Kihciy Askiy (Sacred Earth) in Whitemud Park: Environmental Impact Assessment

Final Report

Prepared for:

City of Edmonton Infrastructure Planning and Design
Edmonton, Alberta

Prepared by:

Spencer Environmental Management Services Ltd.
Edmonton, Alberta

Under contract to:

Manasc Isaac Architects Ltd.
Edmonton, Alberta

Project Number EP 706

November 2017

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Katharina Kafka, AALA, CSLA
Landscape Architect
Manasc Isaac
10225 100 Avenue
Edmonton, Alberta T5J 0A1

13 November 2017
EP 706

Dear Ms. Kafka,

Re: BD17-61- Kihciy Askiy in Whitemud Park – Final Environmental Impact Assessment (EIA)

As requested, please find enclosed a pdf copy of the above-mentioned final Environmental Impact Assessment (EIA) for your files and for distribution to City of Edmonton Urban Form & Corporate Strategic Development. The final EIA includes a concordance table, outlining City of Edmonton reviewer comments and the project team's responses. A final Site Location Study (SLS) is provided under separate cover.

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

Sincerely,

Spencer Environmental
Management Services Ltd.

Kesia Miyashita, M.Sc., P.Biol.
Environmental Scientist

Andra Bismanis, M.Sc., P.Biol.
Project Manager and Senior Environmental Scientist

attch.

cc: Richard Isaac, Manasc Isaac

Environmental Impact Assessment and Site Location Study for Kihciy Askiy (Sacred Earth) in Whitemud Park

Concordance Table - Response to Comments Received: 29 September 2017

October 2017

Review Comment (Verbatim)	Response Approach	EIA/SLS Report Section Reference(s)
1. GEOTECHNICAL SERVICES		
We have been involved with this project and have coordinated the geotechnical investigation in support of the design for this development. As such, we are satisfied that the geotechnical aspects of the design will be addressed accordingly.	Comment noted.	**N/A**
2. CIVIC EVENTS AND FESTIVALS		
Please ensure that all construction schedules are provided so that any and all events in the area can be planned around this. The Civic Events liaison for this area is Sarah Ridley 780-944-0525.	Comment noted.	**N/A**
Please ensure that any closures that will affect trails are recorded on the trail closures maps at Edmonton.ca as this is our reference for all groups.	Comment noted.	**N/A**
Who is the main City of Edmonton contact to liaise between the group and appropriate COE staff that need to be made aware of specialized programming (i.e., to alert other COE staff for example when overnight use will occur or any additional fire elements not already permitted as part of the basic programming permissions, etc)?	The main COE contact is Rob Houle, City of Edmonton Indigenous Relations Office.	**N/A**
Please provide a copy of all comments for our files.	Comment noted.	**N/A**
3. PARTNERSHIPS AND EVENT STRATEGIES		
In the project background it outlines that one of the success of the project, will be that it is "welcoming to the public". What does this look like? Can anyone access/use the site?	• The Kihciy Askiy site will be operated by the NCSA between the hours of 9:00 am – 4:00 pm. During that time, the public is welcome to visit the site, excluding	**EIA, Section 2.3.11.4**

Review Comment (Verbatim)	Response Approach	EIA/SLS Report Section Reference(s)
	designated ceremonial locations. Visitors will be subject to the NCSA policies, procedures and code of conduct. Access to ceremonial locations is restricted to participants in the ceremonies and based on the code of conduct. It is planned that there will be publically accessible indigenous ceremonies on Saturdays (e.g., community sweat lodges). • Outside the NCSA operating hours, public access will be possible in public areas, with the exception of ceremonies that take place in the evenings. • Cameras and other audio/video recording equipment will be restricted on ceremonial locations on site.	
Is the parking that is being proposed open to the public for use?	During NCSA operating hours (9:00 am – 4:00 pm), parking at Kihciy Askiy will be restricted to users of the site. Outside of that time, parking will be available for public access, with the exception of ceremonies that take place in the evening. It is planned that there will be publically accessible ceremonies on Saturdays (e.g., community sweat lodges) and in such cases, additional signage will be placed in the parking lot.	**EIA, Sections 2.3.3.1 and 2.3.11.4**
How is parking going to be managed? • Parking is already a concern in this area, if parking is not available is there a way to manage any potential overflow into Fort Edmonton Park and Whitemud	NCSA will manage parking and site programming to ensure that there are minimal overflow situations. Communication and coordination with	**EIA, Sections 2.3.3.1 and 5.2.3.2**

Review Comment (Verbatim)	Response Approach	EIA/SLS Report Section Reference(s)
Equine's parking lots? • Also, if Fort Edmonton Park is busy, it is anticipated people may choose to park at this new lot. How is this going to be managed? • Will there be designated parking for Elders?	Fort Edmonton Park and Whitemud Equine Centre will be undertaken if special events with anticipated larger parking needs are scheduled. The City of Edmonton administration is setting up a coordination committee between these three organizations (called the Site Stewardship Committee). Additional parking and security requirements for the site will be the responsibility of NCSA and will be enforced by NCSA. Signage will be put in place, and there may be personnel to control access to Kihciy Askiy parking if required. Yes. Additional signage beyond COE parking signs will be the responsibility of NCSA.	
On some of the busier days at Fort Edmonton Park, the traffic on Fox Drive gets incredibly backed up which will also impact access to that site. If people are needing to get there for ceremony and can't access it, what is the strategy to support?	Collaboration through the City of Edmonton Site Stewardship Committee around the scheduling of major events will help to avoid bottleneck and back up situations. Also City of Edmonton administration has indicated that a traffic study for this area and potential light changes will be implemented. Kihciy Askiy is also served by City of Edmonton Transit, with two bus stops (east- and westbound) on Fox Drive, approximately 250 m from Kihciy Askiy. Dedicated bus lanes are also in place along Fox Drive to significantly improve access via public transit during high traffic times.	**EIA, Sections 2.3.3.1 and 5.2.3.2**
Has an analysis been done on how easy/hard it will be for the City's Indigenous population to access the site from different	Yes, coordination with City of Edmonton Transit has been underway for 5 years. Regular bus	**EIA, Sections 2.3.3.1 and 5.2.3.2**

Review Comment (Verbatim)	Response Approach	EIA/SLS Report Section Reference(s)
areas of town? How long will it take, and how many transfers, to get from all areas of the City? Will anything be set up to transport folks from downtown, who may not be able to afford public transportation? How accessible will it be?	service will be provided with additional access through the South Campus/Ft. Edmonton Park LRT stop. Kihciy Askiy is also served by City of Edmonton Transit, with two bus stops (east- and westbound) on Fox Drive, approximately 250 m from Kihciy Askiy. Dedicated bus lanes are also in place along Fox Drive to significantly improve access via public transit during high traffic times. Travel to the site will be the responsibility of the individual or agency making use of the site. For low-income individuals or families, discounted transit tickets are available through Edmonton Transit (https://www.edmonton.ca/ets/subsidized-transit.aspx). Free transit coupons are also available at many social service agencies throughout Edmonton.	
Has an Historical Resource Impact Assessment been done for the area? Are there any archaeological sites in the project area, nearby, that would trigger consultation requirements? Are there any other regulatory requirements from a provincial and federal level that may trigger consultation? Something to consider.	A Historical Resources Statement of Justification was submitted to Alberta Culture and Tourism (ACT) on 29 March 2016 for the department's review and comment regarding additional requirements pursuant to the *Historical Resources Act*. ACT granted clearance for project activities on 13 May 2016, with the standard condition that newly discovered artifacts must be reported to the Province immediately. ACT determined that the potential for the site to support undiscovered paleontological resources at depth was high; because the project required excavations deeper than 1 m in select locations,	**EIA, Sections 4.3.1.2 and 5.3.1.1; Appendix G**

Review Comment (Verbatim)	Response Approach	EIA/SLS Report Section Reference(s)
	the City commissioned a paleontological historical resources impact assessment. The pHRIA found that any excavations exceeding 1.5 m in depth have a high potential to disturb bedrock and significant fossil resources from the Horseshoe Canyon Formation. It was recommended that a paleontological monitoring program be put into place only for activities involving open-cut excavations of 1.5 m or deeper. A copy of the clearance letter from Alberta Culture and Tourism is provided in Appendix G of the EIA.	
When the project is complete, we would like to be able to share the contact information of who is responsible for the programming with Fort Edmonton Park, so that they may connect if needed.	Programming will be coordinated by Native Counselling Services of Alberta (NCSA), Kihciy Askiy Project. 780-451-4002, info@ncsa.ca Key contacts for NCSA are currently Robyn Scott (780-451-4002) and David Faber (780-983-3253)	**N/A**
How will fire bans be addressed at this site?	Due to concerns raised by Fire Services, all burning in area will take place within a special enclosure, which will be designed in consultation with Edmonton Fire Services. Where regular fires are required, appropriate City of Edmonton policy will be followed and all City fire bans will be adhered to.	**EIA, Section 2.3.5**
Will there be any overnight security to keep the site safe and undamaged?	City of Edmonton Park Rangers will be informed of the site once opened and will include it in their regular park security rounds. Installation of a security system will be considered, as funding allows.	**EIA, new section (Section 2.3.6) on Site Security added**

Review Comment (Verbatim)	Response Approach	EIA/SLS Report Section Reference(s)
Suggest a coordination with event schedules between Fort Edmonton Park, Whitemud Equine Centre and Kihciy Askiy in order to mitigate any potential parking/site access issues.	City of Edmonton administration will be creating a Site Stewardship Committee, which will include Kihciy Askiy, Fort Edmonton Park, and the Whitemud Equine Centre. Coordination and cross programming efforts of sites will be possible.	**EIA, Section 2.3.11.4**
4. BIODIVERSITY AND RIVER VALLEY PLANNING		
In regards to the Site Location Study, on page 7, it is recommended to revise "not considered" to "not feasible to consider alternate locations".	Comment noted. The sentence on Page 7 has been revised as follows: "Considering the historical and cultural significance of the proposed site, the proposed project represents a reinstatement of a former, pre-settlement, Indigenous land use. For that reason, it was not feasible to consider alternative river valley or non-river valley project locations."	**SLS, Section 3, Page 7**
5. ENVIRONMENTAL PLANNING		
I have a Phase 1 ESA from 2014 that shows there is no historical environmental concern for the subject site. I have no concerns.	Comment noted.	**N/A**
6. URBAN FORESTRY		
Will there be any planting plans or forest regeneration plans to follow? Forestry would like to be involved early on in the design phase. Please include Urban Forestry in future circulations for any planting.	Re-naturalization of the site will take place. A landscape architecture design (schematic design) has been completed by Manasc Isaac and presented and approved by City of Edmonton administration and NCSA. City of Edmonton administration will coordinate and include Urban Forestry as required.	**EIA, Section 2.3.11.3**

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1.0 INTRODUCTION

1.1 Background

The City of Edmonton Infrastructure Planning and Design and Native Counselling Services of Alberta propose to develop Kihciy Askiy (Cree for "Sacred Earth"), a permanent, 2.5 ha Indigenous ceremonial and cultural site located in Whitemud Park on the former Fox Farm lands (Figure 1.1) (Manasc Isaac 2017). Prior to the land becoming Fox Farm lands, the area proposed for Kihciy Askiy was used for many centuries by Indigenous people foraging for medicines to heal their communities. Ochre, a rare mineral, is also found close to the site and is used in spiritual and traditional ceremonies.

The proposed project is intended to provide a natural setting for the Capital Region's Indigenous community to host spiritual ceremonies, sweat lodges, cultural camps and talking circles; grow medicinal herbs, practice traditional crafts and facilitate intergenerational learning (Manasc Isaac 2017). In addition, Kihciy Askiy will be accessible to the non-Indigenous community for cross-cultural education.

The recent history of the project spans approximately 10 years beginning in 2006 when the City of Edmonton received a proposal from the Edmonton Indigenous Cultural Resource Counsel to create a permanent site for Indigenous cultural events and learning experience for both Indigenous and non-Indigenous people (City of Edmonton 2016). In 2009, the City amended the Whitemud Integrated Area Concept Plan to include development of the cultural site called Kihciy Askiy (Sacred Earth) at the former Fox Farm site. In December 2014, City Council approved $2 million in the 2015-2018 capital budget for design and construction of Kihciy Askiy Phase 1. This is consistent with the City of Edmonton's continuing work in support of recommendations resulting from the federal government's Truth and Reconciliation Commission. In preparation for Kihciy Askiy development at the former Fox Farm site, the City conducted hazard material abatement and demolished the old farm buildings, corrals, and house in February 2015.

Manasc Isaac was commissioned by the City of Edmonton in 2015 to develop an overall site plan, as well as develop, design and implement the first phase of the proposed project (Manasc Isaac 2017). Schematic design for Phase 1 of the project has been completed and it is Phase 1 that is the subject of this environmental assessment. Construction of Phase 1 is estimated to cost $1.7 million. Phase 2 will be developed at some time in the future when funding permits and is not included in this assessment.

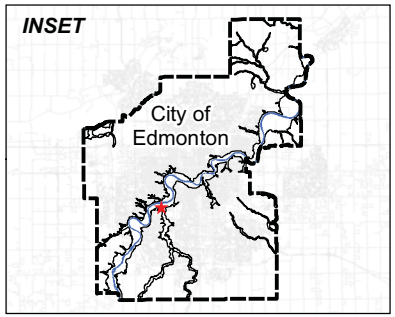
1.2 Environmental Assessment Objectives

Initial review of the proposed project identified the City of Edmonton as the primary jurisdiction requiring an environmental review, triggered by the *North Saskatchewan River Valley Area Redevelopment Plan* (Bylaw 7188). City of Edmonton Sustainable Development, indicated that the appropriate level of environmental review to support Bylaw 7188 would be an Environmental Impact Assessment (EIA) because the proposed

Figure 1.1
Project Setting and Location
Kihciy Askiy in Whitemud Park

Legend

- Study Area
- Bylaw 7188 Boundary
- City of Edmonton River Valley Natural Areas (2010) (with ID)



Date Map Created: 17 July 2017
Aerial Photograph Date: May 2015

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Kihciy Askiy project is situated within Bylaw 7188 boundaries and has been deemed a major facility. This EIA was prepared to meet the following objectives:

- Meet the requirements for an environmental review of the project pursuant to Bylaw 7188.
- Identify all required environmental permits and facilitate securement.
- Achieve an environmentally sound design and facilitate meeting the City's environmental objectives during construction.

1.3 Study Area

This impact assessment focuses on the geographic area most likely affected by the proposed Kihciy Askiy project and used a local study area that encompassed the entire area having potential to be directly (physically) or indirectly impacted, by all stages of the project (site preparation, construction, and operation) (Figure 1.1). Study area boundaries were selected with consideration of:

- the project construction footprint,
- ecologically relevant boundaries, and
- inclusion of potential recreational impacts.

1.4 Bylaw 7188 Environmental Review Process

This environmental assessment will be submitted to City of Edmonton Sustainable Development who will circulate it amongst identified City stakeholders for comment and feedback. The proponent will then respond to feedback, to the satisfaction of the reviewers and Sustainable Development. Once all outstanding concerns are addressed and reviewers are satisfied with the EIA, Sustainable Development will sign off on the EIA and recommend that it and an accompanying Site Location Study (under separate cover), be forwarded to City Council for approval pursuant to the requirements of Bylaw 7188. The approved EIA will also support the Development Permit application for the project.

1.5 Report Organization

This report contains seven chapters. Chapter 1 (Introduction) provides background information related to the project and describes the report structure. Chapter 2 (Project Description) is the detailed project description, including project justification, the scope of the work, procedures to be used and construction scheduling. Chapter 3 (Methodology) outlines the impact assessment methodology and provides a brief summary of the public consultation process. Chapter 4 (Existing Conditions) and Chapter 5 (Potential Impacts and Mitigation Measures) are organized to describe each potentially affected resource using the framework of Valued Environmental Components (VECs). Chapter 6 (Summary Assessment) summarizes findings of the EIA, identifies monitoring requirements and follow-up work. Chapter 7 provides all references and personal communications cited in the report.

Appendices to the report include:

Appendix A: Kihciy Askiy Environmental Impact Assessment Terms of Reference
Appendix B: Kihciy Askiy Summary of Public Consultation
Appendix C: Preliminary Geotechnical Report (Golder Associates 2017)
Appendix D: Phase 1 Environmental Site Assessment: Fox Farm Property (CT & Associates 2014)
Appendix E: Vegetation Survey Results (06 July and 10 August 2016)
Appendix F: Wildlife Species List
Appendix G: Historical Resources

2.0 PROJECT DESCRIPTION

2.1 Declaration

The project proponents are the City of Edmonton and Native Counselling Services of Alberta. Prime consultant for the proposed Kihciy Askiy project is Manasc Isaac. Spencer Environmental Management Services Ltd. (Spencer Environmental) was retained by Manasc Isaac to act as environmental consultant responsible for preparation of this EIA.

This report represents the findings and conclusions of the environmental consultants, but it also incorporates suggestions and comments from the proponent and the design team. The specific mitigation measures outlined in this document will be followed by the proponent as part of their commitment to environmental best management practices.

2.2 Project Need/Rationale

The City of Edmonton currently does not have a cultural/ceremonial site for Indigenous peoples to gather and host events and ceremonies (Manasc Isaac 2017). The proposed Kihciy Askiy site will be one component in the formation of a city-wide Indigenous ceremonial space network ("Spirit of Edmonton"; Indigenous People's Arts and Culture Coalition 2011). It is envisioned that Kihciy Askiy will be an accessible space open to all people. For the project partners, Kihciy Askiy measures of success include: welcoming the general public while being a sacred space for intimate gatherings and spiritual celebrations; serving as a place for healing and reconciliation; serving as a place to share the world view of Indigenous people; respectful integration with the existing land and Whitemud Creek; and successful integration of fire into site activities.

2.3 Project Details

2.3.1 Project Setting

The proposed project will be located in Whitemud Creek Ravine, at the former Fox Farm site south of Fox Drive and west of Whitemud Creek (Figure 1.1). The proposed Kihciy Askiy site is open, gently sloping and was most recently used as a pasture for Fort Edmonton Park horses. Much of the proposed site is situated within the flood fringe area of Whitemud Creek. The site is loosely bounded on the southwest by steep slopes and on the east by a meandering Whitemud Creek. A narrow but variable width of land and a formal unpaved recreational trail separate the project area from the west bank of Whitemud Creek. Neighbourhoods on the tablelands above the site include Brookside to the west and Grandview Heights to the east. Fort Edmonton Park horse pastures are located to the northwest, and Fox Drive is further to the north. The Whitemud Creek Ravine recreational path parallels the east site boundary, connecting to Alfred H. Savage Centre to the north and to the more distant Rainbow Valley Park and Snow Valley Ski Club to the south.

2.3.2 Land Use and Zoning

All lands immediately to the east and west of Whitemud Creek are owned by the City of Edmonton. The bed and shore of Whitemud Creek are owned by the Province of Alberta.

Whitemud Creek Ravine is zoned as A (Metropolitan Recreation Zone) (Figure 2.2). Land uses in the immediate vicinity of the proposed project include Fort Edmonton Park's horse pasture to the northwest and the City's Alfred H. Savage Centre to the northeast on the east side of Whitemud Creek. In addition there are formal, paved and unpaved recreational trails that form part of the City's North Saskatchewan River Valley and ravine system trail network both to the west and east of the site. The nearest residential neighbourhoods, Brookside to the west and Grandview Heights to the east, are zoned RF1 (Single Detached Residential Zone). The nearest roads include 142 Street, which dead-ends immediately west of the site access road; Fox Drive, approximately 200 m north; and Whitemud Drive, approximately 300 m west of the Kihciy Askiy site.

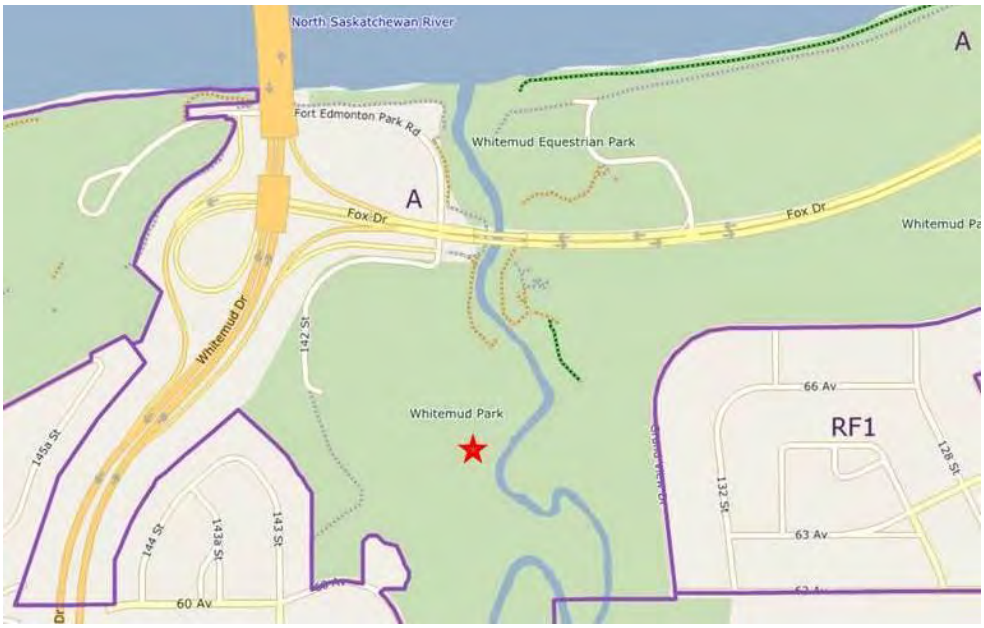


Figure 2.1. Land Use Zoning in the Kihciy Askiy Project Area (taken from City of Edmonton Zoning Bylaw No. 12800, as amended) – red star denotes proposed project area.

2.3.3 Scope of Work/Project Components

Phase 1 of the proposed Kihciy Askiy project focuses on the northern part of the site and includes regrading and re-naturalization of the land, upgrading services and access and installation of ceremonial and ancillary facilities. Phase 1 development comprises the following specific components/activities (Figure 2.2):

- site access and parking,
- site regrading and landscaping,
- sweat lodges and permanent, ceremonial fire pit,

SITE PLAN

REGULARLY MOWED AREA
NATIVE GRASSES
SWALES
NATIVE TREE GROVES WITH NATIVE UNDERGROWTH
NATIVE GRASS AREA ALLOWED TO NATURALLY TRANSFORM INTO ASPEN WOODLAND
CONSERVATION AREA - AS PER RIBBON OF GREEN

MANASC ISAAC

KIHCIY ASKIY SITE PLAN

Figure 2.2

Edmonton

- storage building,
- change rooms, washrooms and indoor gathering space,
- granular walking trails,
- tipis,
- amphitheatre,
- utility upgrades, and
- demolition of existing utility shed.

Kihciy Askiy Phase 2, which will be undertaken in the future at an unspecified date on lands to the south, is not part of this EIA. Phase 2 is anticipated to include space for special event tents, a healing garden and a connection to the trail system along Whitemud Creek. In the near future, the City of Edmonton plans, under separate contract with others, to move a section of the existing 1.8 m high chain link fence parallel to the Site's east boundary approximately 6 m to the west and into the Kihciy Askiy site to accommodate a need to address Whitemud Creek bank erosion and related path impacts. That work is being undertaken separately from Kihciy Askiy Phase 1; however, as part of Phase 2, the existing and realigned fence will be replaced with a decorative fence and gate.

2.3.3.1 Kihciy Askiy Phase 1 Design

The following section details the above-noted project components to be developed or undertaken as part of Phase 1. Descriptions are based on information taken from Manasc Isaac (2017).

Parking/Site Access

The existing site gravel access road will be widened along the entire length by approximately 2 m to the north, to a total width of 6 m. In a meeting with the Council of Elders on 06 October 2016, the Elders chose the compact parking layout presented in Figure 2.2. The plan calls for fifty (50) angled, gravel parking stalls, including two signed disabled parking stalls, and two bus parking stalls situated at the site entrance (Figure 2.2). The car parking stalls will be split into three rows, spanning 37 to 50 m in length. The parking area will terminate in a 15 m radius emergency vehicle turn-around. Plantings and boulders will be used to mark the perimeter of the parking area. Designated parking for Elders will be available; signage beyond City of Edmonton parking signs will be provided by the NCSA. Security requirements for the site will be the responsibility of the NCSA.

Proposed parking on-site is expected to be sufficient for the anticipated level of use; in the case of major special events, it is expected that charter busing will be provided to avoid the need for overflow parking in the area. NCSA will manage parking and site programming to ensure that there are minimal overflow situations. Additional parking and security requirements for the site will be the responsibility of NCSA and will be enforced by NCSA. Signage will be put in place, and there may be personnel to control access to Kihciy Askiy parking if required.

During NCSA operating hours (0900 – 1600), parking at Kihciy Askiy will be restricted to users of the site. Outside of that time, parking will be available for public access, with the exception of ceremonies that take place in the evening. Publicly accessible ceremonies (e.g., community sweat lodges) may be held on Saturdays, and in such cases, additional signage will be placed in the parking area.

NCSA will manage parking and site programming to ensure that there are minimal overflow parking situations, affecting Fort Edmonton Park and Whitemud Equine Centre. Through the City of Edmonton's formation of a Site Stewardship Community, communication and coordination between Kihciy Askiy, Fort Edmonton Park and the Whitemud Equine Centre will be undertaken if special events with anticipated increases in traffic and parking requirements are scheduled.

In addition to proposed parking, the Kihciy Askiy site is served by the Edmonton Transit System (ETS), with two bus stops (east- and westbound) on Fox Drive, approximately 250 m from Kihciy Askiy. Dedicated bus lanes are in place on Fox Drive to improve access via public transit during times of high traffic volumes. Coordination with ETS is ongoing to ensure transit accessibility for Indigenous and non-Indigenous visitors to Kihciy Askiy. Travel to the site will be the responsibility of the individual or agency making use of the site. Discounted transit tickets through ETS and free transit coupons through social service agencies are available for low-income individuals or families.

Site Regrading and Landscaping

Prior to construction, the entire Phase 1 area will be stripped of topsoil and regraded slightly, to ensure positive drainage and to suit the anticipated programmed activities (K. Kafka, *pers. comm.*). All areas will be reseeded with an appropriate river valley seed mix. The easternmost margin of the Phase 1 lands, which will not support facilities, will be seeded with a native seed mix and native trees and shrubs from the adjacent balsam poplar forest community allowed to encroach, creating a transitional zone between the grass-dominated site and adjacent forest. There will be no changes to the existing fencing at the site as part of Phase 1; the site will remain partially fenced, with a chain link fence along the north and east boundaries and a barbed wire fence along some of the south boundary.

Sweat Lodges and Ceremonial Fire Pit

A dedicated sweat lodge area will support four sweat lodges constructed around a permanent, ceremonial fire pit. The lodges will be constructed of willow branches, covered with tarps, and will be erected by members of the Indigenous community. Tarps will be changed twice a year, in spring and fall. A permanent, engineered, enclosed fire pit will be the central element to sweat lodge ceremonies. Currently, the Indigenous community has a temporary fire pit located at the site for improvised sweats. Using that temporary fire pit requires them to apply for a fire permit every time they wish to hold a sweat ceremony. Installation of a permanent fire pit is considered crucial to the operation of Kihciy Askiy because a permanent facility can be issued a permanent fire permit that covers all types of woods (pine, poplar, white spruce, jack pine and birch) that will be

used in ceremonies. A permanent fire permit will provide the operators with on-site decision-making ability for the sweat lodge schedule.

It is expected that sweats will be held on a rotational basis, with each sweat lodge accommodating up to 25 people. For the proposed project (Phase 1), sweats will operate from 9:00 am to 7:00 pm, approximately three to four times a week. It is anticipated that about three sweats per day will be held at the facility and that the start and end of consecutive sweats will be spaced approximately one to one and a half hours apart. It is understood that up to two lodges may host sweats concurrently.

Storage Building

The proposed storage building will be located north of the parking area (Figure 2.2). The locked building is expected to house two utility vehicles, which will be used to transport Elders, other dignitaries or disabled participants, and materials to the sweat area (Manasc Isaac 2017). The storage building will also be used to store fuel, firewood, grass-cutting equipment, tipi poles and canvas. The storage area will occupy a footprint of approximately 75 m^2 and will not be insulated or heated.

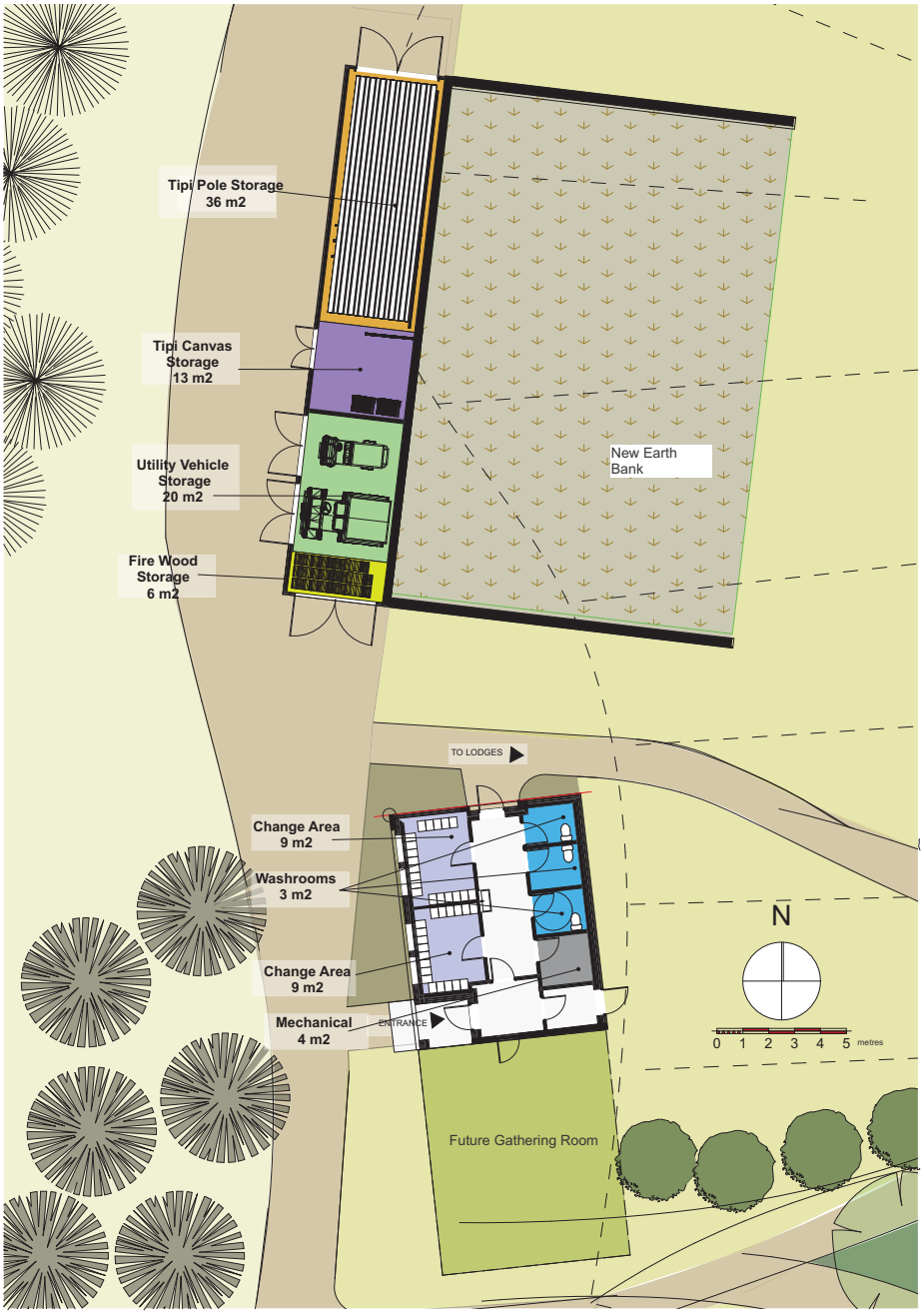
Change Rooms, Washrooms and Indoor Gathering Space

A second building, housing change rooms and washrooms is proposed south of the storage building and in close proximity to the sweat lodges, in support of operating sweats on a regular and permanent basis (Figure 2.2; Figure 2.3). This building will house two gender-specific change rooms, three barrier-free washrooms as well as an indoor gathering space. Each change room will be provided with benches and lockable storage lockers and is designed to accommodate 20 people. The three washrooms are intended to serve up to 40 people. The change room and washroom areas will occupy a footprint of approximately 31 m^2. A third area (approximately 57 m^2) will house an indoor gathering space that can accommodate 40 people. The gathering space is proposed as part of Phase 1; however, construction of the gathering space is funding-

Figure 2.3
Schematic Diagram of Storage and Washroom/Change Room Buildings

Option 2 -view from parking

Option 2 -view from east



Option 2 - two pavilions

dependent. The proposed gathering space will be located at the south end of the washroom/change room building with large windows overlooking the Kihciy Askiy site. It will provide a protected place to prepare for the sweat ceremonies and provide a place for people to celebrate and eat together following a sweat. The gathering space will house a kitchenette for food preparation and tables to seat up to 40 people. The kitchenette will not have a stove or refrigerator, as it is expected that food will be brought to the gathering room, rather than being prepared on-site. The building will, however, have gas service and electricity (see utilities below).

Much of the proposed Kihciy Askiy site is located in the flood fringe of Whitemud Creek so the entire site will be graded to efficiently drain under flood conditions. Both of the proposed buildings will incorporate flood mitigation strategies in their design. Specifically, they will be located away from the creek at the northwest and highest side of the site and constructed so that their main floors are located at, or above, the designated flood level (Manasc Isaac 2017). That will ensure that all habitable rooms, electrical, heating units and mechanical components will be above the designed flood level. The structures will not have basements.

Granular Walking Trails

Compacted gravel walking trails with widths varying between 2-3 meters are proposed to provide pedestrian circulation and utility vehicle access throughout the Kihciy Askiy site as well as provide off-road emergency vehicular access to the proposed storage building, change and washroom building, sweat lodges, and tipi area (Figure 2.2). All granular trails will be constructed to Parks Level standard and to the specifications of the City of Edmonton.

Tipis

Tipis are desired by the Indigenous community for prayer ceremonies, group workshops, or other cultural purposes and, at times, for overnight use (Figure 2.2). For any events/usage exceeding regular park hours (i.e., 5:30 am to 11:00 pm), a special application to the City of Edmonton is required. Apart from the sweats, the tipi area will be the most frequently used event space on site. Each tipi will accommodate 16-20 people, with the largest tipi measuring about 7 m (22 feet) in diameter with a height of 9 m (30 feet). Tipis will be erected on site on an as-needed basis. When not in use, the poles and canvas will be stored in the proposed new storage facility north of the west site entry.

Amphitheatre

While Kihciy Askiy is primarily a ceremonial site, it will also provide education about Indigenous culture. An amphitheatre was proposed to form the educational and showcase component of Phase 1. The roof of the storage building has been designed to double function as an amphitheatre (Plate 2.1).

Plate 2.1. The sloped, grassy roof of the storage building will provide a recreation area and seating for an amphitheatre (Manasc Isaac 2017)

Utilities

Sanitary Sewer

There are currently no sanitary services available for this site. A new 12,000 L sanitary holding tank is proposed to be located adjacent to the new parking area. The tank will be fitted with a level alarm that will include audible and visual high level indicators and will be located outside the Whitemud Creek flood fringe area. It will be designed and maintained to the Alberta Private Sewage Systems 2009 Standard of Practice.

Domestic Water

The site currently has a single 20 mm metered water service that will be abandoned in lieu of a new 25 mm service (Figure 2.4). Domestic hot and cold water will be provided for the new washrooms and future kitchen serving counter in the gathering space. A janitor's sink will be provided in the utility room. Fire sprinklers are not proposed for the two new buildings.

Natural Gas

The existing gas service is located at the extreme north end of the property and has been deemed sufficient to provide service to the proposed change and washroom building. The gas service will be extended to the location of that proposed building (Figure 2.4).

Electrical Power

The existing small shed on-site houses the existing electrical meter. That meter is currently supplying power to the horse water heaters on the adjacent Fort Edmonton Park horse pasture lands. Once the utility shed is demolished, the electrical meter and power line will be relocated underground to the change and washroom building and storage building (Figure 2.4). Power from that building will be directed underground to the adjacent storage building as well as the horse water feeders on the adjacent Fort Edmonton Park pasture lands.

Figure 2.4

Existing utility shed

As built utility conditions, after demolition of fox farm buildings

Demolition of Existing Utility Shed

The existing small utility shed located at the west entrance to the site will be demolished to make way for the new Phase 1 development (Plate 2.2). As noted below, the existing electrical meter in this shed will be relocated to the proposed new change and washroom building.

Plate 2.2. View to southeast of existing small utility shed (30 August 2016)

2.3.4 Surface Water Management

The proposed Kihciy Askiy site is moderately sloped from west to east and gently sloped from north to south (Golder 2014). Golder (2017) noted runoff direction from north to south through the site. A steep, approximately 2.5 m high slope starts parallel to the north-south portion of the access road where it abuts the site and slopes down to the lower central area of the Kihciy Askiy site (Manasc Isaac 2017). That central area is characterized as slightly undulating, with a depression near the centre of the site where surface flows from snowmelt and large rain events result in occasional shallow ponding (Manasc Isaac 2017). The majority of the site is within the flood fringe of Whitemud Creek.

Surface water in the proposed Kihciy Askiy project area will be managed within site boundaries through site grading and drainage swales. Proposed site grading will ensure that surface runoff is drained in the most efficient manner, eliminating unwanted localized depressions and directing surface flows east across the site to constructed drainage swales and rain gardens (Figure 2.2). The combination of appropriate grading and minimal impervious surfaces associated with the proposed project will contribute to effective site specific surface water management. Drainage swales will be constructed to collect runoff, particularly from the slope adjacent to the access road (Figure 2.2). The swales will widen and deepen to the east and terminate in rain gardens. The swales will not drain into Whitemud Creek to the east of the project area.

2.3.5 Fire Smart Strategies

The design of Kihciy Askiy will adhere to Fire Smart Canada principles (Manasc Isaac 2017). The sweat lodges will be located away from the existing woodland with a

minimum 15 m distance to the tree line. All grasses will be kept short and mowed regularly within a 15 m radius around the sweat lodges, and no shrubs or trees will be planted within that area. For all proposed tree groves on-site and outside the 15 m radius, fire-resistant broadleaf trees will be used. During Design Development, a Wildfire Hazard Assessment will be completed to ensure the risk will be maintained below extreme levels, as per the assessment process.

Due to concerns raised by Edmonton Fire Services, all burning will take place within a special enclosure, which will be designed in consultation with Edmonton Fire Services. Where regular fires are required, appropriate City of Edmonton policy will be followed. In the case of a fire ban issued by the City of Edmonton, the users of Kihciy Askiy will adhere to the ban or apply for special consideration.

2.3.6 Site Security

To help keep the site safe and undamaged, the City of Edmonton Park Rangers will be informed of the Kihciy Askiy site once it is opened and will include it in their regular park security rounds. Installation of a security system will be considered, as funding allows.

2.3.7 Construction Timing

Contract award is expected to occur in mid-April 2018 with Phase 1 construction taking place in the period May through September 2018. The grand opening of Kihciy Askiy is scheduled for October 2018 (Figure 2.5).

2.3.8 Construction Environmental Protection Measures

Responsibility for construction environmental protection measures will lie with the contractor pursuant to the City's Enviso program and, therefore, cannot be fully detailed at this time. It is expected that the appropriate fuel handling procedures, erosion and sedimentation control measures and occupational health and safety requirements will be followed. Posting warning signs near all active construction traffic access points that are freely accessible to the public will alert the public to the temporary construction activities. Fencing will be erected around the staging area. In addition, the contractor will be required to implement environmental protection measures stemming from mitigation measures identified in this EIA.

The contractor will develop an Environmental Construction Operations (ECO) Plan, compliant with City guidelines that will include a site-specific Erosion and Sedimentation Control (ESC) Plan, pursuant to the City's Enviso program. The ESC Plan will include temporary and permanent erosion and sedimentation control measures, as detailed in the City of Edmonton's *Erosion and Sedimentation Control Guidelines* (2005), with particular emphasis on work areas in close proximity to Whitemud Creek, and will be adhered to at all times during construction. All related monitoring will be undertaken by a Certified Professional in Erosion and Sediment Control (CPESC).

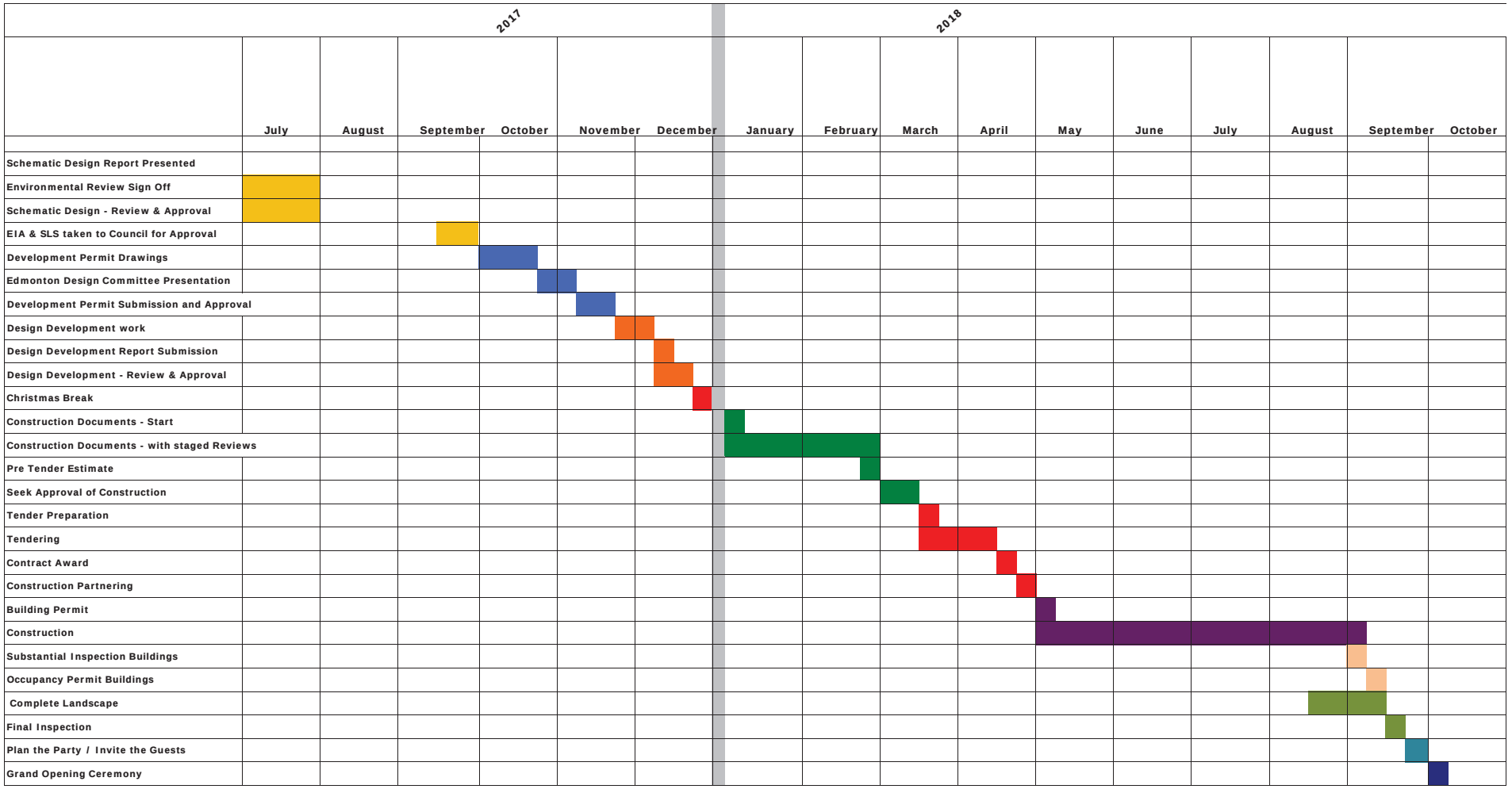


Figure 2.5
Kihciy Askiy Schedule

2.3.9 Resource and Material Requirements

Materials required during Kihciy Askiy construction will include: gravel, concrete, wood framing, roof cladding, exterior cladding, electrical wiring, water pipes, etc. Potential hazardous materials on-site will include fuel, lubricants and oils associated with construction equipment. Hazardous materials will be stored at the proposed staging area on the west side of the site, away from City storm drains and water bodies including Whitemud Creek, at elevations above the flood fringe.

2.3.10 Waste Disposal

All waste disposal materials will become the property of the contractor. Waste disposal methods will be at the discretion of the contractor and cannot be detailed at this time; however, disposal must be at appropriate designated disposal sites remote from the project site and in compliance with environmental regulations. The City of Edmonton requires contractors to develop and maintain a construction material collection and recycling program throughout the duration of the project. As a minimum, 100% of the following materials must be collected and disposed of at an approved recycling facility: concrete, asphalt and asphalt millings, soil, cement, granular material and surplus steel material.

2.3.11 Key Project Activities

2.3.11.1 Site Preparation Phase

Several preparatory activities will precede the proposed Kihciy Askiy project activities. Those will include (not necessarily in this order):

- protection of utilities,
- coordination of access for project equipment, establishment of interim safety measures for pedestrians, vehicles, etc., and site security,
- establishment of construction staging areas to be situated within the Phase 1 lands,
- establishment of erosion and sedimentation control measures,
- vegetation clearing,
- protection (hoarding) and trimming of trees selected for retention as required, and
- site grading.

2.3.11.2 Construction Phase

The main construction activities, not necessarily in this order, will include:

- demolish utility shed,
- construct site access and parking area,
- construct change rooms and washrooms building and storage facility,
- construct granular walking trails and drainage swales, and
- landscape site using an appropriate native seed mix.

2.3.11.3 Reclamation Phase

All disturbed areas within the proposed Kihciy Askiy project area will be recontoured, topsoiled with Class B topsoil and seeded with an appropriate naturalization seed mix. Replacement of any trees removed in support of construction will be undertaken during the reclamation phase, in accordance with the *Corporate Tree Management Policy* and in consultation with the City of Edmonton, including Urban Forestry as required.

2.3.11.4 Operation and Maintenance Phase

Through an operational agreement established between the City of Edmonton and Native Counselling Services of Alberta, Kihciy Askiy will be operated by Native Counselling Services of Alberta (NCSA). They will be responsible for management, operation and the direction/oversight of people working, using and volunteering at Kihciy Askiy. The City of Edmonton will maintain the Kihciy Askiy site, using standard City of Edmonton protocols and procedures. Site operations will comply with City bylaws and other protocols, such as seasonal fire bans.

The site will operate during all four seasons. Daily operational hours will be 0600 – 2300, seven days a week, within the park operating hours specified in the Parkland Bylaw (Bylaw 2202; 05:00-23:00 hours). Activities will include practices associated with sweat lodges, pipe ceremonies, teachings and other ceremonial activities as approved by NCSA. Special events lasting a few days may occur from time to time, as approved. Occasional overnight use will be approved on a case-by-case basis.

The Kihciy Askiy site will be operated by the NCSA between the hours of 0900 – 1600. During that time, the public is welcome to visit the site, excluding designated ceremonial locations, which will be restricted to ceremony participants and based on the code of conduct. Visitors will be subject to NCSA policies, procedures and code of conduct. Outside the NCSA operating hours, public access will be possible in public areas, with the exception of ceremonies that take place in the evenings. Publicly accessible indigenous ceremonies (e.g., community sweat lodges) may be planned for Saturdays. Cameras and other audio/video recording equipment will be restricted at ceremonial locations on-site.

Proposed parking on-site is expected to be sufficient for the anticipated level of use; in the case of major special events, it is expected that charter busing will be provided to avoid the need for overflow parking in the area. During NCSA operating hours, parking will be restricted to users of the Kihciy Askiy site (see *Section 2.3.3.1* for additional parking/site access details). Outside of that time, parking will be available for public access, with the exception of ceremonies that take place in the evening. Additional signage will be placed in the parking area for ceremonies such as community sweat lodges held on Saturdays. Through the formation of a Site Stewardship Committee, coordination between Kihciy Askiy, Fort Edmonton Park and the Whitemud Equine Centre will mitigate any potential parking or site access issues for special indigenous events with anticipated larger parking needs.

2.3.12 Construction Working Hours

Construction will not extend beyond the hours permitted in Part III of the City of Edmonton's Bylaw 14600 (*Community Standards Bylaw*) (07:00-21:00 hours Monday to Saturday; 09:00-19:00 Sundays and holidays), unless special permission is granted by the City following standard protocols for exceptions to that bylaw.

2.3.13 Construction Storage Areas and Access

Manasc Isaac identified a potential laydown area that would serve construction of the Kihciy Askiy project (Figure 2.6). The proposed laydown area is situated in a weedy, disturbed area on the west edge of the proposed project area, immediately north of the proposed parking area and west of the proposed storage and washroom/change room facilities. The proposed staging area will abut the existing fence around the Fort Edmonton Park horse pasture. The staging area will be fenced, and use of the staging area will be carefully managed to prevent any spills or release of contaminants. Signage will be posted indicating a project contact person and phone number for inquiries.

2.3.14 Construction Equipment

Construction equipment used for the Kihciy Askiy project will include typical construction equipment such as bobcats, dump trucks and excavators.

2.3.15 Alternatives Considered

The Kihciy Askiy Master Plan and Phase 1 design were developed with extensive consultation with many stakeholders, including Elders and Indigenous organizations (Manasc Isaac 2017). Workshops were held with Community Services and Native Counselling Services of Alberta in summer 2015 to develop a site master plan and determine which program elements were desired for Phase 1 of development. Through those workshops, additional site requirements, such as the provision of 50 parking stalls, fire access and building location constraints, became apparent. Schematic design was resumed in summer 2016 in response to those requirements and resulted in development of different site layout options and two different building options. Those options developed as part of the 2016 schematic design are presented in the following sections.

2.3.15.1 Site Selection

Prior to European settlement of the river valley, the proposed site, the former Fox Farm lands in Whitemud Park, was used for many centuries by Indigenous people foraging for medicines to heal their communities and is recognized among Indigenous people as a sacred place (Indigenous Peoples' Arts and Culture Coalition 2011; Manasc Isaac 2017). Considering the historical and cultural significance of the site, the proposed project represents a reinstatement of a former, pre-settlement, Indigenous land use. For that reason, no alternative river valley or non-river valley project locations were considered.

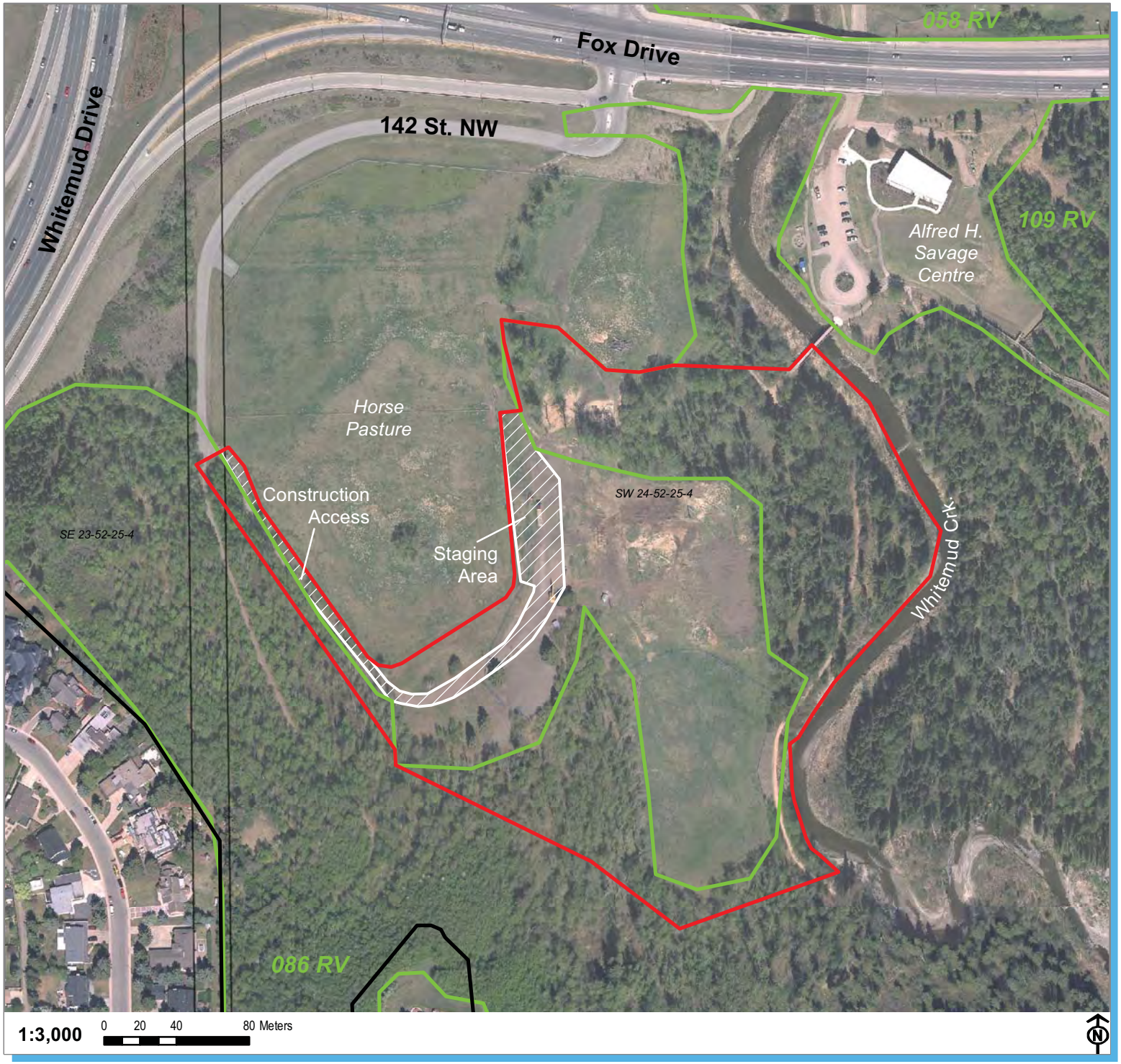
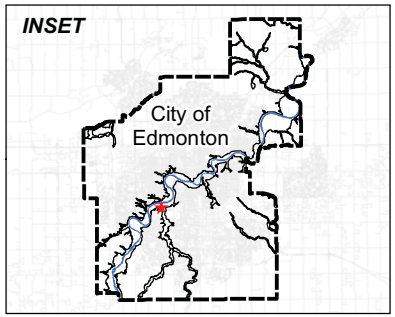


Figure 2.6
Proposed Staging and Construction Access
Kihciy Askiy in Whitemud Park

Legend

- Staging & Construction Access
- Study Area
- Bylaw 7188 Boundary
- City of Edmonton River Valley Natural Areas (2010) (with ID)



Date Map Created: 17 July 2017
Aerial Photograph Date: May 2015

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2.3.15.2 Kihciy Askiy Site Layout

Kihciy Askiy design endeavors to provide private intimate spaces for sacred ceremonies as well as welcoming and educational opportunities for the general public. In particular, the location of the sweat lodges must be in close proximity to the storage and washroom/change room buildings but also screened from public view. Three different site layout options were presented to the Council of Elders (Manasc Isaac 2017).

In Option A, the proposed sweat lodge site was located in the northeast corner of the Kihciy Askiy site, with vegetation plantings screening the view between the proposed storage and washroom/change room buildings and the sweat lodge site. In Option B, the proposed sweat lodge site was situated southeast of the storage and washroom/change room buildings and immediately south of the proposed tipi site. A path with adjacent native plantings separated the tipi site from the sweat lodge site. In Option C, the proposed sweat lodge site is situated in the north-central part of the Kihciy Askiy site in close proximity to and with unscreened views from the proposed storage and washroom/change room buildings. The Elders selected Option B as the preferred configuration.

Two different parking configurations were considered (Manasc Isaac 2017). In one option, the 50 car parking stalls are spread out in a single rank, with the fire/bus turnaround extending north, adjacent to the proposed buildings. In the second option, the 50 car parking stalls are consolidated in three ranks, and the fire/bus turnaround terminates southwest of the proposed buildings. The Elders selected the second option as the preferred configuration, due to the more compact layout.

2.3.15.3 Building Options

Phase 1 of Kihciy Askiy included storage space and space for washrooms and change rooms. Two options were considered to accommodate these spaces (Manasc Isaac 2017). One option included a single building with storage space, washrooms and change rooms under one roof. In this option, the storage area is arranged such that the 30-foot poles for the tipis are stacked on racks along the east side of the building, with storage spaces for utility vehicles, wood and tipi canvas abutting the tipi pole storage. Access for the poles would be via doors opening to the north, while the other storage spaces would be accessed from the west. The change room and washrooms would be housed in a simple "extrusion" of the storage area, with access from the south.

The second option included two separate buildings, one for storage and a second for washrooms and change rooms. In this option, the storage building is located north of the change room/washroom building. The storage spaces for poles, utility vehicles, wood and canvas arranged north to south, with access for the poles from the north, while the remaining storage areas are accessed from the west. The roof of the storage building comprises a sloped grass recreation space, which can also function as an amphitheatre seating area for performances or presentations. The change room/washroom building is accessed from the southwest corner and opens onto the rest of the Kihciy Askiy facility via doors on the north and east sides. Upon review of the alternatives, the two-building option was preferred.

None of the above options considered had appreciable associated environmental benefits or disadvantages. Preferred options were selected for cultural reasons.

2.4 Environmental Permitting Requirements

2.4.1 Federal Regulatory and Permitting Processes

2.4.1.1 Migratory Birds Convention Act

Environment Canada administers the *Migratory Birds Convention Act* (*MBCA*), which prohibits the disturbance of nests and individual birds of species covered by the *Act* and prohibits release of deleterious substances into waters or areas frequented by migratory birds. With respect to construction, the *Act* provides guidelines for enforcement only; it is not linked to formal approvals required for construction. Violation of the *MBCA* may, however, result in penalties. Projects that require clearing of bird habitat or working in or near waters or areas frequented by migratory birds must respect this *Act*. To avoid disturbance of bird nests and dens, vegetation clearing practices should respect breeding periods of species covered by this *Act* and ensure no harm to nesting birds or nests. If this EIA finds that the proposed project has potential to adversely affect breeding birds, mitigation measures will be developed to ensure compliance with the *Act*.

2.4.1.2 Species at Risk Act

The *Species at Risk Act* (*SARA*), administered by Environment Canada, prohibits disturbance to listed species and, in some instances, listed species' habitat. Habitat is defined not only as the area where a species naturally occurs and on which it depends to carry out its life processes, but also areas where that species formerly occurred and has the potential to be reintroduced. The *SARA* emphasizes guidelines for enforcement, and harming a Schedule 1 species is prohibited. Although no approvals or permits are required, violation of the *SARA* may result in penalties. There is some native vegetation in the local study area, which may have potential to support federally-listed wildlife species at risk. This potential will be examined in the wildlife section (*Section 4.1.4*).

2.4.2 Provincial Regulatory and Permitting Processes

2.4.2.1 Alberta Wildlife Act

The Alberta *Wildlife Act* prohibits disturbance to a nest or den of prescribed wildlife species. Although permitting is not required under this *Act*, violations may result in fines. Projects that require clearing of habitat in use by these species must respect this *Act*. To avoid disturbance of nests and dens, vegetation clearing practices should respect breeding periods of species covered by this *Act* and follow practices similar to restrictions that facilitate compliance with the *Migratory Birds Convention Act*. If this EIA finds that this project has potential to adversely affect covered wildlife species, mitigation measures will be developed to ensure compliance with this *Act*.

2.4.2.2 Historical Resources Act

Any development with potential to disturb historical resources requires clearance by Alberta Culture and Tourism (ACT) pursuant to the *Historical Resources Act*.

