GREENTREE

AREA STRUCTURE PLAN

Town of Coalhurst

TITLE GreenTree Area Structure Plan

BYLAW NO. XXXX

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1 INTRODUCTION

1.1 PLAN AREA

The GreenTree Area Structure Plan (ASP) consists of ±59.2 ha (±146.29 ac) of land, approximately one quarter section, within the Town of Coalhurst ('the Town'). Located entirely within NE Section 15 (legally described as NE-15-16-9-22-W4M). A portion of the plan area has been subdivided located on the east side (legally described as Plan 9010514, Block 1). The lands are bound by 45th Avenue to the north, Range Road 223, which is the municipal boundary between the Town of Coalhurst and Lethbridge County to the east, and agricultural lands within Lethbridge County to the south, illustrated in **Map 1** (herein referred to as the 'Plan Area').

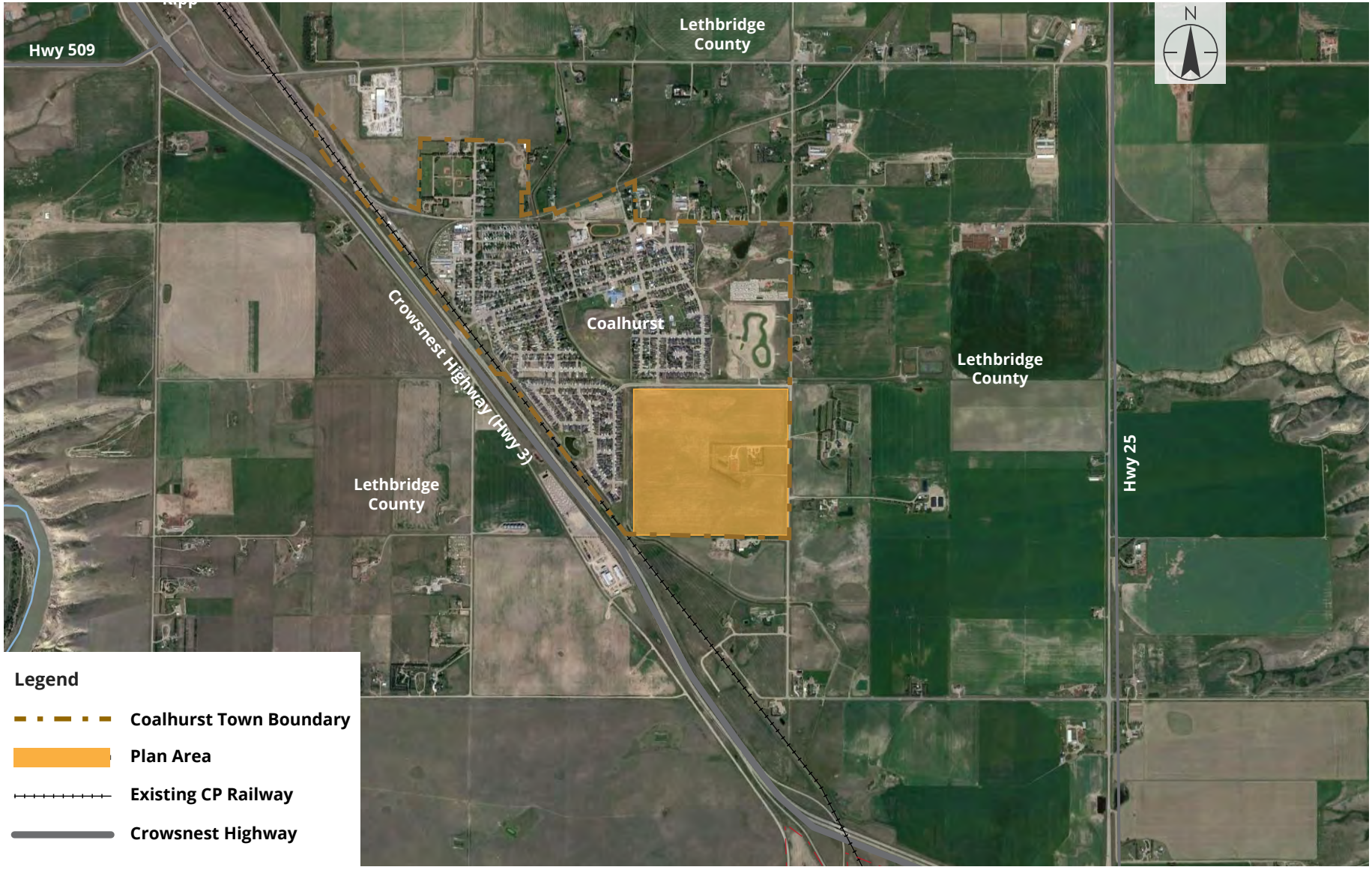
1.2 PURPOSE OF THE PLAN

This ASP reflects the need for comprehensive planning framework to develop a vision and associated set of policies for lands south of 45th Avenue (NW Section 34) prior to consideration of subdivision. As noted within the existing Town of Coalhurst Municipal Development Plan (Bylaw No. 391-17) the preparation of an ASP is required to undertake a consolidated approach to organizing future residential growth in the Town of Coalhurst. This ASP will also address the need for comprehensive planning that informs the implementation of key infrastructure (such as sanitary, storm, and water) required to support growth within the Town.

An ASP is a long-term planning document that describes a vision for the Plan Area and includes policies and guidelines that work towards achieving that vision over time. The Town is working to ensure a sufficient supply of planned residential lands are available that support a healthy residential market, in coordination with a commercial centre that can attract investment. To accomplish these goals, this ASP outlines the general land use and servicing framework, along with a set of policies to guide future development through an implementation plan until the Plan Area is fully built out.

Policies and guidelines in the Plan must be assessed on a case-by-case basis through future planning applications and required technical studies, as determined by the Town during Land Use, Subdivision, or Development Permit application stages. This ASP does not predict the rate of development within the Plan Area but identifies necessary technical reporting and infrastructure needed within each phase, determined by market demand.

Map 1 Plan Area Location



1.3 PLAN INTERPRETATION

1.3.1 Policy Interpretation

The ASP uses language that provides either specific or general policy direction. Where specific direction is used, such as the built form policies and the general policies, the ASP must be exactly followed. Where general direction is given, such as the Land Use Concept, flexibility should be used in the interpretation of the ASP.

Where the term "**shall**" or "**must**" is used in a statement, the direction the statement provides is mandatory; exceptions would require an amendment to the ASP. Policies apply to all situations, without exception, usually in relation to a statement of action, legislative direction, or situation(s) where a desired result is required.

Where the term "**should**" or "**may**" is used in a statement, the direction the statement provides is intended to be followed; however, the direction may be deviated from in order to address specific circumstances while still achieving the general intent of the statement.

The word "should" is used to clarify the directional nature of an associated policy statement. Policies that use "should" are to be applied in all situations, unless it can be demonstrated to the satisfaction of the Development Authority that the policy is not reasonable, practical, or feasible in a given situation. Proposed alternatives will comply with the applicable policies and guidelines to the satisfaction of The Town with regard to design and performance standards.

Policies that use the word "may" apply to situations that are permitted to occur as it relates to the overall objectives of the ASP.

1.3.2 Plan Limitations

This ASP is a long-term planning document that promotes a vision for the Plan Area and guides development through policies and guidelines to work towards achieving that vision over time. The ASP may be amended as needed, either in relation to a Town initiative or future land use applications.

Policies and guidelines in the ASP must not be interpreted as approvals for specific uses for individual sites. Site conditions or constraints, including environmental constraints, adjacency and compatibility of residential uses, and all other constraints must be assessed on a case-by-case basis through future planning and development applications and required technical studies, as determined by the Town during the Concept Plan, Land Use, Subdivision, or Development Permit application stages.

1.3.3 Map Interpretation

Plan maps and any subsequent amendments shall be interpreted as identified below:

Unless otherwise specified in the ASP, boundaries or locations of any symbols or areas depicted on maps within the ASP and its appendices are approximate, not absolute, and must be interpreted as such. The precise location of these boundaries, for the purpose of evaluating development proposals, will be determined by the Development Authority at the time of Land Use, Subdivision, and/or Development Permit application.

Measurements of distances or areas must not be taken from maps in the ASP or its appendices.

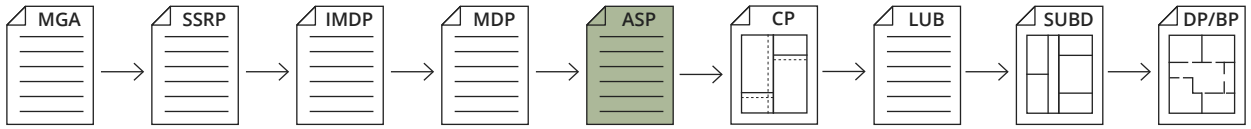
Land use areas, roadway alignments and classifications, and utility alignments may be subject to further study and may be further delineated at the Concept Plan, Land Use or Subdivision stage in alignment with applicable policies in this ASP. Any major changes to the maps in this ASP and its appendices may require an amendment to the ASP at the Development Authority's discretion.

1.4 REGULATORY & PLANNING FRAMEWORK

The ASP has been prepared in accordance with applicable legislative requirements outlined in the Municipal Government Act (**MGA**) and overarching Town policies, such as the Town of Coalhurst Municipal Development Plan (**MDP**), as well as other applicable Town policies and guiding documents.

In accordance with the MGA, all statutory plans passed by a municipality must be consistent with each other. Should a conflict or inconsistency arise between this ASP and the MDP, the MDP prevails to the extent of the conflict or inconsistency, unless otherwise noted.

The diagram below illustrates the planning hierarchy in Coalhurst, and where an ASP fits in with the process, with each heading highlighted in bold throughout the text below:



What Guides the ASP?

The Plan has been prepared to be consistent with, and to support the goals, of higher-level legislation and plans including:

- The **MGA** and any associated regulations,
- The South Saskatchewan Regional Plan (**SSRP**), a southern Alberta regional plan based around the South Saskatchewan watershed,
- The Lethbridge County-Coalhurst Intermunicipal Development Plan (**IMDP**), a local co-operative plan with Lethbridge County and Coalhurst, and
- The Municipal Development Plan (**MDP**).
- Other documents considered as part of developing this Plan include the Coalhurst Land Use Bylaw, and Municipal Servicing Standards.

What Are the Requirements of an ASP?

As per the MGA, an ASP must describe:

- The sequence of development for the Plan Area,
- Land uses proposed for the Plan Area (generally, or with respect to specific parts of the Plan Area),
- Density of population proposed for the area either generally or with respect to specific parts of the area (where applicable),
- General location of major transportation routes and public utilities, and
- Other matters Council may consider necessary.

What Comes After an ASP?

Following the adoption of an ASP, developers shall prepare a Concept Plan and Land Use Bylaw (LUB) amendment for application to the municipality to detail technical considerations and rezone specific lands, in alignment with the vision proposed in the ASP approved through a Bylaw. Under certain circumstances, applicants may proceed directly to block shell Subdivisions (SUBD) for land assembly purposes.

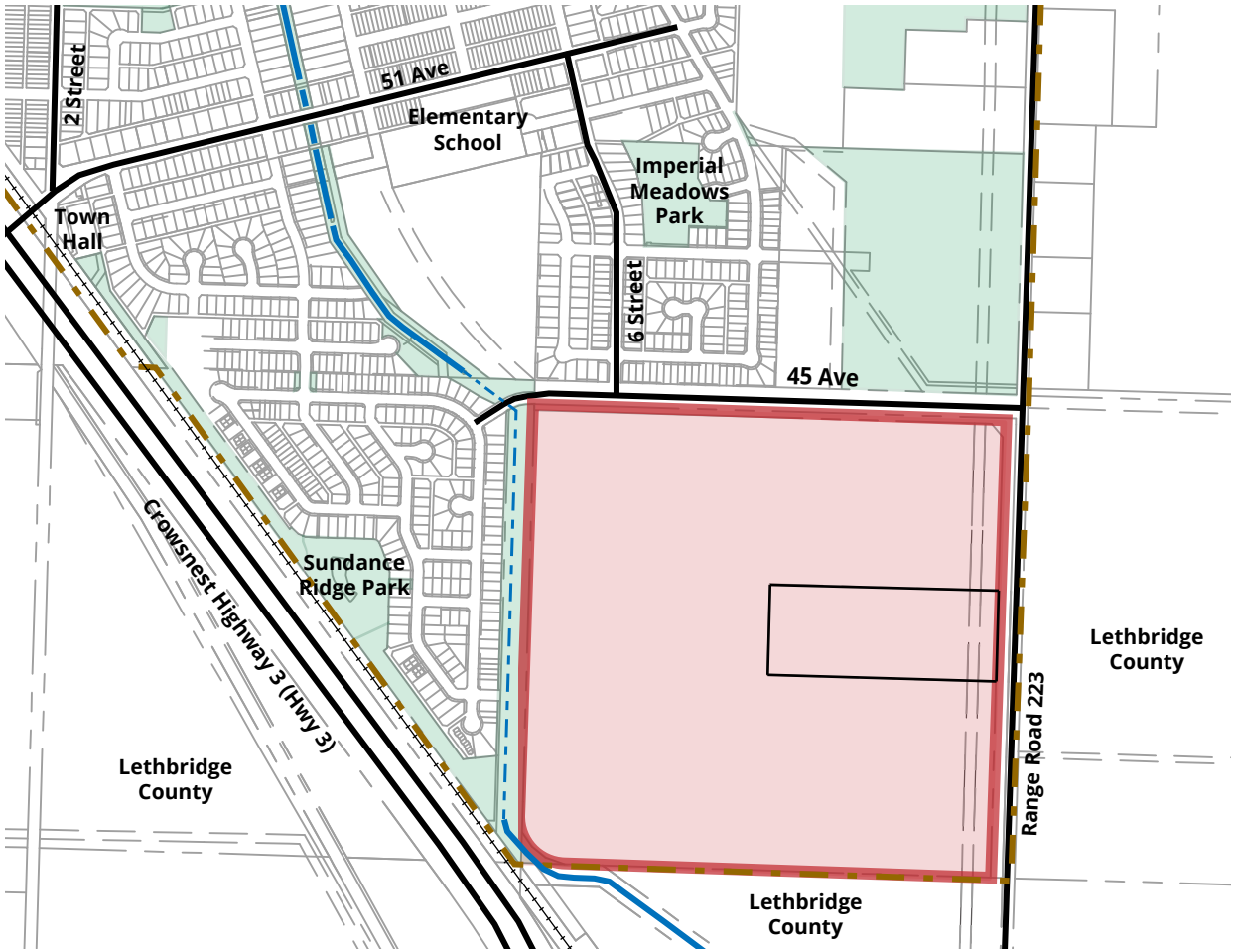
Once the Concept Plan and land uses are confirmed/adopted by Council, the developer may proceed, to the Subdivision stage. Proposals shall be supported by additional servicing analysis or technical studies (e.g., Geotechnical, Biophysical Impact Assessment [BIA], Environmental Site Assessment [ESA], etc.), as required by the Municipality.

2 PLAN AREA & CONTEXT

2.1 SITE CONTEXT

The Plan Area is approximately one quarter section located in southern Coalhurst, comprising of ±59.2 ha (±146.29 ac) and defined by 45th Avenue to the north, Range Road 223 to the east, and the Lethbridge County boundary to the south. The subdivided lot contains a dwelling, accessory buildings, and an agricultural service business. There is a centrally located minor wetland, as well as a natural gas pipeline and Lethbridge Northern Irrigation District Rights of Way running north/south along the Plan Area boundaries on the west and south sides respectively (identified on **Map 2**).

Map 2 Site Context



Uses adjacent to the Plan Area on the north and west sides include a variety of residential and public service uses, including the communities of Sundance and Greenwood Estates as well as the Imperial Meadows Park and Coalhurst Elementary School. The municipal border of Lethbridge County is located to the east and south boundaries, with adjacent lands containing primarily agricultural pursuits with associated residential and minor commercial development. The Crowsnest Highway (Highway 3) and Canadian Pacific Railway sit in close proximity, however there is no direct access provided from the Plan Area. An underground coal mine owned by North American Collieries Ltd. (Mine Number 0174) surrounds the Plan Area, however, this mine has been abandoned and is no longer active.

Legend

- Coalhurst Town Boundary
- Plan Area
- Existing Roadways
- Existing CP Railway
- LNID - Open Channel
- LNID - Piped System
- Parks and Recreation

2.2 MDP OVERVIEW

The MDP is the guiding policy document for the Plan Area, which details the planning, transportation, and associated considerations needed for development. This ASP proposes a comprehensive planning framework as required by the MDP to organize future residential growth in the Town (*Policy 2.1.2*). The Plan Area supports the MDP's vision of creating a sustainable and diverse community by providing a mix of residential, commercial, and open space uses.

The Plan Area is identified within the MDP as a New Living Area with a portion of New Employment (identified on **Map 3**). Following the direction of the MDP's principles, land uses in this ASP will provide a variety of housing types and densities to accommodate different needs and lifestyles. This includes multi unit developments that may include seniors' accommodations, affordable housing, supportive living, and employment areas, as needed, in well-connected areas with convenient proximity to community amenities.

The document emphasizes the importance of connectivity and accessibility. It proposes a network of pedestrian and bicycle links, throughout the Plan Area, promoting active transportation and reducing car dependency. This aligns with the MDP's goal of creating a walkable and bike-friendly community and improves community integration.

MDP's policies on intermunicipal coordination are upheld by circulating the plan and any subsequent amendments and required applications to Lethbridge County for comment to address the potential impacts and mitigation measures for development adjacent to Range Road 223.

