4.0 NORTH VALLEY PRIMARY CONSTRUCTION ACCESS

4.1 Context

The proposed primary construction access road for all north valley construction activity will be temporary in nature but in place for the duration of construction in the north valley, estimated at five years. The proposed access road will support high volumes of traffic during select construction activities, for periods lasting many days. The route will follow the corridor shown in Figure 2.1b and Plate 2.2. Project Co will be required to design and construct the access road to the standard needed to carry out the work safely and without adversely affecting slope stability in the park. Project Co is expected to upgrade the SUP portion of the route to accommodate two-way construction traffic. At this stage, the City has not ruled out the need for Project Co to widen the existing maintenance vehicle road leading from Grierson Hill. While in use for Valley Line construction, that road must also remain available to others for servicing of the facilities at the Riverfront Plaza. The access route may not be used for general construction purposes.

4.2 Assessment Methods

As this project component was not assessed in 2013 and involves a significant boundary adjustment, the VECs selected for this assessment are very similar to those included in the 2013 EISA (Table 4.1).

The spatial boundaries, or study area, for this assessment, are shown in Figure 2.1b. The assessment recognizes that project access routes will extend beyond these boundaries along established City roads, but this aspect was not covered in the assessment. For a select few VECs the study area was expanded. Expansions are noted in VEC-specific sections.

Specific studies undertaken for this assessment in 2014 included the following:

- Reconnaissance-level site inspections on 20 June and 15 September 2014, focusing on general vegetative characteristics.
- A rare plant survey on 07 July 2014.
- Breeding bird surveys on 17 and 27 June 2014.
- Site-specific geotechnical and slope stability assessment of lands traversed by the proposed road (Thurber Engineering 2014) (Full report provided in Appendix B).

Table 4.1. Justification for the selection of VECs – North Valley Primary Construction Access

Valued Environmental Components	Potential for Additional or Unique Issues[1]	Relative Abundance or Status	Public Concern	Professional Concern	Economic Importance	Regulatory Concern	Relevant Legislation/Bylaw/Policy
Valued Ecosystem Components							
Geology/Geomorphology	**Yes**			✓		✓	• Bylaw 7188
Soils	**Yes**			✓		✓	• Bylaw 7188 • Drainage Bylaw 16200
Hydrology Surface Water/ Groundwater	**Yes**			✓		✓	• Bylaw 7188 • Drainage Bylaw 16200 • Alberta *Water Act*
Fish and Fish Habitat	**No**						
Vegetation	**Yes**	✓	✓	✓		✓	• Bylaw 7188 • Alberta *Weed Control Act*
Wildlife	**Yes**	✓	✓	✓		✓	• Bylaw 7188 • Federal *Species at Risk Act* • Federal *Migratory Birds Convention Act* • Alberta *Wildlife Act*
Habitat Connectivity	**Yes**	✓	✓	✓		✓	• Bylaw 7188
Valued Socio-economic Components							
Land Disposition and Land Use Zoning	**No**						
Residential Land Use	**No**						
Recreational Land Use	**Yes**		✓	✓		✓	• Bylaw 7188
Utilities	**Yes**		✓	✓	✓	✓	• Bylaw 7188
Worker and Public Safety	**No**						
Visual Resources	**Yes**		✓	✓		✓	• Bylaw 7188
Valued Historic Components							
Historical Resources	**Yes**		✓	✓		✓	• Alberta *Historical Resources Act* • Bylaw 7188

[1] In instances where it was determined that no potential existed for additional or unique issues to arise, no further consideration to that VEC was given

4.3 Key Issues

Key issues were identified by: 1) examining the project component location, known conditions and potential project activities; 2) considering concerns raised by the public and City services departments; and 3) applying professional judgement. Following are the key issues identified in association with the proposed primary construction access road:

- **Will construction of the access road adversely impact slope stability on the north valley wall or riverbank?**
- **Will the landfill present challenges to road stability or performance and lead to more disturbance?**
- **Do contaminated soils occur within the project component area? Could the work result in mobilization of contaminants from contaminated soils?**
- **Will construction of the access road lead to surface erosion?**
- **Does contaminated groundwater occur within the project component area? Could the work result in mobilization of contaminated groundwater?**
- **Will vegetation in recognized Natural Areas be affected?**
- **Does the work have potential to affect rare, threatened or endangered plants or plant communities?**
- **Will any special status wildlife species be affected by access road construction?**
- **Will local pathway disruptions be suitably mitigated for all users, including those requiring a fully accessible pathway?**
- **Will access to River Valley Adventures/Urban Green Café or washrooms be disrupted as a result of the access road?**
- **Will use of the construction access interfere with park programming or special events?**
- **Does this project component have potential to affect known historical resources?**

4.4 Existing Conditions by VEC

4.4.1 *Geology/Geomorphology*

4.4.1.1 Methods

Thurber Engineering (2014; Appendix B) conducted a site-specific geotechnical investigation and preliminary slope assessment in support of the proposed construction access road through the west side of LMRP. Their investigation comprised a desktop analysis of existing geotechnical information available for LMRP and a field program conducted on 17-24 March 2014. The field program comprised drilling eight test holes for the installation of geotechnical instruments - six holes along the proposed access road alignment to depths ranging between 6 m and 10 m below existing ground surface, and two deep holes upslope of the road alignment to depths 45.6 m and 33.3 m below existing ground surface. Also, five additional test holes were drilled to depths ranging from 5.2 m to 11.9 m below existing ground surface near the eastern end of the road alignment, for a separate study characterizing the thickness of waste material present in the area.

Standpipe piezometers were installed in the boreholes along the proposed access road alignment, to monitor groundwater levels. Soils and bedrock collected in boreholes were subject to laboratory investigations to assess physical, chemical and mechanical properties such as moisture content, strength, and grain size. The full suite of parameters examined, and results for individual samples, are presented in Thurber Engineering 2014 (Appendix B).

As part of this study, Thurber Engineering examined antecedent and new data from six inclinometers, including two inclinometers installed along the proposed access road alignment and four previously installed inclinometers at the eastern end of the access road alignment. All newly and previously installed instruments were monitored several times each year following installation.

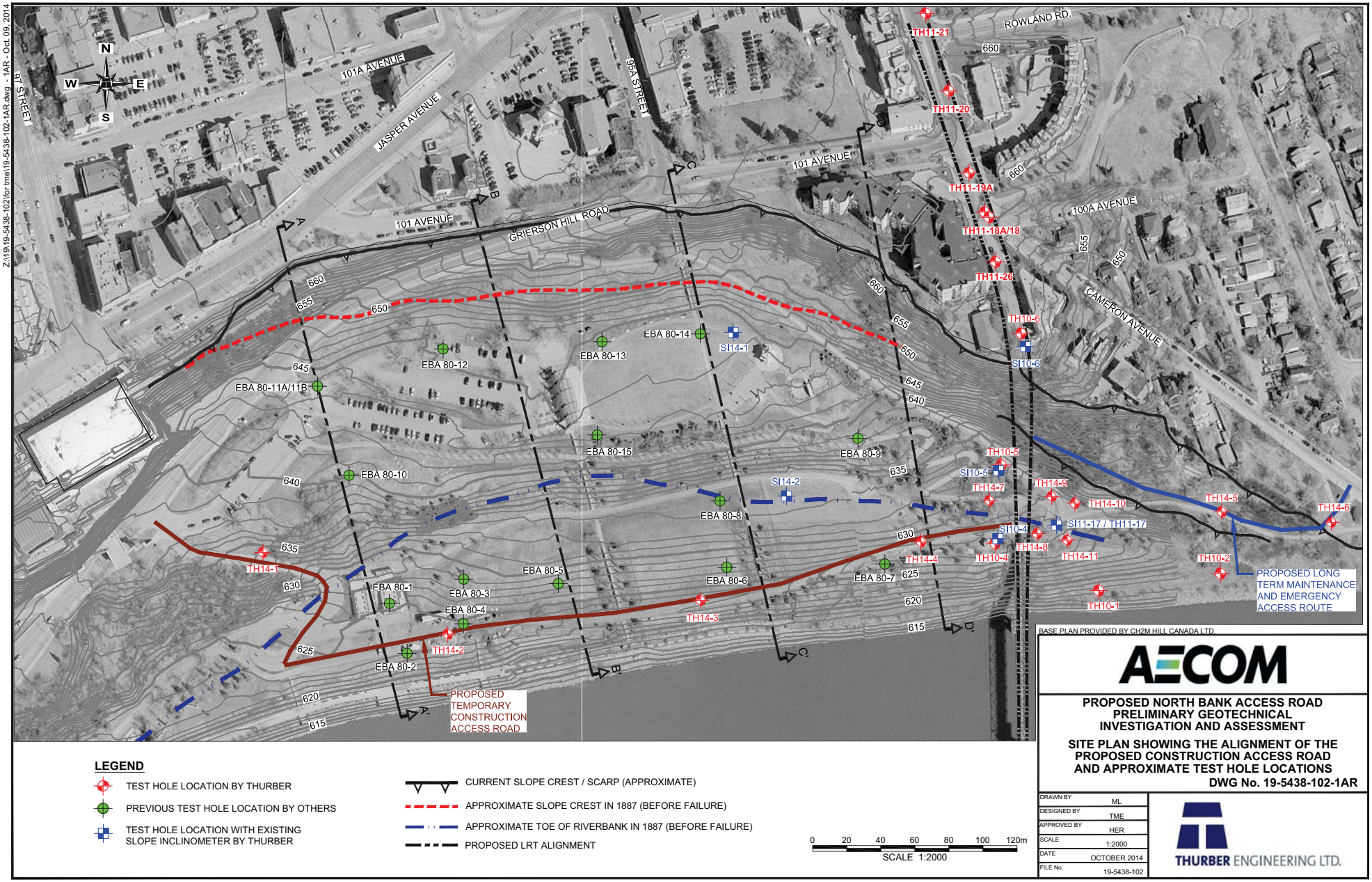
In addition, slope stability assessments were carried out on four cross sections of two bentonite seams ("A" and "B") and also at the riverbank, using the software SLOPE/W (Thurber Engineering 2014). The intent of the stability analyses was to compare existing slope stability and factor of safety (prior to construction) with predicted slope stability and factor of safety following access road construction. Composition of bedrock and depositional layers, shear strength of material and groundwater conditions were all incorporated into assessments of slope stability. Further details are provided in Thurber Engineering 2014 (Appendix B).

For the purposes of their assessment, Thurber Engineering (2014) assumed that fills associated with construction of the proposed access road would be placed up to 1 m high and that the road would be approximately 8 m wide to accommodate two-way traffic.

4.4.1.2 Description

Slope Stability

The cross-slope, proposed primary construction access road would be located near the toe of the Grierson Hill Slide, a major deep-seated landslide that occurred on the north slope of the North Saskatchewan Valley in 1901 (Thurber Engineering 2014). The landslide measures approximately 600 m east-west along the riverbank in LMRP extending from the Shaw Conference Centre in the west to the Cloverdale Pedestrian Bridge to the east. The northern limits of the slide are bounded by Grierson Hill Road and the south limits by the north bank of the NSR (Figure 4.1) (Thurber Engineering 2014). Since the initial slope failure in 1901, the Grierson Hill slope has been modified by extensive dumping and backfilling, mainly on the upper portions of the slope, including using the area as a City landfill (Grierson Nuisance Grounds – see below). Movement of the valley slope has been monitored since the 1950's and movement rates have been noted as very sensitive to changes in slope condition (e.g., grading works, toe erosion, precipitation, etc.). Various slope stabilization measures have been implemented over the years, which have considerably improved overall slope stability. Slope inclinometers, installed in 2000, 2010 and 2011, and monitored regularly since November 2010, have detected no noticeable slope movements since their installation (Thurber Engineering 2014; Appendix B).



BASE PLAN PROVIDED BY CH2M HILL CANADA LTD.