Accordingly, the City prepared a Statement of Justification (SoJ) for the proposed Kihciy Askiy project and submitted it to the Province in March 2016. ACT reviewed the SoJ and in May 2016 granted *Historical Resources Act* approval with conditions. The Province recognized a high potential for paleontological resources to be present on site and requested preparation of a paleontological Historical Resources Impact Assessment (pHRIA) if land surface disturbance is to exceed depths of one meter below the surface. A pHRIA has since been commissioned since excavation at select locations is expected to be deeper than one meter (K. Kafka, *pers. comm*.).

2.4.2.3 Alberta Weed Control Act

The *Weed Control Act* regulates designated weed species and weed seeds in the province through various control and enforcement measures, while creating provisions for the recovery of expenses in the case of non-compliance. Within the *Act*, there are two categories of designated weeds: noxious and prohibited noxious. Noxious weeds are required to be controlled, while prohibited noxious weeds are required to be destroyed. The responsibility for the control/destruction of designated weed species lies with the owner or occupier of the land in question. The *Act* also gives power to municipalities to designate additional weed species as noxious or prohibited noxious but does not allow for the delisting of species or reduction in status from prohibited noxious to noxious. This EIA discusses provisions to enable project compliance with the *Weed Control Act*.

2.4.3 Municipal Bylaws, Policies and Plans

The following sections describe municipal bylaws, policies and plans that are relevant to the proposed Kihciy Askiy project. Select goals, themes and objectives that are relevant to the proposed project are outlined below. Those goals, themes and objectives may support the proposed project or represent constraints or considerations that must be addressed as part of project design or through appropriate mitigation measures during construction and/or operation.

2.4.3.1 North Saskatchewan River Valley Area Redevelopment Plan (City of Edmonton Bylaw 7188)

The City of Edmonton's North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188) requires environmental reviews for projects undertaken in the North Saskatchewan River Valley and tributary ravines. The proposed Kihciy Askiy (Sacred Earth) site is situated within Bylaw 7188 boundaries and has been deemed a major facility as defined by Bylaw 7188; therefore, an environmental assessment is required. This report has been prepared to meet that requirement.

2.4.3.2 Urban Parks Management Plan

The City of Edmonton's Urban Parks Management Plan guides the future acquisition, design, construction, maintenance, preservation and use of City parks, river valley and natural areas. It spans a 10-year period (2006-2016) and provides direction for community, City and school facility land planning. It also outlines parkland management principles for the City and its development partners, both not-for-profit community-based

organizations and for-profit developers. It builds on or reinforces other plans (e.g., Municipal Development Plan, Integrated Services Strategy, Ribbon of Green Master Plan, Table Lands Plan, Recreation Facility Master Plan, Parks Business Plan). The goals of the Urban Parks Management Plan are:

1) to provide a vision specific to Edmonton's park system,
2) to develop strategic direction (e.g. service themes, polices etc.) that will guide decision making, and
3) to develop park management instructions (guidelines, standards etc.) that support the vision, services themes and policies and ensures consistency in implementation.

2.4.3.3 BREATHE: Green Network Strategy

BREATHE: Green Network Strategy is a transformative strategy, currently in development, that will ensure that as the city grows, each neighbourhood will be supported by a network of green space. The City's green network includes all outdoor land and water that is publicly owned and/or publicly accessible. BREATHE brings together and builds on two of the City's key guiding documents about park planning, construction, management and maintenance, as well as protection of the ecological network: the Urban Parks Management Plan (see above) and the Natural Connections Strategic Plan. BREATHE aligns with strategic goals for the City, in particular improving Edmonton's livability, preserving and sustaining the environment, transforming urban form and encouraging use of public transit, walking and cycling. BREATHE will be based on a network approach that will support the connection and integration of open space at the site, neighbourhood, city and regional levels. Three overarching themes frame BREATHE:

1) Ecology: Open space protects the environment. By working with our ecosystems, we support natural ecological processes, save our riverbank from erosion and build habitat for animals and plants.
2) Wellness: Open space supports health and well-being, and offers places for people to be physically active and recharge mentally.
3) Celebration: Open space connects people to each other and builds a sense of place. These are key places for communities to thrive, gather and celebrate.

2.4.3.4 The Way We Grow, Municipal Development Plan (Bylaw 15100)

The Way We Grow, Municipal Development Plan (City of Edmonton 2010a) is the City of Edmonton's strategic growth and development plan for the next ten years. This plan provides guidance to the City for developing the City into a more compact, transit-oriented and sustainable city. Key objectives that are relevant to the proposed Kihciy Askiy project are listed below.

The City of Edmonton:

- fully serves Edmontonians with a comprehensive range of accessible, flexible, inclusive and safe parks and public facilities (Strategic Objective 4.3.1).
- ensures public spaces and the buildings that frame them are inviting to residents and visitors and that they are safe, accessible and well-connected (Strategic Objective 5.6.1).
- encourages a sense of local identity and creates connections to the City's cultural and historical roots through the conservation and preservation of significant structures, buildings, districts, landscapes and archaeological resources (Strategic Objective 5.8.1).
- protects, preserves and enhances a system of conserved natural areas within a functioning and interconnected ecological network (Strategic Objective 7.1.1).
- protects, preserves and enhances the North Saskatchewan River Valley and Ravine System as Edmonton's greatest natural asset (Strategic Objective 7.3.1).
- protects, preserves and improves the North Saskatchewan River Valley and Ravine System as an accessible year-round place for recreation and activity for people of all ages (Strategic Objective 7.3.2).
- mitigates the impact of development upon the natural functions and character of the North Saskatchewan River Valley and Ravine System (Strategic Objective 7.3.3).
- utilizes parks and open space to complement and enhance biodiversity, linkages, habitat and the overall health of Edmonton's ecological network (Strategic Objective 7.4.1).
- mitigates impacts upon Edmonton's water resources by ensuring that new developments in Edmonton embody an exemplary standard of ecological design (Strategic Objective 7.5.1).

2.4.3.5 The Way We Live, Edmonton's People Plan

The Way We Live (City of Edmonton 2010b) is the City of Edmonton's people plan, pursuant to the City's overarching strategic plan, *The Way Ahead*, and intended to advance and support the 10-year goal of improving Edmonton's livability. The plan provides direction on how the municipal government can contribute to the well-being of its citizens by delivering the greatest value of services and infrastructure that are most important to Edmontonians. Key guiding values of the plan include inclusiveness, relationships with the urban Indigenous population, accessibility, public involvement, and integration with other long-range strategic plans. Key objectives that are relevant to the proposed Kihciy Askiy project are listed below.

The City of Edmonton:

- provides and encourages people to explore and enjoy their connection to the natural environment (Strategic Policy Direction 1.2.3).
- provides infrastructure to enhance interaction among Edmontonians (Strategic Policy Direction 1.2.4).

- uses innovative methods to increase connections among citizens (Strategic Policy Direction 1.2.5).
- plans, designs and provides its recreational and social programs and services in areas served by public transit (Strategic Policy Objective 1.3.1).
- provides information, partners with other organizations and advocates so as to increase residents' awareness and knowledge of city programs and services (Strategic Policy Direction 1.4.1).
- provides opportunities for new residents to connect and feel welcome and be engaged in their new city (Strategic Policy Direction 1.4.2).
- builds community and individual capacity by connecting them to the programs, services and resources they require to thrive (Strategic Policy Direction 1.4.3).
- partners with the not-for-profit sector, the private sector and regional municipalities to collaborate on the delivery of services (Strategic Policy Direction 1.4.4).
- promotes the history and contributions of all Edmontonians (Strategic Policy Direction 1.5.3).
- promotes its rich history and diverse cultural heritage (Strategic Policy Direction 1.5.5).
- provides, partners and advocates for leisure, social and recreational opportunities (Strategic Policy Direction 2.1.1).
- provides recreation, leisure and social programs to meet the diverse needs of Edmontonians (Strategic Policy Direction 2.1.2).
- provides infrastructure and public spaces to promote and encourage healthy and active living (Strategic Policy Direction 2.1.3).
- provides access to its parks, natural areas and green spaces for the enjoyment of Edmontonians (Strategic Policy Direction 2.2.1)
- promotes, protects and maintains the North Saskatchewan River Valley as the centerpiece of an integrated regional parks system (Strategic Policy Direction 2.2.4).
- partners with community organizations to enliven, enhance, maintain and protect parks and green spaces (Strategic Policy Direction 2.2.5).
- promotes the use of its parks, green spaces and natural areas (Strategic Policy Direction 2.2.6).
- partners with Aboriginal organizations to recognize and support Aboriginal participation in all aspects of urban live (Strategic Policy Direction 3.1.7).
- promotes intercultural awareness and understanding (Strategic Policy Direction 3.1.8).
- promotes innovative community initiatives to strengthen the capacities of vulnerable populations (Strategic Policy Direction 3.2.4).
- designs and builds its infrastructure using Crime Prevention through Environmental Design principles (The City of Edmonton designs and builds its infrastructure using Crime Prevention through Environmental Design principles (Strategic Policy Direction 4.1.4).
- promotes innovative architecture and design in all areas of the city (Strategic Policy Direction 5.1.4)

- designs, builds and partners to protect and maintain city boulevards and green spaces and the North Saskatchewan River Valley as an integral part of an attractive city (Strategic Policy Direction 5.3.1).
- provides activities and events in city green spaces throughout all seasons (Strategic Policy Direction 5.3.3).
- promotes the river valley as the centerpiece of an integrated regional park system (Strategic Policy Direction 5.3.4).
- provides naming conventions and interpretive materials that are culturally reflective of Edmonton's diverse history and heritage (Strategic Policy Direction 5.4.2).

2.4.3.6 The Way We Green, Environmental Strategic Plan

The Way We Green (City of Edmonton 2011) is the City of Edmonton's updated, long-term environmental strategic plan, pursuant to the City's overarching strategic plan, *The Way Ahead*. *The Way We Green* sets out principles, goals, objectives, policies and approaches for the City of Edmonton to preserve and sustain its environment. The two main focuses of the plan are sustainability and resilience, and the plan outlines 12 goals that describe what must ultimately be achieved for the City to be sustainable and resilient with respect to its environment. The goals address healthy ecosystems, emphasizing land, water and air, as well as food and waste concerns faced by the city now and in the future. *The Way We Green* includes a particular emphasis on the natural environment and sustaining healthy ecosystems but also emphasizes increased use of public transit and transit supportive planning. Many key objectives of the *Way We Green* that are relevant to the proposed Kihciy Askiy project overlap with those of *The Way We Grow* and are presented in *Section 2.4.3.2* above. Additional *The Way We Grow* key objectives that relate to the proposed Kihciy Askiy project area are listed below.

The City of Edmonton:

- ensures biodiversity corridors are appropriate for all scales of development (neighbourhood to regional) and that infrastructure developments provide appropriate wildlife passage (Strategic Action 3.3.16).
- establishes, implements and maintains procedures that make [the City] aware of construction projects in the North Saskatchewan River Valley and its tributary ravines in order to protect and preserve ecological connections (Strategic Action 3.7.1).

2.4.3.7 City of Edmonton 1996 Environmental Policy (Policy C512)

The purpose of this policy is to state the City of Edmonton's commitment to environmental sustainability in accordance with the following guiding principles: 1) quality of life; 2) shared responsibility; 3) decision-making model; 4) protection of the natural environment; 5) intergenerational equality; 6) public awareness and understanding; and 7) citizen consultation and participatory decision-making. Through its planning, decision-making process, and leadership, the City will promote the development of an environmentally sustainable community that functions in harmony

with the natural environment. In addition, it will exercise environmental stewardship of its operations, products, and services, based on its commitment to: (a) prevent pollution, (b) continually improve its environmental performance by setting and reviewing environmental objectives and targets, and (c) meet or exceed applicable environmental legal requirements and other requirements to which it subscribes. Further, the City commits to taking a leadership role in protecting natural heritage and biodiversity within the region. Kihciy Askiy is well aligned with these guiding principles and, in particular, seeks to harmonize Indigenous culture with the natural environment. Site design, construction and operations will all exercise environmental stewardship.

2.4.3.8 City of Edmonton Community Standards Bylaw (Bylaw 14600)

Part III of the City of Edmonton's Community Standards Bylaw 14600 establishes construction working periods (07:00-21:00 hours Monday to Saturday; 09:00-19:00 Sundays and holidays) and acceptable noise levels (not to exceed 65 dBA). Adherence to this bylaw will be required during construction.

2.4.3.9 Corporate Tree Management Policy (Policy C531)

All ornamental trees and natural treed areas on City-owned property are the responsibility of Edmonton Facility and Landscape Infrastructure (including procurement, maintenance, protection and preservation) pursuant to the City of Edmonton's *Corporate Tree Management Policy* (C456). That policy states that where damage to, or loss of, City trees or shrubs occurs, equitable compensation for that loss will be recovered from the entity causing the damage or loss and applied to future tree or shrub replacement. Compensation amounts are dependent on the type of plant species lost or damaged and are calculated using set formulae or, in some cases, negotiations between City departments.

2.4.3.10 Natural Area Systems Policy (C531)

In 2007, City of Edmonton adopted Policy C531 and a new approach to natural area management. The policy commits the City to conserving, protecting and restoring the natural uplands, wetlands, water bodies and riparian areas as integrated and connected natural systems throughout the City. To that end, the Natural Areas inventory was updated (to 2010) and includes both tablelands and river valley Natural Areas. The City is committed to balancing the ecological and environmental considerations of a project with economic and social considerations in its decision-making and will demonstrate that it has done so. This goal requires the procurement of appropriately detailed ecological information about any project that has potential to affect a City Natural Area. The proposed project area comprises primarily cleared and manicured areas, with some native riparian and upland vegetation. Two designated natural areas (086 RV and 109 RV) are situated in close proximity to the Kihciy Askiy site but are not expected to be impacted by the proposed project. Reporting requirements of Policy C531 are addressed as part of this Bylaw 7188 EIA.

2.4.3.11 City of Edmonton Wildlife Passage Guidelines

In June 2010, the City of Edmonton Transportation Department introduced its *Wildlife Passage Engineering Design Guidelines* (Stantec 2010). The purpose of those guidelines is to provide transportation designers and decision makers with recommendations that incorporate the needs of wildlife into transportation projects. That goal will be met through restoring previously removed habitat connections and ensuring that existing connections remain. The guidelines are also meant to reduce the problem of anthropogenic habitat fragmentation and human-wildlife conflict, including wildlife-vehicle collisions. Although the guidelines represent the ideal designs for wildlife passage structures, the City recognizes that not all transportation projects will be capable of meeting that standard and will consider alternative structures on a project-specific basis. Furthermore, while the proposed Kihciy Askiy project is not a transportation project, City of Edmonton Sustainable Development strives to consider these guidelines during project design and construction to reduce any potential impacts to wildlife passage resulting from project activities.

2.4.3.12 Low Impact Development Best Management Practices Design Guide, Edition 1.9 (November 2011)

The "Low Impact Development – Best Management Practices Design Guide" (Design Guide) was developed by the City of Edmonton in November 2011 to provide guidance for the application of low impact development best management practices (LID-BMPs. It provides an overview of LID-BMPs and design guidelines that planners, engineers, developers and designers can use to integrate LID-BMPs into land development, redevelopment or retrofit projects. The Design Guide supports the City's vision of sustainable growth and advances the environmental goals laid out in *The Way We Green*, the City's environmental strategic plan. It is a living document and will be updated based on the results of engineering experience and the results of research studies conducted within the City's local context. While the LID-BMPs are not a design standard, the use of those BMPs is strongly encouraged in the City of Edmonton to achieve sustainable growth and minimize impacts to the environment. As such, the project proponent is incorporating as many LID-BMP's into project design as possible, particularly regarding site drainage.

2.4.3.13 Enviso

The City of Edmonton has in place an ISO 14001 registered Environmental Management System (EMS) called ENVISO that is subject to internal and external audits. All City construction projects are expected to meet the environmental performance standards of the EMS. Prior to tender, the City must ensure an ENVISO permit and approvals checklist is completed to provide information on the permitting requirements for the project and the status of obtaining the permits. After project award, the successful contractor will be required to review the contractor's environmental responsibility package and sign the acknowledgement form. An ECO Plan may be required for some projects. Engineering consultants must review ENVISO bulletins and monitoring forms to determine those applicable to the project and ensure the contractor is made aware of

the requirements of ENVISO. Engineering consultants must ensure continued ENVISO compliance for the duration of the project.

2.4.3.14 City of Edmonton Sewers Use Bylaw (Bylaw 16200)

The release of material, including contaminated runoff, into the ravine system and ultimately into the North Saskatchewan River is regulated by the *Sewers Use Bylaw*. The release of any material other than that permitted in this Bylaw may result in penalties. The proposed project does not involve construction of new drainage facilities connecting to a watercourse, or construction in the vicinity of existing catch basins, but will be on lands draining naturally overland to Whitemud Creek. Compliance with Bylaw 16200 will be achieved through spill prevention measures, erosion and sedimentation control measures, and adherence to the City of Edmonton's "Contractor's Environmental Responsibilities Package" (City of Edmonton 2008).

3.0 EIA METHODS

3.1 General Methods

Following are brief descriptions of the main methods and steps employed in the preparation of this EIA.

- A preliminary scoping meeting was held on 10 March 2016 with representatives from City of Edmonton Sustainable Development and Integrated Infrastructure Services to develop proposed Terms of Reference for Environmental Review based on Manasc Isaac's December 2016 Schematic Design Report. The Schematic Design Report was subsequently updated in May 2017.
- In response to design advances, the proposed Terms of Reference were further refined in late June 2016, and the Valued Environmental Components (VECs) to be addressed in the EIA finalized (Appendix A).
- An appropriate study area was delineated (see above).
- A plant community survey (06 July 2016) and two rare plant surveys (06 July 2016 and 10 August 2016) were conducted.
- A site reconnaissance was undertaken on 30 August 2016.
- Technical information prepared in support of the proposed project, other existing technical information, and reports generated by projects in the vicinity of the study area and existing provincial databases were reviewed.
- Potential environmental impacts associated with the proposed project were assessed and mitigation measures to minimize the severity of identified impacts were developed.

3.2 Detailed Methods

The following sections describe in greater detail the approach used in preparing this EIA.

3.2.1 Literature Review

3.2.1.1 Technical Reports

The following technical reports were reviewed in support of the proposed Kihciy Askiy project:

- *Spirit of Edmonton: Reclaiming Monto, A Collective Vision Connecting the River and the People* (Indigenous Peoples' Arts and Culture Coalition 2011)
- *Detailed Business Case: Spirit of Edmonton – Project Concept Planning and Initiation (Kihciy Askiy/Fox Farms & Indigenous Centre for Art and Knowledge)* (City of Edmonton 2012)
- *Phase 1 Environmental Site Assessment: Fox Farm Property* (CT & Associates Engineering Inc. 2014)
- *Preliminary Geotechnical Assessment and Construction Cost Estimate: Gravel Pathway, Fox Farms, 6215 142 Street NW, Edmonton, Alberta* (Golder Associates 2014)

- *North Saskatchewan River Boat Docks and Launches Environmental Impact Assessment* (Spencer Environmental 2016)
- *Kihciy Askiy Sacred Earth: Schematic Design* (Manasc Isaac 2016)
- *Kihciy Askiy Sacred Earth: Schematic Design* (updated; Manasc Isaac 2017)
- *Kihciy Askiy Phase 1: Traffic and Parking Impact Assessment (*Bunt & Associates 2016)
- *Proposed Kihciy Askiy Phase 1 Site Development, Edmonton, Alberta: Preliminary Geotechnical Report* (Golder Associates 2017)
- *Historic Resources Impact Assessment (Paleontological Report): Kihciy Askiy Sacred Earth* (Aeon Paleontological Consulting Ltd. 2017)

Information from these technical reports was reviewed and incorporated into this EIA.

3.2.1.2 Databases

The following databases were queried for relevant information pertaining to wildlife and vegetation within the study area:

- The Alberta Conservation Information Management System (ACIMS) (Alberta Environment and Parks 2016a) was searched for all records of special status plant species within, and immediately adjacent to, the study area using a legal land description search. Site accessed on 04 August 2016.
- The Fisheries and Wildlife Internet Mapping Tool (FWIMT) (Alberta Environment and Parks 2016b) was searched for all records of special status wildlife species within a 1 km radius centred on the proposed project area. Site accessed on 04 August 2016.
- The City of Edmonton Open Data website (City of Edmonton 2017) was reviewed for tree inventories, recreational amenities and neighbourhood maps in the vicinity of the Kihciy Askiy project. The site was accessed on 07 February 2017.

3.2.2 Description of Existing Conditions

A thorough description of each environmental component within the study area was prepared using all available new and existing sources of information. The description of existing conditions provides a current snapshot of conditions in the local study area, over which the proposed project can be overlaid to assist in identification of issues, potential interactions and potential impacts. Specific methods used to generate the descriptions vary slightly with each environmental component. Specific methods are described in the respective sections of Chapter 4.

3.2.3 Potential Impact Analysis

The impact analysis process typically involves several key steps. First, environmental issues and potential environmental impacts associated with the proposed project, including all project phases (preparation, construction, operation), are identified using various means and sources. All issues and potential impacts identified as warranting further assessment are described and assessed.

3.2.4 Impact Identification

To identify ways that the proposed project could affect environmental components, we developed a matrix with project activities along one axis and environmental component along the other (Table 5.1). Potential for interaction between the elements of each axis was then identified. Each of these interactions was then analyzed in detail looking for changes to environmental components that could occur as a result of the project. This process involved the following:

- Spencer Environmental's extensive experience of environmental impacts typically associated with projects undertaken in the North Saskatchewan River Valley in Edmonton, a comprehensive understanding of the natural environment in the river valley and an understanding of the various components of the proposed project.
- Discussions with specialist consultants and members of Manasc Isaac's team.
- Literature reviews as needed.

In addition, results of project's public engagement program were reviewed, looking for additional environmental concerns or potential environmental impacts raised by the public.

3.2.5 Impact Identification

To identify ways that the proposed project could affect VECs, a matrix with project activities along one axis and VECs along the other was developed (Table 5.1). Potential interactions between the elements of each axis were then identified and assessed with regard to the type of change that would occur in the existing environment as a result of the proposed project. Each of these interactions was then described in terms of the project's effect on each VEC.

3.2.6 Impact Characterization

The characteristic used to describe impacts were based on the requirements of Bylaw 7188. Bylaw 7188 recognizes the importance of the North Saskatchewan River Valley and Ravine System as a contiguous open space and recreation system, and established the Plan Area as an environmental protection area. Bylaw 7188 recognizes the Plan Area as containing natural resource areas that will be preserved and enhanced for recreation, scenic and ecological purpose. The essential question regarding the impact of development on any area of the river valley system is whether or not the impact(s) would positively or negatively affect the present quality of the valley as a highly valued recreational and natural open space. Project practices that will be built into contracts to reduce the degree of impact, such as best management practices in erosion and sedimentation control, were reviewed at this stage and influenced impact characterization. At this point in characterizing *potential* impacts, no additional mitigation measures were applied at this point.

Based on Bylaw 7188 as the guiding regulatory document, potential impacts were described and classified as to their direction (positive or adverse), magnitude/severity (negligible, minor or major), duration (short-term, long-term or permanent), and

confidence in impact prediction (predictable effect/uncertain effect). These criteria were defined as follows:

Direction

Positive Impact: An interaction that enhances the quality or abundance of physical features, natural or historical resources, or recreational pursuits or opportunities.

Adverse Impact: An interaction that diminishes the abundance or quality of physical features, natural or historical resources, or recreational pursuits or opportunities.

Magnitude

Negligible Impact: An interaction that is determined to have essentially no effect on the resource. Such impacts are not characterized with respect to direction duration or confidence.

Minor Impact: An interaction that has a noticeable effect but does not affect local or regional populations, natural or historical resources, or physical features beyond a defined critical threshold (where that exists) or beyond normal limits of natural perturbation.

Major Impact: An interaction that affects local or regional populations, natural or historical resources, or physical features beyond a defined critical threshold (where that exists) or beyond the normal limits of natural perturbation.

Duration

Short-term Impact: An interaction resulting in a measureable change that does not persist for longer than one year post-construction.

Long-term Impact: An interaction resulting in a measureable change that persists longer than one year post-construction but at some point dissipates completely.

Permanent Impact: An interaction resulting in measureable change that persists indefinitely.

Confidence

Predictable Impact: Effects are well understood through application in projects of a similar nature.

Uncertain Impact: Effect on VEC is not well understood due to lack of knowledge of the VEC and its response to disturbance, or lack of previous experience with proposed mitigation measures in similar circumstances.

3.2.7 Development of Mitigation and Residual Impact Assessment

Once potential impacts had been identified and characterized, the next step of the assessment process involved development of mitigation measures to address the identified adverse impacts. In all cases, attempts were made to reduce impact severity. Any adverse impact remaining after implementation of mitigation was termed a residual impact. Residual impacts were classified according to the impact characteristics described above, with one exception – impact rating confidence used the following descriptors:

Predictable Residual Impact: Efficacy of proposed mitigation measures is well understood through application in similar projects or circumstances.

Uncertain Residual Impact: Efficacy of mitigation measure is not well understood because of lack of previous experience in similar circumstances or lack of knowledge about the VEC.

3.2.8 Public Engagement

The City of Edmonton has engaged with the Edmonton Capital Region Indigenous community (corresponding to the Indigenous community within the Edmonton Metropolitan Region, which comprises 24 municipalities around Edmonton) about the proposed Kihciy Askiy project through numerous meetings and gatherings over the past two years. Additional information regarding public engagement is summarized below and provided in Appendix B.

3.2.8.1 Consultation with the Indigenous Community

A draft concept plan for the Whitemud Integrated Area was presented to the general public at open houses in June 2000 and June 2002, where it received a high level of support (Appendix B). The plan was amended in 2009 to include development of the Kihciy Askiy site for Indigenous cultural programs and ceremonies. Additional consultation was completed in spring 2009, with stakeholder focus groups, Aboriginal Community consultation, and a public open house.

A Grand Council Gathering, hosted by Native Counselling Services of Alberta with support from the City of Edmonton, was held 6-7 May 2015 at the Alfred H. Savage Centre. Spiritual leaders from the Capital Region Indigenous community were invited following traditional Indigenous protocols. A total of 32 Elders participated on the first day and 36 on the second day. The gathering was intended to provide an opportunity to discuss how the Capital Region Indigenous community can work together at Kihciy Askiy, with a focus on protocols for ceremonies at Kihciy Askiy. The Elders identified priorities for the first year of operation and identified barriers and limitations as well as opportunities. This feedback was integrated into the Phase 1 design.

Two Council of Elders meetings were held (21 October 2015 and 4 November 2016) to provide feedback on the Schematic Design report and revised Site Plan (Manasc Isaac 2017; Appendix B). Feedback from both meetings was used to revise project documents.

3.2.8.2 Proposed Consultation

Individual letters and project information packages will be prepared for City of Edmonton agencies, local community organizations and local First Nations in 2017. The City of Edmonton's Indigenous Relations Office, in collaboration with Native Counselling Services of Alberta, will conduct additional consultation with Indigenous groups, comprising letters to 32 First Nations. Updates will be posted on the City of Edmonton and Native Counselling Services of Alberta websites every quarter to inform the general public of progress. Public engagement will continue throughout the project.

4.0 EXISTING CONDITIONS

4.1 Valued Ecosystem Components

4.1.1 Geotechnical/Soils

4.1.1.1 Methods

Geological and geomorphological characteristics of the Edmonton region have been well documented (e.g., EPEC Consulting 1981; Edmonton Geological Society 1993). These documents provided general information regarding the geology and geomorphology of both the local and regional study areas and were used to inform descriptions of baseline conditions.

A geotechnical investigation in support of a proposed trail on the Fox Farms site (within the proposed Kihciy Askiy site) was completed by Golder Associates (Golder) in 2014, predating the current Phase 1 design (Golder 2014). Subsequently, Golder completed a geotechnical investigation specific to the Kihciy Askiy project in spring 2017 (Golder 2017; Appendix C).

The 2014 investigation included a site reconnaissance and hand-auguring of seven test holes, oriented north-south on Kihciy Askiy Phase 1 lands. The field investigation took place on 27 October 2014 (Golder 2014). Each test hole was cored to a depth of 1.5 m, and soil samples were collected at 0.25 m intervals. The 2017 investigation included a site reconnaissance on 09 March 2017, at which time an additional seven boreholes were drilled using a drill rig. Soil samples were taken at 0.75 to 1.5 m intervals to depths ranging from 5.6 m to 10.3 m (Golder 2017; Appendix C). Laboratory tests on the soil samples collected in 2014 and 2017 included a particle size analysis, determination of natural moisture content and Atterberg limits.

A Phase 1 Environmental Site Assessment (ESA) was also undertaken in support of the work at the former Fox Farms site [CT & Associates Engineering Inc. (CT & Associates) 2014] (Appendix D). This investigation comprised a site reconnaissance on 18 September 2014 and a desktop review of the site history.

4.1.1.2 Description

Topography

The proposed Kihciy Askiy site is moderately sloped from west to east and gently sloped from north to south (Golder 2014). Golder (2017; Appendix C) noted the runoff direction from north to south through the site. A 2.5 m high slope starts parallel to the north-south portion of the access road where it abuts the site and leads to a lower central area characterized as slightly undulating, with a depression near the centre (Manasc Isaac 2017).

Soils and Subsurface Conditions

Soils and subsurface conditions were documented by Golder (2017; Appendix C) based on data from their seven boreholes. Topsoil was encountered at three of the seven test

holes, forming a layer approximately 100-300 mm thick. Sand and gravel fill was encountered immediately below the surface of the ground in two test holes and formed a layer approximately 130 mm to 150 mm thick. Asphalt concrete layers, approximately 100 mm to 130 mm thick, were encountered at two test holes (Golder 2017; Appendix C).

Silty clay fill, comprising silty clay, trace sand and trace coal fragments, was encountered beneath the surficial materials in four of the test holes, forming a layer 0.5 m to 1.2 m thick. Lacustrine silty clay, comprising silty clay, trace sand, trace coal fragments, root fibers and organic matter, was encountered beneath the surficial materials or fill in all boreholes drilled in 2017 and formed a layer of variable thickness, from approximately 0.9 to 4.5 m thick (Golder 2017; Appendix C). Gravelly clayey sand till was situated below the lacustrine silty clay in three of the seven boreholes and comprised gravelly clayey sand forming a layer approximately 0.8 m to 1.2 m thick (Golder 2017; Appendix C). Silty sand underlaid the lacustrine silty clay in a single test hole, forming a layer 1.2 m thick (Golder 2017; Appendix C)

Bedrock

Regionally, the uppermost bedrock unit encountered in the region is the Horseshoe Canyon Formation (Edmonton Geological Society 1993). The Formation consists of grey, feldspathic, clayey sandstone; grey bentonitic mudstone and carbonaceous shale; concretionary ironstone beds, scattered coal and bentonite beds of variable thickness and minor limestone beds (Golder 2017; Appendix C). Interlayered clayshale and sandstone bedrock was encountered in the boreholes drilled in 2017, underlying sand till or lacustrine clay (Golder 2017; Appendix C). Water content of selected bedrock samples was determined to be between 10% and 33%.

Coal Mines

Golder (2017; Appendix C) reviewed the Coal Mine Atlas (Alberta Energy Regulator 2016) and determined that the Kihciy Askiy site is not located near a previous coal mine.

Frost Depth

The anticipated depth of frost penetration was estimated based on the mean annual Air Freezing Index and the 10-year return period Air Freezing Index (Golder 2017; Appendix C). The mean annual depth of frost penetration for the cohesive soils present on-site was estimated to be approximately 1.7 m, and the penetration for a 10-year return period was approximately 2.0 m (Golder 2017; Appendix C).

Seismic Site Classification

The seismic response of the Kihciy Askiy site was classified as Class E, according to the National Building Code of Canada 2015, which categorizes soil conditions into six types (A through F), based on average shear wave velocity, SPT “N”-values, or undrained shear strength over the top 30 m of the soil profile (Golder 2017; Appendix C).

Phase 1 Environmental Site Assessment

The Phase 1 ESA (CT & Associates 2014) did not encounter any historical evidence indicating the proposed project area had been impacted by contaminants beyond acceptable limits for recreational parkland sites of this nature (CT & Associates 2014; Appendix D). A review of historical imagery identified that the proposed project area was cleared and utilized as cultivated farmland by 1930, with minor increases in cleared area and construction of houses and farm outbuildings over the subsequent 30 years (CT & Associates 2014; Appendix D). By 1974, Whitemud Drive and Fox Drive had been constructed to the northwest and north sides of the project area, respectively, and residential neighbourhoods had been established to the southwest and east (CT & Associates 2014; Appendix D). The 142 Street roadway accessing the site from Fox Drive was constructed between 2008 and 2013 (CT & Associates 2014; Appendix D).

4.1.2 Hydrology/Surface Water Drainage/Groundwater

4.1.2.1 Methods

Surface water patterns in the proposed Kihciy Askiy project area were described based on information provided by Manasc Isaac, field observations from the geotechnical investigations (Golder 2014 and Golder 2017), Phase 1 ESA site reconnaissance (CT & Associates 2014), and during vegetation field surveys for this project.

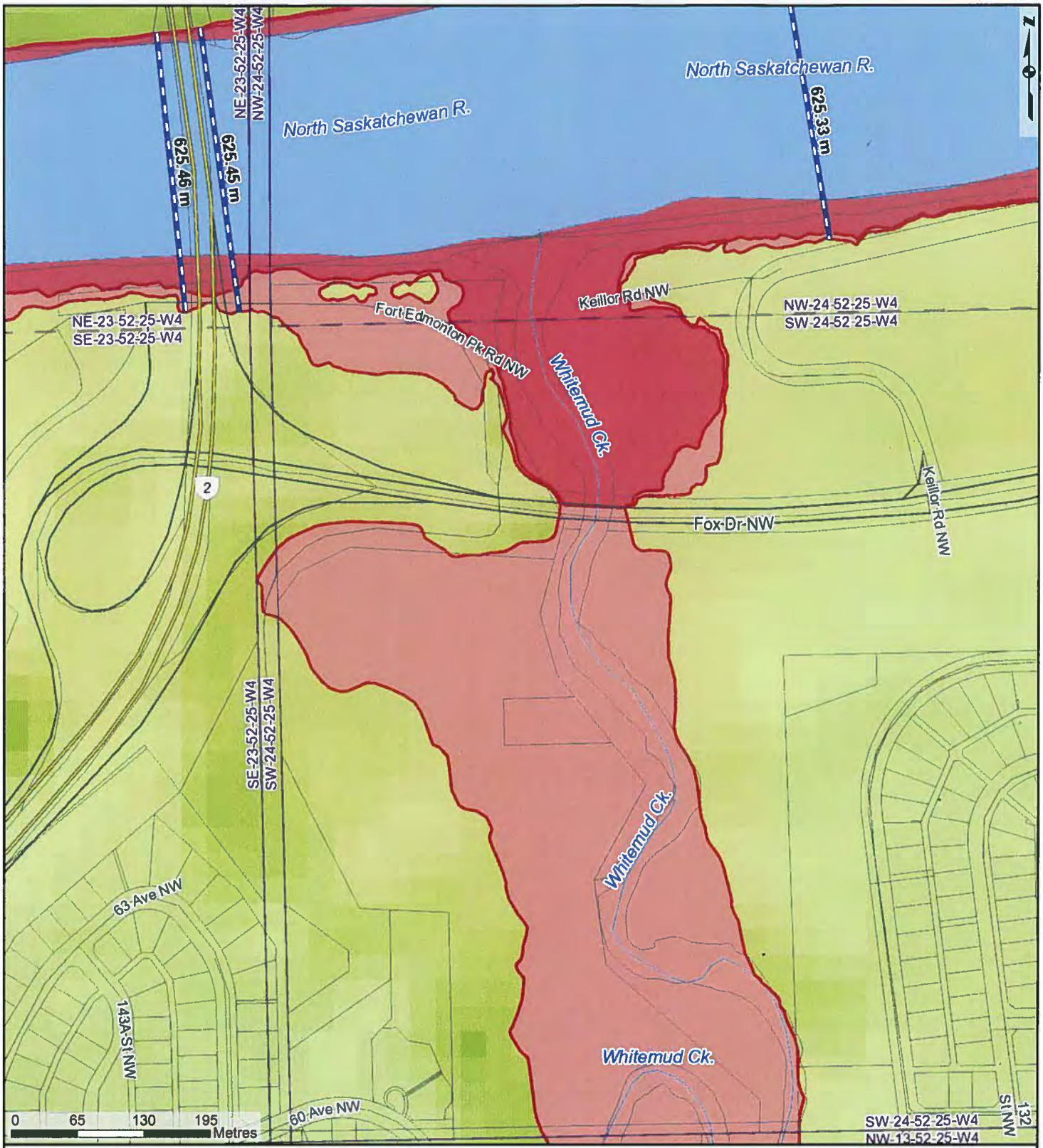
The following groundwater information was taken primarily from Golder (2014) and Golder 2017 (Appendix C). In both of those geotechnical investigations, groundwater conditions were observed in the open boreholes during and immediately following drilling operations. In 2014, seven boreholes were hand-augered to depths of 1.5 m (Golder 2014); in 2017, seven boreholes were advanced using a drill rig to depths up to 10.3 m (Golder 2017; Appendix C). Standpipe piezometers were installed in three of the boreholes drilled in 2017 to facilitate groundwater monitoring (Golder 2017; Appendix C).

4.1.2.2 Description

Surface Water

Surface water bodies in the regional study area include Whitemud Creek and the North Saskatchewan River. Whitemud Creek flows from south to north approximately 50 m east of the eastern limits of the proposed Kihciy Askiy site. Whitemud Creek joins the North Saskatchewan River approximately 550 m north of the proposed Kihciy Askiy site. The North Saskatchewan River originates at the Saskatchewan Glacier 500 km upstream of Edmonton and flows east through the City for 48 km (AEP 2016c; River Valley Alliance 2017).

The majority of the Kihciy Askiy lands are situated with Whitemud Creek's 1:100 year floodplain, in the flood fringe area (Figure 4.1). Golder (2017; Appendix C) noted the runoff direction from north to south through the site, with no defined drainage channels.



Legend

- Floodway
- Flood Fringe
- Overland Flow (Flood Fringe)
- Under Review
- 855.09 m Cross Section and Design Flood Level
- Water Body
- First Nation Boundary
- Municipal Boundary

Flood Hazard Map

Projection:	Datum:	Date:
ALBERTA 10TM	NAD 83	2017-Feb-21

maps.srd.alberta.ca/FloodHazard/

Figure 4.1

Groundwater

Regionally, groundwater in this area generally flows downwards and north toward the North Saskatchewan River (CT & Associates 2014; Appendix D). Within the proposed Kihciy Askiy site, groundwater levels corresponded with Whitemud Creek levels (CT & Associates 2014; Appendix D). Groundwater levels are expected to fluctuate seasonally in response to changes in precipitation and snow melt; therefore, groundwater levels were expected to be higher during the spring and following periods of heavy precipitation (Golder 2017; Appendix C).

The seven test holes drilled in October 2014 to depths of 1.5 m were dry on completion of drilling, with no sloughing observed (Golder 2014). In the seven test holes drilled in March 2017, depths to groundwater ranged from 3.8 m to 9.8 m on completion of drilling; two test holes were dry (Golder 2017; Appendix C). Water seepage from the lacustrine clay deposits was noted at depths ranging from 3.7 m to 4.3 m and from the till deposits at depths of 3.7 m and 5.2 m. Golder (2017; Appendix C) indicated that a perched water table was present within the lacustrine silty clay deposit, overlying bedrock.

4.1.3 Vegetation

4.1.3.1 Methods

Desktop Review

A search of the Alberta Conservation Information Management System (ACIMS) was conducted on 04 August 2016 to determine if any rare plant species had been reported from the study area (AEP 2016a). Recent aerial photographs and Google Earth images were reviewed and interpreted to identify and delineate plant communities, creating preliminary maps for use in field investigations.

Field Investigation

Rare Plant and Plant Community Surveys

A plant community survey was undertaken by a professional plant ecologist on 06 July 2016; rare plant surveys were also undertaken on 06 July 2016 and again on 10 August 2016. All plant communities in the project area were surveyed to fully describe the communities and to document rare plant occurrences. Preliminary community delineations were ground-truthed and boundaries adjusted as necessary. Each community was surveyed via meandering transects encompassing all proposed project components, access routes and staging areas, as well as lands immediately adjacent to those proposed areas. Communities of native vegetation in the vicinity of the proposed project but not expected to be impacted were coarsely classified based on dominant vegetation; however, a detailed inventory and rare plant survey were not conducted in areas outside the proposed site boundaries.

All species were documented and their relative site abundances ranked as dominant, abundant, frequent, occasional, or rare (locally uncommon). This information was used to classify communities, according to the system developed by Westworth & Associates

(1980, *in* EPEC Consulting Western Ltd. 1981) for plant communities in the North Saskatchewan River Valley in Edmonton. Representative sites were photographed.

All communities were surveyed at an intensity that was deemed sufficient to characterize the diversity of communities within the site and to encounter any rare species present. When S1 or S2 species, those noted as rare by the Province, were observed, their location was marked with a GPS. City of Edmonton Urban Analysis Section treats S3 species as rare within the City of Edmonton, so their occurrences were also noted and marked with a GPS.
Species that could not be identified in the field were collected and identified with the aid of a dissecting microscope and various botanical manuals. Species scientific and common names follow the most recent data from ACIMS (AEP 2016a). Common names are used throughout the text; however, complete plant community data, including species scientific names, are provided in Appendix E.

Weed Survey

A noxious weed survey was conducted concurrently with the rare plant and plant community surveys on 6 July 2016 and 10 August 2016, covering all plant communities within the project area. In each community, all noxious or prohibited noxious species observed were recorded and their relative site abundance ranked as dominant, abundant, frequent, occasional or rare (locally uncommon).

4.1.3.2 Description

Regional Vegetation

The project study area lies within the Central Parkland Subregion of the Parkland Natural Region, characterized by a mosaic of aspen groves and prairie vegetation (Natural Regions Committee 2006). The mixed landscape is the product of till plains and hummocky uplands, with moisture availability determining the proportion of grass and aspen. Aspen forests dominate the area with balsam poplar stands occurring on poorly drained sites. Both forest types generally have a well-developed and diverse shrub layer, dominated by species such as snowberry, prickly rose, red-osier dogwood and willow (Natural Regions Committee 2006). Much of the native vegetation within this subregion has been cleared for urban and agricultural development, with remnant communities found in ravines or valleys, such as in the local study area.

Local Vegetation

The proposed project is located within the *North Saskatchewan River Valley Area Redevelopment Plan* (Bylaw 7188) lands, an area that supports many developed parks and relatively few undisturbed areas. The following plant communities were present within the local study area:

- Grassland (G)
- Balsam Poplar-White Spruce (P2)

A summary of these communities is provided in Table 4.1, and a description of each community is provided in the following sections.

Table 4.1. Summary of Plant Communities and Species Composition for the Kihciy Askiy Study Area

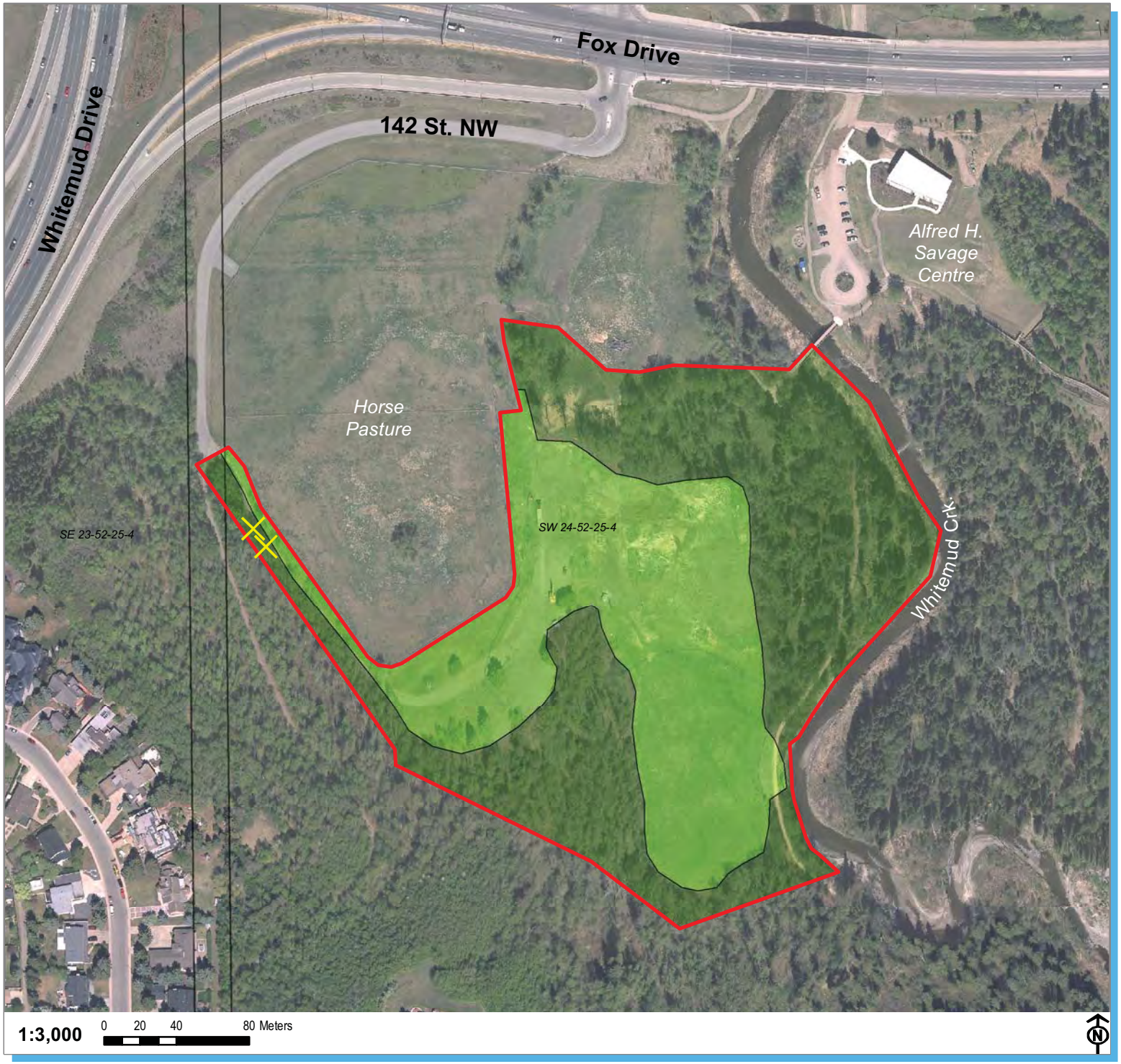
Plant Community	Number of Species			
	Native	Exotic	Noxious Weed	Total
Grassland (G)	25	36	10	71
Balsam Poplar-White Spruce (P2)	46	10	7	63

Grassland Community (G)

The majority of the proposed project area was characterized as a non-forested community dominated by smooth brome and red clover, manifesting as a disturbed, non-native grassland (Figure 4.2), with some local variation. The majority of the project area was dominated by smooth brome and red clover, with abundant alfalfa, quack grass and common dandelion (Plate 4.1). Vegetation along the poorly maintained access road that connects the dead-end of 142 Street to the proposed project area tended to be characteristic of a disturbed grassland community, dominated by smooth brome, red clover, timothy and common peppergrass. A weedy locality at the northwest corner of the grassland was characterized by lamb's-quarters and creeping thistle. In the northeast corner of the project area, shrubs and saplings from the balsam poplar-white spruce community are encroaching into the grassland community, creating a somewhat shrubby transitional zone (Plate 4.2).

Plate 4.1. Grassland (G) community dominated by smooth brome and red clover, looking northeast (6 July 2016)

Figure 4.2
Plant Communities
Kihciy Askiy in Whitemud Park

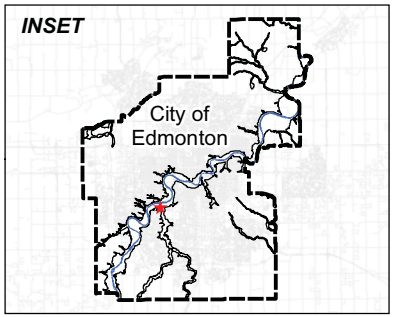


Legend

- High-Bush Cranberry
- Study Area

Plant Communities

- Balsam Poplar-White Spruce
- Grassland



Date Map Created: 17 July 2017
Aerial Photograph Date: May 2015

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Plate 4.2. Shrubs and saplings from the northeast balsam poplar-white spruce (P2) community encroaching into the grassland (G) community (10 August 2016)

Overall, 71 species were observed in the grassland community (Appendix E). Of these, 25 (35%) were native, while the remaining 46 species (65%) were exotic. Ten species of noxious weeds were detected in this community.

Balsam Poplar-White Spruce Community (P2)

A deciduous-leading mixedwood forest was observed around the perimeter of the smooth brome community (Figure 4.2). The mixedwood forest was dominated by balsam poplar and white spruce with abundant aspen and Manitoba maple. The shrub layer was dominated by prickly rose and red-osier dogwood, and the understorey was dominated by wild sarsaparilla, with frequent occurrences of common fireweed, northern bedstraw and tall lungwort (Plate 4.3). Star-flowered Solomon's-seal and northern gooseberry were abundant in relatively shadier areas along the west side of the subject area.

Plate 4.3. A balsam poplar-white spruce (P2) forest stand on the southwest portion of the proposed project area (6 July 2016)

In total, 63 species were observed in the balsam poplar-white spruce community (Appendix E). Of these, 46 (73%) were native, while the remaining 17 (27%) were exotic. One special status species, high-bush cranberry, was detected in this community. Two occurrences were noted on the south side of the access road to the west of the disturbed non-native grassland (G) community High-bush cranberry is currently ranked as S3S4, indicating that it is known from approximately 100 occurrences in the province but acknowledging some uncertainty about its rank and/or some vulnerability to extirpation (AEP 2016c). Seven species of noxious weeds were detected in this community.

Special Status Species

In Alberta, rare plants are typically considered to be those that are found in fewer than 20 locations in the province (AEP 2016d). These plants are given conservation rankings of S1 (five or fewer occurrences in the province) or S2 (6-20 occurrences in the province). The Province typically considers species ranked S3 (21-100 known occurrences) as uncommon, rather than rare, and thus, S3 species are not tracked and mitigation measures for their disturbance are not typically requested. The City of Edmonton Urban Analysis Section, however, does consider species ranked as S1, S2 and S3 to be rare.

A search of ACIMS records for the proposed project area conducted on 04 August 2016 returned no records of special status vascular plant species in the immediate project area. One potential special status species was observed during the field rare plant surveys: high-bush cranberry, which is currently ranked as S3S4. High-bush cranberry was downgraded from S3 to S3S4 in October 2015, as part of a comprehensive review which AEP undertook for all vascular plant species in 2015 (AEP 2016a). While S3 species are considered uncommon and are known from 21-100 occurrences, S4 species are considered uncommon but apparently secure and are known from >100 occurrences (AEP 2016d). A blended rank of S3S4 suggests there is some uncertainty about this species' abundance in Alberta, and/or this species is vulnerable to extirpation due to various internal or external factors (AEP 2016d).

High-bush cranberry is a tall shrub from the honeysuckle family (Caprifoliaceae). This species is found in moist woods and river valleys and has a wide range in Alberta, from the southern limit of the Central Parkland in the south to the lower Peace and Athabasca valleys in the north (Moss 1983). It occurs in low abundances over much of its range but is locally abundant in the North Saskatchewan River Valley in Edmonton.

Weeds

The Alberta *Weed Control Act* defines two categories of weeds: prohibited noxious and noxious. Prohibited noxious weeds are species that are currently uncommon or absent in the province but have been identified as prohibited noxious due to their potential to invade and damage natural and cultivated systems. Alberta law requires that prohibited noxious weeds be destroyed where they are found. No prohibited noxious weeds were detected during the vegetation surveys for the proposed Kihciy Askiy project. Noxious weeds are generally those that are currently widespread in the province and are

considered difficult to eradicate. Provincial legislation requires that these species be controlled.

Noxious Weed Species

Twelve species of noxious weeds were found in the proposed project area, all of which are relatively common on disturbed lands in the Edmonton area (Table 4.2). Noxious weeds were widespread throughout the grassland community, with particular high concentrations adjacent to the poorly maintained road. The northern terminus of the road was overgrown by abundant noxious and exotic species (Plate 4.4). Creeping thistle, common toadflax, perennial sow-thistle and common tansy were the most widespread noxious weed species, occurring in both the grassland and forest communities. Creeping thistle was also the most abundant weed species. Noxious weed occurrences were more limited within the forest community; common burdock and tall buttercup were the only noxious weed species detected solely in the forest community. The presence of noxious weeds is likely reflective of the site's disturbed history, changes in land use/ownership and location within a densely populated city. Provincial legislation does, however, require control of these species.

Table 4.2. Observed Noxious Weeds at the Kihciy Askiy Site (Summer 2016)

Common Name	Scientific Name	Plant Community
Common burdock	*Arctium minus*	P2
Creeping bellflower	*Campanula rapunculoides*	G, P2
Creeping thistle	*Cirsium arvense*	G, P2
Ox-eye daisy	*Leucanthemum vulgare*	G
Leafy spurge	*Euphorbia esula*	G
Field scabious	*Knautia arvensis*	G
Common toadflax	*Linaria vulgaris*	G, P2
Scentless chamomile	*Tripleurospermum inodorum*	G
Tall buttercup	*Ranunculus acris*	P2
White cockle	*Silene latifolia*	G
Perennial sow-thistle	*Sonchus arvensis*	G, P2
Common tansy	*Tanacetum vulgare*	G, P2

Plate 4.4. Noxious and exotic species at the north end of the poorly maintained access road (6 July 2016)

4.1.4 Wildlife and Wildlife Habitat

4.1.4.1 Methods

The local study area shown in Figure 1.1 also served as the wildlife study area. Wildlife resources in the study area were described through a comprehensive desktop analysis and observations made during site reconnaissance. No taxa specific wildlife surveys were completed in support of this project because desktop analysis indicated an absence of amphibian breeding habitat, lands to be directly disturbed by development were seen to comprise a formerly grazed pasture and access road, and peak breeding bird season had ended prior to environmental assessment initiation.

Wildlife habitat present in the study area was characterized through review of the vegetation mapping completed for this assessment. A list of potentially-occurring wildlife species in the study area was developed by consulting a list of wildlife species known to occur in the Edmonton area based on species range within the Province, reviewing a bird species list for Whitemud Creek Ravine compiled by the Edmonton Nature Club, searching the Province's FWMIT database and consideration of available habitat in the study area and species habitat requirements.

The resulting list of potentially-occurring species was then reviewed to determine the likelihood of species on the list to make use of habitat in the local study area. This was done by applying professional opinion, arrived at by considering habitat area and quality and potential to support specific life functions (e.g., breeding at the site or passing through the area on migration and stopping to rest or forage), augmented by extensive experience of habitat use through conducting avian surveys in Edmonton's river valley system and known species' rarity in the local area. The potential for species protected by current provincial and federal conservation legislation (i.e., Alberta's *Wildlife Act*, federal *Species At Risk Act*, *Migratory Birds Convention Act*) to occur in the study area is a critical consideration for assessments related to development, as the potential for a

project to affect these species must be assessed and mitigation provided to demonstrate due diligence in complying with the legislation.

4.1.4.2 Description

Wildlife Habitat

The study area contains two widely contrasting habitat types: mature balsam poplar-white spruce mixedwood forest and disturbed grassland. The mixedwood forest within the study area comprises a small area but is rated as high quality habitat for several reasons. The forest is mature with well-developed shrub and herb layers forming a complex vertical structure that can support a diverse wildlife community. The forest was noted to have a low proportion of non-native species. The mixedwood character of the forested habitat provides capacity to support species dependent on both deciduous and coniferous habitat components. In the study area, the forested habitat also consists of field/forest edge habitat *and* has a riparian influence because of the proximity of Whitemud Creek. Both are characteristics that increase habitat diversity. In addition, the mixedwood forest is contiguous with the forested habitat that extends throughout Whitemud Creek Ravine Park, a feature known to increase habitat function (Bayne and Hobson 1998). Finally, Whitemud Creek Ravine Park, as a whole, is recognized by the City as a Biodiversity Core Area. Core areas are defined as "*habitat patches of suitable size and quality so as to provide environmental conditions that support entire populations of animals and plants and associated ecological functions*" (City of Edmonton 2007). Accordingly, although only relatively small areas of mixedwood forest are present within the study area, this high quality habitat has the potential to regularly support small populations of a great diversity of wildlife species and to be used occasionally by even more species. In contrast, the disturbed grassland habitat is more abundant but is much lower quality habitat. It lacks vertical diversity, has a low native species richness and is dominated by exotic and weedy species. Nonetheless, in its current, non-grazed state the grassland is suitable breeding and foraging habitat for several species. The grassland habitat is expected to support a different and much smaller suite of wildlife species.

Wildlife

Over 200 wildlife species (bird, mammals, reptiles and amphibians) have been observed within the city limits, most of which were observed in the NSRV (Pattie and Fisher 1999, Fisher and Acorn 1998, Russell and Bauer 2000, Westworth and Associates 1980). The most common and abundant wildlife are generalist species tolerant of human activity and fragmented habitats. Based on knowledge of provincial distributions, local records and habitat suitability within the study area, 186 species have been identified as having some potential to be occur within the study area (Appendix F), some fleetingly or occasionally. The list of potentially-occurring species comprises 136 bird species, 46 mammal species, 2 amphibians and 2 reptiles. The following sections consider species most likely to occur and special status species.

Avifauna

A list of bird species recorded within Whitemud Creek Ravine compiled by the Edmonton Nature Club includes approximately 80 species that have the potential to breed

within the study area, with many additional species potentially occurring during migration and the winter. Although the list of potentially-occurring species is long, because the study area is situated at the north end of the ravine and the mixedwood habitat available within the study area comprises small areas of habitat at the edge of larger patches, the species most likely to occur regularly in the study area forest are more common species adapted to edge habitat. During the site reconnaissance in August 2016, observed bird species included red-tailed hawk, black-billed magpie, American crow, and hairy woodpecker. Examples of other expected species within the mixedwood forest include, but are not limited to, downy woodpecker, red-eyed vireo, black-capped chickadee, red-breasted nuthatch, ruby-crowned kinglet, American robin, yellow warbler, yellow-rumped warbler and dark-eyed junco. Species most likely to occur within the disturbed grassland area include savannah sparrow, clay-colored sparrow and European starling. The grassland, particularly in the area closest to Whitemud Creek, could also potentially support nesting mallards and/or Canada geese.

The north-south orientation and linear shape of Whitemud Creek Ravine makes it particularly attractive to migrating songbirds during spring and fall migration. During migration, a number of species that don't typically breed in the Edmonton area may be found making use of the ravine habitat for foraging and protective cover and may temporarily use the study area forest.

Mammals

Based on species provincial distributions, understanding of species-habitat relationships and records of local occurrence, approximately 46 mammal species have the potential to at least occasionally occur within the study area. The list of species expected to frequently or commonly occur within the study area, however, comprises a much reduced subset because the majority of potentially-occurring mammal species are either relatively uncommon at a local scale or occupy large home ranges and would, therefore, be present in the study area only occasionally. The species most likely to frequently occur in the study area, in abundance, are small and medium-sized mammals. Species such as deer mouse, red-backed vole and red squirrel, are expected to be abundant in the mixedwood forest. Richardson's ground squirrel and meadow voles, among others, have a high potential of occurring within the grassland community. Least chipmunks, snowshoe hares and porcupines are also expected to frequently occur in the study area as these are all common species within the North Saskatchewan River valley.

