect Construction Impact (5m Setback)
- Proposed Fence Removal
- Proposed Fence Relocation
- Existing Fence
- Proposed Guard Rail
- Proposed Naturalized Vegetation
- Contours (COE, 2018)

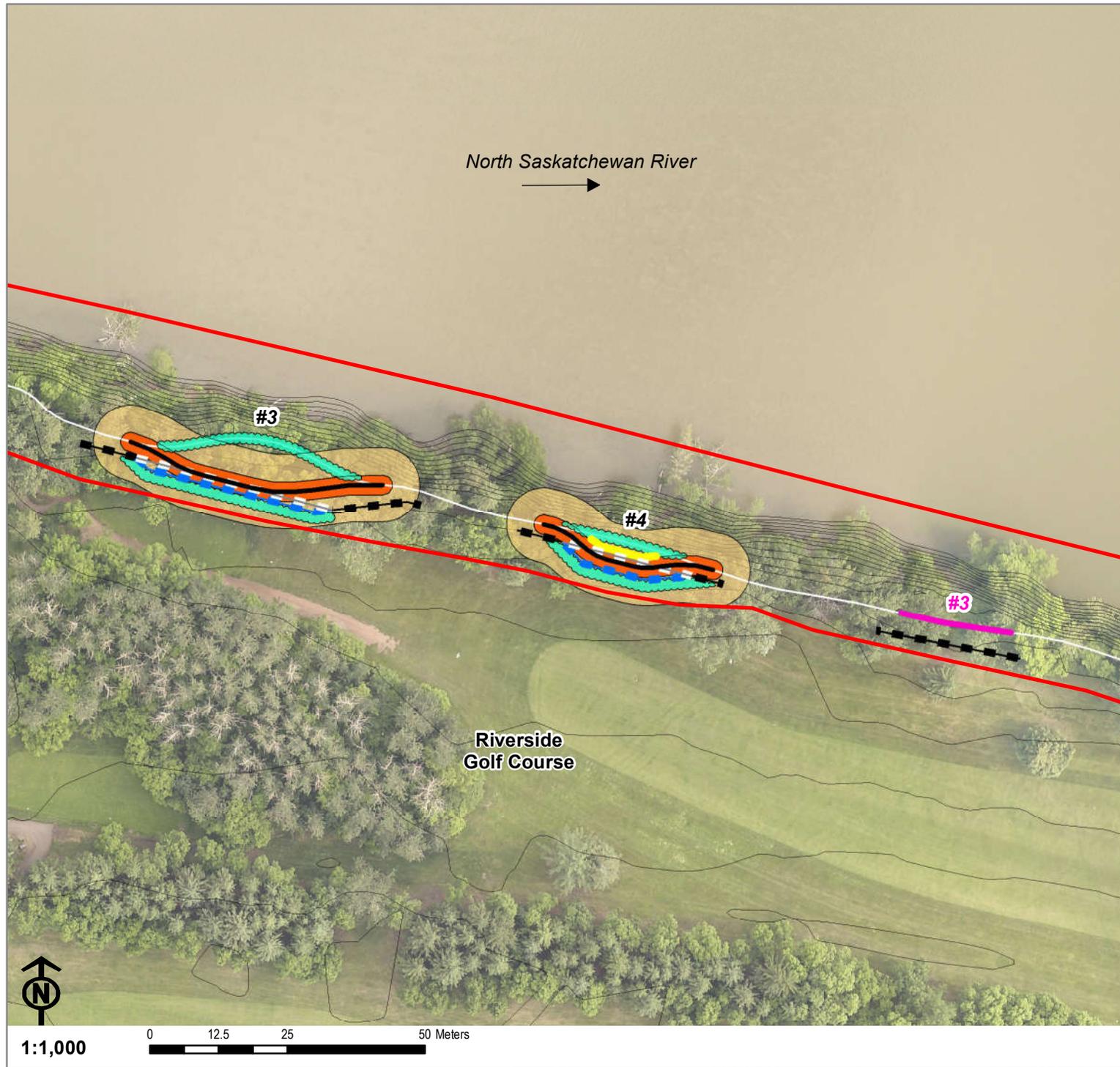


Map Date: 27 August 2020
 Mosaic Imagery Date: May-July 2019



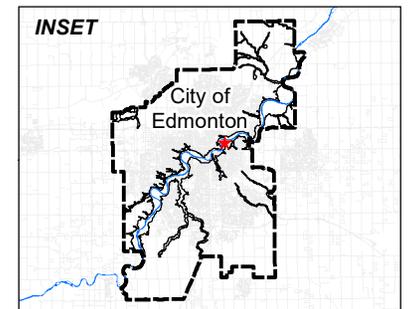
*Conceptual design provided by EDA Planning + Urban Design (2020).

Figure 2d.
Trail Realignment and Upgrading
Riverside Trail Realignment and Upgrading



Legend

- Local Study Area
- #1 Proposed Trail Realignment Location
- #1 Proposed Trail Low Point Upgrade Location
- Existing Trail Centerline
- Proposed Trail Clearing Width (3.5m)*
- Indirect Construction Impact (5m Setback)
- Proposed Fence Removal
- Proposed Fence Relocation
- Existing Fence
- Proposed Guard Rail
- Proposed Naturalized Vegetation
- Contours (COE, 2018)

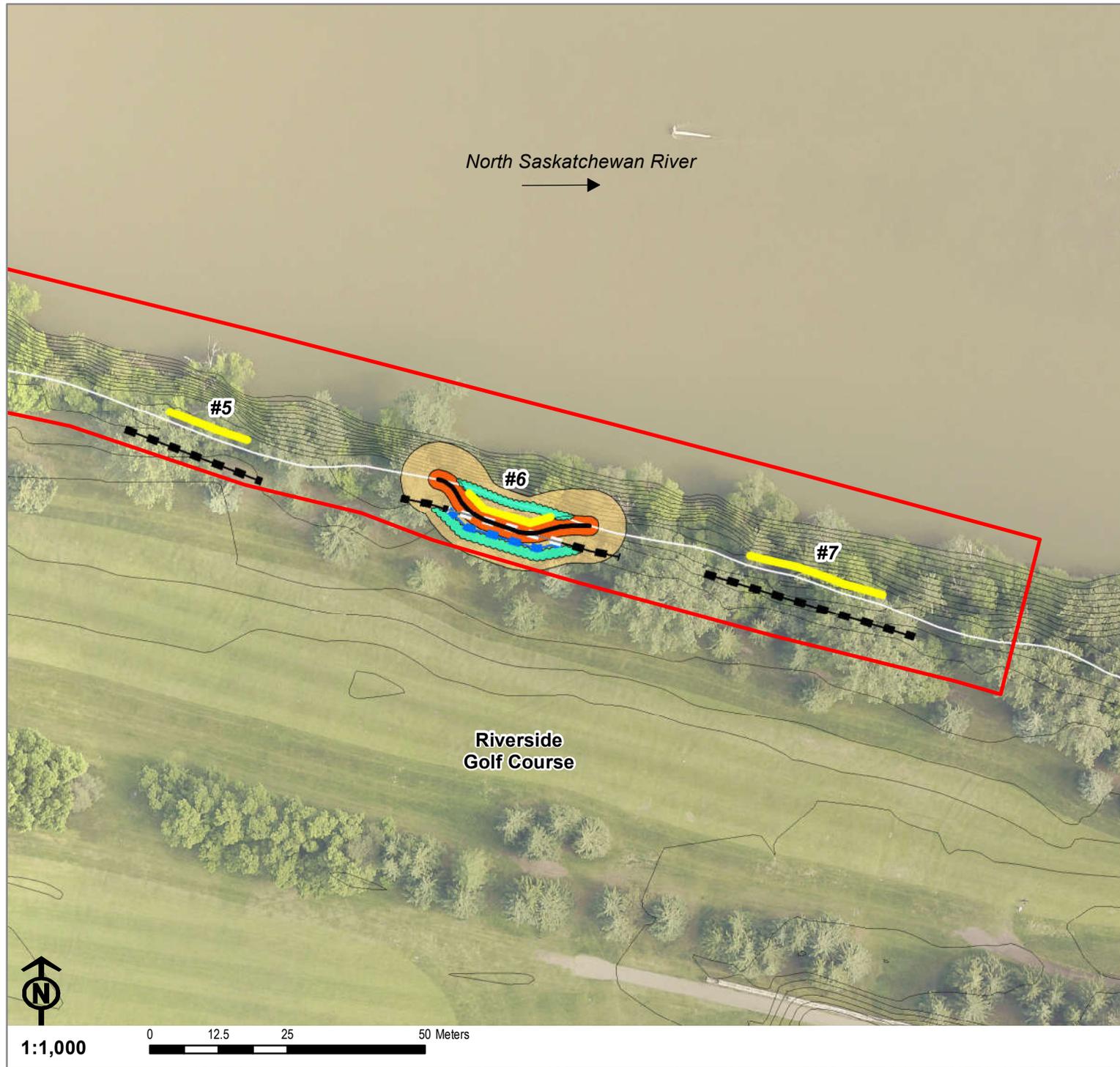


Map Date: 27 August 2020
 Mosaic Imagery Date: May-July 2019



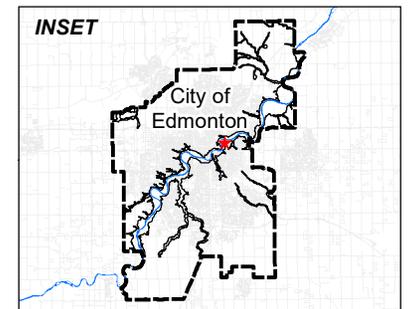
*Conceptual design provided by EDA Planning + Urban Design (2020).

Figure 2e.
Trail Realignment and Upgrading
Riverside Trail Realignment and Upgrading



Legend

- Local Study Area
- #1 Proposed Trail Realignment Location
- #1 Proposed Trail Low Point Upgrade Location
- Existing Trail Centerline
- Proposed Trail Clearing Width (3.5m)*
- Indirect Construction Impact (5m Setback)
- Proposed Fence Removal
- Proposed Fence Relocation
- Existing Fence
- Proposed Guard Rail
- Proposed Naturalized Vegetation
- Contours (COE, 2018)

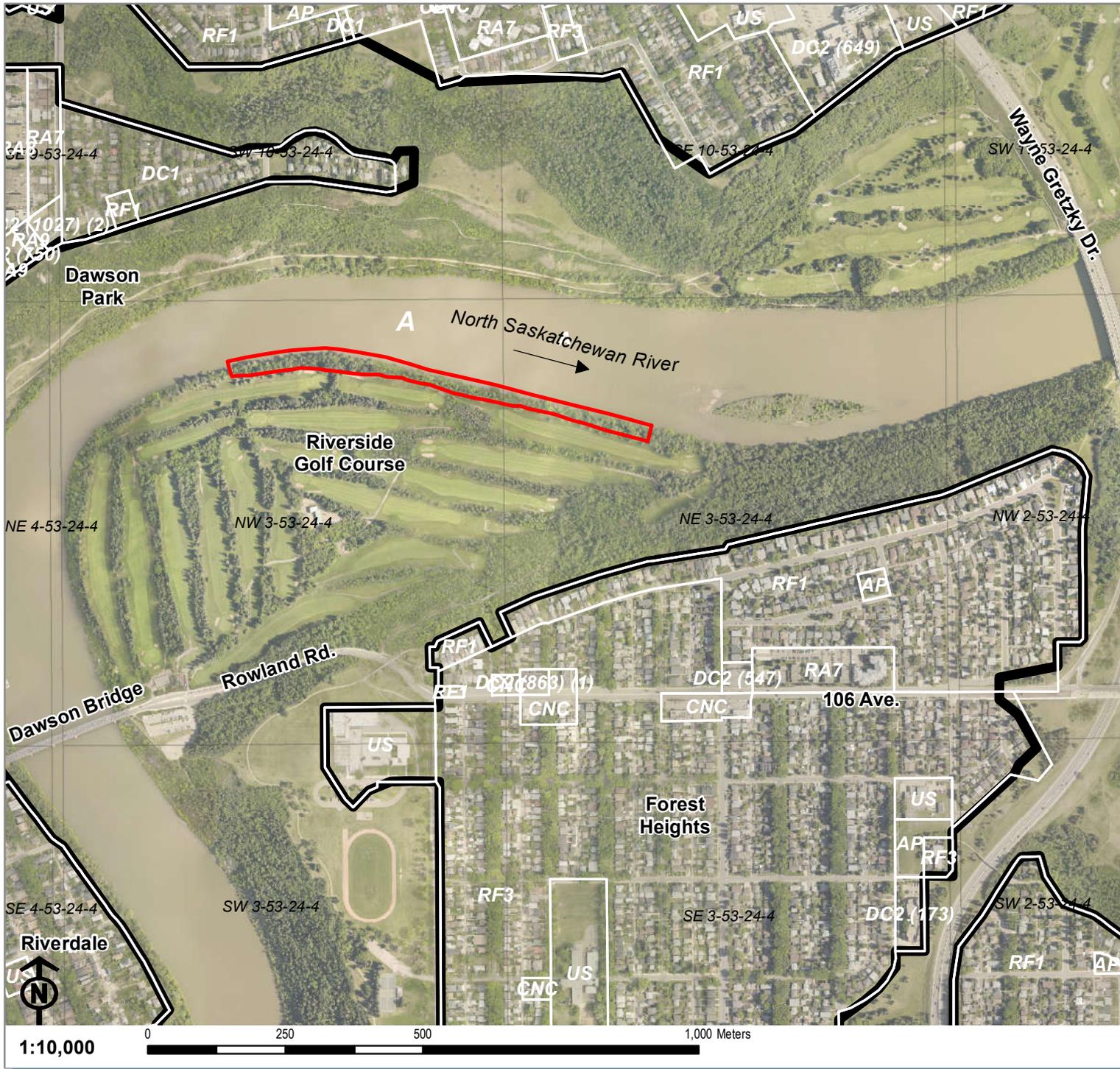


Map Date: 27 August 2020
 Mosaic Imagery Date: May-July 2019



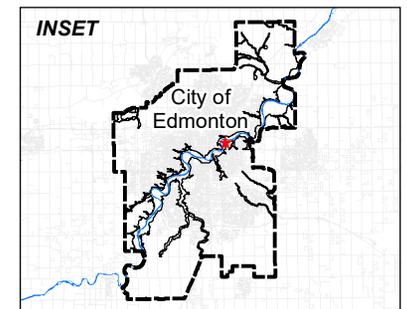
*Conceptual design provided by EDA Planning + Urban Design (2020).

Figure 3.
City of Edmonton
Land Use Zoning
Riverside Trail
Realignment
and Upgrading



Legend

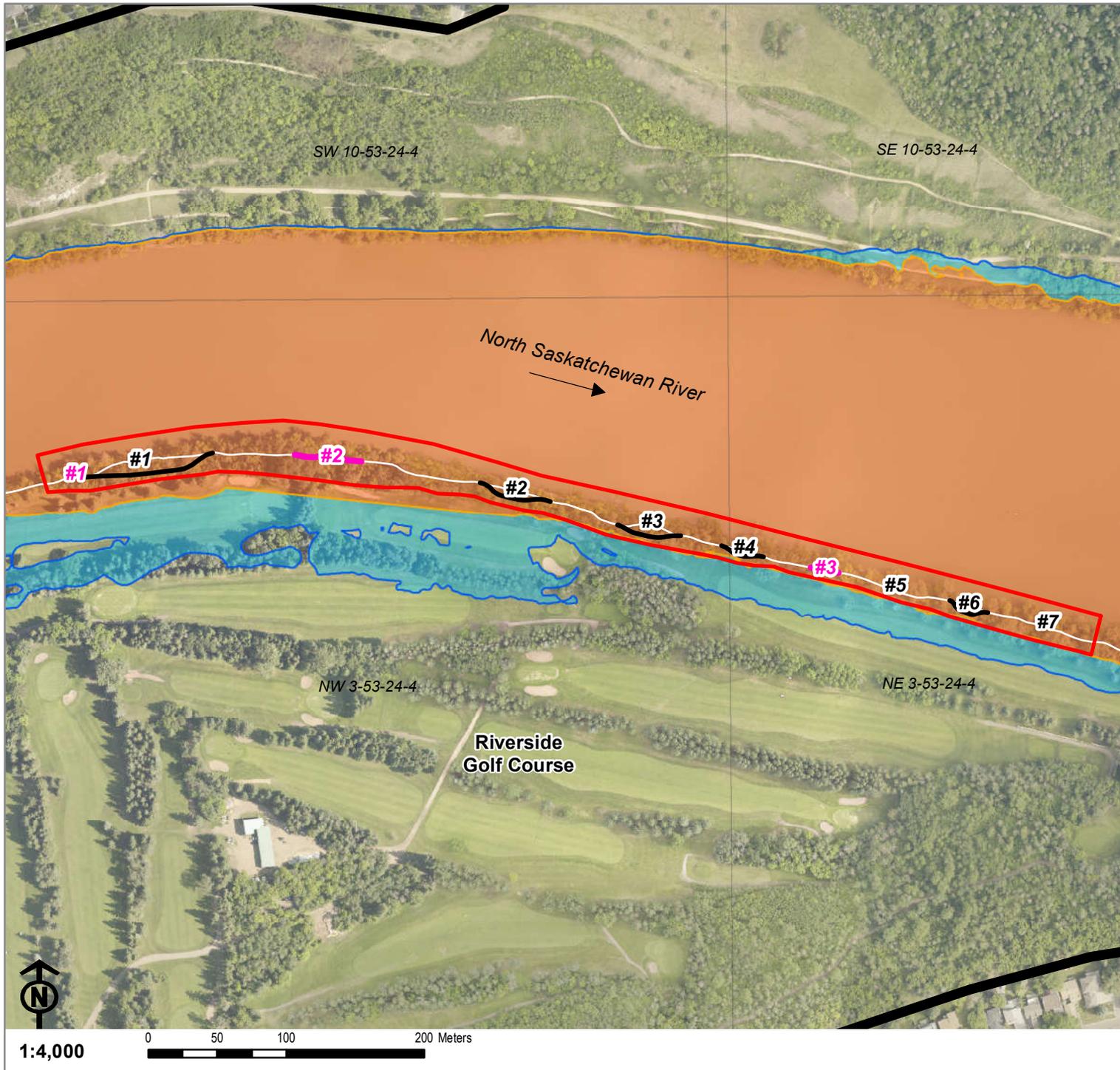
- Local Study Area
- Bylaw 7188 Boundary (COE, 2010)
- A Zoning (COE, 2020)



Map Date: 3 July 2020
 Mosaic Imagery Date: May-July 2019

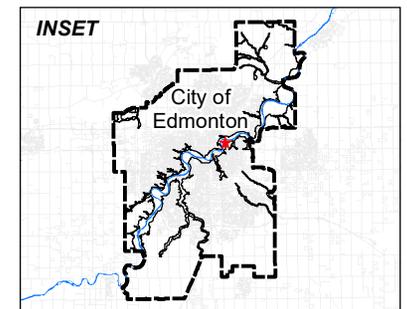


Figure 4.
Flood Hazard Mapping
Riverside Trail
Realignment
and Upgrading



Legend

- Local Study Area
- Bylaw 7188 Boundary (COE, 2010)
- #1 Proposed Trail Realignment Location
- #1 Proposed Trail Low Point Upgrade Location
- Existing Trail Centerline
- Flood Hazard Area****
- Floodway
- Flood Fringe

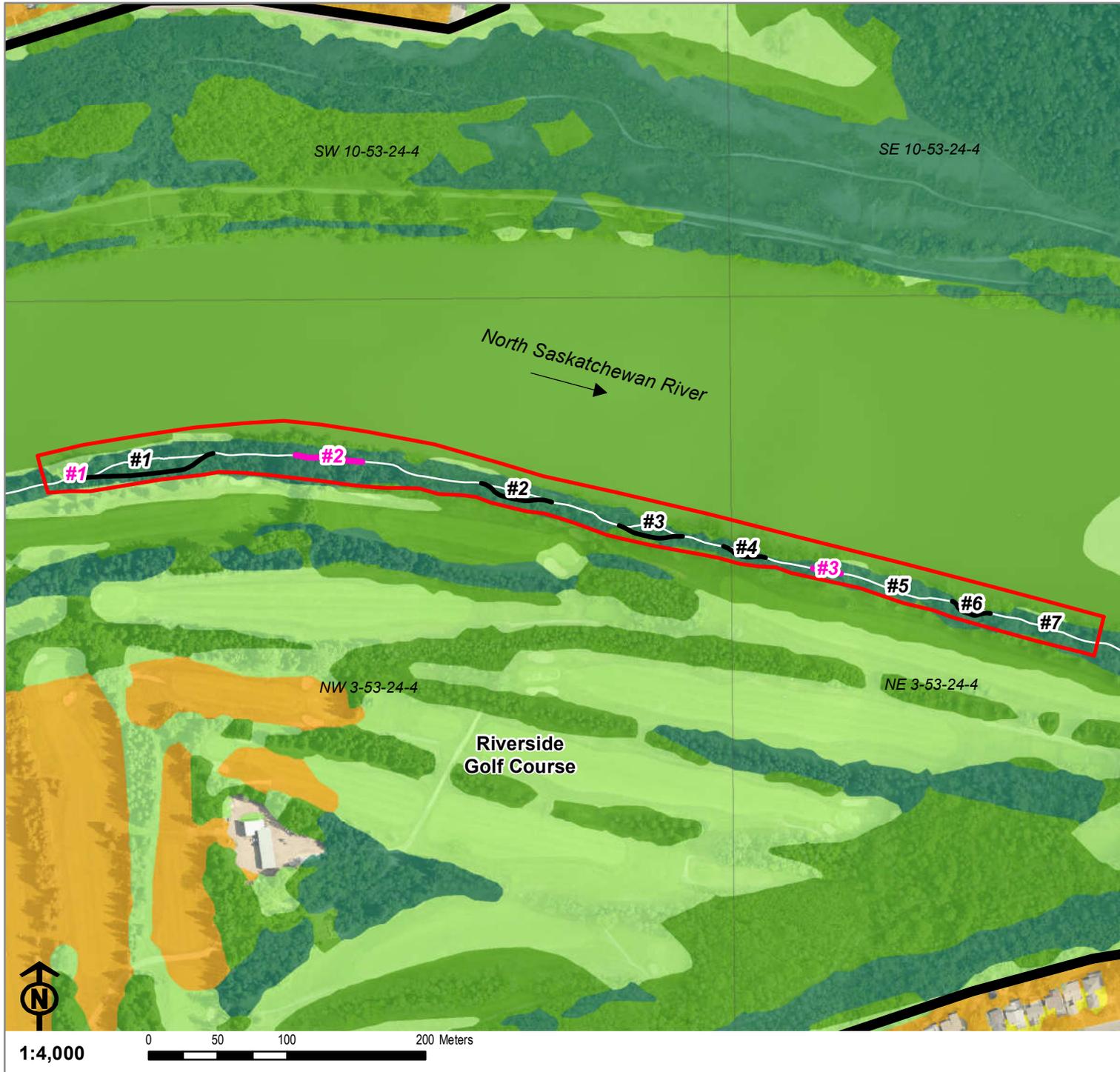


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 Mosaic Imagery Date: May-July 2019



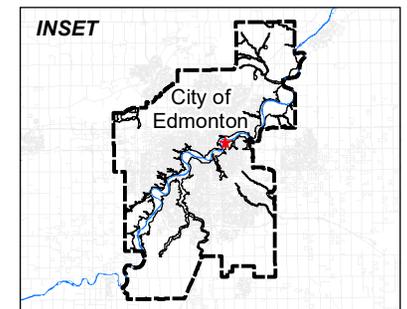
*Conceptual design provided by EDA Planning + Urban Design (2020).
 **Flood Hazard Mapping (AEP, 2015); Government of Alberta is currently updating the City of Edmonton's flood hazard mapping data so the information presented here could change.