LEGEND

- TEST HOLE LOCATION BY THURBER
- PREVIOUS TEST HOLE LOCATION BY OTHERS
- TEST HOLE LOCATION WITH EXISTING SLOPE INCLINOMETER BY THURBER
- CURRENT SLOPE CREST / SCARP (APPROXIMATE)
- APPROXIMATE SLOPE CREST IN 1887 (BEFORE FAILURE)
- APPROXIMATE TOE OF RIVERBANK IN 1887 (BEFORE FAILURE)
- PROPOSED LRT ALIGNMENT

0 20 40 60 80 100 120m

SCALE 1:2000

AECOM

PROPOSED NORTH BANK ACCESS ROAD
PRELIMINARY GEOTECHNICAL INVESTIGATION AND ASSESSMENT

SITE PLAN SHOWING THE ALIGNMENT OF THE PROPOSED CONSTRUCTION ACCESS ROAD AND APPROXIMATE TEST HOLE LOCATIONS

DWG No. 19-5438-102-1AR

DRAWN BY	ML
DESIGNED BY	TME
APPROVED BY	HER
SCALE	1:2000
DATE	OCTOBER 2014
FILE No.	19-5438-102

THURBER ENGINEERING LTD.

Figure 4.1

Landfill

As noted above, the site of the Grierson Hill landslide was used as a landfill (Grierson Nuisance Grounds) for several decades in the early 20th century. Since then, the landfill has been covered with soil fills and landscaped for the creation of LMRP. The approximate boundaries of the landfill have been identified as shown in Figure 4.2 and the 2013 EISA documented the overlap with the proposed LRT infrastructure. The proposed construction access road will intersect with the southern edge of the landfill. Based on their test hole data, Thurber Engineering (2014) noted that landfill materials were up to 20 m thick in the central area of LMRP, approximately 200 to 300 m west of the LRT alignment. Fill encountered during drilling included brick fragments, pieces of glass and wood. Some waste has also been documented close to the surface. For example, waste was evident at 30 cm below existing ground surface at Testhole 14-1, in the vicinity of the construction access road.

As noted in the 2013 EISA, a Phase II ESA undertaken in early 2013 (Connected Transit Partnership 2013b) included two test holes at the former landfill location, yielding soils with significant metals exceedances including arsenic, boron, lead, copper nickel, tin, zinc, and boron.

4.4.2 *Soils*

4.4.2.1 Methods

Thurber Engineering (2014) also provided some information on soil depth and additional information on sub-surface conditions along the proposed construction access alignment.

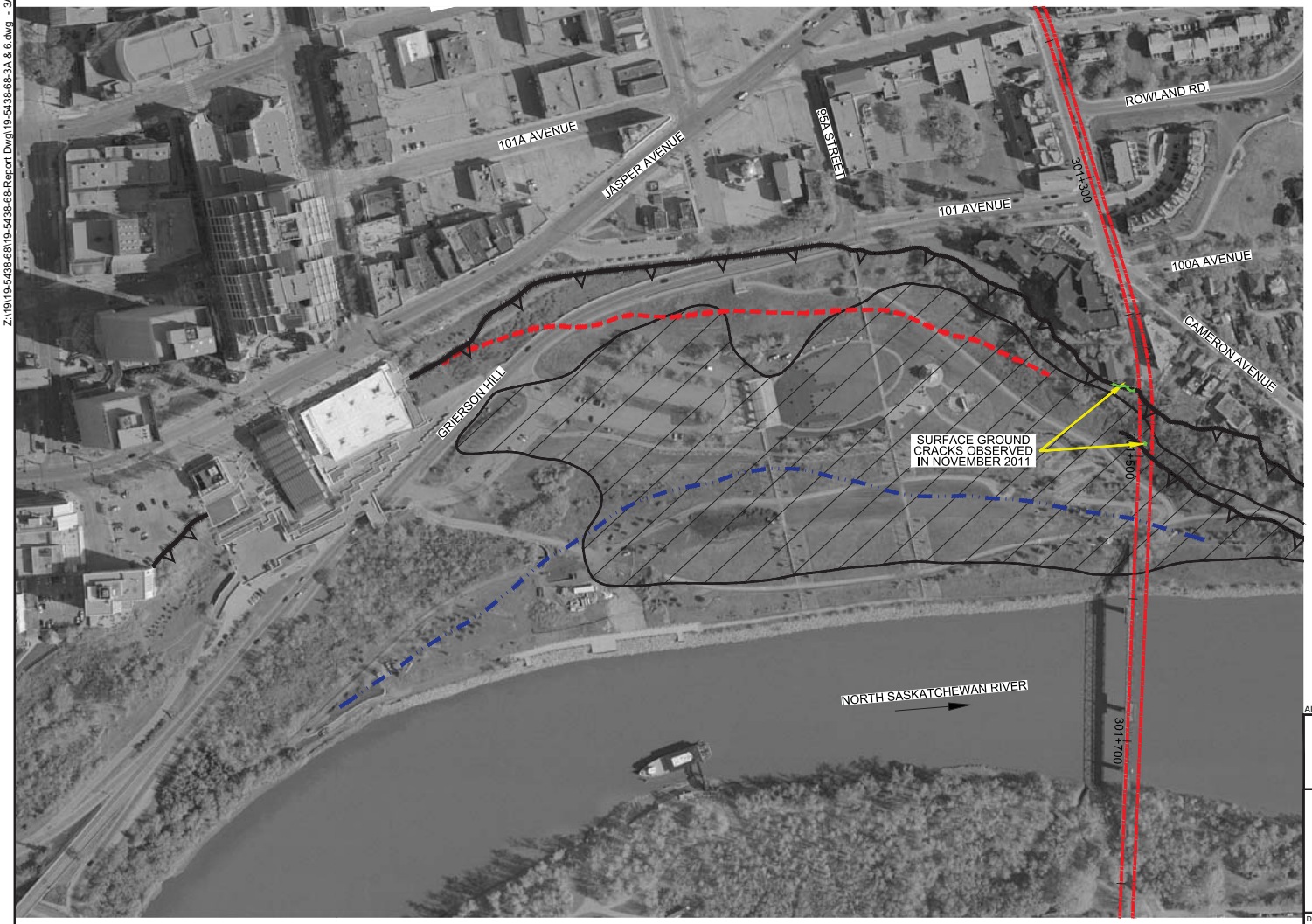
4.4.2.1 Description

Subsurface conditions in the proposed primary construction access road corridor comprised topsoil and fills of varying composition and thickness overlying colluvium (lacustrine clay, clay till and sand) (Thurber Engineering 2014). Conversely, clay shale and sandstone bedrock were encountered directly beneath the topsoil or below a limited thickness of fill at the east end of the proposed alignment. Topsoil was encountered in all test holes and ranged in thickness between 0.15 m to 0.3 m. The fill ranged from 1.6 to 2.9 m in thickness at the western and eastern ends of the proposed road alignment, which coincided with the flanks of the Grierson Hill slide. Fill was approximately 5.8 m thick along the central part of the alignment. Overall, fill comprised clay or clay shale with intermittent gravelly and sandy horizons and included coal, peat, organic soils, brick fragments, pieces of glass and wood (Thurber Engineering 2014).

4.4.3 *Hydrology*

4.4.3.1 Methods

Hydrology investigations specific to this component focused on groundwater as there are no surface water features in the study area. The NSR, previously discussed in the 2013 EISA, is situated downslope from the proposed road, approximately 40 m at its closest point.



N
W E
S

LEGEND

- GRIERSON HILL USED AS A WASTE DUMP FOR EDMONTON BETWEEN 1911 AND 1940
- PRESENT DAY SLOPE CREST / SCARP
- SLOPE CREST IN 1887 (BEFORE FAILURE)
- TOE OF RIVERBANK IN 1987 (BEFORE FAILURE)
- PROPOSED LRT ALIGNMENT

0 25 50 75 100 150 200 m
SCALE 1:3000

AIR PHOTO PROVIDED BY CH2M HILL CANADA LTD.

AECOM

EDMONTON SOUTHEAST LRT EXTENSION
PRELIMINARY GEOTECHNICAL INVESTIGATION

GRIERSON HILL SLIDE - PLAN VIEW

DWG No. 19-5438-68-3A

DRAWN BY	KLW
DESIGNED BY	MB
APPROVED BY	HER
SCALE	1:3000
DATE	MARCH 2012
FILE No.	19-5438-68

THURBER ENGINEERING LTD.

Figure 4.2

To assess groundwater conditions, Thurber Engineering (2014) installed standpipe piezometers in six of the boreholes drilled along the proposed access road alignment for groundwater level monitoring.

4.4.3.2 Description

Groundwater Depth

Short-term groundwater levels measured by Thurber Engineering in 2014 along the proposed road alignment ranged from 4.6 m to 8.1 m below existing ground surface, with two piezometers recording no groundwater (Thurber Engineering 2014). As these are short-term results, they may not represent stabilized long-term groundwater levels.

Landfill

Contaminated groundwater is known to exist within the boundaries of the former landfill. This was not further examined for this project component, as the proposed work does not involve deep excavation. In support of other Valley Line components, a landfill groundwater monitoring program has been established further east, closer to the permanent Valley Line infrastructure. Results are not yet available.

4.4.4 Vegetation

4.4.4.1 Methods

A rare plant and plant community survey was undertaken by a professional plant ecologist in LMRP on 07 July 2014 in support of this proposed construction access road assessment. For this VEC, the study area was expanded to encompass most of LMRP west of the Project Area previously surveyed for the 2013 EISA. Both natural plant communities and manicured areas occur in the west portion of the park. The focus of the plant surveys was to map and characterize natural vegetation; however, manicured areas were also coarsely characterized.

Plant Communities

First, all plant communities in the study area were delineated on an aerial photograph as a desktop exercise, then field investigations were undertaken to ground truth and refine community boundaries, develop descriptions of plant community character and floristics, and document rare plant occurrences. Each natural plant community was surveyed via meandering transects. All species observed were documented and their relative abundances ranked as dominant, abundant, frequent, occasional, or rare (meaning uncommon in that community). Plant species that could not be identified in the field were collected and identified with the aid of a dissecting scope and various keys and botanical manuals. Following field surveys, species were classified as native or exotic based on data in the Alberta Conservation Information Management System (ACIMS), which provides a comprehensive database of species known to occur in the province (Alberta Environment and Sustainable Resource Development 2014). Species nomenclature followed ACIMS. Common species names are used throughout this

document with scientific names provided in brackets. Complete plant community data, including species scientific names, are provided in Appendix C.

Plant communities were delineated based on aerial photographs during field surveys, and later classified according to the system developed by Westworth and Associates (*In:* EPEC Consulting Western Ltd. 1981) specific to Emonton in the NSRV, but adjusted as necessary. This classification system focuses largely on forest types, as the majority of natural communities found in the river valley are treed, and classification is primarily based on canopy composition. Spencer Environmental has found it necessary in the past to include separate classifications for caragana (*Caragana arborescens*) and Manitoba maple (*Acer negundo*) dominated communities, as those communities do not fit within the system developed by Westworth and Associates but are present throughout the river valley.