2.3 EXISTING CONDITIONS

2.3.1 Natural Features

The Plan Area is characterized by moderate water holding capacity and medium textured soils (illustrated on **Map 6**). Utilized predominantly for agricultural uses with a residential development, subdivided out on the east side, the Plan Area generally drains towards the northeast corner. The topography is generally flat (926.46m to 932.80m) with a slight slope from south to north. The subsurface of the Plan Area is generally comprised of a surficial layer of topsoil, underlain by native clay and clay till deposits. Generally, the Plan Area does not contain any significant wetlands, ephemeral waterbodies or steep slopes that create a constraint to development.

2.3.2 Historical Resources

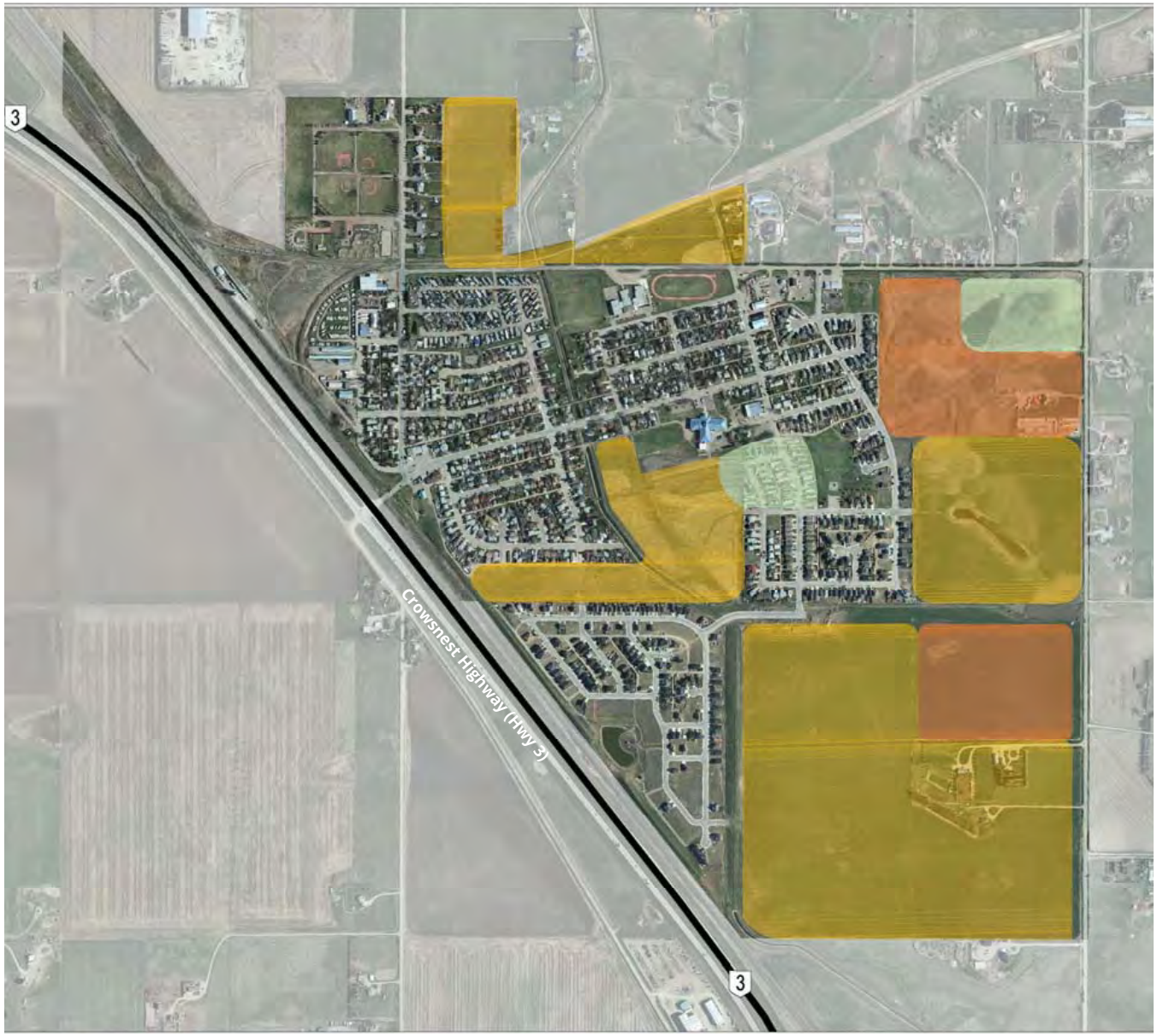
Under the Historic Resources Act (HRA), historic resources include archaeological and paleontological sites, Indigenous traditional use sites, historic structures, and geological or natural resources. The Plan Area is identified on the Listing of Historic Resources as lands with the potential to include undiscovered archaeological historic resources (categorized as 5a).

An approval under the HRA has been provided by Alberta Culture, Multiculturalism, and Status of Women (CMSW) for the development proposed in this ASP, attached in **Appendix D**. Further review through a Historical Resources Impact Analysis (HRIA) is not required.

2.3.3 Existing Land Use & Development

The Plan Area is currently zoned under the LUB as Transitional (TR) land use district (illustrated on **Map 4)**. This district is utilized for parcels on the periphery of existing development and restricts uses to maintain large parcel sizes to allow for maximum flexibility when the land is required for urban development, prior to planning documents and servicing being in place. The Plan Area is primarily used for agricultural purposes, with the exception of one existing residence. All future zoning applications within the Plan Area shall be developed in accordance with the direction and intent of the MDP and LUB.

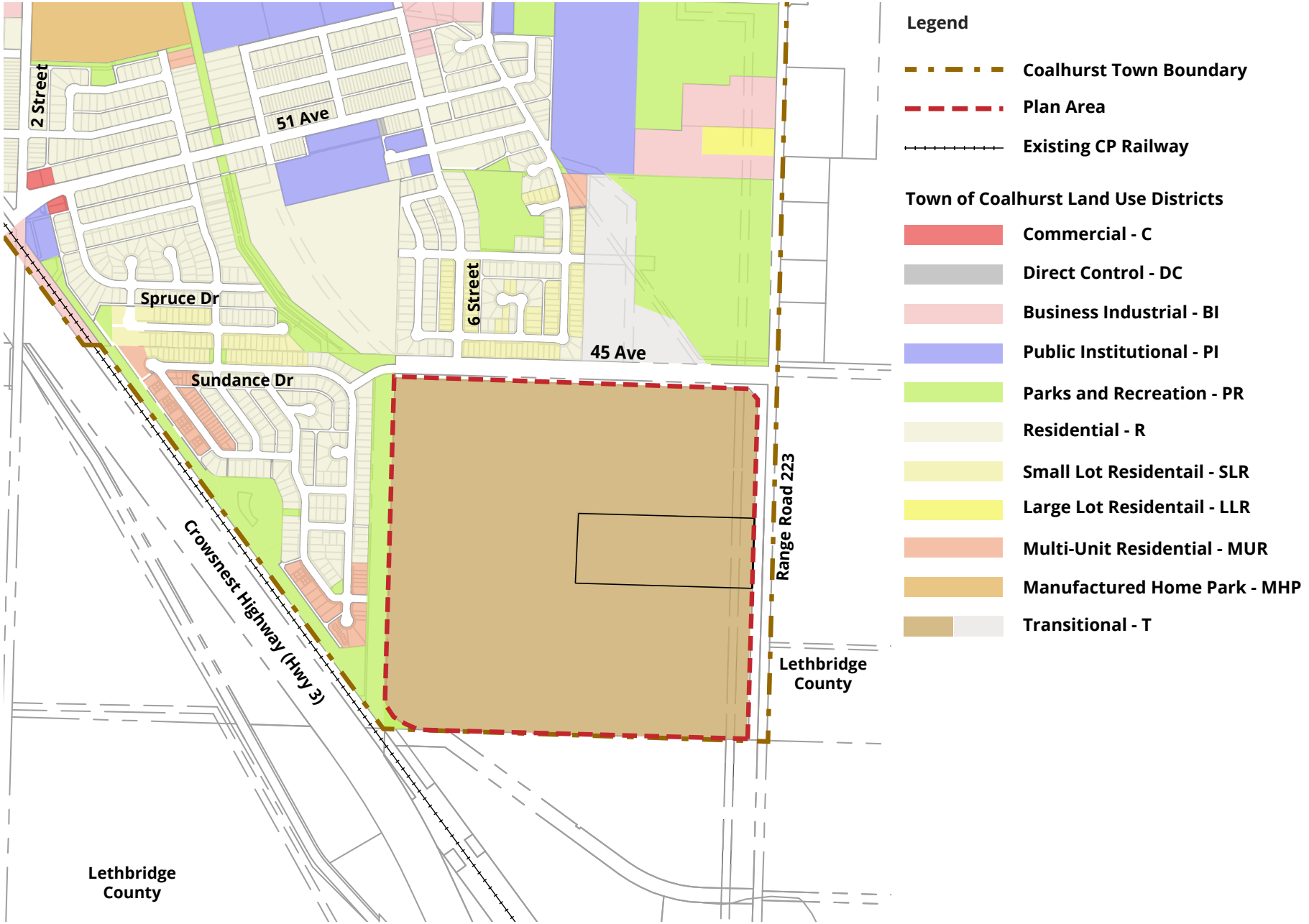
Map 3 Municipal Development Plan - Map 1 Future Land Use Concept



Legend

- New Living Areas
- New Employment Areas
- Additional Planning Areas

Map 4 Existing Land Use



3 PLAN CONSIDERATIONS

This section provides a summary of notable Plan Area attributes (illustrated on **Map 5**) and constraints that may require special attention for future development within the Plan Area. This is not meant to be an exhaustive list. Those developing in the Plan Area must practice due diligence in the development process as it relates to all future planning considerations, inclusive of those identified within this section.

Numerous studies have been conducted in support of the Plan and were used to inform key planning considerations throughout the document and outlined in this section at a high-level. Reports completed for the Plan are noted below.

- ***Appendix B**: Geotechnical Evaluation Coalhurst ASP,* BDT Engineering Ltd. (December 2021)
- ***Appendix C**: Phase I Environmental Site Assessment,* WA Environmental Services (November 2021)
- ***Appendix D**: Historical Resources Act* Clearance
- ***Appendix E**: Mining Study,* BDT Engineering Ltd. (May 2022)

The information outlined within this section may be subject to change and should be verified at the time of Land Use redesignation, Subdivision, or Development Permit Stage as new information arises and further development occurs within the Plan Area. Copies of completed reports and studies may be obtained by request to the Town, referencing the report title.

3.1 ENVIRONMENTAL

In alignment with MDP policies, the Plan Area works to achieve long term sustainability and demonstrate a commitment to environmental stewardship. This helps to ensure that the development has a minimal impact on the environment and contributes to a sustainable future for the Town.

Stormwater Management

The plan proposes low impact development treatments for stormwater management. These treatments can help to reduce runoff, prevent flooding, and protect water quality by filtering out pollutants.

Green Spaces

The plan includes a significant amount of open space, which can provide habitat for wildlife, improve air and water quality, and offer recreational opportunities for residents.

Environmental Assessment

Future development within the Plan Area must consider the information provided in the Phase 1 ESA attached in **Appendix C**.

Geotechnical Report

The Geotechnical Evaluation indicated the following items should be considered during the implementation stages of the plan.

Mine Study

The Mine Study, attached in **Appendix E**, should be considered during the implementation stages of the plan for the development of residential and commercial properties.

3.2 UTILITY RIGHTS-OF-WAY

3.2.1 Irrigation Canal

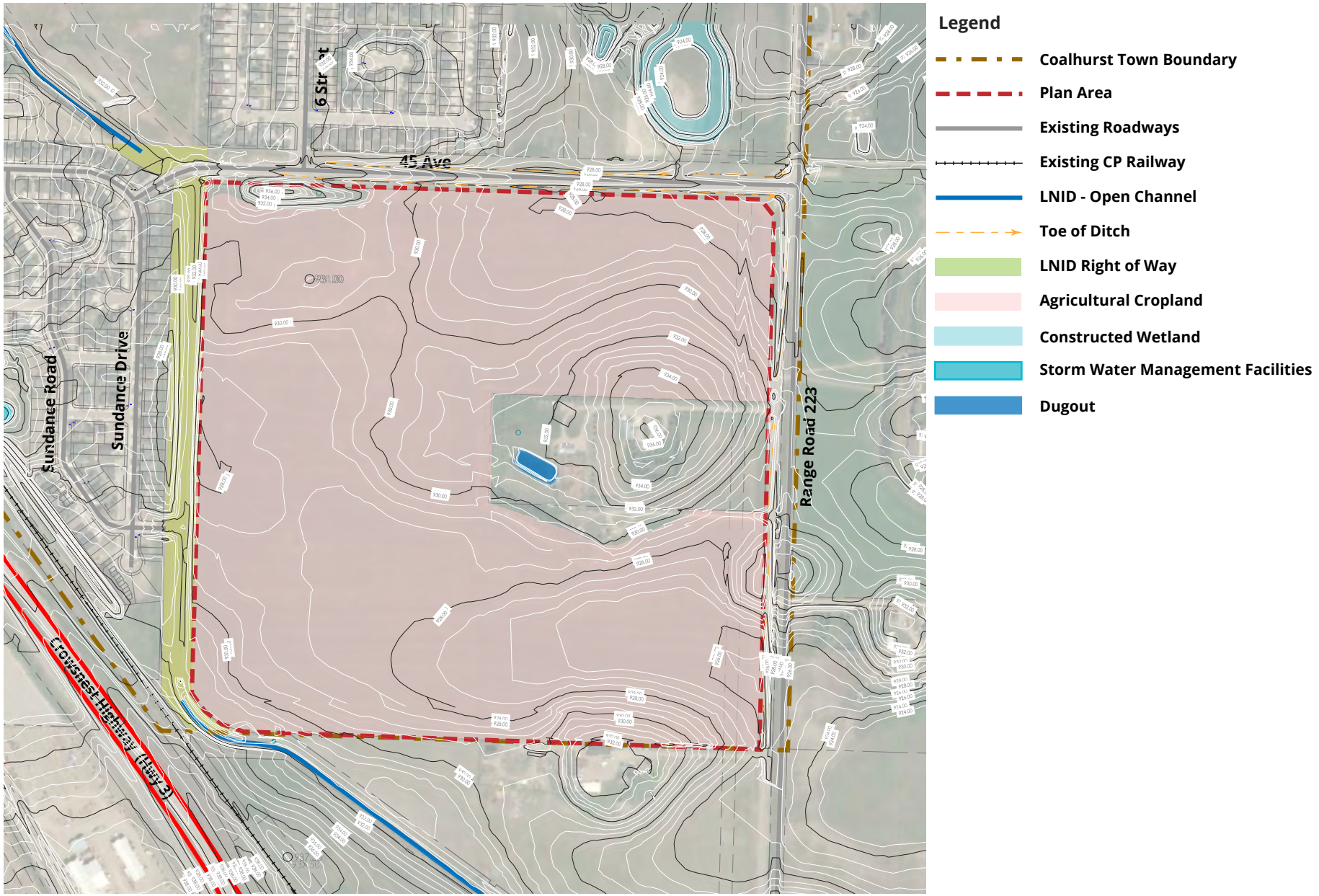
The Lethbridge Northern Irrigation District has registered a canal Right-of-Way (ROW) that sits immediately adjacent to the Plan Area extending along the entire western boundary accessed via 45th Avenue. The infrastructure located along this boundary is a piped system underground (formerly an open canal). Any crossing or encroachment on the ROW will require the approval from the Lethbridge Northern Irrigation District. It is anticipated that all infrastructure crossings will need to be carefully evaluated to ensure protection of this critical infrastructure.

3.2.2 High Pressure Gas Line

ATCO Pipelines operates a high-pressure gas line along the eastern boundary of the Plan Area. This ROW is registered on title within the Plan Area, thus any development within 30 m of this ROW will require the completion of a development proximity agreement with ATCO. In addition, any roadway or utility crossings that are proposed will require a detailed engineering assessment of the proposed vertical encroachments to confirm there would be no impact to the integrity of the line. Typical mitigative measures protecting the pipeline in the event of a future crossing would include: structural protection of the pipeline (including defined vertical clearances), upgrades to the pipeline, or relocation of the pipeline. At grade development may be permitted, subject to ATCO's guidelines in place at the time of development. Current guidelines are attached in **Appendix F** for information purposes and shall be confirmed with ATCO at the time of development.

Map 5 Plan Considerations

Map 6 Natural Features



4 VISION & GUIDING PRINCIPLES

4.1 PLAN VISION

GreenTree is designed to establish a unique residential neighbourhood within the Town that can accommodate a needed variation in housing options through a fully serviced community. Designed to connect with the surrounding areas through thoughtful transportation links, this ASP brings community members together while integrating high-quality residential spaces with public recreational amenity spaces. The Plan Area is well situated and identified for residential and commercial growth that integrates and connects to the broader community through an integrated pathway system as well as efficient connections to the highways and surrounding areas.

4.2 GUIDING PRINCIPLES

The vision for this ASP incorporates the principles listed within the MDP as a basis for the targeted land use mix and distribution within GreenTree. This vision will be achieved through the following Guiding Principles:

Improved Community Integration & Access

Meet the everyday needs of residents by providing a mix of local commercial, retail and recreational amenities within the area. Prioritize the location and quality of public areas that encourage community activity and a sense of place.

Integrated Commercial Design

Cohesive commercial hub that is convenient, accessible and walkable. Development should consider innovative design approaches towards the interface with the public realm both towards pedestrian integration with the residential areas as well as external vehicular connections.