Figure 5.
City of Edmonton
Environmental
Sensitivities (2016)
Riverside Trail
Realignment
and Upgrading



Legend

- Local Study Area
 - Bylaw 7188 Boundary (COE, 2010)
 - #1 Proposed Trail Realignment Location
 - #1 Proposed Trail Low Point Upgrade Location
 - Existing Trail Centerline
- Environmental Sensitivity****
- Extremely High Value
 - Very High Value
 - High Value
 - Moderate Value
 - Low Value

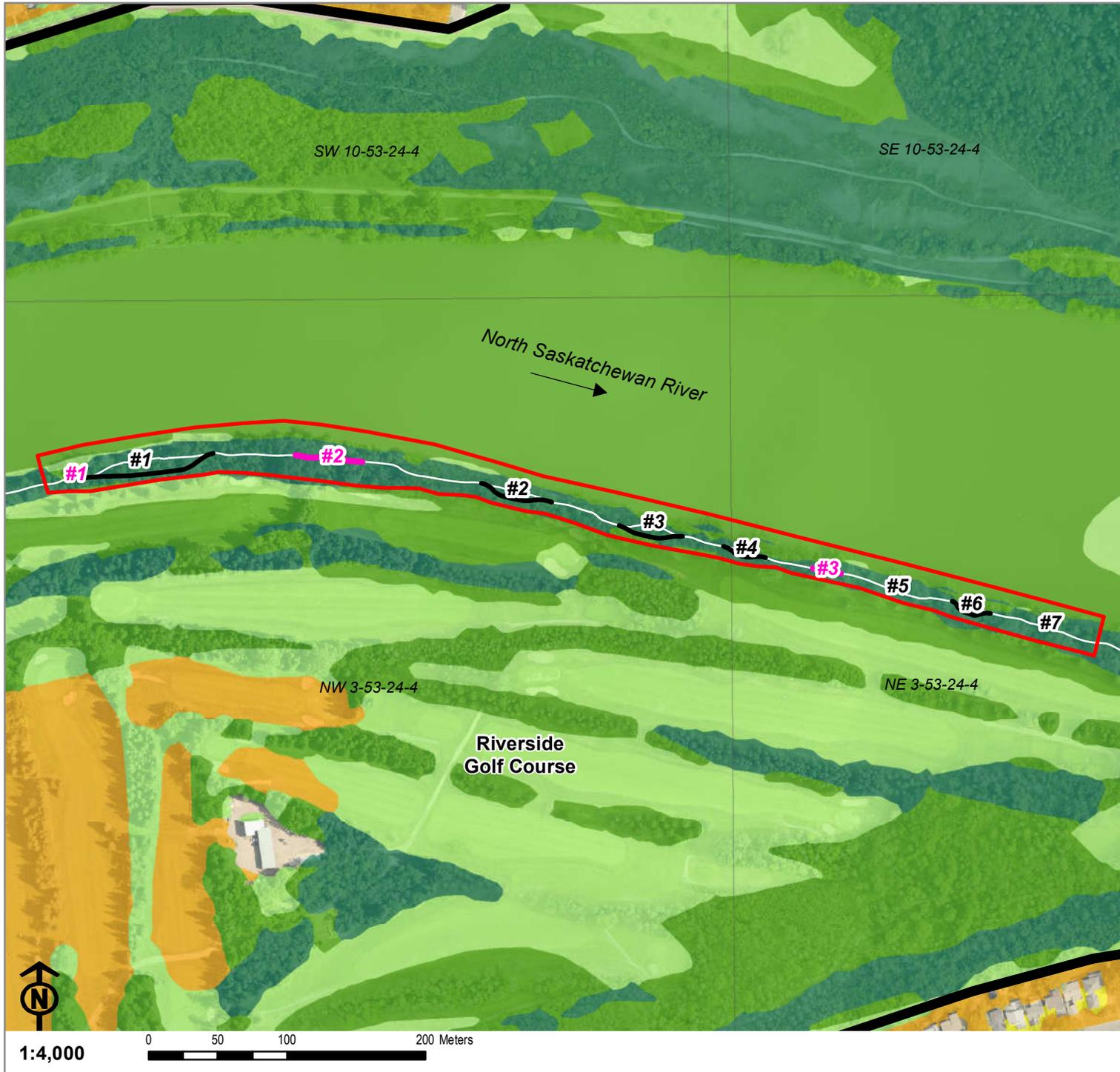


Map Date: 3 July 2020
 Mosaic Imagery Date: May-July 2019



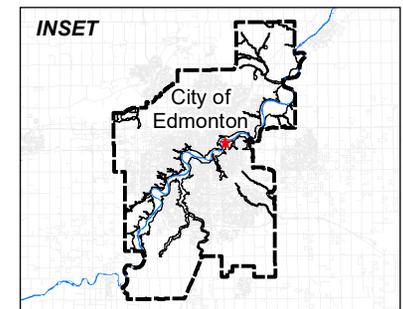
*Conceptual design provided by EDA Planning + Urban Design (2020).
 **City of Edmonton Environmental Sensitivity Project (Solstice Canada, 2016).

Figure 6. Updated City of Edmonton Environmental Sensitivities (2020) Riverside Trail Realignment and Upgrading



Legend

- Local Study Area
 - Bylaw 7188 Boundary (COE, 2010)
 - #1 Proposed Trail Realignment Location
 - #1 Proposed Trail Low Point Upgrade Location
 - Existing Trail Centerline
- Environmental Sensitivity****
- Extremely High Value
 - Very High Value
 - High Value
 - Moderate Value
 - Low Value



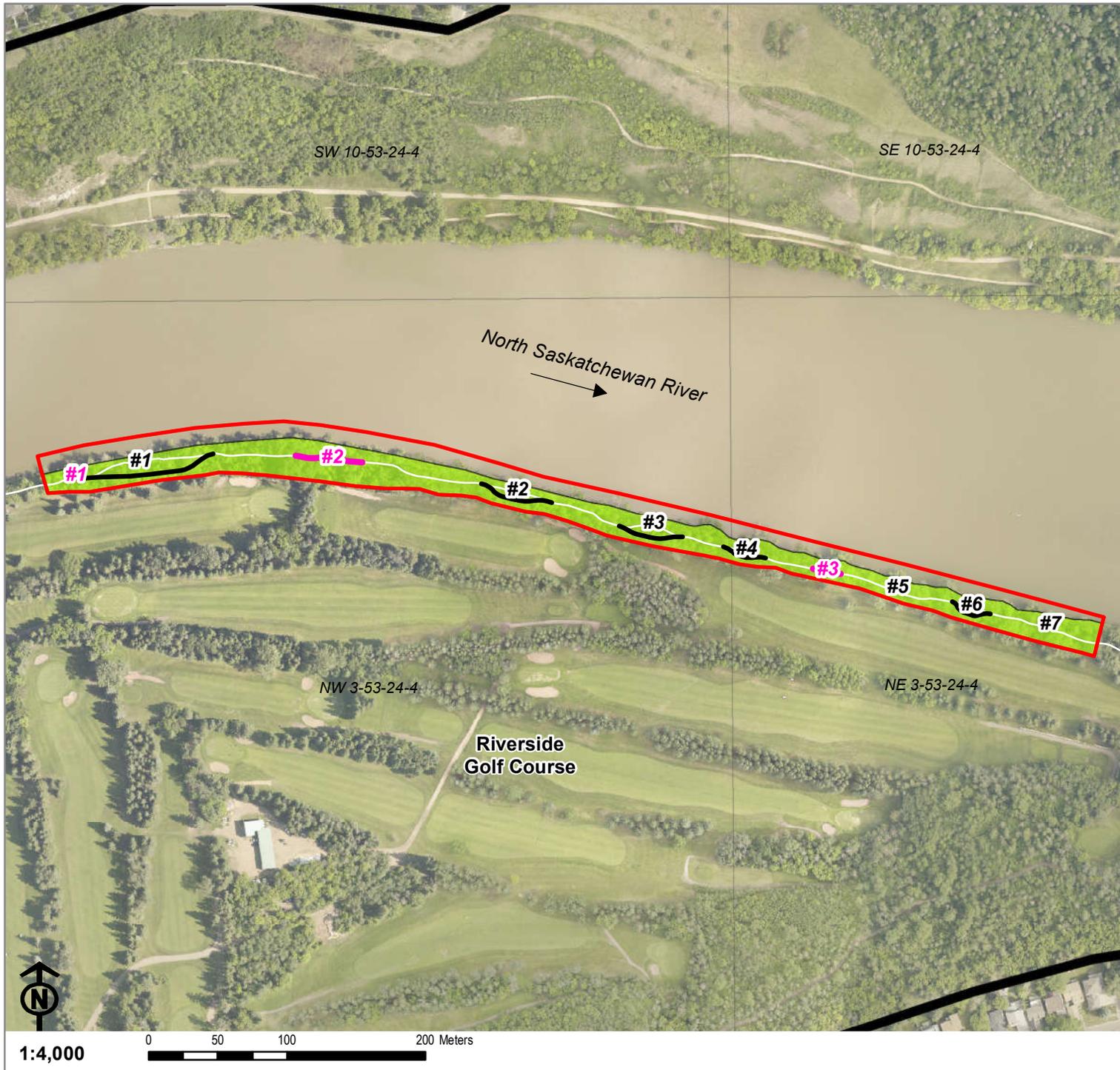
Map Date: 3 July 2020
Mosaic Imagery Date: May-July 2019



*Conceptual design provided by EDA Planning + Urban Design (2020).

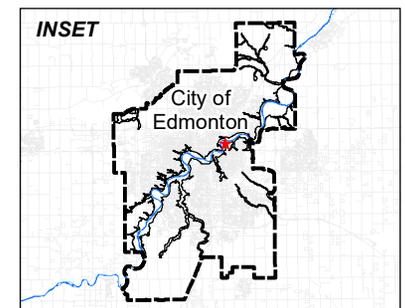
**Update of City of Edmonton Environmental Sensitivity Project (Solstice Canada, 2016) data based on site-specific survey data conducted by Spencer Environmental (2020).

Figure 7.
Plant Communities
Riverside Trail
Realignment
and Upgrading



Legend

- Local Study Area
- Bylaw 7188 Boundary (COE, 2010)
- #1 Proposed Trail Realignment Location
- #1 Proposed Trail Low Point Upgrade Location
- Existing Trail Centerline
- Plant Community** (2020)**
- Mixed Deciduous - Mixed Shrubs (MD.1)



Map Date: 3 July 2020
 Mosaic Imagery Date: May-July 2019



*Conceptual design provided by EDA Planning + Urban Design (2020).
 **Plant community classification follows the Urban Ecological Field Guide for the City of Edmonton, Alberta, Canada (City of Edmonton 2015).

Appendix B: Permitting Table

Summary of Potential Environmental Approvals for the Riverside Trail Realignment

Legislation or Policy	Regulatory Agency	Relevance to Project	Authorization/ Approval/ Permit Required	EDA Steps in the Regulatory Process	Approval Timeline or Potential Schedule Impact
Municipal					
<i>North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188)</i>	City Planning	Bylaw regulates all activities on City lands in the North Saskatchewan River Valley. Riverside Trail realignment requires an Environmental Impact Assessment (EIA) and Site Location Study (SLS)	EIA and SLS must be approved by City Council	EIA and SLS to be submitted to City Planning for review and sign off, then to Council Committee and City Council for approval	Committee date for approval of the EIA anticipated in fall 2020
<i>Corporate Tree Management Policy (C456)</i>	City Forestry	Policy provides protection for City trees/shrub inventory and a mechanism for monetary compensation for lost canopy. Prior to removal, trees/shrubs are assessed by City's Urban Forestry Department	None, but compensation for lost canopy must be arranged with CoE	Meet with City forester to assess project area	A forestry assessment of affected natural vegetation must be completed. Compensation to be realized as part of the project as a whole. Contract tender will be responsible for the protection of retained trees.
<i>City of Edmonton (Bylaw 18100) - EPCOR Drainage Services Bylaw</i>	EPCOR	Bylaw regulates the use of the sewer and contractor must consult with EPCOR regarding use of sewer to dewater site. Application for a permit of payment of fees	No prohibited, restricted or hazardous waste may be released into the sewage system without written consent from EPCOR	Application for a permit to discharge into the sewer system may be required	Proponent responsibility
<i>City of Edmonton Parkland (Bylaw 2202)</i>	City of Edmonton	Bylaw to protect and preserve natural ecosystems for the benefit of all citizens of the City	Approval required to stage construction equipment or other use in park space	Application for a permit to stage for construction	Proponent responsibility

Legislation or Policy	Regulatory Agency	Relevance to Project	Authorization/ Approval/ Permit Required	EDA Steps in the Regulatory Process	Approval Timeline or Potential Schedule Impact
ENVISO, City Policy C505, City Policy C512	City of Edmonton	Based on the ISO 14001 Standard, ENVISO provides a framework for a strong environmental management system aimed at legal/regulatory compliance, pollution prevention and continual improvement	<ul style="list-style-type: none"> Proponent must be compliant with all aspects of ENVISO. An Enviso Design Environmental Permit Approval checklist must be completed for all City projects prior to tender. Review of the Enviso Proponent's Environmental Responsibility Package and City Policy C512. Signing Proponent's Environmental Acknowledgement Form 	<ul style="list-style-type: none"> Process must be implemented as project is underway checklist must be completed prior to tender 	Proponent responsibility
Provincial					
<i>Public Lands Act</i>	Alberta Environment and Parks (Land Management Branch)	Use of crown lands, including the bed and shore of all bodies of water, are regulated under this Act. Act requires proponents wishing to work on, alter or occupy Crown land to obtain a disposition or amend existing dispositions	No project components will be located within the bed and shore of the North Saskatchewan River. No permission under <i>the Public Lands Act</i> is required.	None	None
<i>Water Act and Wetland Policy</i>	Alberta Environment and Parks (Water Approvals Branch)	An approval is required for all activities that may impact water and the aquatic environment, including taking water from a watercourse, realigning a watercourse, constructing within a watercourse, and draining filling or altering any permanent or temporary wetland.	The project is not anticipated to trigger the <i>Water Act</i> . No project components are anticipated to impact water or the aquatic environment.	None	None

Legislation or Policy	Regulatory Agency	Relevance to Project	Authorization/ Approval/ Permit Required	EDA Steps in the Regulatory Process	Approval Timeline or Potential Schedule Impact
<i>Wildlife Act</i>	Alberta Environment and Parks	This Act applies to most species of wildlife. The willful molestation, disruption, or destruction of a wildlife nest or den is prohibited by this Act. Special provisions provide for the protection of raptors and their nests/habitats. Project requires clearing of vegetation that may support nesting/denning wildlife. Wildlife may also use the old bridge as a nest site.	Although permitting for clearing is not required under the Act, violations of the Act may result in fines	Avoid vegetation clearing during the period 20 April to 20 August. Contingent approach is to have a qualified biologist undertake a nest sweep of project area to avoid disturbance of active nests and dens. Abide by findings to ensure compliance. In addition, if clearing vegetation after 15 February, undertake a sweep for active owl nests	Not applicable if vegetation clearing is completed before the start of the nesting season (15 February). Nests sweeps undertaken between February 15 and 20 August have potential to result in findings that delay clearing.
<i>Historical Resources Act</i>	Alberta Culture, Multiculturalism and Status of Women (ACMSW)	All projects with potential to disturb historical, archaeological and paleontological resources are regulated under this Act and require approval from ACMSW	Approval required	Submit <i>Historical Resources Act</i> application to ACMSW. ACMSW will determine if an Historical Resources Impact Assessment (HRIA) is required	If an HRIA is required, ACMSW could require 3 months of review time once the report is completed.
Federal					
<i>Fisheries Act</i>	Fisheries and Oceans Canada (DFO)	Review and/or authorization is required if a project in or near water has potential to cause death of fish and the harmful alteration, disruption or destruction (HADD) of fish habitat. Permits may be sought for aquatic species at risk.	The project is not anticipated to cause death of fish or HADD of fish habitat.	None	None

Legislation or Policy	Regulatory Agency	Relevance to Project	Authorization/ Approval/ Permit Required	EDA Steps in the Regulatory Process	Approval Timeline or Potential Schedule Impact
<i>Migratory Birds Convention Act</i>	Environment and Climate Change Canada	This Act prohibits the disturbance of nests and individuals of most migratory bird species and prohibits the release of deleterious substances into waters or areas frequented by migratory birds. Project requires clearing of migratory bird nesting habitat.	The Act provides guidelines for enforcement only; it is not linked to formal approvals required for construction. Violation of the Act may, however, result in penalties	Avoid vegetation clearing during the period 20 April to 20 August. Contingent approach is to have a qualified biologist undertake a nest sweep of project area and to then avoid disturbance of any noted nesting birds (see related notes for <i>Wildlife Act</i>)	Nests sweeps undertaken between February 15 and 20 August have potential to result in findings that delay clearing.
<i>Species At Risk Act</i>	Environment and Climate Change Canada	This Act prohibits disturbance to species listed on Schedule 1 of the SARA as endangered, threatened or extirpated and, in some instances, listed species' habitat, on federal lands. On non-federal lands, the Act applies only to disturbance of aquatic species and migratory birds that are listed on Schedule 1 as endangered, threatened or extirpated.	Although no approvals or permits are required, violation of the <i>SARA</i> may result in penalties	If any federally listed species are identified as present within or adjacent to the project area, best practice is to consider the impact of the project on that species in consultation with Environment and Climate Change Canada	Schedule impacted only if SARA species are found in the area

Appendix C: Conceptual Design Review (Thurber 2020)



THURBER ENGINEERING LTD.

June 25, 2020

File: 19092

EDA Planning and Urban Design
5307 – 46 Street NW
Edmonton, Alberta
T6B 3T4

Attention: Mr. Will Packolyk, BLA, AALA, BCSLA
Associate, Landscape Architect

**CITY OF EDMONTON
RIVERSIDE TRAIL REHABILITATION
EDMONTON, ALBERTA
CONCEPTUAL DESIGN REVIEW – REVISION 1**

Dear Sir:

Further to your request, Thurber Engineering Ltd. (Thurber) is pleased to submit this letter providing a review of the conceptual design for the Riverside Trail rehabilitation project located along the south bank of the North Saskatchewan River adjacent to the Riverside Golf Club in Edmonton, Alberta.

This work was carried out in support of the trail realignment design being completed by EDA Planning and Urban Design (EDA) to promote the long-term viability of this trail.

It is a condition of this letter that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

1. BACKGROUND

Thurber previously completed a preliminary geotechnical assessment of the Riverside trail and provided a preliminary assessment of two identified bank failure sites in a letter report to EDA dated August 9, 2017. More recently, Thurber completed a geotechnical assessment of the entire trail for the City of Edmonton (City), and the results were presented in a report dated October 8, 2019.

In the 2019 report, Thurber identified an additional ten sites (for a total of 12 sites along the trail alignment) that may be susceptible to erosion or failure in the future from bank erosion, surface water flow patterns, or seepage. The site features were discussed and given a qualitative risk rating from low to high, depending on the severity of erosion and proximity of the top of bank to the trail.

Based on this report, the City has identified seven sites (the original two sites from the 2017 study plus five additional sites identified in 2019) for potential remediation during the upcoming trail rehabilitation works. The conceptual designs for these seven sites, as provided to us by EDA, are attached for reference.



Thurber's current scope involved carrying out a high-level review of these conceptual designs including a site inspection, and providing geotechnical input and recommendations, where required. The following sections provide a summary of this conceptual design review.

2. SITE RECONNAISSANCE

A site reconnaissance of the trail alignment was undertaken by Mr. Robin Tweedie, P.Eng. and Mr. Stephen Coulter, P. Eng of Thurber and Mr. Christopher Rodrigues, L.A.T. of EDA on June 16, 2020.

The site reconnaissance focused on observing the current conditions at the seven selected sites and providing general geotechnical input as it relates to the current conceptual designs. A discussion of the geotechnical recommendations is presented in the following section.

Five of the seven sections involve relocation of the affected trail section away from the top of slope towards the Riverside Golf Course boundary. The remaining two sections (Locations 5 and 7) involve installing a guard rail on the riverbank side for added safety to the trail users.

3. OBSERVED CONDITIONS

In general, Thurber observed that conditions along the trail alignment were generally similar to those observed during the most recent site reconnaissance performed by Thurber in 2019 and presented in our geotechnical assessment report to the City dated October 8, 2019. The conditions at Locations 1 and 6, which were the most immediate locations requiring attention, appeared to have continued to deteriorate with additional erosion noted since originally observed by Thurber in 2017.

It should be recognized, however, that river erosion of this stretch of river bank is an ongoing process and may result in additional stretches of trail being affected in the future.

4. GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

Based on the observed site conditions, as well as the history and topography of the site, the proposed trail re-routed sites (Locations 1, 2, 3, 4 and 6) are all geotechnically feasible and appear to provide the intended longer-term protection from river bank erosion to ensure the ongoing operation of the trail.

During the site reconnaissance, minor site-specific adjustments to the routings were discussed with EDA. In general, these involved minor revisions to trail routing at the start and finish points of selected sections to avoid the larger trees, local drainage paths, and/or take advantage of site topography and grades. The entrance and exit points of each re-routed site were also adjusted to accommodate the full extent of the erosion (or probable future erosion) discussed in the 2019 assessment report.



During the site reconnaissance Mr. Rodrigues of EDA flagged these entrance and exit points where they differed from current routings previously flagged. It was agreed with EDA that the routes should be field fit at the start of construction to avoid large trees or other features.

The inclusion of the planting of new vegetation along the abandoned trail alignments should provide some additional erosion protection as well as serving to direct trail users to the new trail alignments.

It was generally agreed that a timber guard rail was an appropriate interim solution for Location 5. It must be recognized that the purpose of the guardrail is to provide added safety to the trail and is not an upgrading of the trail.

Based on our joint review of Location 7 (formerly Thurber Site 11), it is concluded that that a guard rail is not immediately required in this area, and could be eliminated from the current program, subject to approval from the City.

5. GUARD RAILS

City standard wooden guard rails, as illustrated in the attachments, are considered geotechnically feasible for the locations where the use of guard rails was identified. We understand that these guardrails are typically installed into augered post holes and anchored into the ground using concrete, as per the City standards. The timber posts should be set back sufficiently from the crest of river bank (preferably about two metres) to provide adequate lateral stability.

During the site inspection, we were queried by EDA on the use of helical steel (screw) piles as an alternative for support of the guard rail posts. It was understood that EDA would like to consider these for possible ease of delivery and installation at these relatively remote sites, as opposed to concrete filled post holes.

Screw piles are considered geotechnically feasible at these sites and should provide a suitable support for the guard rail posts. The screw piles would also be typically installed deeper than timber supports and may provide greater survivability than wooden posts in the event of future bank erosion. This would however need to be balanced with potential greater costs for supply and installation of screw piles.

No geotechnical bore hole logs are available for the selected sites; however, based on available geology, the soils within the expected pile installation depths are generally expected to consist of fine-grained silts and clays, overlying sand and gravel at depth, and clay shale bedrock closer to river level.

Screw piles are generally a proprietary foundation system and are therefore typically designed (both geotechnically and structurally) for the expected installation and loading conditions by a specialized supply and installation firm. In this case, both vertical and lateral loads are minimal, and the main requirement is to provide fixity to the guard rail posts.