Among larger, wider-ranging species, both deer (mule and white-tailed) and coyote are also expected to frequent the study area. During the site reconnaissance in August 2016, there was an extensive amount of deer sign, including trails and bedding areas, within the disturbed grassland area. Coyotes are known to travel extensively throughout the North Saskatchewan River valley and associated ravine system and coyote are expected to frequently travel through and hunt in the study area. Red fox, less common than coyote in Edmonton, may also occasionally occur in the study area.

Other large mammals, such as moose are occasionally observed in Edmonton's river valley and, therefore, have some potential to be occasionally present in the study area.

Observations of other large mammals (e.g., lynx, cougar) in Edmonton river valley parks are rare and likely the result of dispersing individuals moving through the region in search of new territory; the possibility of such occurrences does not warrant further consideration in this EIA.

Several bat species, including little and big brown bats, may roost in cavities of mature trees within the study area and may forage above the grassland area or over the adjacent Whitemud Creek. Some of the larger trees in the forest may be sufficiently large to provide suitable cavities to support nursery colonies in the spring.

Amphibians and Reptiles

Amphibians generally require ponded aquatic habitat for breeding and overwinter in adjacent areas of terrestrial habitat. None of the lands within or immediately adjacent to the study area provide suitable amphibian breeding habitat; Whitemud Creek is too fast flowing to support amphibian breeding. Accordingly, amphibians are not expected to occur within the project area.

Common garter snakes are the most commonly-occurring reptile species in the City of Edmonton. There are no known hibernacula (i.e., communal over-wintering sites) in or near the study area (Alberta Environment and Parks, 2016b), however, nearby areas along Whitemud Creek may provide suitable overwintering sites and, as a result, it is possible that garter snakes move into the study area during their active season from off-site hibernacula. Although the potential exists, the likelihood of frequent occurrence of garter snakes in the project area is considered to be low. Management and disturbance sensitivities are typically associated with hibernacula rather than habitat use during the active season.

Special Status Species

Based on species habitat requirements, an understanding of the available habitat, provincial species distributions, and species records in the FWMIT database, a number of special status species have been identified as having at least some potential to occur in the project area. The following section discusses the potential occurrence of species that are ranked by the Province as *At Risk* or *May Be At Risk*, or have been federally assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as either *Endangered*, *Threatened*, or *Special Concern*, and have at least a moderate likelihood of occurrence within the local study area (Table 4.3). Species having a provincial status of *Sensitive*, but no federal status, hold no potential to trigger project considerations beyond those applicable to wildlife in general, and, thus, are not discussed, even if their potential for occurrence was considered moderate or high.

Six species, the northern bat, little brown bat, barn swallow, olive-sided flycatcher, Canada warbler and barred owl met the above criteria and are discussed further below. The search of FWIMT returned records of two special status species observed within 1km of the project area: peregrine falcon and barred owl. The peregrine falcon was determined to have a low likelihood of occurrence within the study area because of the lack of suitable nesting habitat and low quality foraging habitat.

Northern bat and little brown bat, both species that have been recently assessed by COSEWIC as *Endangered,* have a moderate likelihood of occurrence within the study area. Both of these species have experienced extreme rates of mortality in the eastern United States due to white-nose syndrome (WNS; Forbes 2012a, 2012b). WNS is also present in eastern Canada and the spread of WNS westward, throughout the rest of their range, could put these two species at risk of extinction. This has directly contributed to their federal status as *Endangered*. In Alberta, the northern bat is ranked as *May Be At Risk*, while the little brown bat is currently ranked as *Secure*. During the breeding season, both species occupy mid- to late- successional forests, often near water, and roost under the bark of trees or in old nest cavities (Pattie and Fisher 1999). Within the study area, the mature mixedwood forest combined with the presence of adjacent Whitemud Creek, provide potentially good foraging and roosting habitat. On that basis, the likelihood of either the Northern bat or little brown bat occurring in the local study area is rated as moderate.

Barn swallows have been recently assessed as *Threatened* by COSEWIC due to sharp population declines, although the species is still ranked as *Sensitive* in Alberta and relatively common in the Edmonton area. Barn swallows use anthropogenic structures (e.g., barns, buildings, bridges) for supporting their nests, and require open spaces, such as above water bodies, for foraging because they catch insects in mid-air while flying (Brown and Brown 1999). While no barn swallows were observed during field investigations in 2016, the wooden utility shed currently present within the site could function as a suitable location for nest building. The likelihood of the barn swallow occurring in the local study area is rated as moderate.

Olive-sided flycatchers have held a COSEWIC status of *Threatened* since 2007. The species is described as breeding "in semi-open coniferous and mixedwood forests along edges and openings, often near water" (Federation of Alberta Naturalists 2007). Further, the olive-sided flycatcher is listed as a confirmed breeding species within Whitemud Creek Ravine by the Edmonton Nature Club. Based on this documentation and the presence of suitable habitat, the likelihood of the olive-sided flycatcher occurring in the study area is rated as moderate.

Canada warblers are provincially listed as *Sensitive* and listed under the *Species at Risk Act* as *Threatened* due to overall population declines (COSEWIC 2008). There are no breeding records for the Canada warbler in the Edmonton area (Ritchie 2003, Federation of Alberta Naturalists 2007); therefore, Canada warbler presence within the study area is expected to be restricted to spring and fall migration. The Canada warbler is known to migrate through the deciduous woodlands of Edmonton's North Saskatchewan River

Table 4.3. Special Status Wildlife Species with Moderate or High Potential to Occur in the Study Area

Common Name	Scientific Name	Provincial Status (General Status of AB Wild Species 2010)	Wildlife Act Designation	COSEWIC Designation	SARA Designation	Recorded in/near Study Area	Potential Habitat Use	Likelihood of Occurrence
Northern Bat	*Myotis septentrionalis*	May Be At Risk	Data Deficient	Endangered	Schedule 1 (Endangered)		Breeding/ Foraging	M
Little Brown Bat	*Myotis lucifugus*	Secure		Endangered	Schedule 1 (Endangered)		Breeding/ Foraging	M
Olive-sided Flycatcher	*Contopus cooperi*	May Be At Risk		Threatened	Schedule 1 (Threatened)		Breeding/ Foraging	M
Canada Warbler	*Cardellina canadensis*	Sensitive		Threatened	Schedule 1 (Threatened)		Foraging (migration)	M
Barn Swallow	*Hirundo rustica*	Sensitive		Threatened			Breeding/ Foraging	M
Barred Owl	*Strix varia*	Sensitive	Special Concern			FWMIS	Breeding/ Foraging	H

Valley somewhat regularly (Kovacs 2011). The likelihood of the Canada warbler occasionally occurring in the study area is rated as moderate.

Barred owls are listed as *Special Concern* by the Alberta Endangered Species Conservation Committee (ESCC) due to a small population in Alberta and the negative impacts of logging on this species (AESRD 2010). Barred owls prefer nesting in mature mixedwood forest and use the woodland edges for hunting small mammals (Poole 2015). Barred owls are known to nest further south within Whitemud Creek Ravine and have been recently recorded approximately 500m south of the study area (A. Forrest, *pers. comm*.). Based on the knowledge of occurrence from nearby areas, and the presence of suitable habitat, the likelihood of the barred owl occurring in the study area is rated as high. Barred owls are most likely to use habitat within the study area for hunting.

4.1.5 Habitat Connectivity/Wildlife Passage

4.1.5.1 Methods

Habitat connectivity and wildlife passage were assessed based on a review of mapping from the City of Edmonton, analysis of aerial photography of the study area and surrounding vicinity, observations made during site visits and professional experience on the topic. While this assessment focused on the local study area, given the project location near the terminus of a major ravine, a much larger area was also considered, as described below.

4.1.5.2 Description

Whitemud Creek Ravine has been identified by the City of Edmonton as a Biodiversity Core Area because of its large area, habitat function and wildlife corridor function (City of Edmonton 2007).

From the study area, which is located near the northern end of the Ravine at its confluence with the North Saskatchewan River Valley (NSRV), Whitemud Creek Ravine extends several kilometers to the south and, ultimately, stretches to areas south of the City. At the scale of the City, the NSRV functions as the spine of Edmonton's ecological network, serving as a major biological corridor having regional significance (City of Edmonton 2007). Major wildlife corridors provide cover and resources, connecting large areas of habitat at a regional scale and can support a high diversity of species. Whitemud Creek Ravine is recognized as a Biodiversity Core Area and is the City's second most prominent ecological corridor. Whitemud Creek Ravine provides a high-functioning ecological connection between the central NSRV and undeveloped lands beyond Edmonton's south boundary and plays a key role for movement of many wildlife species both within the NSRV system and adjacent upland natural areas.

The ability of a ravine to act as a high-quality wildlife movement corridor is a function of the continuity of vegetation structure, navigable topography, the absence of potential barriers to movement and the ability to buffer the impact of surrounding disturbance. A corridor, particularly those in urban settings, can have high and low quality reaches. For the most part, Whitemud Creek Ravine comprises a relatively continuous stretch of

habitat capable of supporting wildlife movement. Various roads cross the ravine, however, all major road crossings also have large open-span bridges expected to function well as wildlife crossing structures, including Fox Drive just north of the study area. Accordingly, this assessment assumes that the ravine as a whole is a high functioning movement corridor and views the study area as one component reach in that corridor.

Within the study area, the available habitat provides suitable vegetative cover and gently sloping terrain that, combined, provides the necessary features to both facilitate wildlife movement through the study area and to function as a high quality reach within the larger movement corridor of Whitemud Creek Ravine. The site is currently partially fenced; a chain-link fence surrounds much of the site on its east and north boundary and a barbed-wire fence is present along some of the site's west perimeter. A granular trail is located beyond the east edge of the study area that has some potential to influence local wildlife movement.

The chain-linked fence is approximately 1.8 m in height and is in relatively good condition, although some gaps in fence sections do exist. Small mammals such as mice and squirrels are expected to be able to pass through the openings in the chain-link mesh. Slightly larger species such as snowshoe hare, porcupine and even coyote are expected to be able to find gaps within or under the fence, although finding these gaps to pass through the fence may take some effort. The fence, where it is present, is, however, expected to function as a barrier for the passage of deer and moose. Because the majority of the fence is situated in a north-south direction, the presence of the fence likely funnels the movement of deer and moose travel around the ends of the fence when travelling east-west through the study area. North-south travel through the study area would, however, remain relatively unimpeded as a result of this fence. The barbed-wire fence that is also present around sections of the site is considered fully-permeable to all wildlife movement.

The adjacent granular trail is approximately 3 m wide and supports a high-level of recreational use because it is located close to the trailhead at the Alfred H. Savage Centre. The high level of recreational use that this trail receives may be sufficient to deter or impede the daytime movements of more disturbance intolerant species, such as deer. The trail is, however, assumed to have little influence on wildlife movement patterns during the night or during times of low recreational use.

Roads, particularly those conveying high traffic volumes, are known to deter wildlife movement and typically function as semi-permeable or impermeable barriers (van der Ree et al. 2015). The existing access road into the Kihciy Askiy site is not-paved, supports very little vehicular use and has vegetation extending right up to its edge. Accordingly, the access road is not considered an impediment to the majority of wildlife movement within the study area. Beyond the study area, the combination of 142 Street and Fox Drive, a short distance to the north, is, however, expected to influence the movement of many species travelling between Whitemud Creek Ravine and the habitat along the edge of the NSR.

4.2 Valued Socio-Economic Components

4.2.1 Residential Land Use

4.2.1.1 Methods

Residential land use was described by referring to the City of Edmonton Neighbourhood Interactive Map (City of Edmonton 2017b), and through observations during site visits. Residential land use was assessed over an area that extended slightly beyond the local study area to include the nearest tablelands (Figure 4.3)

4.2.1.2 Description

The Kihciy Askiy site is located within the North Saskatchewan River Valley, below the crest of the valley slope. The closest residential land use is in the tableland neighbourhoods of Brookside and Grandview (Figure 4.3). The nearest private residences are in Brookside, approximately 120 m southwest and upslope of the proposed site. A SUP connects Brookside to the terminus of 142 Street at the west boundary of the Kihciy Askiy site.

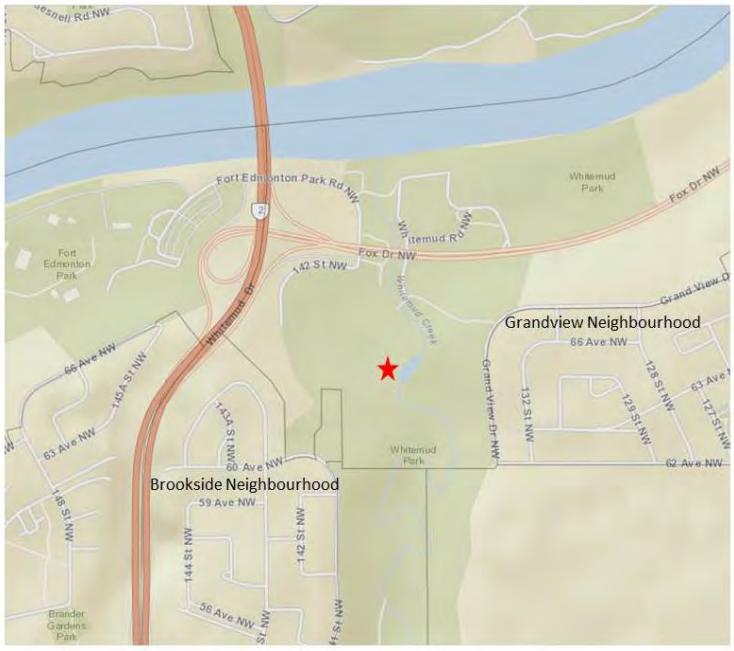


Figure 4.3. Neighbourhoods Located on the Tablelands Near the Proposed Kihciy Askiy Site (taken from City of Edmonton Open Data, as amended) – red star denotes project area

4.2.2 Recreational Land Use

4.2.2.1 Methods

Recreational land use was described by reviewing the City of Edmonton River Valley and Recreation website (City of Edmonton 2017c) and through observations during site visits. Existing recreational land use was assessed over an area that extended slightly

beyond the local study area to include nearby recreational amenities and is shown on Figure 4.4.

4.2.2.2 Description

There are no formal recreational trails or other City amenities within the Kihciy Askiy site. A temporary sweat lodge, located near the southern limits of the site, is currently used for improvised sweats by the Indigenous community. Several river valley paths are located in the vicinity of the Kihciy Askiy site (Figure 4.4). A formal unpaved trail parallels Whitemud Creek, immediately east of the proposed site and connects via pedestrian bridge to the Alfred H. Savage Centre and to other recreational amenities further up and downstream in Whitemud Creek Ravine. Currently a 1.8 m high chain link fence separates that path from Kihciy Askiy lands. A paved shared use path (SUP) connects the Brookside neighbourhood to the terminus of 142 Street, where the street joins the site access road. The site access road is currently gated, but 142 Street is accessible to traffic, pedestrians and cyclists.

4.2.3 Traffic/Parking

4.2.3.1 Methods

Existing motor vehicle traffic, parking and access information were described by reviewing aerial photographs and maps, through observations made during project field surveys and reviewing the Traffic Impact Assessment report prepared for the project (Bunt and Associates 2016).

4.2.3.2 Description

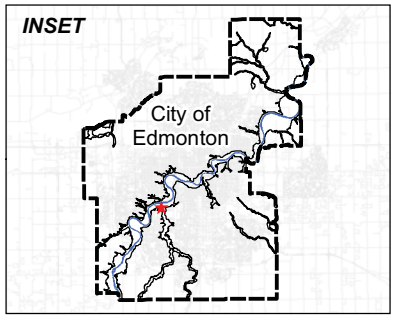
Several major arterial roadways pass through the vicinity of the Kihciy Askiy site, Fox Drive, an urban, divided 4-lane arterial roadway runs east-west immediately north of the proposed site. Whitemud Drive runs north-south to the west of the proposed project area. One roadway, 142 Street, connects the Kihciy Askiy project area to Fox Drive. In this area, 142 Street is a two-lane undivided local roadway that dead-ends at the gate to the Kihciy Askiy site access road. Two bus stops, which serve five different bus routes are located on Fox Drive within 250 m of the Kihciy Askiy study area.

Public parking is available for recreationalists on the east side of Whitemud Creek in Whitemud Park and near the Alfred H. Savage Centre and connects to several SUPs (Figure 4.4). A large public parking lot is located west of Whitemud Drive, providing access to Fort Edmonton Park and the John Janzen Nature Centre. Street parking is available throughout the Brookside and Grandview neighbourhoods at the top-of-bank, upslope of the proposed project area (Figure 4.3).

Figure 4.4
Existing
Recreational Uses
Kihciy Askiy in
Whitemud Park

Legend

- Study Area
- ETS Bus Stop
- Paved Trail
- Non-Paved Trail
- Trails Cleared In Winter
- Arterial Roadway
- Roadway
- LRT Track
- Emergency Blue Phone
- Drinking Fountain
- Parking Lot
- LRT Station
- Transit Centre
- Playground
- Difficult Slope (10% and Greater)
- Moderate Slope (5% to 9%)
- Distance Markers
- Trail Distance in Kilometres
- Golf Course
- Scenic Viewpoint
- Stairway
- Summer Washroom
- Year Round Washroom
- Park
- Bridge



1:10,000 0 100 200 400 Meters

*Source: City of Edmonton Rivery Valley Trail Map (2011)

Date Map Created: 17 July 2017
Aerial Photograph Date: May 2015

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4.3 Valued Historic Components

4.3.1 Historical Resources

4.3.1.1 Methods

Historical Resources

As noted in *Section 2.4.2.2*, a SoJ was submitted to Alberta Culture and Tourism (ACT) on 29 March 2016 for the department's review and comment regarding additional requirements pursuant to the *Historical Resources Act*.

Paleontological Resources

In response to ACT's determination for the high potential for the site to support undiscovered paleontological resources at depth, and the project need to excavate in select locations deeper than 1 m below ground surface, the City commissioned a pHRIA. Aeon Paleontological Consulting Ltd. (Aeon) prepared a Paleontological Historical Resources Impact Assessment (pHRIA) in support of the proposed project (Aeon 2017). That assessment encompassed a desktop review of the baseline geology and paleontology of the project area, followed by a field reconnaissance in June 2017. Field work was undertaken in accordance with Mitigative Palaeontological Permit 17-041 (Aeon 2017). Field inspections comprised pedestrian surveys and a visual examination of the project area, including areas adjacent to Whitemud Creek. Five test pits were excavated to a maximum depth of 3 m via small backhoe to assess the paleontological potential of the study area (Aeon 2017).

4.3.1.2 Description

Historical Resources

ACT has confirmed that there are no known historical or archaeological resources at the proposed site. ACT granted clearance for project activities on 13 May 2016, with the standard condition that newly discovered artifacts must be reported to the Province immediately (Appendix G).

Paleontological Resources

The sediments underlying the Kihciy Askiy study area comprised, in descending order, modern soils, recent floodplain deposits, postglacial alluvium of the Empress Formation and Horseshoe Canyon Formation bedrock (Aeon 2017). The Kihciy Askiy site was determined to be located within a "high palaeontological resource sensitive zone" (Aeon 2017). The test holes were characterized by variable sediments, comprising silt clays, sandy silts, silty mud and gritty white clay with carbonate-enriched ash layers (Aeon 2017). Bedrock was encountered at one of the five test holes at the west side of the study area (Aeon 2017).

Based on their observations, Aeon (2017) noted in their pHRIA that surficial sediments, comprising post-glacial Quaternary floodplain deposits are likely greater than 2 m deep throughout the majority of the proposed project area; however, possible ash layers indicating ephemeral pond environments were encountered at 0.8 to 0.3 m near the centre

of the proposed project area, and bedrock occurred nearest the surface (1.5 m in depth) on the west side of the proposed project area, near the proposed change room/washroom facility.

Consequently, Aeon (2017) concluded that any excavations exceeding 1.5 m in depth have a high potential to disturb bedrock and significant fossil resources from the Horseshoe Canyon Formation. They recommended that a paleontological monitoring program be put into place only for activities that involve open-cut excavations of 1.5 m or deeper near the locations of the proposed buildings and associated utility pits or trenches.

5.0 POTENTIAL IMPACTS AND MITIGATION MEASURES

The proposed Kihciy Askiy project includes the following key project components as outlined in Chapter 2:

- Upgrade site access and construction of parking area.
- Site regrading and landscaping.
- Construction of sweat lodges and permanent, ceremonial fire pit.
- Construction of a storage building.
- Construction of a building housing change rooms, washrooms and an indoor gathering space (construction of gathering space is funding-dependent).
- Construction of granular walking trails.
- Establishment of an area for tipis to be erected on an as-needed basis.
- Construction of an amphitheatre.
- Utility upgrades.
- Demolition of existing utility shed.

Potential interactions between the key project components (and related activities), with VECs, are summarized in Table 5.1. The following sections describe those interactions that have been identified as having the potential to result in an impact, adverse or positive, to any environmental component. Where relevant, potential impacts associated with construction and operation are discussed separately.

Table 5.1. VEC/Project Activity Interaction Matrix

			Site Preparation				Construction		Reclamation	Operation	
			Establish staging area(s)	Coordinate access and public safety	Vegetation clearing	Install temporary erosion and sediment controls	Site regrading	Construction of Kihciy Askiy components	Revegetation, landscaping	Operation	Maintenance
Valued Ecosystem Components	Valued Environmental Components	Geotechnical/Soils	✓		✓	✓	✓	✓	✓		
		Hydrology/Surface Water	✓		✓	✓	✓	✓	✓		✓
		Vegetation	✓		✓		✓	✓	✓		✓
		Wildlife	✓		✓		✓	✓	✓	✓	
		Habitat Connectivity/Wildlife Passage	✓		✓		✓	✓	✓	✓	
	Valued Social Compone	Residential Land Use	✓	✓				✓			
		Recreational Land Use		✓				✓		✓	✓
		Traffic and Parking	✓	✓				✓		✓	✓
Valued Historic Components		Historical Resources					✓	✓			

5.1 Valued Ecosystem Components

5.1.1 Geotechnical/Soils

Potential impacts related to geotechnical resources and soils include:

- slope stability,
- soil erosion,
- loss and mixing of topsoil,
- compaction of soils by construction equipment, and
- accidental spills of hazardous materials near or on unpaved surfaces, resulting in soil contamination.

A detailed analysis of each potential impact is provided below. Golder (2017) provided additional recommendations for subgrade preparation in the greenfield area and the gravel parking lot/access road and for the types of foundations considered feasible at this site. Those recommendations may be found in their complete report in Appendix C.

5.1.1.1 Slope Stability

Impact

The proposed Kihciy Askiy site is moderately sloped from west to east (from the access road to the horse corral) and gently sloped from north to south (Golder 2017; Appendix C). The proposed project will involve some temporary and permanent excavations, as well as stockpiling of materials. Due to the overall gentle to moderate slopes, impacts to slope stability are rated adverse, minor, short-term and predictable.

Mitigation Measures and Residual Impact

Golder (2017) (Appendix C) recommended that the final grade of the site be sloped so that surface water is directed away from buildings, structures and excavations. In areas where sloped excavations are required, Golder (2017; Appendix C) recommended that temporary excavations be developed with side slopes no steeper than 1H:1V within the silty clay fill layer and native lacustrine deposits. Flatter side slopes may be required if seepage is encountered or if the excavations extend below the groundwater level (Golder 2017). If seepage or wet zones are encountered below the toe of the slope, groundwater may be managed using ditches and properly filtered sump and pump systems (Golder 2017). Water removed from the excavations should be directed toward a suitable discharge location (i.e., vegetated area away from Whitemud Creek).

Excavations should be monitored frequently by qualified geotechnical personnel, and if signs of instability are observed, shallower slope angles may be required (Golder 2017; Appendix C). Stockpiling of excavation spoils, construction materials or heavy equipment should not be permitted within 3 m of the crest of excavation slopes to reduce the potential for slope movements (Golder 2017). With these mitigation measures in place, the impacts to slope stability will be reduced to negligible.

5.1.1.2 Soil Erosion

Impact

In areas where existing vegetation cover is cleared, exposed soils can become susceptible to water and wind erosion. Fine-textured soil types, such as the clays present on site, are more sensitive to wind and water erosion than coarse-textured soil types, particularly if they are located on steep slopes. Soils on topographic slopes and temporary, stockpile slopes are particularly susceptible to erosion as a result of surface runoff. The proposed Kihciy Askiy Phase 1 site currently has some moderate slopes, which will be maintained, and the remainder, in general, will be regraded to slope gently towards the east side of the site and vegetated swales. A vegetated buffer currently exists and will remain between the site and Whitemud Creek. Thus, there is some potential for soil erosion off-site until site revegetation is complete, but deposition should occur in the existing forest, not the creek. If eroded materials are transported as sediment into the creek, soil erosion could have adverse secondary impacts on water quality and aquatic habitat.

Responding to the identified potential for soil erosion, a site-specific temporary and permanent Erosion and Sedimentation Control (ESC) Plan (pursuant to the City's Enviso program and the Environmental Construction Operations Plan Framework 2016) will be developed to the satisfaction of the City and implemented, with all related monitoring to be undertaken by a Certified Professional in Erosion and Sediment Control (CPESC) or equivalent. Erosion control measures compliant with the City's *Erosion and Sedimentation Control Guidelines* (2005) will be employed during the project. Following construction, disturbed areas will be topsoiled and reseeded with several seed mixes, approved by City of Edmonton Facility and Landscape Infrastructure. With the proposed erosion control measures in place, the potential for wind and water erosion to result in soil loss and offsite impacts is rated as negligible.

Mitigation Measures and Residual Impact

The proposed grading plan for the Kihciy Askiy site is currently unknown; however, Golder (2017; Appendix C) recommended that any existing vegetation, topsoil, and other deleterious or unsuitable material be removed from the proposed building footprints during site grading. Golder (2017) noted that the existing topsoil and silty clay fill were not suitable for supporting building foundations, floor slab or engineered fill. Their recommendations for topsoil and fill removal should be reviewed by a qualified geotechnical engineer once grading plans are available.

Prior to placing engineered fill, Golder (2017; Appendix C) recommended that the exposed subgrade should be proof rolled in conjunction with an inspection by a qualified geotechnical engineer, and it should be confirmed that the exposed soils are native, undisturbed and competent, and have been adequately cleaned of unsuitable fill, ponded water and all disturbed, loosened, softened, organic, or other deleterious material.

Regular inspections by a CPESC, or equivalent, during, and in the short-term following construction, will be required to ensure that all temporary erosion control measures are in

place and function as intended. With those measures in place, soil losses due to wind and water erosion are expected to remain negligible.

5.1.1.3 Loss of Topsoil or Subsoil Mixing

Impact

Topsoil conservation is an important aspect of any work requiring clearing or earthworks. Loss or degradation of topsoil through mixing with subsoils can result in reduced soil fertility and subsequently reclamation capability. The objective of soils management for this project will be to maintain the current capability of soils in the project area, primarily by minimizing disturbance and reclaiming disturbed areas. This will involve minimizing the land area that will be affected by construction, or used for equipment storage and maintenance.

For many soil units in the region, the transition from topsoil to subsoil layers is evident from colour or textural change; thus, salvage depth can be easily determined in the field. In other soil units, the transition is less distinct and there is potential for the topsoil and subsoils to become mixed, thereby affecting the original soil characteristics and soil fertility. In addition, if there are differences in textures between topsoils and subsoils, mixing can cause adverse effects on soil drainage and compactability.

Topsoil and subsoil will be stripped and stockpiled separately for later use in site reclamation. A soil scientist or contractor experienced/trained in identifying soil horizons will be present on-site when stripping topsoil to ensure appropriate salvage depths are determined in areas where the transition to subsoil is unclear and the area involved is large. Such precautions will help reduce the potential for mixing of topsoil and subsoil layers and the attendant impacts on topsoil quantities and quality are expected to be negligible.

Mitigation Measures and Residual Impact

No additional mitigation measures are required, and the residual impact will remain negligible.

5.1.1.4 Compaction of Topsoil and Subsoil by Construction Equipment

Impact

Compaction of topsoils and subsoils could occur where construction equipment will be operating and after grading and placement of soils during reclamation. The potential impact would be a slower rate of plant regeneration, or, more generally, a reduced capability for effective reclamation. Local drainage patterns can also be modified if compaction occurs, leading to potential erosion issues, especially on slopes. The impact of soil compaction to affect reclamation is rated as adverse, minor, long-term and predictable.

Mitigation Measures and Residual Impact

Subsoils will be ripped and fine topsoils will be disked after they are placed to reduce compaction effects. This will also ensure that drainage is maintained as designed. Golder (2017; Appendix C) recommended full-time monitoring and compaction testing, undertaken by qualified geotechnical personnel, during any subgrade preparation, fill placement or proof-rolling to confirm that specifications are being achieved. With these measures in place, the residual impact will be reduced to negligible.

5.1.1.5 Soil Contamination due to Hazardous Material Spills

Impact

Fuels or lubricants are the primary anticipated on-site hazardous materials. Spills onto soils during equipment maintenance or refueling, when stored on-site, or in the event of a malfunction on-site (e.g., leaking hydraulic hose), can cause localized soil contamination. If spill volumes are large, there is potential for the material to spread over a larger area, potentially placing soils on and adjacent to construction activities at risk of contamination. Whitemud Creek is unlikely to be affected, considering the forested buffer in place between the site and the creek, and the fact that the installed drainage swale will not be graded to discharge to the creek. As a best management practice, fuels and other hazardous materials will be stored on level ground in designated construction staging areas a minimum of 100 m from the North Saskatchewan River or Whitemud Creek, and outside of the flood fringe, with secondary containment to reduce spill potential. Refueling will also take place in designated staging areas. Only minor equipment repairs will be completed in the field; major repairs will take place at a central location such as a staging area, or off-site. Mud tracking on 142 Street will be strictly managed according to BMPs and the contractor's Eco Plan. Excess concrete materials will be handled and disposed of appropriately; concrete vehicles will not be washed on-site. All of these measures will reduce the potential for spills to occur, especially large spills. Potential for hazardous materials spills will, therefore, be low.

Accidental spills from equipment will be contained, cleaned up and disposed of following provincial best management practices, guidelines and codes of practice. A small spill, contained within the construction footprint, is expected to have an adverse, minor, permanent and predictable impact to soils.

Mitigation Measures and Residual Impact

Spill kits will be carried on equipment or stored at nearby work locations and all personnel will be trained to respond appropriately to a spill. The contractor will develop and implement an Environmental Construction Operations (ECO) Plan, including a spill protection plan, to ensure any spills are quickly and effectively cleaned up, and spills beyond the AEP threshold will be reported as required by the Alberta *Environmental Protection and Enhancement Act* (*EPEA*). Such measures will reduce the ability for a spill to spread and increase the efficiency of a clean-up. All contaminated soils will be disposed of off-site and clean replacement soil imported. Properly contained and cleaned up, the residual impact to soils of a small spill within the construction footprint is rated as negligible.

5.1.2 Hydrology/Surface Water Drainage/Groundwater

Potential impacts related to hydrology and surface water include:

- release of sediments into Whitemud Creek from construction activities,
- accidental release of hazardous materials (e.g., fuel, oil or lubricants) used during construction, and
- changes to surface drainage patterns.

A detailed analysis of each potential impact is provided below.

5.1.2.1 Sediment Release

Impact

The only surface water body located in the vicinity of the study area is Whitemud Creek. Construction of the proposed project will take place on a relatively level area but within the Whitemud Creek 1:100 flood fringe area. Due to the relatively level nature of the site, the lack of existing drainage infrastructure connecting to the creek and the presence of a vegetated buffer between the project area and the creek, it is unlikely that sediment generated from construction activities will reach Whitemud Creek via overland movement flow.

As required by the City of Edmonton, the contractor will develop and implement a site-specific Erosion and Sedimentation Control (ESC) Plan (pursuant to the City's Enviso program) to the satisfaction of the City. Temporary erosion and sedimentation control measures will be in place during construction, and all related monitoring will be undertaken by a Certified Professional in Erosion and Sediment Control (CPESC) or equivalent. Erosion and sedimentation control measures compliant with the City's *Erosion and Sedimentation Control Guidelines* (2005) will be employed during the project. Following regrading, temporarily disturbed areas will be topsoiled and reseeded with an appropriate seed mix, approved by City of Edmonton Facility and Landscape Infrastructure. With these measures in place, the impact to Whitemud Creek from sediment release will be negligible.

Mitigation Measures and Residual Impact

With the implementation of the project's future ESC Plan, no adverse impacts to Whitemud Creek from eroded sediments are anticipated. Regular inspections by a CPESC, or equivalent, will be required to ensure that all sedimentation control measures are in place and function as intended throughout the duration of construction and until such a time that vegetation is well established in areas that could pose a threat of erosion and sedimentation to Whitemud Creek. In addition the contractor will be required to include diligent mud tracking management measures for 142 Street and beyond, to ensure that materials are not released to roadway catch basins and receiving water bodies. With these measures in place, residual impacts from sediment release are anticipated to remain negligible.

5.1.2.2 Release of Deleterious Substances during Construction

Impact

Fuels, oils and lubricants used in construction equipment can degrade aquatic habitat or harm aquatic species if they reach Whitemud Creek. Due to the relatively level nature of the site and the distance of the project area from Whitemud Creek, it is unlikely under typical conditions that sediment generated from construction activities will reach Whitemud Creek via overland movements. As the majority of the Kihciy Askiy project area is situated within the flood fringe area as mapped by the Province, it is possible that under flood conditions, hazardous materials could be released into the floodplain and into the creek. Construction staging areas and practices will be required to account for the unlikely event of flood conditions.

Refueling or maintenance of construction equipment will not be permitted within 100 m of Whitemud Creek, or within the flood fringe area. Hazardous materials will not be stored below the floodplain elevation. All equipment operating on-site will have spill kits on hand or nearby in the work area and will employ drip pans to the extent possible, so that accidental release of such material can be quickly and effectively controlled. All personnel will be trained to respond to a spill quickly and effectively. As a result, the potential for large spills should be eliminated and the potential for small spills minimized. Should a spill occur, it will be contained and disposed of following provincial guidelines. With best management practices being followed, and any spills cleaned up following provincial guidelines, the potential impact of hazardous material spills to Whitemud Creek will be minimized; however, a spill would result in an adverse, minor, short-term and predictable impact.

Mitigation Measures and Residual Impact

The contractor will develop and implement an Environmental Construction Operations (ECO) Plan including a spill protection plan, and specifics relevant to working near water and within a flood fringe to ensure any spills are quickly and effectively cleaned up. Any spills beyond the AEP threshold will be reported as required by the Alberta *Environmental Protection and Enhancement Act* (*EPEA*). Best management practices and mitigation measures will reduce the ability for a spill to spread or cause harm and increase the efficiency of a clean-up. Accordingly, the residual impact of a spill on Whitemud Creek will be negligible.

5.1.2.3 Changes to Surface Runoff Patterns

Impact

Currently, there is no formal surface water management at the existing Kihciy Askiy site. The proposed Kihciy Askiy site is moderately sloped from west to east and gently sloped from north to south (Golder 2014). Golder (2017; Appendix C) noted the runoff direction from north to south through the site. A 2.5 m high slope starts parallel to the north-south portion of the access road where it abuts the site and leads to a lower central area characterized as slightly undulating, with a depression near the centre, where surface

flows from snowmelt and large rain events result in occasional shallow ponding. (Manasc Isaac 2017).

Surface water will be managed and maintained within the project's site boundaries during construction and operation. The entire Kihciy Askiy Phase 1 area will be regraded to ensure positive site drainage in the most efficient manner, eliminating unwanted localized depressions. Increases in impermeable surfaces will be limited to one new building. (The storage building will have a grassed roof and the access road and parking areas will be gravel.) LID drainage swales will be constructed to catch runoff, widening and deepening to the east, and terminating near the east site boundary in rain gardens. There will be no designed site discharge to Whitemud Creek. The combination of appropriate grading and minimal impervious surfaces will contribute to effective surface water management on-site, and impacts to surface water patterns on the creek following precipitation are expected to be negligible.

Mitigation Measures and Residual Impact

No mitigation measures are required, and residual impacts will remain negligible.

5.1.3 Vegetation

Potential impacts to vegetation include the following:

- loss or alteration of native plant communities,
- loss of special status plant species,
- invasion of weedy species in disturbed areas, and
- contamination of plants due to accidental spills.

These potential impacts and mitigation measures to reduce their magnitude are described in the following sections.

5.1.3.1 Loss or Alteration of Native Plant Communities

Impact

The proposed Kihicy Askiy Phase 1 work area will be approximately 1.99 ha, the majority of which supports a disturbed grassland community dominated by smooth brome and red clover (Figure 5.1). Two designated natural areas (086 RV and 109 RV) are situated in close proximity to the Kihciy Askiy site but are not expected to be impacted by the proposed project. Nearly all of the Phase 1 area will be stripped of topsoil and regraded. The forested area in the northeast will not be disturbed, although site regrading work will occur in proximity to native forest, creating potential for direct and indirect damage to vegetation that is intended to be retained. All regraded areas will be reseeded with an appropriate river valley seed mix. The easternmost margin of the Phase 1 lands will be seeded and passive encroachment of native trees and shrubs from the adjacent balsam poplar forest community encouraged, creating a transition zone from grass-dominated lands to forest. Additional landscaping using native species of trees and shrubs will be employed in select areas. Some permanent infrastructure will be

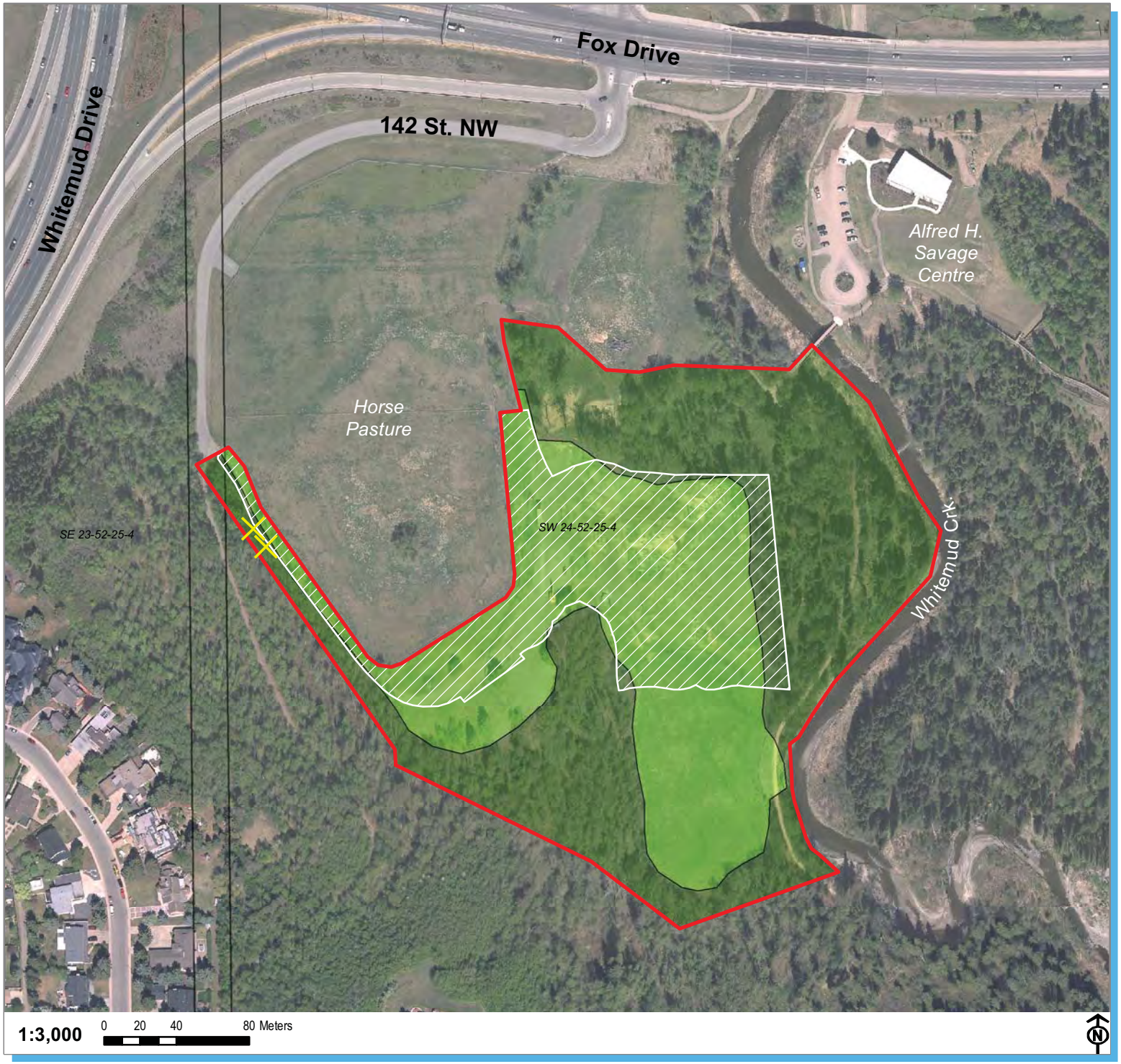


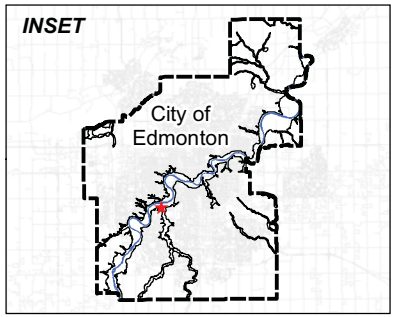
Figure 5.1
Proposed Vegetation Impact Areas
Kihciy Askiy in Whitemud Park

Legend

- High-Bush Cranberry
- Study Area
- Phase 1 Boundary

Plant Communities

- Balsam Poplar-White Spruce
- Grassland



Date Map Created: 17 July 2017
Aerial Photograph Date: May 2015

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constructed (storage building, change room/washroom facility, parking area, granular trails) all in localities currently occupied by disturbed grassland. Loss of native plant communities is rated as negligible, as project construction is intended to take place entirely within the disturbed grassland.

Mitigation Measures and Residual Impact

Prior to construction, marking the clearing and grading limits with highly visible flagging will control unintended damage to vegetation. Laydown/staging areas will be fenced, with no vehicular or project activity outside the fenced area. In addition, the proponent will ensure compliance with all aspects of the City of Edmonton *Corporate Tree Management Policy* (C456). For example, the policy requires all treed areas within 5 m of any construction to be assessed by City of Edmonton's Urban Forestry department during a site meeting a minimum of four weeks in advance of the construction start date and for protection measures to be implemented during construction. All damage to parkland will be restored to the satisfaction of City of Edmonton Construction Standards and City Operations. The contractor will be required to comply with tree protection measures and to detail those measures in the Contractor's ECO Plan.

All temporarily disturbed areas will be reclaimed following construction using a naturalization seed mix and/or plantings as soon as possible following active construction. All tree and shrub loss will be compensated for through proponent cooperation with the City group that administers Edmonton's *Corporate Tree Management Policy*. Based on these measures, residual impacts will remain negligible.

5.1.3.2 Loss of Special Status Plant Species

Impact

One S3S4 plant species, high-bush cranberry, was detected in the proposed project area during field surveys in June and August 2016. Two high-bush cranberry individuals were detected at 12U 329847E, 5931050N, and 12U 329853E, 5931040N, in the balsam poplar-white spruce (P2) community immediately south of the site access road, immediately adjacent to the project footprint. Roadway widening in this location will occur to the northwest, taking advantage of the existing space between the roadway and the horse pasture fence, and eliminating the need to clear native forest vegetation. However, because of the proximity of the high-bush cranberry individuals to the existing road, the plants may be inadvertently impacted by passing equipment or soil compaction. Unmitigated, an impact to these plants would be adverse, minor, short-term to permanent and predictable. It is considered minor because there are only two individuals and high-bush cranberry is abundant in other areas within Edmonton's North Saskatchewan River Valley and ravine system.

Mitigation Measures and Residual Impact

In advance of construction initiation, clearing boundaries will be marked with highly-visible flagging to contain clearing damage in native plant communities and this will reduce the chance that this species, located near the clearing boundaries, will be affected.

Flagging the high-bush cranberry individuals will also reduce the chance of a direct impact to the plants. With this simple mitigation measure implemented, the potential residual impact to special status plant species will be reduced to negligible.

5.1.3.3 Establishment of Invasive and Weedy Species

Impact

Weed species were documented throughout the proposed project area. Exotic species and noxious weeds were detected in both plant communities, ranging in abundance from rare to dominant and noxious weeds were widespread, with some localities dominated by weeds. Although mature weeds will be removed during grubbing, their seeds will remain in topsoils and on-site if topsoils are to be stockpiled and reused in reclamation. Surface disturbance associated with construction could create ideal conditions for the spread of exotic and noxious weed species to adjacent areas, which were less weedy than the site's grasslands. Weed establishment in the reclaimed project area and spreading into the surrounding native plant communities within the Whitemud Ravine is undesirable. Preventing weed establishment in reclaimed areas may be the best and most economical opportunity for weed management. In the absence of mitigation, the spread of weedy species within reclaimed areas will certainly occur and soil work in close proximity to the native forest has high potential to lead to increased weed establishment in the adjacent forest. Pre- and post- turf inspections will be conducted by Parks and Road Services Southwest. As the project intends to strip all of the disturbed grassland on site, reseed with native or naturalized species and implement weed management during the warranty period, the project represents an opportunity to reduce the occurrence of weeds in the project area but also to have an adverse, minor (local impact), permanent and predictable impact on vegetation in the immediately adjacent forested areas.

Mitigation Measures and Residual Impact

Precautions such as cleaning equipment used in weedy areas before moving into site margins will help reduce the potential transfer and spread of weedy species. Cleared areas will be revegetated with topsoil and an appropriate seed mix approved by City of Edmonton Facility and Landscape Infrastructure will be applied as soon as possible following construction. Diligent weed control will be required until desired vegetation becomes established, and the need for remedial measures will be assessed during warranty monitoring. Monitoring will include the forested area to be retained in the site's northeast corner. All weed control measures to be implemented during construction, such as on soil and subsoil stockpiles, will be outlined in the contractor's Environmental Construction Operations (ECO) Plan. With proper implementation of these measures, the residual impact will be reduced to negligible.

5.1.3.4 Contamination due to Accidental Spills

Impact

Fuel or lubricant spills can occur during refueling or as a result of equipment failure or accidents (e.g., broken hydraulic hose). Heavy equipment will be working in close proximity to areas of natural vegetation. Should spills occur in areas with natural

vegetation, these features could be contaminated with hydrocarbons and heavy metals, which, in turn, could result in plant mortality. Most spills would likely be small in nature, but if uncontrolled could spread over larger areas. Spill kits will be carried on or readily accessible to equipment working on-site and at the refueling/maintenance areas. Construction personnel will be trained in the use of spill kits. As a result, the potential for large spills should be eliminated and the potential for small spills minimized. These actions will also reduce the potential for a spill to spread off the construction site and into undisturbed areas. With these practices implemented, the potential for contamination of natural vegetation is low. Nonetheless, in the unlikely event of a spill, damage to vegetation could result in an adverse, minor, long-term and predictable impact.

Mitigation Measures and Residual Impact

No further mitigation is required beyond the standard measures described above. The Contractor will develop and implement an Environmental Construction Operations (ECO) Plan, including a spill protection plan, to ensure any spills are quickly and effectively cleaned up, and spills of a certain size will be reported as required by the Alberta *Environmental Protection and Enhancement Act* (*EPEA*). The residual impact in the unlikely event of a spill remains adverse, minor, long-term and predictable.

5.1.4 Wildlife

Potential impacts related to wildlife and wildlife habitat include the following:

- Loss or alteration of terrestrial habitat.
- Habitat alienation during construction and operation.
- Breeding bird mortality due to construction activity during breeding season.
- Mortality or disturbance of special status wildlife species.

A detailed analysis of each potential impact follows below.

5.1.4.1 Loss or Alteration of Terrestrial Habitat

Impact

Construction of the Kihciy Askiy site will initially involve regrading of the entire site. This will result in the temporary loss of the vast majority of the existing disturbed grassland habitat. As a component of site development, the majority of this area will, however, be seeded with an appropriate river valley seed mix that is intended to result in the establishment of native grass-dominated community throughout much of the site. Some small areas of the current disturbed grassland, mainly along its eastern edge, will be allowed to regenerate into natural successional plant communities, and over the long-term is expected to result in balsam poplar-dominated deciduous woodland. Additional landscaping using native species of trees and shrubs will be employed in select areas. Permanent loss of the current grassland habitat will result from the expansion of the parking lot, construction of the two proposed buildings, construction of granular trails and the establishment of the two areas that will be subject to regular mowing.

At no point during construction or operation will any of the identified balsam poplar-white spruce mixedwood forest be cleared or otherwise permanently impacted.

As a result of the relatively low habitat value of the grassland habitat to be lost, the small areas of permanent habitat loss, the avoidance of impacts to the mixedwood forest and the proposed naturalization efforts that will be undertaken throughout the site, the anticipated impacts of the habitat loss on the capacity of the study area to support wildlife is expected to be negligible.

Mitigation Measures and Residual Impact

Additional habitat mitigation measures are not required. Residual impacts on wildlife habitat are rated as negligible.

5.1.4.2 Habitat Alienation during Construction and Operation

Impact

Construction

Activities and noise associated with construction are known to deter some wildlife species from using immediately adjacent areas of habitat. Most individuals (and species) using habitat in the study area are likely already adapted to disturbance in the form of noise from nearby roadways and the presence of people recreating. Construction activities will generally occur only during daylight hours, allowing animals active at night to move around the construction areas, and use the remainder of the study area. Finally, construction is scheduled to commence in August near the end of the breeding season. Any additional disturbance/stimulus caused by temporary construction activities is expected to have little to no cumulative effect and to be very limited in geographic extent. The impact to wildlife from habitat alienation during construction is rated as negligible.

Operation

The proposed Kihciy Askiy site has, for much of its past, supported various levels of human use. Since being cleared in the 1930's the site has supported farming and associated land uses, including some grazing, and farmyard infrastructure such as horse shelter, sheds, a residence, a garage. However, in the last few years, and especially since demolition of almost all the infrastructure in 2015, the site has supported the lowest levels of human use since the site was first developed in the mid 1900's. The site is rarely visited, there is very little traffic on 142 St. and the gravel access road is gated closed. The proposed Kihciy Askiy programming represents a marked increase in site use intensity relative to recent and more distant history.

The operation of Kihciy Askiy will generally follow standard park hours, with occasional overnight usage to be approved on a case-by-case basis. The proposed development will see a significance increase in traffic on 142 Street and the connecting access road (approximately 50 to 100 vehicles per commuting period). Typical day-to-day operations are expected to involve between 50 and 100 individual site visitors, while occasional special events may see attendance numbers over 100. As is typical of indigenous

ceremonies and celebrations, drumming will form a central component of many activities at the site.

The proposed activities at Kihciy Askiy will likely deter many wildlife species from using habitat available on the site (e.g., the site margins and planted trees), and certainly the less tolerant, more skittish species such as deer, moose and barred owl are likely to be deterred from the site when activities are ongoing. Species that are often associated with high-use parks and humans, such as squirrels, chickadees and corvids are expected to quickly habituate to this new site use. Because of the anticipated, nearly consistent site use and long site hours, this alienation effect for sensitive species is expected to extend beyond the site boundaries, rendering the adjacent habitat less attractive, in much the same way that development of any new river valley park would do. The spatial extent of the predicted alienation is difficult to predict but logic suggests that the effect will be widest for species that typically avoid human presence and may not occur at all for other more tolerant species. The effect on nocturnal animals will be less severe. The location of the site near other parks and roadways suggests that the effect may not be as far reaching as it would be if the project were in a more remote area and involved new road access or clearing into established forest. On balance, operation of Kihciy Askiy is anticipated to result in some habitat alienation both on site and adjacent to the site and this is rated as an adverse, minor, permanent and uncertain impact. The impact is rated as minor because the majority of wildlife in lower Whitemud Creek Ravine are urban-tolerant species and areas adjacent to the Kihciy Askiy site already support trail recreation use. It is rated as uncertain because the area affected cannot be quantified.

Mitigation Measures and Residual Impact

As a matter of best practice, all personnel onsite will be instructed not to harass wildlife. Guidelines are currently being prepared for Kihciy Askiy site access. Ensuring non-harassment of wildlife has been identified as important culturally and will be a key guideline. The residual impact remains rated as adverse, minor, permanent and uncertain.

5.1.4.3 Breeding Bird Mortality due to Clearing

Impact

Clearing of natural vegetation, including unmanicured grasses, can cause wildlife mortality, particularly during the spring and summer breeding season when the mobility of many species is restricted. During those times, adults remain close to dens and nest sites, and young are restricted to nests or not yet able to move long distances. To protect wildlife, and particularly nesting birds protected by the *Migratory Birds Convention Act* and *Wildlife Act*, current best management practice guidance provided by Environment Canada recommends avoiding vegetation clearing during the period when there is a high probability of nesting activity (i.e., high risk period). This extends to removal of individual ornamental trees and weedy, grassy areas because commonly-occurring species such as the American robin and savannah sparrow, which may use those areas for nesting respectively, are covered by the legislation. When this practice is not adopted and in the absence of other mitigation measures, there can be a high potential for nest disturbance. Further, owls that occur in Edmonton are protected by the *Wildlife Act*, and

are early nesters. Clearing during the period 15 February and 20 April without regard for nesting owls can result in owl nest disturbance and nestling mortality. Should clearing due diligence not be employed, wildlife mortality resulting from clearing could occur. This would be an adverse, major, permanent and predictable impact. It is rated as major because it represents contravention of the law.

Mitigation Measures and Residual Impact

For most projects, avoidance of vegetation clearing (including brush piles and tall grass) during the period 20 April to 20 August is recommended as a means of achieving reasonable due diligence for the protection of nesting migratory birds and avoiding project delays. In addition, to respect the possibility of nesting owls being present, it is typically recommended that no mature trees be cleared during the period 15 February and 20 April. If possible, this project will avoid stripping of the grassland area and any necessary tree and shrub clearing/removal during the period 15 February and 20 August. If stripping/clearing must occur between 20 April and 20 August, it may be possible to have a qualified biologist complete a nest sweep by in advance of clearing. All observed nests of species protected by legislation must then be avoided and buffered appropriately until the nest is no longer active. If clearing of *mature trees* must occur between 15 February and 20 April, the trees should first be inspected for owl use by a qualified biologist and similar protective measures applied to all observed nests. Prior to construction, marking the clearing limits with snow-fence or highly-visible flagging will help minimize the extent of incidental vegetation damage and harm to nesting wildlife. With these measures in place, wildlife mortality should be avoided and the residual impact is expected to be negligible.

5.1.4.4 Mortality or Disturbance of Special Status Species

Impact

Six species - the northern bat, little brown bat, barn swallow, olive-sided flycatcher, Canada warbler and barred owl – were identified as having at least a moderate likelihood of occurrence within the study area. The habitat component located within the study area that is of most significance to the northern bat, little brown bat, olive-sided flycatcher and Canada warbler is the mature mixedwood forest. At no point during construction or operation will any of the identified mixedwood forest be cleared or otherwise directly and permanently impacted. As such, direct impacts to those four special status species are not anticipated.

The utility shed located within the Kihciy Askiy site is proposed to be removed to accommodate the development of the site. During the bird breeding season (i.e., 20 April - 20 August), the shed holds moderate potential to provide a nesting location for barn swallows. A schedule is not yet available for the demolition and removal of the shed. If conducted during the breeding season, the removal work could negatively impact nesting barn swallows if not mitigated appropriately. Should impacts to nesting barn swallows occur, it would be an adverse, major, permanent and predictable impact.

Barred owls prefer nesting in mature mixedwood forest and use woodland edges for foraging (Poole 2015). Construction of Kihciy Askiy will not directly impact any of the existing mixedwood forest within the study area, thus, there will be no loss of potential nesting habitat. The Kihciy Askiy site currently includes areas of edge habitat between the mixedwood forest and the disturbed grassland which could serve as suitable hunting habitat for barred owls. Although construction of Kihciy Askiy will result in some temporary loss of the grassland habitat (as a result of site stripping), plans are to establish grass-dominated habitat throughout much of the site and use of the site will generally be limited to daytime hours. As such, although the potential attractiveness of this area as hunting habitat will likely be diminished during construction and during operational daytime hours, once the site is established, suitable hunting habitat is expected to remain during the night when barred owls are most active. Considering this, and the relatively small scale of site development when considered within the context of the entire ravine, the potential disturbance impact to barred owls is rated as negligible.

Mitigation Measures and Residual Impact

To mitigate the potential impacts identified for barn swallows, the utility shed should be inspected by a qualified Professional Biologist for nesting swallows in advance of demolition if scheduled to take place during the breeding bird season of 20 April to 20 August. Any recommendations provided by that biologist would then constitute additional mitigation measures that would require completion in advance of construction. With implementation of this mitigation measure, the potential impact to barn swallows can be effectively controlled, reducing the residual impact to negligible.

The planned naturalization efforts included as part of the project will maintain some amount of small mammal habitat (grassland) that will continue to provide suitable barred owl foraging habitat. Residual impacts will remain negligible.

5.1.5 Habitat Connectivity/Wildlife Passage

Potential impacts related to habitat connectivity and wildlife passage from the proposed project include:

- Creation of barriers impacting wildlife movement/habitat connectivity

This potential impact and recommended mitigation measures are described in the sections below.

5.1.5.1 Creation of Barriers Impacting Wildlife Movement/Habitat Connectivity

Impact

Construction within the confines of the proposed Kihciy Askiy site is not expected to result in additional impacts to wildlife movement beyond some potential for habitat alienation as discussed above (*Section 5.1.4.2*). The construction site will not be a fenced, secure site and there are no major topographic changes that would render the site

hazardous to wildlife. Construction hours will generally be limited to the daytime and evenings. This will provide opportunities for wildlife to pass through the project area at night, without disturbance.

The potential for Kihciy Askiy operation to alienate wildlife from the study area and adjacent lands is discussed above; that discussion also applies to habitat connectivity/wildlife movement. Kihciy Askiy Phase 1 will not result in any changes to the current fencing at the site. As such, the main physical feature that functions as a potential barrier and that, as a result, currently influences wildlife movement through the study area, will remain unchanged. The structures to be installed within the site are not anticipated to render the site itself impermeable to wildlife movement, particularly at night when people are not present. Beyond the study area, habitat within the rest of Whitemud Creek Ravine will remain unchanged and available as wildlife movement corridors. Accordingly, while the increased site activity will make the area less attractive to certain species, the Phase 1 development is not anticipated to render this reach of the ravine less permeable to wildlife movement. The impact of the project on the corridor is expected to be negligible.

Mitigation Measures and Residual Impact

No mitigation measures are required and residual impacts will remain negligible.

5.2 Valued Socio-Economic Components

5.2.1 Residential Land Use

We examined the following potential impacts of the proposed Kihciy Askiy project on residential land use:

- disturbance to residents from Kihciy Askiy construction activities, and
- disturbance to residents from Kihciy Askiy operation.

These impacts and recommended mitigation measures to minimize potential impacts are described in the sections below.

5.2.1.1 Disturbance to Residents from Construction Activities

Impact

The nearest residential neighbourhood to the proposed Kihciy Askiy site is Brookside, situated upslope to the southwest of the Kihciy Askiy site. While vehicle access to Brookside is from the tablelands only, an SUP connects Brookside to 142 Street and then to bus stops along Fox Drive, and this route is used by residents for non-motorized commuting and for transit access. The SUP and 142 Street are expected to remain open during construction, although 142 Street will be used for construction access and temporary closures may be required. Temporary closures of the SUP may adversely affect nearby residents, especially bus or commuters using non-motorized transportation means. Furthermore, some residents, particularly those immediately upslope of the Kihciy Askiy site, may temporarily experience some noise disturbance from construction

activities and construction traffic. Based on this information, impacts to residential land use from construction are rated as adverse, minor, short-term and predictable.