Enhanced Mobility Options

Develop pedestrian and cycling infrastructure to encourage and enable greater use of active modes of transportation and to reduce car dependency.

Social Diversity

Provide a variety of housing options to accommodate varying households and lifestyles that encourages inclusivity and provides the opportunity for residents to age in place.

Flexible Land Use Concept

Establish a land use concept that allows for single unit, multi unit and commercial development uses that are flexible. Maximize opportunities for local services and employment to enhance business development potential within the region.

5 LAND USE CONCEPT

5.1 DEVELOPMENT FRAMEWORK

The Land Use Concept Plan for the GreenTree is shown on **Map 7**. This ASP lays out the general land use areas, primary/secondary roadway network, and a pathway system to support a sustainable new community in southern Coalhurst. The Plan is intended to positively integrate with existing development surrounding and within the Plan Area and provide for meaningful future employment opportunities in Town.

The land use areas of the Plan are intended to be flexible and evolve with potential Land Use Bylaw changes over time. Any refinements to the exact land use boundaries and districts may be made without an amendment to this ASP so long as the overall vision and core values of the Plan are maintained. Current and future land use areas with respect to location, size, and mix of residential and commercial uses will be confirmed at Land Use, Subdivision, or DP stage (whichever applies, under the discretion of the Development Authority), to provide flexibility and adaptability to market conditions at the appropriate time.

There are a number of elements that will shape the future development of the Plan Area, each playing a role in shaping when and how the ASP is developed. Full build out of the Plan Area will likely take several years and is highly dependent on market demand and available financing. The ASP provides a general configuration and the approximate boundaries of the land use areas. However, if a proposed development is pursued in the Plan Area that is not consistent with the ASP, it may be considered so long as it remains consistent with the overall vision of the ASP.

5.2 LAND USE AREAS

Through careful analysis of the opportunities and constraints within the Plan Area, the Land Use Concept provides a mixed use community that is consistent with the Town's planning and growth objectives. Predominately a residential neighbourhood, the Plan Area integrates Open Space and a pathway system that is crucial to the movement of pedestrian traffic and allows for varying modes of transportation and integration to the community.

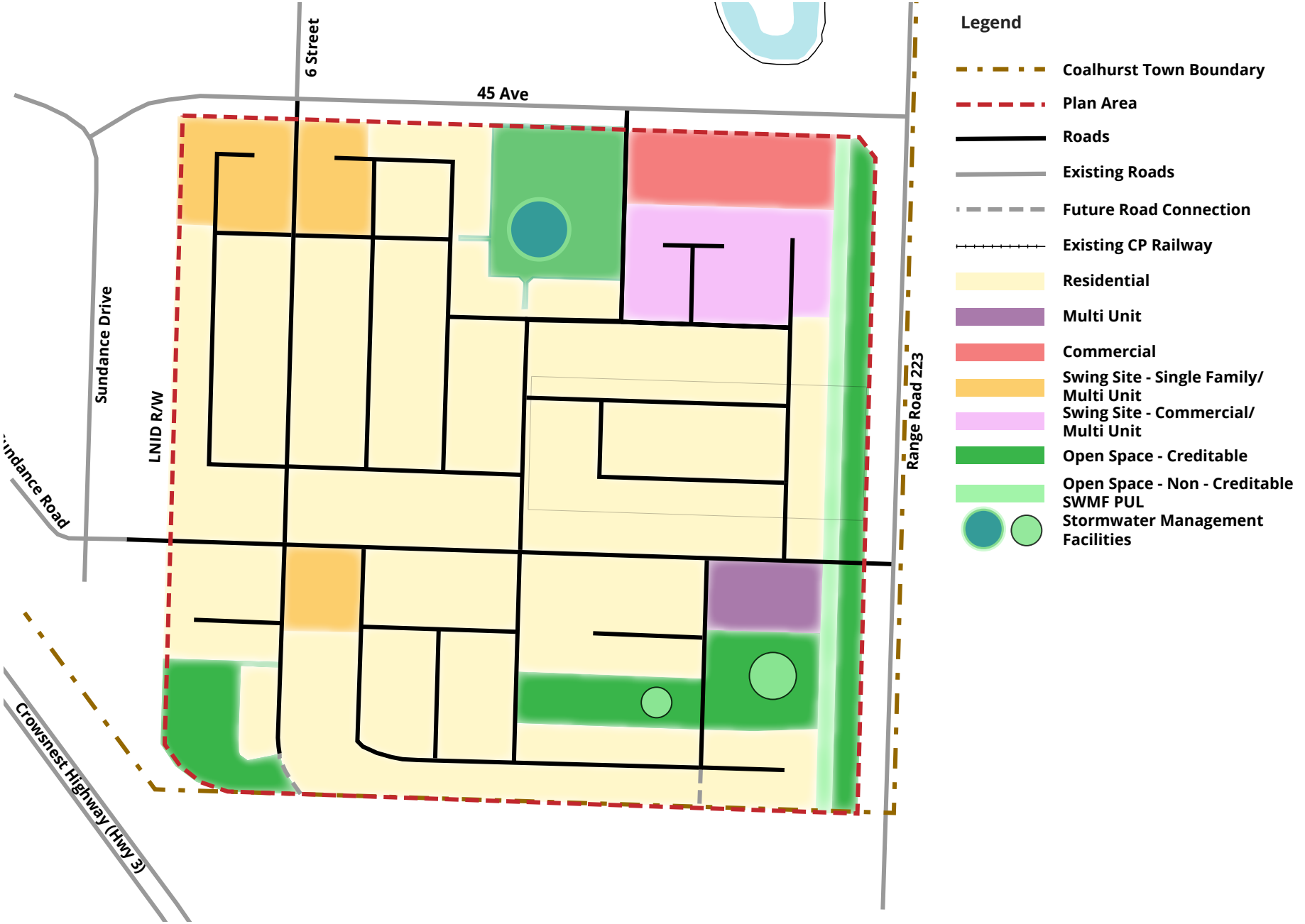
This ASP has been designed to support existing housing forms and character that appeal to residents, while allowing housing types to diversify to meet the needs of residents in all stages of their lives. This ASP looks to establish a successful community through sustainable growth while continuing to maintain a strong sense of Town values and citizen involvement through appropriate amounts of growth in order to have safe and attractive roads and sidewalks.

The majority of residents will live in areas comprised mainly of single unit and multi unit dwellings (low and medium density development), with neighbourhood parks, sidewalks, pathways, and roadways that provide easy access to the community. The approximate estimated population density for GreenTree is 3,000 people, shown in **Table 1**. This target was arrived at through planning and engineering reviews, stakeholder consultation and feedback.

A mixed use and commercial opportunity are identified in the northeast corner adjacent to Range Road 223 and 45th Avenue. The commercial lands are well connected to the surrounding area and are directly adjacent to a multi unit and commercial swing site and open space amenity which provides a transition area towards the residential areas as well as further flexibility for this area to build out in line with market demand. Additionally, there are two residential and multi unit swing sites that provide additional opportunity for density strategically placed within the Plan Area, well aligned with transportation routes and additional servicing capacities. These areas provide the opportunity for a variety of housing options that support the commercial node by encouraging active modes of transportation and an increased customer base that will help support new business' coming into the area. Build out within the Plan Area also contributes to the development of additional sidewalks, open space and recreation pathways creating amenity for the Town. These amenities can be utilized through accessible transportation routes, pedestrian and bicycle connections that are integrated into existing developments within the Town.

Overall density considered within the Plan Area creates the ability to provide a variety of housing forms that can accommodate residents in all stages of their lives including singles, young families, and seniors. Another way this ASP seeks to accommodate varying housing choices is through Secondary Suites. Reviewed based on location, GreenTree looks to achieve a balanced and proportionate distribution of Secondary Suites further defined through a Concept Plan.

Map 7 Land Use Concept



5.2.1 Land Use Policies

5.2.1.1 Any refinements to the exact land use boundaries and districts may be madewithout an amendment to this ASP so long as the overall vision and corevalues of the Plan are maintained.

5.2.1.2 This ASP has been designed to support existing housing forms andcharacter while allowing housing types to diversify to meet the needs ofresidents in all stages of their lives.

TABLE 1 LAND USE SCENARIO

Land Use Type	Gross Area		Overall %	Units per hectare (ac)	Total Units	Population (full build out)	Population per Unit
Residential	±29.21 ha	±72.18 ac	±50%	25 (10)	730	2,044	2.8
Multi Unit Residential	±0.85 ha	±2.10 ac	±1%	75 (30)	63	119	1.9
Swing Sites - *Residential/Multi Unit/Commercial*	±5.67	±14.01	10%	75 (30)	425	807	1.9
Neighbourhood Commercial	±1.85	±4.57	3%				
Open Space (Credit)	±5.96 ha	±14.73 ac	±10%				
Open Space (Non-Credit) - *PUL*	±1.84 ha	±4.55 ac	±3%				
Public ROWs - *Roads*	±12.60 ha	±31.13 ac	±21%				
Storm Pond Areas	±0.89 ha	±2.20 ac	±2%				
Total	**±58.87 ha**	**±145.47 ac**	**100%**		**1218**	**2970**	

**All areas are approximate and should be considered as "more or less".*

5.2.2 Residential

Residential development will continue to accommodate moderate population growth with a focus on retaining existing housing forms and character that are common in Town. This is achieved by a mix of residential opportunities for low to medium density uses. These areas will accommodate a greater variety of building forms and encourages social diversity within Coalhurst through orderly developments that support the efficient use of infrastructure and pedestrian oriented design. This may include but is not limited to single unit dwellings, multi unit dwellings, secondary suites or rowhouse type products.

Residential Policies:

5.2.2.1 The gross density of the Residential area should be 25 units per developable hectare (10 units per acre).

5.2.2.2 Density proposed should achieve as close to the prescribed units per hectare as possible to meet the objectives of this ASP.

5.2.2.3 Development shall accommodate a mix of dwelling types comprised of single unit dwellings, 2–3 unit dwellings, and rowhouses.

5.2.2.4 Dwelling units located along 45th Avenue may be oriented either towards 45th Avenue or the internal local road. Once the direction of the first dwelling is determined through a DP, the rest of the block must also be developed in the same direction.

5.2.2.5 Locations and number of Secondary Suites within an area shall be identified through a Concept Plan.

5.2.2.6 Secondary suites should be considered within the Plan Area where compatible and appropriate to the discretion of Council.

5.2.2.7 Secondary suites should be evenly distributed throughout the block where possible, to avoid concentration in any one area.

5.2.2.8 Community design should provide the following:

a. Street oriented residential design;
b. Pedestrian connections to adjacent areas; and
c. Vehicular connections to other neighbourhoods within the Town.

5.2.3 Multi Unit Residential

Multi Unit areas of the plan are intended to accommodate a greater concentration of units to increase housing choices and provide a variety of residential densities. In order to achieve the targeted densities and increase the housing choices within the Plan Area, low maintenance housing types and the opportunity for supportive living is encouraged in these areas. This ensures that the needs of all residents, including the elderly and those requiring additional support, are met and members of the community can age in place, if desired. This includes but is not limited to multi unit dwellings, low rise apartment buildings, or rowhouses.

Multi Unit Residential Policies:

5.2.3.1 The gross residential density of the multi unit residential area should be 75 units per developable hectare (30 units per acre). However, moderate increases in residential density may be considered as required, to the discretion of the Development Authority.

5.2.3.2 Density proposed should achieve as close to the prescribed units per hectare as possible in order to meet the objectives of this ASP.

5.2.3.3 Developments should be predominantly multi unit residential comprised of 3-4 unit dwellings, low-rise apartment buildings or rowhouses.

5.2.3.4 Developments should be designed to reduce energy costs (e.g. sunlight exposure, retention of trees, orientation of buildings).

5.2.3.5 Multi unit residential development should:

a. Be oriented to the public street with parking located in the rear or side;
b. Be located in proximity to community amenity areas such as open space, a park, or the main street; and
c. Provide landscaped open areas that are safe and secure for residents and integrate private outdoor living areas with public open space.

5.2.4 Commercial

The Commercial lands will serve as a destination point containing a mix of supportive non residential uses. Commercial business areas provide a range of services to Town residents, while contributing to the fiscal sustainability of the Town. The commercial areas adjacency to Range Road 223 and 45th Avenue creates potential for focused growth while reducing impacts to adjacent residential through high quality design and targeted development forms. The interface and transition areas will be crucial to ensure adverse impacts are mitigated through design. This ASP seeks to support the growth of commercial uses by providing a destination for local commercial and business services to serve the community and create local employment opportunities for residents as well as provide services to the traveling public through a walkable, small village centre.

Commercial Policies:

5.2.4.1 Commercial uses should be small to medium scale businesses and services that serve the residents of the Town and Plan Area.

5.2.4.2 The commercial area shall provide a range of local services that support the Town and contribute to an attractive pedestrian environment and meeting place for residents.

5.2.4.3 Commercial uses should primarily be carried on within an enclosed building, where the operation does not generate any significant nuisance or environmental factors such as noise, appearance, or odour outside of the enclosed building.

5.2.4.4 Active Modes shall be integrated within the site where possible.

5.2.4.5 Open spaces adjacent to the commercial area should be accessible and integrated with the sidewalk or public pathway.

5.2.4.6 Sites shall incorporate a pedestrian-scaled lighting and street furniture treatment that contributes to a high-quality urban environment.

5.2.4.7 Design of commercial developments backing onto natural areas should:

a. Integrate on-site amenity spaces with natural areas; and
b. Connect pathways of developments to nearby pathways and green corridors.

5.2.4.8 Surface parking areas shall provide a landscaping plan.

5.2.4.9 Development should incorporate, where possible, Low Impact Development (LID) treatments to reduce environmental impacts.

5.2.4.10 Loading and storage facilities should be visually screened and designed as integral parts of the development. Where possible, they should also be located away from public streets and pathways.

5.2.4.11 All private lighting, including security and parking area lighting, shall be designed to respect the Town's bylaw requirements, conserve energy, reduce glare, and minimize light trespass onto surrounding properties.

5.2.4.12 The use of fencing in commercial areas should be limited, other than for buffering adjacent lands in residential interface areas, screening of outside storage, screening of garbage bins, or for security purposes.

5.2.5 Swing Site - *Single Family / Multi Unit*

Mixed use areas of the plan are intended to provide flexible options for development types and densities based on market demand. This creates vitality and vibrancy to the area through development designed to be pedestrian friendly and create local destinations adjacent to well serviced streets and pathways allowing for short, direct and convenient mobility choices in this area. This includes but is not limited to single unit dwellings, multi unit dwellings (such as semi-detached), low rise apartment buildings or higher density row dwellings.

Buildout of the Residential Swing Sites could take a variety of forms depending on market conditions and landowner requirements. Possible scenarios for buildout include, but are not limited to:

- 100% Light Residential uses,
- 100% Multi Unit Residential uses, or
- Mix or "checker" layout of light/medium residential and multi unit residential uses.

Swing Site Policies:

5.2.5.1 To the discretion of Council, development of these areas should adhere to relevant policies within Sections 5.2.1, 5.2.2 where applicable.

5.2.5.2 Buildings should be oriented towards the street, where possible.

5.2.5.3 Buildings shall provide a transition between light residential and adjacent multi unit residential areas, complimentary to the form and scale of the area (e.g. stepping down in building massing).

5.2.6 Swing Site - *Multi Unit / Commercial*

This mixed use area provides locations within the plan that are anticipated to receive a high volume of pedestrian and vehicular traffic that support a mixed use product and provides opportunity for higher density with a mix of residential and non-residential uses, as needed.

Buildout of the Commercial/Multi Unit Swing Sites could take a variety of forms depending on market conditions and landowner requirements. Possible scenarios for buildout include, but are not limited to:

- 100% Multi Unit Residential uses,
- 100% Commercial uses, or
- Mix or "checker" layout of multi unit residential and commercial uses.

Swing Site Policies:

5.2.6.1 To the discretion of Council, development of these areas should adhere to relevant policies within Sections 5.2.2, 5.2.3 where applicable.

5.2.6.2 Buildings should be oriented towards the street, where possible.

5.2.6.3 Buildings shall provide a transition between commercial and adjacent residential areas, complimentary to the form and scale of the area (e.g. stepping down in building massing).

5.2.6.4 When applicable, at grade units shall be oriented to the street and provide a seamless at-grade transition to the public sidewalk.

5.2.6.5 Where surface parking areas are considered, they should be visually screened (e.g. pergolas, coverings, landscaped buffers).

5.2.7 Open Space

A variety of multi-functional open spaces are provided throughout the Plan Area (illustrated on **Map 8**). Linear open spaces and pathway connections encourage walking and cycling. Direct, safe, and enjoyable routes connect community amenities promoting an alternative to the car for local trips. The open space network protects and enhances both natural and recreational environments. Existing natural systems are important features, which are integrated into the urban fabric, and form part of a comprehensive, contiguous, and accessible regional open space system. Visually appealing and cohesive design is incorporated throughout the Plan Area containing sidewalks, and pathways that contribute to a safe and efficient neighbourhood layout (illustrated on **Map 9**).

Municipal Reserves are lands dedicated to the Town as public land during the subdivision process. Reserves enhance the community by providing land for parks, schools, and recreational amenities. Open Space - Creditable refers to these areas that are set aside for public uses and are calculated at 10% of the total Plan Area as required by the MGA. Open Space - Non-Creditable lands refer to lands that do not qualify for dedication of Municipal Reserve under the guidelines set by the MGA, but are undevelopable within the Plan Area. These areas area illustrated on **Map 8** and are to remain undeveloped.