As a general requirement, the screw piles should be founded with the helices below the depth for seasonal frost penetration, or at least 3 m below ground surface, to avoid seasonal frost heave movements. It is further recommended that these helical piles have a minimum shaft diameter of 100 mm in order to provide sufficient lateral rigidity in these areas that may experience some future bank movements.

The screw piles should be installed in accordance with good industry practice, which includes minimizing churning and disturbance of the upper soils during screw pile installations and infilling any voids between the screw pile shaft and the soil that may be caused during the installations.

Further recommendations on screw pile design can be provided upon request.

6. CLOSURE

We trust that this letter provides you with the information you require at present. Should you have any questions, please contact the undersigned at your convenience.

Yours very truly,
Thurber Engineering Ltd.
Robin Tweedie, M.Sc., P.Eng.
Principal | Senior Geotechnical Engineer

Stephen Coulter, M.Eng., P.Eng., P.E.
Associate | Senior Geotechnical Engineer
/jf

Attachment:

- Statement of Limitations and Conditions
- EDA Conceptual Design Plans



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

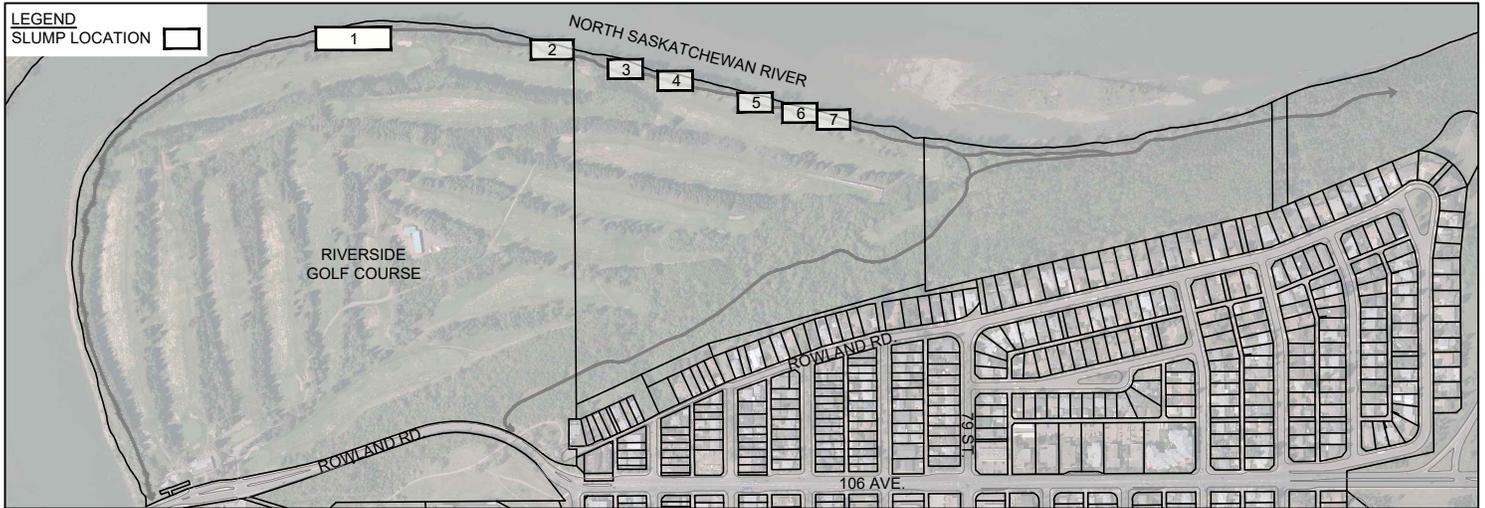
- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

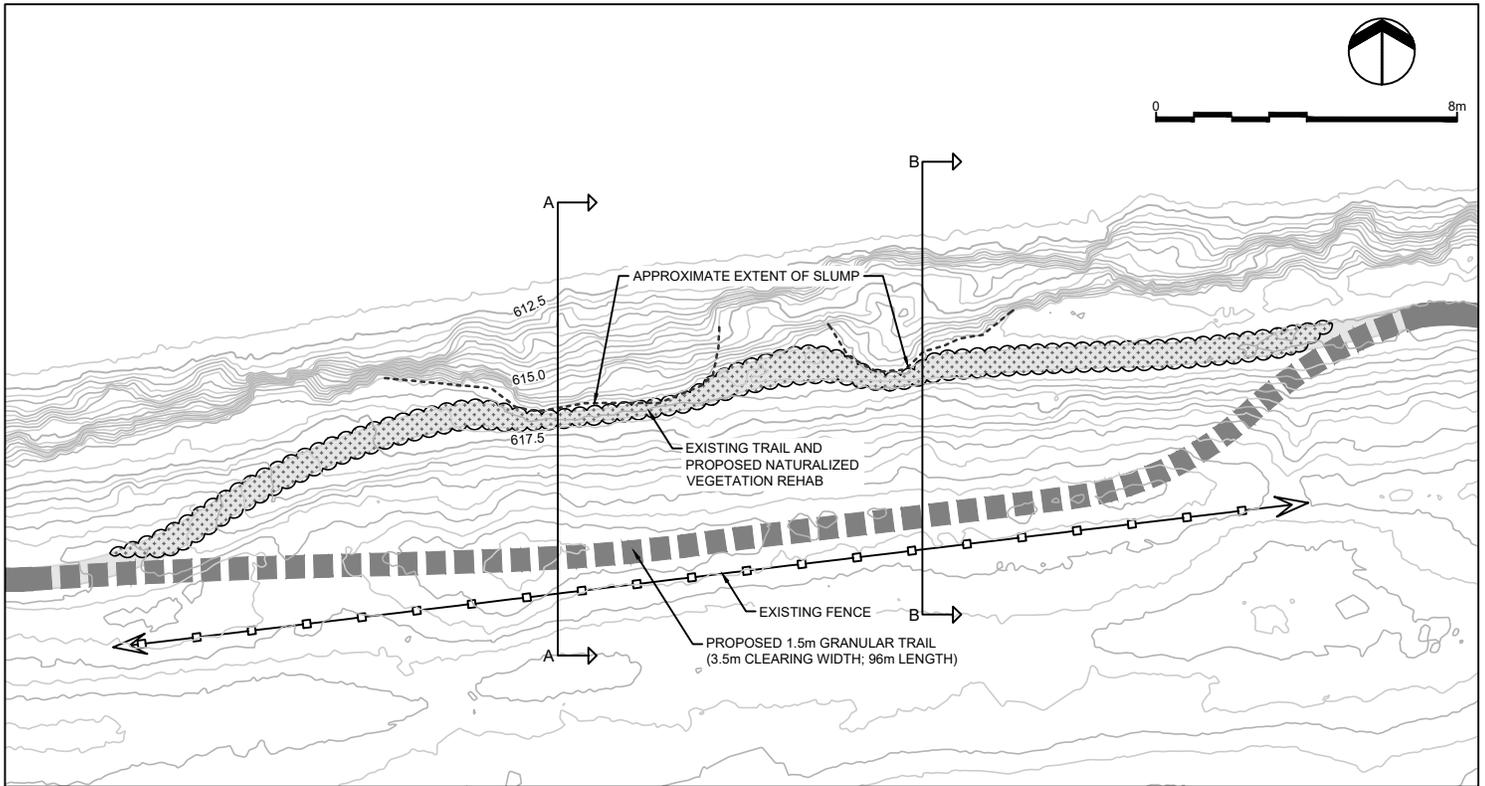
Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

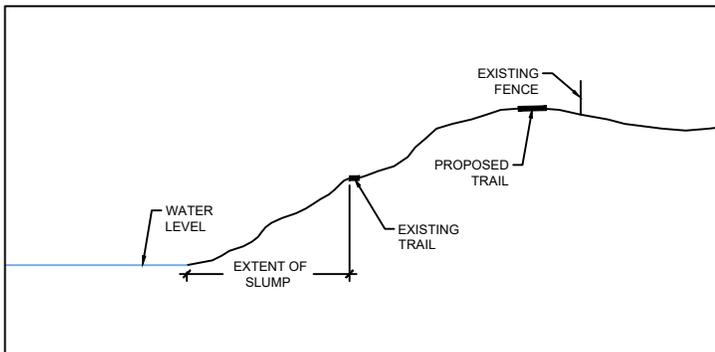
The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



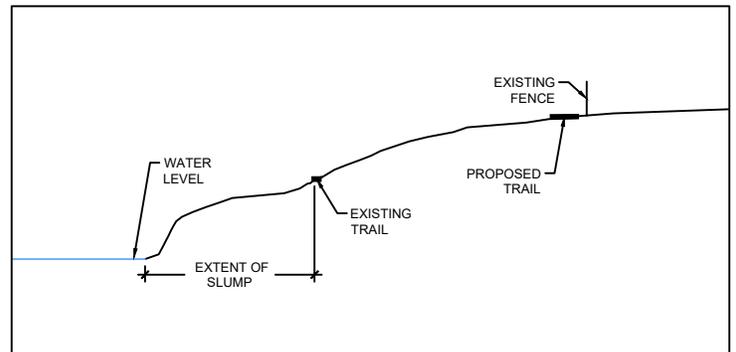
KEY PLAN (NOT TO SCALE)



SITE PLAN



SECTION A

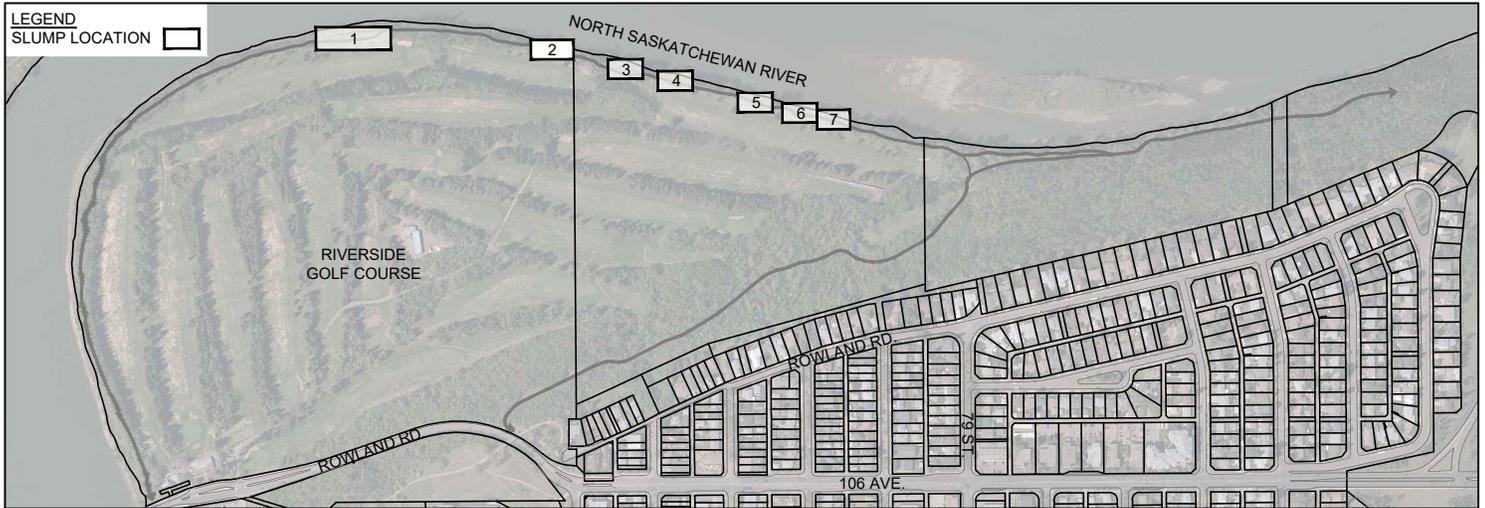


SECTION B

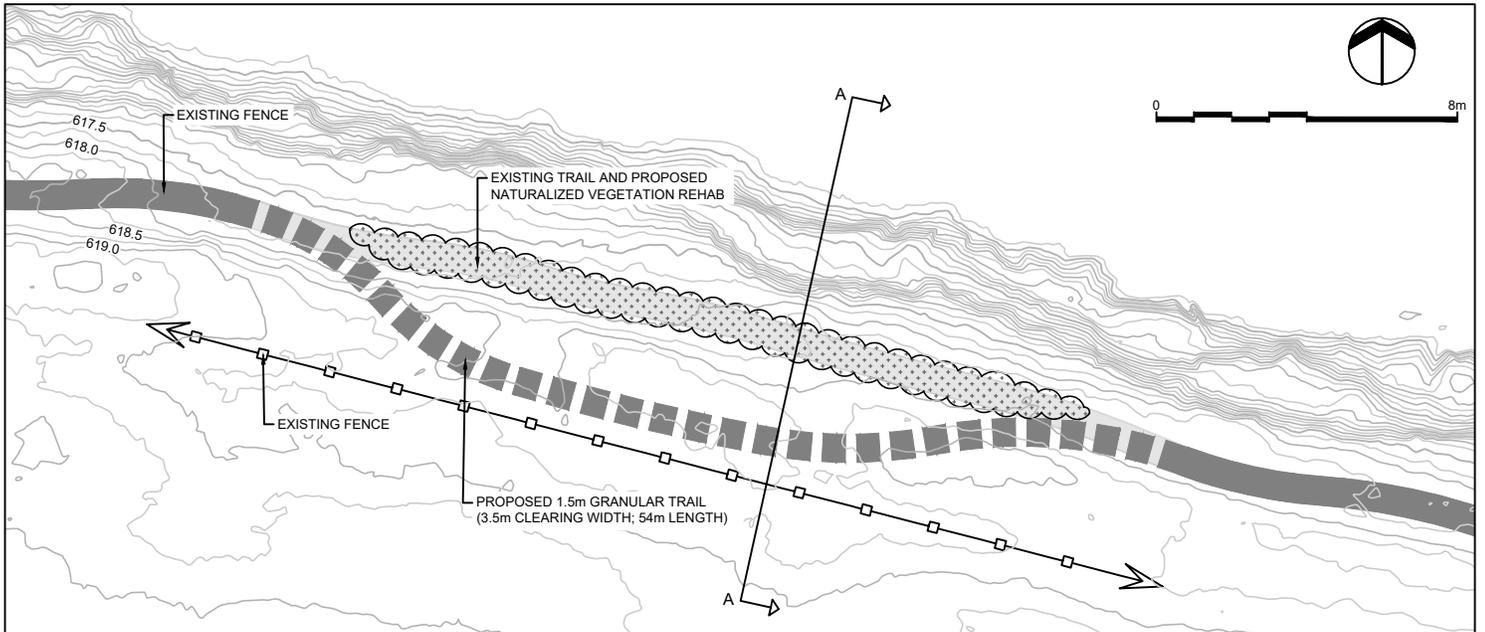
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 1 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

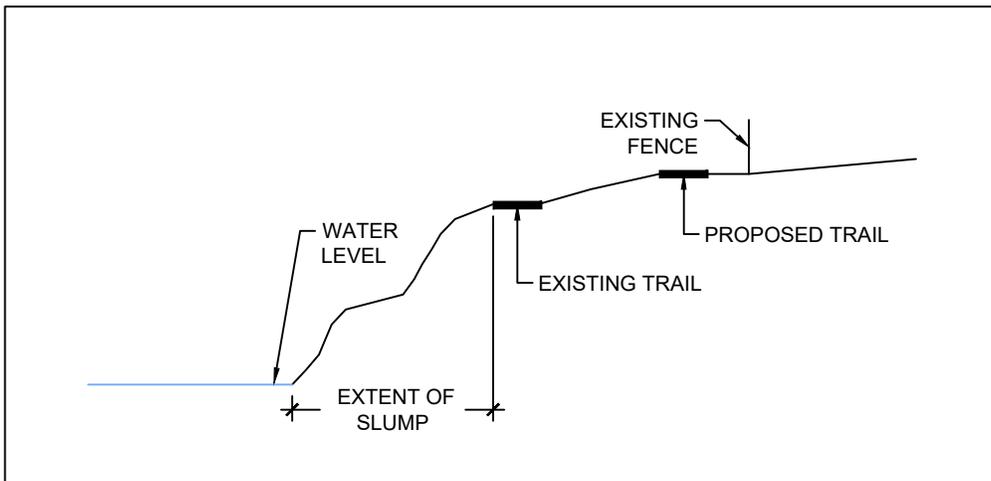
THURBER SITE 1



KEY PLAN (NOT TO SCALE)



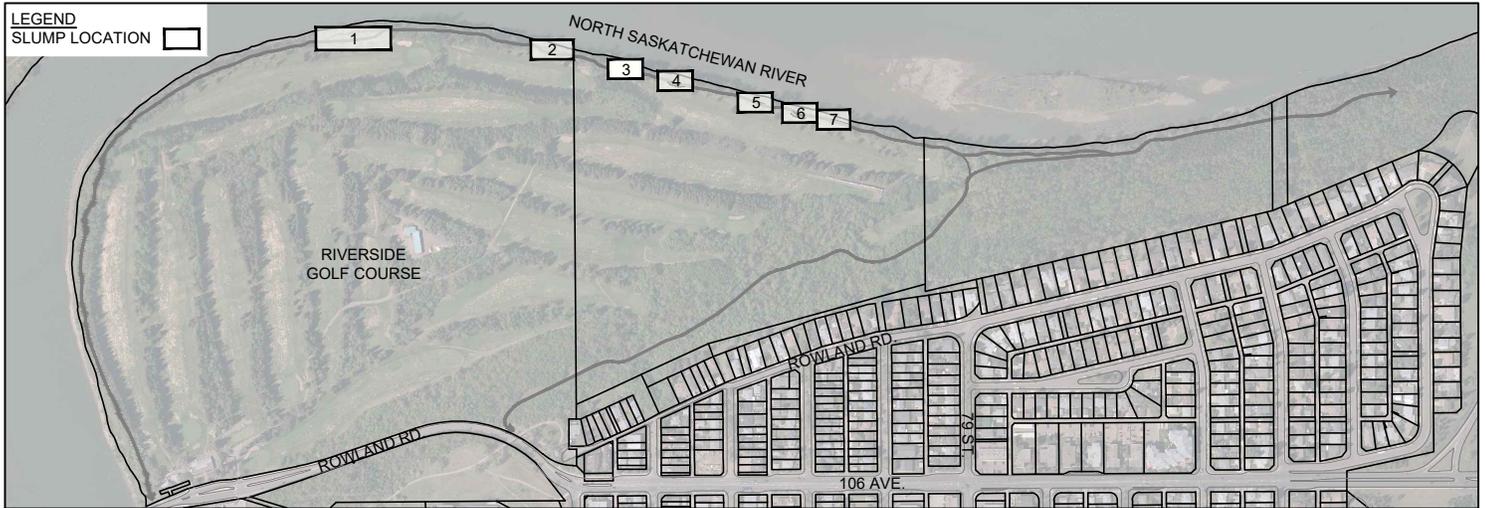
SITE PLAN



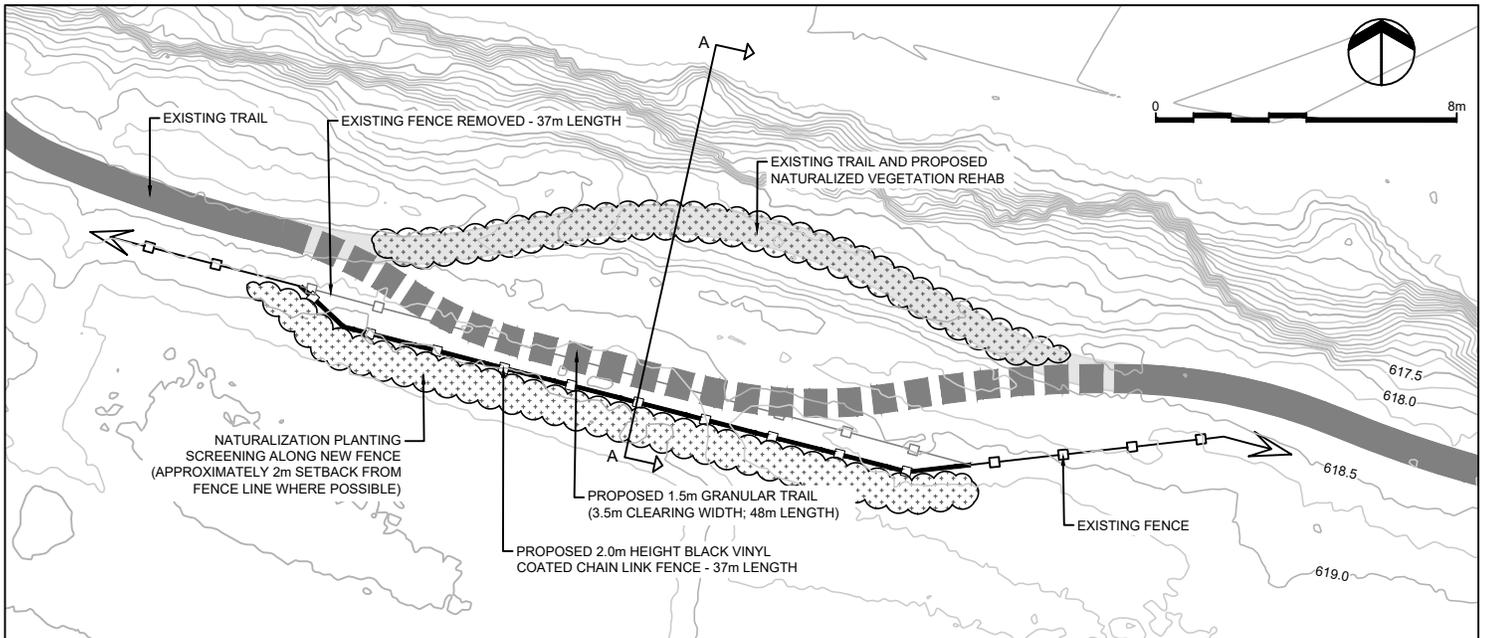
SECTION A

RIVER SIDE TRAIL RE-ALIGNMENT

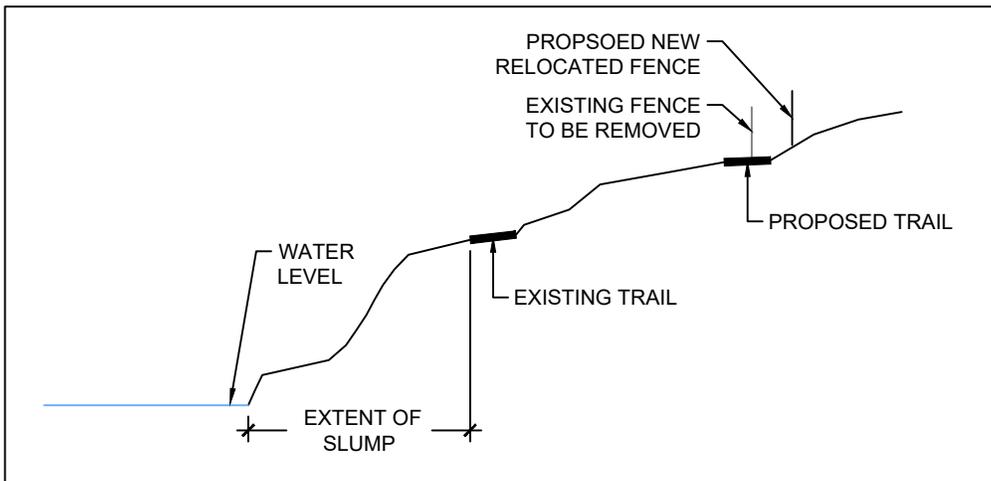
LOCATION 2 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK
THURBER SITE 7



KEY PLAN (NOT TO SCALE)