Mitigation Measures and Residual Impact

Construction working hours will be limited to the hours permitted by the City of Edmonton's *Community Standards Bylaw* (Bylaw 14600) (07:00-21:00 hours Monday to Saturday; 09:00-19:00 hours Sundays and holidays. Extremely loud activities, such as pile driving, are not required as part of this project. The City of Edmonton has undergone and continues to undergo, public consultation to best accommodate concerns regarding the construction period. Any SUP and road detours or temporary closures will be clearly stated. Based on this information, residual impacts will remain adverse, minor, short-term and predictable, as some s inconvenience to residents will remain throughout construction.

5.2.1.2 Kihciy Askiy Operation Affecting Nearby Residents

The hours of operation of Kihciy Askiy will be consistent with City of Edmonton park hours (0600 – 2300, seven days a week, within the park operating hours specified in the Parkland Bylaw, Bylaw 2202). Sweats are anticipated to be held between the hours of 9:00 and 7:00 pm, and occasionally other ceremonies, which may utilize fire and drumming, may be held during park hours. Special events lasting a few days may occur from time to time, as approved by Native Counselling Services of Alberta and the City of Edmonton. A noise study was not required as part of the project. As the Kihciy Askiy site will adhere to park hours as stated in the *Parkland Bylaw* (Bylaw 2202), impacts to nearby residents are expected to be within the acceptable limits of City park use and are thus classified as negligible.

5.2.2 Recreational Land Use

Potential impacts of the proposed project on recreational land use include the following:

- disturbance to existing recreationalists during construction,
- provision of a cultural/ceremonial site for Indigenous peoples, and
- provision of new cultural experiences for the general public.

These impacts and recommended mitigation measures to minimize potential impacts are described in the sections below.

5.2.2.1 Disturbance to Existing Recreationalists

Impact

Construction

The existing SUPs to the west and east of the proposed site will remain open during construction and will be physically unaffected by construction. The recreation experience may be diminished as recreationalists using these SUPs will likely hear construction noise. The west SUP feeds into 142 Street, which will be used for

construction access. For the duration of the construction period, contractors will share that road with recreationists, and the road may be closed to pedestrians and cyclists for very short periods. The potential impacts to recreational use from construction activities are expected to be adverse, minor, short-term and predictable.

Operation

The proposed Kihciy Askiy site will offer unrestricted site access and will therefore provide some new trail connections for users of this part of the ravine. The proposed Phase 1 project will result in a direct trail connection between the SUP that currently connects to 142 Street, the site gravel access road and the new granular trails within the Kihciy Askiy site. Phase 1 will not, however, provide a connection to the existing formal ravine trail immediately west of Whitemud Creek; Phase 2 will provide a connection via a gate in the existing fence. This is recognized as positive, minor, permanent and predictable impact on recreation opportunity.

During operation, recreational parking availability in the general area is not anticipated to be affected as the majority of Kihciy Askiy site users are expected to use the proposed site parking area or will be transported by bus in the case of special events. The potential impacts to recreational use from construction activities are expected to be negligible.

Mitigation Measures and Residual Impact

Construction

Construction noise will be limited to the hours permitted by the City of Edmonton's *Community Standards Bylaw* (Bylaw 14600) (07:00-21:00 hours Monday to Saturday; 09:00-19:00 Sundays and holidays). The construction contractor may apply for exemptions to the hours of work if required.

Temporary fencing will be installed around active construction areas when they occur close to the existing SUP and temporary detours, if required, will be identified. Signage will be clearly posted indicating a project contact person and prime contractor and shall include project information, duration of construction and a phone number for inquiries. Use of corporate logos will be carefully managed in accordance with Edmonton's *Zoning Bylaw* (Bylaw 12800). Signage shall be removed within two weeks of construction completion. In addition, the contractor will provide appropriate safety measures for protection of pedestrians along the shared use access, and these will be outlined in the project ECO Plan. With these measures in place, the impact will be mitigated but some inconvenience will remain. Therefore, the residual impact remains rated as adverse, minor, short-term and predictable.

Operation

Mitigation measures for the operation phase are not required.

5.2.2.2 Provision of a Cultural/Ceremonial Site for Indigenous Peoples

Impact

The City of Edmonton currently does not have a cultural/ceremonial site for Indigenous peoples to gather and host events. The proposed Kihciy Askiy Phase 1 will provide a natural setting for the Indigenous community to host intimate gatherings and spiritual ceremonies, sweat lodges, cultural camps and talking circles, to practice traditional crafts and facilitate intergenerational learning, healing and reconciliation. These opportunities for Indigenous peoples are considered to be a positive, major, permanent and predictable recreational (and cultural) impact.

Mitigation Measures and Residual Impact

No mitigation measures are required.

5.2.2.3 Provision of New Cultural Experiences for the General Public

Impact

While Kihciy Askiy Phase 1 is intended to provide a sacred, intimate space for Indigenous spiritual celebrations, the proposed site will be open to the general public and will provide opportunities to share the world view of Indigenous peoples and offer cultural education. Integrating the Kihciy Askiy site with adjacent well-used recreational amenities (Whitemud Park, adjacent SUPs and the Alfred H. Savage Centre) will increase the potential for cross-cultural education and outreach. Provision of this new kind of experience for non-Indigenous people in an integrated natural setting is rated as a positive, major, permanent and predictable recreational impact.

Mitigation Measures and Residual Impact

No mitigation measures are required.

5.2.3 Traffic/Parking

Potential impacts to traffic and parking include the following:

- increased construction traffic, and
- increased traffic and parking in adjacent areas resulting from Kihciy Askiy operation.

These impacts and recommended mitigation measures to minimize potential impacts are described in the sections below.

5.2.3.1 Increased Construction Traffic

Impact

Conflicts between construction traffic and nearby existing roadway traffic is expected to be minimal. Construction traffic will access the Kihciy Askiy site via 142 Street and will utilize a staging area for parking, within the Kihciy Askiy project area. The local access

road is currently closed to the public. In this area, 142 Street currently experiences a very low level of use (Bunt and Associates 2016) as it dead-ends immediately west of the proposed project area and does not offer parking to recreationists wishing to use local SUPs. Construction traffic is expected to be intermittent and concentrated, limited to construction worker commutes, deliveries of equipment and materials. Potential impacts associated with this temporary increase in traffic and parking in the project area are rated as negligible.

Mitigation Measures and Residual Impact

The contractor will ensure that 142 Street remains open to the public traffic throughout the construction period. Impacts from temporary increased construction traffic and parking will be reduced to negligible.

5.2.3.2 Increased Traffic and Parking in Adjacent Areas from Kihciy Askiy Operation

Impact

Recognizing the proximity of the proposed Kihciy Askiy site to major arterial roadways (Whitemud Drive, Fox Drive), a traffic impact assessment was completed (Bunt & Associates 2016). Site activities, such as sweats, may begin as early as 9:00 am and may operate until 7:00 pm daily. As this overlaps with peak travel times on weekdays and Saturdays, additional traffic on Whitemud Drive and Fox Drive is anticipated. Bunt & Associates (2016) projected an increase of 50 inbound vehicles during the morning peaks and 100 vehicles (50 inbound and 50 outbound) during the evening peaks, with 70% of access via Whitemud Drive and 30% via Fox Drive. This increase may increase queues on Fox Drive, due to additional time to cycle side road movement; however, this is expected to be adequately accommodated without spillback to adjacent roadways, and an acceptable level of service is expected to be maintained (Bunt & Associates 2016).

The site plan calls for fifty (50) angled, gravel parking stalls, including two signed disabled parking stalls (as per code requirements), and two bus parking stalls, situated at the site entrance (Figure 2.2). Proposed parking on-site is expected to be sufficient for the anticipated level of use; in the case of major special events, it is expected that busing will be provided to avoid the need for overflow parking in the area. Phase 1 will not provide a connection to the existing formal ravine trail immediately west of Whitemud Creek; therefore, no additional parking demand at Whitemud Park and the Alfred H. Savage Centre is anticipated.

NCSA will manage parking and site programming to ensure that there are minimal overflow parking situations, affecting Fort Edmonton Park and Whitemud Equine Centre. Through the formation of a Site Stewardship Community, communication and coordination between Kihciy Askiy, Fort Edmonton Park and the Whitemud Equine Centre will be undertaken if special events with anticipated increases in traffic and parking requirements are scheduled.

In addition to proposed parking, the Kihciy Askiy site is served by the Edmonton Transit System (ETS), with two bus stops (east- and westbound) on Fox Drive, approximately 250 m from Kihciy Askiy. Dedicated bus lanes are in place on Fox Drive to improve access via public transit during times of high traffic volumes. Coordination with ETS is ongoing to ensure transit accessibility for Indigenous and non-Indigenous visitors to Kihciy Askiy.

Based on this information, impacts to traffic and parking from Kihciy Askiy site operation are rated as negligible.

Mitigation Measures and Residual Impact

No additional mitigation measures are required, and impacts will remain negligible.

5.3 Valued Historic Components

5.3.1 Historical Resources

Potential impacts to historical resources include the following:

- disturbance to known and undiscovered historical resources, and
- disturbance to known and undiscovered paleontological resources.

These potential impacts are discussed more fully in the following sections.

5.3.1.1 Disturbance to Historical/Archaeological Resources

Impact

Alberta Culture and Tourism (ACT) has confirmed that there are no known historical or archaeological resources at the proposed site and granted clearance for project activities, with the standard condition that newly discovered artifacts must be reported to the Province immediately. Impacts to known historical resources are, therefore, expected to be negligible and there is some low potential to encounter unknown archaeological resources. The potential for adverse impact is reduced to an acceptable level by the Province's condition to immediately suspend work and contact ACT and the Royal Tyrrell Museum should potential historical/archaeological resources be discovered during construction. The potential for the project to adversely affect historical or archaeological resources is, therefore, rated as negligible.

Mitigation Measures and Residual Impact

In accordance with the ACT clearance letter, all work will be immediately suspended and ACT and the Royal Tyrrell Museum contacted should potential historical/archaeological resources be discovered during construction (Appendix G). Appropriate follow-up measures would then be implemented. Considering this, the residual impact to historical resources is rated as negligible.

5.3.1.2 Disturbance to Paleontological Resources

Impact

The pre-construction Paleontological Historical Resources Impact Assessment (pHRIA) for the proposed Kihciy Askiy project identified potential for fossils to occur in the Horseshoe Canyon bedrock of the Kihciy Askiy site (Aeon 2017). Possible ash layers in ephemeral pond environments with gastropod (snail) shells were noted at 0.8 to 1.3 m in the central section of the Project. Backhoe tests also encountered fossiliferous Cretaceous bedrock from the Horseshoe Canyon Formation at approximately 1.5 m in depth on a lower terrace near the proposed change and washroom facility (Aeon 2017). As a result, any excavations below 1.5 m, such as building foundation and support footings for the change room/washroom and storage shed, septic tank installation and utility open-cut trenching, have a high potential to disturb bedrock and significant fossil resources from the Horseshoe Canyon Formation (Aeon 2017). The potential for significant fossil resources to be adversely impacted during project activities, therefore, is considered to be adverse, major, permanent and predictable.

Mitigation Measures and Residual Impact

Aeon (2017) recommended that a paleontological monitoring program be implemented only during construction activities that involve open-cut excavations of 1.5 m or deeper near the locations of the proposed buildings and utility lines. If potential paleontological resources are discovered during construction activities, all work will be immediately suspended and Alberta Culture and Tourism and the Royal Tyrrell Museum will be contacted. With the monitoring program in place, impacts to paleontological resources will be reduced to negligible.

6.0 SUMMARY ASSESSMENT

6.1 Summary of Impacts

With mitigation measures implemented, most impacts to Valued Environmental Components (VECs) identified in this assessment will be reduced to negligible. The residual impacts of four issues remained adverse, while another two were rated positive. The following sections briefly discuss these exceptions.

6.1.1 Positive Impacts

Two positive residual impacts are anticipated as a result of the proposed project. These include:

- Provision of a cultural/ceremonial site for Indigenous peoples. The City of Edmonton currently does not have a permanent site for the Indigenous population in the Capital Region to gather and host events. The proposed Kihciy Askiy Phase 1 will provide a natural setting for the Indigenous community to host intimate gatherings and spiritual ceremonies, sweat lodges, cultural camps and talking circles, to practice traditional crafts and facilitate intergenerational learning, healing and reconciliation. Upon completion of construction, the residual impact is expected to be positive, major, permanent and predictable.
- Provision of new cultural experiences for the general public. In addition to providing a sacred, intimate space for Indigenous spiritual celebrations, the proposed site will be open to the general public and will provide opportunities to share the world view of Indigenous peoples and offer cultural education. By integrating the Kihciy Askiy site with well-used recreational amenities nearby, the potential for cross-cultural education and outreach will be maximized. Upon completion of construction, the residual impact is expected to be positive, major, permanent and predictable.

6.1.2 Adverse Impacts

With mitigation measures implemented, most if the potential adverse impacts identified in this assessment will be reduced to negligible. The following sections briefly discuss those residual impacts that were not reduced to negligible. In most cases, these are short-term impacts and are expected to last only for the duration of project construction, or portions thereof. Anticipated adverse residual impacts are limited to the following:

- During construction, hazardous materials spills could contaminate natural vegetation with hydrocarbons and heavy metals, which, in turn, could result in plant mortality. Mitigation measures include preparing and ECO Plan and a spill protection plan and ensuring spill kits are readily accessible and all personnel are trained in their use. With those measures in place, the potential for contamination of natural vegetation is low; however, in the unlikely event of a spill, vegetation could be damaged. The residual impact to vegetation remains adverse, minor, long-term and predictable.

- The proposed cultural activities at Kihciy Askiy will increase human activity and will therefore likely deter many wildlife species from using habitat available on the site. Because of the anticipated nearly consistent site use and long site hours, this alienation effect for sensitive species is expected to extend beyond the site boundaries. The spatial extent of the alienation is difficult to predict; the location of the site near other parks and major roadways suggests that the effect may not be as far-reaching as it would be if the project were in a more remote area or involved clearing of established forest. The residual effect on wildlife remains adverse, minor, permanent and uncertain.
- Kihciy Askiy Phase 1 construction will temporarily affect nearby residents, particularly those in the Brookside neighbourhood. Some residents may temporarily experience some noise disturbance from construction activities and construction traffic. In addition, the SUP connecting Brookside to the terminus of 142 Street and nearby buses and trails may be affected by temporary closures of 142 Street, which may affect bus commuters or commuters using non-motorized transportation. The residual impact to residents remains adverse, minor, short-term and predictable.
- Kihciy Askiy Phase 1 construction will temporarily affect nearby recreationalists. The recreational experience along the trails in Whitemud Park may be diminished due to construction noise. The SUP connecting Brookside feeds into 142 Street, which will be used for construction access. For the duration of the construction period, contractors will share the road with recreationalists, and the road may be closed to pedestrians and cyclists for very short periods. Temporary detours, if required, will be identified. The residual impact to recreationalists remains adverse, minor, short-term and predictable.

6.2 City Follow-Up and Monitoring Requirements

This EIA identifies several follow-up and monitoring commitments for the City:

- Pursuant to the City of Edmonton's Enviso program, the City must undertake Environmental Construction Operations (ECO) Plan monitoring during the site preparation and construction phases of the project.
- During construction, conduct a paleontological monitoring program for open-cut excavations exceeding 1.5 m in depth and taking place near the proposed buildings and utility lines. Clearance for paleontological resources is currently pending ACT's review.

6.3 Permitting Requirements

In advance of construction, the following environmental approvals/permits and related submissions will be required:

- Sign-off from City of Edmonton administration for this EIA and the related Site Location Study (under separate cover), and approval from Edmonton's Urban Planning Committee and City Council, pursuant to Bylaw 7188.
- Development Permit from the City of Edmonton (submitted by others).

6.4 Summary Assessment and Conclusions

The City of Edmonton, in partnership with Native Counselling Services of Alberta, proposes to establish a spiritual/cultural site known as Kihciy Askiy (Cree for "Sacred Earth") for the Indigenous community. There is currently no cultural/ceremonial site for Indigenous peoples to gather and host events and ceremonies, within City of Edmonton limits. It is envisioned that Kihciy Askiy will be an accessible space, open to all people, while providing a sacred space for intimate gatherings and spiritual celebrations. The site will provide a place to share the world view of Indigenous people with opportunities for cross-cultural education. The proposed Kihciy Askiy project is consistent with the City of Edmonton's continuing work in support of recommendations resulting from the federal government's Truth and Reconciliation Commission.

The proposed Kihciy Askiy project will be located on the former Fox Farms site, west of Whitemud Creek and south of Fox Drive. Prior to European settlement, this area was used for many centuries by Indigenous people foraging for medicines to heal their communities and was a source of ochre, a rare mineral used in spiritual and traditional ceremonies.

The project assessed in this EIA encompasses Phase 1 of Kihciy Askiy. Phase 1 focuses on regrading and re-naturalization of the northern part of the site and installation of ceremonial and ancillary facilities. The main components include sweat lodges and permanent, ceremonial fire pit, a building for storage with the roof forming a grassy amphitheatre, a building for change rooms/washrooms with a gathering space (completion of gathering space funding-dependent), a site for tipis to be erected on an as-needed basis, and granular walking trails. The site will be regraded for accessibility and surface water management, and landscaped using native vegetation. Upon completion of construction, the proposed project will result in several long-lasting positive impacts to the cultural and recreational experiences available in the area.

7.0 REFERENCES

7.1 Literature Cited

Aeon Paleontological Consulting Ltd. 2017. Historical Resources Impact Assessment (Paleontological Report): Kihciy Askiy Sacred Earth. Prepared for City of Edmonton. Edmonton, Alberta.

Alberta Environment and Parks. 2016a. Alberta Conservation Management Information System (ACIMS). http://www.albertaparks.ca/acims-data#. Accessed 22 March 2016.

Alberta Environment and Parks. 2016b. Fish and Wildlife Management Information System. http://aep.alberta.ca/fish-wildlife/fwmis/access-fwmis-data.aspx. Accessed 04 August 2016.

Alberta Environment and Parks. 2016c. Flood Hazard Identification Program: Edmonton (Upper) – North Saskatchewan River – Flood Hazard Study – Summary. http://maps.srd.alberta.ca/floodhazard/. Accessed 12 October 2016.

Alberta Environment and Parks. 2016d. Species Conservation Ranks. http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/tracking-watch-lists/species-conservation-ranks/. Accessed 14 October 2016.

Bayne, E.M. and K.A. Hobson. 1998. The Effects of Habitat Fragmentation by Forestry and Agriculture on the Abundance of Small Mammals in the Southern Boreal Mixedwood Forest. Canadian Journal of Zoology 76: 62-69.

Bunt & Associates. 2016. Kihciy Askiy Phase 1 Traffic and Parking Impact Assessment. Prepared for Manasc Isaac. Edmonton, Alberta.

City of Edmonton. 2007. Natural Connections Strategic Plan – City of Edmonton Integrated Natural Areas Conservation Plan. Edmonton, Alberta.

City of Edmonton. 2008. Contractor's Environmental Responsibilities Package: Construction and Maintenance. http://www.edmonton.ca/business_economy/selling_to_the_city/contractors-enviro-responsibilities.aspx. Accessed 12 October 2016.

City of Edmonton. 2010a. The Way We Grow: Municipal Development Plan, Bylaw 15100. Edmonton, Alberta.

City of Edmonton. 2010b. The Way We Live: Edmonton's People Plan. Edmonton, Alberta.

City of Edmonton. 2011. The Way We Green: Environmental Strategic Plan. Edmonton, Alberta.

City of Edmonton. 2012. Detailed Business Case: Spirit of Edmonton – Project Concept Planning and Initiation (Kihciy Askiy/Fox Farms & Indigenous Centre for Art and Knowledge). Prepared for Indigenous Peoples' Art and Culture Coalition. Edmonton, Alberta.

City of Edmonton. 2016. Kihciy Askiy Development. http://www.edmonton.ca/projects_plans/parks_recreation/kihciy-askiy-development.aspx. Accessed 16 November 2016.

City of Edmonton. 2017a. City of Edmonton Open Data Portal. https://data.edmonton.ca/. Accessed 3 January 2017.

City of Edmonton. 2017b. City of Edmonton Neighbourhood Interactive Map. http://www.edmonton.ca/residential_neighbourhoods/neighbourhoods/neighbourhood-maps.aspx?utm_source=virtualaddress&utm_campaign=neighbourhood maps. Accessed 3 January 2017.

City of Edmonton. 2017c. City of Edmonton Activities, Parks and Recreation. https://www.edmonton.ca/activities-parks-recreation.aspx. Accessed 3 January 2017.

CT & Associates Engineering Inc. 2014. Phase 1 Environmental Site Assessment: Fox Farm Property. Prepared for City of Edmonton Transportation Services. Edmonton, Alberta.

Edmonton Geological Society. 1993. Edmonton Beneath our Feed: A Guide to the Geology of the Edmonton Region. Edmonton Geological Society. Edmonton, Alberta.

EPEC Consulting Western Ltd. 1981. North Saskatchewan River Valley and Ravine System Biophysical Study. Inventory and Analysis Map Folio. Unpublished report prepared for City of Edmonton, Department of Parks and Recreation. Edmonton, Alberta.

Federation of Alberta Naturalists. 2007. The Atlas of Breeding Birds of Alberta: A Second Look. Federation of Alberta Naturalists. Edmonton, Alberta.

Golder Associates Ltd. 2014. Preliminary Geotechnical Assessment and Construction Cost Estimate: Gravel Pathway, Fox Farms, 6215 142 Street NW, Edmonton, Alberta. Prepared for City of Edmonton. Edmonton, Alberta.

Golder Associates Ltd. 2017. Preliminary Geotechnical Report: Proposed Kihciy Askiy Phase 1 Site Development, Edmonton, Alberta. Prepared for City of Edmonton. Edmonton, Alberta.

Indigenous Peoples' Arts and Culture Coalition. 2011. Spirit of Edmonton: Reclaiming Monto, a Collective Vision Connecting the River and the People. Edmonton, Alberta.

Kovacs, J. 2011. Edmonton Bird Banding Society 2011 Banding Results. The Willet 25(2): 3. Beaverhill Bird Observatory, Alberta.

Manasc Isaac. 2017. Kihciy Askiy Sacred Earth Schematic Design Report. January 2016. Prepared for City of Edmonton, Facility and Landscape Infrastructure. Edmonton, Alberta.

Manasc Isaac. 2017. Kihciy Askiy Sacred Earth Schematic Design Report. May 2017. Prepared for City of Edmonton, Facility and Landscape Infrastructure. Edmonton, Alberta.

Moss, E.H. 1983. Flora of Alberta. 2nd Edition, revised by J.G. Packer. University of Toronto Press. Toronto, Ontario.

Poole, A. (ed.). 2014. The Birds of North American Online. http://bna.birds.cornell.edu/bna/. Cornell Laboratory of Ornithology; Ithaca, NY.

Natural Regions Committee. 2006. Natural Regions and Subregions of Alberta. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Edmonton, Alberta.

Ritchie, B.M. 2003. Bird of the Edmonton Area. Report produced by the Provincial Bird Adjudication Committee. Edmonton, Alberta.

River Valley Alliance. 2016. Municipal Members: Edmonton. http://www.rivervalley.ab.ca/about-rva/municipal-members/edmonton/. Accessed 30 November 2016.

Spencer Environmental Management Services Ltd. 2016. North Saskatchewan River Boat Docks and Launches Environmental Impact Assessment. Prepared for City of Edmonton. Edmonton, Alberta.

Stantec Consulting Ltd. 2010. Wildlife Passage Engineering Design Guidelines. Prepared for City of Edmonton Office of Natural Areas. Edmonton, Alberta.

Van der Ree, R.; D.J. Smith, and C. Grilo. 2015. The ecological effects of linear infrastructure and traffic: challenges and opportunities of rapid global growth. *In*

Handbook of Road Ecology. John Wiley and Sons. Ltd., West Sussex, United Kingdom.

Westworth & Associates. 1980. Environmental Inventory and Analysis of the North Saskatchewan River Valley and Ravine System – Vegetation and Wildlife. In: EPEC Consulting Western Ltd. 1981. North Saskatchewan River Valley and Ravine System Biophysical Study. Unpublished report prepared for City of Edmonton Department of Parks and Recreation. Edmonton, Alberta.

7.2 Personal Communications

Forrest, A. Environmental Scientist. Spencer Environmental Management Services Ltd.

Kafka, K. Landscape Architect. Manasc Isaac.

Appendix A. Kihciy Askiy Environmental Impact Assessment Terms of Reference

SPENCER ENVIRONMENTAL
MANAGEMENT SERVICES LTD.

Suite 402, 9925 – 109 Street
Edmonton, Alberta T5K 2L9
Phone (780) 429-2108 Fax (780) 429-2127

Kihciy Askiy Phase 1 Environmental Review Terms of Reference

Development of Bylaw 7188 Terms of Reference for the Kihciy Askiy Environmental Review comprised the following steps:

- A preliminary scoping meeting was held on 10 March 2016 with representatives from City of Edmonton Sustainable Development and Integrated Infrastructure Services to develop proposed Terms of Reference for Environmental Review based on Manasc Isaac's January 2016 Schematic Design Report.
- A draft Terms of Reference (ToR) was developed by Sustainable Development on 11 April 2016 and provided to Integrated Infrastructure Services (see attached ToR document with comments).
- Manasc Isaac provided a copy of those draft ToR to Spencer Environmental in June 2016 as a basis for their scope of work in support of an Environmental Impact Assessment.
- Spencer Environmental's EIA scope of work was further refined in consultation with Manasc Isaac and City of Edmonton. That refinement included the addition of residential and recreational land Valued Environmental Components (VECs) and the deletion of fisheries (see attached email correspondence).

The following list of VECs was ultimately agreed upon and approved by the City of Edmonton as the basis for the Environmental Impact Assessment:

- Geotechnical/Soils
- Hydrology/Surface Water/Groundwater
- Vegetation
- Wildlife
- Habitat Connectivity/Wildlife Passage
- Residential Land Use
- Recreational Land Use
- Traffic and Parking
- Historical Resources

THE CITY OF Edmonton

SUSTAINABLE DEVELOPMENT MEMORANDUM

April 11th, 2016

TO: Jacquie Dalziel

FROM: Brittany Davey

SUBJECT: Environmental Review Terms of Reference for Kihciy Askiy

Please see the following proposed Terms of Reference for Environmental Review based on the preliminary meeting held on March 10th and the Schematic Design Report dated January 14, 2016 prepared by Manasc Isaac.

1. **Project Outline:** A detailed description of the project including the nature and scale of specific activities involved.
   - **1.1. Project Description** - SDR SDR - SCHEMATIC DESIGN REPORT
   - **1.2. Project Justification** SDR
   - **1.3. Project Components** SDR
   - **1.4. Key Project Activities** SDR
   - **1.5. Alternative Designs considered** SDR
2. **Location and Environmental Setting for the project:** Identification of the project's location as well as select baseline environmental, social and cultural information. WHY IS THIS THE LOCATION? SDR
   - **2.1. Project Location/Setting** SDR.
   - **2.2. Description of Existing Conditions (within project area)**
     - **2.2.1. Hydrology and Geology/Geomorphology Characteristics**
     - **2.2.2. Vegetation Characteristics**
     - **2.2.3. Wildlife Characteristics**
     - **2.2.4. Land Use and Zoning**
     - **2.2.5. Historic Characteristics**

     CONSULTANT PROVIDED REFER TO OTHER
3. **Public Consultation:** Overview of public consultation plan, reported outcomes and response to public concerns. - BY CITY TO PROVIDE IN APPENDIX
4. **Overview of Impacts:** Detail on the interactions between project scope and the anticipated impacts on the existing conditions contained in Section 2.2. - BY CONSULTANT
5. **Mitigation Plans:** mitigation plans for adverse impacts. - BY CONSULTANT
6. **Summary Assessment**
   - **6.1. Summary of Impacts**
   - **6.2. Monitoring and Follow-up Requirements**
   - **6.3. Summary Assessment and Conclusions**

   BY CONSULTANT.
7. **Appendices:**
   - 7.1. Public Involvement Plan - BY CITY.
   - 7.2. Public Consultation Summary
   - 7.3. Geotechnical Report - DONE.
   - 7.4. Rare Plant Study
   - 7.5. Vegetation Assessment
   - 7.6. Fisheries Assessment

   BY CONSULTANT.

+ HRIA

PUBLIC - SEPT.
COUNCIL - NOV.

Please call me at 780-442-3261 if you have any questions.

- SITE LOCATION STUDY.

Kesia Miyashita

From: Katharina Kafka <kkafka@manascisaac.com>
Sent: Thursday, June 23, 2016 12:06 PM
To: Andra Bismanis
Subject: Fwd(2): Terms of Reference - Site Location Study and Environmental Assessment
Attachments: Attach0.html

Hi Andra,
I hope I have got your adress correct now. You will be our subconsultant and we will provide payment.

There is no restricted access on to the site, but you might have to park your car at the gate, if closed. Take the existing road access off Fox drive. It is currently difficult to access the site off the trails.

Please see answers to our questions below. As far as I understand regarding point 6. alternatives study - we are just to clarify why we never considered alternatives.

Best regards
Katharina

Katharina Kafka, AALA, CSLA
Landscape Architect

MANASC ISAAC
OFFICE 780.429.3977
CALGARY 403.460.4177

10225 100 Avenue
Edmonton, Alberta
T5J 0A1 Canada
manascisaac.com

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----- Original Message -----

Message Jun 22, 2016 1:02 PM
From: Trevor Jarvis <trevor.jarvis@edmonton.ca>
To: Katharina Kafka View in Browser
Cc: Jacquie Dalziel <jacquie.dalziel@edmonton.ca>
Subject: Fwd: Terms of Reference - Site Location Study and Environmental Assessment

Please see answers below. I hope this provided clarification.

Regards,
---------- Forwarded message ----------
From: **Brittany Davey** <brittany.davey@edmonton.ca>
Date: Wed, Jun 22, 2016 at 10:39 AM
Subject: Fwd: Terms of Reference - Site Location Study and Environmental Assessment
To: Trevor Jarvis <trevor.jarvis@edmonton.ca>
Cc: Jacquie Dalziel <jacquie.dalziel@edmonton.ca>

Hi Trevor,

Please see the following response to the below questions. Hopefully this helps provide more clarity. If the consultant has any further questions, I would be happy to discuss any more in detail.

1. The EIA should include the full scope of the project. In regards to timing, we typically don't have expiry dates for the environmental reviews although if several years pass, environmental conditions could change and there could potentially be a need to confirm existing conditions are the same. Although subject to funding changes and potential changes in scope, these can be addressed through an addendum to the original report. It is also noted that subject to detail design, construction details or changes in the constructibility could be addressed through the project request form.
2. Agreed, the road widening should be included within the EIA.
3. It has been confirmed by Environment and Risk that no additional testing will be required. Please reference the 2014 Phase 1 ESA previously completed for the site.
4. Agreed
5. This was a recommendation from Agneiszka Kotowska, I will have to discuss this piece further and will follow up.
6. I believe this has been addressed through previous correspondence - let me know if more clarity is still needed.

Thanks ,

On Tuesday, 21 June 2016, Trevor Jarvis <trevor.jarvis@edmonton.ca> wrote:

HI Brittany,

Please see the questions below from our prime consultant regarding the terms of reference for the Environmental Review Report that was provided April 11, 2016 for the Kihciy Askiy Project. Please provide your answers to questions 1-5.

Thank you
---------- Forwarded message ----------
From: **Katharina Kafka** <kkafka@manascisaac.com>
Date: Tue, Jun 21, 2016 at 12:19 PM
Subject: Re: Terms of Reference - Site Location Study and Environmental Assessment
To: trevor.jarvis@edmonton.ca, jacquie.dalziel@edmonton.ca
Cc: abismanis@spencerenviromental.ab.ca, Richard Isaac <richard@manascisaac.com>

Hi Trevor,
We met with Spencer Environmental yesterday to discuss the terms of reference for the Environmental Assessment. Spencer raised a few questions that I would like to clarify with you:

1. We assume we are doing the EA for the **full Kihicy Askiy Phase 1,** not just phase 1A - we would certainly recommend that, but just wanted to clarify.
When clarifying, be aware that the EA possibly has a certain lifespan - not sure how long it would be valid.
2. Is the **widening of the access road** part of this EA? Again, we recommend it should be..
3. Are we to include a Phase1 Environemntal Assessment f**or contaminated soils** - not included in the terms of reference, but usually done - so we would like to confirm that this is not required
4. Spencer suggested to add to point 2.2 **adjacent and residential land use** - usually done to mitigate possible adversity (sound and smoke) to the project from residents on top of the bank - should we add this?
5. point 7.6 - according to Spencer a f**ishery assessment** does not apply, since we are not touching or modfifying the creek nor shedding water into it - we will have raingardens. Could you please confirm?
6. as discussed on the phone with you last week - we need clarifictaions on the a**lternatives study** as part of the site location study

Spencer Environmental is going to prepare a revised fee proposal for next Monday. Please be aware that they can only do the EA once we have a revised site plan! However part of the EA- 7.4 **rare plant study has to be start within the next 2 weeks**, or it can only be done in spring 2017.
In order to not miss that window, I will forward you a fee proposal for just this plant study later today, hoping that you could possibly quickly approve this and we can have Spencer start on just this part of the EA.
Also, please let us know if we should approach Bunt regarding the parking study.

I hope you have a productive meeting with NCSA today.

Many thanks

Katharina

Katharina Kafka, AALA, CSLA
Landscape Architect

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Trevor Jarvis <trevor.jarvis@edmonton.ca> on June 14, 2016 at 1:30 PM -0600 wrote:
Katharina,

The site location study terms of reference are as follows:

Site Location Study Terms of Reference

1. Project Background

2. Project Scope

3. Alternative Analysis (including RV and non RV locations)

4. Project Rationale (why the selected alternative should be deemed essential)

5. Opportunities and Constraints Analysis

- Financial Opportunities and Constraints

- Social Opportunities and Constraints

- Environmental Opportunities and Constraints

- Institutional Opportunities and Constraints

6. Conclusion

Regards,
--

Edmonton_sig_RGB_S.jpg**Trevor Jarvis** CET

PROJECT OFFICER
FACILITY DESIGN & CONSTRUCTION

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9803-102A Avenue NW

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--

Edmonton_sig_RGB_S.jpg**Trevor Jarvis** CET
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--

Brittany Davey
PLANNER

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1200, 10250 101 Street NW

Edmonton AB T5J 3P4

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Edmonton_sig_RGB_S.jpg**Trevor Jarvis** CET
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9803-102A Avenue NW
Edmonton AB T5J 3A3

Kesia Miyashita

From: Katharina Kafka <kkafka@manascisaac.com>
Sent: Monday, August 22, 2016 10:46 AM
To: Andra Bismanis
Subject: Fwd(2): Terms of Reference - Site Location Study and Environmental Assessment
Attachments: Attach0.html

Hi Andra,
Please see email below confirming that there is no fisheries information required.
I'll adress your other questions in a next email and have forwarded the funding query to teh City.
Best
Katharina

Katharina Kafka, AALA, CSLA
Landscape Architect

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T5J 0A1 Canada
manascisaac.com

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----- Original Message -----

Message Jun 28, 2016 1:08 PM
From: Trevor Jarvis <trevor.jarvis@edmonton.ca>
To: Katharina Kafka View in Browser
Cc: Jacquie Dalziel <jacquie.dalziel@edmonton.ca>
Subject: Fwd: Terms of Reference - Site Location Study and Environmental Assessment

Katharina,

FYI See below.

Regards,
---------- Forwarded message ----------
From: **Brittany Davey** <brittany.davey@edmonton.ca>

Date: Tue, Jun 28, 2016 at 12:42 PM
Subject: Fwd: Terms of Reference - Site Location Study and Environmental Assessment
To: Trevor Jarvis <trevor.jarvis@edmonton.ca>, Jacquie Dalziel <jacquie.dalziel@edmonton.ca>

Hi Trevor,

Please see the following.

Thanks,

Brittany Davey
PLANNER

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SUSTAINABLE DEVELOPMENT | CITY PLANNING

780-442-3261 OFFICE

City of Edmonton
HSBC Bank Place
1200, 10250 101 Street NW

Edmonton AB T5J 3P4

---------- Forwarded message ----------
From: **Agnieszka Kotowska** <agnieszka.kotowska@edmonton.ca>
Date: Tue, Jun 28, 2016 at 12:04 PM
Subject: Re: Terms of Reference - Site Location Study and Environmental Assessment
To: Brittany Davey <brittany.davey@edmonton.ca>

Hi Brittany,

As I stated originally, a fisheries assessment would be required "where harm to fish or fish habitat **may** result." If the environmental consultant is confident that the proposed project will not impact aquatic or terrestrial habitat within Whitemud Creek in any way (e.g., through direct habitat disturbance or through erosion, sedimentation, changes in hydrologic regime, etc.) then I am fine if they proceed without a fisheries assessment, with the understanding that the onus is on the proponent to ensure that all provincial and federal regulatory requirements are met. The proponent and the proponent's environmental consultant should consider whether any site and/or watercourse monitoring might be required for work adjacent to the waterbody, even if no work within the waterbody itself is planned. If there are changes to the project scope, design, construction methodology, etc. that may affect fish or fish habitat, this may affect the need for or

extent of a fisheries assessment. The proponent will be responsible for undertaking such an assessment if any changes to the project deem it necessary. The proponent may request that the environmental consultant re-assess project designs and work plans on a regular basis to ensure that fisheries are not affected throughout construction and operation of the proposed development.

Let me know if you have any thoughts on the above or would like to discuss further. I am available on Thursday and Friday if you want to chat.

On Tue, Jun 28, 2016 at 11:25 AM, Brittany Davey <brittany.davey@edmonton.ca> wrote:

Hi Agnieszka,

Please see the following and hopefully we can discuss later this week. The proponent is questioning the scope of the Environmental Review and the inclusion of the need for fisheries assessment. I will defer and support your recommendations.

Thanks,

Brittany Davey
PLANNER

PARKS & BIODIVERSITY
SUSTAINABLE DEVELOPMENT | CITY PLANNING

780-442-3261 OFFICE

City of Edmonton
HSBC Bank Place
1200, 10250 101 Street NW

Edmonton AB T5J 3P4

---------- Forwarded message ----------
From: **Trevor Jarvis** <trevor.jarvis@edmonton.ca>
Date: Tue, Jun 28, 2016 at 11:20 AM
Subject: Re: Terms of Reference - Site Location Study and Environmental Assessment
To: Brittany Davey <brittany.davey@edmonton.ca>
Cc: Jacquie Dalziel <jacquie.dalziel@edmonton.ca>

Hi Brittany,

Just a follow up, any chance you have been able to discuss #5 with Agneiszka?

Thanks TJ

On Wed, Jun 22, 2016 at 10:39 AM, Brittany Davey <brittany.davey@edmonton.ca> wrote:

Hi Trevor,

Please see the following response to the below questions. Hopefully this helps provide more clarity. If the consultant has any further questions, I would be happy to discuss any more in detail.

1. The EIA should include the full scope of the project. In regards to timing, we typically don't have expiry dates for the environmental reviews although if several years pass, environmental conditions could change and there could potentially be a need to confirm existing conditions are the same. Although subject to funding changes and potential changes in scope, these can be addressed through an addendum to the original report. It is also noted that subject to detail design, construction details or changes in the constructibility could be addressed through the project request form.
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Also, please let us know if we should approach Bunt regarding the parking study.

I hope you have a productive meeting with NCSA today.

Many thanks

Katharina

Katharina Kafka, AALA, CSLA
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T5J 0A1 Canada
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Trevor Jarvis <trevor.jarvis@edmonton.ca> on June 14, 2016 at 1:30 PM -0600 wrote:
Katharina,

The site location study terms of reference are as follows:

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3. Alternative Analysis (including RV and non RV locations)

4. Project Rationale (why the selected alternative should be deemed essential)

5. Opportunities and Constraints Analysis

- Financial Opportunities and Constraints

- Social Opportunities and Constraints

- Environmental Opportunities and Constraints

- Institutional Opportunities and Constraints

6. Conclusion

Regards,
--

Edmonton_sig_RGB_S.jpg**Trevor Jarvis** CET

PROJECT OFFICER
FACILITY DESIGN & CONSTRUCTION

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Edmonton AB T5J 3A3

--

Edmonton_sig_RGB_S.jpg**Trevor Jarvis** CET
PROJECT OFFICER
FACILITY DESIGN & CONSTRUCTION
INTEGRATED INFRASTRUCTURE SERVICES | FACILITIES & LANDSCAPE INFRASTRUCTURE

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Brittany Davey
PLANNER

PARKS & BIODIVERSITY
SUSTAINABLE DEVELOPMENT | CITY PLANNING

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Edmonton_sig_RGB_S.jpg**Trevor Jarvis** CET
PROJECT OFFICER
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Edmonton AB T5J 3A3

--

Edmonton_sig_RGB_S.jpg **Agnieszka Kotowska** **Msc, PBiol**
PRINCIPAL ECOLOGICAL PLANNER
BIODIVERSITY AND RIVER VALLEY PLANNING
PARKS AND BIODIVERSITY
CITY PLANNING | SUSTAINABLE DEVELOPMENT

780-508-9246 OFFICE

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1200, HSBC Bank Place
10250-101 ST NW

Edmonton AB T5J 3P4

--

Edmonton_sig_RGB_S.jpg**Trevor Jarvis** CET
PROJECT OFFICER
FACILITY DESIGN & CONSTRUCTION
INTEGRATED INFRASTRUCTURE SERVICES | FACILITIES & LANDSCAPE INFRASTRUCTURE

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Edmonton AB T5J 3A3

Appendix B. Kihciy Askiy Summary of Public Consultation

Kihciy Askiy Phase 1 Deliver Communications Work Plan
Facility and Landscape Infrastructure
For: Jacquie Dalziel, Trevor Jarvis, Rob Houle, Mike Chow
By: Shani Gwin
December 2016

Background:
Kihciy Askiy, Cree for Sacred Earth, is an Indigenous cultural and ceremonial space being planned on the former Fox Farms site. The Indigenous community has been engaging the City of Edmonton for the last seven years in discussions around developing an urban ceremonial site, such as Kihciy Askiy. Indigenous ceremonial sites are typically located outside of the urban areas which poses a challenge for urban Indigenous people that are unable to access those sites.

The project is dedicated as a safe place for Indigenous and non-Indigenous people to access cultural teachings, knowledge and ceremonies. Native Counselling Services of Alberta will administer programming and manage operations on the site. The site is recognized as a place for reconciliation between indigenous and non-indigenous people of Edmonton and the capital region. The City of Edmonton's Facility and Landscape Infrastructure Branch will manage the design and construction process. A schematic design concept and site master plan are now ready and will be presented to the community, stakeholders and general public at two information sessions.

Kihciy Askiy Phase 1A will consist of four sweat lodges, space for tipis for ceremonies and small group workshops, a large tent gathering area for ceremonial feasts and cultural teachings, a washroom/changeroom building with a sloped amphitheatre on the roof, a storage and utility building, 50 car parking spaces, two bus parking spaces, a gravel road with turnaround for emergency response vehicles, a permanent ceremonial fire with water source and re-grading/seeding of the entire area.

The Kihciy Askiy project was originally conceived by Indigenous community members within Edmonton in 2006. Through initial dialogue, with political and administrative leadership, approval was given to pursue the creation of a vision for the site that would become a first in Canada. Work with City Administration and City Council continued to integrate this idea into City planning documents. The amended Whitemud Park Integrated Master Plan was presented and approved by City Council in 2009. Throughout the years, the project has garnered support from a variety of organizations, groups and communities.

Key Messages:

- Kihciy Askiy will be a natural setting that will provide a safe place for Indigenous and non-Indigenous people to access cultural teachings, ceremonies and share knowledge within the city of Edmonton.

- Kihciy Askiy will be the first permanent urban Indigenous ceremonial site in Canada and will be a place for reconciliation between Indigenous and non-Indigenous people.
- The City of Edmonton is dedicated to enhancing cultural inclusion to create a city that is inspiring and alive with culture and enriches the quality of life for all Edmontonians.
- Native Counselling Services of Alberta (NCSA) have partnered with the City of Edmonton to administer programming and manage operations at Kihciy Askiy.

Tactical Plan:

Tactic	**Who**	**Date**	**Cost**
Website updated	Jacquie/Shani	TBA	
Public involvement Calendar	Jacquie	TBA	
Update Councillor Walters and Council	Jacquie/Rob/Mike	TBA	
Community league & community group newsletters	Jacquie/Shani	TBA	
COE poster for neighbouring facilities (Brookside and Grandview Heights) and Indigenous Agencies, Post Secondary Institutions, EPSB, ECSB, Inner City Agenices, Edmonton Interfaith Community	Jacquie/Shani	TBA	
Direct invitations to stakeholder groups	Jacquie/Rob/NCSA	TBA	
Two road signs in the area	Shani	TBA	$400
PSA	Shani	TBA	
social media, create Facebook event	Shani	TBA	
greatcity news	Shani/Rob/Jacquie	TBA	

Add: 4 Pager prepared by Manasc Isaac - for NCSA's use and the project website.

Add: Advertisement in The ARO Bulletin, The Park Bench Bulletin and NCSA partnership newsletter.

Summary of Public Engagement

Whitemud Integrated Area Concept Plan

(prepared by the Whitemud Integrated Plan Advisory Committee with assistance from EDA Collaborative Inc. February 2003)

- The draft concept plan was refined into a final concept plan that was presented to the general public at a Public Open House on 06 June 2000 and in June 2002. The plan generally received a high level of support with relatively few concerns. A summary of the questionnaires received at the Public Meetings is included in Appendix 2 "Public Meeting Summary Comments") of the Whitemud Integrated Area Concept Plan, under separate cover Further details are provided on page 31 ("Renaturalization of Farm Site") of EDA Collaborative Inc. 2003, under separate cover.

Environmental Screening Report - Edmonton River Valley and Ravine Trails Development Program

(prepared by AMEC Earth & Environmental. March 2004)

- Public comments from open houses held on 25 June 2002 and 10 March 2004 are summarized in AMEC Earth & Environmental 2004, under separate cover.

Whitemud Park Concept Plan Amendment - Draft Summary Report

(written for the City of Edmonton by EDA Collaborative Inc. in consultation with Aecom. September 1, 2009)

- Public consultation events are outlined on pages 13 and 14 of the concept plan amendment, under separate cover (EDA Collaborative Inc. 2009). Events included a stakeholder focus group held on 30 April 2009, Aboriginal community consultation held on 05 May 2009 and public consultation on 03 June 2009.
- A summary of the comments and responses collected from the 2009 consultation is outlined on pages 23 -31 of the concept plan amendment, under separate cover (EDA Collaborative Inc. 2009)

Grand Council Gathering

(06 and 07 May 2015 from 8-5 pm at the Alfred H. Savage Centre, hosted by Native Counselling Services of Alberta with support from The City of Edmonton)

- Purpose: To provide a protocol driven dialogue session for Indigenous Spiritual Leaders in the Edmonton Region, to come together for counsel and advisement for how the Urban Indigenous community can work together at Kihciy Askiy. Dialogue will be centered around the protocol to conduct ceremonies at Kihciy Askiy. This includes the use of the area in a coordinated and facilitated manner as well as an update on the development of the site over the next several years.
- Expected Outcomes
  - Recognition of past work and status update to all attendees
  - Review and feedback of site design

- Understanding and Counsel for the Kihciy Askiy project in particular the protocols to be used for ceremony.
- Understanding of the needs of the Indigenous community in the Edmonton Region.
- Counsel and dialogue on how the Indigenous community can come together
- Engagement of the Indigenous community in the Edmonton Capital Region
- Sharing and learning opportunities across diverse groups
- Information and feedback for orders of Government and Native Counselling Services of Alberta

- Attendees:
  - Spiritual Leaders from the Indigenous Community in the Edmonton Region
  - Invitations were sent to Edmonton Capital Region Indigenous organizations requesting attendance from their Spiritual Leaders.
  - Additional personal invitations were sent directly to Spiritual Leaders as necessary. Invitations were done through traditional Indigenous protocols by Native Counselling Services of Alberta Spiritual Leaders.

Functional Program Questions for the Spiritual Leaders to Discuss and Confirm Schematic Design requirements were sent to NCSA in advance of the Gathering to assist with the event planning.

- Engagement and Consultation Process

NCSA prepared the following summary of the Grand Council Gathering:

- The Elders' Gathering took place on May 6-7 2015, at the Alfred Savage Centre, located next door to the Kihciy Askiy site.
  A list of Elders was compiled and additions to the list were made up to the event taking place. There were also a number of walk-in Elders, who heard about the event.
  All identified Elders were notified of the event, and asked to participate. The great difficulty in reaching Elders, was the lack of current contact information for many on the list. This meant tracking down via other means, including word of mouth.

- Over the 2 days, 32 participated on the first day and 36 participated on the second day.
  Other participants included 10 helpers (drummers and singers), 6 City of Edmonton employees and one City of Edmonton Councillor. Native Counselling Services of Alberta provided 20 staff in a variety of capacities – small group recorders/facilitators, food service, registration and general support.

- The first day included an opening ceremony along with a general discussion, led by Elder Fred Campiou and Elder Wil Campbell, about the purpose of the Gathering. A pipe ceremony also took place.

- The second day included small group work, with 5 circles of Elders answering the following questions:

- What types of activities do you see taking place at the site?
- Ceremony or other activities
- What are some of the things to consider for landscaping the grounds?
- What are some of the barriers to accessing the site?
- What sorts of services need to be on site?

Are there specific requirements for ceremony? (Male, Female, combined/Participation of children)

- <u>Ceremonies and Teachings Feedback</u>
  - Kihciy Askiy is an important link for people who want to connect or reconnect with their culture;
  - It is a place where topics such as traditional knowledge, ceremony, natural law and the importance of nature can be discussed;
  - People need to know protocol; and,
  - People need to know the purpose of the ceremonies.
  - There also seemed to be a general consensus that while Kihciy Askiy is on Treaty 6 land, all nations are accepted, and people from other Tribes are welcome, as are the ways they conduct ceremony. There was a suggestion that a ceremony welcome the different nations/tribes.
  - Over and over we heard that we are in unchartered territory and everyone should be open to doing things in a new way.
  - The circles identified a number of ceremonies and teachings that should be considered for Kihciy Askiy, includes sweat lodges , feasts, traditional round dances, pipe ceremonies, Aboriginal Day activities, summer and winter lodges, and tepee teachings.
  - There was also agreement that young people be incorporated into the different ceremony, as a means of teaching.

- <u>Facility Considerations Feedback</u>
  - Washrooms
  - A sign about under the influence – stop here if under the influence, maybe someone available to make a referral
  - Interim shelter for inclement weather before the site is complete•Showers, toilets and change rooms•A fire pit for cooking
  - Emergency medical tents and fire safety equipment
  - Kitchen space that is configured for multiple events/functions
  - Grand hall (social dances, graduations, weddings, honour wall with crafts and beading)
  - Parking
  - Good supply of fresh water
  - Storage areas
  - Sweats should go year round
  - should some of the sweats be within structures for winter
  - Use as a gathering place, like its original purpose

- Minimal concrete, lots of open grass
- One place for people to pray
- Lockers for clothes for people going into sweats?

- Landscaping Feedback
  - Do not mow the site – it is best not to disturb the natural area
  - Need to keep spaces safe and free from damage or harm (with intent or not)
  - Thistles next to sweet grass
  - Have medicines in their natural space
  - No big structures on the land – keep it natural
  - Use the sloped area for building a structure
  - NO PESTICIDES
  - Build security as an invisible net
  - Ask Edmonton to make sure KA is prominent and visible on city maps
  - Bulletin boards on site– information, maps, guidelines
  - Allocation of space based on different groups/functions
  - Liability signs?
  - An area for feasts
  - Night lodges – questions of enclosed space and lighting?
  - Some sort of security for sacred spaces and for areas that demand privacy
  - Consider accessibility issues – distance to travel on the site, terrain conditions
  - Look at the Rundle park model regarding facilities
  - Disposable units for garbage and recycling
  - Grounds need to be protected at night, from vandalism, graffiti, alcohol and drugs
  - Enclosed fire pits so they can be used during a fire ban
  - Can willows be grown for future use for sweat lodges?
  - No growing or transplanting of any plants that do not grow naturally there (except berries)
  - Sweat sites should be closer to the natural setting and private
  - Use the kinikinik and red willow which grow wild in the area
  - Worried about the trails used by walkers and runners – can there be 2 separate trails?
  - There needs to be private and public space
  - Ceremonies are private
  - Include a pond
  - Ground needs to be pretty level to be accessible
  - Should women have their own fire pit?
  - Barriers to create more control over the area

- Barriers to accessing the site
  - Lack of signage
  - Golf carts from the bus to the site, for elderly or disabled
  - ETS access
  - Has to be winter friendly

- Priorities for the first year
    - Feasts
    - Sweat lodges
    - Have to have a good start on holding ceremony by the end of the first year
    - Build in 4 phases to keep with tradition
    - Changing rooms, kitchen facilities
    - Build up to large gathering place and interpretive centre

Council of Elders Meeting – 21 October 2015

Kihciy Askiy Council of Elders Members:

- Howard Mustus - Chair
- Annabelle Kootenay
- Joe Ground
- Wilson Bearhead
- Doris Daychief
- Beatrice Morin
- Emil Desorchers
- Fred Campio
- Wil Campbell

The purpose of the meeting was to present the first draft of the Schematic Design report and Site Plan for the Council's review and approval. Feedback from the meeting was used to revise both documents.

Council of Elders Meeting – 04 November 2016

The purpose of this meeting was to ask the Council of Elders to confirm the location of the permanent ceremonial fire pit, sweat lodges and teepees on the revised Site Plan.

Kihciy Askiy – 2016/ 2017 Community Communications Approach

- Introduction:
  - Joint initiative between Native Counselling Services of Alberta and City of Edmonton
  - Provides culture and spiritual space. Culture and spirituality for Indigenous people is a way of life.
- Purpose:
  - A land area for Indigenous Cultural activities within the City of Edmonton and surrounding region.
  - A place where the diverse Indigenous Cultures can practice activities in a safe method
  - A place where Edmontonian Youth and Families can access cultural resources
  - A place where Edmontonians can learn about the traditions of Aboriginal people
  - A much needed resource for Edmonton's growing Indigenous population
  - Re-establish a relationship and place within the city directed by the Indigenous Community
- Approach:
  - Edmonton Agencies
    - Individual information packages (summary, purpose, links to additional information) will be mailed out to each Edmonton Agency (To be complete by March 31, 2017)
    - This will include an invitation to attend an information session(s) (To be complete between January 31st, 2017 March 31st, 2017)
    - An update will be posted on CoE and NCSA websites every quarter informing of progress
    - As the building phase of the project is near completion a second information session will be held. (Timeline TBD)
  - Local First Nations
    - A letter and background information package will be sent to Local First Nations requesting an opportunity for Native Counsellings Services of Alberta to present the Kihciy Askiy project. (To be complete by March 31, 2017)
    - An update will be posted on City of Edmonton and Native Counselling Services of Edmonton websites every quarter informing of progress
  - Local Community Organizations
    - For example: United Church of Canada, Edmonton Interfaith Organization, Children Services, etc
    - A letter and background information package will be sent
  - General Communications
    - An update will be posted on City of Edmonton and Native Counselling Services of Edmonton websites every quarter informing of progress

Appendix C. Preliminary Geotechnical Report: Proposed Kihciy Askiy Phase 1 Site Development, Edmonton, Alberta (Golder Associates 2017)

PRELIMINARY REPORT

May 23, 2017

PRELIMINARY GEOTECHNICAL REPORT

Proposed Kihciy Askiy Phase 1 Site Development
Edmonton, Alberta

Submitted to:
Mr. Shawn McArthur, P.Eng.
Senior Geotechnical Engineer
City of Edmonton, Engineering Services
11004 190 Street NW
Edmonton, AB T5S 0G9

Report Number: 1773525

Distribution:

1 Copy - City of Edmonton
1 E-Copy - Golder Associates Ltd.

Golder Associates

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the City of Edmonton (COE) to carry out a geotechnical investigation for the proposed Phase I Development at the Kihciy Askiy site located at the previously named Fox Farms in Edmonton, Alberta (the Site).

The scope of work for this project was outlined in Golder's proposal submitted to COE on February 2, 2017.

The purpose of this investigation was to assess subsurface soil and groundwater conditions at the Site, and based on Golder's interpretation of this information provide comments and preliminary recommendations on the geotechnical engineering aspects as input to the design and construction of the proposed development at the Site. The current investigation was supplemented with the following information:

- Map 143, Surficial Geology of Edmonton (83H), Alberta Geological Survey.
- Map 600, Bedrock Geology of Alberta, Alberta Geological Survey.

This report summarizes Golder's geotechnical investigation and based on the interpretation of this information, provides preliminary geotechnical engineering comments and recommendations as input to the design and construction of the proposed development.

The factual data, interpretations and recommendations provided in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, Golder should be given an opportunity to confirm that the recommendations are still valid.

Use of this report is subject to the conditions outlined in the *Important Information and Limitations of this Report* that follows the main text and forms an integral part of this document. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of the report.

2.0 SITE AND PROJECT UNDERSTANDING

2.1 Project Understanding

It is understood that the COE is proposing to develop the Kihciy Askiy site into a natural setting for the Capital Region's indigenous community to host spiritual ceremonies, sweat lodges, cultural camps and talking circles; grow medicinal herbs, practice traditional crafts and facilitate intergenerational learning in an appropriately designed outdoor learning space[1]. Based on the provided marked up drawings, the site improvements for Phase 1 will include construction of the following:

- washroom facility;
- storage building;
- large feast fire pit area;
- new gravel parking lot area; and

[1] City of Edmonton website: https://www.edmonton.ca/projects_plans/parks_recreation/kihciy-askiy-development.aspx

- reconstruction of the access road to upgrade it to an emergency access capable road.

2.2 Site Description

The Site is located at the previously named Fox Farms near the intersection of Fox Drive NW and Fort Edmonton Park Road NW in Edmonton, Alberta (Figure 1), within the southwest quarter of Section 24, Township 52, Range 25, west of the 4th meridian. The infrastructure that previously existed at the site, including a house, barns, storage sheds, and a temporary sweat lodge, had been demolished prior to the geotechnical field investigation. The horse corral is still present at the site, located north of the proposed gravel parking lot.

The Site currently consists of a greenfield area where the proposed washroom facility, storage building and large feast fire pit area are planned to be constructed and of a gravel access road where the gravel parking lot and upgraded gravel access road are planned to be constructed.

The Site is moderately sloped from the access road east to the horse corral and from north to south within the horse corral. To the south of the horse corral, the Site is very gently sloping from north to south. The Site has an obvious runoff direction from north to south and was vegetated primarily with short grass and bordered by forested areas to the east, south, and west.

3.0 GEOTECHNICAL FIELD INVESTIGATION

The field investigation was carried out on March 9, 2017, at which time seven (7) boreholes, designated as Boreholes BH17-01 to BH17-07, were advanced at the Site at the locations shown on Figure 1. All boreholes were advanced using a Unimog drill rig, supplied and operated by Mobile Augers and Research Ltd. of Edmonton, Alberta. The boreholes were advanced using 150 mm diameter solid stem augers, with soil samples obtained at 0.75 to 1.5 m intervals of depth using a 50 mm outside diameter split-spoon sampler driven by an automatic hammer in accordance with the Standard Penetration Test (SPT) procedure (ASTM D1586-11 Standard Test Method for Standard Penetration Test). Grab samples were obtained from the auger flights. A thin-walled Shelby tube sample was taken within the cohesive material in Borehole BH17-02 (ASTM D1587-15 Standard Penetration for Thin-Walled Tube Sampling).

The groundwater conditions were observed in the open boreholes during and immediately following the drilling operations and standpipe piezometers were installed in three (3) of the boreholes to permit monitoring of the groundwater levels. The piezometers consist of 25 mm diameter PVC pipe, with a hand-slotted screen sealed with bentonite at a selected depth interval within the boreholes. The piezometer installation details and water level readings are indicated on the Record of Borehole Sheets in Appendix A. Soil cuttings were used to backfill the boreholes above the screened section and a near surface bentonite seal and flush-mounted protective road boxes were installed for Boreholes BH17-05 and BH17-07, while Borehole BH17-02 was installed with a stick-up of 1.0 m and no casing protector. Excess soil cuttings remaining after backfilling the boreholes were neatly scattered on site.