Open Space Policies:

5.2.7.1 Open Space development should be in accordance with Map 8: Open Space Network.

5.2.7.2 Parks should be designed to accommodate active and passive recreational needs (e.g. play equipment, informal sports fields, and space to accommodate neighbourhood events) where applicable.

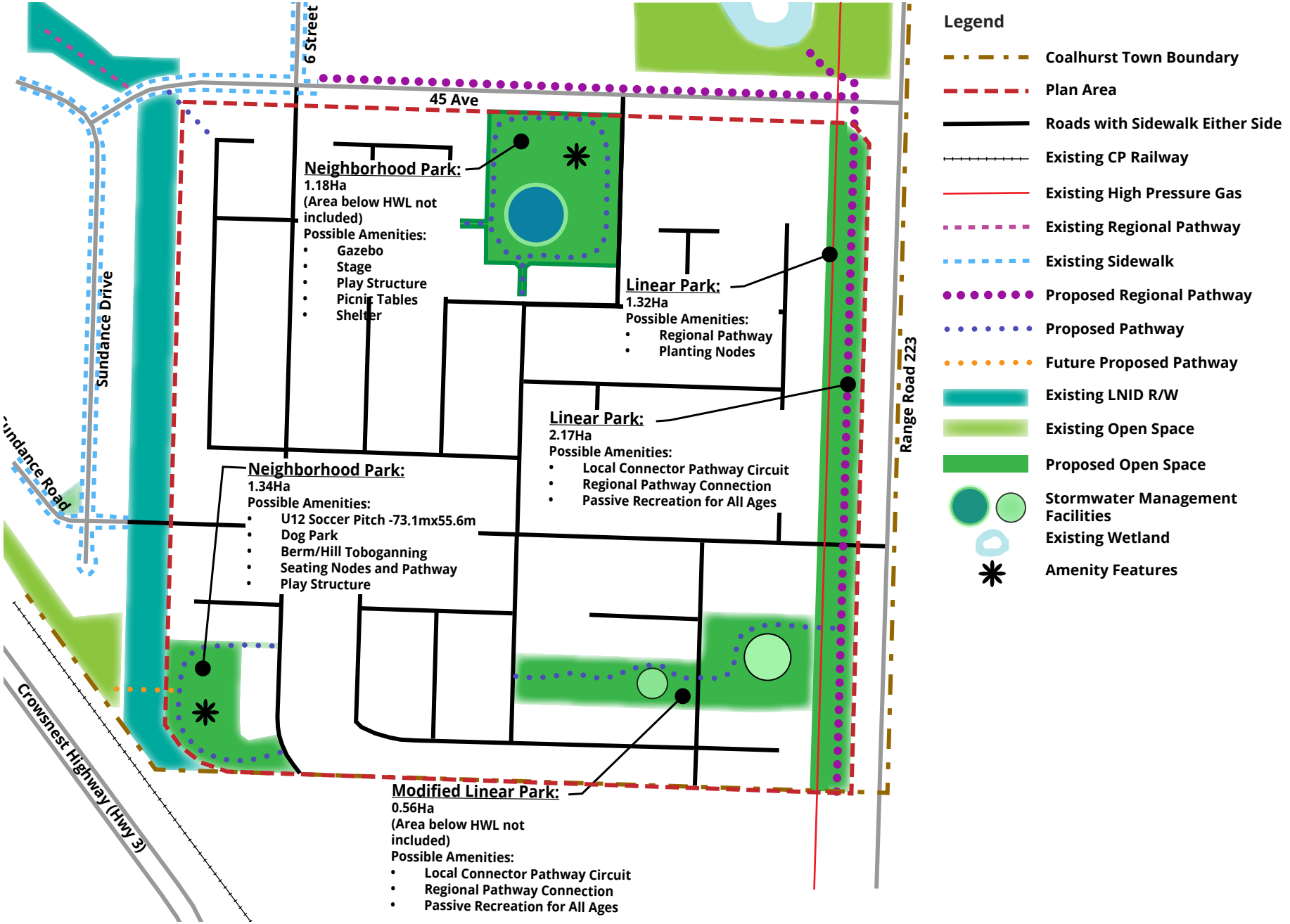
5.2.7.3 Sites should incorporate pedestrian-scaled lighting and street furniture treatment that contributes to a high-quality urban environment.

5.2.7.4 Applications for concept plan and subdivision must demonstrate that the required 10% Municipal Reserve is met and that connectivity is retained throughout the Plan Area.

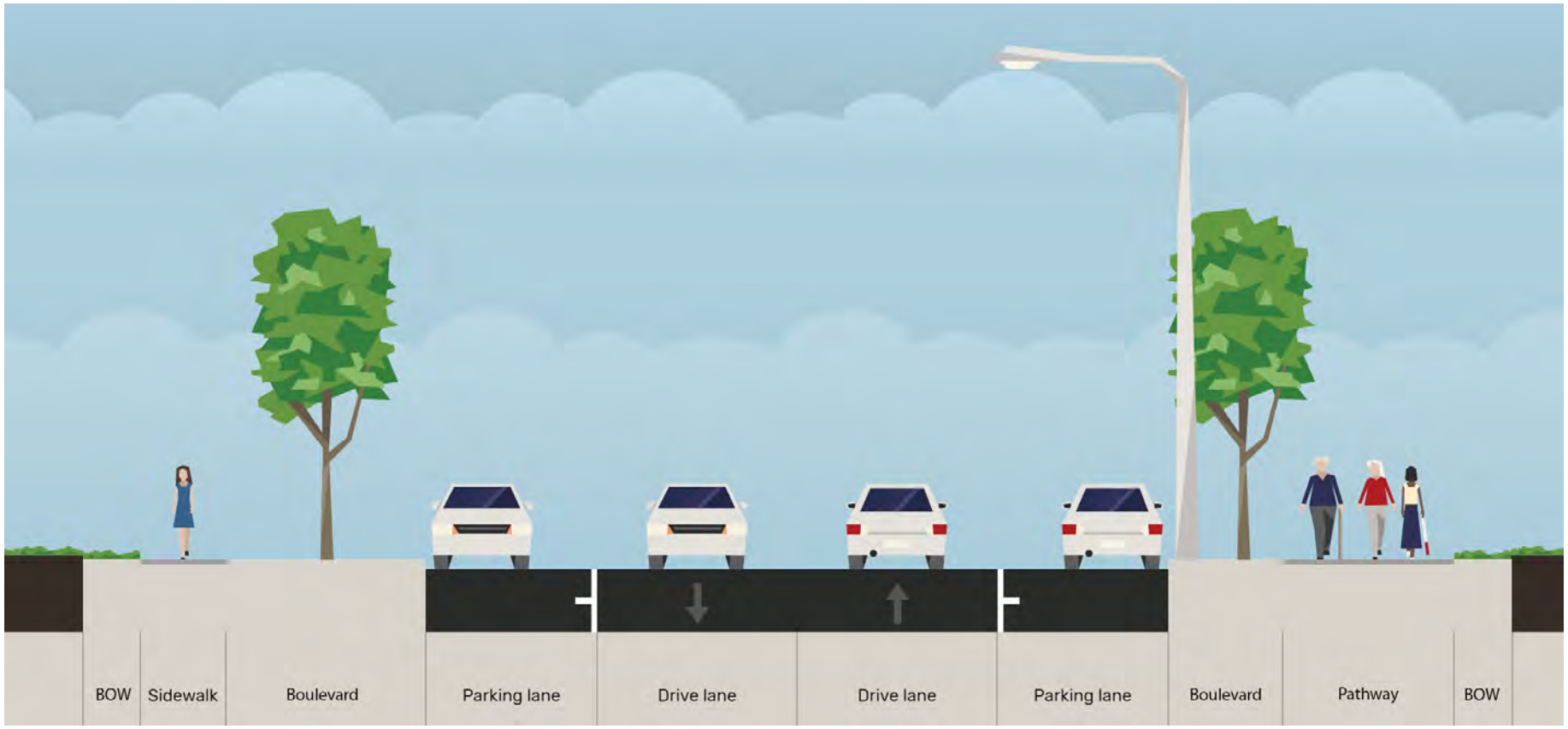
5.2.7.5 Municipal Reserves may be used to create natural parks that accommodate the transplanting of native vegetation where appropriate.

5.2.7.6 Opportunities for public art may be incorporated within open spaces. Unique public art pieces that engage the pedestrian and activate the public realm are strongly encouraged.

Map 8 Open Space Network



Map 9 Multi-Modal Collector Road - Cross Section



5.3 INTERMUNICIPAL COORDINATION

Context

The Plan Area is bordered by Lethbridge County to the east and south (separated by Range Road 223) and was historically part of Lethbridge County. Annexation of Lethbridge County lands by The Town of Coalhurst in 2016 have resulted in the present development pattern including jurisdiction of Range Road 223. Additionally, the approval of the MGA and the SSRP led to the identification of planning principles which were refined through the 2014 Lethbridge County/ Town of Coalhurst Intermunicipal Development Plan (IMDP). With light/medium residential development making up a majority of the adjacent land uses north and west of the Plan Area, future residential development within the Plan Area should provide for an appropriate and compatible built form for interface conditions along 45th Avenue.

Lethbridge County and The Town of Coalhurst will work collaboratively with regulatory agencies and other stakeholders to develop coordinated planning for geographical areas of mutual interest.

Intermunicipal Review & Consultation

The IMDP (approved by the Councils of Lethbridge County and Town of Coalhurst) identifies areas of mutual interest within the borders of the Town of Coalhurst and establishes policies and processes for dealing with issues that may arise. The entire quarter section of the Plan Area (NE15) falls within the Land Use Planning Area 3 within the IMDP.

The IMDP Plan Area identifies where the County would be provided with information respecting urban planning and expansion within the Town of Coalhurst. New ASPs withing the IMDP area are subject to referrals to the neighbouring municipality. Range Road 223 also serves as an important access road between the Town of Coalhurst, Lethbridge County, and the City of Lethbridge located within the Town of Coalhurst, northwest of the City of Lethbridge. Potential impacts to Range Road 223 include potential new intersections, potential construction impacts, etc. and will be referred to the County for comment, where appropriate.

Intermunicipal Policies:

5.3.1 The Town of Coalhurst should consult with Lethbridge County on intermunicipal planning, transportation and servicing matters that may arise within the Plan Area.

5.3.2 The Plan and any subsequent amendments to the Plan, as well as any future land use, Subdivision and Development Permit proposals within the IMDP Policy Area shall be circulated by the Town of Coalhurst to Lethbridge County for comment.

5.3.3 Business adjacent to and west of Range Road 223 should seek to:

a. Minimize the visual impact of parking, loading, and other outdoor activities visible from Range Road 223; and

b. Suitably screen loading areas, and outdoor storage areas from Range Road 223 when considered a requirement by the Development Authority, in accordance with applicable requirements of the Land Use Bylaw.

5.4 RESERVES

Municipal Reserves (MR) and Environmental Reserves (ER) are lands dedicated to the Town as public land during the subdivision process. MR is dedicated to enhance the community by providing land for parks, schools, and recreational amenities, as required. ER supports the protection of the natural environment by preventing development in hazardous areas such as ravines, floodways, or coulees.

The determination of exact reserve allocation and analysis of MR owing within the Plan Area should be addressed at time of Concept Plan and Subdivision in accordance with the provisions of the MGA. At the time of report preparation a school reserve is not expected to be required within the Plan Area.

Policies within this section are intended to provide an understanding and aid in decisions made regarding dedication of MR land within the Plan Area.

Reserves Policies:

5.4.1 A reserve analysis should be conducted by the developer in collaboration with the Town of Coalhurst during preparation of a Concept Plan to determine the amount of reserves owing within the Plan Area. The reserve analysis should include a determination of:

a. The total gross area of the proposed Subdivision;

b. Other reserves owing on an ownership basis (if applicable); and

c. The amount of residual reserves, if any, that are to be taken as money-in-lieu of land.

5.4.2 The creation of MR should be developed and confirmed within a Concept Plan in conjunction with the design and construction of community amenities and gathering areas. Examples of community amenities include enhanced landscaping, pathways, benches, playgrounds, gazebos, activity/exercise nodes, etc.

5.4.2.1 Non-Credit Open Space or Voluntary dedication of reserve land beyond the maximum amount allowed by the Municipal Government Act may be considered if it is demonstrated that the additional reserve will benefit the community and result in no additional acquisition costs to the Town.

5.4.3 Enhanced landscaping should minimize the need for irrigation and promote water re-use or the use of raw water where possible.

6 TRANSPORTATION

6.1 TRANSPORTATION NETWORK

The transportation system outside the Town comprises a grid network of urbanized and rural roads consisting of township and range roads. This network connects into the provincial highway system at Crowsnest Highway (Highway 3) and the nearby Highway 25. The Town has been developed with an internal system of collector and local roads to provide adequate access to previously developed areas.

Internally, the Plan Area is proposing a grid or modified grid style road network that will ultimately create multiple access points to 6th Street, Sundance Road, 45th Avenue and Range Road 223. This future condition will greatly enhance mobility within the community, access to external highways and provide multiple access points for emergency services. The plan as proposed creates a strong collector linkage between Sundance Road and Range Road 223 as defined in the Town's MDP. Any future Concept Plan shall consider this linkage as a critical piece of infrastructure.

The transportation network must develop in a manner that is safe, functional, and efficient. The network should integrate development within the Town and provide regional opportunities for walking and cycling. Future roadway designs and cross-sections should consider the potential for mass transit given the municipality's proximity to Lethbridge. **Map 10**: Transportation Network shows the provincial, regional, and local transportation networks in the Coalhurst area, and provides a schematic of potential roadway alignments within the Plan Area. The Transportion Network also identifies the anticipated total vehicle volumes per day at full-buildout at plan boundary intersections.

In accordance with the National Fire Protection Association standards, "a second public access is required when the distance from the centre line of the primary access street to the closest point of the access route at a building's principal entrance exceeds 200 m and /or the total number of households exceeds 100 (NFPA 1141). A second public access is to be installed in the early stages of the development or in conjunction with the primary access.

Transportation Policies:

6.1.1 Development of the 6th Street and Sundance Road connections shall be prioritized to provide additional access and connection to the Plan Area.

6.1.2 The design of the street should include an enhanced public realm where possible, including pedestrian amenities such as benches or landscaping.

6.1.3 An additional connection to Lethbridge County should be considered on the south side of the Plan as required and to the discretion of the Development Authority.

6.1.4 Future roadway cross-sections shall be classified and confirmed through a developer delivered Traffic Impact Assessment during the completion of the developer's Concept Plan.

6.1.5 Grid or Modified Grid community layouts should encourage smaller blocks (60m -100m) and may include lanes.

6.2 PEDESTRIAN & ACTIVE MOBILITY

Pedestrian and bicycle circulation is a priority in the Plan Area. Community pathways and green corridors provide safe and convenient connections to recreational sites, community amenities, adjacent residential communities and connections beyond the Plan Area. These pathways are intended to provide for direct and convenient pedestrian and bicycle circulation. Refer to **Map 8** for potential locations of these types of amenities and a customized road cross-section that could be considered during the development of collector road linkages at the time of Concept Plan Development.

Active Modes Policies

6.2.1 Pathways and Green Corridor alignments may be refined at time of Concept Plan to the discretion of Council.

6.2.2 Active Modes Crossings should provide continuous pedestrian, cycle and possible emergency service access throughout the Plan Area.

6.2.3 Pathways and Green Corridors should:

a. Consist of a continuous system which connect the residential areas with the Commercial and Swing Sites as well as natural areas and features; and

b. Provide external linkages to adjacent communities.

6.2.4 Where Pathways and Green Corridors are proposed to cross a collector street, it should occur at roadway intersections.