SITE PLAN

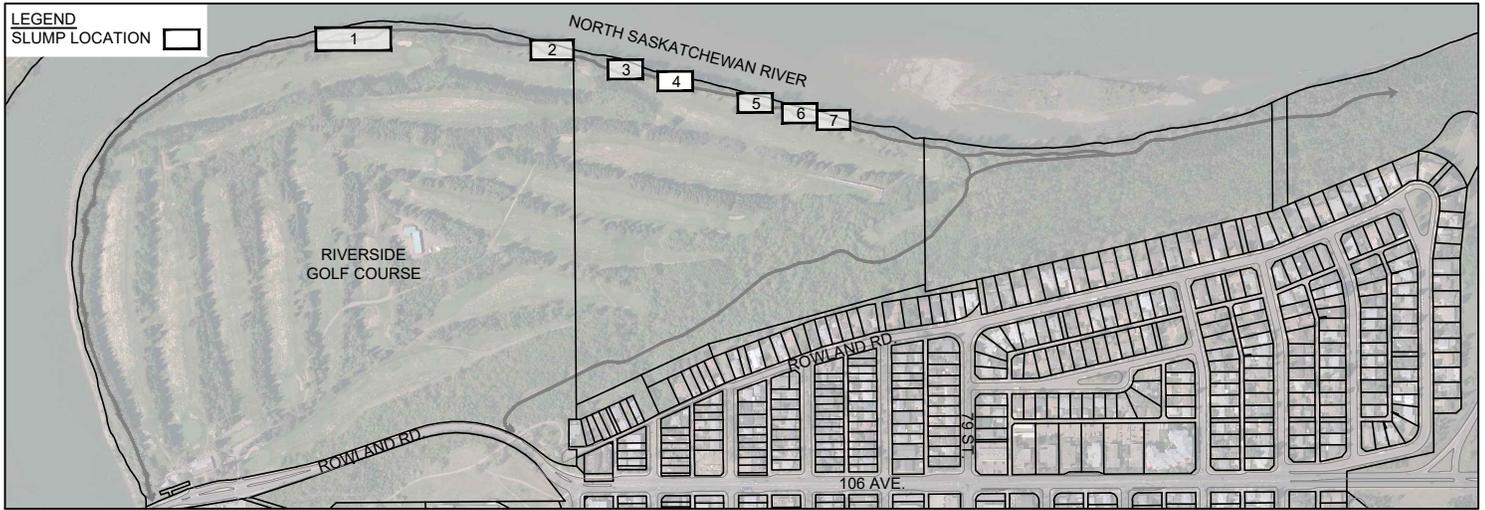


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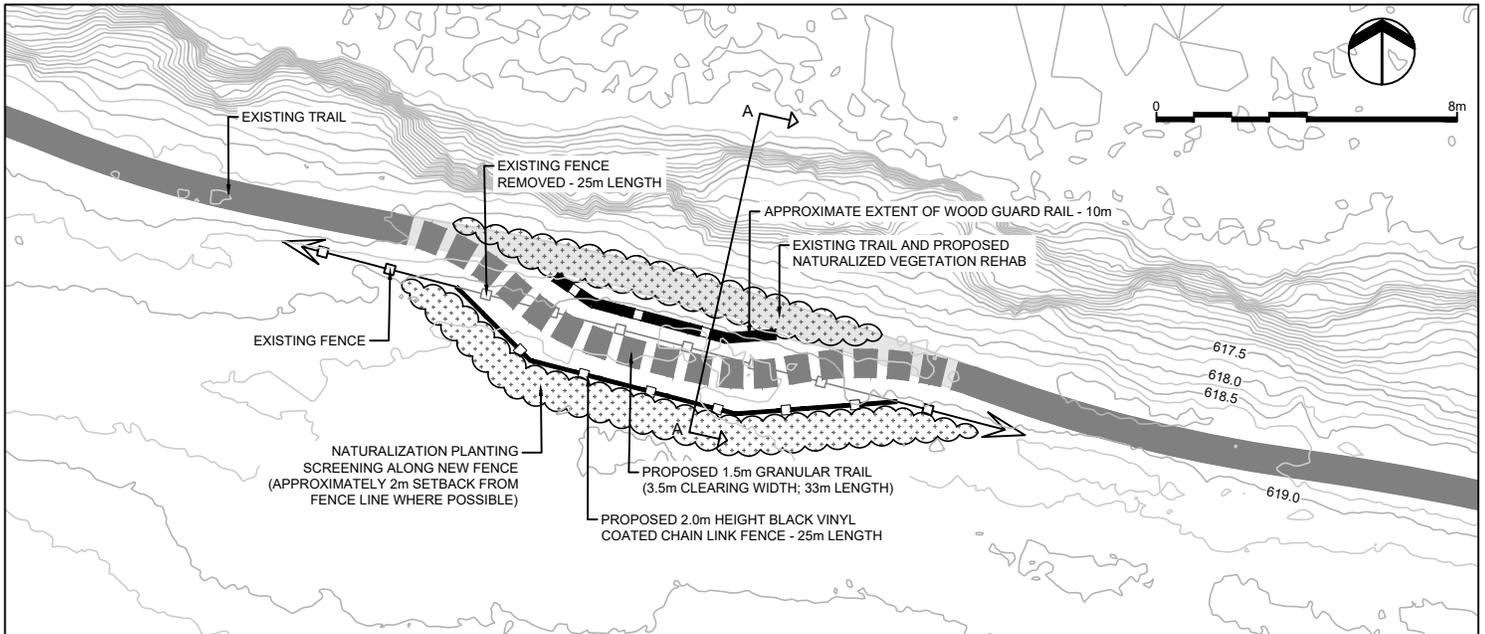
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 3 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

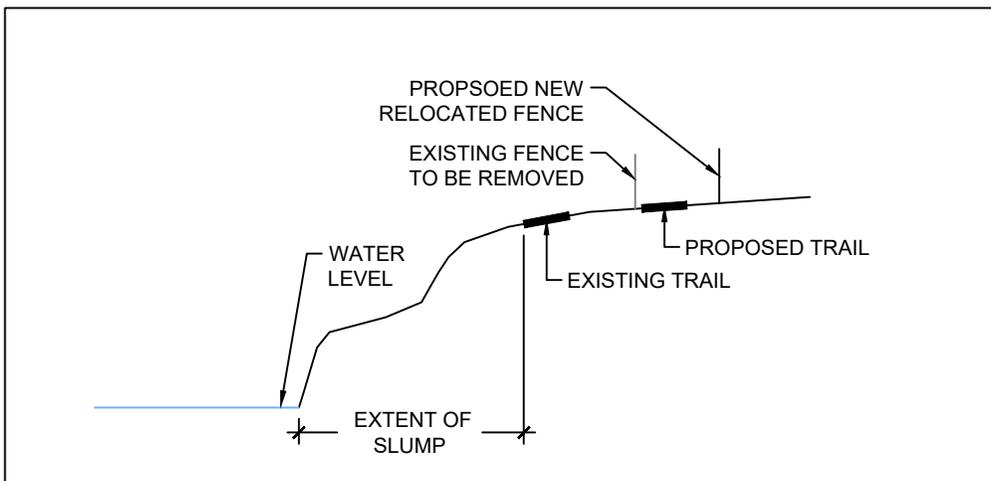
THURBER SITE 8



KEY PLAN (NOT TO SCALE)



SITE PLAN

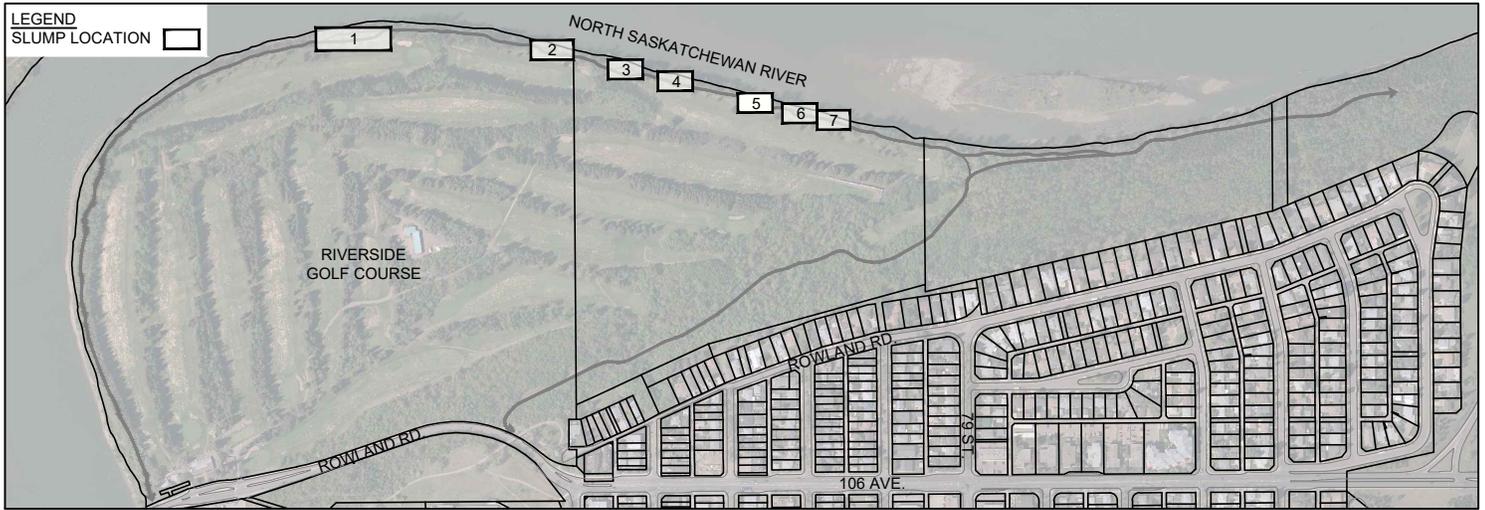


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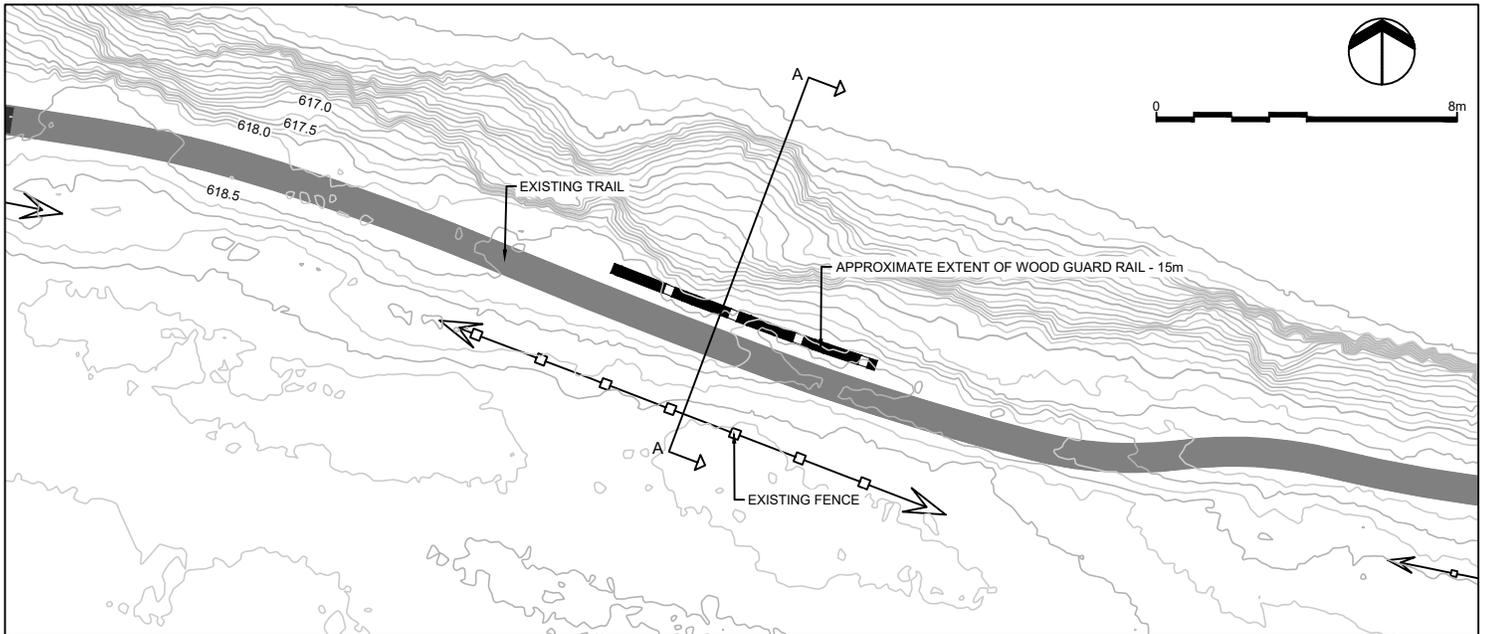
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 4 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

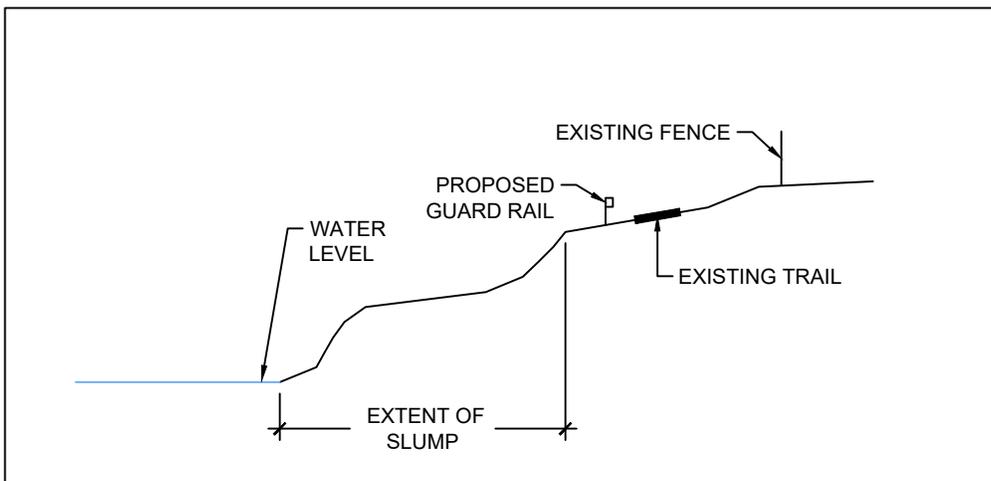
THURBER SITE 9



KEY PLAN (NOT TO SCALE)



SITE PLAN

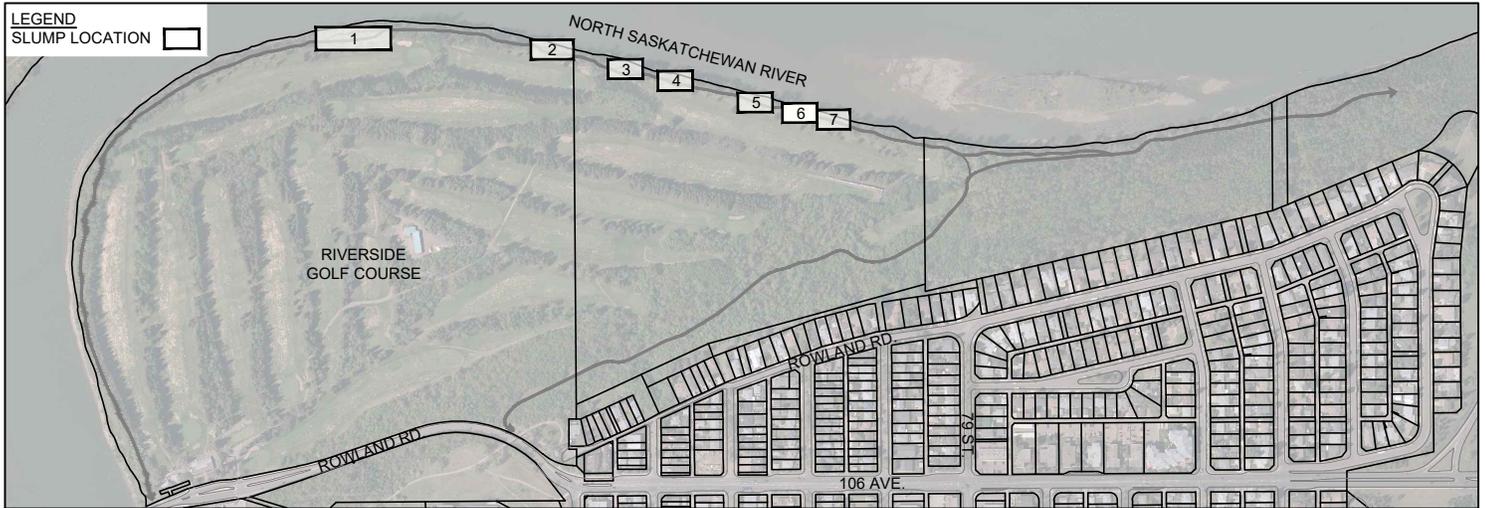


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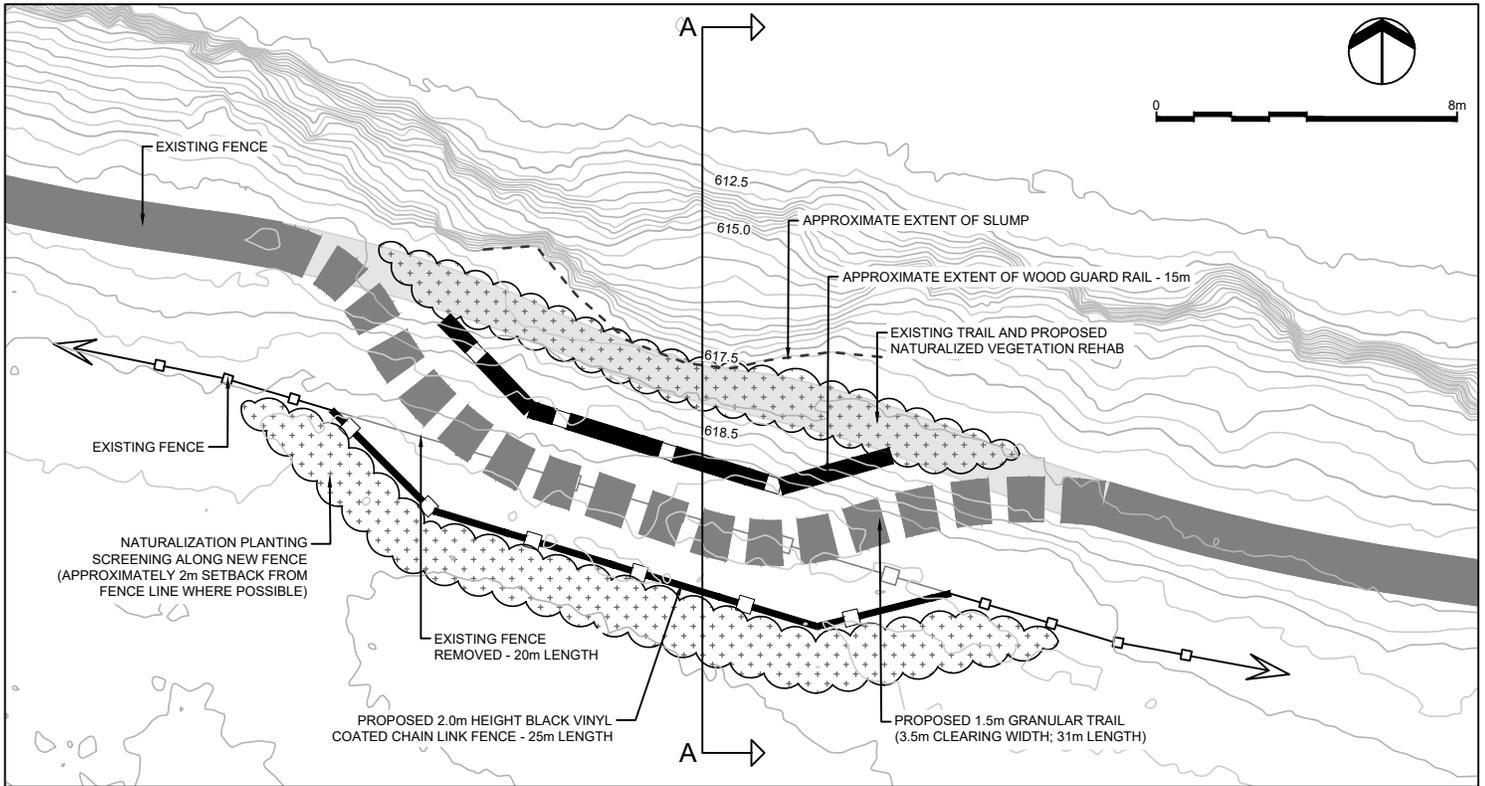
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 5 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

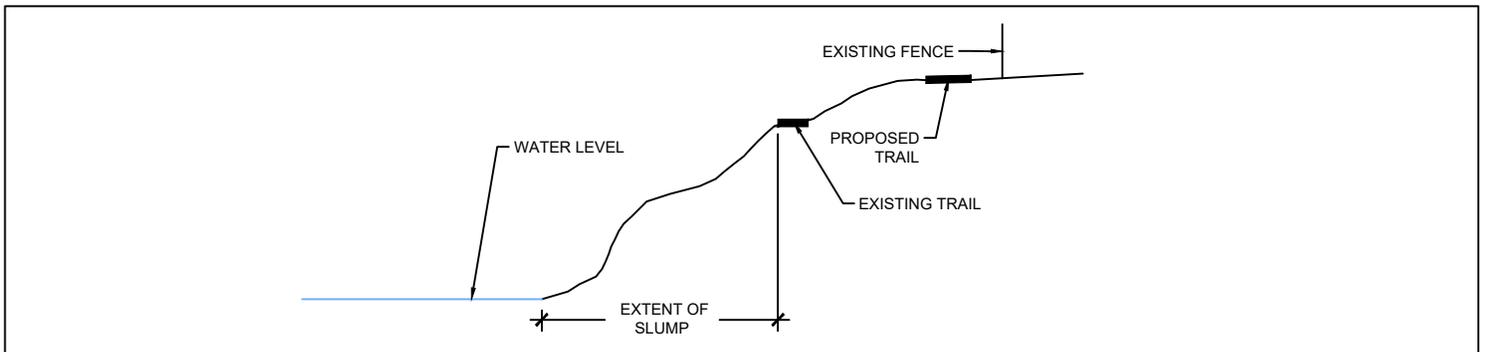
THURBER SITE 10



KEY PLAN (NOT TO SCALE)