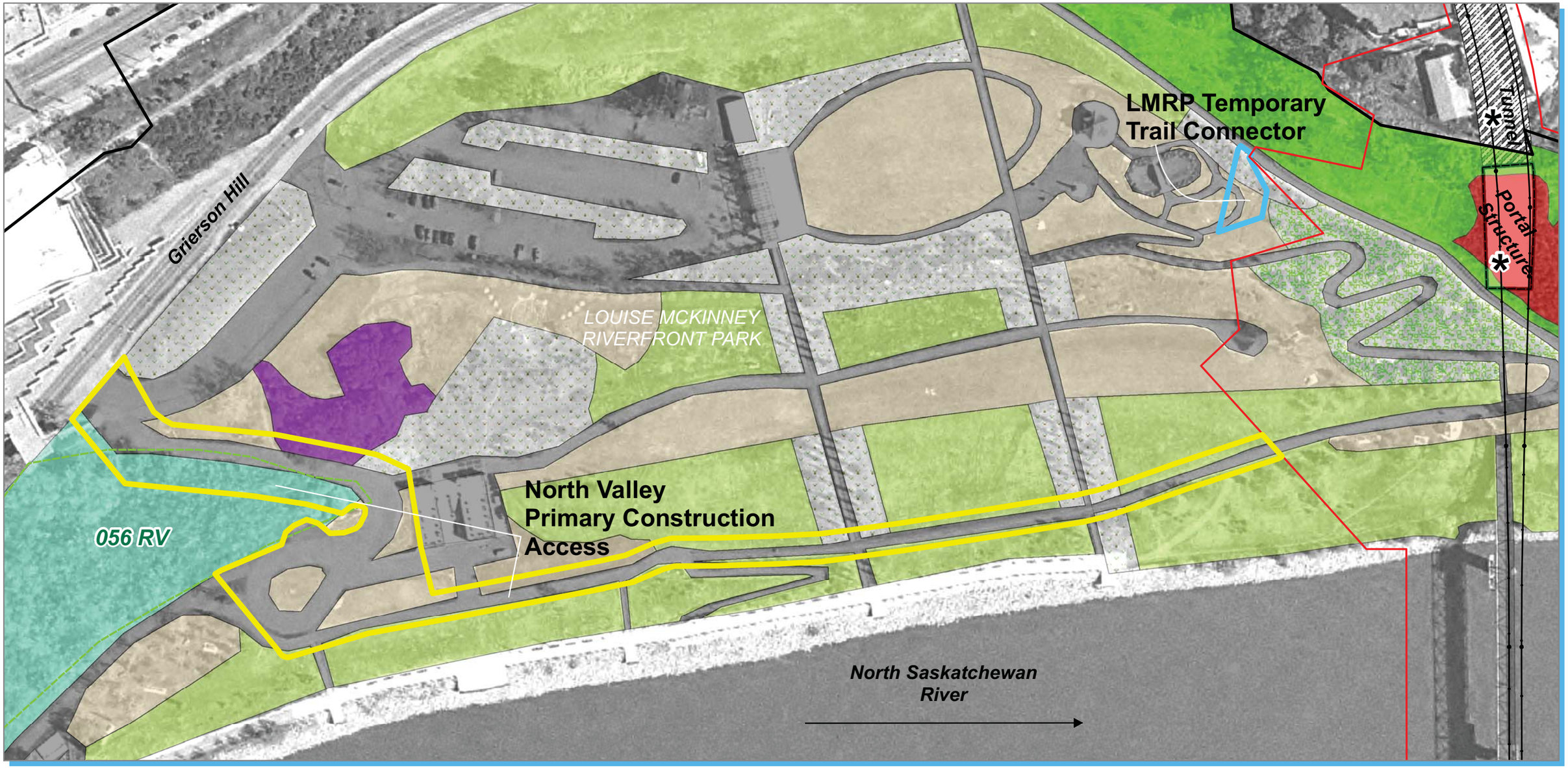
Manicured areas were classified as lawns, gardens, and planted beds. Lawns were defined for the purpose of this assessment as areas dominated by grass and regularly mowed, that may also contain scattered, planted trees. Gardens were discrete beds dominated by ornamental flowers and shrub species. Planted beds were characterized by concentrations of planted, native or exotic shrubs and trees and having definite boundaries. Gardens and planted beds were coarsely surveyed, gathering only the data necessary to characterize them broadly. Lawns were mapped but not surveyed; therefore, individual planted trees are not identified. Reconnaissance level investigations showed that all manicured areas were typically dominated by ornamental cultivars and non-native plants.

Rare Plant Survey

All plant communities were surveyed at an intensity that was deemed sufficient to capture the diversity of habitats within the site and to encounter any rare species present. Prior to conducting the rare plant survey, the ACIMS database was consulted to identify any existing records of rare plants within or near the study area, as this was last done for this general area in 2012. The rare plant survey was carried out via meandering transects in all natural plant communities. Rarity was defined by subnational ranks (S-ranks) based on up-to-date data from ACIMS. For the purposes of this report, S1, S2, and S3 species were considered rare, as is the stated practice of City of Edmonton Urban Ecology (Young *pers. comm.).*

4.4.4.2 Description

Vegetation in the west portion of LMRP is characterized by landscaped parkland, including manicured lawns and several types of formal gardens, and is traversed by several paved pathways (Plate 4.1). Non-manicured, natural communities in this area are relatively small and, at the time of our survey, consisted of grassland (G), Manitoba maple (MM) and a portion of one larger, poplar-Manitoba maple (PMM) forest community on the west edge of the study area (Figure 4.3). Detailed descriptions of each community are provided below. A full list of species observed in each community is provided in Appendix C.



Legend

Additional Lands
- Undertaken by Project Co

Lands Involved in Preparatory (Early) Works
- Undertaken by City of Edmonton
- Project Area
- Valley Line LRT Alignment (Reference Design)
- Bylaw 7188 Boundary
- City of Edmonton River Valley Natural Areas (2010)
- Pathway/Structure

Natural Communities
- Balsam Poplar/Manitoba Maple (PMM)
- Manitoba Maple (MM)
- Caragana (C)
- Grassland/Shrub (G/S)
- Grassland (G)

Manicured Communities
- Lawn
- Garden
- Planted Bed

* Indicative Location Only

N

0 25 50 100 Meters

1:1,400

Figure 4.3 North Valley Primary Construction Access & LMRP Temporary Trail Connector, Existing Plant Communities

City of Edmonton LRT Valley Line - Stage 1
EISA Update

Aerial Photograph Date: May 2012
Date Map Created: 10 February 2015

SPENCER ENVIRONMENTAL MANAGEMENT SERVICES LTD.

Plate 4.1. The west portion of LMRP is characterized by landscaped parkland, including manicured lawn, gardens and paved pathways (July 2014)

Grassland (G)

Small naturalized grasslands (G) communities were located throughout the park including parallel to the SUP that will form the proposed construction access road and were commonly dominated by exotic grass species, including smooth brome, quack grass, and crested wheatgrass (Plate 4.2). Reed canary grass (*Phalaris arundinacea*) and slender wheatgrass (*Elymus trachycaulus*), both native grasses, were also dominant or abundant in some areas; Kentucky bluegrass (*Poa pratensis*) and western wheatgrass (*Agropyron smithii*) were frequently observed. Other common species included wild vetch (*Vicia americana*), alsike clover (*Trifolium hybridum*), common goat's-beard (*Tragopogon dubius*), prickly rose (*Rosa acicularis*), and buckbrush (*Symphoricarpos occidentalis*). A total of 52 species was detected in grassland communities, 20 (38%) of which were native. The remaining 32 species (62%) were exotic, with five of those species listed as noxious under the Alberta *Weed Control Act*.

Plate 4.2. Naturalized (unmanicured) grassland communities on the slopes of Louise McKinney Riverfront Park (July 2014)

Manitoba Maple (MM)

One naturalized Manitoba maple (MM) community was located in the west end of the park bordering the maintenance vehicle access road (Figure 4.3). That community was dominated by Manitoba maple, with occasional balsam poplar (*Populus balsamifera*) and red-osier dogwood (*Cornus stolonifera*). The understorey was typically open, comprising reed canary grass, smooth brome (*Bromus inermis*), and quack grass (*Elytrigia repens*) (Plate 4.3). A total of 11 species was detected in this community, 7 (64%) of which were native. The remaining four species (36%) were exotic, with one noxious weed species observed. Manitoba maple is not native to this region of Alberta but has naturalized and commonly occurs in the NSRV and is often found as a sub-dominant tall shrub or tree species.

Plate 4.3. Open understorey in a Manitoba maple community in Louise McKinney Park (July 2014)

Poplar-Manitoba Maple (PMM)

A densely-forested balsam poplar-Manitoba maple (PMM) community was located on the slope below the Shaw Conference Centre at the west margin of LMRP and bordering much of the maintenance vehicle access road (Figure 4.2). This community is part of a larger area that is mapped by the City as Natural Area 056 RV. The canopy of this forest community was dominated by Manitoba maple and balsam poplar, and had occasional aspen (*Populus tremuloides*). The dense shrub layer consisted of buckbrush, prickly rose, red-osier dogwood, Saskatoon (*Amelanchier alnifolia*), and bracted honeysuckle (*Lonicera involucrate*).

The margins of the PMM community, adjacent to along the existing access road were characterized as a typical edge community (Plate 4.4) that graded into the more mature stand interior. The margins consisted of shrubbery and young trees, with few mature trees. In particular, Manitoba maple formed dense populations with red osier-dogwood and prickly rose shrubs comprising the majority of the shrub layer. Together, these trees and shrubs formed a dense band, limiting the space available for low-growing shrubs or forbs to establish. The understorey along the edge was dominated by exotic species: smooth brome and quack grass were widespread, as were alfalfa and white sweet-clover. Occasional creeping thistle, a noxious weed, was also observed along the edge, near the bottom of the slope. In contrast, the interior of this stand was characterized by a patchy canopy of balsam poplar and Manitoba maple, where the trees tended to be taller,

with larger DBHs than closer to the edge (Plate 4.5). More space between trees promoted heterogeneity and facilitated the establishment of diverse shrub and herbaceous layers. Red-osier dogwood and prickly rose were common shrubs in the interior of the stand, as they were along the edges; however, snowberry and species of honeysuckle and currant were also frequently observed in the interior. Interior understorey was characterized by a variety of native forbs, such as wild sarsaparilla, northern bedstraw, star-flowered Solomon's-seal, and species of aster. Exotic and noxious weed species occurred throughout the stand, but they tended to be rare in the interior.

A total of 58 species was detected in this community, 36 (62%) of which were native. The remaining 22 species (38%) were exotic, with three of those species listed as noxious weeds.

Plate 4.4. The margins of the PMM community, adjacent to along the existing access road typified Edmonton river valley forest edge communities, view looking south (July 2014)

Plate 4.5. Dense understorey in the interior of the PMM community along the west edge of LMRP (July 2014)

Manicured Areas

Manicured lawns, gardens, and planted beds occupied most of the park including some occurances in the vicinity of the SUP portion of the proposed access road. Planted beds in the park supported ornamental perennial forbs as well as trees and shrubs; common species included oleaster (*Elaeagnus sp*.), ornamental columnar poplar (*Populus sp*.), pine (*Pinus sp*.), and larch (*Larix sp*.). Planted beds comprising oleaster, pine, and columnar poplar were located along the staircases intersecting with the SUP to be upgraded (Plates 4.6 and 4.7).

Special Status Species

No rare plant species (i.e., ranked S1, S2 or S3) were detected within the construction access road corridor during the July 2014 survey. One rare plant species, smooth sweet cicely (*Osmorhiza longistylis*), was found at the edge of the vegetation survey area, within Natural Area 056 RV, but his was approximately 175 m southwest of the access road corridor.