6.3 TRANSIT

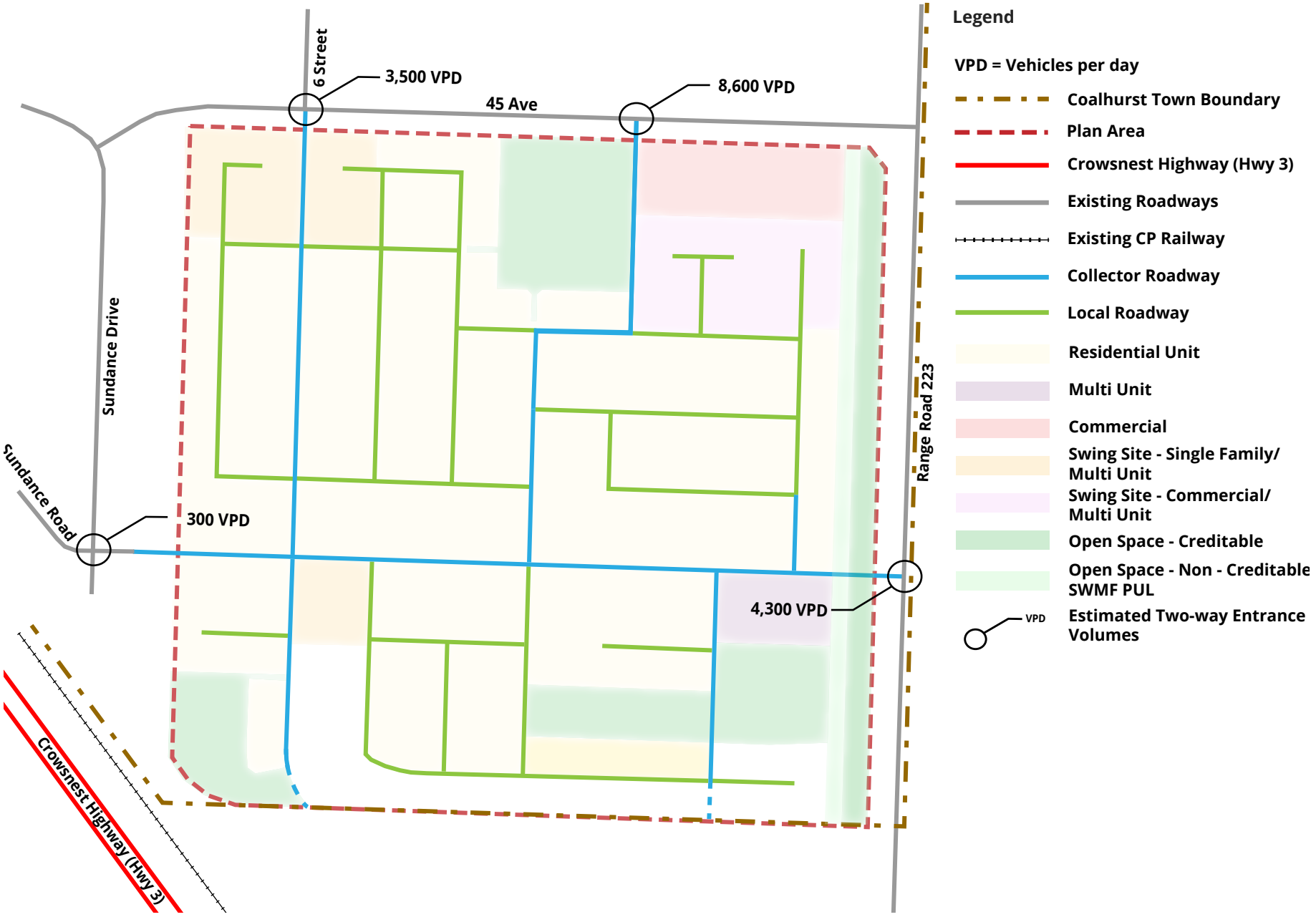
Transit is a high priority mode of transportation as it provides affordable and sustainable mobility options for residents. Future expansion of service should provide direct, convenient and efficient transit services within the Plan Area and to the rest of the Town that enables public transit as the preferred mobility choice for residents.

Transit Policies

6.3.1 Community design should allow for transit routes that minimize the number of turns while providing maximum community coverage.

6.3.2 Community design should enable transit routes that provide direct and convenient connections to key destinations within the Plan Area, including other bus routes connecting to destinations beyond the Plan Area.

Map 10 Transportation Network



7 SERVICING

7.1 GENERAL

The Servicing Section provides a general overview of sanitary, water, storm water management and shallow utilities within the Plan Area. Utilities will include the extensions of existing municipal and private infrastructure from existing developed areas on the west and north side of the plan.

The existing terrain of the ASP lands has been reviewed to establish a logical sequence of utility installation and grading. Regarding topography, the Plan Area is divided into a northern (Stage 1) and southern (Stage 2) drainage area. It is recommended that natural topography and existing drainage be incorporated into future designs wherever possible to minimize grading efforts and to mitigate against the creation of boundary conditions that could pose problems to future development beyond the Plan Area. All utilities within the ASP will be subject to further refinement through:

- Concept Plan Development;
- Master Servicing Plans;
- Traffic Impact Assessments;
- Stormwater Management Reports; and/or
- Subdivision and detailed design.

General Servicing Policies

7.1.1 The location, size and general standards of the water, sanitary sewer and stormwater management systems shall conform to applicable Municipal and Provincial Guidelines and Standards.

7.1.2 Rights-of-way, easements, or public utility lots shall be provided, as required, accommodating development or extension of necessary municipal utilities.

7.1.3 Any required facilities should be located to maximize efficiency and integration with existing and future development, while minimizing the burden on any one landowner.

7.1.4 System capacities shall be reviewed at time of development, with the allocation of capacities to the development determined by the Town.

7.1.5 Locations and sizes of infrastructure should follow the general servicing direction as outlined in the ASP and finalized at later design stages of development.

7.2 WATER

Future water distribution expansion must ensure that a suitable and efficient water system is provided to serve the full build-out of the Plan Area. The design and construction of water distribution systems must take extreme care with respect to safety. Any threat to the delivery or quality of water is unacceptable. The following fundamental factors are to be considered when designing potable water distribution facilities.

- Provision of high-quality drinking water.
- Minimized interruption in service delivery.
- Provision of adequate fire protection.
- Sustainable water efficiency strategy (MDP 2.1.8).

A preliminary water distribution system is illustrated on **Map 11** and identifies key connection points at the ASP boundary. Based on an approximate population of 2 970 people and an approximate commercial area of 2 hectares, initial water consumption demands are estimated as follows:

Average Day Demand	1 286m³/day
Maximum Day Demand	2 573m³/day
Peak Hour Demand	60 L/s
Maximum Day + Fire Flow	180 L/s

Values above derived from City of Lethbridge Servicing Standards (Residential 415 L/c/d, Commercial 21m³/ha/day).

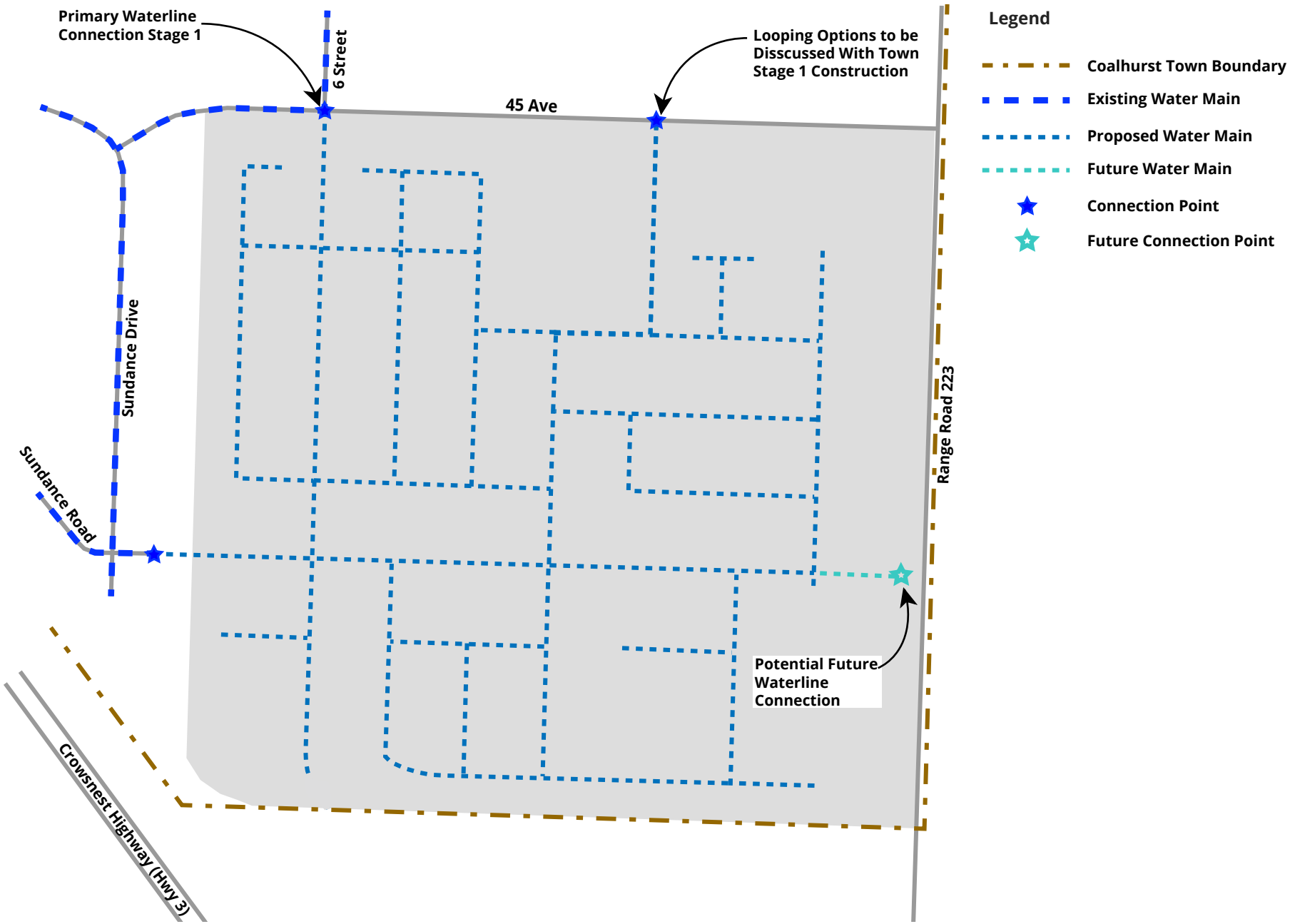
Water Servicing Policies

7.2.1 Developers shall be required to prepare estimated water demands to the municipality prior to Concept Plan or Subdivision application submissions.

7.2.2 Developments anticipating significant water consumption shall demonstrate to the Town that proposed utility extensions will not adversely affect existing users connected to the same system.

7.2.3 Developers shall be required to prepare estimated volumes for water treatment and the capacity of municipal infrastructure within a Concept Plan to manage demands required for the proposed development.

Map 11 Water Servicing



7.3 SANITARY

The proposed sanitary sewer system identified on **Map 12** represents a combination of gravity sewers, a pressurized force main, and a lift station in the southeastern region of the Plan Area. As noted in **Section 7.1**, the Plan Area is divided into two major drainage zones as identified within Sewershed A and Sewershed B.

Sewershed A (Stage 1)

Based on an estimated population of 1820 people and a commercial area of approximately 2.0ha (2.47ac), the peak wet weather flow is estimated at 43 L/s discharging to the trunk as identified along 45th Avenue.

Sewershed B (Stage 2)

Based on an additional population of 1150 people in Sewershed B, the peak wet weather flow is estimated at 26 L/s discharging to the trunk as identified at the corner of 45th Avenue and Range Road 223. There are two options for servicing Sewershed B.

- Option 1 is a lift station / force main system to 45th Avenue.
- Option 2 is an offsite gravity sewer to 45th Avenue.

Both options are viable for servicing of the Plan Area, however the latter gravity option requires further analysis beyond the scope of the ASP. Key concerns are depth of installation adjacent to ATCO Pipelines infrastructure (~9.0m depth) and the need for imported fill material to ensure appropriate servicing depths within the Stage 2 lands. It is recommended that an oversized sewer line be installed if the gravity option is selected for Stage 2 as this will allow for potential connection from future annexation lands to the east of Range Road 223.

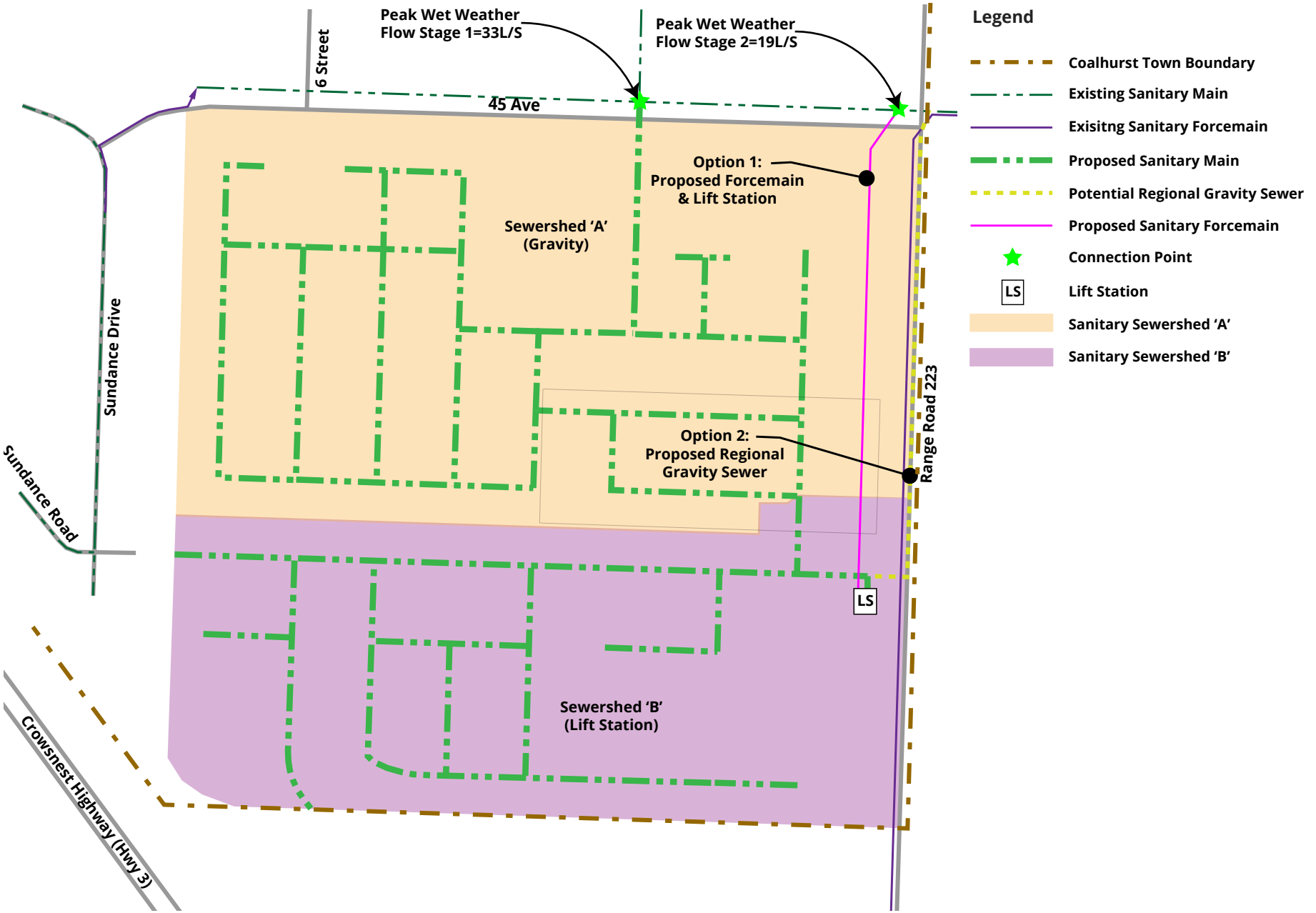
Peak Wet Weather flows above derived from City of Lethbridge Servicing Standards (Residential 400 L/c/d Dry Weather and 500L/c/d Wet Weather; Commercial 20m³/ha/day and 7.5 m³/ha/day Wet Weather).

Sanitary Servicing Policies

7.3.1 Proposed residential and commercial land uses shall be required to prepare estimated sanitary sewage flows as part of Concept Plan and Subdivision applications.

7.3.2 Subdivision and Development Permits for residential and commercial land uses may only proceed following Municipal confirmation that downstream infrastructure has the capacity to convey and treat wastewater from the proposed development.

Map 12 Sanitary Servicing



7.4 STORMWATER

The Plan Area is made up of two stormwater catchment areas, with a breakpoint running east/west located centrally within the ASP. Stage 1 lands drain towards the existing constructed wetland to the northeast. Stage 2 lands drain to a trapped low area adjacent to Range Road 223. A proposed stormwater management concept has been illustrated on **Map 13** outlining the major stormwater catchments within zones and their outfall restrictions to the Town of Coalhurst system on 45th Avenue.

Based on MPE's *Town of Coalhurst, Stormwater Management Plan*, June 19th, 2017, the lands identified in the Plan Area have been provided an allowable release rate of 750L/s/Ha. The proposed use of this available capacity is described below and has been allocated to various catchments to maximize the amount of developable land that can be brought to market in the near term. A stormwater management report will be required to confirm all assumptions below at the Concept Plan stage.

Zone 100

Zone 100 in Stage 1 will operate as a Dual Drainage System (Minor Storm and Major Storm Conveyance Systems) with a restricted outflow of 550 L/s. Urbanized run-off will be collected and conveyed to a wet pond facility in the general location identified on Map 11. Based on an assumed 50% impervious surface, Zone 100 will require active storage volume of approximately 14 000m³.

Zone 200

Zone 300 in Stage 1 is identified as a commercial area of approximately 2 hectares in size. This future private site will be restricted to 100 L/s which will discharge directly to the 45th Avenue storm system upstream of the Town's wetland. Based on an assumed 90% Impervious surface, Zone 300 requires on-site storage of approximately 1,000m³. This equates to approximately 50mm of storage depth over the site area which will be accommodated by detention storage in internal parking lot and landscaped areas. The commercial node could be constructed prior to the completion of the wet pond in Zone 100.

Zone 300

Zone 400 in Stage 1 is an area of development that cannot be practically routed through the Plan Area's proposed stormwater management infrastructure due to topography. As such, this urbanized land, (largely open space, ~30% impervious level) will drain directly to the twin 600mm diameter culverts that exist today (45th Avenue/Range Road 223).

Zone 400

Zone 200 in Stage 2 will operate as dry pond facility and be serviced by a lift station and force main that will connect upstream of the Town's wetland in 45th Avenue and is proposed to discharge at a rate of 100 L/s. Based on an assumed 50% impervious surface, Zone 200 will require an active storage volume of approximately 25 000m³.

Stormwater Management Policies

7.4.1 Stormwater management facilities should be designed to minimize operation and maintenance costs whenever possible, and designed to promote a naturalized ecosystem that promotes biodiversity.

7.4.2 Stormwater management facilities shall be designed as Dual Drainage Systems with a Minor storm sewer system that has the capacity to convey a 1:5-year rainfall event, and a Major overland conveyance system that has the capacity to safely convey the 1:100-year rainfall event.