SITE PLAN

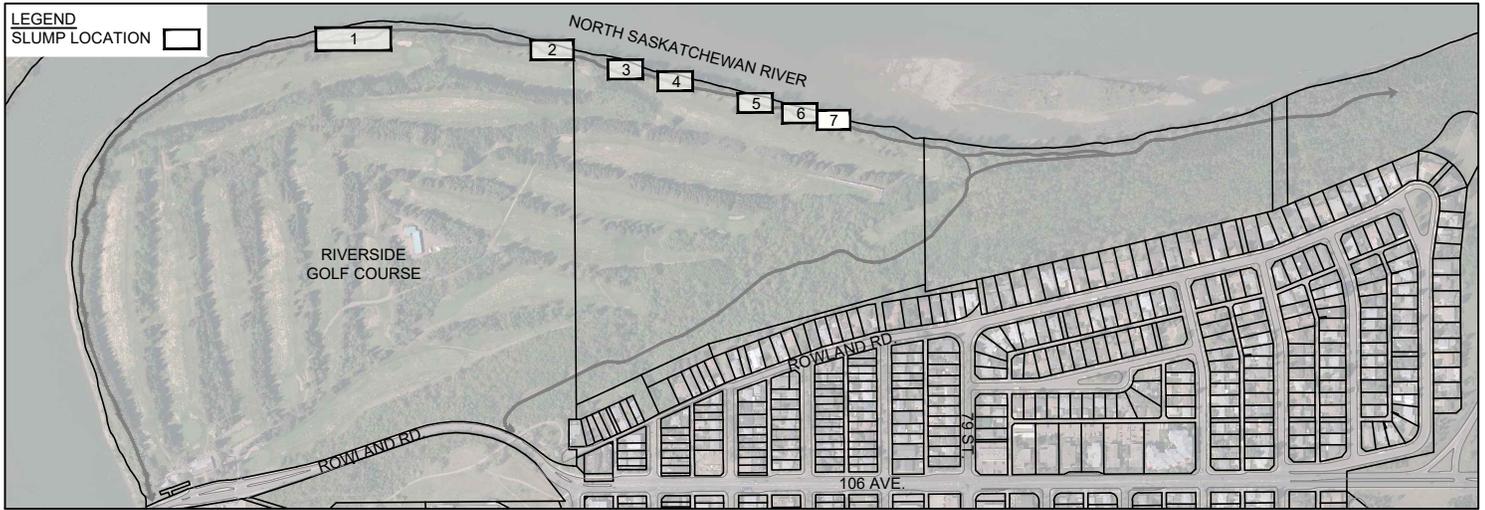


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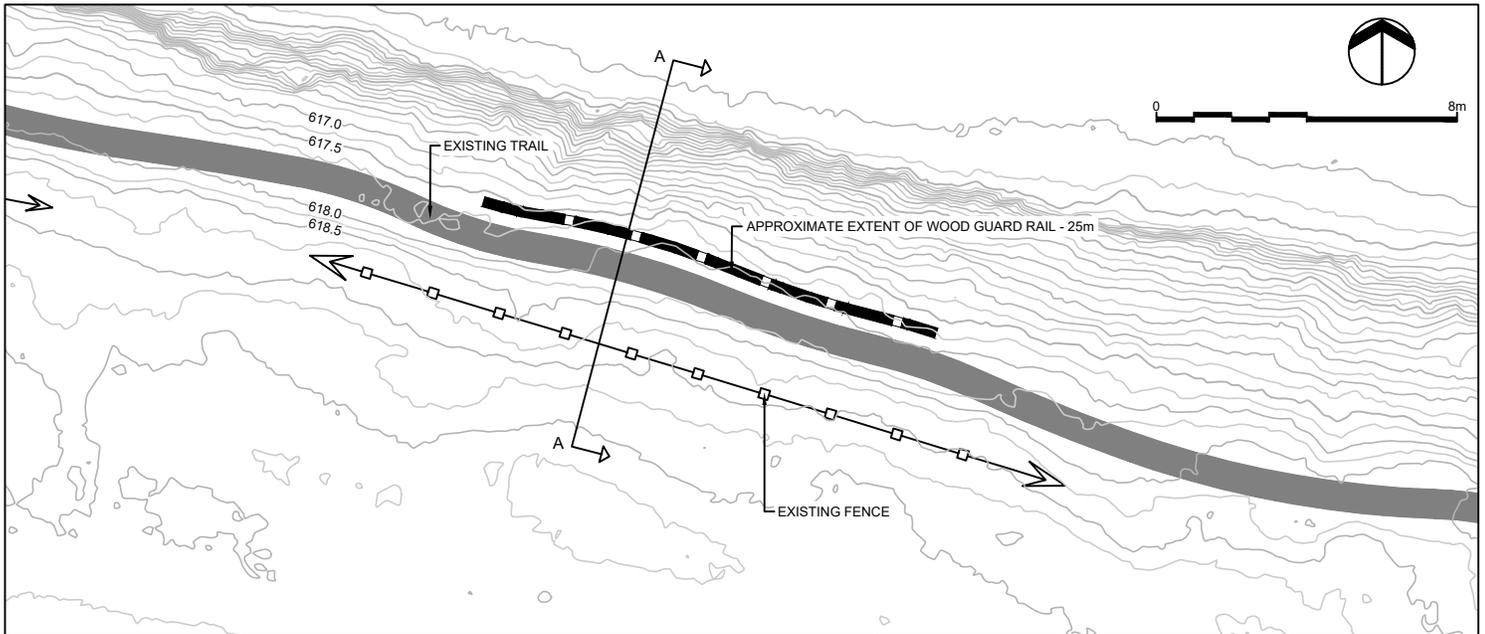
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 6 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

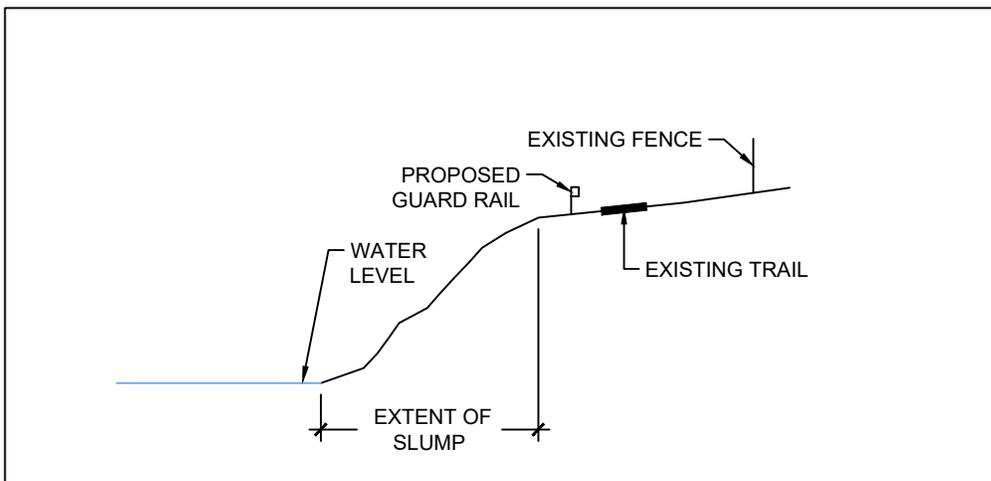
THURBER SITE 2



KEY PLAN (NOT TO SCALE)



SITE PLAN

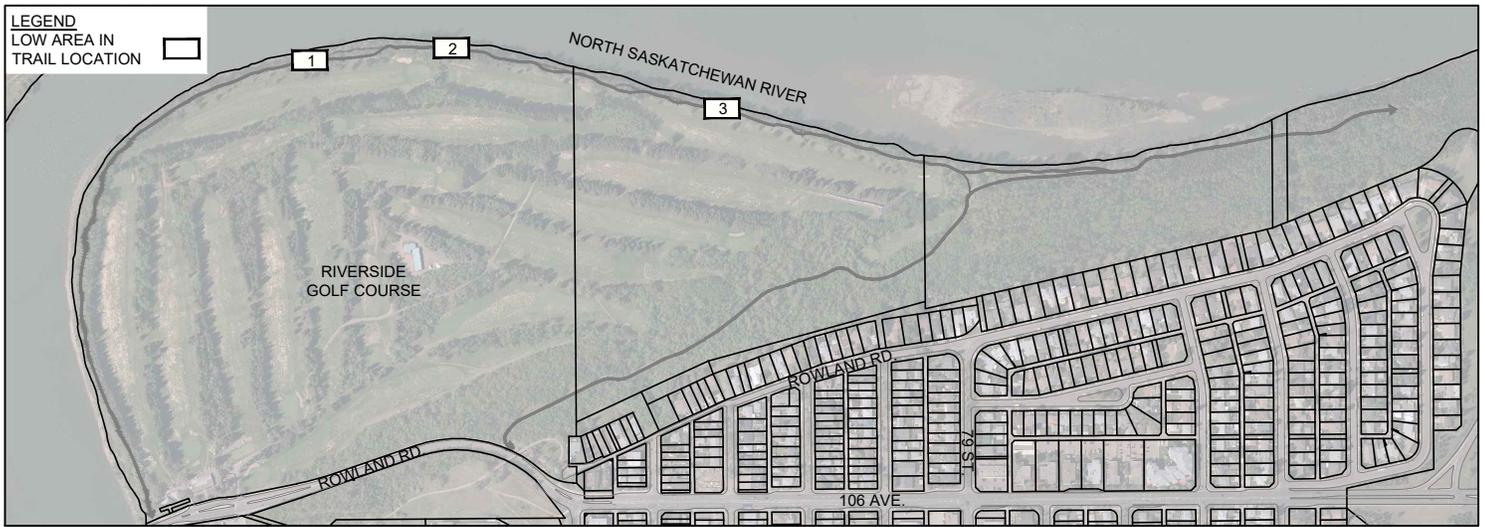


SECTION A

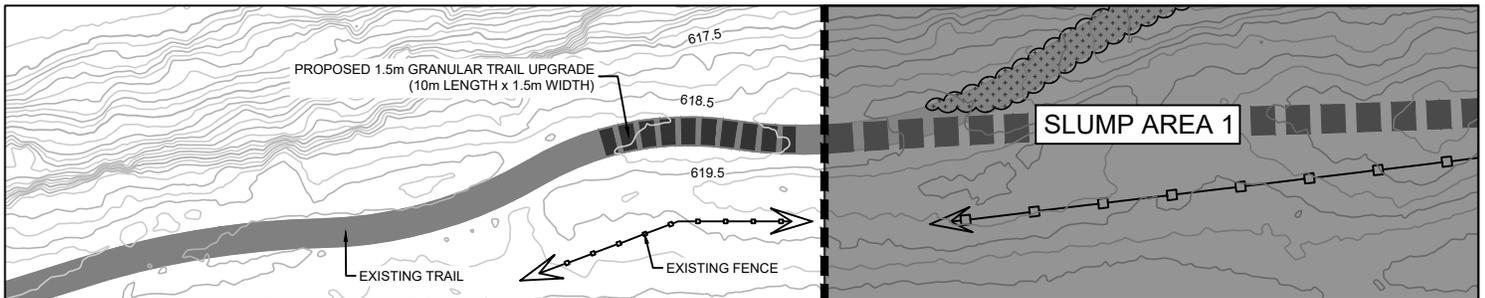
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 7 OPTION: PROPOSED GUARD RAIL

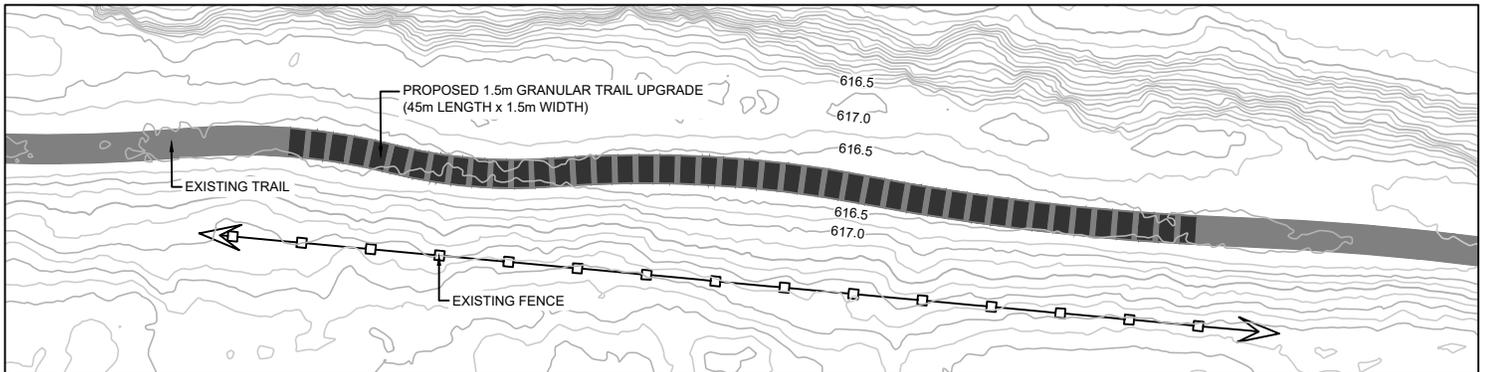
THURBER SITE 11



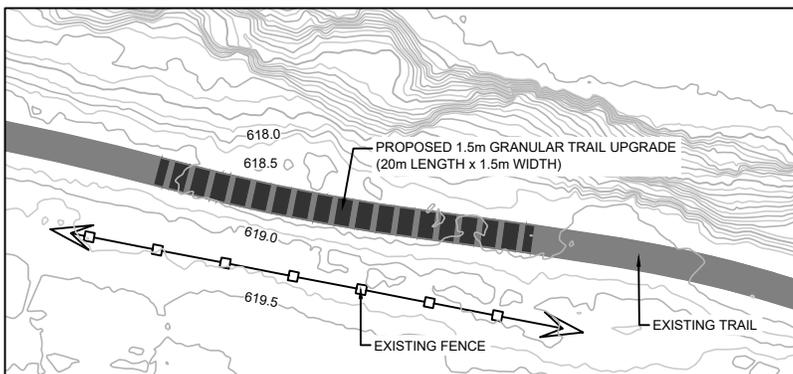
KEY PLAN (NOT TO SCALE)



LOW AREA IN TRAIL LOCATION 1 - 10m LENGTH X 1.5m WIDTH



LOW AREA IN TRAIL LOCATION 2 - 45m LENGTH X 1.5m WIDTH
THURBER SITE 6



LOW AREA IN TRAIL LOCATION 3 - 20m LENGTH X 1.5m WIDTH

GENERAL NOTES

- CLEAR AND COMPACT EXISTING TRAIL SURFACE. SUPPLY AND INSTALL FILTER FABRIC AND GEOGRID ON TOP OF EXISTING SURFACE, ADD 150mm OF NEW GRANULAR MATERIAL AND COMPACT, EDGE OF TRAIL REHABILITATION ACCORDINGLY



**RIVERSIDE TRAIL RE-ALIGNMENT
TRAIL UPGRADE OPTIONS: LOW POINTS IN TRAIL**



GRANULAR TRAIL
1.5m WIDTH



BLACK VINYL COATED
CHAIN LINK FENCE
2.0m HEIGHT



WOODEN GAURD RAIL
1.2m HEIGHT



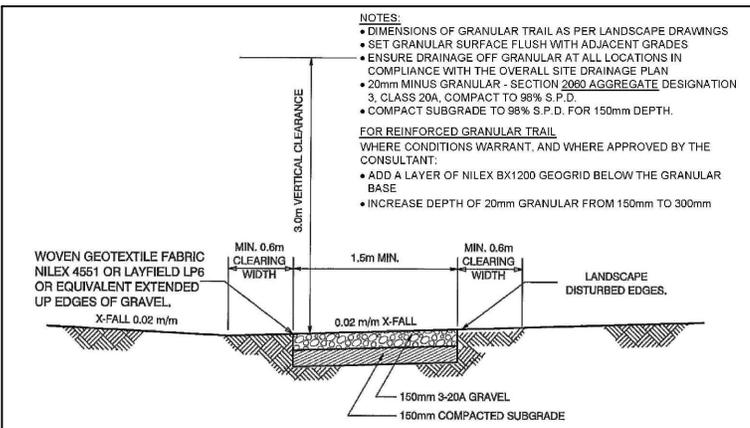
NATURALIZATION VEGETATION
TREE IN 20 GALLON POT



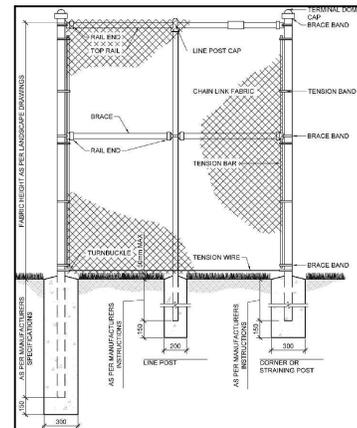
NATURALIZATION VEGETATION
SHRUB IN 20 GALLON POT



EXAMPLE OF NATURALIZATION
VEGETATION REHAB



PROPOSED GRANULAR TRAIL DETAIL



PROPOSED CHAIN LINK
FENCE DETAIL

RIVERSIDE TRAIL RE-ALIGNMENT MATERIAL EXAMPLES

Appendix D: Vegetation Inventory (June 2020)

Riverside Trail Realignment Plant Species Inventory for each Rehabilitation Location (19 June 2020)

Species*				Location**						
Scientific Name	Common Name	Origin	ACIMS rank	1	2	3	4	5	6	7
<i>Acer negundo</i>	Manitoba maple	Native	SU	F (seedlings)	D	D	O			O
<i>Achillea alpina</i>	many-flowered yarrow	Native	S5	R						
<i>Actaea rubra</i>	red and white baneberry	Native	S5	R		R			R	
<i>Amelanchier alnifolia</i>	saskatoon	Native	S5	R	R			R		R
<i>Anemone canadensis</i>	Canada anemone	Native	S5	R	R					
<i>Aralia nudicaulis</i>	wild sarsaparilla	Native	S5	O	F	O		F	F	F
<i>Betula papyrifera</i>	white birch	Native	S5?	R	O			O	R	R
<i>Bromus inermis</i>	smooth brome	Exotic	SNA				O	O	O	R
<i>Carex peckii</i>	Peck's sedge	Native	S4	R						
<i>Clematis occidentalis</i>	purple clematis	Native	S5						O	R
<i>Cornus stolonifera</i>	red-osier dogwood	Native	S5	O		O	O	O	F	O
<i>Corylus cornuta</i>	beaked hazelnut	Native	S5	R	R	R	R		O	
<i>Cotoneaster lucidus</i>	Peking cotoneaster	Exotic	SNA	O						
<i>Elymus repens</i>	quackgrass	Exotic	SNA	R						R
<i>Equisetum pratense</i>	meadow horsetail	Native	S5			R				
<i>Fragaria vesca</i>	woodland strawberry	Native	S4	R						
<i>Fragaria virginiana</i>	wild strawberry	Native	S5			O				
<i>Fraxinus sp.</i>	ash species	Exotic		F	F	O		F	O	F
<i>Galium boreale</i>	northern bedstraw	Native	S5			O	R			
<i>Geum aleppicum</i>	yellow avens	Native	S5			R				
<i>Lathyrus ochroleucus</i>	cream-colored vetchling	Native	S5					R		
<i>Lonicera dioica</i>	twining honeysuckle	Native	S5	O	R	R	R	R	R	R
<i>Maianthemum canadense</i>	wild lily-of-the-valley	Native	S5	O	R	O	O	R	O	O
<i>Maianthemum stellatum</i>	star-flowered Solomon's-seal	Native	S5	O	R	O	R		R	R
<i>Picea glauca</i>	white spruce	Native	S5	R		O	R			R
<i>Plantago major</i>	common plantain	Exotic	SNA					R		
<i>Poa palustris</i>	fowl bluegrass	Native	S5	R						
<i>Poa pratensis</i>	Kentucky bluegrass	Native	S5	R	R	O		R	O	O
<i>Populus balsamifera</i>	balsam poplar	Native	S5	O		R	O	O	F	O
<i>Populus tremuloides</i>	aspen	Native	S5	F	O	R				
<i>Populus X</i>	hybrid poplar	Exotic			O		R		F	

Species*				Location**						
Scientific Name	Common Name	Origin	ACIMS rank	1	2	3	4	5	6	7
<i>Prosartes trachycarpa</i>	fairybells	Native	S5	R	R					
<i>Prunus virginiana</i>	choke cherry	Native	S5	O		R	F	F		O
<i>Quercus sp.</i>	oak species	Exotic		R						
<i>Rhamnus catharticus</i>	common buckthorn	Prohibited Noxious	SNA	O	R	O	R			R
<i>Rosa acicularis</i>	prickly rose	Native	S5	O			R	O	O	
<i>Rosa woodsii</i>	common wild rose	Native	S5	R	R	O	F	O	F	R
<i>Rubus idaeus</i>	wild red raspberry	Native	S5	R						
<i>Salix famelica</i>	hungry willow	Native	S4							R
<i>Solidago gigantea</i>	late goldenrod	Native	S5	O						
<i>Sorbus aucuparia</i>	European mountain-ash	Exotic	SNA	O	R	R			R	R
<i>Symphoricarpos occidentalis</i>	buckbrush	Native	S5	O	R	O	O		R	O
<i>Taraxacum officinale</i>	common dandelion	Exotic	SNA	O	O	F	F	F	F	F
<i>Thalictrum venulosum</i>	veiny meadow rue	Native	S5	O		R	R			
<i>Tilia</i>	lindin species	Exotic		R					R	
<i>Ulmus americana</i>	American elm	Exotic	SNA							R
<i>Viburnum opulus</i>	high-bush cranberry	Native	S3S4	O	O	O			R	
<i>Vicia americana</i>	wild vetch	Native	S5			R				
<i>Viola canadensis</i>	western Canada violet	Native	S5						R	
Species Richness				36	19	26	18	16	22	24
Native Species Richness				28	14	22	14	12	16	17
Exotic Species Richness				7	4	3	3	4	6	6
Noxious/Prohibited Noxious Species Richness				1	1	1	1	0	0	1

* Scientific nomenclature , common names and rank follow ACIMS (2019)

** Species abundance abbreviations per location are as follows: D=dominant, A=abundant, F=frequent, O=occasional, R=rare

Appendix E: Wildlife List

Riverside Trail Wildlife List (April 2020)

Common Name	Scientific Name*	Provincial Status (General Status of AB Wild Species 2015)	Wildlife Act Designation and New Species Assessed by ESCC	COSEWIC Designation	SARA Designation	Species Recorded in Study Area**	Potential Habitat Use	Likelihood of Occurrence
Common Garter Snake	<i>Thamnophis sirtalis</i>	Sensitive						
Canada Goose	<i>Branta canadensis</i>	Secure				eBird		
American Wigeon	<i>Mareca americana</i>	Secure				eBird		
Mallard	<i>Anas platyrhynchos</i>	Secure				Spencer 2020; eBird		
Common Goldeneye	<i>Bucephala clangula</i>	Secure				Spencer 2020; eBird		
Hooded Merganser	<i>Lophodytes cucullatus</i>	Secure						
Common Merganser	<i>Mergus merganser</i>	Secure				eBird		
Rock Pigeon	<i>Columba livia</i>	Exotic/Alien						
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Secure						
Spotted Sandpiper	<i>Actitis macularius</i>	Secure				eBird		
Greater Yellowlegs	<i>Tringa melanoleuca</i>	Secure						
Lesser Yellowlegs	<i>Tringa flavipes</i>	Secure						
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	Secure						
Franklin's Gull	<i>Leucophaeus pipixcan</i>	Secure						
Ring-billed Gull	<i>Larus delawarensis</i>	Secure				eBird		
California Gull	<i>Larus californicus</i>	Secure						
Osprey	<i>Pandion haliaetus</i>	Sensitive					Breeding/ Foraging	Low
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Sensitive					Breeding/ Foraging	Low
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Secure						
Great Horned Owl	<i>Bubo virginianus</i>	Secure						
Barred Owl	<i>Strix varia</i>	Sensitive					Breeding/ Foraging	Low
Boreal Owl	<i>Aegolius funereus</i>	Secure						
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	Secure						
Belted Kingfisher	<i>Megasceryle alcyon</i>	Secure						
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Secure						
Downy Woodpecker	<i>Dryobates pubescens</i>	Secure				eBird		
Hairy Woodpecker	<i>Dryobates villosus</i>	Secure				eBird		
Black-backed Woodpecker	<i>Picoides arcticus</i>	Sensitive					Breeding/ Foraging	Low
Northern Flicker	<i>Colaptes auratus</i>	Secure				eBird		