The field work was carried out under the full-time supervision of a member of Golder's engineering staff who located the boreholes in the field, directed the sampling and in situ testing operations, and logged the boreholes. The samples were identified in the field, placed in labelled containers and transported to Golder's laboratory in Edmonton for further examination and laboratory testing. Index and classification tests consisting of water content determinations, Atterberg limits, and particle size distribution testing were carried out on selected soil samples.

The approximate borehole locations were surveyed on site using a consumer grade, handheld global positioning system (GPS) with a horizontal resolution of +/- 5 m. Ground surface elevations were estimated using Google Earth. The borehole locations, including approximate UTM NAD83 northing and easting coordinates and ground surface elevations referenced to geodetic datum are presented on the Record of Borehole Sheets and are summarized in Table 1.

Table 1: Approximate Borehole Locations

Proposed Structure	Borehole Number	Approximate UTM NAD83 Northing (m)	Approximate UTM NAD83 Easting (m)	Approximate Ground Surface Elevation (masl)	Borehole Depth (m)
Feast Fire Pit	BH17-01	5,931,013	330,090	625	10.1
Storage Building	BH17-02	5,931,055	330,039	624	10.3
Washroom / Change Room	BH17-03	5,931,021	330,021	626	9.9
Gravel Parking Lot	BH17-04	5,930,991	329,995	627	5.6
	BH17-05	5,930,963	329,955	627	5.6
Access Road	BH17-06	5,930,979	329,896	628	5.8
	BH17-07	5,931,072	329,838	628	5.8

4.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

4.1 Regional Geology

Based on the Alberta Geological Survey Map 143, “Surficial Geology of Edmonton”, the near surface geologic profile in the area of the proposed development consists of glaciolacustrine deposits of silt and clay. The silt and clay is composed of bedded layers of silt and clay with minor sand and may be varved in places.

Regionally, the uppermost bedrock unit in the area consists of the Horseshoe Canyon Formation. According to Map 600, “*Bedrock Geology of Alberta*”, the Horseshoe Canyon Formation generally consists of grey, feldspathic, clayey sandstone; grey bentonitic mudstone and carbonaceous shale; concretionary ironstone beds, scattered coal and bentonite beds of variable thickness; minor limestone beds, mainly non-marine.

Available water well records in the area are consistent with the available mapping, showing deposits of clay underlain by sandy clay and sand, underlain by sandy till further underlain by bedrock comprised of shale, sandstone lenses, and coal.

Based on a review of the Coal Mine Atlas (Alberta Energy Regulator 2016), the study area is not located near a previous coal mine.

4.2 Subsurface Conditions

As part of the subsurface investigation, seven (7) boreholes were advanced in the proposed development Site. The detailed subsurface soil and groundwater conditions encountered in the boreholes advanced as part of the current investigation and the results of in situ and laboratory testing are presented on the Record of Borehole Sheets contained in Appendix A. The results of geotechnical and analytical laboratory testing are presented in Appendix B.

Soil descriptions provided in this report are based on visual and textural evidence along with accepted standard methods of classification and description routinely used in current geotechnical practice. The stratigraphic boundaries shown on the Record of Borehole Sheets are inferred from observations of drilling progress and from non-continuous sampling and, therefore, represent transitions between soil types rather than exact planes of geological change. The subsurface conditions will vary between and beyond the borehole locations.

In general, the subsurface conditions at the Site consist of a surficial layer of topsoil (BH17-01 to BH17-03), sand and gravel fill (BH17-04 and BH17-05) or asphalt concrete (BH17-06 and BH17-07), depending on the borehole location, underlain by silty clay fill, further underlain by a lacustrine silty clay deposit. The lacustrine deposit was underlain by a gravelly clayey sand till deposit in Boreholes BH17-01, BH17-03 to BH17-05, which was further underlain by weathered bedrock consisting of interlayered clayshale and sandstone. In Boreholes BH17-02 and BH17-06 the lacustrine silty clay was underlain by the weathered bedrock. In Borehole BH17-07 a silty sand layer was encountered underlying the lacustrine silty clay. A more detailed description of the subsurface conditions encountered in the boreholes is provided in the following sections.

4.2.1 Topsoil, Sand and Gravel Fill and Asphalt Concrete

An approximately 100 mm to 300 mm thick layer of topsoil was encountered in Boreholes BH17-01 to BH17-03, which were advanced within the proposed feast fire pit, storage building and washroom/change room areas, within the existing green field. Approximately 130 mm and 150 mm thick layers of sand and gravel fill were encountered in Boreholes BH17-04 and BH17-05, respectively, which were advanced in the proposed gravel parking lot area along the existing road surface. Approximately 100 mm and 130 mm thick asphalt concrete layers were encountered in Boreholes BH17-06 and BH17-07, respectively, which were advanced along the proposed and existing access road.

4.2.2 Silty Clay Fill

An approximately 0.5 to 1.2 m thick layer of silty clay fill was encountered beneath the surficial materials in Boreholes BH17-02, BH17-04, BH17-06 and BH17-07. The silty clay fill extended to depths between about 0.6 m and 1.2 m, corresponding to approximate elevations between 626.8 and 623.4 m. The fill consisted of silty clay containing trace sand to and sand and trace coal fragments. The fill was typically brown in color, contained oxidation staining and was observed to be frozen in all boreholes.

The laboratory water contents measured on selected samples of the fill were between about 16 per cent and 42 per cent. The measured Standard Penetration Test (SPT) “N”-values within the fill were 50 blows and 57 blows per 0.3 m of penetration. The fill material was frozen during the drilling investigation and the SPT “N”-values may not be representative of the actual in-situ strength of the fill material. It is estimated that the consistency of the fill is firm to stiff.

4.2.3 Lacustrine Silty Clay

A lacustrine deposit was encountered beneath the surficial materials or fill in all boreholes, with the surface of the deposit between depths of 0.1 and 1.2 m, corresponding to elevations 626.9 and 623.4 m. The lacustrine deposit varied in thickness between about 0.9 and 4.5 m. The lacustrine deposit consisted of silty clay containing trace sand to and sand, and trace coal fragments. Root fibers and organic matter were present in the upper portions of the deposit. The deposit was typically brown to brownish grey, contained oxidation staining in four of the seven boreholes. The lacustrine silty clay was observed to be frozen to a depth of 1.2 m in Boreholes BH17-01 and BH17-03, and to a depth of 1.4 m in BH17-05.

The results of particle size distribution testing completed on six selected samples of the silty clay deposit are contained in Appendix B. Atterberg limit testing was conducted on six selected samples of the lacustrine silty clay deposit and measured a liquid limit between about 32 per cent and 56 per cent, a plastic limit between about 17 per cent and 26 per cent and corresponding plasticity indices between about 15 per cent and 30 per cent. These results indicate that the silty clay is generally of medium plasticity, with the exception of the deposit encountered in Boreholes BH16-06 and BH16-07, where the silty clay is of high plasticity.

The laboratory water contents measured on selected samples of the lacustrine silty clay deposit were between about 13 per cent and 49 per cent. In general, the water content was near or wet of the plastic limit.

The SPT “N”-values measured within the silty clay deposit ranged from 3 blows to 24 blows per 0.3 m of penetration, suggesting soft to very stiff consistency. In general, most of the SPT “N”-values were between about 6 and 8 blows per 0.3 m of penetration, suggesting a firm consistency. An SPT “N”-value of 63 blows per 0.3 m of penetration was measured in the upper portion of the deposit in BH17-05 and is not considered representative of the actual in-situ strength of the silty clay as the material was frozen at this depth.

Water seepage was noted within the base of the silty clay deposit during drilling in Boreholes BH17-02, BH17-03, BH17-06 and BH17-07.

4.2.4 Gravelly Clayey Sand Till

A gravelly clayey sand till deposit was encountered underlying the lacustrine silty clay in Boreholes BH17-01, and BH17-03 to BH17-05. The till deposit was encountered at depths between about 1.5 and 4.6 m, corresponding to elevations 625.5 and 620.4 m. The gravelly clayey sand till deposit had a thickness between about 0.8 and 1.2 m. The till deposit consisted of gravelly clayey sand with the exception of Borehole BH17-04 which consisted of clayey sand, trace amounts of gravel. The till was brown in color and generally contained oxidation stains.

The results of particle size distribution testing completed on two selected samples of the gravelly clayey sand till deposit are contained in Appendix B. Atterberg limit testing was conducted on two selected samples of the till and measured liquid limits of about 31 per cent and 32 per cent, plastic limits of about 17 per cent and corresponding plasticity indices of about 14 per cent and 15 per cent. These results indicate that the till is of medium plasticity.

The laboratory water contents measured on selected samples of the gravelly clayey sand till were between about 11 per cent and 27 per cent. In general, the water content was near or wet of the plastic limit. The SPT “N”-values measured within the gravelly clayey sand till were between 11 blows and 21 blows per 0.3 m of penetration, suggesting stiff to very stiff consistency.

Water seepage was noted from the till deposit in Boreholes BH17-01 and BH17-05 during drilling.

4.2.5 Silty Sand

A silty sand deposit was encountered underlying the lacustrine silty clay deposit in Borehole BH17-07 at a depth of 4.6 m, corresponding to elevation 623.4 m. Borehole BH17-07 was terminated within this deposit after penetrating it for a thickness of 1.2 m. The silty sand contained some cohesive fines and was brown in color.

The laboratory water contents measured on selected samples of the silty sand were between 30 per cent and 34 per cent. One SPT “N”-value measured within the silty sand was 2 blows per 0.3 m of penetration, suggesting a very loose relative density.

4.2.6 Bedrock

Bedrock comprised of interlayered clayshale and sandstone of the Horseshoe Canyon Formation was encountered underlying the lacustrine clay in Boreholes BH17-02 and BH17-06 and underlying the gravelly clayey sand till in Boreholes BH17-01, BH17-03 to BH17-05. The bedrock was generally completely weathered, extremely weak, and blueish-grey. The bedrock appeared to be less weathered with depth. All boreholes were terminated within the bedrock with the exception of Borehole BH17-07. The bedrock was penetrated for a thickness between about 1.2 m and 5.7 m.

The laboratory water contents measured on selected samples of the bedrock were between about 10 per cent and 33 per cent. The water content results indicate the bedrock samples may have been affected by seepage from the lacustrine silty clay and gravelly clayey sand till deposits encountered above the bedrock, as the augers can disturb the bedrock samples, allowing water to infiltrate the sample. The SPT “N”-values measured within the bedrock were between 26 blows per 0.3 m of penetration to refusal blow counts of up to 50 blows per 0.13 m of penetration. The blow counts in the bedrock generally increased with depth.

4.3 Groundwater Conditions

The observed/recorded water levels in the open boreholes following completion of drilling and in the standpipe piezometers are shown on the Record of Borehole sheets and are summarized as follows:

Table 2: Groundwater Conditions

Borehole No.	Approximate Ground Surface Elevation (m)	Depth to Water Level (m)	Approximate Groundwater Elevation (m)	Date
BH17-01	625	Dry	-	March 9, 2017 (completion of drilling)
BH17-02	624	9.8	614.2	March 9, 2017 (completion of drilling)
		Dry	-	March 9, 2017 (piezometer)
		2.7	621.4	March 23, 2017 (piezometer)
BH17-03	626	3.8	622.2	March 9, 2017 (completion of drilling)
BH17-04	627	Dry	-	March 9, 2017 (completion of drilling)
BH17-05	627	4.6	622.4	March 9, 2017 (completion of drilling)
		4.3	622.7	March 9, 2017 (piezometer)
		2.5	624.5	March 23, 2017 (piezometer)
BH17-06	628	4.0	624	March 9, 2017 (completion of drilling)
BH17-07	628	4.6	623.4	March 9, 2017 (completion of drilling)
		4.3	623.7	March 9, 2017 (piezometer)
		4.6	623.4	March 23, 2017 (piezometer)

Water was observed in the lacustrine silty clay deposit as indicated by water level readings installed in BH17-02 (screen installed in silty clay deposit), BH17-05 (screen installed within silty clay, till and bedrock deposits) and BH17-07 (screen installed in silty clay and silty sand deposits). Water seepage was noted from the lacustrine clay deposit in Boreholes BH17-02, BH17-03, BH17-06 and BH17-07 at depths of 3.8 m, 3.7 m, 4.3 m and 3.8 m, respectively, and from the till deposit in Boreholes BH17-01 and BH17-05 at depths of 5.2 m and 3.7 m, respectively. It is expected that a perched water table is present within the lacustrine silty clay deposit overlying the bedrock.

The water level at the Site is expected to fluctuate seasonally in response to changes in precipitation and snow melt, and is expected to be higher during the spring and following periods of heavy precipitation. Seasonally, the groundwater levels may rise higher than those levels observed in this investigation.

5.0 GEOTECHNICAL ENGINEERING COMMENTS AND PRELIMINARY RECOMMENDATIONS

This section of the report provides geotechnical engineering comments and preliminary recommendations as input to the design and construction of the proposed Kihciy Askiy Phase I Development at the Site. The preliminary recommendations are based on Golder's interpretation of the factual data obtained from the boreholes advanced as part of the current subsurface investigation at this Site. The interpretation and preliminary recommendations contained in this report are intended to provide the designers with sufficient information as input to the detailed design of the proposed Phase I development.

Where comments are made on construction, they are provided to highlight those aspects that could affect the design of the project, and for which special provisions may be required in the Contract Documents, and which should be confirmed during detailed design. Those requiring information on aspects of construction should make their own interpretation of the factual information provided as such interpretation may affect equipment selection, proposed construction methods, scheduling and the like.

5.1 Frost Susceptibility and Penetration Depth

The anticipated depth of frost penetration was estimated for the average properties for the in-situ soil materials encountered at the location of the advanced boreholes both based on the mean annual Air Freezing Index (AFI) and the 10 year return period Air Freezing Index of about 1,475°C and 1,700°C days, respectively. It was assumed that the near surface soil comprises silty clay fill overlying lacustrine silty clay, both with a dry density of 16 kN/m^3 and a gravimetric water content of 25 per cent and 28 per cent, respectively, based on the existing stratigraphy encountered at the Site. The mean annual depth of frost penetration for the cohesive soils present on Site is estimated to be about 1.7 m, and the penetration for a 10-year return period is about 2.0 m. A design frost penetration depth of 2.2 m is recommended. These estimates were determined using the method outlined in the Canadian Foundation Engineering Manual (CFEM) (Canadian Geotechnical Society, 2006).

The U.S. Corps of Engineers have classified the frost susceptibility of soils based on soil type into four groups designated F1 to F4 in approximate order of increasing frost susceptibility and loss of strength during thaw. Frost effects should be considered in the design of structural elements that are sensitive to post construction movement such as foundations, or buried services that cannot be allowed to freeze. Frost heave is a potential concern at the bottom of foundation elements (i.e., shallow foundations, slabs-on-grade, grade beams, pile caps and roadways). Based on Atterberg Limit test results, the soils at the Site generally fall into group F3 indicating the soils are moderately susceptible to the development of ice lenses and subsequent frost heave.

5.2 Seismic Site Classification

The seismic response of the Site was classified according to the National Building Code of Canada 2015 (NBCC), which categorizes the soil conditions into 6 types - Class 'A' to 'F'. This classification is based on the average shear wave velocity, SPT "N"-values, or undrained shear strength over the top 30 m (100 ft) of the soil profile.

No boreholes were drilled to depths over 30 m at the proposed Site. Based on the SPT profile to the depths established at the borehole locations, the Site is categorized as Class 'E' according to NBCC 2015.

5.3 General Grading and Site Drainage

5.3.1 Subgrade Preparation Greenfield Area

Based on the results of the geotechnical investigation in the area of the proposed Kihciy Askiy Phase 1 Development, the near-surface soils in the existing green field, or the proposed feast fire pit, storage building and washroom/change room areas consist of surficial topsoil underlain by silty clay fill further underlain by lacustrine silty clay that is further underlain by clayey sand till and bedrock.

The proposed grading plan for the greenfield area is currently unknown; however, any existing vegetation, topsoil, and other deleterious and unsuitable material should be removed from the proposed building footprints during general site grading. The existing topsoil and silty clay fill are not suitable for supporting the building foundations, floor slab or engineered fill. These materials will need to be completely removed from the building/engineered fill footprint. The silty clay material underlying the topsoil and silty clay fill often contained trace root fibers and organic matter to depths up to 1.8 m and its suitability is further discussed in Section 5.3.3. The recommendations for the topsoil and fill removal should be reviewed by a qualified geotechnical engineer once the grading plans are available.

Prior to placing engineered fill, the exposed subgrade should be proof rolled in conjunction with an inspection by a qualified geotechnical engineer. The inspection should confirm that the exposed soils are native, undisturbed and competent, and have been adequately cleaned of existing unsuitable fills, ponded water and all disturbed, loosened, softened, organic and other deleterious material.

Material for use as engineered fill may consist of either suitable low to intermediate plastic cohesive material or granular material compacted in layers not exceeding 150 mm loose lifts and to a minimum of 100 per cent Standard Proctor Maximum Dry Density (SPMDD) as per ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600kN-m/m^3)) for the washroom facility and storage building facility. For the feast fire pit area, a SPMDD of 98 per cent may be used as per ASTM D698. The fill should be placed at water contents between optimum and 2 per cent wet of optimum to reduce the potential for swelling due to placement of "dry" material. The placement of engineered fill should be monitored by a geotechnical engineer on a full-time basis. The top surface of the engineered fill should be protected as necessary from construction traffic, and should be sloped to provide positive drainage for surface water during the construction period.

It is recommended that the final grade of the Site be sloped so that surface water is directed away from the buildings, structures and excavations. Groundwater level measurements from the current investigation and the desktop study indicate a high water level and perched water table conditions with a water table overlying the bedrock at between 2.5 and 4.5 m below existing ground surface. In addition, water seepage should be expected near the interface of the lacustrine silty clay and clayey sand till/bedrock.

Full-time monitoring and compaction testing should be provided during any subgrade preparation, fill placement or proof-rolling to confirm that the specifications are being achieved. Qualified geotechnical personnel, independent of the contractor, should perform this monitoring.

Prior to backfilling operations, the SPMDD of the excavated soils and of potential borrow sources should be determined. This information is required for quality control purposes during compaction and backfilling operations.

Unnecessary trafficking, disturbance and water content changes (wetting or drying) of the subgrade should be avoided. A large sheepsfoot compactor or similar that imparts a kneading-type compactive effort should be used to achieve suitable levels of compaction of the silty clay to clay soils. A vibratory roller-compactor should be used for compacting granular fill.

5.3.2 Subgrade Preparation Gravel Parking Lot and Access Road

Based on the results of the geotechnical investigation in the area of the proposed Kihciy Askiy Phase 1 Development, the near-surface soils near the proposed gravel parking lot and upgraded access road consist of fill consisting of sand and gravel or asphalt, underlain by silty clay fill further underlain by lacustrine silty clay that is further underlain by clayey sand till and bedrock. A silty sand deposit was encountered underlying the lacustrine silty clay in Borehole BH17-07.

The proposed grading plan for the gravel parking lot and upgraded access road area is currently unknown; however, any existing vegetation, topsoil, and other deleterious and unsuitable material should be removed from the proposed construction footprint extents during general site grading. The existing fill is not suitable for supporting the gravel parking lot and upgraded access road. These materials will need to be completely removed from the construction footprint. The silty clay material underlying the fill increased varied in plasticity from a medium to high plastic silty clay and its suitability is further discussed in the Section 5.3.3. The recommendations for the topsoil and fill removal should be reviewed by a qualified geotechnical engineer once the grading plans are available.

Prior to placing engineered fill, the exposed subgrade should be proof rolled in conjunction with an inspection by a qualified geotechnical engineer. The inspection should confirm that the exposed soils are native, undisturbed and competent, and have been adequately cleaned of existing unsuitable fills, ponded water and all disturbed, loosened, softened, organic and other deleterious material.

Material for use as engineered fill may consist of either suitable low to intermediate plastic cohesive material or granular material compacted in layers not exceeding 150 mm loose lifts and to a minimum of 100 per cent SPMDD as per ASTM D698. The fill should be placed at water contents between optimum and 2 per cent wet of optimum to reduce the potential for swelling due to placement of “dry” material. The placement of engineered fill should be monitored by a geotechnical engineer on a full-time basis. The top surface of the engineered fill should be protected as necessary from construction traffic, and should be sloped to provide positive drainage for surface water during the construction period.

It is recommended that the final grade of the gravel parking lot and the upgraded access road be sloped so that surface water is directed to either manhole/sewers or into adjacent roadside ditches, whichever is designed. Groundwater level measurements from the current investigation and the desktop study indicate a high water level and perched water table conditions with a water table overlying the bedrock at between 2.5 and 4.5 m below existing ground surface.

Full-time monitoring and compaction testing should be provided during any subgrade preparation, fill placement or proof-rolling to confirm that the specifications are being achieved. Qualified geotechnical personnel, independent of the contractor, should perform this monitoring.

Prior to backfilling operations, the SPMDD of the excavated soils and of potential borrow sources should be determined. This information is required for quality control purposes during compaction and backfilling operations.

Unnecessary trafficking, disturbance and water content changes (wetting or drying) of the subgrade should be avoided. A large sheepsfoot compactor or similar that imparts a kneading-type compactive effort should be used to achieve suitable levels of compaction of the silty clay to clay soils. A vibratory roller-compactor should be used for compacting granular fill.

5.3.3 Suitability of Re-Using Excavated Soils as Engineered Fill

Based on the information presented on the Record of Borehole Sheets contained in Appendix A, the depth of fill in the greenfield area may be up to 0.6 m. The depth of fill in the gravel parking lot and upgraded access road may be up to 1.2 m.

Based on the boreholes, the excavated native lacustrine clay material may be re-used as general or select engineered backfill for backfilling of subcut or subgrade in building or pavement areas provided that it is free of organic or deleterious materials. The lacustrine silty clay materials to be used as backfill should be checked to confirm it meets the requirements for engineered fill for the proposed structure. If the lacustrine clay does not meet the requirements, imported borrow material would be required.

The upper portion of the lacustrine silty clay deposit encountered near Boreholes BH17-06 and BH17-07, below the fill (existing access road area), was high plastic and it should be noted that soils with high plasticity provide a much lower bearing support for roadway subgrade.

Options for management of the non-reusable excavated soils include disposing of them off-site or to use them as fill below landscape areas.

5.4 Feasible Foundations

Loads for the existing structures on site were not available at the time this report was prepared. Based on the available information, Golder assumed that the feast fire pit, storage facility and washroom/change room facility will all be lightly loaded structures. Geotechnical recommendations for deep and shallow foundation options are provided for the proposed structures.

Table 3 below shows the feasible and recommended foundations for the three structures on site:

Table 3: Feasible Foundation Options

Structure	Slab on Grade	Shallow Foundations	Deep Foundations		
		Spread/ Strip Footings	Screw Piles	Cast-in-Place Piles	Steel Driven Piles
Feast Fire Pit	✓	✓	✓	×	×
Storage Facility	✓	✓	✓	✓	✓
Washroom/Change Room Facility	✓	✓	✓	✓	✓

5.4.1 Slab-on-Grade/Structurally Supported Slabs

Slab-on-grade floors may be utilized for lightly loaded structures; however, settlements should be anticipated and the magnitude is dependent on grading plan, founding soils, and proposed loading. Additional analysis is recommended at the detail design stage. Slab-on-grade foundations are not recommended to be founded on the existing fill material.

The exposed subgrade materials should be reviewed at the time of construction to confirm the soil conditions at the underside of slab design grade, and to better determine the material suitability for appropriate subgrade preparation and slab-on-grade support.

The slab-on-grade should be supported on at least 150 mm of compacted, freely-draining, well-graded 19 mm minus crushed gravel base course, placed over competent subgrade soils. The compacted base course material should be uniformly compacted to at least 100 per cent SPMDD as per ASTM D698. The exposed subgrade soils should be proof-rolled prior to placement of base course gravel. Soft or other unsuitable materials should be excavated and backfilled with suitable, well-compacted, approved earth backfill materials.

External (unheated) concrete slabs may be subject to vertical movement as a result of frost heave action. Potential slab heave may be reduced by appropriate surface and sub-slab drainage control and insulation. Should the potential for frost action movement not be acceptable, additional recommendations related to the use of insulation and of less frost susceptible soils will be required to reduce or prevent frost penetration.

Alternatively, if a slab-on-grade is not considered desirable, then the slab should be structurally supported by one of the other discussed methods within this report. As with slab-on-grade systems, a layer of at least 150 mm thickness of free-draining, well-graded 19 mm minus crushed gravel that is uniformly compacted to at least 100 per cent SPMDD, should be placed beneath the slab.

5.4.2 Shallow Foundations

From a geotechnical perspective, shallow foundations are feasible at the Site depending on the proposed vertical weight of the structures. If founded within the native, undisturbed lacustrine silty clay deposit or the bedrock, shallow foundations, in the form of conventional spread or strip footings may be a feasible options.

In general, it is recommended that shallow footings are founded at a minimum depth equivalent to the frost penetration depth expected at the Site. Based on the recommended design frost penetration depth, the shallow footings are recommended to be founded at a minimum of 2.2 m below the finished grade, or alternatively, footings may be founded at a shallower depth in conjunction with the use of rigid insulation as frost protection. If the footings are founded at the recommended depth of 2.2 m below the finished grade, groundwater may be encountered during installation; however, it is expected that such seepage volumes will be minor and could be adequately controlled by pumping from properly filtered sumps within the foundation excavations.

Strip or spread footings should be founded below the frost depth of 2.2 m, as such, based on the minimum founding elevation at the Feast Fire Pit, Storage facility and washroom facility, the preliminary factored geotechnical resistance at Ultimate Limit States (ULS) and preliminary geotechnical resistance at Serviceability Limit States (SLS), for 25 mm of settlement at each structure is shown in Table 4.

Table 4: Preliminary Spread/Strip Footing Recommendations

Structure	Footing Foundation Subgrade	Factored Geotechnical Resistance at ULS (kPa)	Geotechnical Resistance at SLS (kPa)
Feast Fire Pit	Silty Clay to sandy Silty Clay	75	50
Storage Facility	Silty Clay to sandy Silty Clay	75	50
Washroom/Change Room Facility	Silty Clay to Silty Clay and Sand	60	40

The values provided in Table 4 are based on a footing width of 1 m. A resistance factor of ϕ=0.5 was used to obtain the factored bearing resistance at ULS. These values must be confirmed during the detailed design phase. The values provided are given under the assumption that the loads will be applied perpendicular to the surface of the footings. Where the load is not applied perpendicular to the surface of the footing, inclination of the load should be taken into account. The geotechnical resistance values provided above are relatively low as compared to many design conditions; however, these value reflect the relatively low strength of the native soils.

Footing excavations should be hand cleaned to remove all soft, wet, loose, or disturbed soil so that the footing concrete is placed on undisturbed native soil. Footing excavations should then be protected from freezing, desiccation by drying, from ponding of water, and from disturbance by construction activities. Affected soils should be overexcavated and removed. Areas of overexcavation required for any reason should be backfilled with concrete.

5.4.3 Deep Foundations

From a geotechnical perspective, deep foundations are considered feasible depending on the expected load of the proposed facilities at the Site. If utilized, deep foundations should extend into the bedrock deposit encountered during the geotechnical investigation. Three options, screw piles, cast-in-place concrete piles and steel driven piles are discussed below.

5.4.3.1 Screw Piles

Screw piles are typically considered to be a proprietary foundation system due to variability in pile materials and installation methods. As the proposed buildings are assumed to be relatively lightly loaded, it is expected that screw piles will be feasible. The following is provided for information only, a qualified supplier should be consulted for detail design.

The nature of helical piles having slender shafts, results in the potential susceptibility to buckling in loose or soft to firm soils, and may not be suitable foundations requiring high lateral resistance. The structural pile designer should check helical piles for buckling effect. Battered helical piles (which function as anchors) may be considered to improve lateral load resistance. Helical piles may be best suited for relatively compact and stiff soils free of large cobbles. Skin friction along the shafts should not be included in calculating the total load capacity as the shafts are typically slender.

The resistance of helical piles is highly dependent on the installation method. The design is typically completed by the contractor installing the pile and should be based on local experience and load testing. It is critical that the foundation bearing soil is not excessively disturbed during installation to minimize the risk of excessive settlements.

Properly installed helical piles that are preloaded (recommended) should encounter settlement in the order of 10 to 15 mm. However, poorly installed helical piles may settle in excess of 50 mm.

Based on the subsurface conditions encountered, screw piles are considered a suitable pile type for the proposed structures if they are lightly to moderately loaded. It is recommended that screw piles be installed with the upper most helix at a minimum of 2.8 m below finished grade (i.e. at least 0.5 m below the 100-year design frost penetration depth of 2.3 m) for the proper development of frost protection.

For preliminary purposes, screw pile geotechnical parameters are provided in the following table.

Table 5: Design Parameters for Screw Piles

Subsurface Soil Layer	Depth (m)	Bulk Unit Weight, γ (kN/m^3)	Factored Shaft Friction (kPa)	Factored Screw Plate Bearing Capacity (kPa)
Silty Clay Fill	0 to 1.5	16	0	Not Recommended
Lacustrine Silty Clay	1.5 to 4	16	5	90

m = metres; kN/m^3 = kilonewton per cubic metre

The upper 2.0 m below ground surface or to depth of fill, whichever is greater, is ignored in the calculation of shaft friction resistance due to the potential for loss of contact between the pile and the ground due to combinations of lateral movements, freeze-thaw cycles, and wetting-drying cycles. A resistance factor of ϕ=0.4 was used to obtain the factored plate bearing capacity and a resistance factor of 0.3 was used to obtain the factored shaft friction in the lacustrine silty clay.

As mentioned above, screw piles are considered a feasible option as long as the upper most helix is installed at a minimum of 2.8 m below finished grade; however, based on the measured SPT “N”-values within the bedrock material encountered at the site, it is probable that screw piles advanced into the bedrock will achieve refusal with minimal penetration. There is the potential that if screw piles were advanced into the bedrock, the material adjacent to the piles will be displaced due to augering which would reduce the uplift resistance of the piles. As such, if the design calls for the screw piles to be advanced to depths greater than 4 m or to the depth of bedrock (whichever is shallower), Golder does not recommend the use of screw piles.

Further geotechnical information can be provided, upon request by the pile supplier/designer.

5.4.3.2 Cast-In-Place Concrete Piles

Based on the subsurface conditions encountered, straight shaft friction piles or belled cast-in-place concrete end-bearing piles are considered feasible at the Site for the storage building facility and washroom/change room facility.

Seepage was observed during the current field investigation in the boreholes from the suspected perched water table within the lacustrine silty clay above the bedrock at a depth between about 2.7 m and 3.6 m below ground surface. Therefore, temporary casing will be required during construction to seal off zones where seepage and possible sloughing may occur. In areas where softer clay are encountered, it may be necessary to extend the length of the end-bearing piles, and the temporary casing to achieve the design pile capacity.

For preliminary design, the unfactored geotechnical parameters for the cast-in-place concrete piles are presented in Table 6:

Table 6: Preliminary Unfactored Pile Design Parameters

Soil Layer	Depth (m)	Ultimate Unit Skin Friction Resistance (kPa)	Ultimate Unit End Bearing Resistance (kPa)
Lacustrine Silty Clay Deposit	1.5 to 4.0	30	Not Recommended
Clayey Sand Till	4.0 to 5.0	35	Not Recommended
Weathered Clayshale/Sandstone	>5.0	45	700

The values presented in Table 6 must be confirmed during the detailed design phase. The skin friction resistance within the upper 2 m below final grade or to depth of fill, whichever is greater, should be ignored in the calculation of the pile resistance, as it is assumed that this material will not offer resistance due to disturbance during construction. Adfreeze, minimum pile length and reinforcement considerations will need to be addressed during detailed design.

For the above noted unfactored Ultimate Limit States (ULS) skin friction and end bearing resistances values, a geotechnical resistance factor (ϕ) of 0.4 should be applied for axial compression loading based on static parameters. For uplift (skin friction only), a geotechnical resistance factor (ϕ) of 0.3 should be applied.

It should be noted that the recommended axial capacity of the concrete piles assumes that the base of the drilled shaft is free of any loose or softened soil, the soil is relatively undisturbed over the design length of the pile and that the concrete can be placed in dry conditions. The piling contractor should be prepared to remove any loose or wet material from the base prior to placing the concrete. Concrete placement by tremie techniques may be required if groundwater seepage into the piles cannot be controlled during construction.

Full-time inspection by qualified geotechnical personnel during pile installation is recommended to maintain pile driving records. It is recommended that each pile be reviewed and approved by the geotechnical engineer in charge of the design to confirm that the required pile capacity is achieved.

5.4.3.3 Steel Driven Piles

Based on the subsurface conditions encountered, steel driven piles are considered feasible at the Site for the storage building facility and washroom/change room facility.

The preliminary unfactored shaft friction and end bearing values recommended for driven steel piles at the Site are provided in Table 7. This value is estimated based on current conventional engineering practice as described in CFEM (2006). A geotechnical resistance factor (ϕ) of 0.4 for axial compression and 0.3 for uplift loading should be applied.

Table 7: Preliminary Unfactored ULS Pile Design Parameters for Driven Steel Piles

Major Soil Type	Depth (m)	Ultimate Unit Skin Friction Resistance (kPa)	Ultimate Unit End Bearing Resistance (kPa)
Lacustrine Silty Clay Deposit	1.5 to 4.0	30	Not Recommended
Clayey Sand Till	4.0 to 5.0	35	Not Recommended
Weathered Clayshale/Sandstone	>5.0	45	700

For the determination of axial pile capacity, it is recommended that the skin friction be ignored in the upper 2.0 m below final grade or to depth of fill, whichever is greater, due to the potential disturbance effects associated with frost, desiccation and construction. Adfreeze, minimum pile length and reinforcement considerations will need to be addressed during detailed design.

For final pile design, soil and groundwater conditions, pile type (i.e. pipe or H-pile), size and length, and pile tip and cut-off elevations need to be considered to determine the design parameters. Minimum pile sizes should be determined by design loads, structural design requirements and associated pile driving criteria.

Dynamic testing using a Pile Driving Analyzer (PDA) may be carried out to evaluate pile axial resistances achieved in the field, hammer performance, installation criteria, and pile bearing certification. If a suitable number of PDA tests are performed, a resistance factor of 0.5 can be used to determine the factored axial capacity at ULS under compression.

For the design of a single driven pile, SLS is not considered relevant as the anticipated settlement of individual piles is anticipated to be less than 15 mm. The design of pile groups may be governed by SLS conditions and further analysis will be required. A settlement analysis of pile groups can be completed by Golder upon request and upon submittal of detailed design information (number of piles, pile spacing, load conditions).

5.5 Excavation and Construction Groundwater Control

Excavations will typically extend through the existing firm silty clay fill and stiff to firm lacustrine silty clay deposits. All temporary and permanent excavations, including trenches should be carried out in accordance with the guidelines outlined in the Alberta Occupational Health and Safety Regulation (OH&S), specifically Part 32, which deals with excavation and tunnelling (2009). Based on the OH&S, the fill and native silty clay deposits are classified as “likely to crack or crumble”.

For those areas of construction in which sloped excavations are required, it is recommended that temporary excavations (i.e., those that are open for a relatively short time period) be developed with side slopes no steeper than 1 horizontal to 1 vertical (1H:1V) within the silty clay fill layer and native lacustrine deposits. Flatter side slopes will be required if seepage is encountered or if the excavations extend below the groundwater level. Excavations should be monitored frequently by qualified geotechnical personnel. If signs of suspected instability are observed, shallower slope angles may be required.

The stockpiling or storage of excavation spoils, construction materials or heavy equipment should not be permitted within 3 m of the crest of excavation slopes to avoid overloading of the crest and reduce the potential for slope movements.

If the excavations are maintained above the groundwater level, some minor groundwater seepage may occur from within the native lacustrine silty clay deposit. However, it is expected that such seepage volumes will be minor and could be adequately controlled by pumping from properly filtered sumps within the excavations. Excavations below a depth of about 3 m may experience significant groundwater seepage and sloughing.

Should seepage or wet zones be encountered during excavation, flatter temporary and permanent slopes may be required. If the seepage or wet zones are encountered below the toe of the slope, the groundwater may be managed using ditches and properly filtered sump and pump systems. Water removed from excavations should be directed toward a suitable discharge location.

Control of surface water should be maintained at all times and surface water should be directed away from all excavations and exposed subgrade soils.

5.6 Gravel Road and Parking Lot Design

5.6.1 Subgrade Preparation

All uncontrolled fill, topsoil, organic clay and other deleterious materials should be removed from the areas proposed for the upgraded access road and gravel parking lot. Any fill required to bring the access road and gravel parking lot areas to grade should be placed in lifts not exceeding 300 mm loose thickness and compacted to at least 95 per cent SPMDD except for the top 450 mm, which should be compacted to at least 100 per cent SPMDD as per ASTM D698. The subgrade should be prepared in accordance with COE Section 02335 Subgrade Preparation.

The final prepared surface should be proof rolled to observe for localized soft and/or wet areas. Remedial work should be carried out on any disturbed, softened or poorly performing zones as directed by geotechnical personnel.

5.6.2 Site Traffic

Based on the information provided, the pavement structures for the access road and parking lot will be designed and constructed using granular materials only, without asphalt concrete surfacing. It is assumed that the gravel pavement structure for the roads will accommodate wheel loadings from traffic associated with the operation of the site, patrons of the site, maintenance traffic and emergency vehicles. It is also our understanding that the road is not intended to support larger construction traffic. Therefore, for a 15 year design life, the Equivalent (80 kN) Single Axle Loads (ESAL) would be approximately 1 x 10^4 repetitions. A design CBR of 2.5 has been used based on the soil conditions encountered near surface at the borehole locations.

On the basis of the above design assumptions, for preliminary design purposes, the minimum pavement structure to accommodate the anticipated traffic conditions is provided in the Table 8.

Table 8: Minimum Thickness of Gravel for Operational Traffic Loading

Pavement Designs	Minimum Thickness (mm)
Granular Base (20 mm Crushed Gravel)	150
Granular Sub-base (80 mm Pit Run Gravel)	300
Prepared Subgrade	150

It should be noted that gravel roads require regular maintenance, as gravel will eventually be displaced due to traffic action and rutting will likely occur following precipitation events. The above design recommendations should be reviewed by Golder once the site configurations and any traffic data are available. The roadways should be inspected after the construction period and repairs made as required. All contaminated granular material should be removed and areas of distress repaired. Depending on the condition of the road, it may be necessary to add additional crushed gravel on the gravel roadways at the end of construction.

5.7 Water Soluble Sulphate Content and Cement Type

A total of two water soluble sulphate content tests were completed on selected samples obtained from the current drilling investigation. The test results indicated water soluble sulphate concentrations were less than the detectible

limit of 0.05 per cent, indicating a low degree of sulphate attack. The results of the water soluble sulphate testing are provided in Table 9 and contained in Appendix B.

Table 9: Analytical Test Results

Borehole/ Sample No.	Depth (m)	pH	Soluble Sulphates (%)	Chloride Concentration (mg/L)	Electrical Resistivity (Ohm-cm)
BH17-02 AS7	2.9 – 3.4	7.57	<0.05	<20	3970
BH17-03 AS3	1.5 – 1.8	7.79	<0.05	<20	2220

However, based on local experience, concrete in contact with the soils should be designed to an S-3 exposure class. For design purposes, type HS or HSb cement is recommended for all concrete in contact with soil. To enhance durability, an appropriate quantity of entrained air, as per CSA A23.1-09, Clause 4.1.1.3, is recommended for all concrete exposed to freezing and thawing. Based on an S-3 exposure class, the maximum water-to-cementing material ratio of 0.50 is recommended, with a minimum specified compressive strength of 30 MPa at 56 days. Imported soils should be tested for compatibility with the recommended cement type.

6.0 CLOSURE

The preliminary recommendations presented in this report are made based on Golder's interpretation of subsurface conditions encountered during the geotechnical investigation, a review of existing information for the area, and Golder's present understanding of the project requirements. Should any conditions at the Site be encountered which differ from those addressed, we require that we be notified immediately in order to permit re-assessment of our recommendations.

We trust that the information presented in this report meets your present requirements. If you have any questions, please contact the undersigned at your convenience.

GOLDER ASSOCIATES LTD.

APEGA Permit to Practice #05122

May 23, 2017

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REFERENCES

Alberta Energy Regulator. 2016. *Coal Mine Atlas.* Available at: https://www.aer.ca/data-and-publications/statistical-reports/st45 Accessed: December 2016.

ASTM D1586-11 Standard Test Method for Standard Penetration Test

ASTM D1587-15 Standard Penetration for Thin-Walled Tube Sampling.

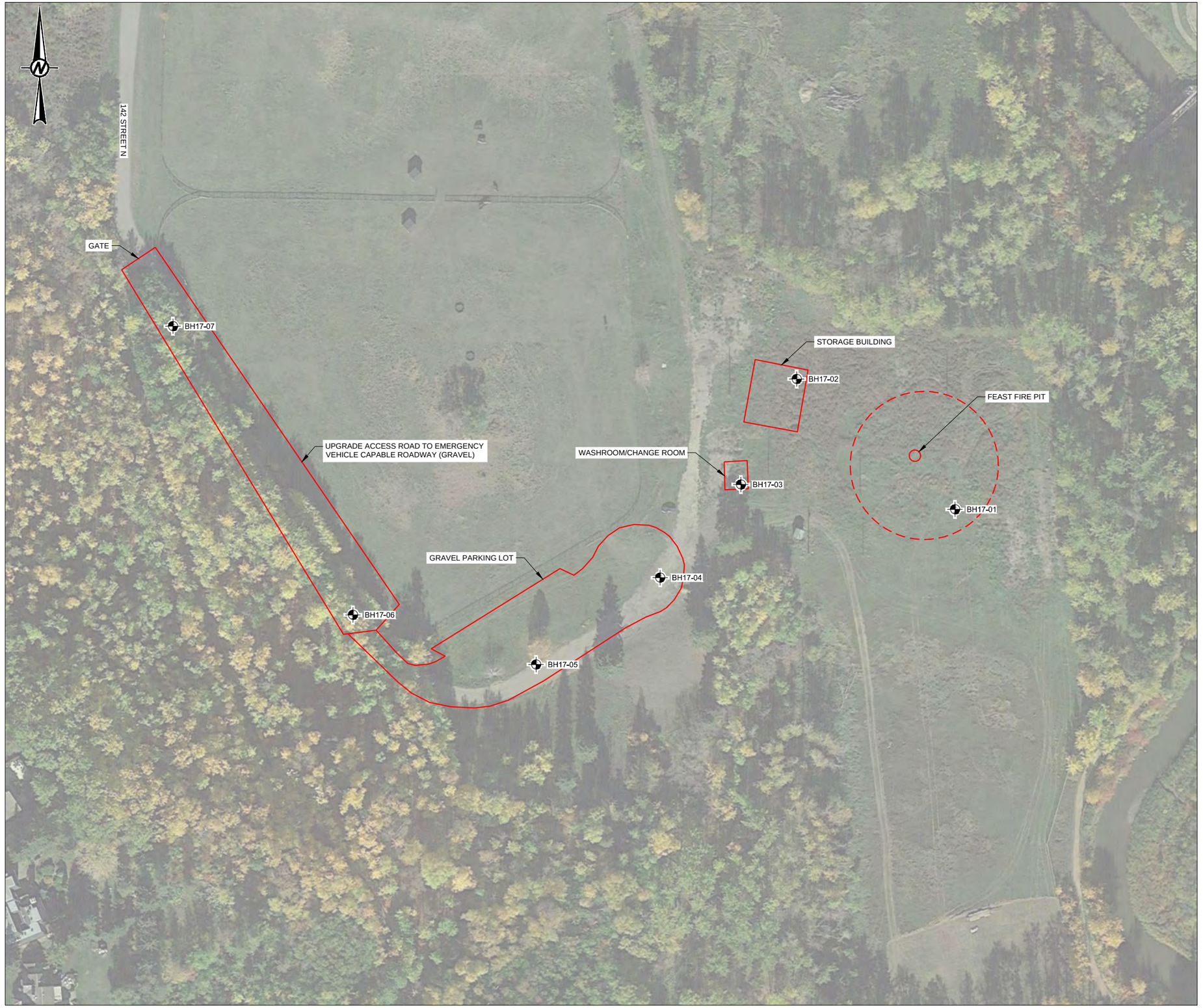
ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600kN-m/m3))

Bayrock, L.A., Map 143 – Surficial Geology Edmonton. Alberta Geological Survey, 2005.

Prior, G.J., Hathway, B., Glombick, P.M., Pana, D.I., Banks, C.J., Hay, D.C., Schneider, C.L., Grobe, M., Elgr, R., Weiss, J.A. 2013. *Bedrock Geology of Alberta, Alberta Geological Survey.*

The City of Edmonton. 2015*. Design Standards Construction Specifications*. Transportation Services.

FIGURE

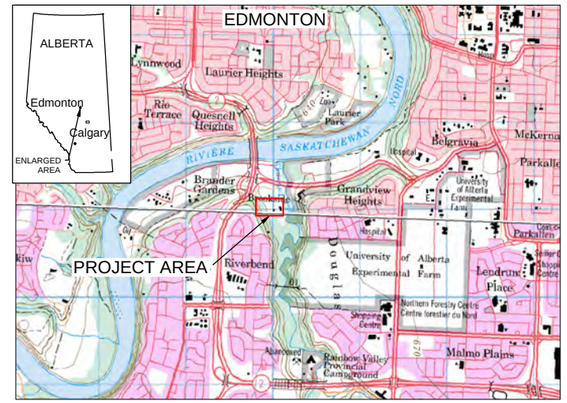


LEGEND

- BOREHOLE LOCATION
- SITE FEATURE
- FLAT AREA

REFERENCE

IMAGE OBTAINED FROM GOOGLE EARTH PRO, USED UNDER LICENSE.
IMAGERY DATE: SEPTEMBER 29, 2015. GOOGLE EARTH IMAGE IS NOT TO SCALE.
NAD83 UTM ZONE 12.



KEY MAP
NOT TO SCALE

0 25 50
1:1,250 METRES

CLIENT
CITY OF EDMONTON

PROJECT
PROPOSED KIHCIY ASKIY PHASE 1 SITE DEVELOPMENT

TITLE
SITE AND BOREHOLE LOCATION PLAN

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-05-23
PREPARED	MKH
DESIGN	KW
REVIEW	NK
APPROVED	TF

PROJECT No.	PHASE	Rev.	FIGURE
1773525	5000	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

25 mm

0

Path: \\golder.gds\ga\saskatoon\gis\2017\1773525 COE Kichy Askiy\Figures\ | File Name: 1773525 - Borehole Location Plan.dwg

APPENDIX A

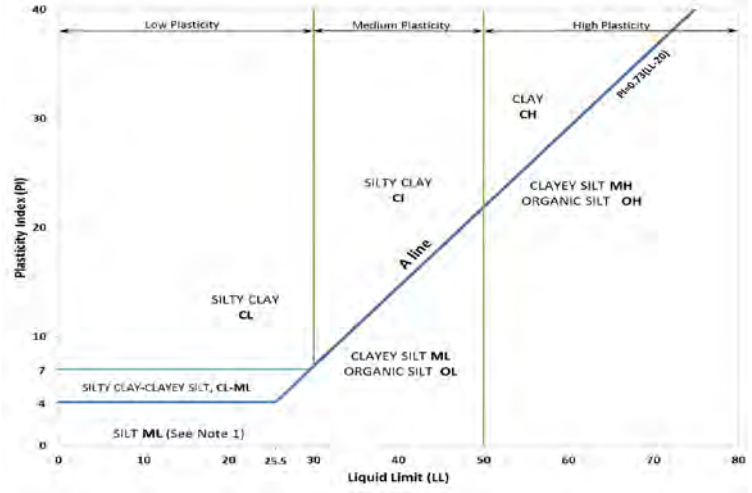
Record of Borehole Sheets

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
GS	Grab Sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N_{60} values.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation
w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c′	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

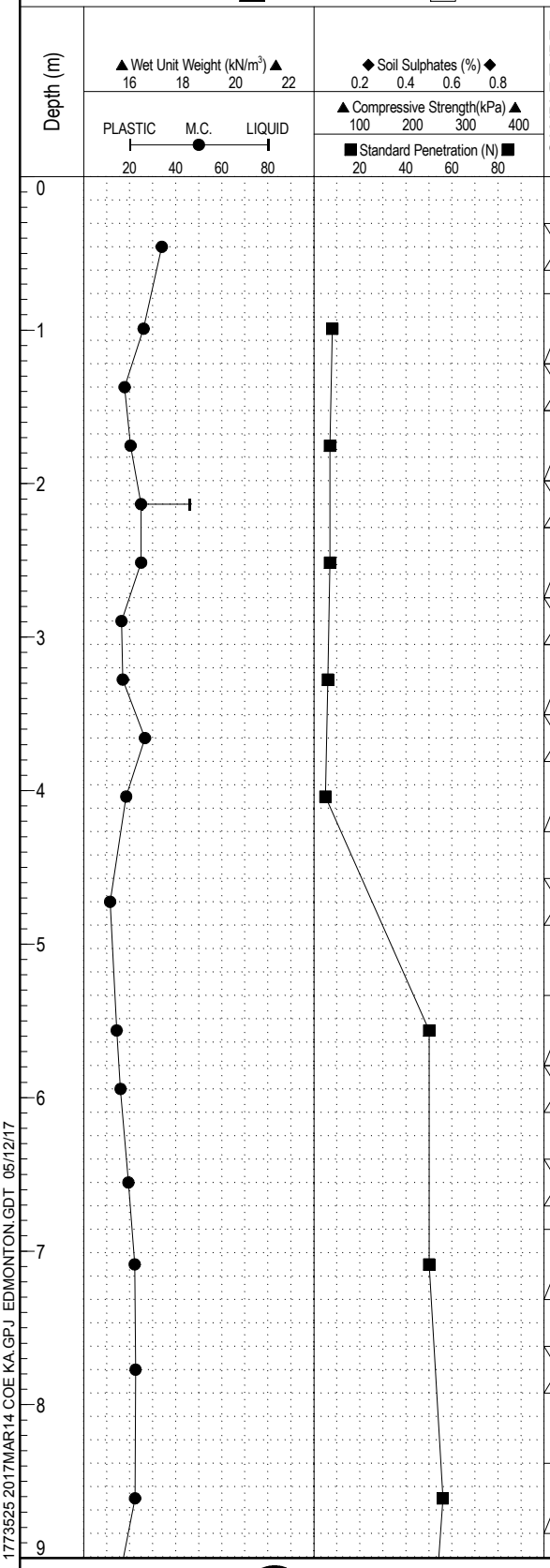
Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-01**
Engineering Services Section	UTM ZONE: - N5931013 E330090	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 625 m

SAMPLE TYPE: Shelby Tube; Drive Sample; Auger Sample; No Recovery; A Casing; Cored Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



SAMPLE TYPE	SPT (N)	USC	SOIL SYMBOL	SOIL DESCRIPTION	ELEVATION (m)
		OR		TOPSOIL	625
	8			(Cl) SILTY CLAY to Sandy SILTY CLAY, trace to some sand pockets, trace coal fragments, trace root fibers to 1.2 m; brown, frozen to 1.2 m; cohesive, w<PL to w>PL, stiff to firm.	624
	7				623
	7	Cl			
	6				622
	5				621
		TILL		(SC) Gravelly CLAYEY SAND, fine to coarse sand, fine to coarse gravel; brown, trace oxidations stains, (TILL); cohesive, w>PL, stiff.	620
				...seepage observed around 5.2 m	
	50/0.15			Completely weathered, massive, blueish grey, non-porous, extremely weak, SANDSTONE interbedded with CLAYSHALE (Horseshoe Canyon Formation)	619
	50	SS			618
	56				617

THE CITY OF Edmonton

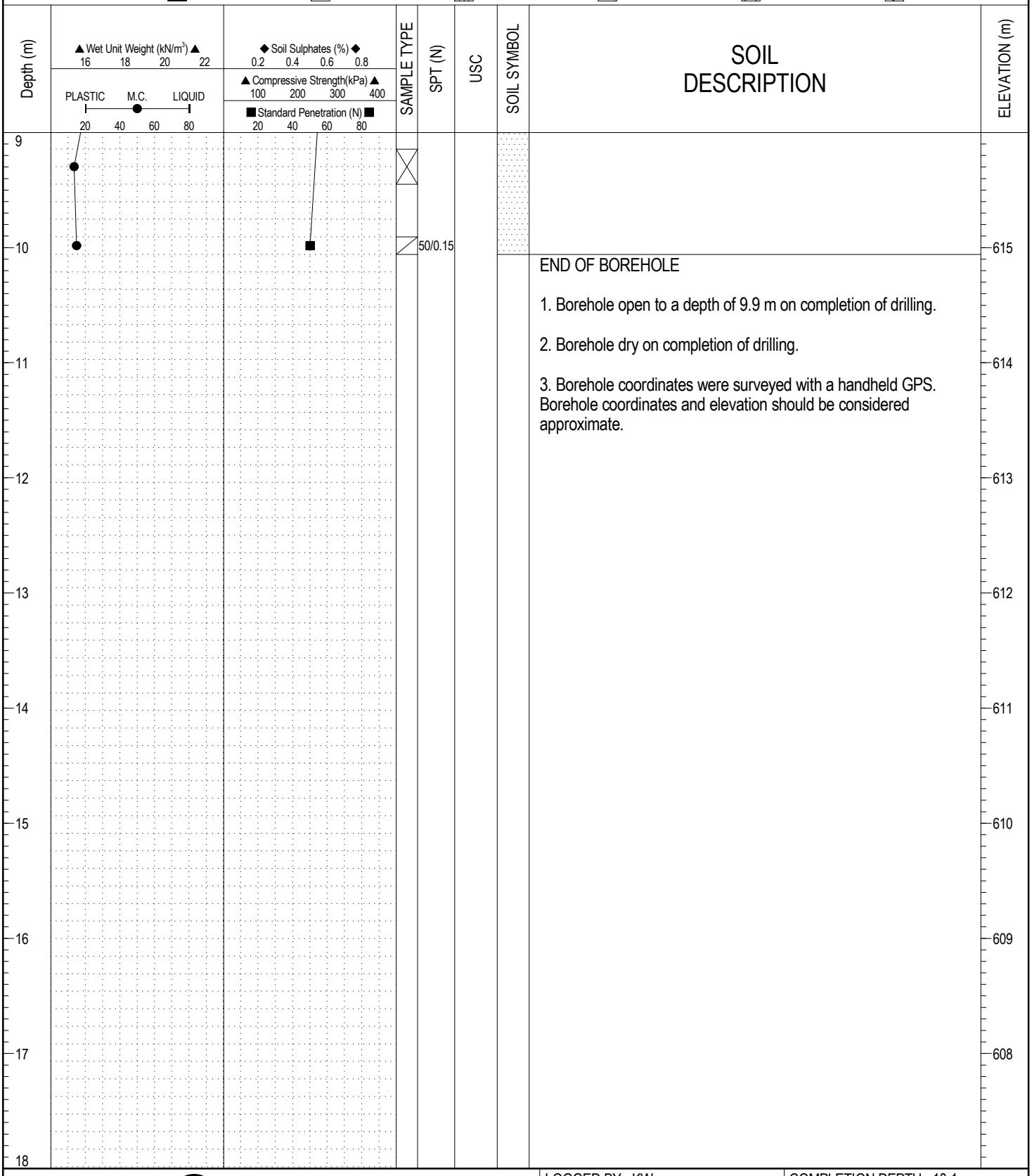
LOGGED BY: KW	COMPLETION DEPTH: 10.1 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17
	Page 1 of 2

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-01**
Engineering Services Section	UTM ZONE: - N5931013 E330090	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 625 m

SAMPLE TYPE: Shelby Tube; Drive Sample; Auger Sample; No Recovery; A Casing; Cored Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



END OF BOREHOLE

1. Borehole open to a depth of 9.9 m on completion of drilling.

2. Borehole dry on completion of drilling.

3. Borehole coordinates were surveyed with a handheld GPS. Borehole coordinates and elevation should be considered approximate.

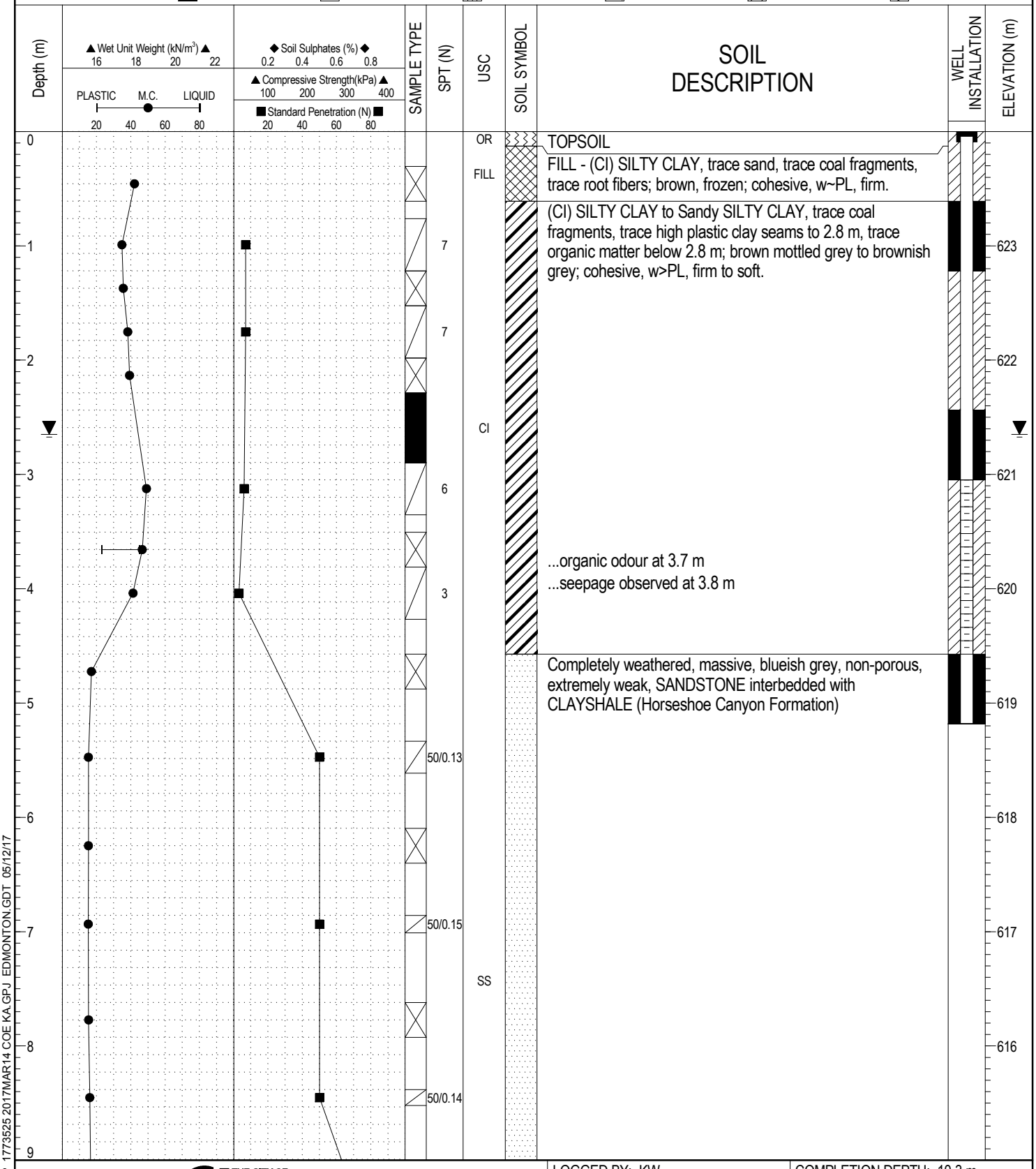
LOGGED BY: KW	COMPLETION DEPTH: 10.1 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-02**
Engineering Services Section	UTM ZONE: - N5931055 E330039	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 624 m

SAMPLE TYPE: Shelby Tube; Drive Sample; Auger Sample; No Recovery; A Casing; Cored Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



TOPSOIL

FILL - (CI) SILTY CLAY, trace sand, trace coal fragments, trace root fibers; brown, frozen; cohesive, w~PL, firm.