Plate 4.6. Manicured areas and paths, including columnar poplar, adjacent to the proposed access road alignment (July 2014)

Plate 4.7. A typical planted bed along a staircase intersecting with the to the proposed access road alignment (July 2014)

4.4.5 *Wildlife*

4.4.5.1 Methods

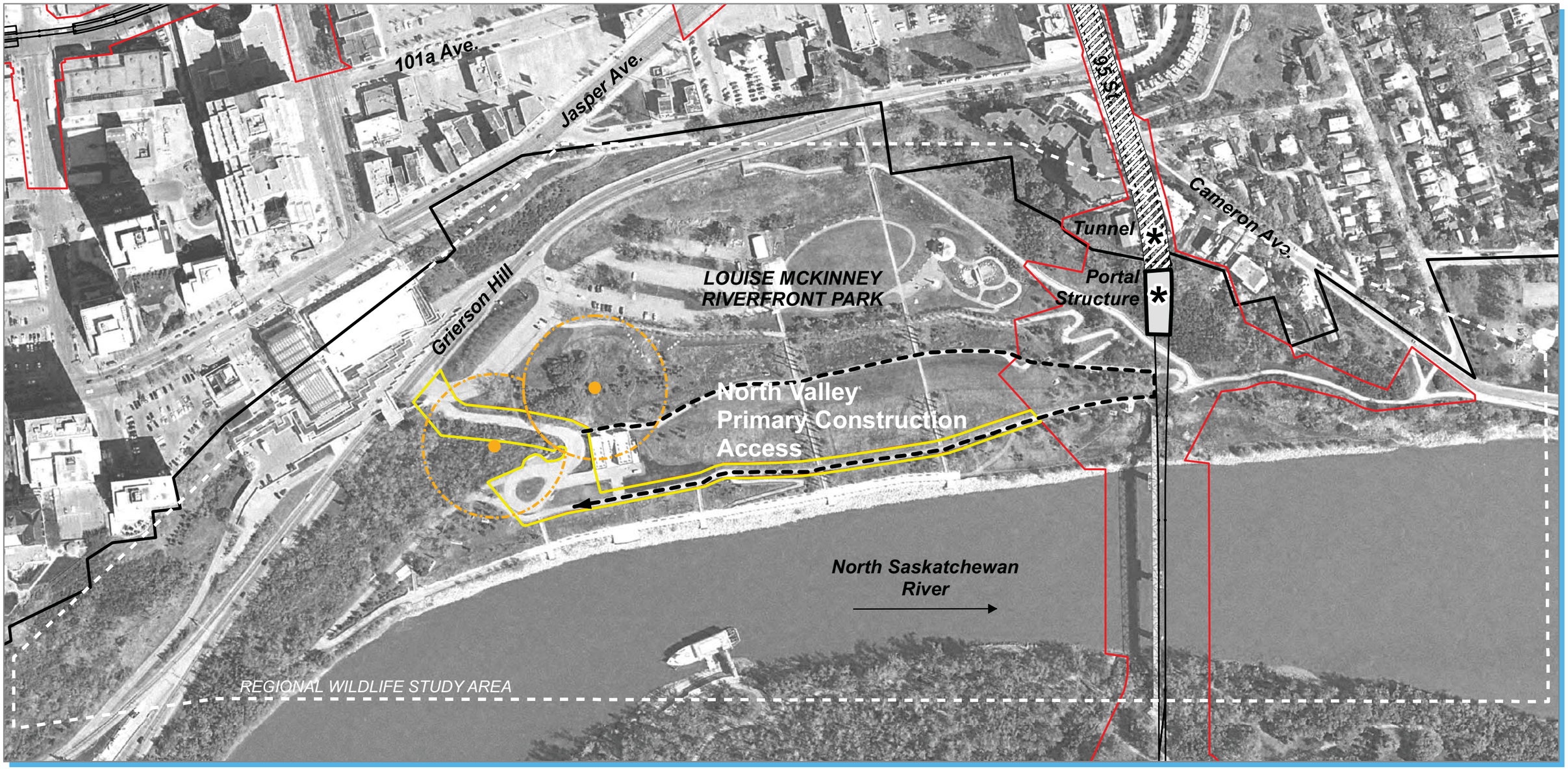
As the western portion of LMRP was not described in detail in the 2013 EISA, wildlife communities within the proposed primary construction access road area were described using a combination of literature review (including the 2013 EISA) and field investigations. Analysis of existing wildlife conditions was completed to a level commensurate with the scale of the project component area and the habitat potential, to enable a description of commonly occurring species and habitat quality, and a brief discussion of potential for the area to support special status species. Species nomenclature followed ACIMS. Common names are used throughout the report; scientific names are provided in Appendix D and E.

Literature Review

Several resources were consulted to determine wildlife species previously recorded in the area. The Fisheries and Wildlife Internet Mapping Tool (FWMIT) (Alberta Environment and Sustainable Resource Development 2014) was searched on 04 September 2014 for information regarding special status species recorded in the area. eBird, a publicly available database of citizen-scientist bird observations, was searched on 04 September 2014 for observations of bird species within the project area (Sullivan *et al.* 2009). To determine wildlife species potentially present in LMRP, information was compiled through a review of previous studies conducted within the NSRV. As was the case for the 2013 EISA, Westworth & Associates (1980) provided preliminary information. More recent and local supplemental information was provided by the 2013 EISA and an earlier study centered on LMRP (Spencer Environmental 2005). In addition, a number of scientific papers and field guides were consulted to determine species ranges and behavior.

Field Investigations

Wildlife field investigations were limited to the spring and comprised breeding bird surveys. No suitable amphibian breeding habitat was identified in the park. For bird surveys, the study area was expanded to include natural habitat adjacent to the proposed road corridor. A breeding bird survey was conducted on 17 June 2014 and repeated on 27 June 2014, to characterize breeding bird richness and abundance. Each bird survey consisted of a point count at each of two stations located within areas of natural vegetation (i.e., the PMM and MM plant communities) and a meandering search of areas supporting manicured vegetation (Figure 4.4). Each point count was an eight-minute survey, wherein all birds detected (seen or heard) within a 50 m radius were recorded. The meandering survey consisted of walking SUPs in the vicinity of the proposed primary construction access road at a rate of approximately 40 m/s and recording all birds detected using habitat in that area. Data from the bird surveys were reported as the maximum number of individuals of each species detected on 17 or 27 June 2014, and the total number of surveys that each species was detected in (out of four point counts and two meandering surveys). All other animal observations or signs were documented and described in terms of presence and habitat use. All habitat types present were briefly described and qualitatively assessed with respect to habit potential.



Legend

- Bird Point Count Survey Location (with 50m radius plot)
- Bird Survey Transect

Addition to Lands

- Undertaken by Project Co
- Project Area
- Valley Line LRT Alignment (Reference Design)
- Bylaw 7188 Boundary

* Indicative Location Only

N

0 50 100 200 Meters

1:2,700

Figure 4.4 North Valley Primary Construction Access, Wildlife Survey Locations

City of Edmonton LRT Valley Line - Stage 1
EISA Update

Aerial Photograph Date: May 2012
Date Map Created: 10 February 2015

SPENCER ENVIRONMENTAL MANAGEMENT SERVICES LTD.

4.4.5.2 Description

The manicured character of LMRP and its location in the center of Edmonton makes the habitat within the project area most suitable for urban-adapted species (e.g., coyotes, several small mammals, commonly-occurring, disturbance-tolerant bird species), although some less tolerant wildlife species may be present on an irregular basis. Please refer to the 2013 EISA for a more complete discussion of wildlife habitat and communities within this reach of the NSRV.

Wildlife Habitat

Of the habitat present within LMRP, there are three types of natural vegetation that are not manicured and experience lower levels of human use. These areas are assumed to provide the highest quality wildlife habitat within the west part of LMRP. The first is a patch of poplar-Manitoba maple (PMM) along the steep slope at the western edge of LMRP (Figure 4.3). The second is a patch of large Manitoba maple (MM) trees on the east side of the existing paved maintenance vehicle access road. The third habitat type is naturalized grassland (G), which occurs as several discrete patches scattered around the west part of LMRP. All of these habitats likely support a small variety of small animals. The existing buildings and structures within LMRP also offer suitable nesting habitat for avian species such as eastern phoebes and some swallows species. Finally, manicured lawns offer some foraging habitat to commonly-occurring species, such as American robins, and ornamental trees can provide perching and nesting habitat for several urban-tolerant bird species. The NSR, located outside of our survey area, but possibly influencing bird use in the park, comprises aquatic habitat suitable for foraging and loafing by a number of waterbird species. It is possible that some urban-tolerant waterbird species at times nest, graze, or loaf in the park.

Avifauna

A total of eight bird species was observed during point count and meandering surveys (Table 4.2; Appendix D). The most common species observed within the naturally vegetated areas in LMRP was the black-billed magpie, which was the most abundant species and was observed at both survey stations and during both visits (17 June and 27 June 2014). Yellow warblers were also abundant during the 17 June 2014 survey. Along the meandering search transect, clay-coloured sparrows were abundant in the shrubs along the NSR, south of the paved SUP. Song sparrows were also frequently observed in this area. All of the species observed are common, urban-adapted species that typically occupy deciduous woodland, shrubby habitat, or manicured areas, the common natural habitat types in the study area. No special status species were observed.

Table 4.2. Bird species recorded during point count and meandering surveys conducted during the breeding season of 2014 in LMRP

Species	Point Count Survey		Meandering Survey	
	Total Count	% of Surveys Present (n=4)	Total Count	% of Surveys Present (n=2)
Gray catbird (*Dumetella carolinensis*)	1	25	1	50
Yellow warbler (*Setphaga petechia*)	3	25	1	50
Black-billed magpie (*Pica pica*)	3	75	0	0
Clay-coloured sparrow (*Spizella pallida*)	1	50	4	100
American robin (*Turdus migratorius*)	1	75	0	0
Chipping sparrow (*Spizella passerina*)	0	0	2	100
House finch (*Haemorhous mexicanus*)	0	0	1	0
Song sparrow (*Melospiza melodia*)	0	0	3	100
Total # Species	**8**			

Bird abundance was greatest in the poplar-Manitoba maple (PMM) forest (Figure 4.3). During the survey on 17 June 2014, three yellow warblers were observed singing in response to each other on either side of the paved SUP, indicating that this is good yellow warbler breeding habitat. Black-billed magpies were detected in this area on both visits. Fewer birds were detected in the Manitoba maple plant (MM) community. One clay-coloured sparrow was heard singing from the planted pine trees to the east of that community. Only black-billed magpies and American robins were observed to be using the Manitoba maples, suggesting this habitat is only suitable for highly urban-adapted species and reflecting the lack of vertical habitat structure present in the community due to the sparse understorey. During the meandering survey, clay-coloured sparrows and song sparrows were frequently detected in the shrubs adjacent to the river and one gray catbird was also seen and heard moving through the shrubs in the study area. The two final species detected, house finch and chipping sparrow, are urban-adapted species that were detected in the manicured areas surrounding the parking lots.

Mammals

Of the mammal species that may occur within LMRP, small- and medium- sized urban-adapted species are the most likely to occur (Appendix D). White-tailed jackrabbits and red squirrels were observed in LMRP during field investigations. Ground-squirrels and skunks have previously been observed within the project area (City of Edmonton Animal Care and Control Centre 2011, Spencer Environmental 2005). Several larger mammals are also present. Coyote movement monitoring conducted by the Edmonton Urban Coyote Project has documented coyotes moving within the park (Murray and Cassidy St Clair unpublished data). Both white-tailed and mule deer have been observed in the NSRV, primarily outside the downtown core, but smaller populations and transients also occur closer to the city center, usually not far from the NSRV. Deer have been documented in Mill Creek Ravine and Gallagher Park less than 1 km across the NSR (Spencer Environmental unpublished data) and they are anecdotally reported in LMRP.

The high level of human activity and lack of natural vegetation in LMRP likely discourages regular use by deer and other large ungulates and carnivores. .

Amphibians & Reptiles

No suitable breeding amphibian habitat is available in LMRP; however, two reptile species may occur year round within more natural habitat in the project area (Appendix D). The project area is within the range of red-sided and plains garter snakes; however, garter snakes generally prefer natural habitat with ample ground cover (Russell and Bauer 2000), and so if present in the project area are likely to be generally confined to the naturally vegetated areas (e.g., poplar-Manitoba maple habitat on west margin of LMRP).

Special Status Species

Based on habitat requirements, habitat availability and provincial distributions, two special status species were considered to have at least a moderate probability of occurring in the north valley access study area: peregrine falcon, ranked provincially as *At Risk,* and little brown bat, ranked federally as *Endangered* under the *Species at Risk Act* (SARA) (Table 4.3; Appendix E).

Table 4.3. Select special status species with a moderate probability of occurrence in the study area

Common Name	Provincial Status*	Wildlife Act Designation and New Species Assessed by ESCC[1]	COSEWIC Designation[2]	SARA Designation[3]	Recorded in Study Area	Potential Habitat Use	Likelihood of Occurrence
Peregrine Falcon (*Falco peregrinus anatum*)	At Risk	Threatened	Special Concern	Schedule 1 (Threatened)	FWMIS	Foraging	High
Little Brown Bat (*Myotis lucifugus*)	Secure		Endangered	Endangered	No	Foraging/ Roosting	Moderate

*According to General Status of AB Wild Species (date)
[1] ESCC- Alberta's Endangered Species Conservation Committee
[2] COSEWIC -
[3] SARA – Committee on the Status of Endangered Wildlife in Canada
[4] Fish and Wildlife Information Management System

Peregrine falcons prefer to nest in rocky cliffs, or tall buildings in cities (White *et al.* 2002) and are known to nest on office buildings in Edmonton's downtown core, approximately 1 km northeast of the Cloverdale Pedestrian Bridge, and within 5 km at the University of Alberta. Peregrine falcons are also known to have nested in recent years on the High Level Bridge approximately 3 km upstream from the study area. Peregrine falcons often hunt in the NSRV and are recorded in FWMIS as foraging within 1 km of the local study area. Considering this information, Peregrine falcons are considered to have a high likelihood of foraging in the study area.