Common Name	Scientific Name*	Provincial Status (General Status of AB Wild Species 2015)	Wildlife Act Designation and New Species Assessed by ESCC	COSEWIC Designation	SARA Designation	Species Recorded in Study Area**	Potential Habitat Use	Likelihood of Occurrence
Pileated Woodpecker	<i>Colaptes pileatus</i>	Sensitive				eBird	Breeding/ Foraging	Moderate
Merlin	<i>Falco columbarius</i>	Secure				eBird		
Olive-sided Flycatcher	<i>Contopus cooperi</i>	May Be At Risk		Special Concern	Schedule 1 (Threatened)		Migrating	Low
Least Flycatcher	<i>Empidonax minimus</i>	Sensitive				eBird		
Eastern Phoebe	<i>Sayornis phoebe</i>	Sensitive						
Blue-headed Vireo	<i>Vireo solitarius</i>	Secure				eBird		
Warbling Vireo	<i>Vireo gilvus</i>	Secure						
Philadelphia Vireo	<i>Vireo philadelphicus</i>	Secure						
Red-eyed Vireo	<i>Vireo olivaceus</i>	Secure				eBird		
Blue Jay	<i>Cyanocitta cristata</i>	Secure				eBird		
Black-billed Magpie	<i>Pica hudsonia</i>	Secure				eBird		
American Crow	<i>Corvus brachyrhynchos</i>	Secure				eBird		
Common Raven	<i>Corvus corax</i>	Secure				eBird		
Tree Swallow	<i>Tachycineta bicolor</i>	Secure						
Black-capped Chickadee	<i>Poecile atricapillus</i>	Secure				Spencer 2020; eBird		
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Secure				eBird		
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Secure				eBird		
House Wren	<i>Troglodytes aedon</i>	Secure						
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Secure				eBird		
American Robin	<i>Turdus migratorius</i>	Secure				eBird		
Gray Catbird	<i>Dumetella carolinensis</i>	Secure				eBird		
European Starling	<i>Sturnus vulgaris</i>	Exotic/Alien						
Bohemian Waxwing	<i>Bombycilla garrulus</i>	Secure						
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Secure				eBird		
House Sparrow	<i>Passer domesticus</i>	Exotic/Alien				eBird		
Pine Grosbeak	<i>Pinicola enucleator</i>	Secure						
Purple Finch	<i>Haemorhous purpureus</i>	Secure						
House Finch	<i>Haemorhous mexicanus</i>	Secure				eBird		
Common Redpoll	<i>Acanthis flammea</i>	Secure						
Hoary Redpoll	<i>Acanthis hornemanni</i>	Secure						
Pine Siskin	<i>Spinus pinus</i>	Secure				eBird		
American Goldfinch	<i>Spinus tristis</i>	Secure						

Common Name	Scientific Name*	Provincial Status (General Status of AB Wild Species 2015)	Wildlife Act Designation and New Species Assessed by ESCC	COSEWIC Designation	SARA Designation	Species Recorded in Study Area**	Potential Habitat Use	Likelihood of Occurrence
Chipping Sparrow	<i>Spizella passerina</i>	Secure				eBird		
Song Sparrow	<i>Melospiza melodia</i>	Secure				eBird		
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Secure				eBird		
Dark-eyed Junco	<i>Junco hyemalis</i>	Secure						
Yellow Warbler	<i>Setophaga petechia</i>	Secure				eBird		
Yellow-rumped Warbler	<i>Setophaga coronata</i>	Secure				eBird		
Tennessee Warbler	<i>Oreothlypis peregrina</i>	Secure				eBird		
Orange-crowned Warbler	<i>Oreothlypis celata</i>	Secure				eBird		
Magnolia Warbler	<i>Setophaga magnolia</i>	Secure				eBird		
Black-and-white Warbler	<i>Mniotilta varia</i>	Secure				eBird		
Bay-breasted Warbler	<i>Setophaga castanea</i>	Sensitive				eBird	Migrating	Low
Blackpoll Warbler	<i>Setophaga striata</i>	Secure				eBird		
American Redstart	<i>Setophaga ruticilla</i>	Secure				eBird		
Wilson's Warbler	<i>Cardellina pusilla</i>	Secure				eBird		
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	Secure				eBird		
Black-Throated Green Warbler	<i>Setophaga virens</i>	Sensitive	Special Concern			eBird	Migrating	Low
Snowshoe Hare	<i>Lepus americanus</i>	Secure						
White-tailed Jack Rabbit	<i>Lepus townsendii</i>	Secure						
Least Chipmunk	<i>Neotamias minimus</i>	Secure				Spencer 2020		
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Secure				Spencer 2020		
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	Secure						
Northern Pocket Gopher	<i>Thomomys talpoides</i>	Secure						
American Beaver	<i>Castor canadensis</i>	Secure				Spencer 2020		
Deer Mouse	<i>Peromyscus maniculatus</i>	Secure						
Southern Red-backed Vole	<i>Myodes gapperi</i>	Secure						
Meadow Vole	<i>Microtus pennsylvanicus</i>	Secure						
Muskrat	<i>Ondatra zibethicus</i>	Secure						
House Mouse	<i>Mus musculus</i>	Exotic/Alien						
Common Porcupine	<i>Erethizon dorsatum</i>	Secure						
Masked Shrew	<i>Sorex cinereus</i>	Secure						
Prarie Shrew	<i>Sorex haydeni</i>	Secure						
Dusky Shrew	<i>Sorex monticolus</i>	Secure						

Common Name	Scientific Name*	Provincial Status (General Status of AB Wild Species 2015)	Wildlife Act Designation and New Species Assessed by ESCC	COSEWIC Designation	SARA Designation	Species Recorded in Study Area**	Potential Habitat Use	Likelihood of Occurrence
Water Shrew	<i>Sorex palustris</i>	Secure						
Little Brown Myotis	<i>Myotis lucifugus</i>	May Be At Risk		Endangered	Schedule 1 (Endangered)		Roosting/ Foraging	Moderate
Northern Bat	<i>Myotis septentrionalis</i>	May Be At Risk	Data Deficient	Endangered	Schedule 1 (Endangered)	FWMIS	Roosting/ Foraging	Moderate
Big Brown Bat	<i>Eptesicus fuscus</i>	Secure						
Coyote	<i>Canis latrans</i>	Secure						
Red Fox	<i>Vulpes vulpes</i>	Secure						
Long-tailed Weasel	<i>Mustela frenata</i>	May Be At Risk					Breeding/ Foraging	Low
Ermine	<i>Mustela erminea</i>	Secure						
Least Weasel	<i>Mustela nivalis</i>	Secure						
Striped Skunk	<i>Mephitis mephitis</i>	Secure						
Moose	<i>Alces alces</i>	Secure						
Mule Deer	<i>Odocoileus hemionus</i>	Secure						
White-tailed Deer	<i>Odocoileus virginianus</i>	Secure						

* Scientific names are based on the Cornell Lab of Ornithology's 2018 Clements Checklist (birds) and the Government of Alberta's 2015 Wild Species Status List (mammals, amphibians, reptiles).

** Sources of species records: Spencer 2020 = site reconnaissance (22 April 2020), FWMIS = fish and wildlife Management Information System (Accessed 20 April 2020, observation dates not known), eBird = The Cornell Lab of Ornithology eBird (Accessed 06 July 2020, observation dates range from 1978 to 2020)

Appendix F: *Historical Resources Act* Approval

Historical Resources Act Approval

Proponent: City of Edmonton
14th Floor, Edmonton Tower, 10111 - 104 Avenue NW, Edmonton, AB T5J 0J4

Contact: Jim Nakonechny

Agent: Circle CRM Group Inc.

Contact: Margarita de Guzman

Project Name: Riverside Trail Realignment and Upgrading

Project Components: Trail

Application Purpose: Requesting HRA Approval / Requirements

Historical Resources Act approval is granted for the activities described in this application and its attached plan(s)/sketch(es) subject to Section 31, "a person who discovers an historic resource in the course of making an excavation for a purpose other than for the purpose of seeking historic resources shall forthwith notify the Minister of the discovery." The chance discovery of historical resources is to be reported to the contacts identified within [Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources](#).



Martina Purdon
Manager, Regulatory Approvals
and Information Management
Alberta Culture, Multiculturalism
and Status of Women

Lands Affected: All New Lands

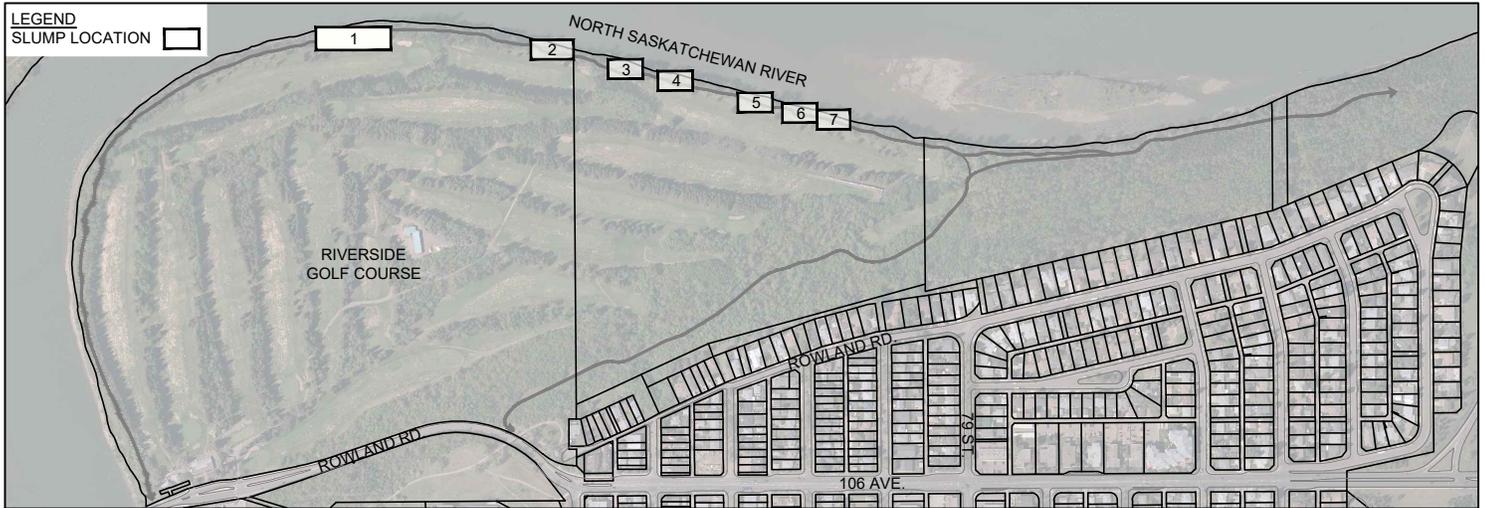
Proposed Development Area:

MER	RGE	TWP	SEC	LSD List
4	24	53	3	5,12-15
4	24	53	2	13

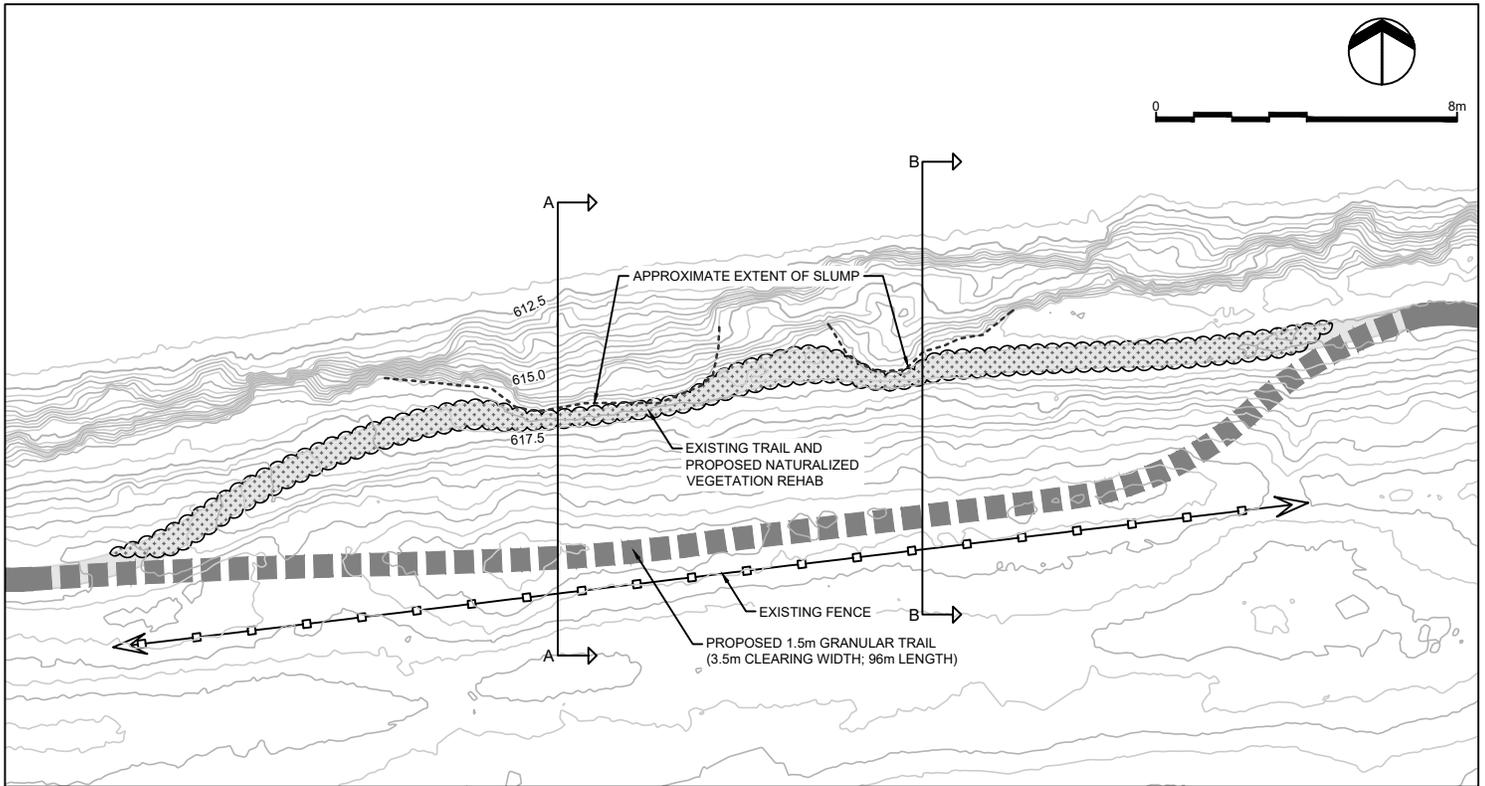
Documents Attached:

Document Name	Document Type
Project Plan	Illustrative Material

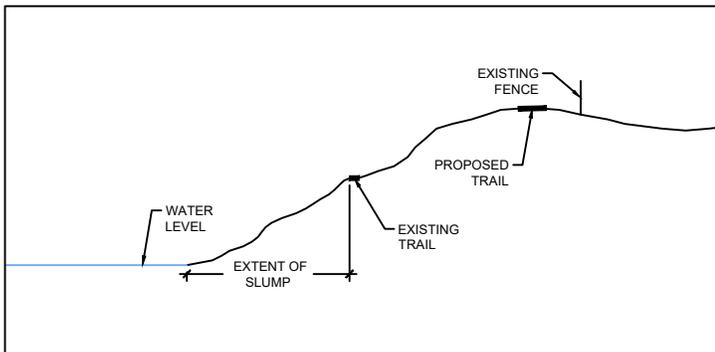
Appendix G: Riverside Trail Realignment Concept Drawings (EDA 2020)



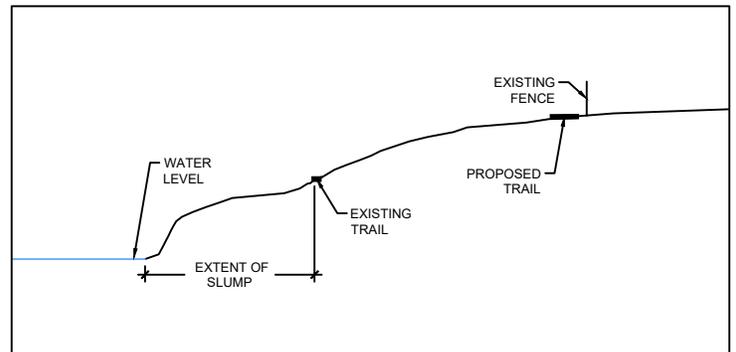
KEY PLAN (NOT TO SCALE)



SITE PLAN



SECTION A

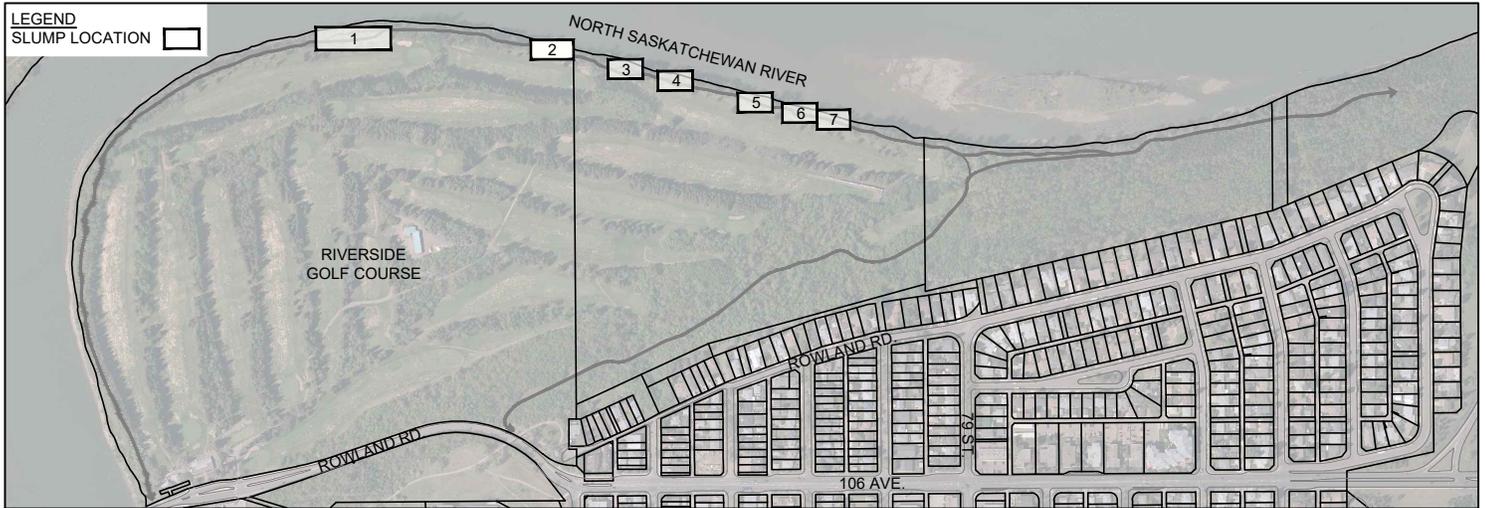


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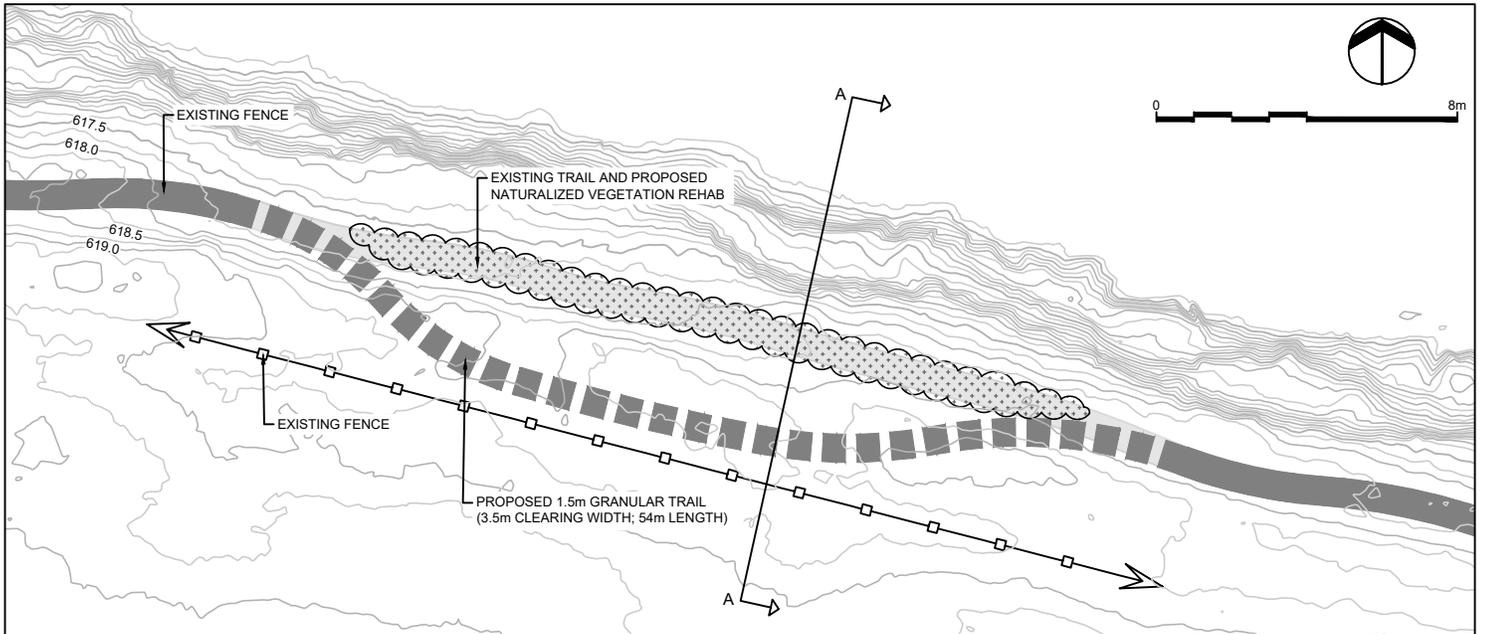
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 1 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

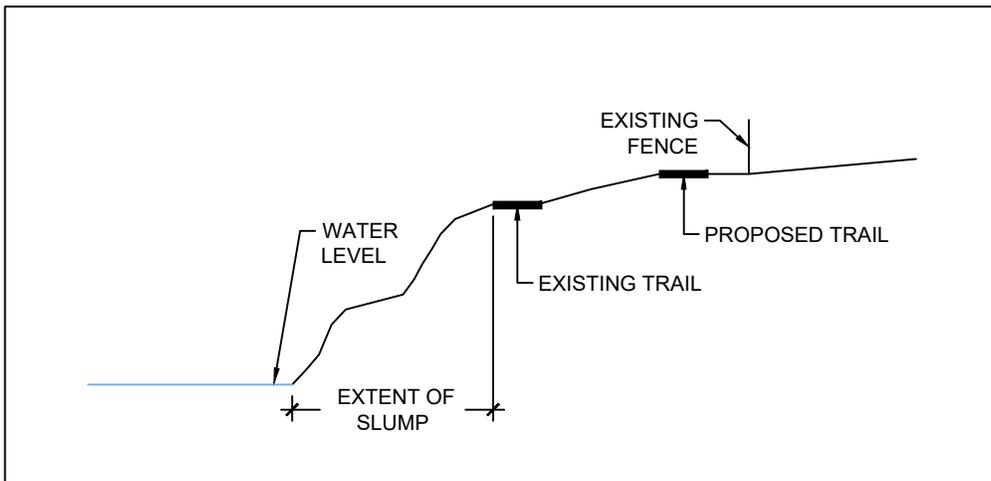
THURBER SITE 1



KEY PLAN (NOT TO SCALE)