(CI) SILTY CLAY to Sandy SILTY CLAY, trace coal fragments, trace high plastic clay seams to 2.8 m, trace organic matter below 2.8 m; brown mottled grey to brownish grey; cohesive, w>PL, firm to soft.

...organic odour at 3.7 m

...seepage observed at 3.8 m

Completely weathered, massive, blueish grey, non-porous, extremely weak, SANDSTONE interbedded with CLAYSHALE (Horseshoe Canyon Formation)

THE CITY OF Edmonton

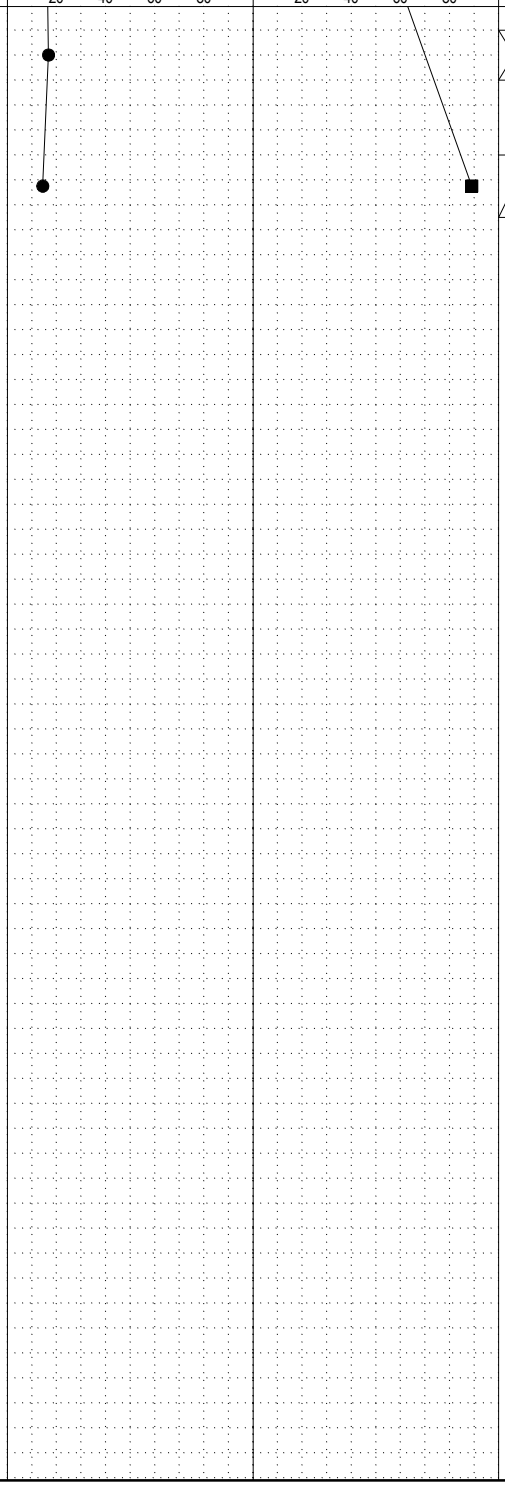
LOGGED BY: KW	COMPLETION DEPTH: 10.3 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-02**
Engineering Services Section	UTM ZONE: - N5931055 E330039	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 624 m

SAMPLE TYPE: Shelby Tube; Drive Sample; Auger Sample; No Recovery; A Casing; Cored Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



Depth (m)	SAMPLE TYPE	SPT (N)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL INSTALLATION	ELEVATION (m)
9							
10		89/0.23					614
					END OF BOREHOLE		
11					1. Borehole open to a depth of 9.9 m on completion of drilling.		613
					2. Water level in open borehole to a depth of 9.8 m on completion of drilling.		
12					3. Water levels in standpipe piezometer measured as follows:		612
					Date / Depth (m) / Elev (m) Mar 9, 2017 / Dry / - Mar 23, 2017 / 2.6 / 621.4		
13					4. Borehole coordinates were surveyed with a handheld GPS. Borehole coordinates and elevation should be considered approximate.		611
14							610
15							609
16							608
17							607
18							

THE CITY OF Edmonton

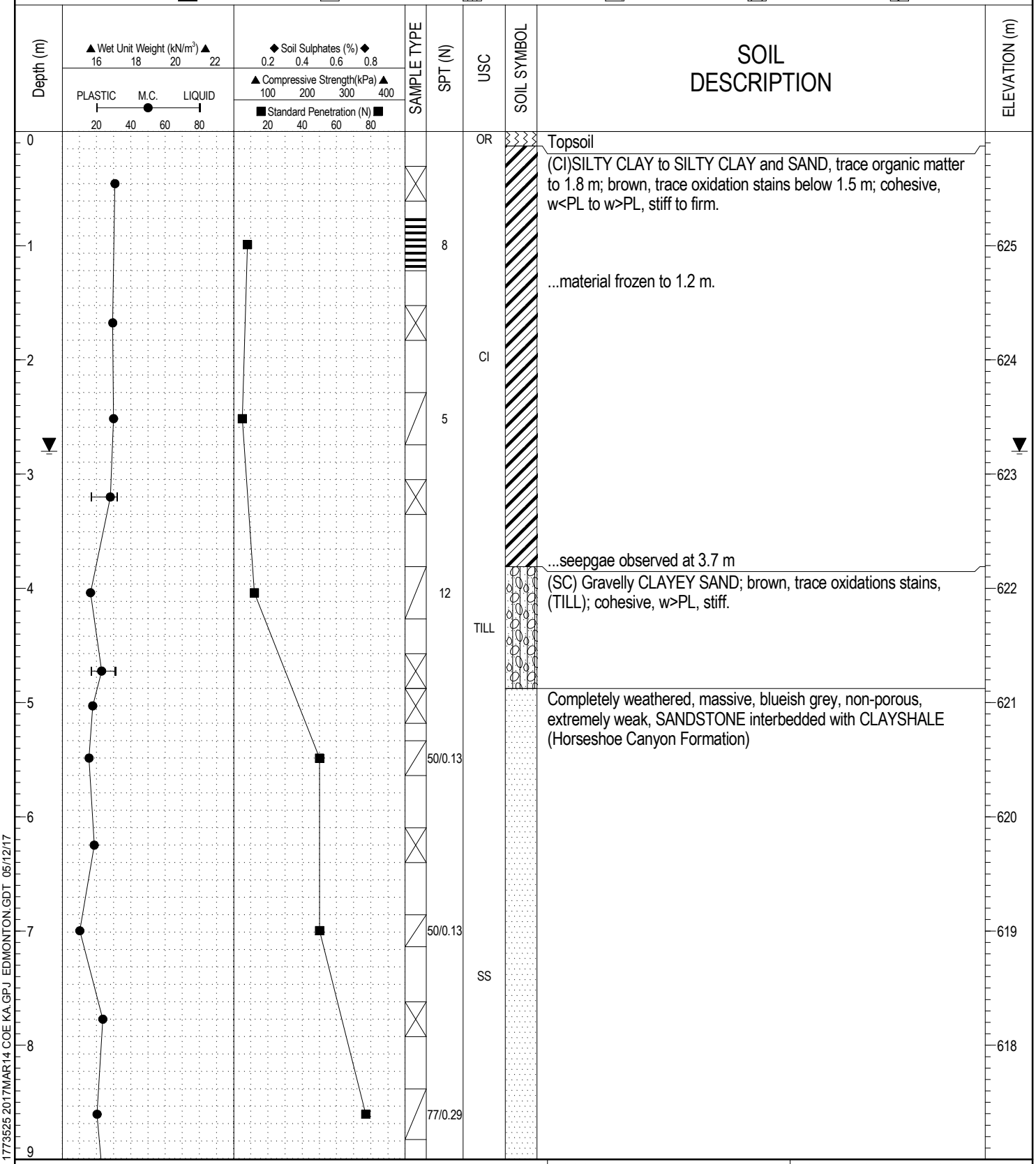
LOGGED BY: KW	COMPLETION DEPTH: 10.3 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-03**
Engineering Services Section	UTM ZONE: - N5931021 E330021	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 626 m

SAMPLE TYPE: Shelby Tube; Drive Sample; Auger Sample; No Recovery; A Casing; Cored Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



LOGGED BY: KW	COMPLETION DEPTH: 9.9 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-03**
Engineering Services Section	UTM ZONE: - N5931021 E330021	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 626 m

SAMPLE TYPE: Shelby Tube | Drive Sample | Auger Sample | No Recovery | A Casing | Cored Sample

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	▲ Wet Unit Weight (kN/m³) ▲ 16 18 20 22 PLASTIC M.C. LIQUID 20 40 60 80	◆ Soil Sulphates (%) ◆ 0.2 0.4 0.6 0.8 ▲ Compressive Strength(kPa) ▲ 100 200 300 400 ■ Standard Penetration (N) ■ 20 40 60 80	SAMPLE TYPE	SPT (N)	USC	SOIL SYMBOL	SOIL DESCRIPTION	ELEVATION (m)
9								
10							END OF BOREHOLE 1. Borehole open to a depth of 7.2 m on completion of drilling. 2. Water level in open borehole observed at 3.8 m on completion of drilling. 3. Borehole coordinates were surveyed with a handheld GPS. Borehole coordinates and elevation should be considered approximate.	616
11								615
12								614
13								613
14								612
15								611
16								610
17								609
18								

THE CITY OF Edmonton

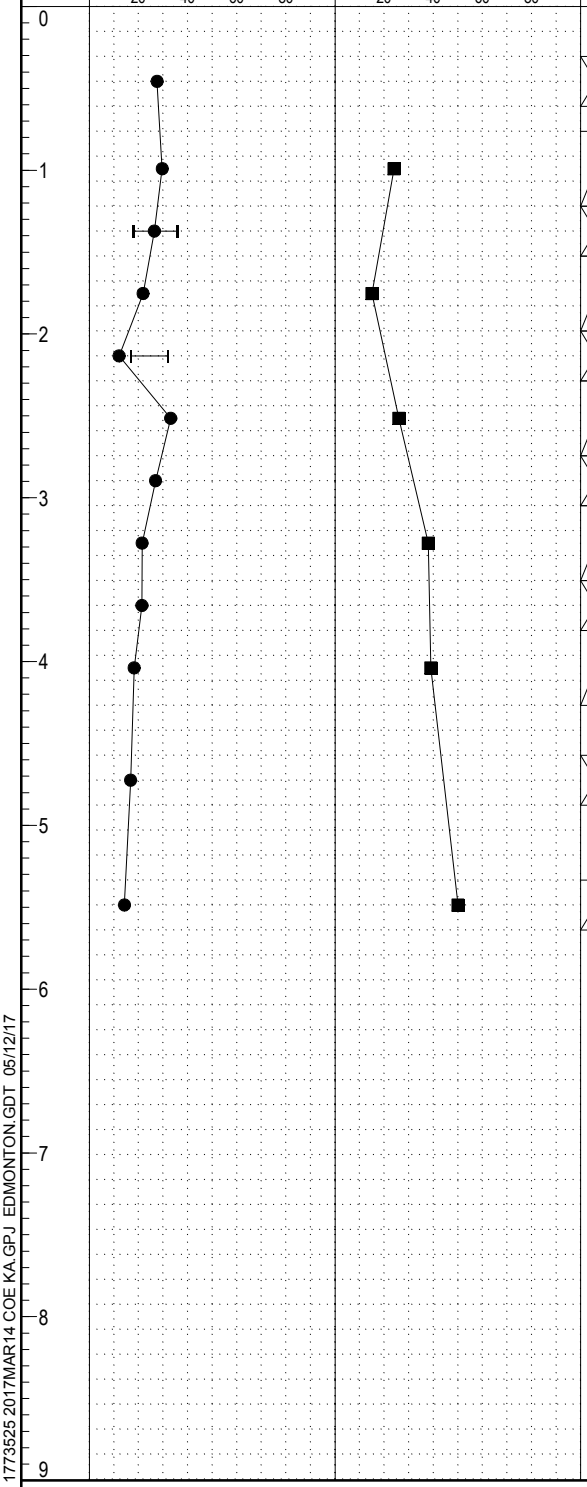
LOGGED BY: KW	COMPLETION DEPTH: 9.9 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17
	Page 2 of 2

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-04**
Engineering Services Section	UTM ZONE: - N5930991 E329995	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 627 m

SAMPLE TYPE: Shelby Tube; Drive Sample; Auger Sample; No Recovery; A Casing; Cored Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



Depth (m)	SAMPLE TYPE	SPT (N)	USC	SOIL SYMBOL	SOIL DESCRIPTION	ELEVATION (m)
0			FILL		FILL - (SP-GP) SAND and GRAVEL; brown; non-cohesive, dry, compact.	
			FILL		FILL - (CI) SILTY CLAY, some sand; brown, frozen; cohesive, w>PL, stiff.	
1		24	CI		(CI) SILTY CLAY, some sand; brown, frozen, trace oxidation stains; cohesive, w>PL, stiff. ...material frozen; SPT "N" Value of 24 may not be representative of in-situ strength	626
		15	TILL		(SM) CLAYEY SAND, trace gravel, some sand pockets; brown, trace oxidation stains, (TILL); cohesive, w~PL to w<PL, stiff.	
2						625
		26			Completely weathered, massive, grey, non-porous, extremely weak, CLAYSHALE (Horseshoe Canyon Formation)	
3			SH			624
		38				
4		39			Completely weathered, massive, blueish grey, non-porous, extremely weak, SANDSTONE interbedded with CLAYSHALE (Horseshoe Canyon Formation)	623
			SS			
5						622
		50/0.15				
6					END OF BOREHOLE	621
					1. SS2 frozen, SPT "N" Value of 24 may not be representative of in-situ strength.	
					2. Borehole open to a depth of 5.3 m on completion of drilling.	
7					3. Borehole dry on completion of drilling.	620
					4. Borehole coordinates were surveyed with a handheld GPS. Borehole coordinates and elevation should be considered approximate.	
8						619
9						

THE CITY OF Edmonton

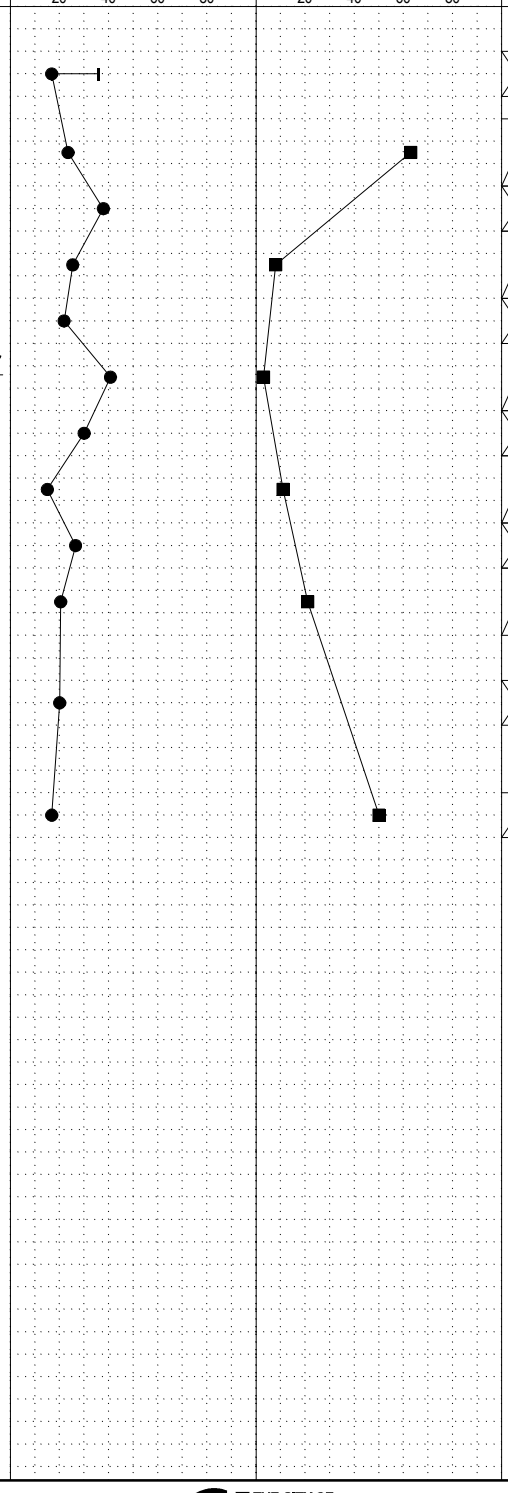
LOGGED BY: KW	COMPLETION DEPTH: 5.6 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17
	Page 1 of 1

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-05**
Engineering Services Section	UTM ZONE: - N5930963 E329955	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 627 m

SAMPLE TYPE: Shelby Tube | Drive Sample | Auger Sample | No Recovery | A Casing | Cored Sample

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



SOIL DESCRIPTION

FILL - (SP-GP) SAND and GRAVEL; brown; non-cohesive, dry, compact.

(CI) SILTY CLAY and SAND, trace coal fragments, trace sand pockets below 1.5 m; grey to brown below 1.5 m; cohesive, w~PL to w>PL, stiff to soft.

...material frozen to 1.4 m; SPT "N" Value of 63 may not be representative of in-situ strength

(SM) Gravelly CLAYEY SAND; brown, (TILL); cohesive, w>PL, stiff.

...seepage observed at 3.7 m

Completely weathered, massive, blueish grey, non-porous, extremely weak, SANDSTONE interbedded with CLAYSHALE (Horseshoe Canyon Formation)

END OF BOREHOLE

1. SS2 frozen, SPT "N" Value of 63 may not be representative of in-situ strength.

2. Borehole open to a depth of 4.9 m on completion of drilling.

3. Water level in open borehole to a depth of 4.6 m on completion of drilling.

4. Water levels in standpipe piezometer measured as follows:

Date	Depth (m)	Elev (m)
Mar 9, 2017	4.3	622.7
Mar 23, 2017	2.5	624.5

4. Borehole coordinates were surveyed with a handheld GPS. Borehole coordinates and elevation should be considered approximate.

SLOTTED PIEZOMETER

ELEVATION (m): 626, 625, 624, 623, 622, 621, 620, 619, 618

THE CITY OF Edmonton

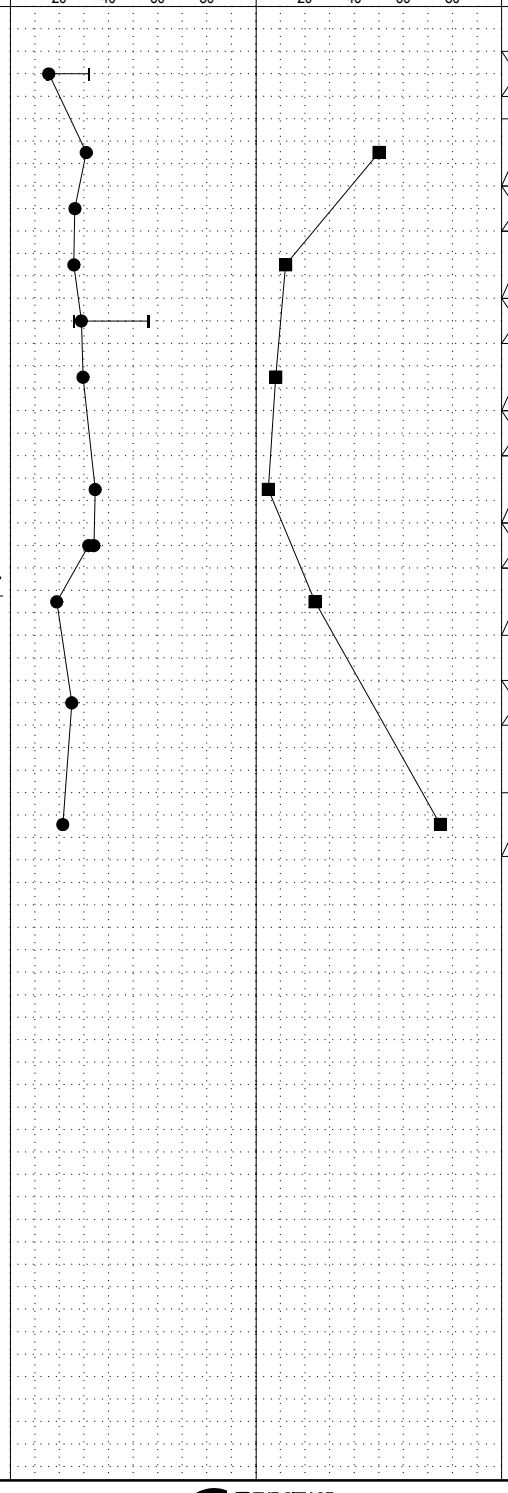
LOGGED BY: KW	COMPLETION DEPTH: 5.6 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-06**
Engineering Services Section	UTM ZONE: - N5930979 E329896	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 628 m

SAMPLE TYPE: Shelby Tube; Drive Sample; Auger Sample; No Recovery; A Casing; Cored Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



Depth (m)	SAMPLE TYPE	SPT (N)	USC	SOIL SYMBOL	SOIL DESCRIPTION	ELEVATION (m)
0			ASPH		ASPHALT CONCRETE	
			FILL		FILL - (CI) SILTY CLAY and SAND, trace coal fragments; brown, frozen, trace oxidation stains; cohesive, w~PL, stiff to very stiff.	
1		50			...material frozen; SPT "N" Value of 50 may not be representative of in-situ strength	627
			CH		(CH) SILTY CLAY, trace sand, trace high plastic clay pockets, trace coal fragments below 2.0 m; brown, trace oxidation stains; cohesive, w~PL to w>PL, stiff to firm.	
2		12				626
		8				
3			CI		(CI) Sandy SILTY CLAY; brown mottled grey, trace oxidation stains; cohesive, w>PL, firm to very stiff.	625
		5				
4		24			...seepage observed at 4.3 m	624
5			SS		Completely weathered, massive, blueish grey, non-porous, extremely weak, SANDSTONE interbedded with CLAYSHALE (Horseshoe Canyon Formation)	623
		75/0.28				
6					END OF BOREHOLE	622
7					1. SS2 frozen, SPT "N" Value of 50 may not be representative of in-situ strength. 2. Borehole open to a depth of 4.3 m on completion of drilling. 3. Water level observed at a depth of 4.0 m on completion of drilling. 4. Borehole coordinates were surveyed with a handheld GPS. Borehole coordinates and elevation should be considered approximate.	621
8						620
9						619
10						

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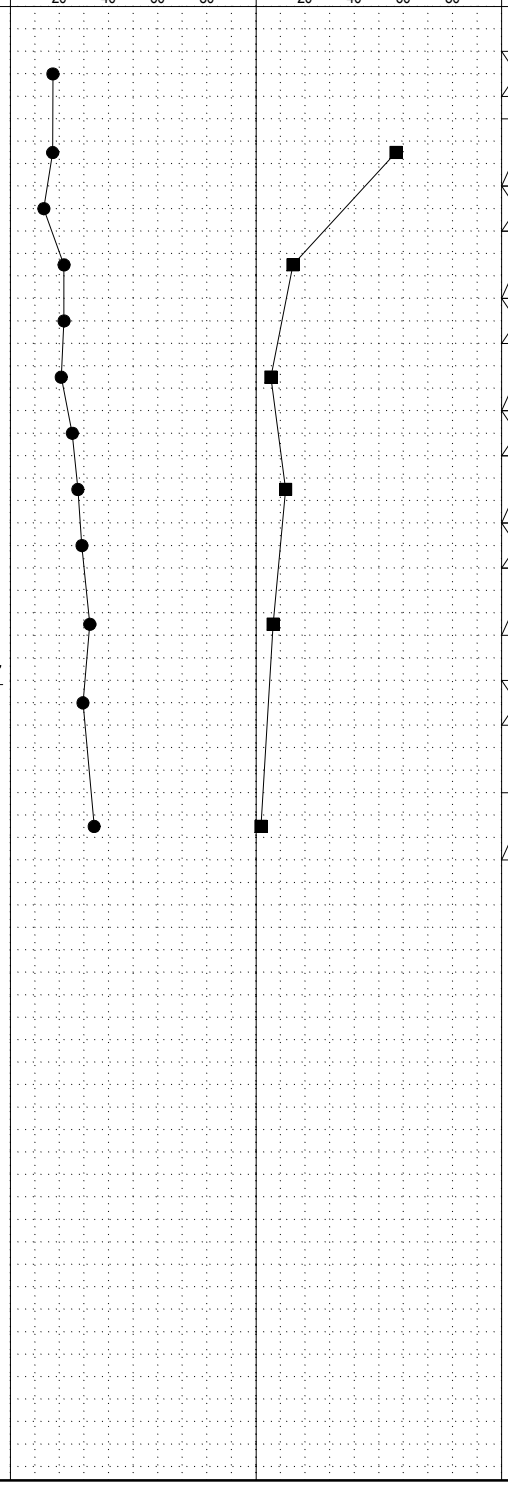
LOGGED BY: KW	COMPLETION DEPTH: 5.8 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17
	Page 1 of 1

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

Kihciy Askiy	Drilling Co: Mobile Augers and Research Ltd.	BOREHOLE NO: **BH17-07**
Engineering Services Section	UTM ZONE: - N5931072 E329838	PROJECT NO: 1773525
START DATE: 03/09/17	NAD83, UTM ZONE 12	ELEVATION: 628 m

SAMPLE TYPE: Shelby Tube; Drive Sample; Auger Sample; No Recovery; A Casing; Cored Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



SPT (N)	USC	SOIL DESCRIPTION	SLOTTED PIEZOMETER	ELEVATION (m)
	ASPH	ASPHALT CONCRETE		
	FILL	FILL - (CI) Sandy SILTY CLAY, trace coal fragments, trace root fibers; brown, frozen; cohesive, w~PL, very stiff.		
57		...material frozen; SPT "N" Value of 57 may not be representative of in-situ strength		627
15	CH	(CH) SILTY CLAY, trace to some sand, trace sand pockets, trace organics to 1.5 m, trace coal fragements to 2.0 m; brown, trace oxidation stains; cohesive, w<PL to w>PL, stiff to firm.		626
6				
12				625
	CI	(CI) Sandy SILTY CLAY; brown mottled grey, trace oxidation stains; cohesive, w>PL, firm.		624
7		...seepage observed at 3.8 m		
	SM	(SM) SILTY SAND, some cohesive fines; brown; non-cohesive, wet, very loose.		623
2				
		END OF BOREHOLE		622
		1. SS2 frozen, SPT "N" Value of 57 may not be representative of in-situ strength.		621
		2. Borehole open to a depth of 4.9 m on completion of drilling.		
		3. Water level observed at a depth of 4.6 m on completion of drilling.		620
		4. Water levels in standpipe piezometer measured as follows:		
		Date / Depth (m) / Elev (m) Mar 9, 2017 / 4.3 / 623.7 Mar 23, 2017 / 4.6 / 623.4		619
		4. Borehole coordinates were surveyed with a handheld GPS. Borehole coordinates and elevation should be considered approximate.		

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LOGGED BY: KW	COMPLETION DEPTH: 5.8 m
REVIEWED BY: NK	COMPLETION DATE: 03/09/17
	Page 1 of 1

STANDPIP 1773525 2017MAR14 COE KA.GPJ EDMONTON.GDT 05/12/17

APPENDIX B

Laboratory Test Results

General Lab Testing Summary

Project No.:	1773525	Phase:	4000
Short Title:	COE/Kichy Askiy Site Development	Sched:	C238
Tested By:	DS	Date:	16-Mar-17

Sample Identification				Laboratory Test Results
Borehole No.	Sample No.	Depth (m)	Lab No.	Water Content (%)
BH17-01	AS1	0.46	C238-01	33.9
	SS2	0.99	C238-02	26.0
	AS3	1.37	C238-03	17.7
	SS4	1.75	C238-04	20.3
	AS5	2.13	C238-05	24.9
	SS6	2.51	C238-06	24.9
	AS7	2.90	C238-07	16.4
	SS8	3.28	C238-08	16.9
	AS9	3.66	C238-09	26.6
	SS10	4.04	C238-10	18.4
	AS11	4.72	C238-11	11.4
	SS12	5.56	C238-12	14.3
	AS13	5.94	C238-13	16.0
	AS14	6.55	C238-14	19.4
	SS15	7.09	C238-15	22.1
	AS16	7.77	C238-16	22.5
	SS17	8.61	C238-17	22.3
	AS18	9.30	C238-18	13.4
	SS19	9.98	C238-19	14.9

Reviewed By:

General Lab Testing Summary

Project No.:	1773525	Phase:	4000
Short Title:	COE/Kichy Askiy Site Development	Sched:	C238
Tested By:	DS	Date:	16-Mar-17

Sample Identification				Laboratory Test Results
Borehole No.	Sample No.	Depth (m)	Lab No.	Water Content (%)
BH17-02	AS1	0.46	C238-20	42.1
	SS2	0.99	C238-21	34.8
	AS3	1.37	C238-22	35.5
	SS4	1.75	C238-23	38.2
	AS5	2.13	C238-24	39.2
	TO6	2.59	C238-25	-
	SS7	3.12	C238-26	49.0
	AS8	3.66	C238-27	46.6
	SS9	4.04	C238-28	41.2
	AS10	4.72	C238-29	16.9
	SS11	5.47	C238-30	15.2
	AS12	6.25	C238-31	15.2
	SS13	6.93	C238-32	15.1
	AS14	7.77	C238-33	15.3
	SS15	8.45	C238-34	16.0
	AS16	9.30	C238-35	16.7
	SS17	10.10	C238-36	14.4

Reviewed By:

General Lab Testing Summary

Project No.:	1773525	Phase:	4000
Short Title:	COE/Kichy Askiy Site Development	Sched:	C238
Tested By:	DS	Date:	16-Mar-17

Sample Identification				Laboratory Test Results
Borehole No.	Sample No.	Depth (m)	Lab No.	Water Content (%)
BH17-03	AS1	0.46	C238-37	30.7
	SS2	0.99	C238-38	-
	AS3	1.68	C238-39	29.4
	SS4	2.51	C238-40	29.9
	AS5	3.20	C238-41	28.0
	SS6	4.04	C238-42	16.4
	AS7	4.72	C238-43	22.9
	AS8	5.03	C238-44	17.7
	SS9	5.49	C238-45	15.6
	AS10	6.25	C238-46	18.6
	SS11	7.00	C238-47	10.2
	AS12	7.77	C238-48	23.6
	SS13	8.60	C238-49	20.2
	AS14	9.30	C238-50	24.3

Reviewed By:

General Lab Testing Summary

Project No.:	1773525	Phase:	4000
Short Title:	COE/Kichy Askiy Site Development	Sched:	C238
Tested By:	DS	Date:	16-Mar-17

Sample Identification				Laboratory Test Results
Borehole No.	Sample No.	Depth (m)	Lab No.	Water Content (%)
BH17-04	AS1	0.46	C238-51	27.5
	SS2	0.99	C238-52	29.6
	AS3	1.37	C238-53	26.4
	SS4	1.75	C238-54	21.9
	AS5	2.13	C238-55	12.1
	SS6	2.51	C238-56	33.1
	AS7	2.90	C238-57	26.9
	SS8	3.28	C238-58	21.4
	AS9	3.66	C238-59	21.4
	SS10	4.04	C238-60	18.2
	AS11	4.72	C238-61	16.8
	SS12	5.49	C238-62	14.2

Reviewed By:

General Lab Testing Summary

Project No.:	1773525	Phase:	4000
Short Title:	COE/Kichy Askiy Site Development	Sched:	C238
Tested By:	DS	Date:	16-Mar-17

Sample Identification				Laboratory Test Results
Borehole No.	Sample No.	Depth (m)	Lab No.	Water Content (%)
BH17-05	AS1	0.46	C238-63	16.8
	SS2	0.99	C238-64	23.5
	AS3	1.37	C238-65	37.8
	SS4	1.75	C238-66	25.4
	AS5	2.13	C238-67	21.8
	SS6	2.51	C238-68	40.7
	AS7	2.90	C238-69	30.0
	SS8	3.28	C238-70	15.0
	AS9	3.66	C238-71	26.5
	SS10	4.04	C238-72	20.5
	AS11	4.72	C238-73	20.1
	SS12	5.49	C238-74	16.8

Reviewed By:

General Lab Testing Summary

Project No.:	1773525	Phase:	4000
Short Title:	COE/Kichy Askiy Site Development	Sched:	C238
Tested By:	DS	Date:	16-Mar-17

Sample Identification				Laboratory Test Results
Borehole No.	Sample No.	Depth (m)	Lab No.	Water Content (%)
BH17-06	AS1	0.46	C238-75	15.6
	SS2	0.99	C238-76	30.9
	AS3	1.37	C238-77	26.3
	SS4	1.75	C238-78	25.8
	AS5	2.13	C238-79	28.9
	SS6	2.51	C238-80	29.5
	AS7	2.90	C238-81	34.0
	SS8	3.28	C238-82	34.5
	AS9	3.66	C238-83	31.9
	SS10	4.04	C238-84	18.9
	AS11	4.72	C238-85	25.0
	SS12	5.55	C238-86	21.3

Reviewed By:

General Lab Testing Summary

Project No.:	1773525	Phase:	4000
Short Title:	COE/Kichy Askiy Site Development	Sched:	C238
Tested By:	DS	Date:	16-Mar-17

Sample Identification				Laboratory Test Results
Borehole No.	Sample No.	Depth (m)	Lab No.	Water Content (%)
BH17-07	AS1	0.46	C238-87	17.3
	SS2	0.99	C238-88	17.2
	AS3	1.37	C238-89	13.6
	SS4	1.75	C238-90	21.8
	AS5	2.13	C238-91	21.8
	SS6	2.51	C238-92	20.7
	AS7	2.90	C238-93	25.2
	SS8	3.28	C238-94	27.5
	AS9	3.66	C238-95	29.1
	SS10	4.04	C238-96	32.3
	AS11	4.72	C238-97	29.5
	SS12	5.56	C238-98	34.1

Reviewed By:

GENERAL TESTING RESULTS

Project #: 1773525 Phase : 2000

Short Title: COE / Kichy Askiy Site Development

Tested by: S.B. Date: March 24, 2017

Sample Identification				Laboratory Test Results										
Borehole #	Sample #	Depth (m)	Sample Type	Water Content (%)	Plastic Limit	Liquid Limit	Plasticity Index	% Passing #200	SHT Group Index	ASTM Group Index	Specific Gravity	Dry Density (Kg/m^3)	Pocket Penetrometer (kPa)	Lab Vane (kPa)
BH17-01	AS5	2.0 - 2.3	AS		21	46	25							
BH17-02	AS8	3.5 - 3.8	AS		23	45	22							
BH17-03	AS5	3.1 - 3.4	AS		17	32	15							
BH17-03	AS7	4.6 - 4.9	AS		17	31	14							
BH17-04	AS3	1.2 - 1.5	AS		18	36	18							
BH17-04	AS5	2.0 - 2.3	AS		17	32	15							
BH17-05	AS1	0.3 - 0.6	AS		17	36	19							
BH17-06	AS1	0.3 - 0.6	AS		15	32	17							
BH17-06	AS5	2.0 - 2.3	AS		26	56	30							

1721 8th Street E.
Saskatoon, SK S7H 0T4

Reviewed by:_____

GRAIN SIZE ANALYSIS

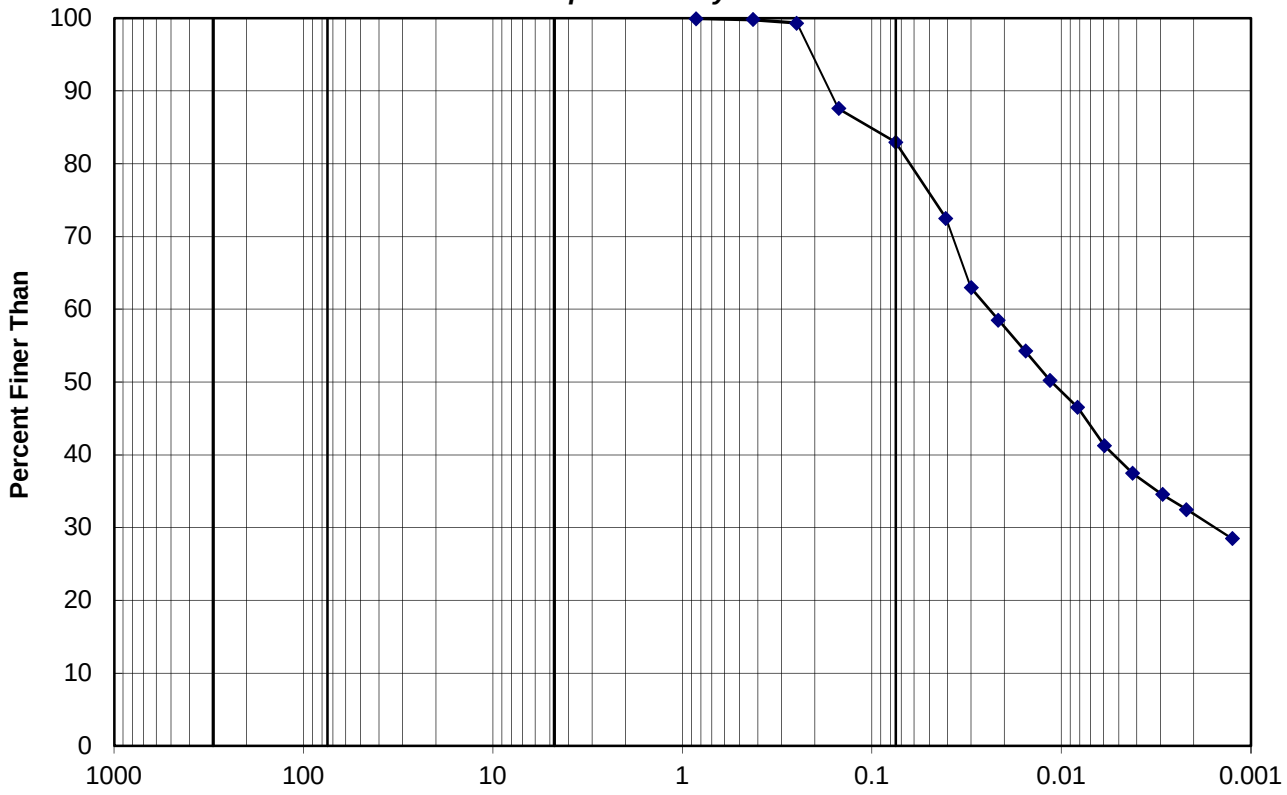
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-01 Sample #: AS5
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	100
9.5	100
4.75	100
2.0	100
0.850	100
0.425	100
0.250	99
0.150	88
0.075	83
0.041	72
0.030	63
0.022	59
0.015	54
0.011	50
0.008	46
0.006	41
0.004	37
0.003	35
0.002	32
0.001	28

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GRAIN SIZE ANALYSIS

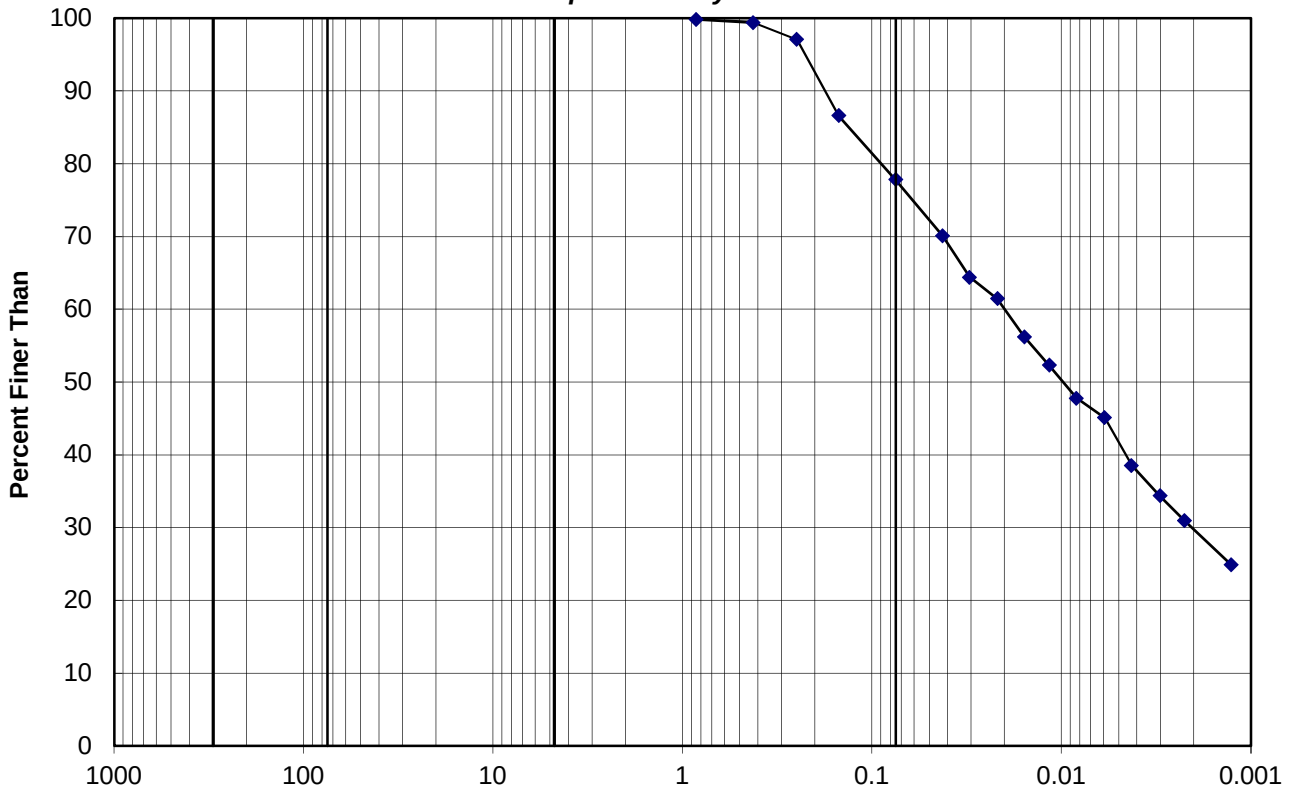
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-02 Sample #: AS8
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	100
9.5	100
4.75	100
2.0	100
0.850	100
0.425	99
0.250	97
0.150	87
0.075	78
0.042	70
0.031	64
0.022	61
0.016	56
0.012	52
0.008	48
0.006	45
0.004	39
0.003	34
0.002	31
0.001	25

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:

GRAIN SIZE ANALYSIS

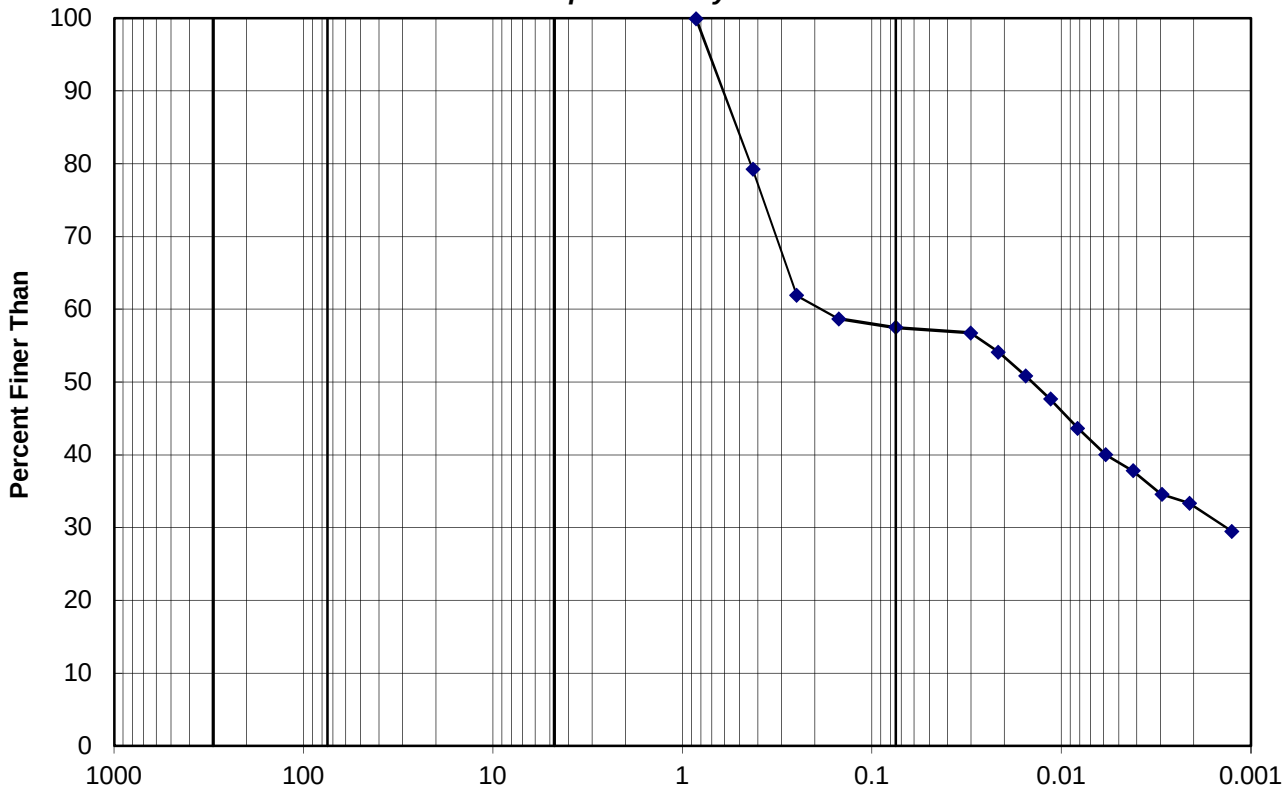
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-03 Sample #: AS5
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	100
9.5	100
4.75	100
2.0	100
0.850	100
0.425	79
0.250	62
0.150	59
0.075	57
0.030	57
0.022	54
0.015	51
0.011	48
0.008	44
0.006	40
0.004	38
0.003	35
0.002	33
0.001	29

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GRAIN SIZE ANALYSIS

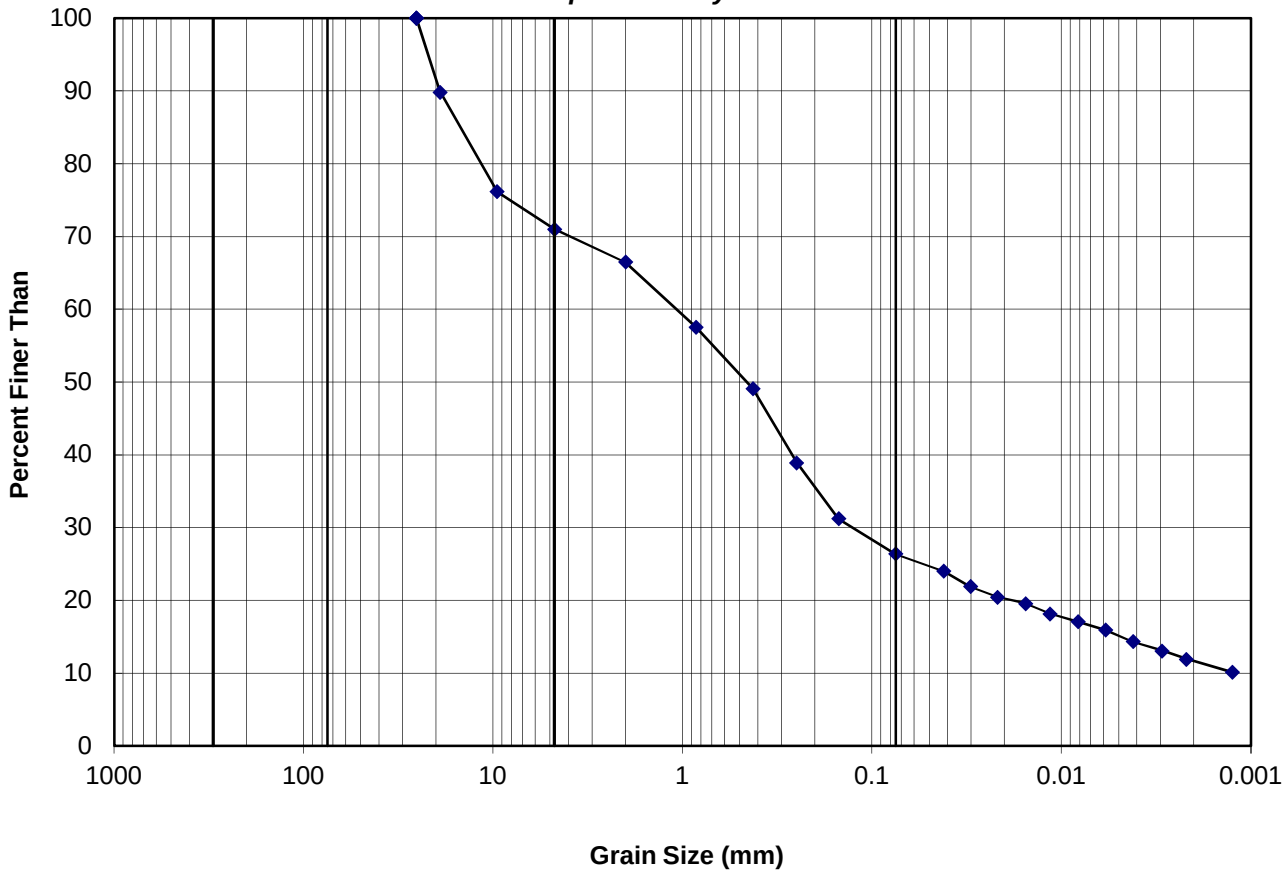
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-03 Sample #: AS7
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	90
9.5	76
4.75	71
2.0	66
0.850	58
0.425	49
0.250	39
0.150	31
0.075	26
0.042	24
0.030	22
0.022	20
0.015	20
0.011	18
0.008	17
0.006	16
0.004	14
0.003	13
0.002	12
0.001	10

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GRAIN SIZE ANALYSIS

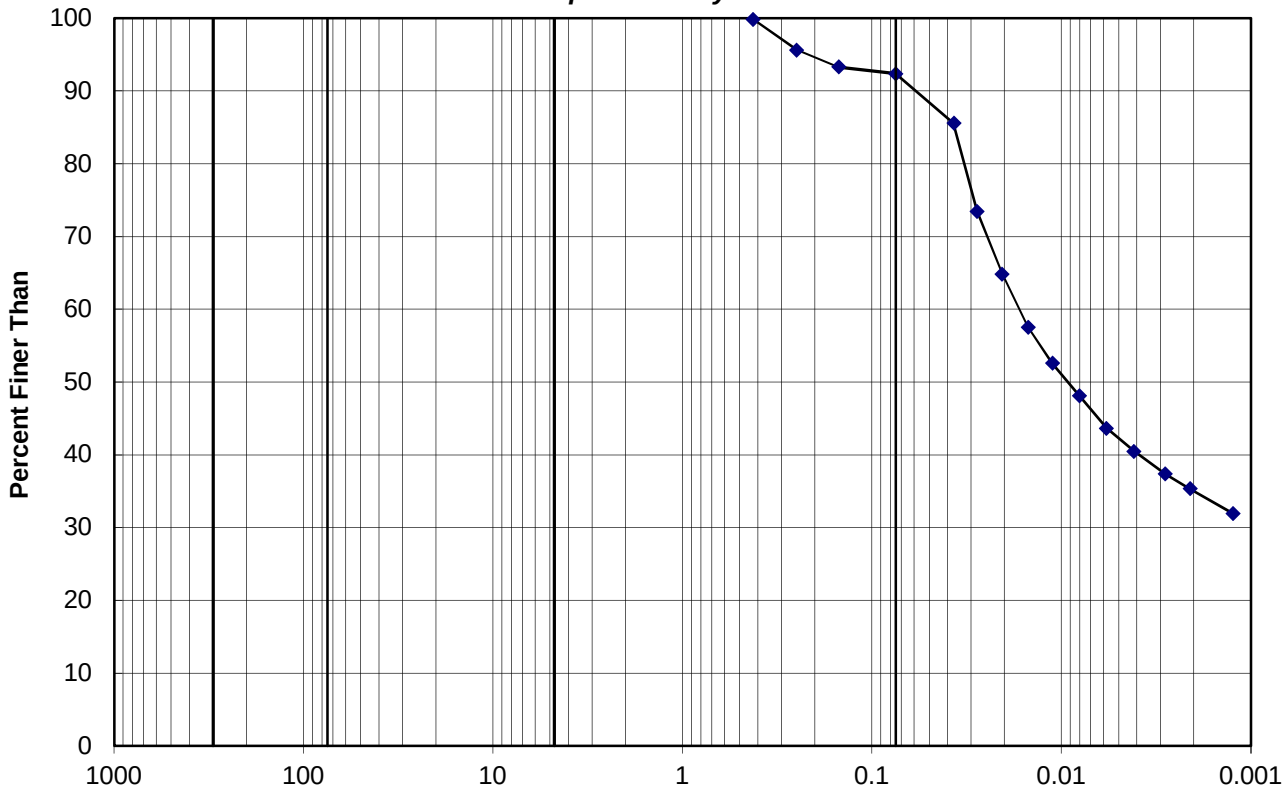
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-04 Sample #: AS3
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	100
9.5	100
4.75	100
2.0	100
0.850	100
0.425	100
0.250	96
0.150	93
0.075	92
0.037	86
0.028	73
0.021	65
0.015	58
0.011	53
0.008	48
0.006	44
0.004	40
0.003	37
0.002	35
0.001	32

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GRAIN SIZE ANALYSIS

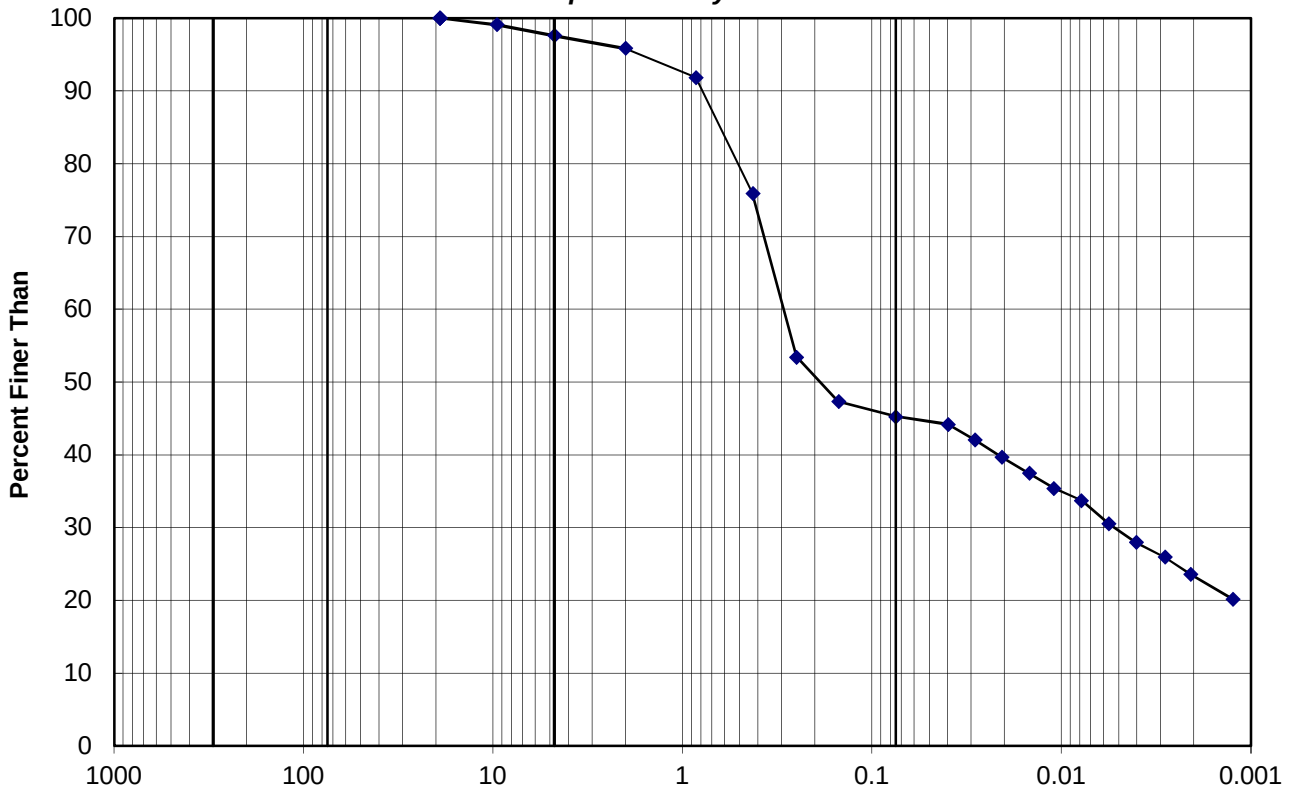
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-04 Sample #: AS5
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	100
9.5	99
4.75	98
2.0	96
0.850	92
0.425	76
0.250	53
0.150	47
0.075	45
0.040	44
0.029	42
0.021	40
0.015	37
0.011	35
0.008	34
0.006	31
0.004	28
0.003	26
0.002	24
0.001	20

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GRAIN SIZE ANALYSIS

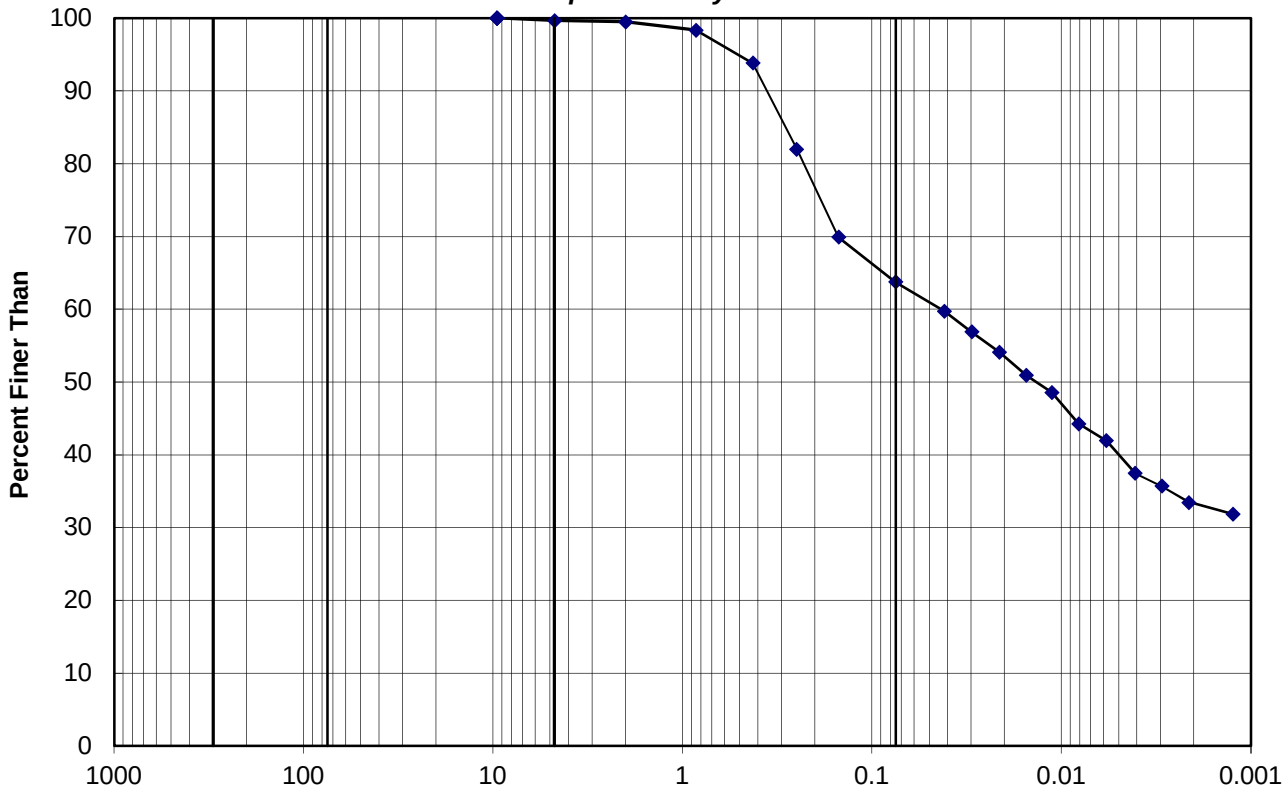
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-05 Sample #: AS1
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	100
9.5	100
4.75	100
2.0	100
0.850	98
0.425	94
0.250	82
0.150	70
0.075	64
0.042	60
0.030	57
0.021	54
0.015	51
0.011	49
0.008	44
0.006	42
0.004	37
0.003	36
0.002	33
0.001	32

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GRAIN SIZE ANALYSIS

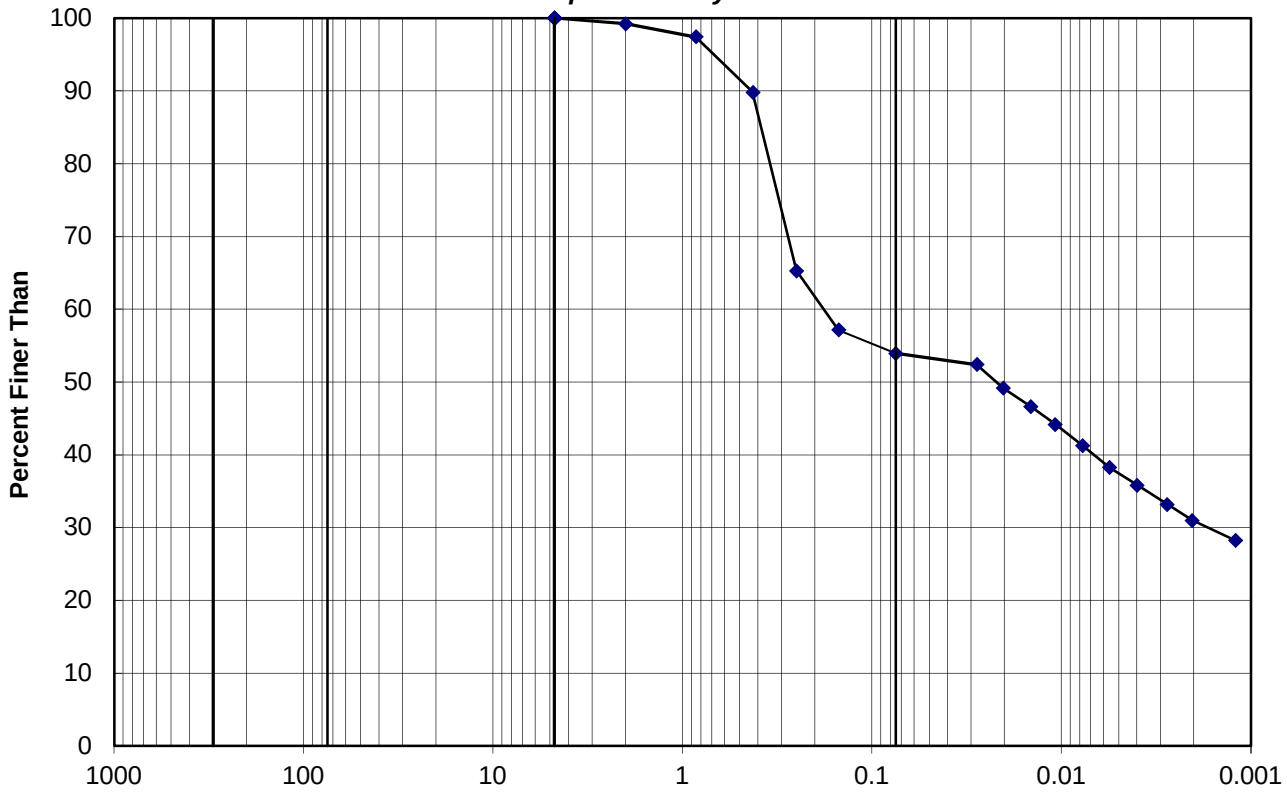
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-06 Sample #: AS1
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	100
9.5	100
4.75	100
2.0	99
0.850	97
0.425	90
0.250	65
0.150	57
0.075	54
0.028	52
0.020	49
0.015	47
0.011	44
0.008	41
0.006	38
0.004	36
0.003	33
0.002	31
0.001	28

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:

GRAIN SIZE ANALYSIS

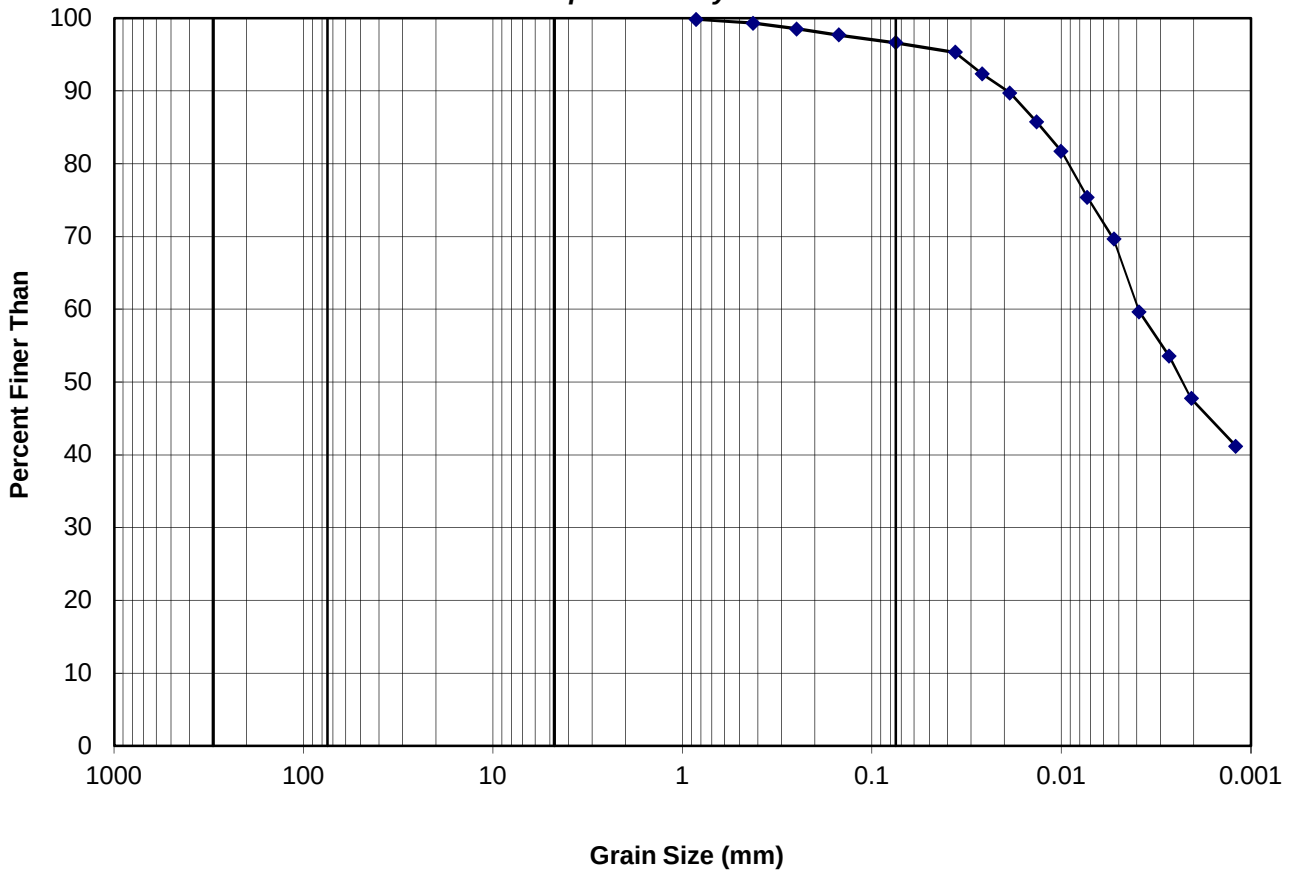
(Mechanical & Hydrometer)

Project #: 1773525
Short Title: COE / Kichy Askiy Site Development
Tested by: S.B.