7.4.3 Parcel and ROW development should be designed to increase surface permeability wherever possible to reduce stormwater run-off and mitigate against overland flooding.

7.4.4 Stormwater sewers shall be designed and constructed to convey foundation drainage from adjacent residential and commercial foundation systems.

7.4.5 Overland conveyance routes shall consist of public roadways, lanes, open spaces and naturalized or concrete swales.

7.4.6 Commercial Development sites shall be designed to prevent contaminants from entering down stream systems through the use of mechanical treatment like an Oil and Grit Separation System.

7.4.7 Stormwater shall be treated in facilities prior to discharge to municipal systems and natural drainage courses subject to applicable provincial guidelines and regulations.

7.4.8 The ultimate configuration of ponds within the ASP may include additional or a fewer number of storm ponds than identified in this ASP, depending on The Municipality's needs, development staging, and investment potential. Final location and sizing of ponds shall be determined at the Concept Plan stage.

7.4.9 A Stormwater Management Report shall be completed by the developer at the time of Concept Plan development and utilized in the preparation of applications for regulatory approvals under applicable regulations.

7.5 SHALLOW UTILITIES

Shallow Utility Servicing includes electricity, natural gas, and telecommunications. The following is provided for general information and will be subject to confirmation by service providers. Shallow utilities should be constructed prior to, or in conjunction with all associated development within the Plan Area.

Electricity, natural gas and telecommunications infrastructures are located adjacent to the ASP in Sundance Road, 45th Avenue, 6th Street and Range Road 223. System capacities shall be confirmed by the service provider at the time of Subdivision, and/or Development Permit stage.

Shallow Utility Policies

7.5.1 At the time of subdivision, the developer will be required to coordinate the design and installation of all shallow utility infrastructure and rights of way to support development.

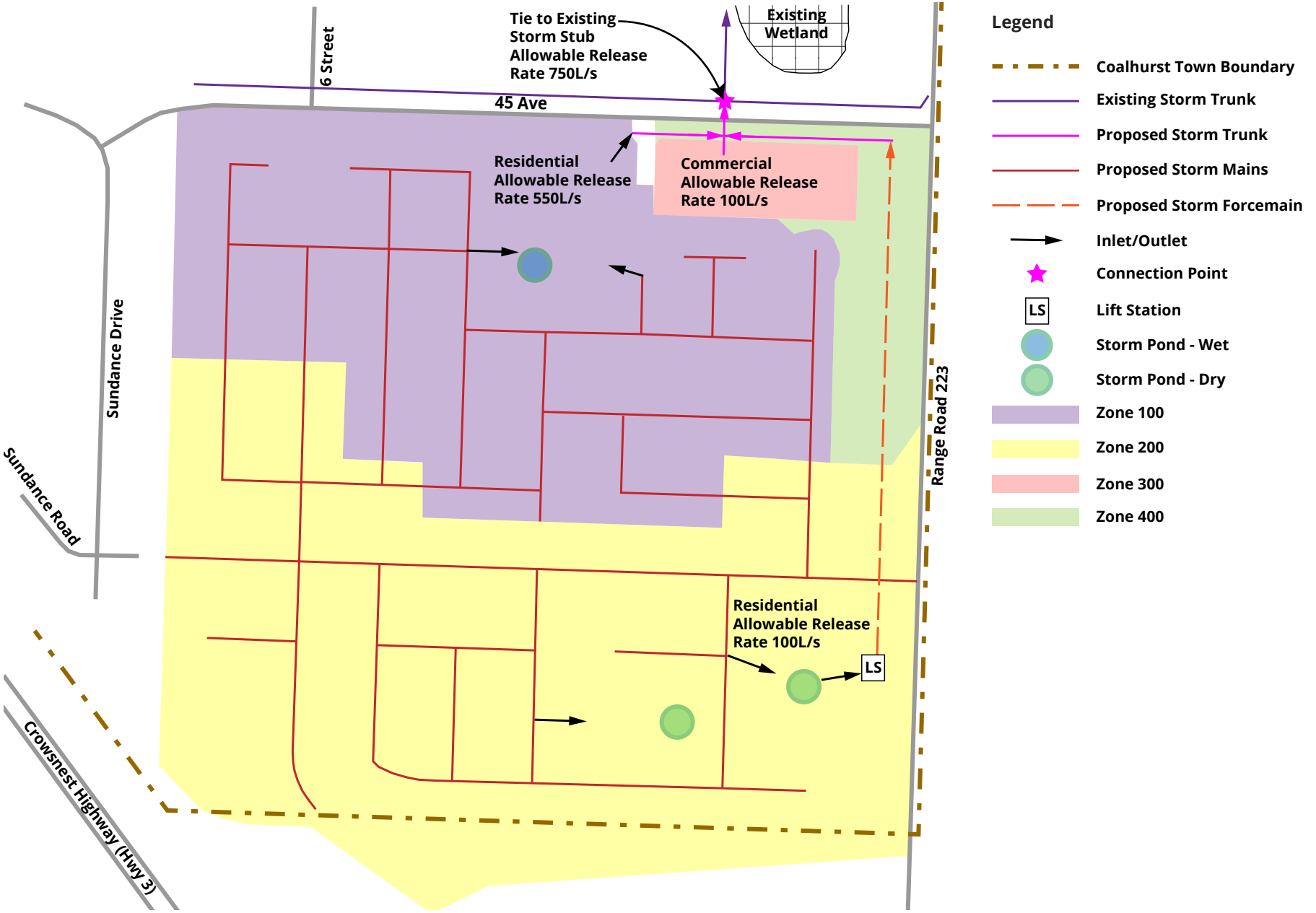
7.5.2 Rights-of-way and easements shall accommodate the extension of utility services through the Plan Area at the time of subdivision.

7.5.3 Shallow Utility Infrastructure shall be designed and constructed as per utility provider standards and incorporated into public R/W's and easements.

7.5.4 New subdivisions shall utilize underground utilities. Overhead installations of utilities shall be avoided if possible.

7.5.5 Utility structures and poles should be located to minimize visual impact along an arterial street.

Map 13 Stormwater Servicing



8 IMPLEMENTATION

8.1 PHASING

The GreenTree ASP outlines the vision for the physical development of the Plan Area and provides guidance with regard to infrastructure, land use, subdivision, and development. The purpose of this section is to describe the implementation process, to provide detail on the sequence of development, and to specify requirements to ensure the ASP policies and strategies are adhered to.

The community will be developed from north to south working from existing utility installations along 45th Avenue as presented on **Map 14**.

Final phasing will occur through the development of a Concept Plan along with preliminary engineering designs. Given topography, the land has been divided into two distinct development stages based on the requirements for the management of stormwater and sanitary sewage identified previously.

Stage 1

Development within Stage 1 should commence with completion of initial site grading and the completion of the wet pond south of 45th Avenue. All subsequent phasing should radiate from this general location ensuring that water looping is provided as required by the municipality and that secondary access is provided for emergency services.

Finalization of an interim water looping strategy from 45th Avenue should be considered within Stage 1 as it is an important consideration during preliminary engineering. This requires significant engineering design to ensure that this installation does not conflict with future grading and infrastructure installations as development radiates south. Given the above, it is recommended that this looping option be considered only if northerly options are determined to be not viable by the Town of Coalhurst.

The Stage 1 Commercial Parcel could be developed as an initial phase along 45th Avenue without the completion of residential or the public stormwater management facility provided that the:

- Parcel directly services to the sewer trunk in 45th Avenue.
- Water distribution systems are extended to the parcel boundary as required by the municipality.
- Storm sewer is extended across 45th Avenue and is designed and constructed to accommodate all upstream contributions from the Green Tree ASP boundary.

Stage 2

Development within Stage 2 should commence with the completion of the stormwater management facility in the southeast sector of the plan and the installation of either: a lift station/force main system; or a gravity trunk-line back to 45th Avenue for the conveyance of sanitary sewage. The determination of the final sewer system's operation will be completed at the subdivision and detailed design stage.

The private residential land parcel that exists today has been identified for development as a final phase in both stages subject to any changes in ownership of this parcel and a desire to re-develop the lands.

8.2 SUPPORTING STUDIES

The purpose of these policies is to outline supporting information required by a developer to assist the Development Authority (or Authorities) and Council in evaluating proposals, as well as to ensure their conformity with this Plan.

While implementation of the Plan will be achieved through a variety of planning instruments (e.g., Subdivision, Development Permits, Development Agreements, etc.), the primary means of implementation should occur through the Concept Plan prior to the land use approval process. As such, comprehensive servicing and transportation studies and analysis should be conducted in collaboration with Concept Plan preparation.

It is recommended that a Concept Plan outlines ROWs, block shells, intersection spacing, roadway classifications, stormwater management infrastructure and utility servicing. This ASP will become the framework for development staging, and the following key studies shall be completed as part of municipal and provincial regulatory approvals:

- Traffic Impact Assessment.
- Stormwater Management Plan.
- Master Servicing Plan.

Implementation Policies

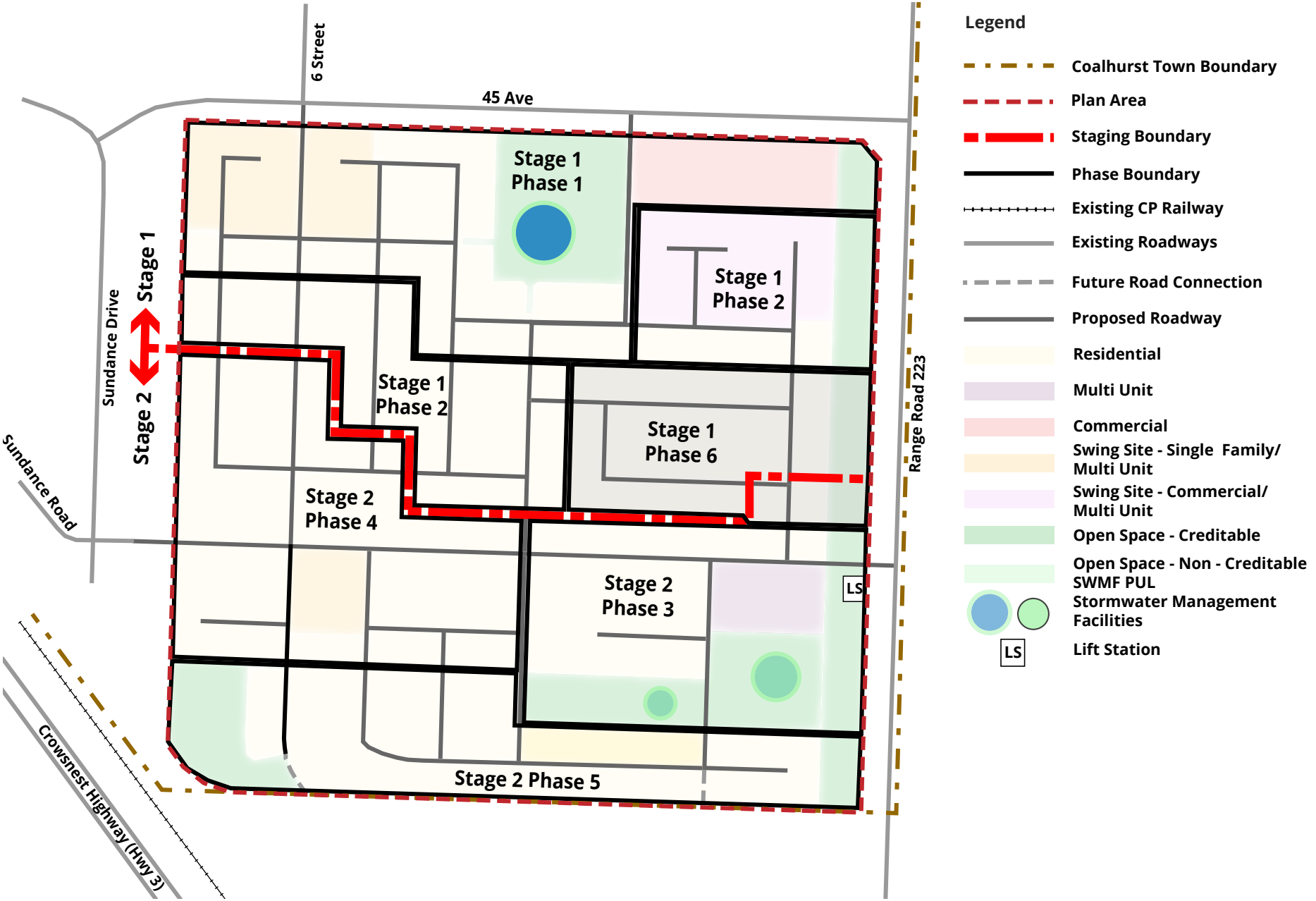
8.2.1 Phased development should be designed and constructed to extend from the existing infrastructure to promote efficient development and avoid skip development.

8.2.2 Phased development should encourage water looping wherever possible.

8.2.3 Phased development shall provide secondary emergency vehicle access at the time of home occupancy.

8.2.4 Land Use Rezoning and Subdivision shall not be permitted prior to the approval of a Concept Plan including supporting studies to the satisfaction of the municipality.

Map 14 Phasing Plan



8.3 DEVELOPMENT REGULATIONS

8.3.1 Redesignation of Land Use District

Once the GreenTree Area Structure Plan has been approved by Council, further development may occur. Any subdivision application which proposes to create an outline block plan, with the sole purpose to create separate titles and facilitate the creation of new parcels of land, may be considered within the current Transitional (TR) land use district. Minimum parcel size shall be 4.0 hectares (10.0 acres) or greater in size in accordance with the Land Use Bylaw.

In order to move to the next phase of development, the land within the GreenTree Plan Area must be redesignated to the appropriate residential, commercial or other land use in accordance with the municipality's Land Use Bylaw. The process for redesignation, as outlined in the Municipal Government Act, provides for advertising of the proposal and holding a public hearing where affected landowners may comment on the proposal. The council will make the final decision to redesignate a parcel and there is no appeal of this decision.

Landowners and developers will be required to prepare and submit a concept plan and will be responsible, at their expense, for preparing any additional detailed plans to support their development prior to applying for redesignation or subdivision. The following is a sample Table of Contents for a Concept Plan. The sample shows the areas that should be addressed. The information required and level of detail for each plan will vary due to the differences in topography and proximity to other developments. This is simply a guide – the actual characteristics and presentation will be unique to the applicant and the area of interest.

Introduction

a. Purpose of the Concept Plan
b. Concept Plan Area and Existing Conditions
c. Policy Framework
    i. Town of Coalhurst Municipal Development Plan
    ii. Town of Coalhurst Land Use Bylaw

Development Concept

a. Goals of the Plan
b. Land Use Concept including proposed zoning at the lot level
c. Municipal Reserve Dedication

Transportation and Servicing

a. Road Network
b. Sanitary and Water Systems Servicing
c. Storm Water Management
d. Shallow Utilities
e. Master Grading Plan

Policies

8.3.2 Any subdivision application which propose to create an outline block plan, with the sole purpose to create separate titles and facilitate the creation of new parcels of land, may be considered within the current Transitional (TR) land use district. Minimum parcel size shall be 4.0 hectares (10.0 acres) or greater in size in accordance with the Land Use Bylaw.

8.3.3 Subdivision applications which propose to create multiple lots for residential or commercial purposes, the Land Use Bylaw must be amended to provide for redesignation of the land and shall be supported by a professionally prepared Concept Plan (Parcel Specific Area Structure Plan) which conforms and aligns with the GreenTree Area Structure Plan. This Concept Plan will be required to be adopted by bylaw.

8.3.4 Applications for redesignation of lands shall follow the process outlined in the Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26.

8.3.5 There is no obligation on the part of Council to redesignate any parcel of land, and they will review each application on its own merits.

8.3.6 As part of the Concept Plan, an engineering detail plan must be prepared for the subdivision area and must be approved by the municipality as part of the Concept Plan prior to an individual applying for a redesignation or applying to subdivide.

8.3.7 The Engineering Detail Plan will typically include more detailed engineering and construction information pertaining to road networks, drainage and storm water management, utility provisions and rights-of-way, fire suppression, and geotechnical and soils analysis. In addition, a Subdivision Grading Plan shall be required which specifies design elevations, surface gradients, lot types, swale locations, and other drainage related information required for lot grading as well as establish the drainage relationship between adjacent properties, and will need to be approved by the Municipality.

Subdivision Process

With the appropriate Concept Plan and land use designation in place, the developer or landowner may apply for subdivision of the parcel into separate titles. The landowner or developer will have certain costs to consider associated with the subdivision process. These include: subdivision application fees, municipal reserve payments, survey costs and Land Titles Office registration costs. Any required infrastructure to be installed to service the subdivision will be in addition to this.

Policies

8.3.8 The Concept Plan is to be used as a guideline for subdivision when a landowner/developer decides they want to subdivide any land affected by this Plan. The proposed density and minimum lot size shall be adhered to when subdividing a lot.

8.3.9 A landowner/developer is responsible for the costs of subdividing and developing parcels affected by this Plan, and the municipality shall not be responsible for executing the Plan or any associated costs.

8.3.10 As a condition of subdivision approval, the landowner or developer will be required to enter into a Development Agreement with the Town of Coalhurst.

8.3.11 Costs of infrastructure/utilities shall be borne by the persons owning and developing land in the Concept Plan Area.

8.3.12 As part of the subdivision application, the developer must provide a plan of survey prepared by a certified Alberta Land Surveyor.

8.3.13 Subdivision proposals will be reviewed in terms of conformity to the GreenTree Area Structure Plan design and the detailed Concept Plan prepared specifically for the subject lands. Prior to the application or survey of the subdivision proposal, developers are encouraged to consult with the municipality and their planning staff to determine if the proposal is in compliance with the ASP.