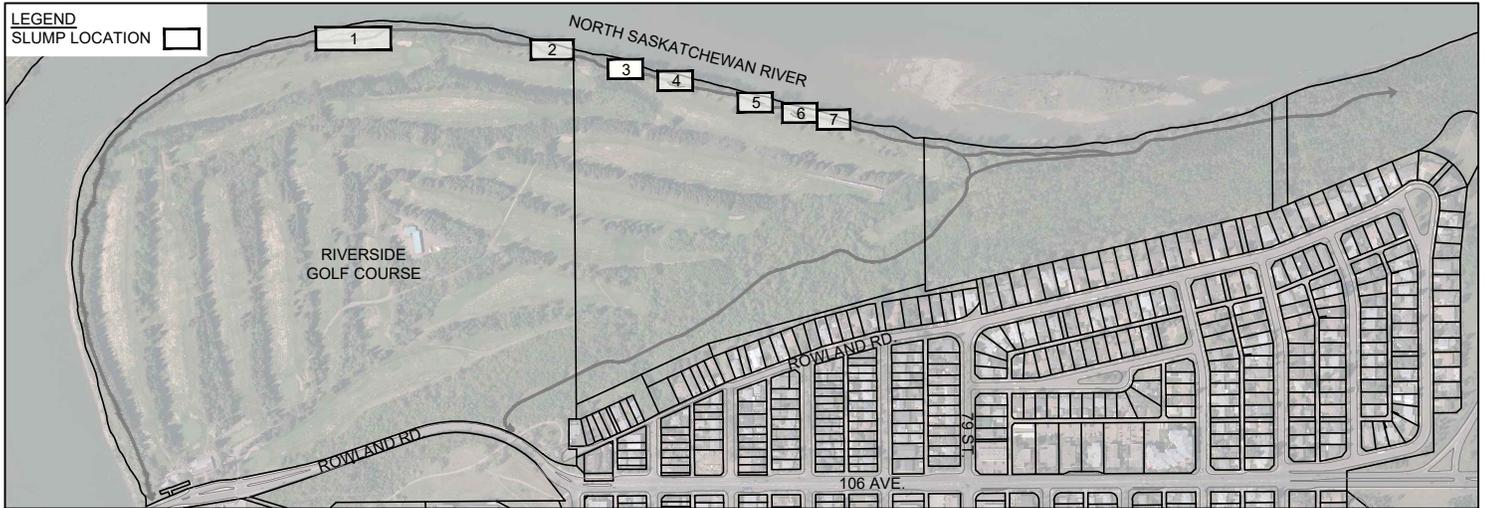
SITE PLAN



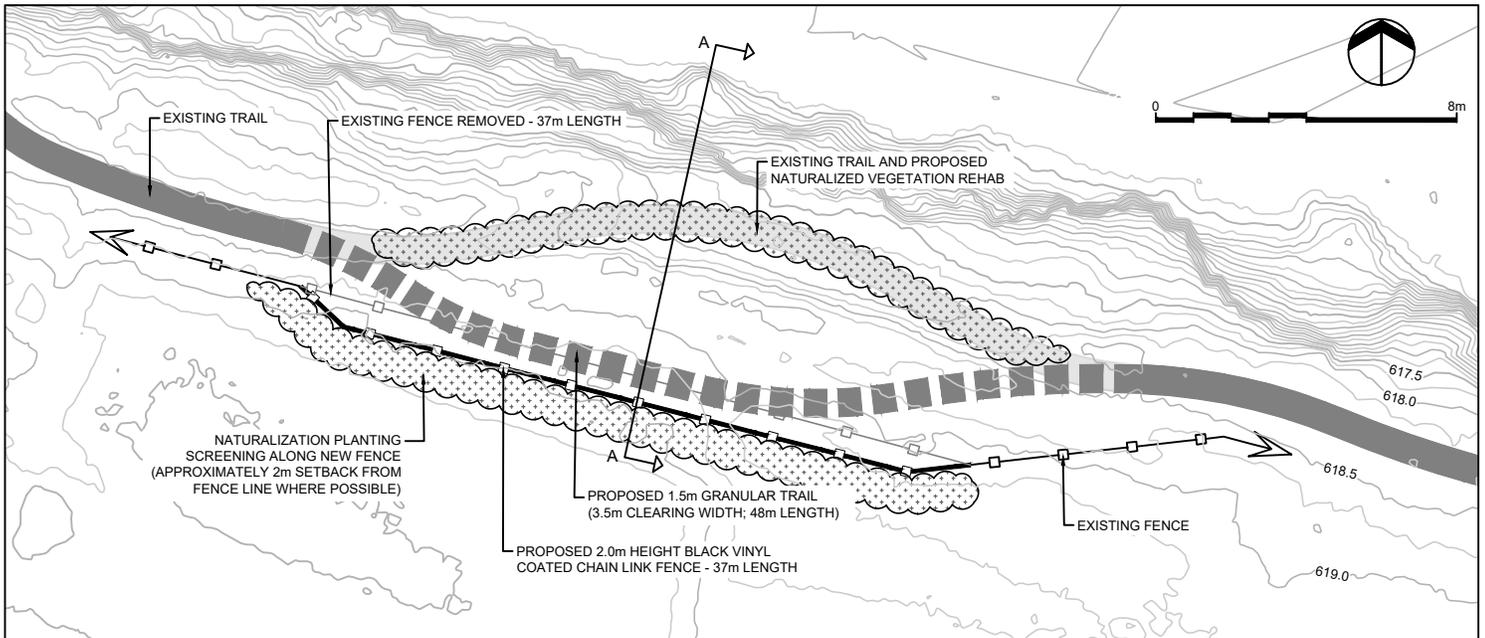
SECTION A

RIVER SIDE TRAIL RE-ALIGNMENT

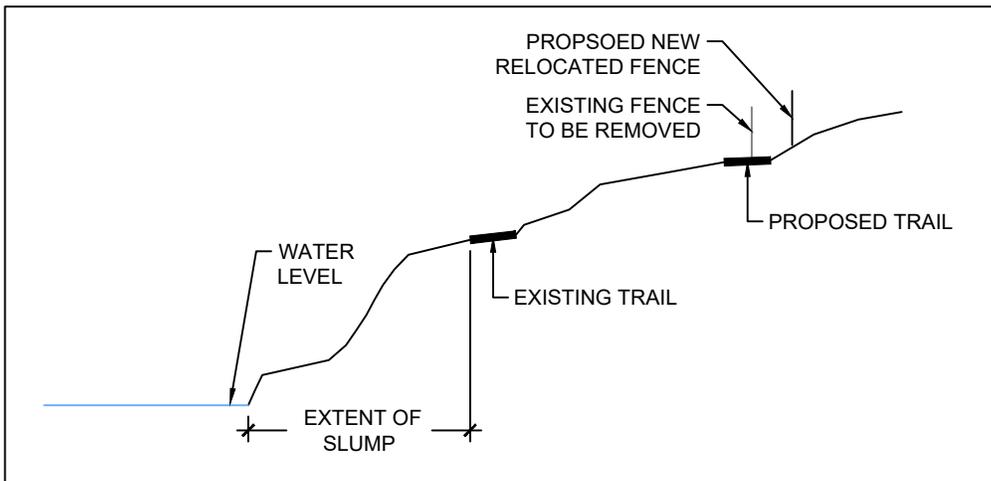
LOCATION 2 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK
THURBER SITE 7



KEY PLAN (NOT TO SCALE)



SITE PLAN

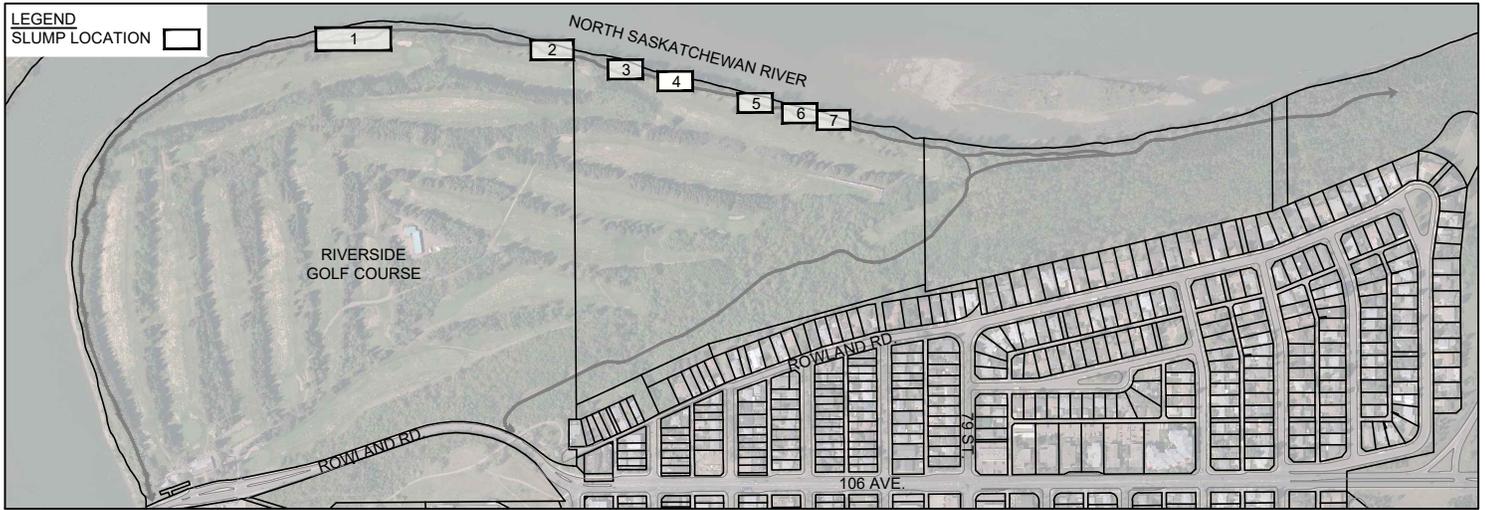


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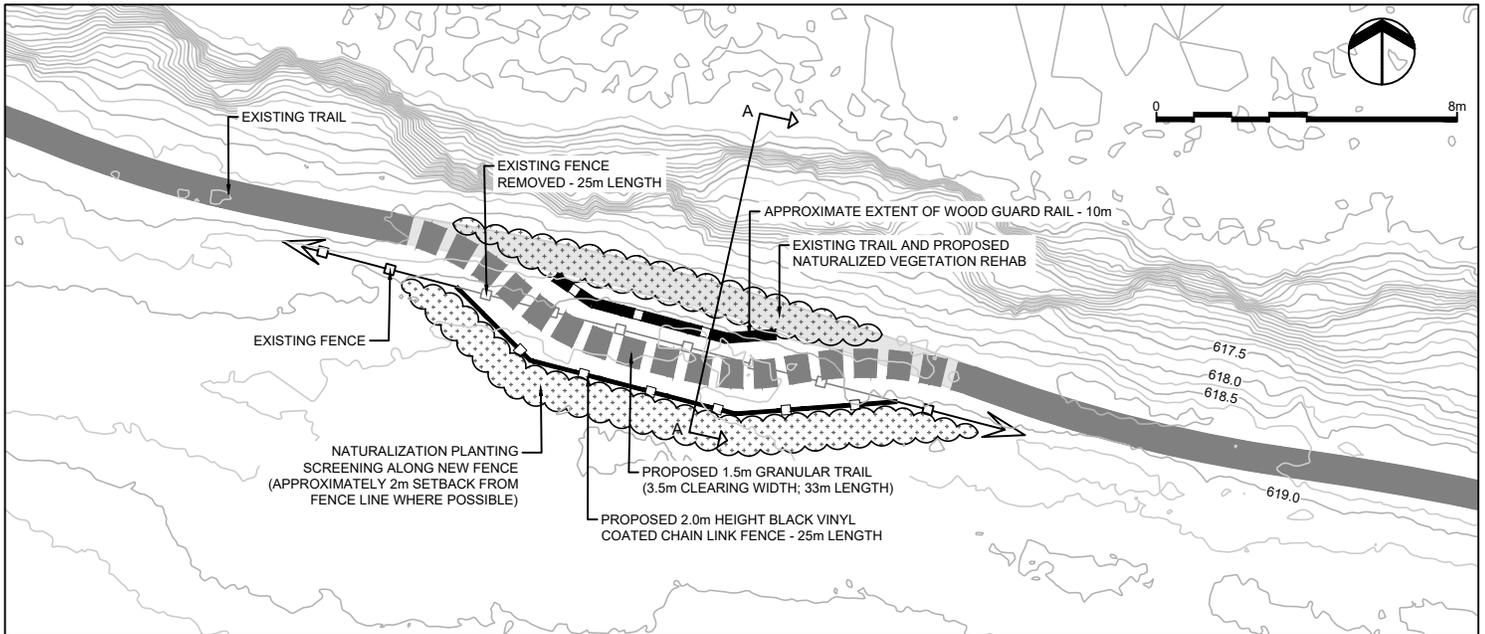
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 3 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

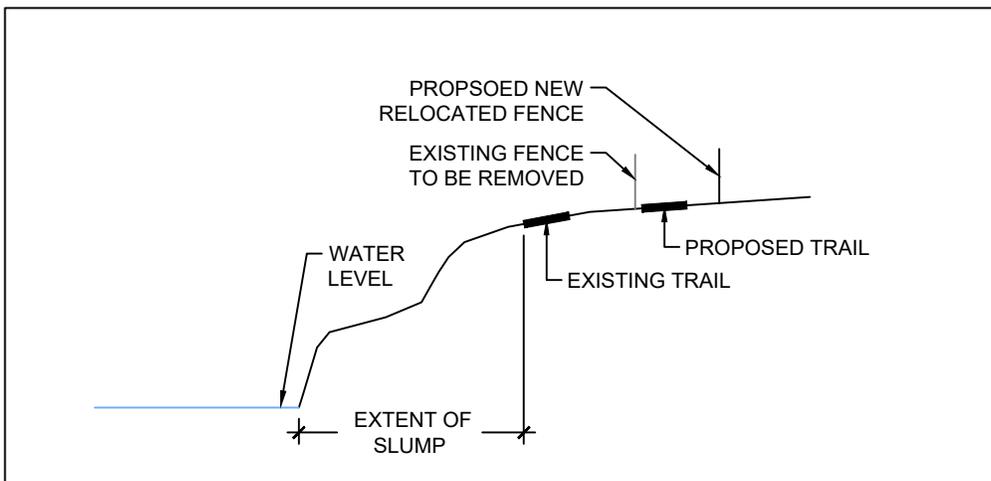
THURBER SITE 8



KEY PLAN (NOT TO SCALE)



SITE PLAN

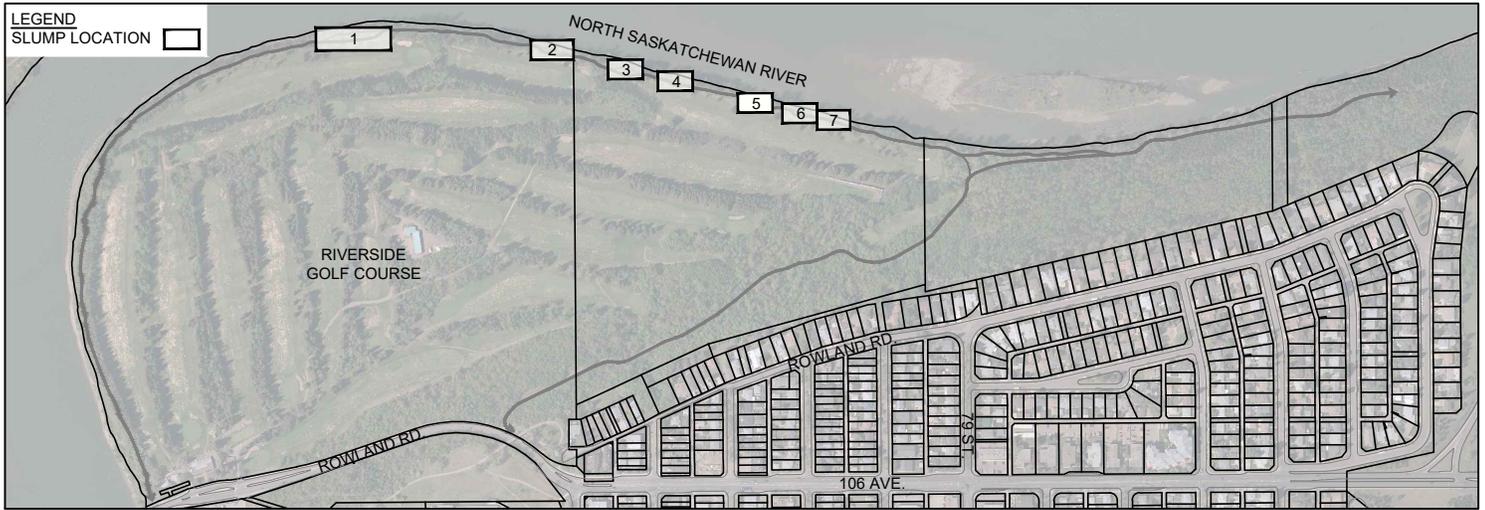


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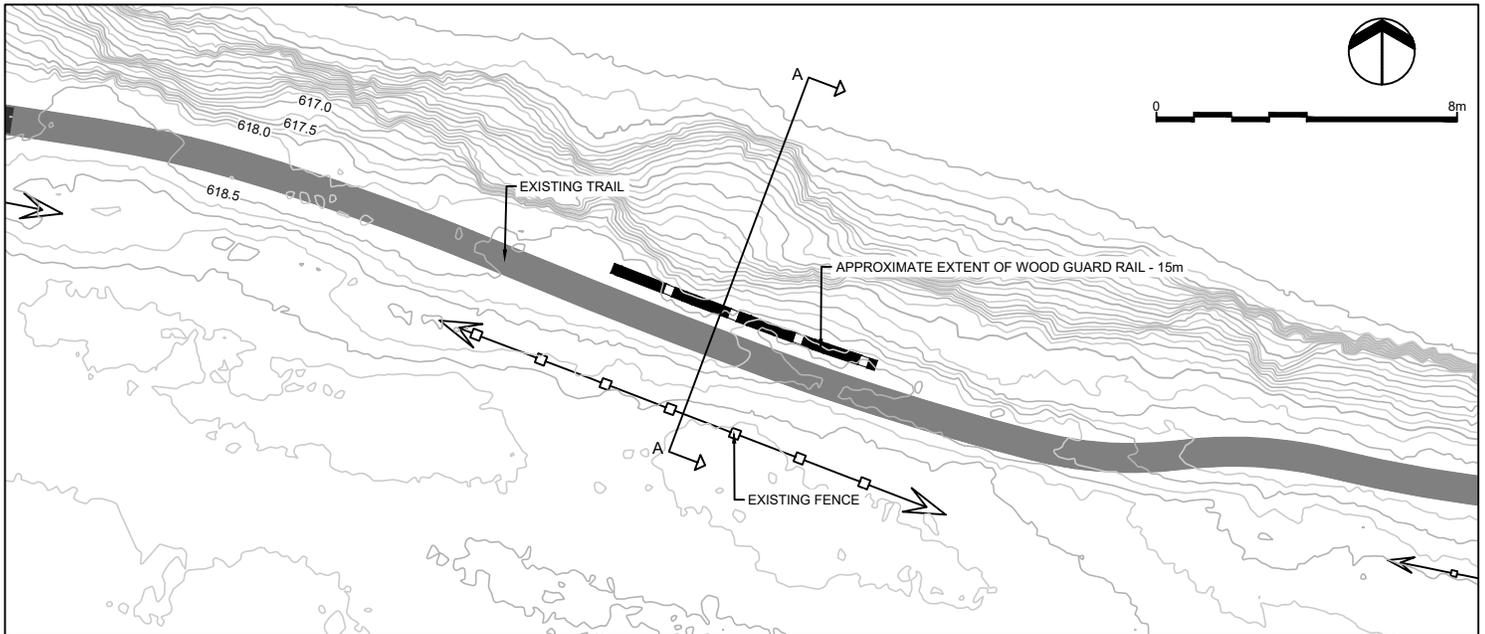
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 4 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

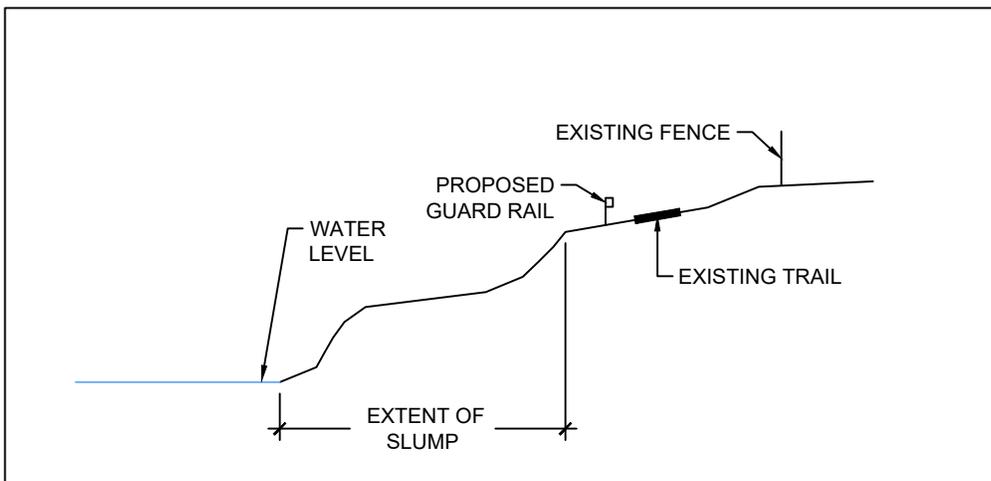
THURBER SITE 9



KEY PLAN (NOT TO SCALE)