Phase: 2000
Date: March 24, 2017

Borehole #: 17-06 Sample #: AS5
Source:
Date Sample Received: March 16, 2017

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
51	100
38	100
25	100
19	100
9.5	100
4.75	100
2.0	100
0.850	100
0.425	99
0.250	99
0.150	98
0.075	97
0.036	95
0.026	92
0.019	90
0.014	86
0.010	82
0.007	75
0.005	70
0.004	60
0.003	54
0.002	48
0.001	41

Comments:

1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GOLDER ASSOCIATES LTD
ATTN: KEVIN WALLIN
16820 107 Ave NW
EDMONTON AB T5P 4C3

Date Received: 17-MAR-17
Report Date: 23-MAR-17 13:56 (MT)
Version: FINAL

Client Phone: 780-483-3499

Certificate of Analysis

Lab Work Order #: L1902574

Project P.O. #: NOT SUBMITTED
Job Reference: 1773525/2000
C of C Numbers:
Legal Site Desc:

Jessica Spira, Env. Tech. DIPL
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1902574-1 BH17-02 AS7							
Sampled By: J.T on 17-MAR-17 @ 12:00							
Matrix: SOIL							
Miscellaneous Parameters							
% Saturation	71.9		1.0	%		21-MAR-17	R3680977
Chloride (Cl)	<20		20	mg/L		22-MAR-17	R3681751
Resistivity	3970		1.0	ohm cm		21-MAR-17	R3681003
Total Sulphate Ion Content	<0.050		0.050	%	22-MAR-17	22-MAR-17	R3682356
pH in Saturated Paste	7.57		0.10	pH		21-MAR-17	R3680977
L1902574-2 BH17-03 AS3							
Sampled By: J.T on 17-MAR-17 @ 12:00							
Matrix: SOIL							
Miscellaneous Parameters							
% Saturation	71.4		1.0	%		21-MAR-17	R3680977
Chloride (Cl)	<20		20	mg/L		22-MAR-17	R3681751
Resistivity	2220		1.0	ohm cm		21-MAR-17	R3681003
Total Sulphate Ion Content	<0.050		0.050	%	22-MAR-17	22-MAR-17	R3682356
pH in Saturated Paste	7.79		0.10	pH		21-MAR-17	R3680977

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-PASTE-COL-CL	Soil	Chloride in Soil (Paste) by Colorimetry	CSSS, APHA 4500-Cl E
A soil extract produced by the saturated paste extraction procedure is analyzed for Chloride by Colourimetry.			
PH-PASTE-CL	Soil	pH in Saturated Paste	CSSS Ch. 15
A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.			
RESISTIVITY-PASTE-CL	Soil	PASTE RESISTIVITY	ASTM G57-95A
This analysis is carried out using procedures adapted from ASTM G57-95a (2001) "Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method". In summary, 200 to 500 grams of sample is mixed with deionized water as required to create a saturated paste. The sample is then placed directly into a four electrode resistivity soil box and measured for resistivity using a resistivity meter.			
SAT-PCNT-CL	Soil	% Saturation	CSSS 18.2-Calculation
As received samples are pasted to saturation. A sub-sample is weighed, oven dried and re-weighed to determine % saturation.			
SO4-T-CSA-A23-ED	Soil	Total Sulphate Ion Content	CSA INTERNATIONAL A23.2
Total sulphate content is determined by mixing soil with water then hydrochloric acid, and digesting just below boiling point, for 15 minutes. Analysis by ion chromatography follows. NOTE: the CSA-A23 method states that for a total sulphate ion content greater than 0.2%, soluble sulphate ion content shall be determined on the basis of a water extraction. This water extraction requires the total sulphate ion content result to calculate the correct ratio for the water extraction.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: GOLDER ASSOCIATES LTD
16820 107 Ave NW
EDMONTON AB T5P 4C3
Contact: KEVIN WALLIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-PASTE-COL-CL	**Soil**							
Batch R3681751								
WG2497704-4 IRM		**SAL-STD8**						
Chloride (Cl)			99.5		%		70-130	22-MAR-17
WG2497704-3 LCS								
Chloride (Cl)			103.1		%		70-130	22-MAR-17
WG2497704-1 MB								
Chloride (Cl)			<20		mg/L		20	22-MAR-17
WG2498619-2 MS		**L1902574-1**						
Chloride (Cl)			100.1		%		60-140	22-MAR-17
PH-PASTE-CL	**Soil**							
Batch R3680977								
WG2497704-4 IRM		**SAL-STD8**						
pH in Saturated Paste			7.12		pH		6.9-7.5	21-MAR-17
RESISTIVITY-PASTE-CL	**Soil**							
Batch R3681003								
WG2497692-1 IRM		**SAL-STD8**						
Resistivity			114.1		%		80-120	21-MAR-17
SAT-PCNT-CL	**Soil**							
Batch R3680977								
WG2497704-4 IRM		**SAL-STD8**						
% Saturation			99.0		%		80-120	21-MAR-17
SO4-T-CSA-A23-ED	**Soil**							
Batch R3682356								
WG2498111-3 CRM		**ED-634A_CEMENT**						
Total Sulphate Ion Content			101.1		%		80-120	22-MAR-17
WG2498111-2 LCS								
Total Sulphate Ion Content			102.3		%		70-130	22-MAR-17
WG2498111-1 MB								
Total Sulphate Ion Content			<0.050		%		0.05	22-MAR-17

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

L1902574-COFC

COC # _____

Page 1 of 1

Report To		R	Service Requested (Rush for routine analysis subject to availability)
Company:	Golder Associates	☑ Standard ☐ Other	◉ Regular (Default)
Contact:	Kevin Wallin	☑ PDF ☑ Excel ☑ Digital ☐ Fax	○ Priority (Specify Date Required → →) Surcharges apply
Address:	16820 107 Avenue	Email 1: Kevin_Wallin@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
	Edmonton, AB T5P 4C3	Email 2: nkochmanova@golder.com	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	1 (780) 483 3499 Fax:		
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Company:		Job #: 1773525 / 2000	Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:	
Address:		LSD:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		ALS Contact:	Sampler: J.T.

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Corrosivity Suite												Number of Containers
	BH17-02 AS7	17-Mar-17	N/A	Soil	x												1
	BH17-03 AS3	17-Mar-17	N/A	Soil	x												1

Special Instructions / Regulations / Hazardous Details

Golder requests report "STANDARDQC_ALS" and custom digital report "GOLDER_SK".

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
				17-Mar	3:00	18 °C				

GENF 18.02 Front

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

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South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

Golder Associates Ltd.
16820 107 Avenue
Edmonton, Alberta, T5P 4C3
Canada
T: +1 (780) 483 3499

Golder Associates

Appendix D. Phase 1 Environmental Site Assessment: Fox Farm Property (CT & Associates 2014)

CT & Associates Engineering Inc.

PHASE I ENVIRONMENTAL SITE ASSESSMENT

FOX FARM PROPERTY

14141 FOX DRIVE NW, EDMONTON, ALBERTA
MAJORITY OF PLAN 5975CL, BLOCK A

Prepared for

THE CITY OF EDMONTON
TRANSPORTATION SERVICES

SEPTEMBER 2014

CTA File No. 02-1872

CT & Associates Engineering Inc.

PHASE I ENVIRONMENTAL SITE ASSESSMENT

FOX FARM PROPERTY

14141 FOX DRIVE NW, EDMONTON, ALBERTA
MAJORITY OF PLAN 5975CL, BLOCK A

Prepared for

THE CITY OF EDMONTON
TRANSPORTATION SERVICES

SEPTEMBER 2014

CTA File No. 02-1872

Prepared by,
CT & ASSOCIATES ENGINEERING INC.

Przemek Dudek, P. Eng.

Marc Mahabir, P. Eng.
PD/MCM/lsr

PROFESSIONAL ENGINEER ALBERTA
PRZEMEK DUDEK

PERMIT TO PRACTICE
CT & ASSOCIATES ENGINEERING INC.
Signature
Date September 30 2014
PERMIT NUMBER: P 7826
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

#102, 14420 - 116 Avenue, Edmonton, Alberta T5M 4B4 Ph. (780) 451-1332 Fax. (780) 732-5300

EXECUTIVE SUMMARY

A Phase I Environmental Site Assessment was conducted by CT & Associates Engineering Inc. for the Fox Farm property with the municipal address of 14141 Fox Drive NW in Edmonton, Alberta. The legal description of the site is Plan 5975CL, Block A.

The purpose of the environmental assessment was to review historical and current land uses of the subject site and surrounding properties, and assess potential items of environmental concern.

The subject site has been utilized as an off-site storage and service area of the Fort Edmonton Park, since 1996. The buildings are part of a former farmyard and were constructed in the 1960's. The barns, sheds and fenced pens are used for horse boarding, and the house and garage are used for restoration of park displays (woodwork).

The south portion of the subject site consists of treed areas of the Whitemud Ravine Park with the Whitemud Creek crossing the southeast portion of the subject site.

Prior to development as a farmyard in the 1960's, the subject site and surrounding areas had been vacant land.

No items of environmental concern were identified within the subject site nor surrounding areas and therefore no further investigation is required.

TABLE OF CONTENTS

1.0 INTRODUCTION

A Phase I Environmental Site Assessment was conducted by CT & Associates Engineering Inc. for the Fox Farm property situated at the municipal address of 14141 Fox Drive NW in Edmonton, Alberta. The legal description of the site is Plan 5975CL, Block A.

The purpose of the environmental assessment was to review historical and current land uses of the subject site and surrounding properties, and to assess potential items of environmental concern.

Authorization to proceed with the Assessment was provided by Tami Dolen, P. Ag., EP., Environmental Scientist with The City of Edmonton, Transportation Services, on August 27, 2014.

This report has been prepared in accordance with CSA Standards Z768-01 (2012).

2.0 SITE LOCATION AND FEATURES

2.1 SITE LOCATION

The subject site is situated on the south side of Fox Drive and on the east side of 142 Street, in southwest Edmonton, Alberta. The site covers approximately 13 hectares (32 acres) of land.

The location of the subject site is presented on Drawing No. A-1, Appendix A. Site photographs are presented in Appendix B.

2.2 SURFACE FEATURES

The north portion of the subject site is covered with low-lying grass. A house, barn, and several sheds are situated on the central portion of the subject site. The remaining areas consist of treed areas of the Whitemud Ravine Park, situated on the south portion of the subject site. The Whitemud Creek crosses the south portion of the site.

The majority of the subject site is situated on the west side of the Whitemud Creek Ravine, and slopes to the southwest.

The Whitemud Ravine Park surrounds the site to the east and south. A residential neighborhood is situated to the southwest. Fox Drive and Whitemud Drive are located to the north and northwest of the subject site.

2.3 GEOLOGY

Geological maps of the area indicate that the Whitemud Ravine crosses glaciolacustrine deposits of sands, silts and clays to approximately 10 m depth, overlying 10 m thick layer of glacial till. Beneath the glacial till is a bedrock of the Edmonton Formation at 20 m depth, consisting of bentonitic shales and sandstones, with numerous coal seams. The bottom of the Whitemud Ravine is situated within the bedrock itself (Kathol and McPherson, 1975).

Hydrogeological maps of the area indicate the local soil condition to be of low groundwater yield, and the groundwater level to correspond with the Whitemud Creek water level (on the top of the bedrock). The regional groundwater generally flows downward and to the north towards North Saskatchewan River (Research Council of Alberta - Earth Sciences Report 78-5, Hydrogeology of the Southwest Segment, Edmonton area, Alberta).

3.0 METHODOLOGY

A historical review of the site was conducted in order to identify previous land uses which may be of environmental concern to the subject site. The historical information researched included historical air photos, fire insurance maps, land titles, regulatory agency records, and historical address listings.

A site reconnaissance and an interview with a representative familiar with the site conditions was conducted. The reconnaissance objective was to visually assess the current site conditions in order to identify potential sources of contamination from operations on either the subject site or surrounding areas.

4.0 RESULTS OF SITE ASSESSMENT

4.1 HISTORICAL INFORMATION

4.1.1 Historical Aerial Photograph Summary

A review of historical air photos was conducted for the subject site and surrounding properties for the period of 1924 to 2013, as available from the City of Edmonton Archives. The air photos available for review that included the subject site were dated 1924, 1930, 1949, 1954, 1962, 1965, 1969, 1974, 1978, 1984, 1988, 1993, 1998, 2003, 2008 and 2013. Representative historical air photos are included in Appendix C.

The earliest air photo available which included the subject site and surrounding properties, taken in 1924, shows the subject site and surrounding areas to be a vacant treed land. The Whitemud Creek is situated to the immediate east of the subject site and crosses the south portion.

By 1930, the north portion of the subject site had been cleared of trees and utilized as cultivated farmland. Two sheds had been constructed on the north portion of the subject site, and to the immediate west of the subject site.

By 1949, more of the north portion of the subject site had been converted into cultivated farmland and the two sheds on the north portion of the subject site had been removed. A house had been constructed to the immediate east of the subject site. A roadway had been constructed along the west site boundary.

By 1954, a house had been constructed to the immediate west of the south portion of the subject site.

By 1962, a farmyard with a house, barns, sheds and pens (as found today) had been constructed on the central portion of the subject site.

By 1965, the site and surrounding areas remained generally unchanged.

Between 1969 and 1974, a garage and a barn had been constructed in the farmyard area of the subject site. Whitemud Drive and Fox Drive had been constructed to the northwest and north of the subject site respectively. Residential neighborhoods had been constructed to the southwest and the far east of the subject site.

Between 1978 and 2008, the site and surrounding areas remained generally unchanged.

By 2013, the 142 Street roadway was constructed within the subject site along the northwest property boundary. In 2013, the site and surrounding areas are similar to conditions observed today.

4.1.2 Fire Insurance Maps

Three sets of fire insurance maps, dated 1913, 1925 and 1966, were reviewed to identify former operations, including fuel storage facilities and underground tanks.

None of the maps included the subject site within their surveyed area.

4.1.3 Numerical Street Address Directory Listings

Henderson's Directory and City of Edmonton Numerical Street Address listings were reviewed to identify former business operations within the subject site and surrounding area of potential environmental concerns.

The following is a summary of listings for the subject site:

14141 Fox Drive	1975-1985	Fox Investment
	1980	Meadowview Ranches
	1975-1980	C B Holdings

The above listings are not of environmental concern to the subject site.

There were no other business listings for the subject site and surrounding areas. There were no listings for the subject site prior to 1975.

4.1.4 Historical Land Titles

A historical land title review was conducted as a part of this assessment to include the period 1909 to the present.

No environmental concerns were noted with the site owners or within the site title statements.

A summary of the historical owners of the site are included in Table 1.

TABLE 1
LIST OF HISTORICAL LAND OWNERS

Land Owner	Date
The City of Edmonton	1968
Meadowview Ranches Ltd.	1957
Clara Boyd Fox	1956
Rudy Ritz	1954
Dorothy Terwillegar and Catherine Folinsbee	1951

Land Owner	Date
Norman L. Terwillegar	1937
Peter Ring	1937
Ralph H Trouth	1936
John J Mellon	1929
City of Edmonton	1925

4.2 REVIEW OF ENVIRONMENTAL AGENCY RECORDS

Various municipal and provincial environmental agencies were contacted to obtain environmental records pertaining to previous operations on the subject site that could potentially be of environmental concern.

The following summarizes the results of the inquiries, with the actual correspondence contained in Appendix D.

4.2.1 Environmental Law Centre

The Environmental Law Centre file search of site owners indicates no enforcement issues related to the subject site.

4.2.2 Petroleum Tank Management Association of Alberta (PTMAA)

The PTMAA indicates they have no records of active or abandoned storage tanks on the subject site.

4.2.3 City of Edmonton Fire Department

The City of Edmonton Emergency Response Department indicates no records pertaining to installation and removal of underground storage tanks, leaks, and site contamination or remediation.

4.2.4 City of Edmonton Drainage Department

The City of Edmonton Drainage Department records indicate that the subject site have not been inspected.

4.2.5 Alberta Health Services

Alberta Health Services indicate no landfills, waste sites, or contamination pertaining to the subject site.

4.2.6 City of Edmonton Waste Management

The City of Edmonton Waste Management has indicated there are no records of waste landfills or dumpsites on or within 500 m radius of the subject site.

4.2.7 Energy Resources Conservation Board

ERCB data obtained through Abacus Datagraphics Ltd. was searched to obtain the following information in the area of the subject site and surrounding area:

- Surface Wells and Battery Site locations;
- Pipeline locations;
- Coal Mine locations;
- Environmental Incidents.

According to the ERCB there are no pipelines, oil wells, battery sites, coal mines, or environmental incidents reported for the subject site or in the near vicinity (search radius of 300 m).

4.2.8 Alberta Environment

- FOIP - Alberta Environment FOIP search indicates no records regarding environmental incidents, site contamination, or site remediation related to the subject site;

- ESAR - The Alberta Environment ESAR (Environmental Site Assessment Repository) file search did not indicate any records for the subject site nor surrounding areas.

4.3 SITE RECONNAISSANCE

A site reconnaissance was conducted on September 18, 2014. Access to the property was provided by Mr. Danny Haaf, with the City of Edmonton River Valley Parks, current occupant of the subject site.

4.3.1 Subject Site

The subject site is currently used as an off-site storage and service area of the Fort Edmonton Park since 1996, utilizing the buildings of a former farmyard on the subject site. The remaining areas consist of treed areas of the Whitemud Ravine Park situated on the south portion of the subject site. The Whitemud Creek crosses the south portion of the subject site.

Building Usage

The subject site buildings are utilized as follows:

- Barns, sheds, and fenced pens are used for horse boarding;
- A house and a garage are utilized for restoration of park displays (woodwork).

There is one water well in a pump house situated by the house.

There is no significant chemical use on the subject site, with only small quantities of commercially available products, stored in an organized manner within the house and the garage.

Communications with the owner of the lands (City of Edmonton) indicates they are not aware of any environmental concerns with the subject site.

No environmental concerns were identified within the subject site.

4.3.2 Surrounding Properties

The Whitemud Ravine Park surrounds the site to the east and south. A residential neighborhood is situated to the southwest. Municipal roadways, Fox Drive and Whitemud Drive are located to the north and northwest of the subject site.

No environmental concerns were identified in surrounding areas.

4.4 SITE OBSERVATIONS AND SUMMARY OF ENVIRONMENTAL CONCERNS

The following is a summary of findings collected during the historical and site reviews.

4.4.1 Underground Storage Tanks

There were no underground storage tanks identified within the subject site or immediately surrounding areas.

4.4.2 Above-Ground Storage Tanks

There were no above-ground storage tanks identified within the subject site or immediately surrounding areas.

4.4.3 Fill Materials

There was no indication of fill materials on the subject site from the review of historical air photos and existing site conditions.

4.4.4 Right-of-Ways

No right-of-ways of environmental concern to the subject site were observed.

4.4.5 Oil and Gas Wells / Pipelines

There were no oil and gas wells/pipelines identified within the subject site or immediately surrounding areas.

4.4.6 Chemical Use

Based on the review of historical information and current operations, there is no significant chemical use on the subject site, with only small quantities of commercially available products, stored in an organized manner within the house and the garage.

4.4.7 Transformers

There were no transformers observed within the subject site.

4.4.8 Regulated Building Materials

Based on the age of the farmyard buildings (constructed in the early 1960's), there is potential for asbestos, PCB's in fluorescent light ballasts and paints with high lead to be contained within the building materials. In general, the use of these materials was banned from construction by 1980.

During the site reconnaissance, it was observed that there was no obvious indication of materials which would be of immediate concern (loose or friable materials, leaking light ballasts, flaking paint). As a result, all materials may remain as they are at this time. However, it is recommended that prior to future renovation or demolition, a sampling and testing program be completed on materials of potential concern such as wall paint, pipe insulation and fluorescent light ballasts, to identify the presence of and any required handling/disposal requirements.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The subject site has been utilized as an off-site storage and service area of the Fort Edmonton Park, since 1996. The buildings are part of a former farmyard and were constructed in the 1960's. The barns, sheds, and fenced pens are used for horse boarding, and the house and garage are used for restoration of park displays (woodwork).

The south portion of the subject site consists of treed areas of the Whitemud Ravine Park with the Whitemud Creek crossing the southeast portion of the subject site.

Prior to development as a farmyard in the 1960's, the subject site and surrounding areas had been vacant land.

No items of environmental concern were identified within the subject site nor surrounding areas and therefore no further investigation is required.

6.0 CLOSURE

This report has been prepared in accordance with generally accepted environmental and geotechnical practices and procedures.

Classification of soil and groundwater conditions, contaminated materials and its quantities have been based on generally accepted engineering practices in this area. Some environmental and geotechnical conditions are found to vary over time. In addition, at times, subsurface conditions have been found to vary between the identified locations presented within the report. As such, the user of this report should be aware of this possibility, and understand that this report only presents the conditions at the time of the preparation and exact identified locations.

Conditions identified during the field work, and thereby recommendations presented within this report are considered to be reasonably representative of the site. If however, conditions other than those presented are identified during any subsequent work on the subject site, CT & Associates Engineering Inc. should be notified and given an opportunity to review or modify our recommendations in light of new findings.

7.0 QUALIFICATIONS OF ASSESSORS

CT & Associates Engineering Inc. is a professional engineering firm, specializing in Environmental Site Assessment and Geotechnical engineering.

This report was prepared by **Mr. Przemek Dudek, P. Eng.**, who regularly conducts Environmental Site Assessments for properties ranging from residential to commercial lands.

This report was reviewed by **Mr. Marc Mahabir, P. Eng.**, who has obtained over ten years of professional engineering experience. Over this time, he has been involved with many environmental assessment projects, ranging from Phase I Assessments to complex site remediation programs. His clients have included government bodies (municipal and provincial), property managers and property developers.

APPENDIX A

SITE PLAN

APPROXIMATE SCALE (meters)
0 100 200
1 : 5 000

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (2013)

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE PLAN		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872- A1		DWG. NO. A-1

APPENDIX B

SITE PHOTOS

Photo No. 1 - Subject Property – horse pens and farmyard on north and central portion.

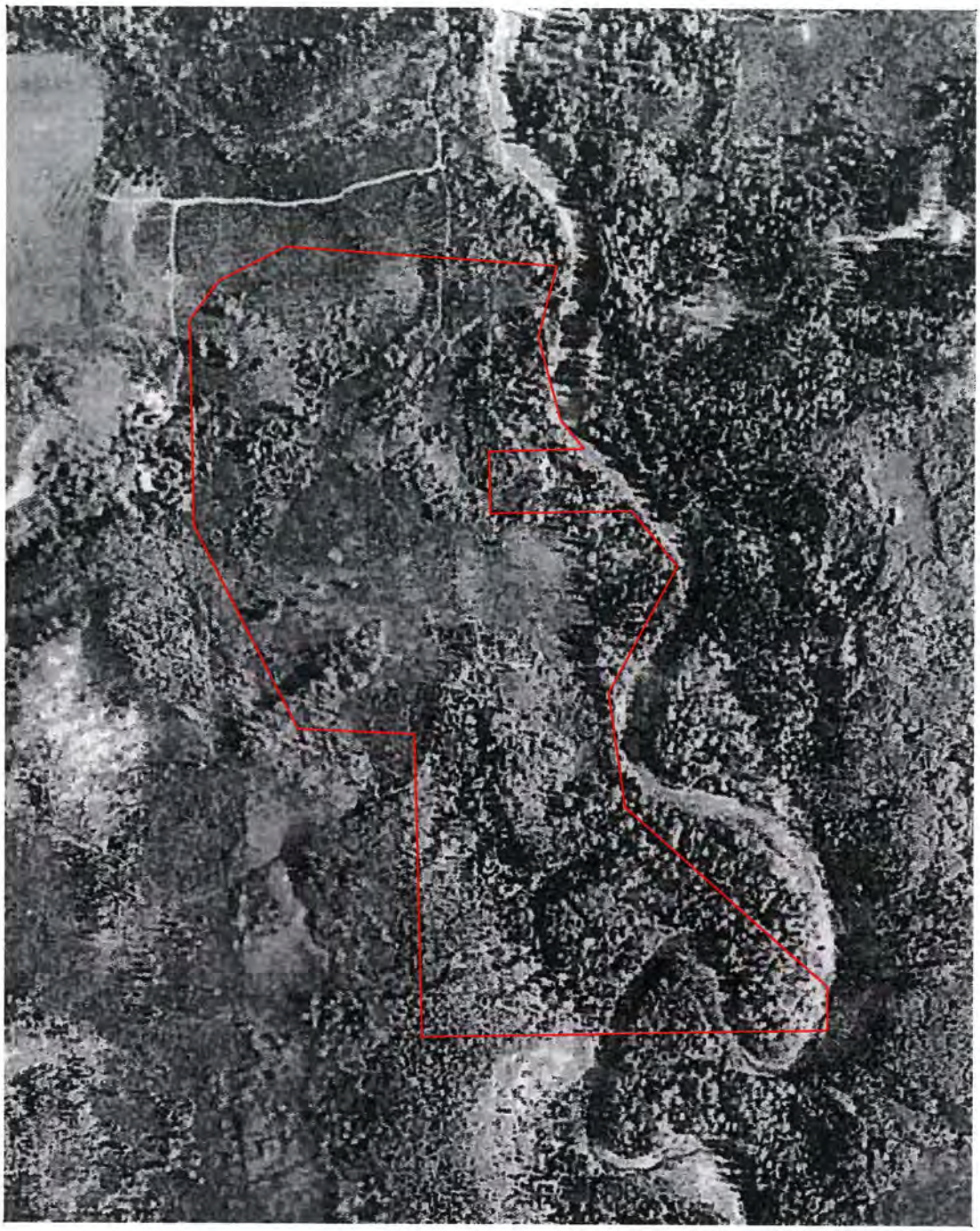
Photo No. 2 – Subject Property – Whitemud Ravine Park on south portion.

Photo No. 3 – Subject Property – house.

Photo No. 4 – Subject Property – garage interior.

APPENDIX C

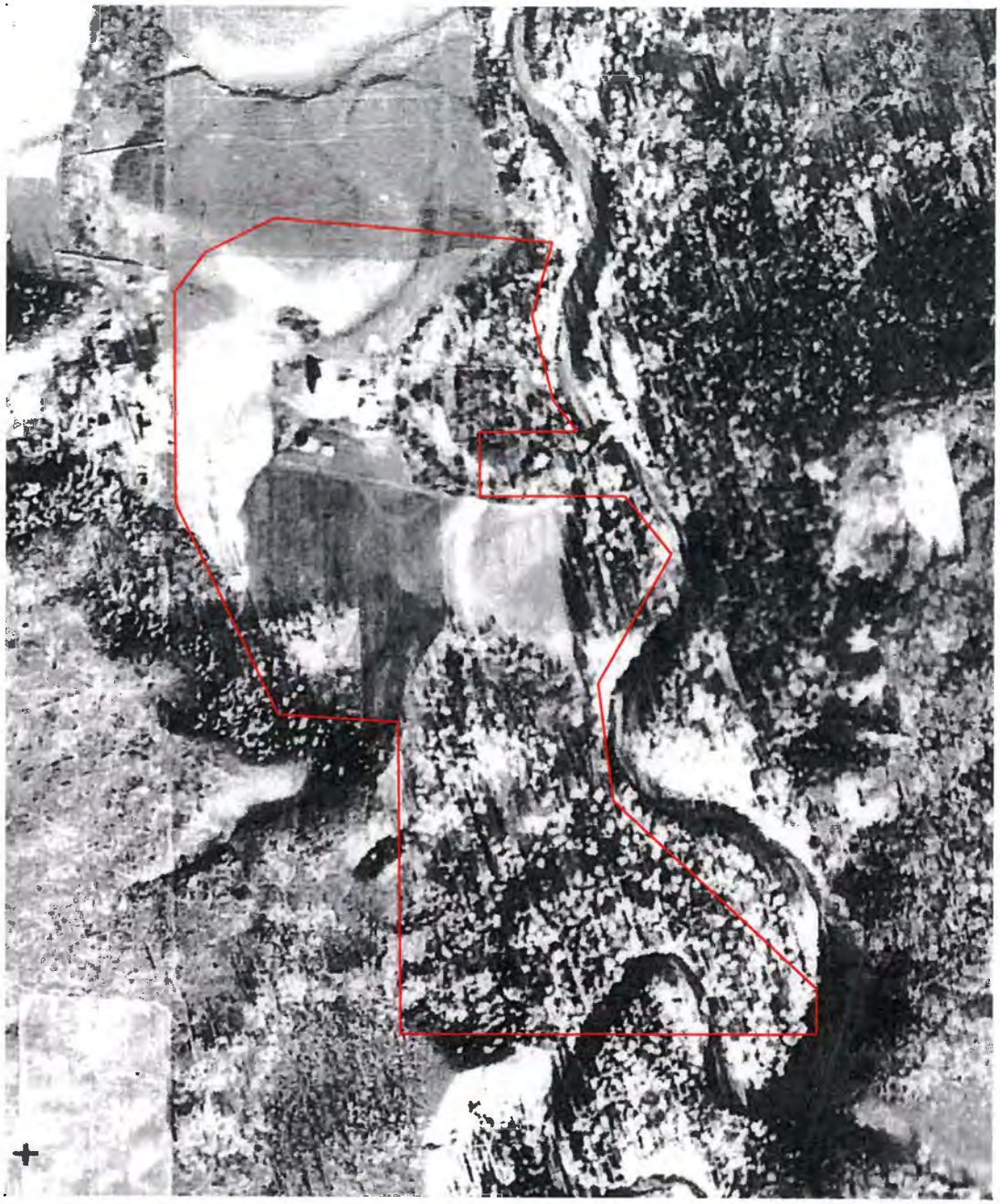
HISTORICAL AIR PHOTOS



NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1924)

APPROXIMATE SCALE 1 : 5 000

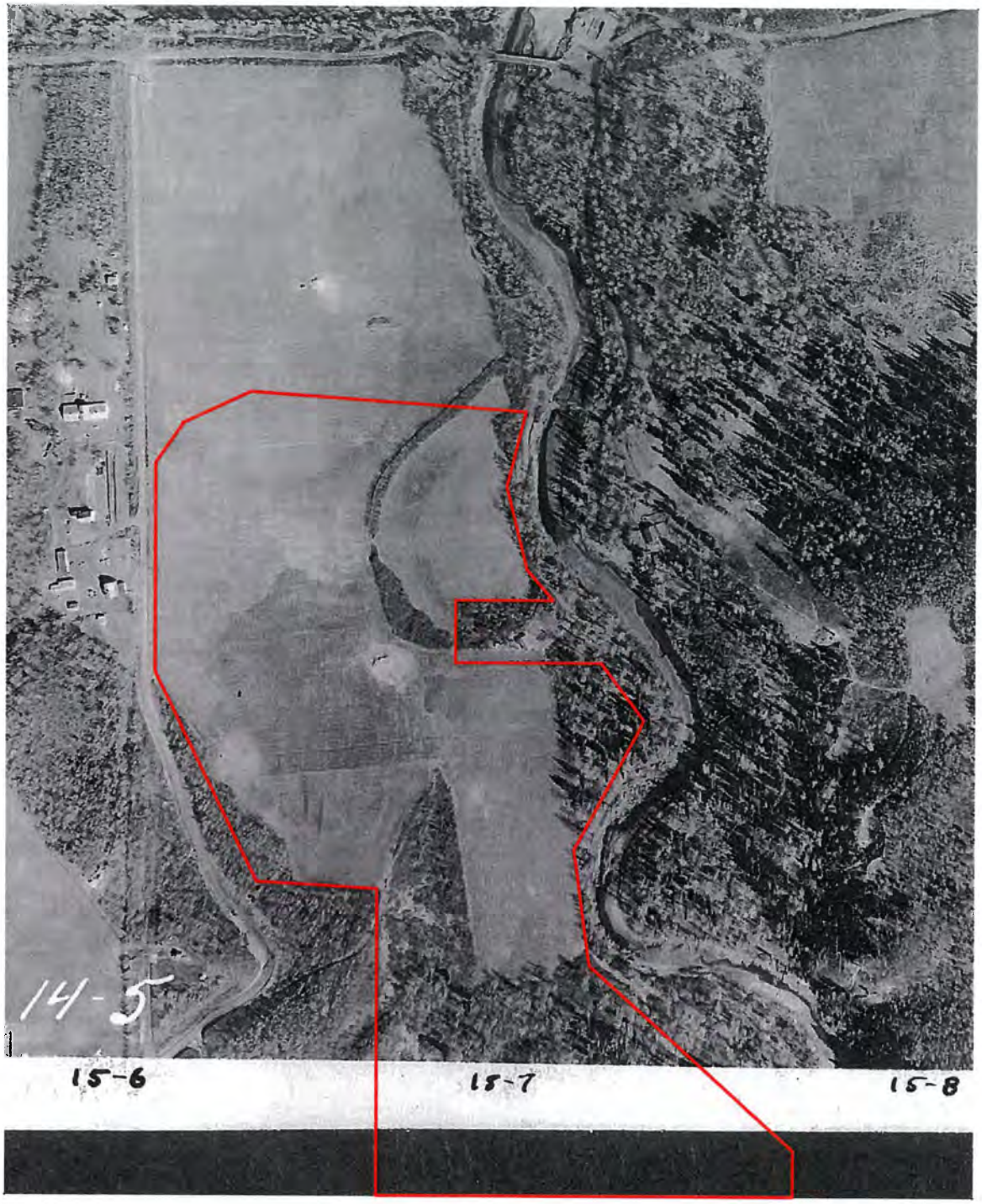
CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1924		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C1		DWG. NO. C-1



NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1930)

APPROXIMATE SCALE 1 : 5 000

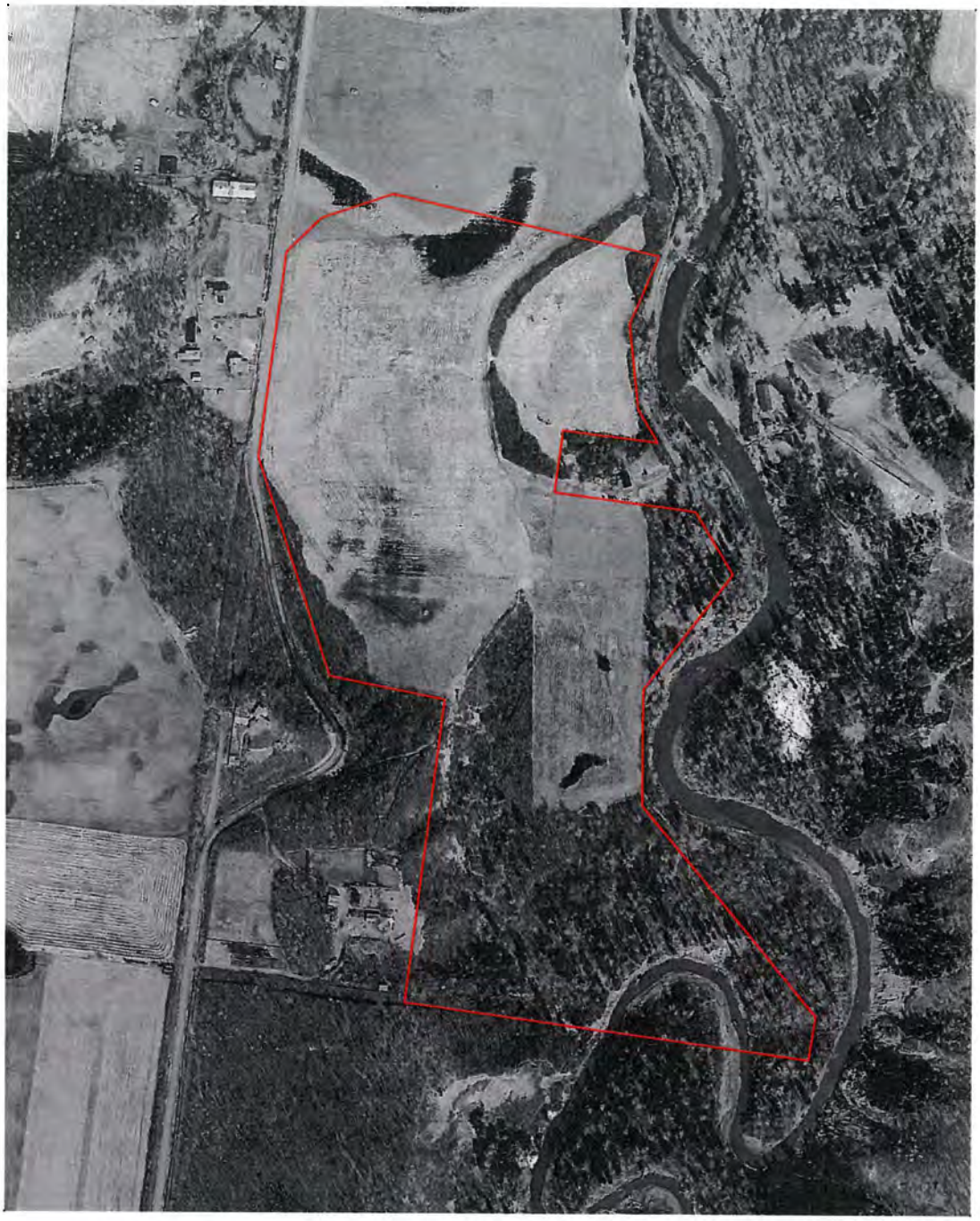
CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1930		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C2		DWG. NO. C-2



NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1949)

APPROXIMATE SCALE 1 : 5 000

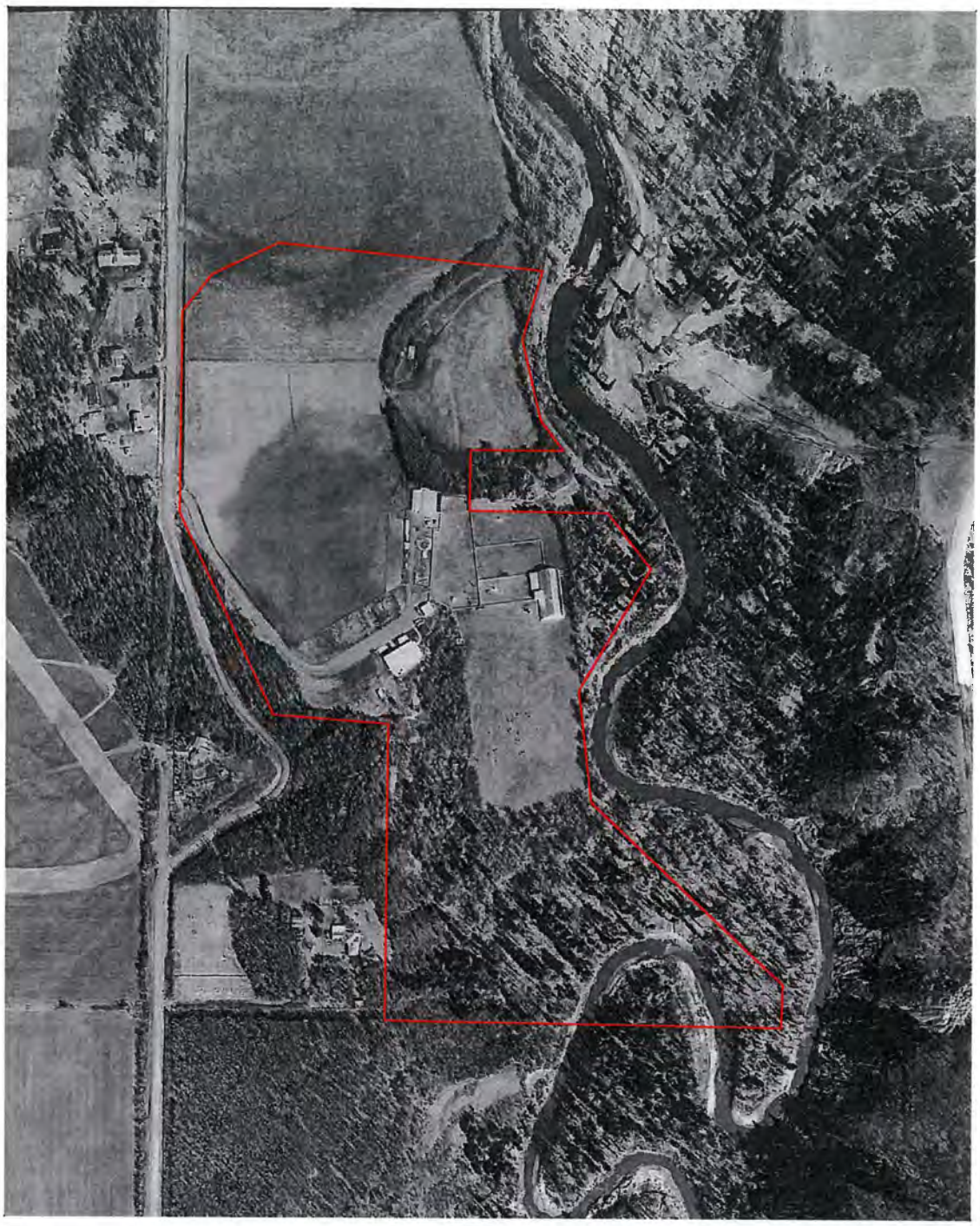
CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT	CITY OF EDMONTON		TITLE	SITE AIR PHOTO - 1949	
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C3		DWG. NO. C-3



NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1954)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1954		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C4		DWG. NO. C-4



NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1962)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT	CITY OF EDMONTON		TITLE	SITE AIR PHOTO - 1962	
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C5		DWG. NO. C-5

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1965)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1965		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C6		DWG. NO. C-6

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1969)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1969		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C7		DWG. NO. C-7

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1974)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1974		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C8		DWG. NO. C-8

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1978)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1978		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C9		DWG. NO. C-9

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1984)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1984		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C10		DWG. NO. C-10

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1988)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1988		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C11		DWG. NO. C-11

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1993)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1993		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C12		DWG. NO. C-12

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (1998)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 1998		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C13		DWG. NO. C-13

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (2003)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 2003		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C14		DWG. NO. C-14

NOTE: BASED ON CITY OF EDMONTON ARCHIVES AIR PHOTO (2008)

APPROXIMATE SCALE 1 : 5 000

CT & ASSOCIATES ENGINEERING INC.			PROJECT	PHASE I ENVIRONMENTAL SITE ASSESSMENT FOX FARM PROPERTY 14141 FOX DRIVE NW, EDMONTON, ALBERTA PLAN 5975CL, BLOCK A	
CLIENT CITY OF EDMONTON			TITLE SITE AIR PHOTO - 2008		
DATE SEP 11, 2014	DWN. PWD	CHKD. MCM	FILE NO. 02-1872-C15		DWG. NO. C-15

APPENDIX D

ENVIRONMENTAL AGENCY SEARCH RESULTS

CT & Associates Engineering Inc.

Subject: **PHASE I ENVIRONMENTAL SITE ASSESSMENT**
14141 FOX DRIVE NW, EDMONTON, ALBERTA
PLAN 5975CL, BLOCK A

Ownership Name: CITY OF EDMONTON

Representative Name: JACQUIE DALZIEL

Representative Contact No. (780)944-5420

Date: Aug 25/14

Please complete the following and return via email to CT & Associates Engineering (pdudek@ctaengineering.com) or fax at 780-732-5300, attention Przemek Dudek.

1) Length of time owners have been associated with the lands: 46 years
COE acquired land in 1968.
Fox Family moved off land in 1996.

2) Describe known use of the lands, both historical and current (farmland, residential/acreage, buildings or other infrastructure, others)

Farmland, livestock, residential, barn, riding arena, bunkhouse, well house.

3) Knowledge of any environmental concerns related to the lands, such as fill placement, spills or site remediation, well-sites, pipeline, right-of-ways or other such items: (please check the appropriate answer)

✓ yes _____ no

If yes, please provide details of the known concerns:

well-sites, septic fields, utilities.

Petroleum Tank Management Association of Alberta
Suite 980, 10303 Jasper Avenue
Edmonton, Alberta T5J 3N6
PH: (780)425-8265 or 1-866-222-8265
FAX: (780)425-4722

August 27, 2014

Przemek Duked
CT & Associates Engineering Inc.
102 14420 116 Avenue
Edmonton, AB
T5M 4B4

Dear Przemek Duked:

As per your request, the PTMAA has checked the registration of active tank sites and inventory of abandoned tank sites and there are no records for the property with the legal land description:

14141 Fox Drive NW, Edmonton
Plan 5975CL, Block A
SW 24-52-25-W4

Please note that both databases are not complete. The main limitation of these databases is that they only include information reported through registration or a survey of abandoned sites completed in 1992 and should not be considered as a comprehensive inventory of all past or present storage tank sites. The PTMAA **cannot** guarantee that tanks do not or have not existed at this location. Information in the databases is based on information supplied by the owner and the PTMAA cannot guarantee its accuracy. Information on storage tanks or on past or present contaminant investigations may be filed with the local Fire Department or Alberta Environment.

Yours truly,

Connie Jacobsen
PTMAA

ENVIRONMENTAL LAW CENTRE
Suite 800, 10025 - 106 Street, Edmonton, AB T5J 1G4
Phone: (780) 424-5099 Fax: (780) 424-5133
Internet: www.elc.ab.ca E-Mail: elc@elc.ab.ca

August 28, 2014 Our File: 094698

Mr. Przemyslaw Dudek
CT & Associates Engineering Inc.
102, 14420-116 Ave NW
Edmonton, AB T5M 4B4

Dear Mr. Dudek:

RE: Search Requested - City of Edmonton

In response to your request of August 26, 2014, we have searched the Environmental Enforcement Historical Search Service database for an exact match with respect to the above request, and can advise that as of today's date, the enforcement actions listed in the attached report have been issued pursuant to the Alberta "Environmental Protection and Enhancement Act" ("EPEA") and its predecessor legislation, the "Hazardous Chemicals Act", "Agricultural Chemicals Act", "Clean Water Act" and "Clean Air Act" to 1971, and/or pursuant to the "Water Act" from 1999 onwards. The attached report may also contain records which are not an exact match to your search request but may be related to the subject of your search.

This search is limited to the following enforcement actions under EPEA and its predecessor legislation: Tickets, Prosecutions, Administrative Penalties, Warnings, Enforcement Orders, Enforcement Orders Concerning Waste, Environmental Protection Orders, Emergency Environmental Protection Orders, Emission Control Orders, Chemical Control Orders, Water Quality Control Orders and Stop Orders. This search is limited to the following enforcement actions under the Water Act: Prosecutions, Administrative Penalties, Water Management Orders, Warnings and Enforcement Orders. It does not include Clean Up Orders issued under the Litter Act or Environmental Protection Orders respecting unsightly property issued under EPEA; this information may be available from the local municipality.

Enforcement actions are entered in the database following: (1) the decision date, for prosecutions; (2) the date an administrative penalty was paid or due (30 days after issuance), whichever is sooner; and (3) the date the document was issued for all other enforcement actions.

These search results are based on information provided by Alberta Environment ("AENV"). AENV advises that they try to provide the best information possible. However, AENV advises that it cannot guarantee that the information provided is complete or accurate and that any person relying on these search results does so at their own risk. More information may be gained by referring to original enforcement documents.

Copies of orders are available from the Environmental Law Centre. Any other enforcement information may be available directly from Alberta Environment.

Yours sincerely,

Cindy Dewing
Enforcement Search Service
Encl.

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Phone: (780) 424-5099 Fax: (780) 424-5133
Internet: www.elc.ab.ca E-Mail: elc@elc.ab.ca

Environmental Enforcement Historical Search Service

Accountable Party	Action	Decision Date/ Penalty	Municipality/s Legal Description/s	Act/s & Section/s	Comments/Disposition
Edmonton, City of	Water Quality Control Order	05-Nov-1991 $0.00	Edmonton	CWA 14(1)	Release of water contaminant (raw sewage); failure to report; company to take temporary measures to prevent discharges of raw sewage; submit written report outlining monitoring results and methods; submit written proposal for long term and permanent corrective actions; submit written proposal to identify magnitude of dry weather raw sewage overflows; submit written monthly reports detailing actions taken to comply with Order.
Edmonton, City of	Warning Letter	03-Mar-1992 $0.00	Edmonton	HCA 17	Acceptance of prohibited material at Cloverbar Landfill, contrary to licence conditions and Hazardous Waste Regulations
Edmonton, City of	Water Quality Control Order	19-Feb-1993 $0.00	Edmonton	CWA 14	Discharge of hydrofluosilicic acid from Rossdale Water Treatment and Clean Water Reservoir into the North Saskatchewan River; directed to install additional containment systems; undertake preventative maintenance inspections; develop a plan to ensure adequate (secondary) containment at both Rossdale and E.L. Smith treatment plants; detail existing methods used for keeping inventories of chemicals.
Edmonton, City of	Administrative Penalty	27-Sep-1995 $2,000.00	Edmonton	AEPEA 99(2)	Failed to report the release of hydraulic oil from a City of Edmonton vehicle into the North Saskatchewan River (at Capilano Bridge); paid 23-OCT-1995.
Edmonton, City of	Warning Letter	21-Jul-1999	Edmonton	AEPEA 213(e)	The City of Edmonton contravened the terms of their approval to operate the Goldbar Wastewater Treatment Plant by bypassing the wastewater treatment plant and releasing untreated or partially treated wastewater to the North Saskatchewan River.

Acts:

ACA:	Agriculture Chemicals Act	CAA:	Clean Air Act	HCA:	Hazardous Chemicals Act
AEPEA:	Environmental Protection Enhancement Act(S.A.1992)	CC:	Criminal Code (Canada)	LA:	Litter Act
		CWA:	Clean Water Act	TDGCA:	Transportation of Dangerous Goods Control Act
AEPEA(R)	Environmental Protection & Enhancement Act(R.S.A.2000)	DEA:	Dept. of Environment Act		
		FFA:	Fisheries Act (Canada)	WA:	Water Act
BCA:	Beverage Container Act				

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Environmental Enforcement Historical Search Service

Accountable Party	Action	Decision Date/ Penalty	Municipality/s Legal Description/s	Act/s & Section/s	Comments/Disposition
Edmonton, The City of	Prosecution	07-Mar-2002	#Type!	AEPEA 213(e)	Count 1: On or about September 16, 2000 at or near Edmonton, in the Province of Alberta did unlawfully contravene a term or condition of an approval, to wit: 9.2.1(a)(ii) of Approval No. 95-MUN-117 which provides as follows: The Approval Holder shall contact the Director of Pollution Control at 1-800-222-6514 immediately after any of the following events: (a) if untreated or partially treated sewage; (ii) from the wastewater collection system overflows under dry weather conditions, contrary to s.213(e) of the Environmental Protection and Enhancement Act. Withdrawn 7 March 2002.
Edmonton, The City of	Prosecution	07-Mar-2002 $200,000.00	#Type!	AEPEA 213(e)	Count 2: On or about September 16, 2000 at or near Edmonton, in the Province of Alberta did unlawfully contravene a term or condition of an Approval, to wit: 9.2.1(a)(iii) of Approval No. 95-MUN-117 which provides as follows: The Approval Holder shall contact the Director of Pollution Control at 1-800-222-6514 immediately after any of the following events: (a) if untreated or partially treated sewage; (iii) bypasses or overflows from lift stations contrary to s.213(e) of the Environmental Protection and Enhancement Act. Pled guilty 7 March 2002 and sentenced to a fine of 5,000 with a creative sentence. Fine paid 11 April 2002. An order requiring the City to pay a further $5,000 to cover the costs of Alberta Environment's investigation into the matter, and a Creative Sentence Order of $190,000 was issued 30 April 2002. The Creative Sentence Order was granted to fund a leading-edge university study to determine potential alternate uses for city wastewater. Order complied with 14 October 2005.