8.3.14 Any major proposed deviations in the lot layout will require an amendment to the GreenTree Area Structure Plan by Council through the statutory plan amending process, if acceptable. However, the overall road layout, design pattern, land uses and density shall be adhered to.

8.3.15 Any utility easements and rights-of-way as required by utility companies or either municipality shall be established prior to finalization of the subdivision application.

8.3.16 All subdivision applications will be required to include a site plan or surveyors sketch that identifies:

(a) existing buildings or structures and the location of any utility lines or easements, drainage ditches or swales, dugouts or ponds, etc.;

(b) the exact dimensions of the lot(s) to be subdivided, proposed road and lane including widths and corner cut-offs, and any public utility lots and municipal reserve parcels;

(c) any storm water management facilities, existing and/or proposed, to ensure that the location and interconnecting of the facilities is feasibly developed in accordance with the storm water management plan;

(d) any other information required by the Subdivision Authority, the ASP or under the municipality's Land Use Bylaw.

8.3.17 At the time of subdivision, if required in the Concept Plan, architectural controls as approved by the Municipality shall be registered on title in the form of a restrictive covenant. The approved architectural controls shall be implemented at the development permit stage. The developer not the Municipality will be responsible for managing or enforcing any such controls once registered.

8.3.18 The provision of any applicable Municipal Reserve must be provided by the developer as required on the subdivision approval resolution.

Development of Land / Lots Process

Once the parcel has been subdivided and separate titles issued, the individual landowner can apply to the Municipality for a development permit to develop a permitted or discretionary use as listed within the land use district as contained in the municipality's Land Use Bylaw.

Policies

8.3.19 The GreenTree Area Structure Plan is to be used as a guideline for development in conjunction with detail Concept Plan for the land and the Municipal Land Use Bylaw when considering a development permit application.

8.3.20 All residential dwellings units shall be required to connect to the municipal potable water system and sewage system. Commercial/ industrial with the plan area shall also be required to be connect for municipal services but shall be assessed on the proposed use and the estimated need for water and sewer services and the ability of the municipality to provide the necessary service.

8.3.21 The landowner/developer will be required to submit an application form, a fee, a site plan showing the location of the proposed building on the lot, building plans and a grading plan as requested by the municipality. Legal access and egress from a lot shall be indicated on a site plan and shall be at a location to the satisfaction of the Designated Officer or the Development Authority.

8.3.22 Any costs associated with survey or engineering work that may be required shall be at the expense of the landowner/developer.

8.3.23 The Development Authority may require that as a condition of issuing a development permit, the applicant enter into a development agreement with the municipality.

8.3.24 If a development permit is issued by the municipality, the developer/ applicant is responsible for applying for and securing the necessary building permits and any other safety code approvals that may be required.

8.3.25 Landowners will be required to provide and adhere to the storm water drainage management plan as applicable to their land parcel and proposed development.

8.3.26 Builders/developers must give proper consideration to lot grades when choosing a building design. The final building grades must respect the approved Subdivision Lot Grading Plan as approved. Landscaping may be required to the satisfaction of the Designated Officer or the Development Authority in accordance with the Land Use Bylaw.

8.3.27 The Development Authority may require the developer to provide additional standards of development (landscaping, screening of storage/ goods, etc.) in conjunction with the Land Use Bylaw.

8.3.28 The developer/applicant is responsible for contacting the applicable private utility companies prior to undertaking any excavation or development work.

Appendices

The following appendices do not form part of the statutory portion of the ASP. The intent of the appendices is to provide supplementary information for interpretation of components within the ASP, and additional information with respect to certain policy sections of the ASP.

Appendices Contents

Appendix A: Glossary

Abbreviations

The following section expands upon the abbreviations and outlines the meanings of commonly used terms that appear throughout this document.

Abbreviation	Expanded
ASP	Area Structure Plan
ESA	Environmental Site Assessment
HRA	Historical Resources Act
HRIA	Historical Resources Impact Assessment
IMDP	Intermunicipal Development Plan
MDP	Municipal Development Plan
MGA	Municipal Government Act
MR	Municipal Reserve
ORRSC	Oldman River Regional Services Commission
ROW	Right-of-Way
VPD	Vehicles per Day

Definitions

Active Modes

Active transportation through self-propelled motion or using human powered mobility. This can include biking, walking, skateboarding, rolling or travelling in a non-mechanized wheelchair to get from one place to another.

Area Structure Plan (ASP)

A statutory plan as defined by the Municipal Government Act, that directs the future land use patterns, transportation and utility networks, and sequence of development in new communities.

Biophysical Review

Provides biophysical information to identify significant natural areas and features, facilitating informed decisions regarding protection and enhancement of those features (where necessary), in accordance with Town plans and policies carried through subsequent Planning and Subdivision decisions.

Concept Plan

A conceptual plan that outlines proposed subdivision, land use classifications, reserves, roadway and trail alignments, parks/open spaces, major utilities, and is supported by research, technical studies and detailed engineering designs.

Council

The elected Council of The Town of Coalhurst.

Development Authority

The Development Authority is responsible for receiving, processing, and deciding on development applications.

Development Permit

Permission from the Development Authority for construction or changes of use in accordance with the Land Use Bylaw.

Enhanced Landscaping

Refers to any addition to the space that boosts the aesthetics, function and overall enjoyment of the outdoor area above the traditional maintenance of plants or grass.

Historical Resources Act (HRA)

Any work of nature or humans that is primarily of value for its palaeontological, archaeological, prehistoric, historic, cultural, natural, scientific or aesthetic interest including, but not limited to, a palaeontological, archaeological, historic, or natural site, structure or object.

Historic Resources Impact Assessment (HRIA)

An assessment that evaluates the presence of historical resources in an area and provides recommendations for whether preservation should take place.

Infrastructure

The physical assets developed and used to support the town's people and activities. The Town's infrastructure inventory includes such assets as drainage, roads and right-of-way infrastructure, parks and green spaces, buildings, fleet vehicles, buildings, recreation facilities, etc.

Intermunicipal Development Plan (IMDP)

A plan which provides for the coordination of planning between neighbouring municipalities. Jointly approved and administered by the affected municipalities, it is particularly focused on providing guidance for the development and regulation of lands close to the shared boundary.

Land Use Area

One of the categories of land uses delineated on the Land Use Concept Map and described in policy sections of the ASP.

Municipal Development Plan (MDP)

A MDP is a planning policy document guiding growth and development within The Town of Coalhurst. It is visionary, strategic, long-term, and provides the basis for actions and decisions to both protect and improve quality of life for all residents, present and future.

Municipal Government Act (MGA)

Alberta's provincial legislation which defines how a municipality can function, develop land, raise funds for things like services, and more. The three themes of the MGA are planning and development, governance and administration, and assessment and taxation.

Municipal Reserve (MR)

Land provided, as part of a subdivision, by the developer without compensation for park and school purposes in accordance with the provisions of the Municipal Government Act. This includes lands dedicated as Municipal Reserve (MR), School Reserve (SR) and Municipal and School Reserve (MSR).

Non-Statutory Plan

Non-statutory plans are bylaws passed by resolution. They are often developed to help encourage a certain direction for development or growth in a particular area.

Plan Area

The land that is the subject of the ASP.

Public Utility

Development that comprises a system or works used to provide for public consumption, benefit, convenience or use, such as: irrigation; drainage; infrastructure; water/gas/sewer pipes; waste management; telecommunications; among others.

Secondary Suite

Described as a self-contained residence with two or more rooms and includes a kitchen, living, sleeping and sanitary facility, meeting all requirements of the Building Code and Land Use Bylaw.

South Saskatchewan Regional Plan (SSRP)

A long term regional land use plan for the south area of Alberta including the municipalities of Calgary, Lethbridge, Medicine Hat and Coalhurst.

Statutory Plan

A statutory plan is a legal document that must go through three readings and a public hearing before it is adopted. Once adopted, there is a legal obligation on the part of the municipality and residents to adhere to the plan. Examples of statutory plans include MDPs, IMDPs, and ASPs.

Town

Where capitalized as the "Town of Coalhurst" or "the Town," refers to The Town of Coalhurst as a municipal government or corporation. Where written in lower case as "the town" or as "Coalhurst," refers to the physical area of the municipality.

Transportation Impact Assessment (TIA)

A study required to support the transportation aspects of a proposed development that has the potential of generating significant amounts of new pedestrians, and bicycle and vehicular traffic, or that could potentially change the mobility patterns in the area where it is proposed.

Appendix B: Geotechnical Evaluation

GEOTECHNICAL EVALUATION
COALHURST ASP
COALHURST, ALBERTA

Prepared for: 2176168 Alberta Ltd.
2021-163
December, 2021

BDT Engineering Ltd.
thurberbruce@outlook.com

1 CONTENTS

1.0 INTRODUCTION

This report presents the results of a geotechnical evaluation conducted by BDT Engineering Ltd. (BDT) for the proposed residential lands located at NE 16-9-22 W4M, in Coalhurst, AB.

The scope of work for this evaluation was outlined in a proposal emailed to Mr. Bud Hogeweide, President of Hogeweide Management & Consulting Inc., on November 2, 2021. The objective of this evaluation was to determine the general subsurface conditions in the area of the proposed development and provide recommendations for the geotechnical aspects of design and construction.

Authorization to proceed with this work was received from Mr. Hogeweide on November 16, 2021.

2.0 PROJECT DETAILS AND SCOPE OF WORK

Based on the information provided, the proposed development will consist mainly of residential lands with an employment node envisioned towards the northeast portion of the area.

The scope of work for this evaluation included drilling eighteen (18) boreholes, a laboratory program to assist in classifying subsurface soils and a report providing the following design and construction recommendations:

- Design parameters for shallow foundations.
- Recommendations for Backfill materials and compaction.
- Design and construction provisions for control of groundwater and mitigation, if required.
- Recommendations for stormwater management facility design and construction.
- Concrete type for structural elements in contact with soils.
- Trench excavation recommendations as well as backfill materials, compaction and moisture content requirements.
- Asphalt pavement materials, structure design and recommendations for roadways (subgrade preparation, granular materials, asphalt materials).
- Recommendations for Seismic design

3.0 GEOTECHNICAL FIELD AND LABORATORY WORK

The fieldwork for this evaluation was carried out on December 6 and December 7, 2021, using a truck mounted solid stem auger drill rig contracted from Chilako Drilling Services Ltd. of Coaldale, Alberta. The drill rig was equipped with 150 mm diameter solid stem continuous flight augers. The borehole locations are presented on figure 1 in Appendix A.

Eighteen boreholes, (BH001 to BH018), were drilled at equally spaced locations across the development area.

Disturbed grab samples were obtained from each borehole at 0.75 m intervals. All soil samples were visually classified in the field, and the individual soil strata and the interface between them were noted. The borehole logs are presented in Appendix B. An explanation of the terms and symbols used on the borehole logs is also included in Appendix B.

A slotted 25 mm diameter PVC standpipe was installed in nine of the boreholes to monitor groundwater levels. Auger cuttings were used to backfill around the standpipes and the boreholes were sealed at the surface with approximately 600 mm of bentonite chips.

Classification tests including natural moisture content, Atterberg Limits were subsequently performed on the collected borehole samples at BDT's Lethbridge Laboratory to aid in the determination of engineering properties. Laboratory results are noted on the borehole logs in Appendix B.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 SITE CONDITIONS

The site is located on the southern edge of Coalhurst, Alberta at NE 16-9-22 W4M. At the time of the field drilling the lands were agricultural. The site is generally flat with about 3 m of elevation change across the site.

4.2 SOIL CONDITIONS

It should be noted that geological conditions are innately variable. At the time of preparation of this report, information on subsurface stratigraphy was available only at discreet borehole locations. In order to develop recommendations from this information, it is necessary to make some assumptions concerning conditions other than at the borehole locations. Adequate field reviews should be provided during construction to check that these assumptions are reasonable.

The general subsurface stratigraphy comprised surficial layer of topsoil, underlain by native clay and clay till, in descending order. The following sections provide a summary of the soils encountered in the borehole logs. A more detailed description is provided on the borehole logs in Appendix B.

4.2.1 TOPSOIL

A layer of topsoil was encountered in all boreholes. The topsoil ranged in thickness between 150 mm and 300 mm. Given these lands are agricultural in nature, varying depths of topsoil should be expected.

4.2.2 CLAY

Clay was encountered beneath the topsoil in all boreholes. The clay ranged in thickness from 900 mm to 3.5 m. The clay was described as silty, with a trace of sand, stiff, medium to high plastic, moist and light to olive brown.

4.2.3 Clay Till

Clay till was encountered beneath the clay in all boreholes and present to the maximum depths drilled. The clay till was silty, with trace sand and gravel. The clay till was stiff to very stiff, generally increasing with depth, medium to high plastic, and damp to very moist. The clay till was olive brown. White precipitates, oxide stains and coal specks were noted in the clay till.

4.3 Groundwater Conditions

At the time of drilling, no sloughing was encountered in any of the boreholes. Minor seepage was noted at depths below 7 m in BH013 and BH017. The groundwater levels were measured on December 20, 2021. Table 4.3 summarizes the groundwater monitoring data.

Table 4.3 Groundwater Monitoring Data December 20, 2021

Borehole Number	Depth of Standpipe below Ground Surface (m)	Ground Elevation (m)	Depth to groundwater from ground surface (m)	Groundwater Elevation (m)
BH001	9.10	930.04	3.64	926.40
BH004	9.10	928.45	4.12	924.33
BH006	9.10	930.37	4.43	925.94
BH007	9.10	930.62	8.85	921.77
BH009	9.10	928.61	4.60	924.01
BH012	9.10	928.24	5.32	922.92
BH013	9.10	927.71	3.84	923.87
BH015	9.10	928.46	3.03	925.43
BH018	9.10	927.89	4.05	923.84

It appears that the groundwater encountered is associated with the sand seams and lenses noted during drilling, in the clay till, and isolated across the site. Given the isolated nature of the groundwater recorded, it is anticipated that groundwater for the most part will not impact future developments. It is noted that groundwater levels will fluctuate seasonally in response to climatic conditions and may be at a different depth when construction commences. Groundwater levels should be monitored prior to development. The intent is to provide an early indication of dewatering requirements during excavations for underground utilities and foundations.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 General

The recommendations that follow offer options intended to aid in the development of the area. The recommendations are provided on the understanding and condition that BDT will be retained to review the relevant aspects of the final design drawings and specifications and will be retained to conduct such field reviews as are necessary to ensure compliance with geotechnical aspects of the Building Code, this report, and final plans and specifications. BDT accepts no liability for any use of this report in the event that BDT is not retained to provide these review services.

Recommendations are provided for shallow footings, grade supported floor slabs, below grade construction, general site development and lot grading, trench excavation and backfill, stormwater retention ponds, groundwater considerations, backfill materials and compaction, roadway design considerations and concrete type.

5.2 SITE PREPARATION

Subgrade preparation is required in all lots, where there will be grade changes, as well as all paved areas. This includes stripping of topsoil and deleterious fill materials, scarification, moisture conditioning, and compaction. The native clay and clay till soils are suitable for site grading purposes. The clay soils appear to be slightly below the optimum moisture content (OMC) at shallower depths, and as such, moisture conditioning consisting of minor wetting and/or mixing will be required to reduce the swelling potential of this soil and to achieve the compaction standards recommended. Proof-rolling within roadways to detect soft areas is also recommended. The contractor should expect soil moisture variability across the site.

Shallow footings are generally feasible for residential and light commercial buildings in all areas of the proposed development area. Further recommendations are provided in Section 5.10. However, because footings may be placed within areas of general engineered fill, quality assurance monitoring by geotechnical personnel is recommended during fill placement. It is noted that placement of foundations on engineering cohesive fill thicknesses greater than 1.5 m may require special consideration regarding long-term consolidation of the fill and subsequent performance issues with the foundations / floor slabs-on-grade.

Slabs-on-grade construction for the development area should consider the precautions recommended for slabs-on-grade, including the subgrade preparation measures intended to improve slab performance.

All foundation recommendations presented in this report are based on the assumption that an adequate level of monitoring will be provided during construction and that all construction will be carried out by suitably qualified contractors, experienced in foundation and earthworks construction. An adequate level of monitoring is considered to be:

- For earthworks, and underground utility construction, full-time monitoring and compaction testing.
- For shallow foundations and slabs, inspection of bearing surfaces prior to placement of concrete of mudslabs, and design review during construction.

All such monitoring should be carried out by suitably qualified persons, independent of the contractor. One of the purposes of providing an adequate level of monitoring is to check that recommendations, based on information collected at discrete borehole locations, are applicable to other areas of the site.

5.3 SITE GRADING

All lots should be graded for drainage at a minimum of 2.0 %. The existing surficial site soils comprising clay and clay till are suitable for use as landscape fill materials or for use as general

engineered fill materials for general grading. The moisture content of the site soils at surface generally appear to be slightly below their OMC and may require some wetting and/or mixing to achieve their anticipated OMC. General engineering fill materials for lot grading should be moisture conditions to within a range of -1 % to +2% of the OMC prior to compaction and compacted to a minimum of 98 % of SPD.

Further recommendations regarding backfill materials and compaction are in Appendix C.

5.4 CONSTRUCTION EXCAVATIONS

Excavations should be carried out in accordance with the Alberta Occupational Health and Safety (OH&S) Regulations. For this project, the depth for the majority of the excavations is assumed to be less than 3.0 m below existing ground surface. Excavations to deeper depths require special considerations. The following recommendations notwithstanding, the responsibility of trench and all excavation cutslopes resides with the Contractor and should take into consideration site-specific conditions concerning soil stratigraphy and groundwater. All excavations should be reviewed by a geotechnical engineer prior to personnel working within the base of the excavation.