SITE PLAN

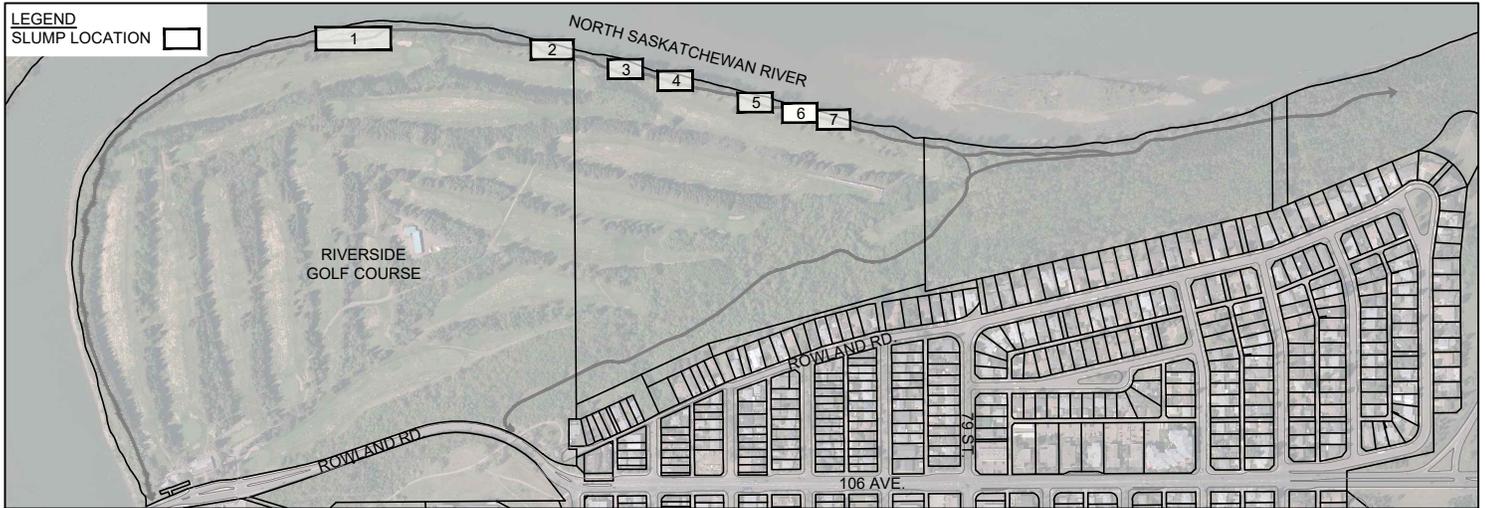


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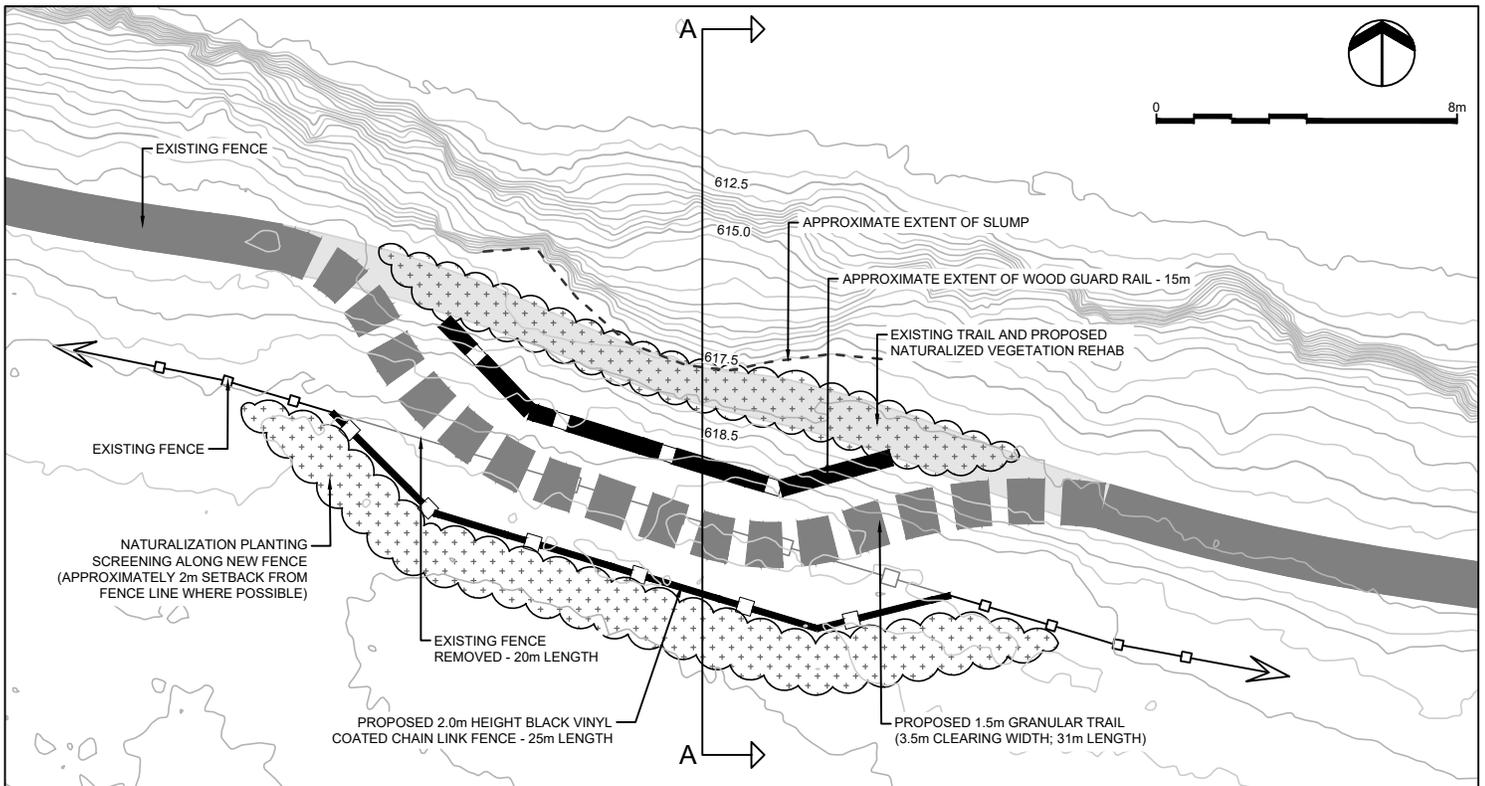
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 5 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

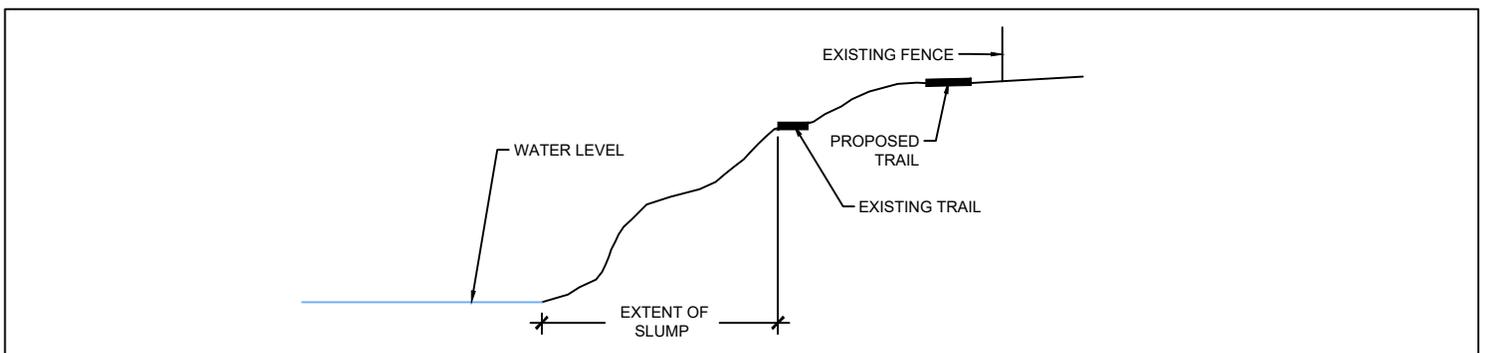
THURBER SITE 10



KEY PLAN (NOT TO SCALE)



SITE PLAN

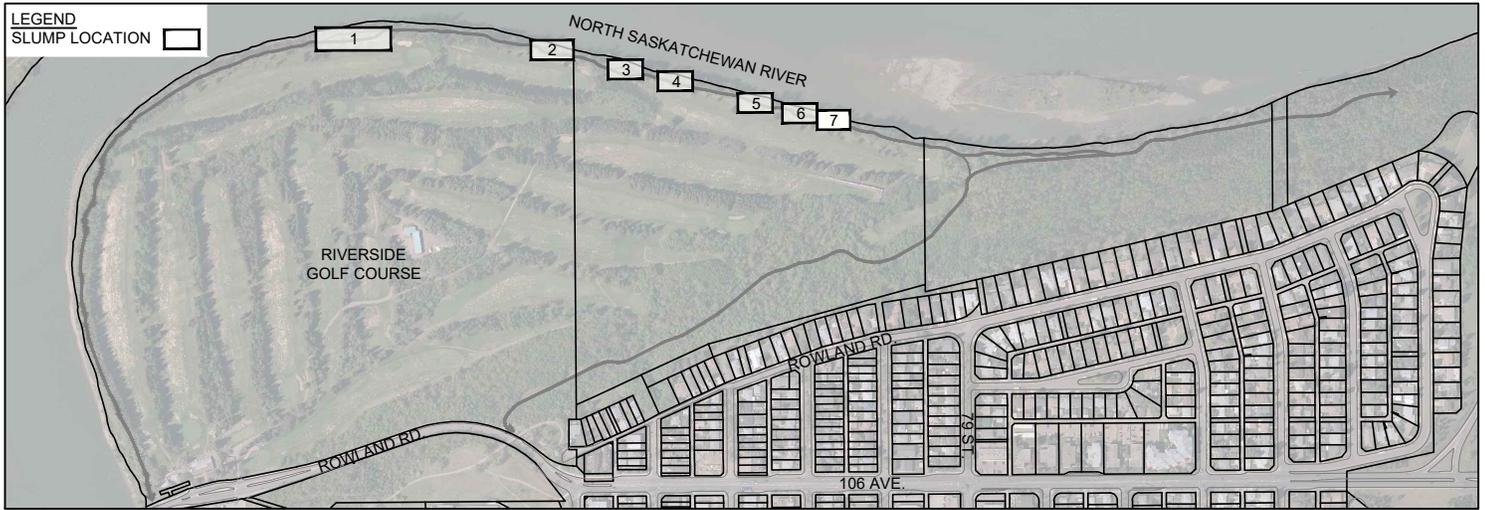


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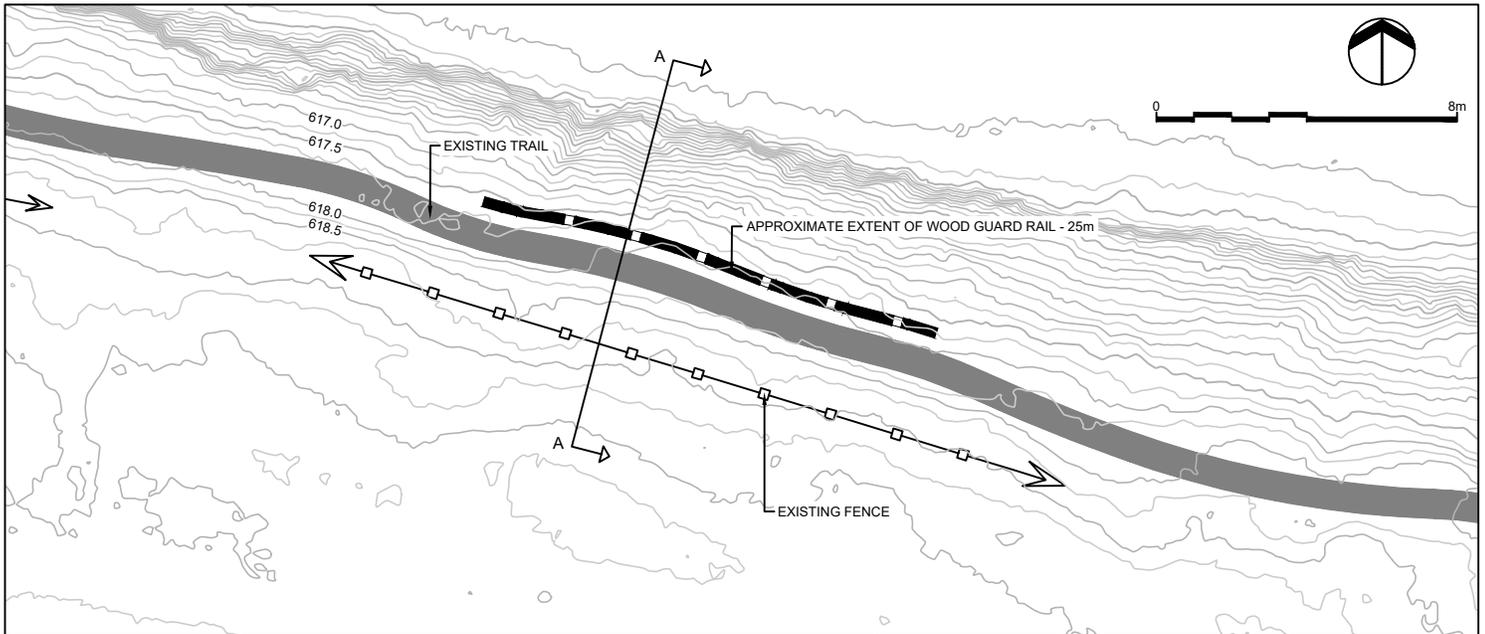
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 6 OPTION: TRAIL RELOCATION TO AVOID SLUMPING BANK

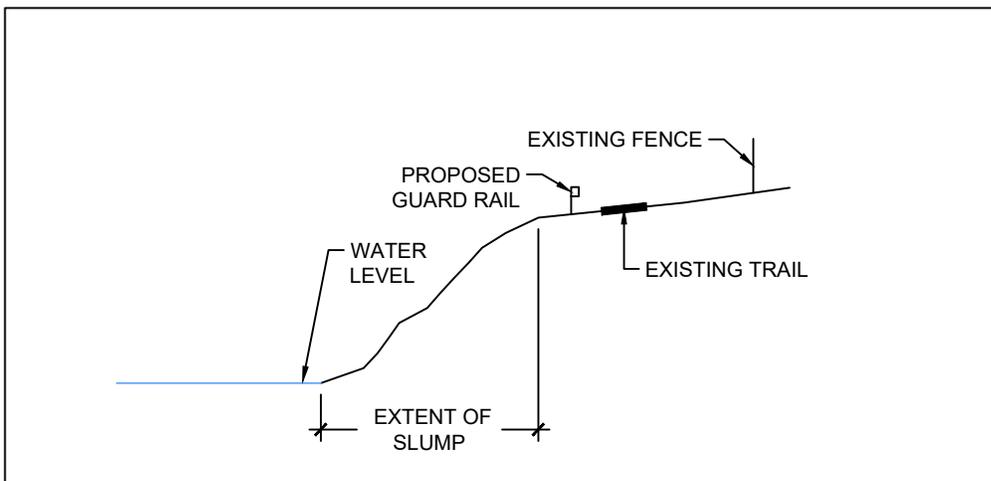
THURBER SITE 2



KEY PLAN (NOT TO SCALE)



SITE PLAN

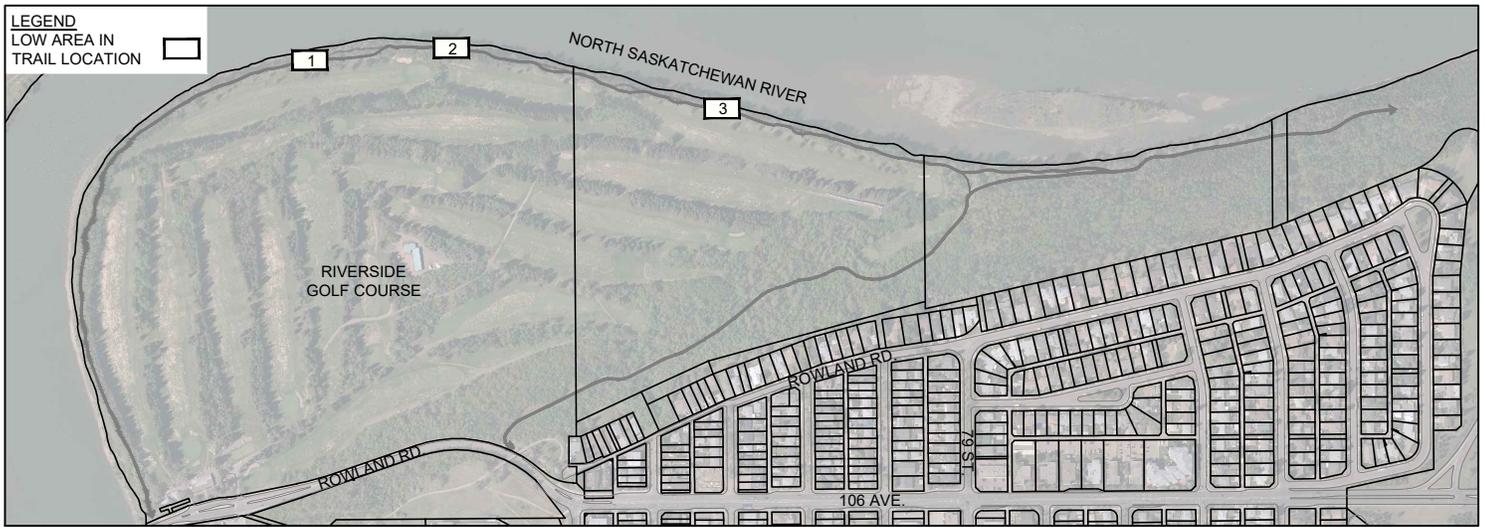


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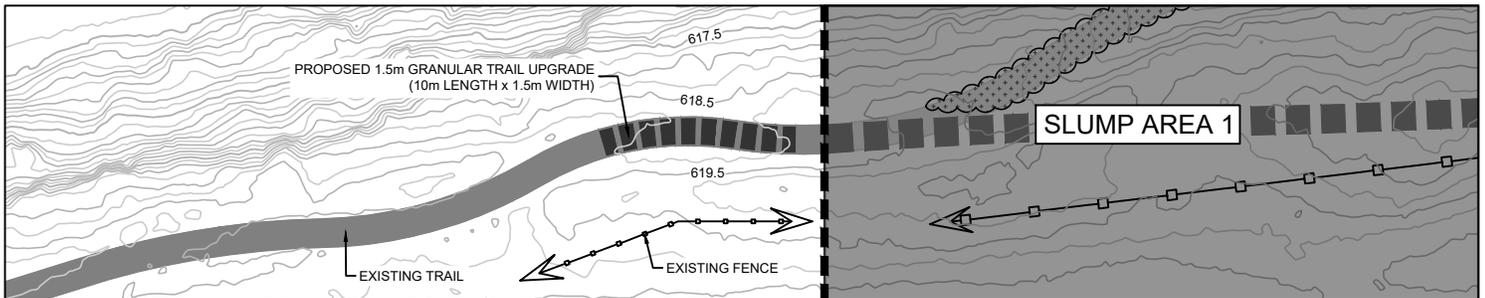
RIVER SIDE TRAIL RE-ALIGNMENT

LOCATION 7 OPTION: PROPOSED GUARD RAIL

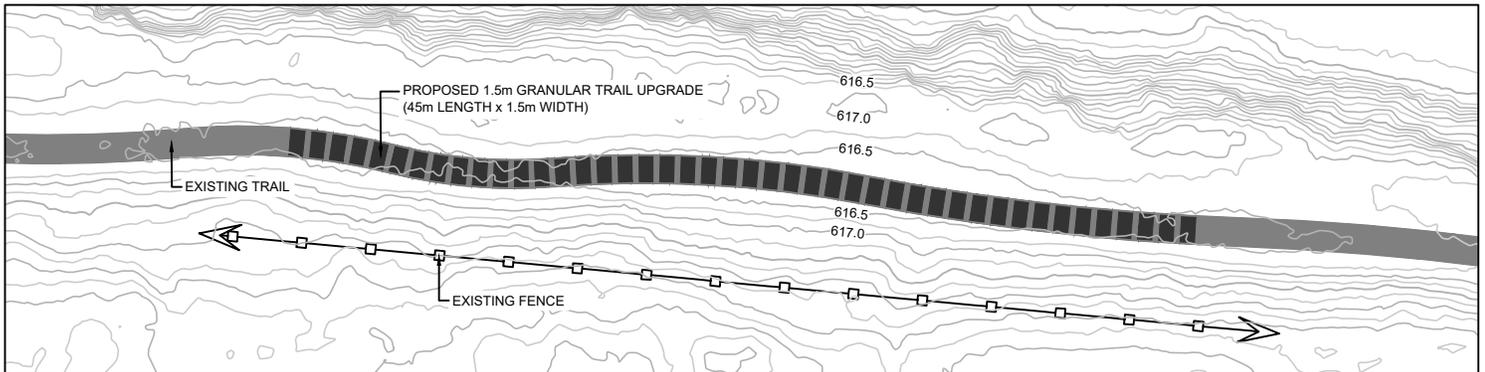
THURBER SITE 11



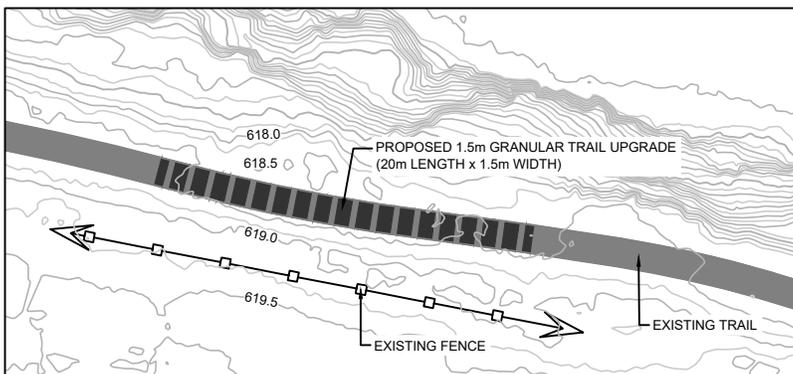
KEY PLAN (NOT TO SCALE)



LOW AREA IN TRAIL LOCATION 1 - 10m LENGTH X 1.5m WIDTH



LOW AREA IN TRAIL LOCATION 2 - 45m LENGTH X 1.5m WIDTH
THURBER SITE 6



LOW AREA IN TRAIL LOCATION 3 - 20m LENGTH X 1.5m WIDTH

GENERAL NOTES

- CLEAR AND COMPACT EXISTING TRAIL SURFACE. SUPPLY AND INSTALL FILTER FABRIC AND GEOGRID ON TOP OF EXISTING SURFACE, ADD 150mm OF NEW GRANULAR MATERIAL AND COMPACT, EDGE OF TRAIL REHABILITATION ACCORDINGLY



**RIVERSIDE TRAIL RE-ALIGNMENT
TRAIL UPGRADE OPTIONS: LOW POINTS IN TRAIL**



GRANULAR TRAIL
1.5m WIDTH



BLACK VINYL COATED
CHAIN LINK FENCE
2.0m HEIGHT



WOODEN GAURD RAIL
1.2m HEIGHT



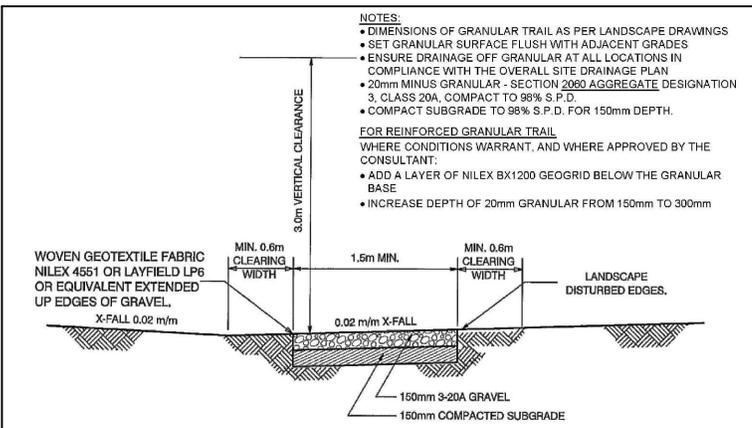
NATURALIZATION VEGETATION
TREE IN 20 GALLON POT



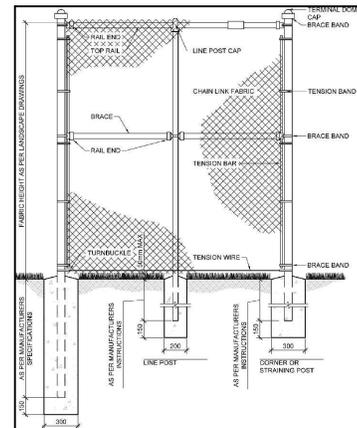
NATURALIZATION VEGETATION
SHRUB IN 20 GALLON POT



EXAMPLE OF NATURALIZATION
VEGETATION REHAB



PROPOSED GRANULAR TRAIL DETAIL



PROPOSED CHAIN LINK
FENCE DETAIL

RIVERSIDE TRAIL RE-ALIGNMENT MATERIAL EXAMPLES