The most commonly occurring bat species in Edmonton, the little brown bat, may be present in the park as it is most often seen foraging around water bodies such as the NSR (Alberta Sustainable Resource Development 2001). Suitable roosting snags occur within the poplar-Manitoba maple community. The little brown bat has recently been listed under the federal *Species at Risk Act* as *Endangered* due to extreme rates of mortality in the eastern United States caused by white-nose syndrome (WNS) (COSEWIC 2012). Although WNS has not yet been reported in western Canada, a similar event is expected, and this could severely reduce this species abundance. At present, the little brown bat remains common in the Edmonton area (ASRD 2001). Little brown bats roost in old nest cavities or under the bark of trees, and could make diurnal use of old snags in the poplars in the forest at the west end of LMRP and thus are considered to have a moderate potential to roost and forage in LMRP, and possibly breed in suitable trees or buildings. They do not overwinter in the Edmonton area. Within the areas subject to potential vegetation clearing, the potential for little brown bat breeding and roosting is considered low because the trees in these areas are relatively small, and little brown bats prefer larger than average diameter tree snags for cavity roosts (Crampton and Barclay 1998, Olson and Barclay 2013).

4.4.6 *Habitat Connectivity*

4.4.6.1 Methods

Study Area

Habitat connectivity was considered at two scales: locally and regionally. A regional wildlife study area was delineated to account for the fact that the local project area in LMRP comprises only a small portion of the home range for some species in that area and to facilitate the discussion of the NSR system as a wildlife movement corridor. A reduced regional study area used in the 2013 EISA was suitable because it included ecological boundaries relevant to potentially occurring wildlife species with large home range requirements, and considered the topographic NSRV features in the vicinity of the local project component study area.

Habitat connectivity was assessed based on the quality and distribution of habitat in the local and regional study areas; consideration of local topography; a review of an existing report on landscape linkages and connectivity in the City of Edmonton (Spencer Environmental 2006); preliminary data from the University of Alberta urban coyote project (Murray and Cassidy St. Clair, unpublished data); and wildlife collision data from City of Edmonton Animal Care and Control Centre (2011).

4.4.6.2 Description

When juxtaposed with natural areas, highly developed lands, such as those supporting residential, commercial and recreational land uses, pose barriers to wildlife attempting to move through the lands to the adjacent more suitable natural habitat patches beyond them. In such cases, wildlife corridors within the developed areas play a key role in successful wildlife movement between the disjunct, natural habitat patches. They provide a necessary link between larger habitat areas, accommodating daily, seasonal or

dispersal movements that enable genetic exchange and access to other resources (Paquet et al. 2004). The viability of an area as a wildlife corridor is a function of the continuity in its vegetation structure, its width, the amount and type of surrounding disturbance and the quality of the habitat it connects. Major wildlife corridors provide cover and resources, connecting large areas of habitat at a regional scale. River valleys and their associated riparian strips are widely recognized as major wildlife corridors (Vermont Agency of Natural Resources 2005). The Edmonton NSRV is the longest continuous urban green space in North America, has abundant natural cover, links much wilder habitat on either end of the City, and is viewed as an important regional biological corridor (Spencer Environmental 2006). For those reasons, the NSRV serves as the foundation of Edmonton's ecological network.

Within the regional study area, the presumed general direction of dispersal movement is east-west, following the river alignment and the quality of the corridor is variable. At the west end a relatively narrow strip of naturally wooded valley lines the riverbank and provides a nearly continuous corridor for movement through that part of the city core. This segment is assumed to be used regularly by species that are tolerant of the adjacent residential areas and valley recreational use and to also be important for intermittent use by species attempting to follow the valley through the city. The existing paved maintenance vehicle access and the Riverfront Plaza likely deflect movement of animals leaving the east and south edges of that natural habitat patch. The proposed primary construction access corridor, while mostly paved, is currently embedded in a mosaic of naturalized grassland habitat on the valley slopes. The slope bottom comprises landscaped manicured habitat. The lack of forested area within this construction corridor does not provide the protective cover preferred by many species such as deer or fox and weasel. This highly developed and manicured park area is an exposed portion of the longer north valley corridor. There is some more continuous habitat cover along the riverbank within the local study area that may facilitate the movement of smaller wildlife species through the area, but the value is diminished by the presence of the riprapped bank and the concrete promenade. The Cloverdale Pedestrian Bridge spanning that narrow band of habitat is a further limitation for the largest mammals (i.e., moose and deer). Coyotes, which tend to be less wary and more willing to travel through open areas, have been documented to travel through the area, including the open park space (Murray and Cassady St Clair unpublished data) and across the river in winter, proving the connectivity within the wider valley corridor. East of the future Valley Line LRT, lands offer more cover, but the suitable area is only approximately 60 m wide (between residential property boundaries and the shores of the river). And then, further east, wildlife movement is assumed to be further impeded but not prohibited, by a pinch point of very steep slopes. Overall, the quality of the wildlife movement corridor on the north valley slopes in the regional study area is considered low to moderate because of the lack of protective cover, the presence of a pinch point, and the area's more limited suitability for larger mammals, with the lands to be occupied by the proposed primary construction access road ranking among the lowest quality locales.

4.4.7 Recreational Land Use

4.4.7.1 Methods

Recreational land use was described based on information and supporting investigations presented in the 2013 EISA (Spencer Environmental 2013), new LMRP event information generated in 2014 and reconnaissance site visits on 20 June and 15 September 2014. The recreation study area was expanded to include lands surrounding the project component area in order to capture indirect effects on recreational activities.

4.4.7.2 Description

Due to its central location and high quality amenities within the NSRV, LMRP supports numerous programmed and un-programmed activities, including passive and active uses (Plate 4.8), some commercial activities, and two major events, the annual Edmonton Dragon Boat Festival and the inaugural Edmonton 2015 Red Bull Crashed Ice event.

The 2013 EISA documented the recreational value of LMRP in general and the facilities present. In the more limited area of the proposed primary construction access road alignment, park facilities include an important service road, recreational pathways and facilities as follows:

- A paved maintenance/service vehicle road and turn-around that connects to the gravel east-west park maintenance road and recreational businesses and public washrooms. It also facilitates regular holding tank service. This road does not provide vehicular park access or parking for the general public (Plate 4.9)
- Situated along both the SUP and the vehicle access road is the Riverfront Plaza – which includes public washrooms and two businesses (River Valley Adventures/Urban Green Café). River Valley Adventures operates a Segway rental service that relies on their connection to the paved Trans Canada Trail and the broader river valley SUP network (Plate 4.10).
- The SUP within the proposed project area is one of two SUPs travelling through LMRP. This SUP forms part of the main spine of east-west trails through the longer river valley and is part of the Trans Canada Trail. Within the park, the west section of this SUP connects with the aforementioned maintenance access road and continues west, outside the park, towards the Low Level Bridge; the east section of this SUP connects with the Cloverdale Pedestrian Bridge and continues east, outside the park, towards Riverdale and Dawson Park.
- Within the footprint of the proposed primary construction access road, this SUP intersects with four stairways and one paved path: two bisecting downhill staircases connect uphill trails and amenities to the Riverfront Promenade; two intersecting staircases lead south to the Riverfront Promenade, one paved, fully accessible trail leads south to the promenade (Plate 4.11). Through the promenade, these routes also lead to the public boat launch/dock just west of the promenade; however, the dock can also be accessed from trails further west.

Plate 4.8. LMRP supports numerous programmed and un-programmed activities, including passive and active uses.

Plate 4.9. Maintenance/service vehicle road turn-around, looking north (July 2014). This road does not provide vehicular park access or parking for the general public.

Plate 4.10. Riverfront Plaza, looking northwest: River Valley Adventures operates a Segway rental service that relies on the connection to the paved Trans Canada Trail and the broader river valley SUP network (July 2014).

Plate 4.11. Paved fully accessible trail leading south to the Riverfront Promenade, looking east (July 2014).

- An additional, fully accessible north-south pathway is planned for construction in 2015 by City of Edmonton Community Services (Figure 4.5), to provide

increased accessibility to the Riverfront Plaza, the SUP and the Riverfront Promenade and to replace the accessible trail in the east park that will be temporarily closed by LRT construction. Since trail construction is scheduled to be undertaken prior to Valley Line LRT construction, this assessment assumes this trail to be an operating park facility that must be accounted for by the proposed primary construction access road.

- An additional staircase connecting the above-mentioned accessible path to the Riverfront Plaza is also anticipated to be constructed by Community Services in 2015 (Figure 4.5).

The Dragon Boat Festival occurs in LMRP annually during August. The festival is centered on the water but also involves land-based activities in the west part of LRMP, within the proposed primary construction access road corridor. In March 2015, Edmonton's inaugural Red Bull Crashed Ice event will take place in the west part of LMRP, making use of the maintenance vehicle access road, Riverfront Plaza and adjacent lands. This event is expected to repeat in 2017 and 2019.

Other Park Infrastructure

Within the boundaries of the proposed primary construction access study area, other park infrastructure is limited. There are no light standards, benches or other recreational infrastructure situated within the area. In autumn 2014, the entrance path connecting to the east part of the Riverfront Plaza included two portable bike racks, one portable picnic bench and decorative planters.

4.4.8 *Visual Resources*

4.4.8.1 Methods

Visual resources were described based on information and supporting investigations presented in the 2013 EISA (Spencer Environmental 2013) and subsequent reconnaissance site visits on 20 June and 15 September 2014.

4.4.8.2 Description

The role of LMRP as an important visual resource in Edmonton, aesthetically linking the downtown urban environment with the natural environment of the NSRV, is well documented in the 2013 EISA. This assessment focuses on the smaller area of LMRP that would be traversed by the proposed primary construction access road (Plate 4.12). The western part of LMRP is highly visible from several in-valley and top-of-bank west-facing vantage points, including the Cloverdale Pedestrian Bridge, higher points of land across the NSR, the Shaw Conference Centre (Plate 4.13) and LMRP parking lot and the Riverfront Plaza (rooftop views) (Plate 4.14), (looking east and west), and several residential properties at the top of the river valley west of Cameron Avenue.