Acts:

ACA:	Agriculture Chemicals Act	CAA:	Clean Air Act	HCA:	Hazardous Chemicals Act
AEPEA:	Environmental Protection Enhancement Act(S.A.1992)	CC:	Criminal Code (Canada)	LA:	Litter Act
		CWA:	Clean Water Act	TDGCA:	Transportation of Dangerous Goods Control Act
AEPEA(R)	Environmental Protection & Enhancement Act(R.S.A.2000)	DEA:	Dept. of Environment Act		
		FFA:	Fisheries Act (Canada)	WA:	Water Act
BCA:	Beverage Container Act				

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Environmental Enforcement Historical Search Service

Accountable Party	Action	Decision Date/ Penalty	Municipality/s Legal Description/s	Act/s & Section/s	Comments/Disposition
Edmonton, The City of	Prosecution	07-Mar-2002	#Type!	AEPEA 213(e)	Count 3: On or between September 16, 2000 and September 18, 2000, both dates inclusive, at or near Edmonton, in the Province of Alberta, did unlawfully contravene a term or condition of an Approval, to wit: 5.1.2 of Approval No. 95-MUN-117 which provides as follows: Untreated or partially treated wastewater into the treatment plant shall not be bypassed to the North Saskatchewan River during dry weather conditions, contrary to s.213(e) of the Environmental Protection and Enhancement Act. Withdrawn 7 March 2002.
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 98(2)	Count 1: On or between the 3rd day of August and the 8th day of August, 2001, at or near Edmonton, in the Province of Alberta, did unlawfully release or permit the release into the environment of a substance in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect, contrary to section 98(2) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 99(1)	Count 2: On or between the 3rd day of August, 2001 and the 9th day of August, 2001 at or near Edmonton, in the Province of Alberta, being a person who releases or causes or permits the release of a substance into the environment that has caused, is causing, or may cause an adverse effect, did fail, as soon as that person knows or ought to know of the release, report it to the Director, contrary to section 99(1) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.

Acts:

ACA:	Agriculture Chemicals Act	CAA:	Clean Air Act	HCA:	Hazardous Chemicals Act
AEPEA:	Environmental Protection Enhancement Act(S.A.1992)	CC:	Criminal Code (Canada)	LA:	Litter Act
		CWA:	Clean Water Act	TDGCA:	Transportation of Dangerous Goods Control Act
AEPEA(R)	Environmental Protection & Enhancement Act(R.S.A.2000)	DEA:	Dept. of Environment Act		
		FFA:	Fisheries Act (Canada)	WA:	Water Act
BCA:	Beverage Container Act				

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Environmental Enforcement Historical Search Service

Accountable Party	Action	Decision Date/ Penalty	Municipality/s Legal Description/s	Act/s & Section/s	Comments/Disposition
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 99(2)	Count 3: On or between the 3rd day of August, 2001 and the 9th day of August, 2001 at or near Edmonton in the Province of Alberta, being a person having control of a substance that is released into the environment that has caused, is causing, or may cause an adverse effect, did fail, immediately on becoming aware of the release, report it to the Director, contrary to section 99(2) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 99(1)	Count 4: On or between the 4th day of August, 2001 and the 10th day of August, 2001 at or near Edmonton, in the Province of Alberta, being a person who releases or causes or permits the release of a substance into the environment that has caused, is causing, or may cause an adverse effect, did fail, as soon as that person knows or ought to know of the release, report it to the Director, contrary to section 99(1) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 99(2)	Count 5: On or between the 4th day of August, 2001 and the 10th day of August, 2001 at or near Edmonton in the Province of Alberta, being a person having control of a substance that is released into the environment that has caused, is causing, or may cause an adverse effect, did fail, immediately on becoming aware of the release, report it to the Director, contrary to section 99(2) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.

Acts:

ACA:	Agriculture Chemicals Act	CAA:	Clean Air Act	HCA:	Hazardous Chemicals Act
AEPEA:	Environmental Protection Enhancement Act(S.A.1992)	CC:	Criminal Code (Canada)	LA:	Litter Act
		CWA:	Clean Water Act	TDGCA:	Transportation of Dangerous Goods Control Act
AEPEA(R)	Environmental Protection & Enhancement Act(R.S.A.2000)	DEA:	Dept. of Environment Act		
		FFA:	Fisheries Act (Canada)	WA:	Water Act
BCA:	Beverage Container Act				

ENVIRONMENTAL LAW CENTRE
Suite 800, 10025 - 106 Street, Edmonton, AB T5J 1G4
Phone: (780) 424-5099 Fax: (780) 424-5133
Internet: www.elc.ab.ca E-Mail: elc@elc.ab.ca

Environmental Enforcement Historical Search Service

Accountable Party	Action	Decision Date/ Penalty	Municipality/s Legal Description/s	Act/s & Section/s	Comments/Disposition
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 99(1)	Count 6: On or between the 5th day of August, 2001 and the 10th day of August, 2001 at or near Edmonton, in the Province of Alberta, being a person who releases or causes or permits the release of a substance into the environment that has caused, is causing, or may cause an adverse effect, did fail, as soon as that person knows or ought to know of the release, report it to the Director, contrary to section 99(1) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 99(2)	Count 7: On or between the 5th day of August, 2001 and the 10th day of August, 2001 at or near Edmonton, in the Province of Alberta, being a person having control of a substance that is released into the environment that has caused, is causing, or may cause an adverse effect, did fail, immediately on becoming aware of the release, report it to the Director, contrary to section 99(2) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 99(1)	Count 8: On or between the 8th day of August, 2001 and the 10th day of August, 2001 at or near Edmonton, in the Province of Alberta, being a person who releases or causes or permits the release of a substance into the environment that has caused, is causing, or may cause an adverse effect, did fail, as soon as that person knows or ought to know of the release, to report it to the Director, contrary to section 99(1) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.

Acts:

ACA:	Agriculture Chemicals Act	CAA:	Clean Air Act	HCA:	Hazardous Chemicals Act
AEPEA:	Environmental Protection Enhancement Act(S.A.1992)	CC:	Criminal Code (Canada)	LA:	Litter Act
		CWA:	Clean Water Act	TDGCA:	Transportation of Dangerous Goods Control Act
AEPEA(R)	Environmental Protection & Enhancement Act(R.S.A.2000)	DEA:	Dept. of Environment Act		
		FFA:	Fisheries Act (Canada)	WA:	Water Act
BCA:	Beverage Container Act				

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Environmental Enforcement Historical Search Service

Accountable Party	Action	Decision Date/ Penalty	Municipality/s Legal Description/s	Act/s & Section/s	Comments/Disposition
Edmonton, The City of	Prosecution	17-Feb-2006	Edmonton 2191EO-OT	AEPEA 99(2)	Count 9: On or between the 8th day of August, 2001 and the 10th day of August, 2001 at or near Edmonton in the Province of Alberta, being a person having control of a substance that is released into the environment that has caused, is causing, or may cause an adverse effect, did fail, immediately on becoming aware of the release, report it to the Director, contrary to section 99(2) of the Environmental Protection and Enhancement Act. Found not guilty 17 February 2006.

THE CITY OF Edmonton COMMUNITY SERVICES

FIRE RESCUE SERVICES
FIRE PREVENTION
10425 - 106 AVENUE NW
EDMONTON, ALBERTA
T5H 0P5
PHONE: 780-496-3628
FAX: 780-442-7364

August 28, 2014

Our Reference No.: 50788152-005

CT & Associates
102, 14420 – 115 Avenue
Edmonton, Alberta T5M 4B4

Attention: Przemek Dudek

RE: **Your File No.:**
Legal: Plan 5975CL, Block A
Municipal: 14141 – Fox Drive Edmonton, Alberta

A Fire Rescue Services record file search was conducted on August 28, 2014. Your payment has been received.

Fire Prevention has not received any information or reports regarding the following:

- installation/removal of underground storage tanks
- leaks
- site contamination or site remediation

Please understand that, as of the date indicated, none of the above described information has been reported to Fire Rescue Services in connection with this property. We make no representations or warranties whatsoever as to the present condition of the property or whether the property complies with the Safety Codes Act. We recommend that you take steps to satisfy yourself as to the condition of the property and the property's compliance with the Safety Codes Act.

Future requests for information should be accompanied by a prepayment of the charge and forwarded to Fire Prevention, 10565 - 105 Street, Edmonton, Alberta T5H 2W8. Please note, effective January 1, 2014, the File Search fees per address are $126.00 + $6.30 (G.S.T.) = $132.30.

.../2

Should you have any questions, please contact Fire Prevention at (780) 496-3628.

Yours truly,

T. Karpa
Fire Marshal

TRK/ja/jc/jls

THE CITY OF Edmonton COMMUNITY SERVICES

FIRE RESCUE SERVICES
FIRE PREVENTION
10425 - 106 AVENUE NW
EDMONTON, ALBERTA
T5H 0P5
PHONE: 780-496-3628
FAX: 780-442-7364

August 28, 2014

Our Reference No.: 50788152-005

CT & Associates
102, 14420 – 115 Avenue
Edmonton, Alberta T5M 4B4

FAXED Sept 19/14

Attention: Przemek Dudek

RE: **Your File No.:**
Legal: Plan 5975CL, Block A
Municipal: 14141 – Fox Drive Edmonton, Alberta

A Fire Rescue Services record file search was conducted on August 28, 2014. Your payment has been received.

Fire Prevention has not received any information or reports regarding the following:

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- leaks
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Future requests for information should be accompanied by a prepayment of the charge and forwarded to Fire Prevention, 10565 - 105 Street, Edmonton, Alberta T5H 2W8. Please note, effective January 1, 2014, the File Search fees per address are $126.00 + $6.30 (G.S.T.) = $132.30.

.../2

Should you have any questions, please contact Fire Prevention at (780) 496-3628.

Yours truly,

T. Karpa
Fire Marshal

TRK/ja/jc/jls

THE CITY OF Edmonton FINANCIAL SERVICES AND UTILITIES

OFFICE OF THE CHIEF FINANCIAL OFFICER & TREASURER
5TH FLOOR, CHANCERY HALL
3 SIR WINSTON CHURCHILL SQUARE
EDMONTON, ALBERTA
T5J 2C3

August 29, 2014

Application No: 159996753-001
Customer File: 512.022

Przemek Dudek, P.Eng.
CT & Associates Engineering Inc
#102, 14420 – 116 Avenue NW
Edmonton AB T5M 4B4

Re: Legal Address: Plan 5975CL, Block A
Municipal Address: 14141 Fox Drive NW, Edmonton AB

Attached are the results of a record search for the above noted premises with respect to compliance with Edmonton's Sewers Use Bylaw No. 9675, Sewers Bylaw No. 9425 and Drainage Bylaw No. 16200. Inquiries with respect to this search should be directed to the undersigned at (780) 496-4347. You will be invoiced for this service at a later date.

Original will no longer be sent by mail unless requested.

Regards,

J. Cam
For
Dave Johnston
Supervisor – Industrial Source Control
Regulatory Services
Drainage Services

Enclosure

THE CITY OF Edmonton

FINANCIAL SERVICES AND UTILITIES

REGULATORY SERVICES RECORD SEARCH

*SEWERS BYLAW # 9425, SEWERS USE BYLAW # 9675 & DRAINAGE BYLAW 16200

CUSTOMER: CT & ASSOCIATES ENGINEERING INC.

CUSTOMER FILE #: 512.022 APPLICATION #: 159996753-001

PROPERTY DETAILS

MUNICIPAL ADDRESS: 14141 Fox Drive NW, Edmonton, AB

LEGAL ADDRESS / DESCRIPTION: Plan 5975CL, Block A

NAME OF FACILITY:

TYPE OF BUSINESS:

☒ - NOT INSPECTED / NO RECORDS FOUND

☐ - INSPECTED - DATE OF INSPECTION:

☐ - NO VIOLATION(S) FOUND

☐ - VIOLATION(S) FOUND:

☐ - NOTICE TO COMPLY ISSUED:

☐ - FINE(S) ISSUED:

☐ - OVERSTRENGTH SURCHARGES LEVIED:

COMMENTS:

*Note: This search will only contain violations of the Sewers Bylaw No. 9425 (Sections 4 – 38), Sewers Use Bylaw No. 9675 (Sections 4 – 37) and Drainage Bylaw No.16200 (Sections 4-40, 50 and 51).

SEARCH PERFORMED BY: Tanja Hanton DATE: August 29, 2014

REVIEWED BY: J. Lau DATE: Aug. 29, 2014

THE CITY OF Edmonton Financial Services And Utilites

HEAD OFFICE
3RD FLOOR, CENTURY PLACE
9803 - 102A AVENUE, N.W
EDMONTON, ALBERTA
T5J 3A3
FAX (780) 496-8657

September 18, 2014

File No.: 71-020-008-001
Search ID: 2930

Przemel Dudek
CT & Associates Engineering Inc.
102, 14420 - 116 AVENUE NW
Edmonton, Alberta
T5M 4B4

Dear Sir/Madam:

	ADDRESS	LEGAL
SUBJECT:	14141 - FOX DRIVE NW T6H4P3	Plan 5975CL Blk A
	14141 - FOX DRIVE NW T6H4P3	Plan 5975CL Blk A

In response to your recent inquiry, our limited records do not identify a former landfill or dump site on or within a 500 metre radius of the subject property. Please note that this information is provided without prejudice and the onus is on the developer/owner to verify by site tests the suitability of the property for their intended use of it.

Sincerely,

Jim Schubert
Director of Business Planning
Waste Management Services
City of Edmonton

Enclosure

Alberta Health Services

Environmental Public Health
HSBC Building
Suite 700, 10055 – 106 Street,
Edmonton, AB T5J 2Y2
Fax 780.735.1802
Phone 780.735.1800
AHS.EZ.EPH.RecordSearch@albertahealthservices.ca

August 27, 2014

File No. 512.022

Przemek Dudek
CT & Associates Engineering Inc
#102, 14420-116 Avenue NW,
Edmonton, AB T5M 4B4
Phone: 780 451 1332
Fax: 780 732 5300

Dear Przemek:

Re: Your request for records search

On August 27, 2014 our office received your request for information regarding the following properties:

14141 Fox Drive NW, Edmonton Plan 5975CL Block A
W4M 25 52 24 SW

No records responsive to your request have been located. However, it should be noted that the fact that records do not exist does not necessarily mean that the property complies with all applicable legislation.

Please be advised that records relevant to your search may be held by other agencies, such as Alberta Environment and Sustainable Resource Development, Alberta Energy and Utilities Board, local governments, and others. You should contact these agencies directly for further information.

Enclosed is the invoice in the amount of $100 owing for this service. Please issue payment to the address noted above.

Sincerely,
Alberta Health Services

For Elson Zazulak, B.Sc., CPHI(C)
Provincial Advisor
Environmental Site Assessments
Enclosure: Invoice

N

Wellheads
- Abandoned Wellhead
- Suspended Gas Wellhead
- Suspended Oil Wellhead
- Flowing Gas Wellhead
- Location Wellhead
- Flowing Oil Wellhead
- Miscellaneous Wellhead
- Water Wellhead
- Well Downhole Location
- Newly Licenced Well
- Newly Spudded Well

High Pressure Pipelines
- Gas Pipeline
- Oil Pipeline
- Water Pipeline
- LVP/HVP Pipeline
- Foreign Pipeline (Only when a company is specified.)

Low Pressure Pipelines
- Gas Co-op Pipeline

COAL MINE INFORMATION				OPTIONS
MINE NO:	1277	CATALOG ID:	439661	Open Production Data
MINE NAME:	FRIDEL'S			Print Screen
OWNER:	WACLAW FRIDEL			Close Screen
LOCATION:	13-052-25 W4M			
MINE LEGAL STATUS:	ABANDONED	MINE TYPE:	UNDERGROUND	
MINING METHOD:	ROOM & PILLAR			

closest to the site
over 100m

Coal Mine Production Data

COAL MINE PRODUCTION DATA

YEAR: 1928

COAL RANK:	SUBBITUMINOUS
COAL TYPE:	THERMAL
COAL PRODUCTION WEIGHT:	0

OPTIONS

Print Screen

Close Screen

with no actual production

AER DATA | ATTACHED FILES

Close Screen

WELL INFORMATION
CURRENT TO JULY 31, 2014

EVENT: 0

WELL ID:	W0 / 05-24-052-25 W4 / 0		RecExempt
LICENCE #:	0002483W	**LICENCE DATE:**	JANUARY 2, 1951
WELL NAME:	DOME 23 ST. ALBERT TH 5-24-52-25		
WITHIN:	05-24-052-25 W4	**H2S (mol/kmol):**	NOT AVAILABLE
LICENCEE:	PLAINS MIDSTREAM CANADA ULC		
SPUD DATE:	JANUARY 2, 1951	**FINAL DRILL DATE:**	JANUARY 2, 1951
STATUS:	ABD	**ABANDONED DATE:**	JANUARY 3, 1951
SURFACE:		**DOWNHOLE:**	
OFFSETS:	N 670.6 W 1619.3	OFFSETS:	N 670.6 W 1619.3
LATITUDE:	53.50367	LATITUDE:	53.50367
LONGITUDE:	113.565711	LONGITUDE:	113.565711
GROUND ELEVATION:	623.9 m 2047 '	TOTAL DEPTH:	153 m 502 '
WELL TYPE:	NOT AVAILABLE	**SUBSTANCE:**	NOT AVAILABLE

OPTIONS

Open Well Plat

Request Divestco Log

Create CBM Report

Add To Custom Well List

Print Screen

MORE INFO

Select Info to View

closest to site
over 120m

AER SPILL / COMPLAINT INCIDENTS FOR 02-24-052-25W4M				OPTIONS
COMPLAINT - NOVEMBER 7, 1997 - INCIDENT NUMBER: 19973357				View Licensee Info
AER NOTIFIED:	NOVEMBER 7, 1997	INCIDENT COMPLETE:	NOVEMBER 7, 1997	Print Screen
LICENCE #:				Close Screen
LICENCEE:	CALIBRE PRODUCTION OPERATORS LTD.			
SOURCE:	UNKNOWN			
SOURCE IN COMPLAINCE?				
CAUSE:	CONVERSION			
STRIKE AREA:		FIELD CENTRE:	ST. ALBERT	
CONCERNS:	ODOURS - H2S			

closest to site
over 500 m

AER DATA | ATTACHED FILES

Close Screen

This pipeline falls under NEB regulations. The graphics were originally supplied by the AER however, they are no longer maintaining the data. In order to provide the most accurate product possible, AbaData is attempting to maintain these NEB regulated pipelines. If you notice an error or omission, please email abadata@abacusdatagraphics.com and we will recity the data.

AER PIPELINE INFORMATION
CURRENT TO AUGUST 5, 2014

LICENCE/LINE #:	80045 - 1		**PERMIT DATE:**	JANUARY 22, 1998	
ABACUS #:			**LICENCE DATE:**		
COMPANY:	TERASEN INC.				
FROM LOCATION:	04-05-053-23 W4M PT		**TO LOCATION:**	16-13-053-06 W5M PS	
LENGTH:	99.4 kms	61.76 mi	**STATUS:**	O	
SUBSTANCE:	CO		**H2S:**	0 mol/kmol	0 ppm
OD:	610 mm	24.02 "	**WT:**	6.35 mm	0.25 "
MATERIAL:	S		**TYPE:**	5L	
GRADE:	X52		**MOP:**	5380 kPa	780 psi
JOINTS:	W		**INTL COATING:**	U	
STRESS LEVEL:	72 %		**ENVIRONMENT:**	RC	
ORIGINAL PERMIT DATE:	JANUARY 22, 1998		**CONST. DATE:**		
ORIGINAL LICENCE/LINE #:	80045 - 1		**NEB REG:**	Yes	

OPTIONS

View Company Info

View Installation Info

View Entire Licence

View Licence Ticket

View Spill Incidents

Highlight Line

Highlight Entire Licence

Print Screen

closest to site
over 600 m

Alberta

Environment and Sustainable Resource Development

FOIP & Information Mgmt. Section
5th Floor, Great West Life,
9920 - 108 Street
Edmonton, Alberta, T5K 2M4
Telephone: 780-427-4429
Fax: 780-427-9838
www.esrd.alberta.ca

August 27, 2014

Mr. Przemek Dudek
CT & Associates Engineering Inc.
#102, 14420 - 116 Avenue NW
Edmonton Alberta T5M 4B4

Fax: (780) 732-5300
Your File #: 02-1872
Access Request: E14-G-1398

Dear Mr. Dudek,

Re: Freedom of Information and Protection of Privacy Act Request for records pertaining to the property located at 14141 Fox Drive NW, Edmonton, AB.

Records or information not publicly or routinely available under Alberta Environment and Sustainable Resource Development legislation can be requested under the Freedom of Information and Protection of Privacy Act (the Act). Our office received your request under the Act for access to the subject records and $25.00 initial fee on August 27, 2014.

We will make every effort to provide the records available to you under the Act within 30 calendar days from the date your request was received. Your request due date is **September 26, 2014**. You will be advised in writing of a new due date if we need to extend the time limit for response under Section 14 of the Act or if we need to consult with third parties under Section 30 of the Act.

In processing an access request, a search for responsive records is conducted based on the following search parameters:

- the legal land description based on the Alberta Township Survey (section, township, range, meridian)
- the municipal address (if unavailable, specify closest village, town or city)
- the corporate names of existing and/or previous owners, operators or occupants associated with that property,
- the types of records requested, and
- time frame.

Although Alberta Environment and Sustainable Resource Development may potentially have records responsive to the scope of your request, records can only be retrieved based on the search parameters provided. The search for responsive records will be conducted using the search parameters you have specified.

These parameters have been reflected in the scope of your request as follows:

Location: **14141 Fox Drive NW, Edmonton**
SW Sec 24 Twp 52 Rge 25 W4M
Plan 5975CL, Block A

Name(s): **City of Edmonton**

Time Frame: **Historical to August 27, 2014**

Records: **Internal correspondence/documentation relating to scientific/technical reports, assessments, investigations, and if applicable, enforcement action. Any other records relating to the status of the subject site that cannot be made routinely available due to potential sensitivity of some or all of the information contained within the records.**

We have initiated a search for records based on the above search parameters. If this does not accurately reflect the scope of your request, please call me as soon as possible so we can amend your search. This will enable our office to respond to your access request as completely and accurately as possible. Once we receive and review potentially responsive records you will be contacted, if necessary, to further refine or clarify the scope of your access request.

If you are acting on behalf of a corporation, organization or person referenced within the scope of your access request, the Freedom of Information and Protection of Privacy Office requires:

1. written confirmation from your client that you are acting as their agent, and
2. written authorization to disclose to you any records/information responsive to access request **E14-G-1398** that either pertains or belongs to your client.

Without such an authorization, Alberta Environment and Sustainable Resource Development may be obligated to seek their representations on the disclosure of such records, which could extend your request by an additional 30 days.

Section 93 of the Act states that in addition to the initial fee, you may be required to pay fees for services if the total fee for providing you with the records is expected to be greater than $150.00. If costs are expected to exceed $150.00 you will receive a fee estimate letter.
[Note: the amount of fees charged for locating and retrieving a record, which is calculated at $6.75 per ¼ hour, cannot be reduced if this service has already been provided.]

If you have any questions or concerns, please write or call me at **(780) 427-2253**.

Yours truly,

J K Adams

Janet Adams, CIAPP-P
Access & Privacy Advisor

Alberta Environment and Sustainable Resource Development

FOIP & Information Mgmt. Section
5th Floor, Great West Life,
9920 - 108 Street
Edmonton, Alberta, T5K 2M4
Telephone: 780-427-4429
Fax: 780-427-9838
www.esrd.alberta.ca

September 4, 2014

RECEIVED
SEP 0 8 2014

Mr. Przemek Dudek
CT & Associates Engineering Inc.
#102 14420 - 116 Avenue NW
Edmonton Alberta T5M 4B4

Fax: (780) 732-5300
Your File #: 02-1872
Access Request: E14-G-1398

Dear Mr. Dudek,

Re: Freedom of Information and Protection of Privacy Act Request for records pertaining to the property located at 14141 Fox Drive NW, Edmonton, AB.

The following is in response to your request of August 27, 2014 for access under the *Freedom of Information and Protection of Privacy Act* to the subject records.

A search of Alberta Environment and Sustainable Resource Development record holdings has not identified any records relating to the subject of your request, based on the search parameters you provided to this office.

If you have any questions or concerns about the processing of your request, please write to the above address or call me at **(780) 427-2253,** so that we can look at ways to address these issues. If, however, we are unable to resolve your concerns, you have the right to ask the Information and Privacy Commissioner to conduct a review under section 65 of the Act. You have 60 days from the receipt of this notice to request a review by writing to:

Information and Privacy Commissioner
410, 9925 - 109 Street
Edmonton, Alberta, T5K 2J8
Telephone (780) 422-6860
Fax (780) 422-5682

If you request a review, please provide the Commissioner with a copy of your original request, any letters of clarification, a copy of this letter and the reason why you are requesting a review.

Sincerely,

J. L. Adams

Janet Adams,
Access & Privacy Advisor

Appendix E. Vegetation Survey Results (06 July and 10 August 2016)

Table E1. Kihciy Askiy Vegetation Survey Inventory (06 July and 10 August 2016)

Scientific Name	Common Name	ACIMS Rank	Origin	Species Occurrences*	
				Grassland (G)	Balsam Poplar-White Spruce Forest (P2)
Trees					
Acer negundo	Manitoba maple	SNA	exotic	O	A
Betula neoalaskana	Alaska birch	S5	native	R	
Picea glauca	white spruce	S5	native		D
Picea pungens	Colorado blue spruce	SNA	exotic	R	
Pinus banksiana	jack pine	S5	native		R
Populus balsamifera	balsam poplar	S5	native	O	D
Populus tremuloides	aspen	S5	native	O	A
Shrubs					
Alnus incana	alder	S5	native		R
Amelanchier alnifolia	saskatoon	S5	native		O
Caragana arborescens	common caragana	SNA	exotic		O
Cornus stolonifera	red-osier dogwood	S5	native	O	D
Corylus cornuta	beaked hazelnut	S5	native		O
Cotoneaster lucidus	Peking cotoneaster	SNA	exotic		O
Prunus virginiana	choke cherry	S5	native	R	F
Ribes oxyacanthoides	northern gooseberry	S5	native		A
Ribes triste	wild red currant	S5	native		F
Rosa acicularis	prickly rose	S5	native		D
Rubus idaeus	wild red raspberry	S5	native		F
Shepherdia canadensis	Canada buffaloberry	S5	native		O
Sorbus aucuparia	European mountain-ash	SNA	exotic	R	O
Symphoricarpos occidentalis	buckbrush	S5	native		F
Viburnum edule	low-bush cranberry	S5	native		O
Viburnum opulus	high-bush cranberry	S3S4	native		O

Scientific Name	Common Name	ACIMS Rank	Origin	Species Occurrences*	
				Grassland (G)	Balsam Poplar-White Spruce Forest (P2)
Forbs					
Achillea millefolium	common yarrow	S5	native	F	
Actaea rubra	red and white baneberry	S5	native	R	F
Aegopodium podagraria	goutweed	SNA	exotic	R	
Agrimonia striata	agrimony	S4	native		O
Amaranthus retroflexus	red-root pigweed	SNA	exotic	O	
Amoracia rusticana	horseradish	SNA	exotic	O	
Anemone canadensis	Canada anemone	S5	native		O
Apocynum androsaemifolium	spreading dogbane	S5	native	R	
Aralia nudicaulis	wild sarsaparilla	S5	native		D
Arctium minus	common burdock	SNA	noxious		R
Astragalus cicer	cicer milk vetch	SNA	exotic	O	
Brassica sp.	canola	SNA	exotic	R	
Campanula rapunculoides	creeping bellflower	SNA	noxious	O	O
Chamerion angustifolium	common fireweed	S5	native		F
Chenopodium album	lamb's-quarters	SNA	exotic	F	
Cirsium arvense	creeping thistle	SNA	noxious	F	O
Descurainia sophia	flixweed	SNA	exotic	O	
Equisetum arvense	common horsetail	S5	native	F	
Equisetum sylvaticum	woodland horsetail	S5	native		F
Erigeron philadelphicus	Philadelphia fleabane	S5	native		R
Euphorbia esula	leafy spurge	SNA	noxious	O	
Eurybia conspicua	showy aster	S5	native	O	O
Fragaria virginiana	wild strawberry	S5	native	R	
Galeopsis tetrahit	hemp-nettle	SNA	exotic	O	
Galium aparine	cleavers	SNA	exotic	O	
Galium boreale	northern bedstraw	S5	native		F

Scientific Name	Common Name	ACIMS Rank	Origin	Species Occurrences*	
				Grassland (G)	Balsam Poplar-White Spruce Forest (P2)
Geum aleppicum	yellow avens	S5	native		O
Geum macrophyllum	yellow avens	S5	native		O
Heracleum maximum	cow parsnip	S5	native	R	O
Hieracium umbellatum	narrow-leaved hawkweed	S5	native	O	R
Knautia arvensis	field scabious	SNA	noxious	O	
Lactuca serriola	prickly lettuce	SNA	exotic	O	
Lamium amplexicaule	henbit	SNA	exotic	O	
Lappula squarrosa	bluebur	SNA	exotic		O
Lathyrus ochroleucus	cream-colored vetchling	S5	native		O
Lepidium densiflorum	common pepper-grass	S5	native	A	
Leucanthemum vulgare	ox-eye daisy	SNA	noxious	O	
Linaria vulgaris	common toadflax	SNA	noxious	O	O
Lonicera dioica	twining honeysuckle	S5	native		R
Lonicera involucrata	bracted honeysuckle	S5	native		O
Maianthemum canadense	wild lily-of-the-valley	S5	native		O
Maianthemum stellatum	star-flowered Solomon's-seal	S5	native	R	F
Matricaria discoidea	pineappleweed	SNA	exotic	O	
Medicago lupulina	black medick	SNA	exotic	F	
Medicago sativa	alfalfa	SNA	exotic	A	O
Melilotus alba	white sweet-clover	SNA	exotic	O	
Melilotus officinale	yellow sweet-clover	SNA	exotic	F	
Mertensia paniculata	tall lungwort	S5	native		F
Petasites palmatus	palmate-leaved coltsfoot	S5	native		O
Plantago major	common plantain	SNA	exotic	O	
Polygonum aviculare	prostrate knotweed	SNA	exotic	O	
Potentilla norvegica	rough cinquefoil	S5	native	R	R

Scientific Name	Common Name	ACIMS Rank	Origin	Species Occurrences*	
				Grassland (G)	Balsam Poplar-White Spruce Forest (P2)
Ranunculus acris	tall buttercup	SNA	noxious		O
Ranunculus macounii	Macoun's buttercup	S5	native		O
Senecio eremophilus	cut-leaved ragwort	S5	native	O	O
Senecio vulgaris	common groundsel	SNA	exotic	O	
Silene latifolia	white cockle	SNA	noxious	A	
Solidago altissima	tall goldenrod	S5	native		O
Sonchus arvensis	perennial sow-thistle	SNA	noxious	F	R
Symphyotrichum ciliolatum	Lindley's aster	S5	native	R	O
Symphyotrichum puniceum	purple-stemmed aster	S4	native	R	
Tanacetum vulgare	common tansy	SNA	noxious	O	R
Taraxacum officinale	common dandelion	SNA	exotic	A	O
Thalictrum venulosum	veiny meadow rue	S5	native		R
Thlaspi arvense	stinkweed	SNA	exotic	O	
Tragopogon dubius	common goats'-beard	SNA	exotic	R	
Trifolium hybridum	alsike clover	SNA	exotic	F	
Trifolium pratense	red clover	SNA	exotic	D	
Trifolium repens	white clover	SNA	exotic	R	
Tripleurospermum inodorum	scentless chamomile	SNA	noxious	A	
Urtica dioica	common nettle	S5	native	O	
Vicia americana	wild vetch	S5	native	O	F
Vicia cracca	tufted vetch	SNA	exotic	O	
Viola canadensis	western Canada violet	S5	native		O
Graminoids					
Agropyron cristatum ssp. *pectinatum*	crested wheatgrass	SNA	exotic	O	
Agrostis stolonifera	redtop	SNA	exotic	R	
Bromus inermis	smooth brome	SNA	exotic	D	F

Scientific Name	Common Name	ACIMS Rank	Origin	Species Occurrences*	
				Grassland (G)	Balsam Poplar-White Spruce Forest (P2)
Dactylis glomerata	orchard grass	SNA	exotic	O	
Echinochloa crusgalli	barnyard grass	SNA	exotic	O	
Elymus repens	quackgrass	SNA	exotic	A	O
Elymus trachycaulus	slender wheatgrass	S5	native	O	
Hordeum jubatum	foxtail barley	S5	native	F	
Pascopyrum smithii	western wheatgrass	S5	native	O	
Phleum pratense	timothy	SNA	exotic	F	R
Poa pratensis	Kentucky bluegrass	S5	native	F	O
Total Number of Species				**71**	**63**
Total Number of Native Species				**25**	**46**
Total Number of Exotic Species				**36**	**10**
Total Number of Noxious Weed Species				**10**	**7**

* Abbreviations are as follows, in declining order of relative abundance: D=dominant, A=abundant, F=frequent, O=occasional, R=rare (locally uncommon)

Appendix F. Wildlife Species List

List of species with potential to occur in the Kihciy Askiy study area

Common Name	Scientific Name	Species Group	Provincial Status (General Status of AB Wild Species 2010)	Wildlife Act Designation and New Species Assessed by ESCC (see Comments)	COSEWIC Designation	SARA Designation	Recorded in Study Area	Potential Habitat Use	Likelihood of Occurrence
Wood Frog	*Lithobates sylvaticus*	Amphibian	Secure		LP Candidate (SSC)			R	M
Boreal Chorus Frog	*Pseudacris maculata*	Amphibian	Secure		LP Candidate (SSC)			R	M
Harris's Sparrow	*Zonotrichia querula*	Bird	Secure		HP Candidate (SSC)			M	L
American Kestrel	*Falco sparverius*	Bird	Sensitive		LP Candidate (SSC)			B	L
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Bird	Undetermined		LP Candidate (SSC)			B	L
Least Flycatcher	*Empidonax minimus*	Bird	Sensitive		LP Candidate (SSC)			B	H
Connecticut Warbler	*Oporornis agilis*	Bird	Secure		LP Candidate (SSC)			B	L
Sharp-shinned Hawk	*Accipiter striatus*	Bird	Secure		Not at Risk			B	M
Cooper's Hawk	*Accipiter cooperii*	Bird	Secure		Not at Risk			B	M
Red-tailed Hawk	*Buteo jamaicensis*	Bird	Secure		Not at Risk		X	B	M
Merlin	*Falco columbarius*	Bird	Secure		Not at Risk			B	H
Nelson's Sparrow	*Ammodramus nelsoni*	Bird	Secure		Not at Risk			B	L
Rough-legged Hawk	*Buteo lagopus*	Bird	Secure		Not at Risk			M	M
Great Grey Owl	*Strix nebulosa*	Bird	Sensitive		Not at Risk			R	L
Boreal Owl	*Aegolius funereus*	Bird	Secure		Not at Risk			R	L
Gyrfalcon	*Falco rusticolus*	Bird	Secure		Not at Risk			W	L
Northern Goshawk	*Accipiter gentilis atricapillus*	Bird	Sensitive		Not at Risk (see Comments)			R	M
Short-eared Owl	*Asio flammeus*	Bird	May Be At Risk		Special Concern	Schedule 1 (Special Concern)		B	L
Peregrine Falcon	*Falco peregrinus anatum*	Bird	At Risk	Threatened	Special Concern (see Comment	Schedule 1 (Special Concern)		B	L
Rusty Blackbird	*Euphagus carolinus*	Bird	Sensitive		Special Concern (see Comment	Schedule 1 (Special Concern)		B	L
Olive-sided Flycatcher	*Contopus cooperi*	Bird	May Be At Risk		Threatened	Schedule 1 (Threatened)		B	L
Canada Warbler	*Cardellina canadensis*	Bird	Sensitive		Threatened	Schedule 1 (Threatened)		M	M
Bank Swallow	*Riparia riparia*	Bird	Secure		Threatened			B	L
Barn Swallow	*Hirundo rustica*	Bird	Sensitive		Threatened			B	M
Common Nighthawk	*Chordeiles minor*	Bird	Sensitive		Threatened (see Status Report)	Schedule 1 (Threatened)		B	L
Cape May Warbler	*Setophaga tigrina*	Bird	Sensitive	In Process (see Comments)				M	M
Bay-breasted Warbler	*Setophaga castanea*	Bird	Sensitive	In Process (see Comments)				M	M
Black-Throated Green Warbler	*Setophaga virens*	Bird	Sensitive	Special Concern				M	L
Barred Owl	*Strix varia*	Bird	Sensitive	Special Concern				R	M
Canada Goose	*Branta canadensis*	Bird	Secure					B	M
Mallard	*Anas platyrhynchos*	Bird	Secure					B	M
Broad-winged Hawk	*Buteo platypterus*	Bird	Sensitive					B	L
Swainson's Hawk	*Buteo swainsoni*	Bird	Sensitive					B	M
Mourning Dove	*Zenaida macroura*	Bird	Secure					B	M
Long-eared Owl	*Asio otus*	Bird	Secure					B	L
Ruby-throated Hummingbird	*Archilochus colubris*	Bird	Secure					B	M
Belted Kingfisher	*Megaceryle alcyon*	Bird	Secure					B	M
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Bird	Secure					B	H
Northern Flicker	*Colaptes auratus*	Bird	Secure					B	H
Western Wood-pewee	*Contopus sordidulus*	Bird	Sensitive					B	M
Alder Flycatcher	*Empidonax alnorum*	Bird	Secure					B	L
Eastern Phoebe	*Sayornis phoebe*	Bird	Sensitive					B	M
Great-crested Flycatcher	*Myiarchus crinitus*	Bird	Sensitive					B	L
Eastern Kingbird	*Tyrannus tyrannus*	Bird	Secure					B	M
Blue-headed Vireo	*Vireo solitarius*	Bird	Secure					B	M
Warbling Vireo	*Vireo gilvus*	Bird	Secure					B	M
Philadelphia Vireo	*Vireo philadelphicus*	Bird	Secure					B	L
Red-eyed Vireo	*Vireo olivaceus*	Bird	Secure					B	H
American Crow	*Corvus brachyrhynchos*	Bird	Secure				X	B	H
Purple Martin	*Progne subis*	Bird	Sensitive					B	L
Tree Swallow	*Tachycineta bicolor*	Bird	Secure					B	M
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Bird	Secure					B	L
Cliff Swallow	*Petrochelidon pyrrhonota*	Bird	Secure					B	L
House Wren	*Troglodytes aedon*	Bird	Secure					B	H
Golden-crowned Kinglet	*Regulus satrapa*	Bird	Secure					B	M
Ruby-crowned Kinglet	*Regulus calendula*	Bird	Secure					B	H
Mountain Bluebird	*Sialia currucoides*	Bird	Secure					B	L
Veery	*Catharus fuscescens*	Bird	Secure					B	M

Common Name	Scientific Name	Species Group	Provincial Status (General Status of AB Wild Species 2010)	Wildlife Act Designation and New Species Assessed by ESCC (see Comments)	COSEWIC Designation	SARA Designation	Recorded in Study Area	Potential Habitat Use	Likelihood of Occurrence
Swainson's Thrush	*Catharus ustulatus*	Bird	Secure					B	M
Hermit Thrush	*Catharus guttatus*	Bird	Secure					B	M
American Robin	*Turdus migratorius*	Bird	Secure					B	H
Gray Catbird	*Dumetella carolinensis*	Bird	Secure					B	M
European Starling	*Sturnus vulgaris*	Bird	Exotic/Alien					B	H
Cedar Waxwing	*Bombycilla cedrorum*	Bird	Secure					B	H
Tennessee Warbler	*Oreothlypis peregrina*	Bird	Secure					B	H
Orange-crowned Warbler	*Oreothlypis celata*	Bird	Secure					B	H
Yellow Warbler	*Setophaga petechia*	Bird	Secure					B	H
Magnolia Warbler	*Setophaga magnolia*	Bird	Secure					B	M
Yellow-rumped Warbler	*Setophaga coronata*	Bird	Secure					B	H
Blackpoll Warbler	*Setophaga striata*	Bird	Secure					B	M
Black-and-white Warbler	*Mniotilta varia*	Bird	Secure					B	M
American Redstart	*Setophaga ruticilla*	Bird	Secure					B	H
Ovenbird	*Seiurus aurocapilla*	Bird	Secure					B	H
Northern Waterthrush	*Parkesia noveboracensis*	Bird	Secure					B	M
Mourning Warbler	*Geothlypis philadelphia*	Bird	Secure					B	M
Common Yellowthroat	*Geothlypis trichas*	Bird	Sensitive					B	M
Western Tanager	*Piranga ludoviciana*	Bird	Sensitive					B	H
Chipping Sparrow	*Spizella passerina*	Bird	Secure					B	H
Clay-colored Sparrow	*Spizella pallida*	Bird	Secure					B	H
Vesper Sparrow	*Pooecetes gramineus*	Bird	Secure					B	M
Savannah Sparrow	*Passerculus sandwichensis*	Bird	Secure					B	H
Le Conte's Sparrow	*Ammodramus leconteii*	Bird	Secure					B	M
Song Sparrow	*Melospiza melodia*	Bird	Secure					B	H
Lincoln's Sparrow	*Melospiza lincolnii*	Bird	Secure					B	M
White-throated Sparrow	*Zonotrichia albicollis*	Bird	Secure					B	H
Dark-eyed Junco	*Junco hyemalis*	Bird	Secure					B	H
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Bird	Secure					B	H
Western Meadowlark	*Sturnella neglecta*	Bird	Secure					B	L
Brewer's Blackbird	*Euphagus cyanocephalus*	Bird	Secure					B	M
Common Grackle	*Quiscalus quiscula*	Bird	Secure					B	M
Brown-headed Cowbird	*Molothrus ater*	Bird	Secure					B	H
Baltimore Oriole	*Icterus galbula*	Bird	Sensitive					B	M
Purple Finch	*Carpodacus purpureus*	Bird	Secure					B	M
American Goldfinch	*Spinus tristis*	Bird	Secure					B	H
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Bird	Undetermined					M	L
Say's Phoebe	*Sayornis saya*	Bird	Secure					M	L
Winter Wren	*Troglodytes hiemalis*	Bird	Secure					M	L
Townsend's Solitaire	*Myadestes townsendi*	Bird	Secure					M	M
Gray-cheeked Thrush	*Catharus minimus*	Bird	Undetermined					M	L
Chestnut-sided Warbler	*Setophaga pensylvanica*	Bird	Secure					M	L
Blackburnian Warbler	*Setophaga fusca*	Bird	Sensitive					M	L
Palm Warbler	*Setophaga palmarum*	Bird	Secure					M	L
Wilson's Warbler	*Cardellina pusilla*	Bird	Secure					M	L
American Tree Sparrow	*Spizella arborea*	Bird	Secure					M	H
Fox Sparrow	*Passerella iliaca*	Bird	Secure					M	M
White-crowned Sparrow	*Zonotrichia leucophrys*	Bird	Secure					M	M
Gray Partridge	*Perdix perdix*	Bird	Exotic/Alien					R	M
Ring-necked Pheasant	*Phasianus colchicus*	Bird	Exotic/Alien					R	M
Ruffed Grouse	*Bonasa umbellus*	Bird	Secure					R	M
Rock Pigeon	*Columba livia*	Bird	Exotic/Alien					R	H
Great Horned Owl	*Bubo virginianus*	Bird	Secure					R	H
Northern Saw-whet Owl	*Aegolius acadicus*	Bird	Secure					R	M
Downy Woodpecker	*Picoides pubescens*	Bird	Secure					R	H
Hairy Woodpecker	*Picoides villosus*	Bird	Secure				X	R	H
Three-toed Woodpecker	*Picoides tridactylus*	Bird	Secure					R	M
Pileated Woodpecker	*Dryocopus pileatus*	Bird	Sensitive					R	H
Blue Jay	*Cyanocitta cristata*	Bird	Secure					R	H

Common Name	Scientific Name	Species Group	Provincial Status (General Status of AB Wild Species 2010)	Wildlife Act Designation and New Species Assessed by ESCC (see Comments)	COSEWIC Designation	SARA Designation	Recorded in Study Area	Potential Habitat Use	Likelihood of Occurrence
Black-billed Magpie	*Pica hudsonia*	Bird	Secure				X	R	H
Common Raven	*Corvus corax*	Bird	Secure					R	H
Black-capped Chickadee	*Poecile atricapillus*	Bird	Secure					R	H
Boreal Chickadee	*Poecile hudsonicus*	Bird	Secure					R	H
Red-breasted Nuthatch	*Sitta canadensis*	Bird	Secure					R	H
White-breasted Nuthatch	*Sitta carolinensis*	Bird	Secure					R	H
Brown Creeper	*Certhia americana*	Bird	Sensitive					R	M
House Finch	*Carpodacus mexicanus*	Bird	Secure					R	M
Red Crossbill	*Loxia curvirostra*	Bird	Secure					R	H
White-winged Crossbill	*Loxia leucoptera*	Bird	Secure					R	H
Pine Siskin	*Spinus pinus*	Bird	Secure					R	H
Evening Grosbeak	*Coccothraustes vespertinus*	Bird	Secure					R	M
House Sparrow	*Passer domesticus*	Bird	Exotic/Alien					R	M
Varied Thrush	*Ixoreus naevius*	Bird	Secure					V	L
Black-backed Woodpecker	*Picoides arcticus*	Bird	Sensitive					W	M
Northern Shrike	*Lanius excubitor*	Bird	Secure					W	M
Bohemian Waxwing	*Bombycilla garrulus*	Bird	Secure					W	H
Snow Bunting	*Plectrophenax nivalis*	Bird	Secure					W	M
Pine Grosbeak	*Pinicola enucleator*	Bird	Secure					W	H
Common Redpoll	*Acanthis flammea*	Bird	Secure					W	H
Hoary Redpoll	*Acanthis hornemanni*	Bird	Secure					W	H
Northern Bat	*Myotis septentrionalis*	Mammal	May Be At Risk	Data Deficient	Endangered (see Comments)	Schedule 1 (Endangered)		R	M
Little Brown Bat	*Myotis lucifugus*	Mammal	Secure		Endangered (see Comments)	Schedule 1 (Endangered)		R	M
Black Bear	*Ursus americanus*	Mammal	Secure		Not at Risk			R	L
Canada Lynx	*Lynx canadensis*	Mammal	Sensitive		Not at Risk			V	L
Long-tailed Weasel	*Mustela frenata*	Mammal	May Be At Risk		Not at Risk (see Comments)			R	L
Hoary Bat	*Lasiurus cinereus*	Mammal	Sensitive					B	M
Masked Shrew	*Sorex cinereus*	Mammal	Secure					R	M
Hayden's Shrew/Prarie Shrew	*Sorex haydeni*	Mammal	Secure					R	L
Dusky Shrew	*Sorex monticolus*	Mammal	Secure					R	L
Water Shrew	*Sorex palustris*	Mammal	Secure					R	M
Arctic Shrew	*Sorex arcticus*	Mammal	Secure					R	M
Pygmy Shrew	*Sorex hoyi*	Mammal	Secure					R	L
Silver-haired Bat	*Lasionycteris noctivagans*	Mammal	Sensitive					R	M
Big Brown Bat	*Eptesicus fuscus*	Mammal	Secure					R	M
Snowshoe Hare	*Lepus americanus*	Mammal	Secure					R	H
White-tailed Jack Rabbit	*Lepus townsendii*	Mammal	Secure					R	H
Least Chipmunk	*Tamias minimus*	Mammal	Secure					R	H
Woodchuck	*Marmota monax*	Mammal	Secure					R	M
Richardson's Ground Squirrel	*Spermophilus richardsonii*	Mammal	Secure					R	H
Thirteen-lined Ground Squirrel	*Spermophilus tridecemlineatus*	Mammal	Undetermined					R	L
Franklin's Ground Squirrel	*Spermophilus franklinii*	Mammal	Undetermined					R	L
Red Squirrel	*Tamiasciurus hudsonicus*	Mammal	Secure				X	R	H
Northern Flying Squirrel	*Glaucomys sabrinus*	Mammal	Secure					R	H
Northern Pocket Gopher	*Thomomys talpoides*	Mammal	Secure					R	H
American Beaver	*Castor canadensis*	Mammal	Secure					R	H
Deer Mouse	*Peromyscus maniculatus*	Mammal	Secure					R	H
Southern Red-backed Vole	*Clethrionomys gapperi*	Mammal	Secure					R	H
Eastern Heather Vole	*Phenacomys ungava*	Mammal	Secure					R	L
Meadow Vole	*Microtus pennsylvanicus*	Mammal	Secure					R	H
Prairie Vole	*Microtus ochrogaster*	Mammal	Secure					R	L
Muskrat	*Ondatra zibethicus*	Mammal	Secure					R	L
Northern Bog Lemming	*Synaptomys borealis*	Mammal	Secure					R	L
House Mouse	*Mus musculus*	Mammal	Exotic/Alien					R	M
Meadow Jumping Mouse	*Zapus hudsonius*	Mammal	Secure					R	M
Western Jumping Mouse	*Zapus princeps*	Mammal	Secure					R	M
Common Porcupine	*Erethizon dorsatum*	Mammal	Secure					R	H
Coyote	*Canis latrans*	Mammal	Secure					R	H
Red Fox	*Vulpes vulpes*	Mammal	Secure					R	M

Common Name	Scientific Name	Species Group	Provincial Status (General Status of AB Wild Species 2010)	Wildlife Act Designation and New Species Assessed by ESCC (see Comments)	COSEWIC Designation	SARA Designation	Recorded in Study Area	Potential Habitat Use	Likelihood of Occurrence
Ermine	*Mustela erminea*	Mammal	Secure					R	H
Least Weasel	*Mustela nivalis*	Mammal	Secure					R	M
Mink	*Neovison vison*	Mammal	Secure					R	L
Striped Skunk	*Mephitis mephitis*	Mammal	Secure					R	M
Moose	*Alces alces*	Mammal	Secure				X	R	H
Mule Deer	*Odocoileus hemionus*	Mammal	Secure				X	R	H
White-tailed Deer	*Odocoileus virginianus*	Mammal	Secure					R	H
Mountain Lion/Cougar	*Puma concolor*	Mammal	Secure					V	L
Common Garter Snake	*Thamnophis sirtalis*	Reptile	Sensitive	LP Candidate	LP Candidate (SSC)			R	M
Plains Garter Snake	*Thamnophis radix*	Reptile	Sensitive	MP Candidate	MP Candidate (SSC)			R	L

Appendix G. Historical Resources

Alberta Culture and Tourism

Heritage Division
Old St. Stephen's College
8820 – 112 Street
Edmonton, Alberta T6G 2P8
Canada
Telephone: 780-431-2300
www.alberta.ca

Via e-mail: jacquie.dalziel@edmonton.ca

May 13, 2016

HRM Project File: 4725-16-0010
OPaC HR Appl: 008380489

Jacquie Dalziel
City of Edmonton
12th Floor, 10004 104 Avenue NW, P.O. Box 2359
Edmonton AB
T5J 0K1

Dear Ms. Dalziel:

SUBJECT: *HISTORICAL RESOURCES ACT* APPROVAL WITH CONDITIONS
4725-16-0010-001
CITY OF EDMONTON
KIHCIY ASKIY SACRED EARTH
LSDs 4 & 5, SECTION 24, TOWNSHIP 52, RANGE 25, W4M

The attached Schedule outlines Alberta Culture and Tourism's requirements for the proposed footprint of Kihciy Askiy Sacred Earth, as illustrated on the attached plan. This involves the condition to restrict surface land disturbance activities across the project area to a depth not exceeding 1 metre below the surface.

HISTORICAL RESOURCES ACT APPROVAL WITH CONDITIONS

Historical Resources Act approval is granted to the Proponent for the Project, as illustrated on the attached plan and subject to the requirements outlined in the attached Schedule.

Should you require additional information or have any questions concerning these requirements, please contact George Chalut, Land Use Planner, at 780-431-2329 (toll-free by first dialing 310-0000) or george.chalut@gov.ab.ca.

I would like to thank representatives of City of Edmonton for their cooperation in our endeavour to conserve the Province's historic resources.

Sincerely,

David Link, PhD
Assistant Deputy Minister

Attachments

Alberta
Culture and Tourism

Historic Resources Application

Activity Administration

Date Received: March 29, 2016 HRA Number: 4725-16-0010-001

Project Category:	Recreation and Tourism (4725)

Application Purpose:	☑	Requesting HRA Approval / Requirements
Lands Affected	☑	All New Lands

Project Type:	☑	Park Development	GIS Shapefiles are attached (yes/no)	No
			Approximate Project Area (ha)	2.5

Project Name:	Kihciy Askiy Sacred Earth
Additional Name(s):	

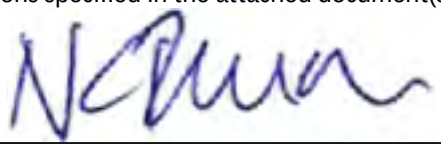
Key Contact:	Mr. Corey Toews	Affiliation:	Planner, City of Edmonton
Address:	12th Floor, 10004 104 Avenue NW, P.O. Box 2359	City / Province:	Edmonton, AB
Postal Code:	T5J 2R7	Phone:	(780) 496-8381
E-mail:	corey.toews@edmonton.ca	Fax:	() -
		Your File Number:	

Proponent:	City of Edmonton	Contact Name:	Jacquie Dalziel
Address:	12th Floor, 10004 104 Avenue NW, P.O. Box 2359	City / Province:	Edmonton, AB
Postal Code:	T5J 0K1	Phone:	(780) 944-5420
E-mail:	jacquie.dalziel@edmonton.ca	Fax:	() -

Proposed Development Area					Land Ownership			
MER	RGE	TWP	SEC	LSD List	FRH	SA	CU	CT
4	25	52	24	4,5	☑	☐	☐	☐

Historical Resources Impact Assessment:					
For archaeological resources:					
Has a HRIA been conducted?	☐	Yes	☑	No	Permit Number (if applicable):
For palaeontological resource:					
Has a HRIA been conducted?	☐	Yes	☑	No	Permit Number (if applicable):

Historical Resources Act approval is granted for the activities described on this application and its attached plan(s)/sketch(es) subject to the conditions specified in the attached document(s).



Chris Robinson
Acting Assistant Deputy Minister

May 13, 2016
Date

Location of project indicated in red. Project is located on the west side of Whitemud Creek south of Fox Drive and east of Whitemud Drive.

Alberta Culture and Tourism

OPaC Historic Resources Appl: 008380489

HISTORICAL RESOURCES ACT APPROVAL WITH CONDITIONS

CITY OF EDMONTON
KIHCIY ASKIY SACRED EARTH
PARK DEVELOPMENT

HISTORIC RESOURCES MANAGEMENT PROJECT FILE: 4725-16-0010-001

SCHEDULE

For the purposes of this Schedule, the City of Edmonton shall be referred to as the "Proponent" and Kihciy Askiy Sacred Earth shall be referred to as the "Project".

Part I provides the Proponent with *Historical Resources Act* approval for components of the Project while Part II outlines the conditions attached to this approval.

I. *HISTORICAL RESOURCES ACT* APPROVAL

Historical Resources Act approval is granted to the Proponent for the Project, as illustrated on the attached plan and subject to the conditions outlined below.

II. CONDITIONS OF APPROVAL

The Proponent is granted *Historical Resources Act* approval to proceed with this Project on the understanding that the conditions below will be followed.

1.0 PALAEONTOLOGICAL RESOURCES

The potential for this Project to affect palaeontological resources is high.

1.1 Contacting the Royal Tyrrell Museum of Palaeontology

For further information regarding the acquisition of a palaeontological research permit, the conduct of the required palaeontological resource studies and/or consulting palaeontologists' obligations under Alberta Regulation 254/2002, please contact Dan Spivak, Head, Resource Management, Royal Tyrrell Museum of Palaeontology, at 403-820-6210 (toll-free by first dialing 310-0000) or dan.spivak@gov.ab.ca.

May 13, 2016

1.2 Project Sub-surface Disturbances

Surface land disturbance activities across the project area must be restricted to a depth that does not exceed 1 metre below the surface. In the event that this condition cannot be met, a Historic Resources Impact Assessment for palaeontological resources must be completed in advance of any construction activities anticipated to extend below 1 metre.

2.0 STANDARD CONDITIONS UNDER THE *HISTORICAL RESOURCES ACT*

The Proponent must comply with standard conditions under the *Historical Resources Act*, which are applicable to all land surface disturbance activities in the Province. Standard conditions require applicants to report the discovery of historic resources. These requirements are stated in Attachment 1, *Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources*.

3.0 COMPLIANCE IS MANDATORY

These conditions shall be considered the directions of the Minister of Alberta Culture and Tourism under the *Historical Resources Act*. The Proponent and agents acting on behalf of the Proponent are required to become knowledgeable of the conditions. Failure to abide by the conditions will result in *Historical Resources Act* approval being delayed or not granted.

Alberta Culture and Tourism

ATTACHMENT 1

STANDARD REQUIREMENTS UNDER THE *HISTORICAL RESOURCES ACT*: REPORTING THE DISCOVERY OF HISTORIC RESOURCES

If proponents and/or their agents become aware of historic resources during the course of development activities, they are required, under Section 31 of the *Historical Resources Act*, to report these discoveries to the Heritage Division of Alberta Culture and Tourism. This requirement applies to all activities in the Province of Alberta.

1.0 REPORTING THE DISCOVERY OF ARCHAEOLOGICAL RESOURCES

The discovery of archaeological resources is to be reported to Eric Damkjar, Head, Archaeology, at 780-431-2346 (toll-free by first dialing 310-0000) or eric.damkjar@gov.ab.ca.

2.0 REPORTING THE DISCOVERY OF PALAEONTOLOGICAL RESOURCES

The discovery of palaeontological resources is to be reported to Dan Spivak, Head, Resource Management, Royal Tyrrell Museum of Palaeontology, at 403-820-6210 (toll-free by first dialing 310-0000) or dan.spivak@gov.ab.ca.

3.0 REPORTING THE DISCOVERY OF HISTORIC PERIOD SITES

The discovery of historic period sites is to be reported to Brenda Manweiler, Manager, Historic Places Research and Designation Program, at 780-431-2309 (toll-free by first dialing 310-0000) or brenda.manweiler@gov.ab.ca. Please note that some historic period sites may also be considered Aboriginal traditional use sites.

4.0 REPORTING THE DISCOVERY OF ABORIGINAL TRADITIONAL USE SITES

The discovery of any Aboriginal traditional use site that is of a type listed below is to be reported to Valerie Knaga, Director, Aboriginal Heritage Section, at 780-431-2371 (toll-free by first dialing 310-0000) or valerie.knaga@gov.ab.ca.

Aboriginal Traditional Use sites considered by Alberta Culture and Tourism to be historic resources under the *Historical Resources Act* include:

Historic cabin remains;
Historic cabins (unoccupied);
Cultural or historical community camp sites;

ATTACHMENT 1

STANDARD REQUIREMENTS UNDER THE *HISTORICAL RESOURCES ACT*: REPORTING THE DISCOVERY OF HISTORIC RESOURCES

Ceremonial sites/Spiritual sites;
Gravesites;
Historic settlements/Homesteads;
Historic sites;
Oral history sites;
Ceremonial plant or mineral gathering sites;
Historical Trail Features; and,
Sweat/Thirst/Fasting Lodge sites

5.0 FURTHER SALVAGE, PRESERVATIVE OR PROTECTIVE MEASURES

If previously unrecorded historic resources are discovered, proponents may be ordered to undertake further salvage, preservative or protective measures or take any other actions that the Minister of Alberta Culture and Tourism considers necessary.