Site Plan - Louise McKinney Riverfront Park

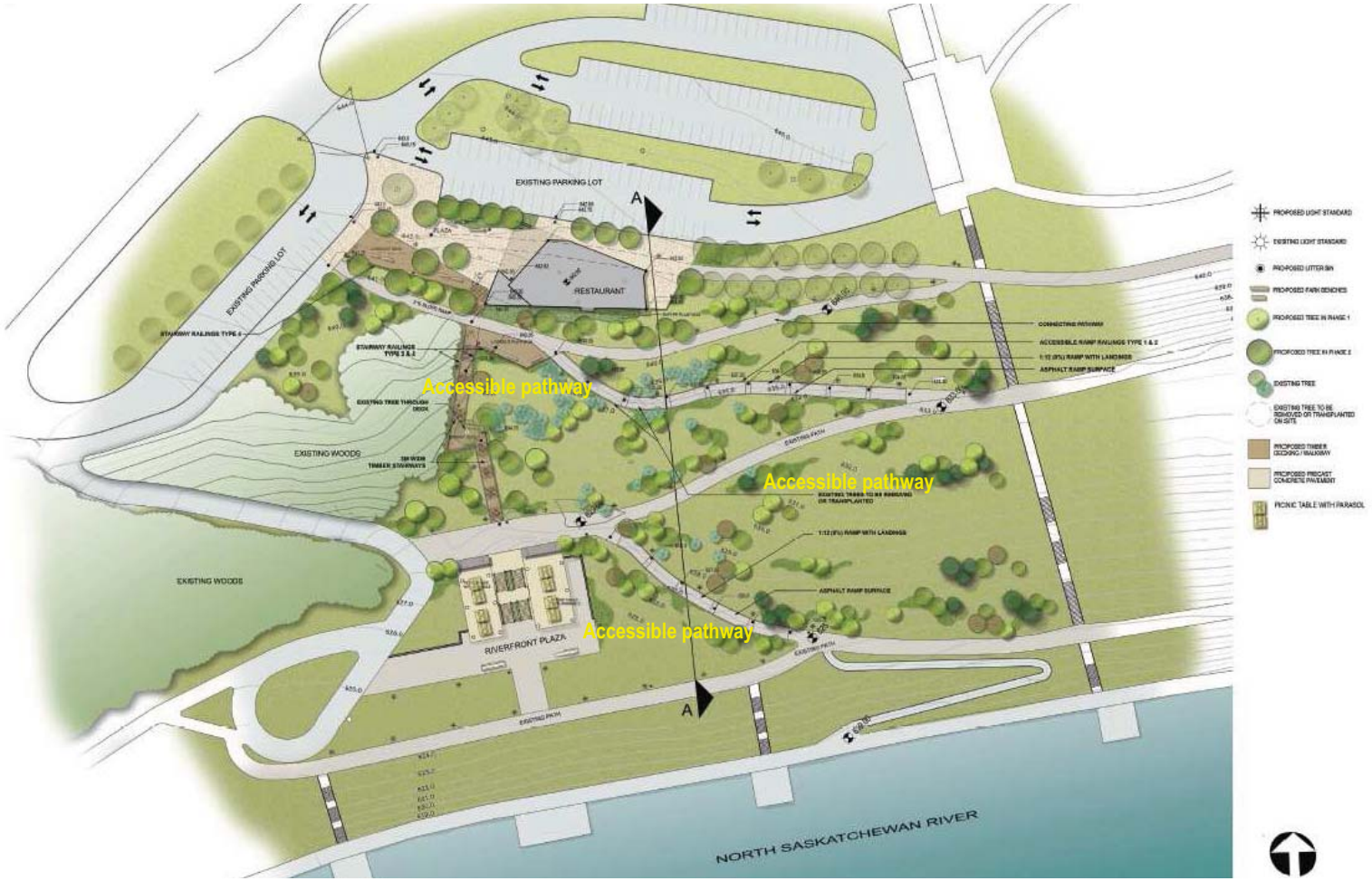


Figure 4.5

Plate 4.12. West End of proposed primary construction access road, looking southeast along the maintenance vehicle access road, from the Shaw Conference Centre (June 2014).

Plate 4.13. West End of proposed primary construction access road, looking northeast towards the maintenance vehicle access road and the Shaw Conference Centre, from the Riverfront Plaza (June 2014).

Plate 4.14. Rooftop view from the Riverfront Plaza, looking east (June 2014).

4.4.9 *Utilities*

Utility information was derived from detailed LRMP utility maps provided by Community Services to LRT D and C. It is possible that not all utilities have currently been located. Prior to beginning work on the site, Project Co will need to confirm all utilities and their locations within the designated Project Area.

Multiple buried utility lines (and associated surface components) are present in the proposed construction access road project area (Appendix F). Several buried EPCOR electrical lines are within the project area including one running parallel with the Trans Canada SUP at the base of the slope, which terminates at an electrical panel near the east end of the Promenade. EPCOR lines also travel north, east and south and intersect with the project component area. Several utility panels/boxes are located along the vehicle access road turnaround (Plate 4.15). Two storm sewer lines are located across and adjacent to the entrance to the maintenance access road to the Riverfront Plaza building and two additional storm sewer lines are documented as running north/south across the valley slope east of the plaza building. A subsurface holding tank, an associated sanitary line and a monitoring cable are located west of the Riverfront Plaza building, with surface connections and the majority of the tank located in the grassed centre of the vehicle turn-around (Plate 4.16). This holding tank is anticipated to be replaced with a lift station and associated sanitary lines in 2015. One north-south water main and fire hydrant are situated immediately west of the Riverfront Plaza. An ATCO gas line is located under the west side of the vehicle access road to LMRP, within the project component lands. There are no identified overhead utilities. While some of the utility relocations required for the Valley Line are already underway, no relocation work has been undertaken in support of the proposed primary construction access road in LMRP.

Plate 4.15. Several utility panels/boxes are located along the vehicle access road turnaround, looking north.

Plate 4.16. A subsurface holding tank, an associated sanitary line and a monitoring cable are located west of the Riverfront Plaza building.

4.4.10 *Historical Resources*

The entire project has been granted Clearance under the *Historic Resources Act*, in the form of two Clearance letters issued by the Province. The second letter, issued on 01 December 2014, accounted for the lands affected by the proposed construction access road. The Province has indicated that the abandoned landfill, the Grierson Nuisance Grounds, is in their inventory of known historic sites and is designated as site FjPj-166. Portions of the proposed construction access road would intersect with site FjPj-166.

4.5 Potential Impacts and Mitigation Measures

4.5.1 *Geology/Geomorphology*

4.5.1.1 Slope Stability

Impact

While a history of slope stabilization measures has improved the overall slope stability in LMRP, it is recognized that excavation and fill activities associated with construction of the proposed primary construction access road along the toe of the former Grierson Hill Slide may have potential to result in slope instability. Thus, to assess this, Thurber Engineering (2014) compared pre- and post-construction use factors of safety. They found that construction of the proposed access road would have no effect on the slope factor of safety for Bentonite Seams "A" and "B" (Thurber Engineering 2014). Thurber Engineering attributed this finding to the relatively minute height/volume of road fill, 1 m high embankments, compared to the volume of the slide mass.

At the riverbank, the pre-construction factor of safety was estimated to be in the range of 1.15 to 1.25 while the post-construction factor of safety was estimated to be reduced by 2 to 7 percent, to a factor of safety ranging from 1.1 to 1.2 (Thurber Engineering 2014). While the percent reduction was not considered large, it reduces the already low factors of safety for the riverbank.

Overall, Thurber Engineering found that construction of the proposed construction access road is expected to have a minimal adverse impact on the stability of the overall valley slope (Thurber Engineering 2014; Appendix B), but could adversely affect the stability of the shallow bank along the NSR. Although such a failure would impact a limited portion of the valley slope, instabilities along the toe of the sensitive Grierson Hill slide may trigger slope movements on a wider scale, if not repaired on a timely basis. The above potential is, therefore, rated as an adverse, major, permanent and predictable impact.

Mitigation Measures and Residual Impact

Thurber Engineering (2014) recommended the following measures be incorporated into construction and operation of the portion of the proposed primary construction access road situated along the existing SUP, as built-in mitigation:

- Placement of additional fill (greater than 1 m in height) should be avoided during construction of the primary construction access road.

- The footprint of the primary construction access road (to accommodate an 8 m wide road) should be kept as far north as practical from the rest of the riverbank.
- Limited cuts may be used to achieve the required road width. To limit the extent of excavation, cuts could be supported using temporary retaining systems (e.g. lock-block walls).
- Several slope inclinometers should be installed along the proposed alignment and monitored on a regular basis to help detect and assess any slope movements.
- Visual inspections of the river valley slope in the general area of the access road should also be carried out regularly during road and Valley Line LRT construction to identify any signs of ground movement (e.g., cracks, bulging, tilted trees or posts, etc.)
- Should the slope monitoring or visual inspections indicate any ground movement, a review of the slope condition should be carried out immediately by a geotechnical engineer and measures to arrest the movement should be implemented as soon as possible.

Project Co will be required to comply with all geotechnical and slope stability recommendations by Thurber Engineering for the design and construction and use of the portion of the proposed primary construction access road situated along the existing SUP. For the portion of the proposed primary construction access road situated along the existing maintenance access road (leading from Grierson Road), the City will undertake a geotechnical assessment of road upgrading in this area and develop recommendations required to ensure slope stability. LRT D and C will submit any geotechnical report to Transportation Services for review and sign-off. Project Co will be required to implement all recommendations and abide by all limitations. Should the City report recommend no clearing of native vegetation or re-grading, Project Co will be required to use the road in its current horizontal and vertical alignment.

With such recommendations in place, residual impacts to slope and riverbank stability from construction of the proposed primary construction access road are anticipated to be negligible.

4.5.2 *Soils*

Construction and operation of the proposed primary construction access road has the potential to interact with surface water from precipitation and snow melt. As identified in the 2013 EISA and carried forward into the Project Agreement, Project Co will be required to develop an EMS and an associated ECO Plan and ESC Plan. The ESC Plan will conform to the City of Edmonton Erosion and Sedimentation Control Guidelines and Erosion and Sedimentation Control Field Manual and must provide for measures commensurate with the sensitivities of the site conditions a location within the landscape. Thus, no *new* impacts relating to erosion and sedimentation and no *new* mitigation measures are required.

Construction and operation of the proposed primary construction access road does, however, have the potential to interact with soils in several other ways.

4.5.2.1 Disturbance of Contaminated Soils during Construction

Construction of the primary construction access will follow existing grades but will likely involve some minor cuts and fills. In certain areas, minor cuts along the base of the slope may encounter landfill materials, as debris has been noted close to the ground surface, particularly in the center of the project area (Thurber Engineering 2014). A Phase II ESA (Connected Transit Partnership 2013b) confirmed that the former Grierson Nuisance Grounds appear to have contributed to heavy metals contamination in soils upgradient of the river. The 2013 EISA determined that for lands in LMRP along the new LRT track, excavation activities in support of permanent infrastructure installation must unavoidably occur within the boundaries of the abandoned landfill and will therefore interface with contaminated soils. Because of this, the proposed access road poses no impacts relating to contaminated soils over and above those associated with the permanent LRT infrastructure.

Project-wide mitigation measures developed for the Valley Line LRT project require Project Co to abide by all environmental laws and include specific protocols and other requirements to ensure suitable handling of all contaminated soils and no exacerbation of soil contamination within the park. All project-wide mitigation measures developed to date are now included in the Project Agreement and will be applied to any activities associated with the construction access road. In addition, the City is developing a Valley Line risk management strategy for soil and groundwater contamination in this area, and will be consulting with the Province. This is a work in progress and Project Co will be required to comply with all Provincial recommendations.

4.5.3 *Hydrology*

Construction and operation of the proposed primary construction access road has the potential to interact with both surface and groundwater in several ways.

4.5.3.1 Road Surface Drainage Impacts

Impact

Construction of the primary construction access road will include limited site grading and creation of a road bed, which will require draining surface water off the access roadway. Negative drainage could affect road integrity and increase the disturbance footprint. This would be a minor, adverse, long-term, predictable impact.

Mitigation Measures and Residual Impact

Thurber Engineering (2014) recommended that permanent site drainage be developed at the early stages of access road construction. They recommended ensuring a 2% slope to the subgrade towards side ditches. The purpose of this is to drain surface water from the subgrade and thereby prevent ponding of water which could result in swelling, softening, and/or possible frost heave of the subgrade. Project Co will also be required to develop a dewatering plan and an ESC plan for all works associated with the project component. The ESC Plan will conform to the City of Edmonton *Erosion and Sedimentation Control Guidelines* and *Erosion and Sedimentation Control Field Manual* and must account for

surface drainage associated with the construction access roadway. With these mitigation measures, residual impacts should be negligible.

4.5.3.2 Disturbance of Contaminated Groundwater during Construction

Impact

Construction of the proposed primary construction access road will involve some minor cuts. While this is required in an area with known groundwater contamination, groundwater levels recorded in piezometers suggest it is unlikely that excavation would be deep enough to interact with contaminated groundwater. In the unlikely event that contaminated groundwater is encountered during excavation activities, project wide mitigation measures have already been developed for the Valley Line LRT and are included in the Project Agreement. For example, Project Co must have an approved plan in place for testing, containment, handling and disposal of contaminated water. These protocols account for all LRT work on the landfill. Because of this, the proposed access road poses no additional or unique impacts with respect to interacting with contaminated groundwater.

Mitigation Measures and Residual Impact

Project-wide mitigation measures developed for the Valley Line LRT project require Project Co to abide by all environmental laws and include specific protocols and other requirements to ensure suitable handling of contaminated groundwater and no exacerbation of contamination within the park. All project-wide mitigation measures developed to this end are now included in the Project Agreement and will be applied to any activities associated with the construction access road. In addition, the City is undertaking a groundwater monitoring program at the former Grierson Hill landfill in the vicinity of the permanent Valley Line infrastructure and will be developing a risk management strategy for soil and groundwater contamination and consulting with the Province. These measures will ensure no residual impacts to park resources.

4.5.3.3 Surface Drainage and Contaminated Soils

Construction of the proposed primary construction access road will involve some minor cuts and re-grading and these activities may expose contaminated soils for brief periods. During precipitation events, surface drainage may interact with such contaminated soils, flow off site, and potentially contaminate nearby lands. Suitable project wide mitigation measures have already been developed for other Valley Line LRT components and are included in the Project Agreement. This includes the development of site dewatering plans that include measures appropriate for the handling of all potentially contaminated surface runoff. Because of this, the proposed access road poses no additional or unique impacts with respect to interacting with contaminated groundwater.

4.5.4 *Vegetation*

4.5.4.1 Impacts to Native and Naturalized Vegetation

Impact

It will be the responsibility of Project Co to determine the final design of the proposed primary construction access road. If the geotechnical assessment undertaken by the City recommends that vegetation clearing and re-grading is acceptable at the portion of the access route along the existing maintenance road, Project Co may elect to clear portions of the poplar-Manitoba maple (PMM) and/or Manitoba maple (MM) communities. If the road is widened to the east, a relatively small area of the MM community would be lost, totaling approximately 168 m^2.

Of greater vegetation consequence would be a widening or realignment to the west, which would involve clearing into the PMM community. This is a more diverse and more native stand and is also part of Natural Area 056 RV. The largest area that could be cleared of this community is captured in the Project Area overlap shown on Figure 4.3 and measures approximately 1,036 m^2. The overlap shown in the figure allows only for widening/upgrading of the existing road. This would permit a disturbance corridor approximately 10 m wide into the PMM community. Vegetation impacts resulting from this would include the edge and potentially the transitional area from edge to more interior habitat of the PMM community. This is considered to be the worst-case scenario and the actual area required for widening/upgrading may be smaller.

Widening the portion of the access road that follows the SUP to support the movement of heavy equipment, would also require removing portions of several naturalized grassland (G) communities, clearing a total of approximately 1,305 m^2. This community is the result of park naturalization and is relatively fast growing and thus, easily restored in a relatively short time.

If realized, the additional loss of native vegetation as described above is rated as adverse, minor, long-term and predictable. It is minor, even though some native vegetation would be removed, because of the relatively small areas involved.

Importantly, the City has adopted a project wide strategy to ensure compliance with the City's Corporate Tree Policy. This strategy will also apply to this project component.

Mitigation Measures and Residual Impact

Mitigation for clearing in the Manitoba maple (MM) and poplar-Manitoba maple (PMM) communities will take the form of avoidance, followed by restoration for unavoidable clearing. If road upgrading proposed by Project Co requires clearing in either of these areas, Project Co will be required to submit a detailed request to the City, justifying the clearing by indicating why other options could not be used and demonstrating that a suitable alternative that does not require clearing of trees cannot be achieved. Clearing of the MM community would be the first acceptable alternative. Clearing of the PMM community would be considered as a last resort. If clearing of the MM and/or PMM communities is approved, restoration will be governed by native forest restoration

requirements already noted in the Project Agreement for any clearing of forest communities, as part of this project component change. Establishment of Manitoba maple will not be an acceptable part of restoration.

Finally, to ensure compliance with the Corporate Tree Management Policy, the City of Edmonton commits to updating the Valley Line tree inventory to cover the lands included for this project component.

Any loss of naturalized grassland (G) communities will be mitigated by requiring Project Co to restore all affected grasslands to their original condition, according to an approved plan. Use of clean imported topsoil will be required to ensure that re-use of any soils affected by landfill debris is avoided.

The above mitigation measures will ensure that impacts to native and natural communities will be negligible; however full restoration of the native community would be a long-term process.

4.5.4.2 Impacts to Manicured Vegetation

Impact

Construction activities associated with the proposed construction access road are anticipated to impact a small area of manicured vegetation within LMRP, totaling approximately 1,622 m^2 associated with widening the existing SUP to support construction traffic. Impacts to manicured vegetation will include lawn (approximately 1,338 m^2), some planted trees and portions of planted beds (approximately 284 m^2) situated along the existing SUP. The additional loss of manicured vegetation is rated as adverse, minor, long-term and predictable. It is rated as minor because of the small patches involved and ease of restoration in comparison to naturalized communities.

Mitigation Measures and Residual Impact

Any manicured park areas disturbed by this project component will be reclaimed to the existing landscaped condition. Project Co will be required to include this area in their project landscaping plans that demonstrate that full reclamation will be achieved. Any removal of trees within this project component will be subject to the City's Corporate Tree Management Policy and, more specifically, to the process and tree inventory that the City has established for the Valley Line LRT to ensure compliance with that policy. These measures should result in a negligible residual impact to manicured vegetation, in the long-term, allowing for time for plantings to mature.

4.5.5 *Wildlife*

4.5.5.1 Loss of Terrestrial Habitat Due to Clearing Activities

Impact

Construction activities associated with the proposed primary construction access road have potential to remove some small areas of the park's unmanicured and comparatively better quality wildlife habitat. Those losses will only be required if it is determined that

the existing maintenance/service vehicle access road in LMRP would require some realignment to accommodate construction vehicles.

Because the potentially affected areas are small, not of the highest quality, would not be fully removed, are found in abundance in the NSRV and support commonly-occurring species, and must be replaced as part of mitigation efforts, this potential loss of habitat is rated as a minor, long-term adverse and predictable impact.

Mitigation Measures and Residual Impact

Because Project Co will be required to re-establish all lost native or naturalized plant communities, as described in the previous section, the long-term residual impact to wildlife habitat within the project component area is rated as negligible.

4.5.5.2 Special Status Species

Impact

None of the project components are thought to have potential to adversely influence peregrine falcons because falcons do not now regularly occur in the area. Construction activity may alienate some potential peregrine avian prey species from the park, thereby further reducing the potential for peregrines to use the area. An abundance of foraging opportunities exist elsewhere in the NSRV. The potential impact to peregrine falcons is considered negligible.

Because the areas subject to potential clearing are not suited to little brown bat roosting, the project has negligible potential to affect little brown bat habitat or to result in direct mortality to little brown bats as a result of clearing. Potential for direct mortality is further reduced by the Project Agreement clause that prohibits all clearing in vertically complex forest (which applies to the PMM community) between 10 May and 10 August. In the Edmonton area, little brown bats *can* return to cavity roosts in early May; however, their numbers in early May are generally low (Schowalter *et al.* 1979, Alberta Fish and Wildlife Division *n.d.*). Females do not give birth until June, their young fledge in late July and most roosts are free of little brown bats by the second week of August (Schowalter *et al.* 1979). If bats happen to be present in early May or after 10 August, and are disturbed during roosting, they would be mobile enough to fly away.

Mitigation Measures and Residual Impact

Additional mitigation measures are not required.

4.5.6 *Habitat Connectivity*

Impact

Although the manicured west portion of LMRP is not considered to be a high quality movement corridor, the construction and use of the proposed primary construction access road is likely to further reduce its suitability for use as a wildlife corridor. Conversely, as the access road is to be oriented parallel and not perpendicular to the riverbank and

because construction activity will typically occur between the hours of 07:00-22:00 hours Monday to Saturday and 09:00-21:00 hours on Sundays and holidays, the potential effect of this project component on wildlife movement through the western part of the park is reduced. During working hours the noise and visible traffic may deter some animal movement through this area; impacts during these periods are anticipated to be adverse but only minor, short-term, and predictable.

Mitigation Measures and Residual Impact

The 2013 EISA required Project Co to develop several measures to accommodate wildlife movement through the valley, the main ones being to ensure that during construction, a corridor remains present in the north river valley and to address any wildlife-worker conflicts. Such requirements have been incorporated into the Project Agreement for the Valley Line LRT. These measures are anticipated to reduce the impact but because it may not eliminate all adverse impacts, it does not change the impact severity rating.

4.5.7 *Recreational Land Use*

Use of the proposed north valley primary construction access road will impact recreational land use within the western part of LMRP. The 2013 EISA addressed the impacts of partial closure of this east-west SUP, as it was recognized that further east this same SUP intersects with the LRT alignment and main construction zone. This update is, therefore, specific to the impacts of closure of the additional (western) portion of the SUP and use of the existing maintenance/service vehicle access road and SUP as the primary construction access road.

4.5.7.1 Impacts to the Pathway Network

Impact

West Park Pathway Use

Closure of the east-west SUP to the public and use of it as the proposed primary construction access road has the following implications for public use of the greater west LMRP pathway network:

- The four north-south wooden staircases intersections with the SUP must either be controlled for safety reasons or closed, limiting access to the Riverfront Promenade.
- Ensure that all businesses located in LMRP remain accessible to recreationalists and service vehicles.
- The new accessible pathway to be constructed in 2015, and remain open during Valley Line LRT construction, will intersect with the proposed primary construction access road, creating a need to ensure safe access across this area to the existing accessible path south of the SUP that leads to the promenade.
- Segway renters will have more limited access to the greater SUP network to the east and west.

- There is potential for construction traffic to pose a safety hazard to members of the public using available shared use routes and where pathways intersect with the vehicle access route (Plates 4.17 and 4.18).

Unmitigated, potential impacts to the pathway network are rated as adverse, major, long-term and predictable.

Plate 4.17. An informal trail that connects to the maintenance access road from the LMRP parking lot, looking north (July 2014).

Plate 4.18. Three pathways (from west, south and east) connect to vehicle maintenance access road (July 2014).

Mitigation Measures and Residual Impact

To mitigate the limitations that the construction access route will have on existing pathways that currently access the east-west SUP and the Riverfront Promenade to the south, Project Co will be required to undertake the following:

- Provide and maintain barrier-free and safe access across the primary construction access road at the two wooden staircases leading south to the Riverfront Promenade and at the connection with the accessible pathway to the north and to the south.
- Post-construction, re-establish all affected pathways and staircases will be re-established to the pre-disturbance condition, alignment and width, restoring the trail network in the local area.
- During the construction period, all works associated with the primary construction access road will be subject to the contractual obligations of the Valley Line LRT, which includes requirements and protocols pertaining to trail detours, signage and communications.
- Ensure safe and effective shared use of the existing or upgraded maintenance/service vehicle access route with vehicular traffic servicing the existing facilities.
- Provide a safe crossing of the existing maintenance/service vehicle access route for all recreationists accessing the formal pathway network to the west, south and northeast.

Implementing these measures should ensure that residual adverse impacts to trail users are minimized, reducing the adverse effect of the proposed route to minor, long-term and predictable.

4.5.7.2 General Park Use

Impact

The use of the proposed primary construction access for all activities in the north river valley will result in the daily flow of numerous trucks and various types of heavy equipment through the area, with intermittent periods of peak activity each lasting up to several months. This has potential to create noise and dust and be a very noticeable project component in the lower, western portion of LMRP. Therefore, there is some potential for this to adversely affect unprogrammed uses in that part of the park, such as use of the Riverfront Plaza roof top patio, grassed areas for picnicking and nature appreciation. Vehicles servicing the Riverfront Plaza and associated businesses may be inconvenienced by the volume and nature of the construction traffic. There is also potential for construction traffic through the park to pose a safety hazard to members of the public using adjacent manicured areas of the park, if public access is uncontrolled.

Unmitigated, the potential impact to park users is rated as adverse, minor, long-term and predictable. The severity is minor because of the relatively low passive use in this park locale.

Mitigation Measures and Residual Impact

To mitigate the impact of construction traffic on unprogrammed park uses the City will ensure the following:

- Project Co will be required to continuously control dust emanating from the road surface using acceptable protocols as set out in the Project Agreement.
- Project Co will make available to the café any printed project update information generated through the public communications plan, so as to allow patrons using the plaza and rooftop to interpret visible construction activities.
- Effective barriers are present along the construction route to clearly delineate the route and protect the safety of nearby park users.
- Project Co will ensure continuous access for vehicles servicing facilities at the Riverfront Plaza, including the holding tank and future lift station.

Implementing these measures should ensure that residual adverse impacts are minimized, reducing the adverse effect of the proposed route on the quality of recreation experiences to minor, long-term and predictable. It remains minor because of the anticipated traffic noise that will be incompatible with most park uses.

4.5.7.3 Special Events

Impact

Programmed uses in this part of the park include the annual Dragon Boat Festival and the inaugural Edmonton 2015 Red Bull Crashed Ice event (with anticipated future events in 2017 and 2019) both of which have considerable spatial overlap with the construction access route, involve installation of temporary infrastructure, attract hundreds of spectators and rely on good visual sightlines and broadcasting acoustics for a successful event. In addition, the Dragon Boat Festival requires direct access for spectators to the Riverfront Promenade. None of these event requirements are compatible with an active construction access route, and thus, unmitigated, this project component has potential to create significant conflict with these events.

Overall, the potential impact to special events, prior to mitigation is rated as adverse, major, long-term and predictable. It is rated as major because these are major events that rely on public attendance and draw people from across the City.

Mitigation Measures and Residual Impact

To mitigate the effects of this project component on the Dragon Boat Festival, the City will implement the following protocols and measures:

- For the period of 4 days before to 2 days after the event, Project Co must provide unimpeded access to the Edmonton Dragon Boat Festival site from Grierson Hill Road to allow for festival set-up and tear-down and for emergency evacuation.
- Valley Line construction access via the north valley primary access route will be suspended from noon on the Friday of the Edmonton Dragon Boat Festival event to midnight on the Sunday of the event, during which time construction access will be via the portal maintenance access road from Cameron Avenue.
- The City will reserve the right to modify these measures as informed by the experience gained during the first occurrence of the event after project initiation, assumed to be 2016.

To mitigate the effects of this project component on Red Bull Crashed Ice, the City will implement the following protocols and measures for the period spanning 28 days prior to, and until 14 days following the, Red Bull Crashed Ice event:

- Use of the construction access road will cease and unimpeded access from Grierson Hill will be granted to event organizers for activities associated with set-up, tear down and emergency evacuation related to the event.
- Construction equipment vehicle access will be by way of Cameron Avenue and the north portal permanent access road.
- Grierson Hill Road will not be used for construction access and the road will be fully closed for the four day event.
- All Project Co construction fencing, temporary structures, equipment and materials will be removed from the Red Bull Crashed Ice Site.

- Within the entire river valley, all Project Co construction activity will be suspended during the four-day event. Specific activities having no potential to be audible may be allowed at the discretion of the City.
- Red Bull Crashed Ice organizers may erect temporary fencing on their site, as needed.
- The City will reserve the right to modify these measures as informed by the experience gained during the 2015 event.

Implementing these measures should ensure that residual adverse impacts on special events are reduced to negligible.

4.5.8 *Visual Resources*

Impact

The North Valley Primary Construction Access will be highly visible within the NSRV, including from in-valley and top-of-bank vantage points. Activities associated with this project component will, however, be undertaken concurrently with other extensive construction associated with the Valley Line PRT including the north valley portal and the Tawatina Bridge, and this portion is expected to be relatively minor although one of the longer lasting components. Visual impacts will include the temporary conversion of vegetated areas to construction zones, some fencing and the frequent presence of numerous construction vehicles and heavy equipment. Based on these considerations, impacts to visual resources are considered to be adverse, minor to major, long-term and predictable.

Mitigation Measures and Residual Impact

During construction, all works associated with the North Valley Primary Construction Access project component will be subject to the contractual obligations of the Valley Line LRT, which includes requirements to provide aesthetically suitable fence and/or visual screening. Despite the implementation of such measures, works associated with this project component are anticipated to increase the overall visual impact within the local area, thus, impacts are still rated as adverse, minor, long-term and predictable.

4.5.9 *Utilities*

Impact

Use of the park maintenance access road as the construction access road has some potential to affect several buried utilities situated underneath the access route, including but potentially not limited to, a subsurface holding tank, an associated sanitary line and monitoring cable located west of the Riverfront Plaza building, several EPCOR lines connecting to the electrical panels to the immediate northwest of the Riverfront Plaza, and an ATCO gas line located under the west side of the vehicle access road to LMRP. Even if subsurface work or road widening is not required in that section of the construction access route, there is some uninvestigated potential for these underlying utilities to be damaged by the heavy loads that will use this road. Should the road require straightening this also has potential to affect buried and surface utilities. The SUP

corridor will also carry heavy loads and constructing the access road will require some subsurface work, including cuts. Utilities in that corridor may also require protection and/or relocation. Should any utility relocations be necessary, it would be the utility owner that would undertake the work, in cooperation with Project Co.

Although not at present anticipated, since utility locates and road design are still in the future, it is possible that temporary or permanent relocations will be required and may involve lands outside the Project Area, affecting other park resources. This impact is rated as adverse, minor, and uncertain. It is minor based on the assumption that relocations would affect very small areas only.

Mitigation Measures and Residual Impact

Project Co will need to confirm utility locations prior to commencing construction and will then implement suitable mitigation, which may be protection in place through proven measures such as temporary bridging over the utility, or may be temporary or permanent relocation. Protection of such utilities should also include the holding tank or lift station and associated sanitary line. Continued accessibility for maintenance vehicles servicing the tank/lift station will also be required. Relocation within the Project Area would be subject to all of the environmental protection measures included in the contract agreement and any impacts would thus be mitigated. Should it become evident that utility relocation or new utility installation is required on lands outside the Project Area, the work would be undertaken by the utility owner. The work would be subject to review under Bylaw 7188, would most likely take the form of an Initial Project Review (IPR) and would be the responsibility of the utility owner. An approved Bylaw 7188 review is expected to ensure no attendant long-term impacts to park resources.

4.5.10 *Historical Resources*

The second Clearance Letter issued by the Province covers the construction access road component and all conditions and associated reporting requirements stipulated in the *Historic Resource Act* Clearance letter are included in the Valley Line Project Agreement. Because there is some potential for the construction access road to affect historical artifacts in the Grierson Landfill, the Provincial Clearance includes a condition requiring archaeological monitoring of all excavations at site FjPj-166. This includes any excavation work associated with the construction access road. The Provincial conditions ensure that any uncovered historical resources will be documented and brought to the attention of the Province. On that basis, there should be no residual impacts on Historical Resources.

4.6 Summary Assessment

4.6.1 *Summary of Residual Impacts*

Five residual adverse impacts were identified after the application of mitigation measures. The assessment determined that during construction, even with mitigation, there will be adverse minor impacts to native vegetation, habitat connectivity during construction, the recreational pathway network, general park use and visual resources.

With the exception of some vegetation, these residual impacts will be eliminated very shortly after construction. Impacts associated with any removal of woody vegetation will be much longer-lasting, but not permanent, as forest restoration and planted trees will take time to mature.

4.6.2 *Monitoring Requirements*

The Province requires monitoring of excavation work within site FjPj-166, at the former Grierson Landfill.

4.6.3 *Resolution of Key Environmental Issues*

The following are brief answers to the questions initially posed in *Section 4.3*.

Will construction of the access route adversely impact slope stability on the north valley wall or river bank?

No. Project Co will be required to comply with all geotechnical and slope stability information and recommendations by Thurber Engineering for the design and construction and use of the portion of the proposed primary construction access road situated along the existing SUP. For the portion of the proposed primary construction access road situated along the existing maintenance access road (leading from Grierson Road), the City will undertake a geotechnical assessment of road upgrading in this area and develop recommendations required to ensure slope stability. LRT D and C will submit any geotechnical report to Transportation Services for review and sign-off. Project Co will be required to implement such recommendations. Should the City report recommend no clearing of native vegetation or re-grading, Project Co will be required to use the road in its current horizontal and vertical alignment.

Will the landfill present challenges to road stability or performance and lead to more disturbance?

No, not if Thurber Engineering (2014) recommendations and subsequent recommendations from the City's additional geotechnical assessment are incorporated into construction and operation of the proposed primary construction access road. These measures took into consideration the presence of the existing landfill. Project Co will be required to comply with all geotechnical and slope stability information and recommendations by both reports for the design and construction of the temporary construction access road through Louise McKinney Riverfront Park.

Do contaminated soils occur within the project component area?

Yes.

Could the project result in mobilization of contaminants or contaminated soils?

Unlikely. Project-wide mitigation measures developed for the Valley Line LRT project require Project Co to abide by all environmental laws and include specific protocols and other requirements to ensure suitable handling of all contaminated soils and no exacerbation of soil contamination within the park. All project-wide mitigation measures developed to date are now included in the Project Agreement and will be applied to any activities associated with the construction access road. In addition, the City is developing

a Valley Line risk management strategy for soil and groundwater contamination in this area, and is consulting with the Province. Project Co will comply with any resulting provincial requirements.

Will construction of the access road lead to surface erosion?
Construction and operation of the proposed primary construction access road has the potential to interact with surface water from precipitation and snow melt. As identified in the 2013 EISA and carried forward into the Project Agreement, Project Co will be required to develop an EMS and an associated ECO Plan and ESC Plan. The ESC Plan will conform to the City of Edmonton Erosion and Sedimentation Control Guidelines and Erosion and Sedimentation Control Field Manual and must provide for measures commensurate with the sensitivities of the site conditions a location within the landscape.

Does contaminated groundwater occur within the project component area?
Yes.
Could construction access route activities result in mobilization of contaminants or contaminated groundwater?
Not likely. Project-wide mitigation measures developed for the Valley Line LRT project require Project Co to abide by all environmental laws and include specific protocols and other requirements to ensure suitable handling of contaminated groundwater and no exacerbation of contamination within the park. All project-wide mitigation measures developed to this end are now included in the Project Agreement and will be applied to any activities associated with the construction access road. In addition, the City is undertaking a groundwater monitoring program at the former Grierson Hill landfill in the vicinity of the Valley Line permanent infrastructure and will be developing a risk management strategy for soil and groundwater contamination and consulting with the Province. Project Co will have to comply with any resulting requirements.

Do construction access road activities have the potential to affect rare, threatened or endangered plants or plant communities?
No. No rare, threatened or endangered plants or plant communities are present within the project component area.

Will vegetation in recognized Natural Areas be affected?
Possibly. Such an impact would occur only if it is determined that the existing maintenance vehicle access road into LMRP would require widening/upgrading to support construction vehicle access. Clearing would be contingent on the results of the City's geotechnical assessment for the portion of the access route situated at the existing maintenance road. In a worst case scenario, this would result in the disturbance of up to approximately 1,036 m^2 (or approximately 1.5%) of Natural Area 056 RV. If Project Co determines that such a widening/upgrading required and if geotechnical assessments undertaken by the City support such works, Project Co will adhere to the requirements governing native forest restoration in the river valley noted in the Project Agreement for any clearing of the MM or PMM communities. Establishment of Manitoba maple will not be an acceptable part of restoration. All plans will be subject to approval by the City.

Will any special status wildlife species be affected by access road construction?
No. Both special status species within the potential to occur in the project area are highly mobile and wide ranging and can avoid the area during construction.

Will local pathway disruptions during construction activities be suitably mitigated for all users, including those availing themselves of wheelchair accessibility?
Yes. Numerous measures will be incorporated into the Project Agreement to mitigate effects on pathway use. In addition, the City has developed several other measures, such as provision of fully accessible routes.

Will access to River Valley Adventures/Urban Green Café or washrooms be disrupted as a result of the access road?
No. River Valley Adventures, the Urban Green Café and public washrooms at the Riverfront Plaza will remain accessible during project activities. It is anticipated, however, that closure of the nearby east-west SUP will result in a more limited access for Segway renters to the greater SUP network to the west.

Will construction activities interfere with park programming or special events?
No. Programmed uses in this part of the park include the annual Dragon Boat Festival and inaugural Edmonton 2015 Red Bull Crashed Ice event (with anticipated future events in 2017 and 2019), both of which have considerable spatial overlap with the construction access route. To mitigate the effects of this project component on these events, the City has developed event-specific mitigation measures to ensure that construction does not impact the accessibility and operation of these events in LMRP.

Will project activities occur in an area where the Province requires historical resources monitoring of subsurface construction activities?
Yes. There is some potential for the construction access road to affect historical artifacts in the Grierson Landfill, thus, the Provincial Clearance includes a condition requiring archaeological monitoring of all excavations at site FjPj-166. This includes any excavation work associated with the construction access road.