Temporary excavations within stiff clay or clay till soils which are to be deeper than 1.5 m should have the sides shored and braced or the slopes should be cut back no steeper than 1.0 horizontal to 1.0 vertical (1H:1V)

Flatter sideslopes may be required in some areas where groundwater is encountered within sand layers, which may cause local sloughing and instability of the excavation sidewalls. In these instances, the excavation configuration design should be reviewed by experienced personnel, prior to allowing personnel to enter the base of the excavation. Vertical trench cuts using trench box wall support are not recommended for this project due to the inherent difficulty in compacting the backfill materials to an engineered standard, as well as the potential of cave-ins of the excavation sidewalls against the utility box.

Any encountered groundwater seepage should be directed towards sumps for removal. Conventional construction sump pumps should be capable of groundwater control.

Temporary surcharge loads, such as spill piles, should not be allowed within a distance equal to the depth of the excavation from an unsupported excavation face or 3.0m, whichever is greater, while mobile equipment should be kept back at least 3.0m. All excavation sideslopes should be checked regularly for signs of sloughing, especially after rainfall periods. Small earth falls from the sideslopes are a potential source of danger to workmen and must be guarded against.

General recommendations regarding construction excavations are included in Appendix C.

5.5 TRENCH EXCAVATION AND BACKFILL

The moisture content of the clay and clay till soils encountered across the site generally varies below and above the anticipated optimum moisture content. The clay and clay till soils tend to be slightly dryer than the OMC at shallower depths and then trend towards slightly wetter at depth. It is expected that such soils will require slight wetting to achieve desired moisture content and proper compaction.

Any seepage, if encountered, should be directed towards a sump for removal from the excavation, where necessary. Temporary surcharge loads, such as spill piles, should not be allowed within 3.0 m of an unsupported excavation face, while mobile equipment should be kept back at least 1.0 m. All excavations should be checked regularly for signs of sloughing, especially after rainfall periods. Small earth falls from the sideslopes are a potential source of danger to workers and must be guarded against.

Trenches must be backfilled in such a way as to minimize the potential differential settlement and/or frost heave movements. A minimum density of 98% of Standard Proctor Density (SPD) is recommended for all trenches. Clay backfill should be uniformly moisture conditioned to between ± 2% of optimum moisture content (OMC). The compacted thickness of each lift of backfill should not exceed 150 mm. In order to achieve this uniformity, the lift thickness and compaction criteria must be strictly enforced.

General recommendations for trench excavation and backfill are included in Appendix C.

5.6 Subgrade Preparation

For all roadways the upper 300 mm of clay or clay till soils should be scarified and uniformly moisture conditioned to between -1% of optimum and 2% over OMC. The subgrade should then be uniformly compacted to a minimum of 98% of SPD.

All deleterious and unsuitable materials, including any sand pockets, if encountered, should be excavated from under proposed fill areas during the reconstruction operations.

The clay, clay till soils encountered are acceptable for subgrade construction. Sand layers if encountered should be removed. Proof-rolling to detect soft areas once the subgrade preparation activities are completed is also recommended.

5.7 Pavement Design Recommendations

Two pavement design sections are provided below. One for 'Local' roadways, and one for 'Collector' roadways.

Design Pavement Section		
Material Type	**Local**	**Collector**
Surface Course Asphalt Concrete (Type III)	80 mm	60 mm
Base Course Asphalt Concrete (Type II)		60 mm
Granular Base Course	200 mm	300 mm
Subgrade Preparation	300 mm	300 mm

The above recommended pavement layer thicknesses generally refer to average values and recognize typical construction variability. As such, constructed layer thicknesses should satisfy the thickness tolerances identified in the City of Lethbridge Engineering Standards for granular materials and asphalt concrete. All asphalt paving lifts should be compacted to a minimum of

93 % of the Maximum Relative Density (97 % Marshall Density), as per current City of Lethbridge Transportation Standards.

The pavement design should include provisions for subsurface drainage of the pavement granular layers. It is understood that the roadway cross section for this development contemplates a semi-rural cross section. Therefore, the granular layers should daylight to the ditches where possible.

5.8 CEMENT TYPE

Based on BDT's local experience with the local soils, as well as the laboratory testing conducted to determine soluble sulphate levels, the properties of concrete for foundations in contact with soil or groundwater shall meet the requirements of CSA A23.1-14 Class S-2 exposure and have a minimum specified 56-day compressive strength of 32 MPa.

For this exposure classification, alternatives include the usage of Type HS Portland cement or blends of cement and supplementary cementing materials conforming to Type HS and/or Type HSb cements.

5.9 LIMIT STATES DESIGN

The design parameters provided in the following sections may be used to calculate the ultimate foundation capacity in each case. For Limit States Design (LSD) methodology, in order to calculate the factored load capacity, the appropriate Soil Resistance Factors must be applied to each loading conditions as follows:

Factored Capacity = Ultimate Capacity X Soil Resistance Factors

In general, the following soil resistance factors in Table 5.9 must be incorporated into the foundation design. These factors are considered to be in accordance with the CFEM (2006).

Table 5.9 Soil Resistance Factors

Item	Soil Resistance Factor
Shallow Foundations	
Bearing Resistance	0.5
Passive Resistance	0.5
Horizontal resistance (sliding)	0.8

5.10 SHALLOW FOUNDATIONS

Shallow foundations, should be constructed a minimum of 1.4 m below the final design ground surface (frost protection requirements). Based on the soil stratigraphy and conditions on this site, it is recommended that shallow footings be founded on the clay or clay till.

The ultimate static bearing pressure for the design of strip and spread footings at these depths may be taken as 300 kPa for the clay, clay till soils. Factoring should be considered as noted in section 5.9. Footing dimensions should be in accordance with the minimum requirements of the Building Code.

Bearing certification by a geotechnical engineer is recommended to ensure that the shallow foundations are placed on competent native soils. If softer native soils are encountered at footing level, recommendations may be provided to lower the footing elevations to materials satisfying the design bearing capacity or to widen the footings within these areas. This should be a field determination at the time of bearing observation.

The anticipated foundation soils are of a medium to high plasticity, and therefore, are prone to significant volume changes (both heave and settlement) with varying moisture content. Exposed soils beneath building structures must be protected against changes in moisture content during construction to reduce the risk of heaving. A permanent weeping tile system is also recommended around the outside perimeter of any structure at the foundation elevation to maintain a consistent moisture profile of the foundation soils.

Settlement of footings designed and constructed in accordance with the above recommendations should be well within the normally tolerated values of 25 mm total and 15 mm differential at factored loading. If this range of settlement is not tolerable, then a pile foundation system may be considered for the building.

Further recommendations regarding shallow foundations are presented in Appendix C.

5.11 FLOOR SLABS-ON-GRADE

For construction of floor slabs-on-grade for buildings in the development area the subgrade should be scarified to a minimum depth of 300 mm, and moisture conditioned to within –1% to +2% of the OMC. The minimum compaction should be 98% of SPD. The prepared subgrade should be proof-rolled and any soft or loose pockets detected should be reconditioned as recommended above or over-excavated and replaced with general engineered fill.

A levelling course of clean well-graded crushed gravel, at least 150 mm in compacted thickness, is recommended directly beneath the slabs-on-grade, unless a thicker course is required for structural purposes. The subgrade beneath slabs-on-grade should be protected at all times from moisture or exposure which may cause softening or disturbance of the subgrade soils. This applies during and after the construction period (and before and after replacement of the required general engineered fill). Should the exposed surface become saturated or disturbed, it should be reworked to achieve the above standards. If the subgrade is properly prepared as noted above, floor slab movements should be limited to less than approximately 25 mm. Slabs-on-grade should be separated from bearing members to allow some differential movement. If this range of differential movement is unacceptable, the owner should consider a structurally supported floor.

Recommended procedures for proof-rolling and backfill materials and further recommendations for slabs-on-grade construction are included in Appendix C.

5.12 STRUCTURAL SLABS

A structurally supported floor slab with a crawl space beneath may be used, if differential movements from a slabs-on-grade system are not tolerable. The crawl space floor should be graded toward a sump to collect water that may enter. The crawl space floor should also be covered with a vapour barrier and concrete. If a concrete floor is selected for the crawl space, bond breaks should be provided at the foundation walls and columns to allow it to move independently of the structure.

It is important that the crawl space be properly insulated and vented according to applicable building codes. The use of a crawl space with any covering other than concrete is not recommended for this development. Alternatively, the slab may be totally structurally supported with no crawl space. However, with this type of structurally supported floor slab system, there is a risk of ground movement relative to the slab. This relative movement can lead to problems if piping and other utilities that are connected to the slab are embedded within the ground beneath the slab. Utilities beneath the structurally supported floor slabs should be protected from differential movement by placing utilities within boxes suspended from the structural slab. In addition, a void form is recommended below the floor slab in order to prevent transfer of uplift pressures due to swelling clay soil.

5.13 BELOW GRADE WALLS

All below-grade walls should be designed to resist lateral earth pressure in an "at-rest" condition. This condition assumes a triangular pressure distribution and may be calculated using the following expression:

$$P_o = K_o (\gamma H + Q)$$

Where: P_o = Lateral earth pressure "at-rest" condition (no wall movement occurs at a given depth)

K_o = Coefficient of earth pressure "at-rest" condition (use 0.5 for cohesive backfill and 0.45 for sand and gravel backfill)

γ = Bulk unit weight of backfill soil (use 19 or 21 kN / m^3 for cohesive or granular backfill, respectively).

H = Depth below final grade (m).

Q = Surcharge pressure at ground level (kPa).

It is assumed that drainage is provided for all below-grade walls through the installation of the weeping tile, and hydrostatic pressure will not be a factor in design. An acceptable weeping tile system should consist of a perforated weeping tile wrapped in a geosock or geotextile fabric, in turn surrounded with a minimum of 150 mm thick covering of washed rock (maximum size 25 mm). The weeping tile should have a minimum 0.5 % slope leading to a sump. The preferred method would be to have the sump discharge any water accumulation remotely from the building footprint towards ditches or other stormwater conveyance features. Based on site conditions it is anticipated that the sump pump will run intermittently and more often during and after rain events.

Backfill around concrete walls should not commence before the concrete has reached a minimum two-thirds of its design strength and the walls are laterally braced. Only hand-operated compaction equipment should be employed within 600 mm of the concrete walls. Caution should be used when compacting backfill to avoid high lateral loads caused by excessive compactive

effort. A compaction standard of 95 % Standard Procter Density is recommended. To avoid differential wall pressures, the backfill should be brought up evenly around the walls. A minimum 600 mm thick clay cap should be placed at the ground surface to reduce the infiltration of surface water.

5.14 Frost Protection

For protection against frost-action, perimeter footings in heated structures should be extended to such depths as to provide a minimum soil cover of 1.4 m. Isolated or exterior footings in unheated structures should have a minimum soil cover of 2.1 m unless provided with equivalent insulation.

Pipes buried with less than 2.1 m of soil cover should be protected with insulation to avoid frost effects that might cause damage to or breakage of the pipes. Rigid insulation place under areas subject to vehicular wheel loadings should be provided with a minimum thickness of 600 mm of compacted granular base.

5.15 Seismic Design

The site classification recommended for seismic site response is Classification D, as noted in Table 4.1.8.4a of the NBCC.

6.0 STORMWATER POND DEVELOPMENT

6.1 General

Based on BDT's understanding of a typical stormwater management facility design, a dry pond typically has a base elevation of approximately 2 m to 3 m below final ground surface. A typical wet pond might have a base elevation ranging between 3 m and 5 m below final ground elevation. Such facilities are normally constructed as an excavation below ground surface. These facilities will provide overland stormwater storage for the area in accordance with City of Lethbridge guidelines.

Once the operational water level elevation of the wet pond is designed, it is recommended that the proposed sideslopes for the pond below normal operating level be no steeper than 3H:1V. Above the normal water level, the sideslopes are recommended to no steeper than 5H:1V.

6.2 Facility Design

As discussed in the previous sections, the subsurface stratigraphy of the site comprises clay overlying clay till. It is recommended that the clay or clay till soils be reworked into a low permeable compact clay liner to provide the required containment.

The use of native clay or clay till materials encountered on this site for construction of a remoulded clay liner for the pond is considered feasible, provided certain precautions are undertaken, as recommend in the following sections.

For the assessment of clay liner suitability, a laboratory constant head permeability test should be conducted on a remoulded sample of the native clay or clay till soil. Prior to final design and

construction of the facility the borrow source should be reviewed to verify the site-specific permeability coefficient.

Based upon the site soil conditions and the anticipated permeability value, it is recommended that a preliminary thickness for the remoulded clay liner be 0.6 m long the base of the wet pond and 1.0 m along the sidewalls up to design operation water elevations (minimum recommended).

A liner thickness of 0.3 m may be given consideration for base liners in other areas of the proposed development (dry pond), which will only occasionally be below water. This thickness accounts for the potential of desiccation of the upper 0.2 m during the initial periods when the dry pond is empty. This also accounts for potential disturbance during storm events and to facilitate access during periods of maintenance. Thirdly, it is intended as an additional level of protection, to reduce the long-term infiltration of groundwater and soil saturation below the dry pond, as a means of maintaining long-term stability of the adjacent slopes.

The following discussions and recommendations pertain to the pond construction, including the construction of a low permeability complicated clay liner.

6.3 POND CONSTRUCTION

6.3.1 GENERAL BASE PREPARATION

Following stripping any organic materials within the development area, the containment basin area should be over-excavated beneath the proposed invert elevation in order to allow sufficient thickness of compacted clay base liner. The clay or clay till soil within the base of the excavation should then be scarified to a minimum depth of 300 mm, moisture conditioned to between -1% and +2% of OMC, and recompacted to a minimum of 98 % of SPD. The prepared subgrade thickness may be taken into account in the design liner thickness.

The Pond sidewalls in the cut areas (up to HWL) should also be over-excavated a sufficient amount to allow the construction of a compacted clay liner with the exposed subgrade scarified, moisture conditioned, and compacted as noted above.

Monitoring of excavated soils within the pond footprint is recommended so that unsuitable materials, such as sands, are not used in critical construction items.

The composition and consistencies of the soils encountered on the site are such that conventional hydraulic excavators should be able to remove these materials. Cobbles and boulders may be occasionally encountered within the clay till matrix. General recommendations regarding backfill materials and compaction as well as construction excavations are given in Appendix C.

Full-time monitoring is recommended by suitably qualified persons, independent of the Contractor, one of the purposes of providing an adequate level of monitoring is to check that recommendations, based on data obtained at discrete borehole locations, are relevant to other areas of the site.

7.0 DESIGN AND CONSTRUCTION GUIDELINES

General design and construction guidelines are provided in Appendix D, under the following supplemental heading:

- Shallow Foundations
- Floor Slabs-on-Grade
- Backfill Materials and Compaction
- Construction Excavations

These guidelines are intended to present standards of good practice. Although supplemental to the main text of this report, they should be interpreted as part of the report. Design recommendations presented herein are based on the premise that these guidelines will be followed. The design and construction guidelines are not intended to represent detailed specifications for the works although they may prove useful in the preparation of such specifications. In the event of any discrepancy between the main text of this report and Appendix D, the main text should govern.

8.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully Submitted

Bruce D. Thurber, P.Eng.
BDT Engineering Ltd. P13556

APPENDIX A – SITE PLAN SHOWING BOREHOLE LOCATIONS

Figure 1 – Site Plan
Borehole Location

APPENDIX B – BOREHOLE LOGS

TERMS USED ON BOREHOLE LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on 0.075mm sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as inferred from laboratory or in situ tests.

DESCRIPTIVE TERM	RELATIVE DENSITY	N (blows per 0.3m)
Very Loose	0 TO 20%	0 to 4
Loose	20 TO 40%	4 to 10
Compact	40 TO 75%	10 to 30
Dense	75 TO 90%	30 to 50
Very Dense	90 TO 100%	greater than 50

The number of blows, N, on a 51mm O.D. split spoon sampler of a 63.5kg weight falling 0.76m, required to drive the sampler a distance of 0.3m from 0.15m to 0.45m.

FINE GRAINED SOILS (major portion passing 0.075mm sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as estimated from laboratory or in situ tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH (KPA)
Very Soft	Less than 25
Soft	25 to 50
Firm	50 to 100
Stiff	100 to 200
Very Stiff	200 to 400
Hard	Greater than 400

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil.

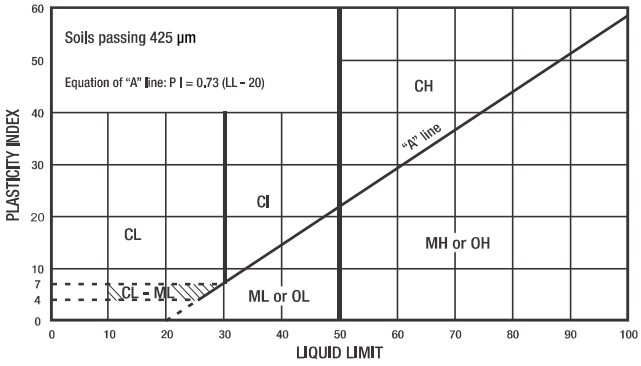
GENERAL DESCRIPTIVE TERMS

Slickensided - having inclined planes of weakness that are slick and glossy in appearance.
Fissured - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
Laminated - composed of thin layers of varying colour and texture.
Interbedded - composed of alternate layers of different soil types.
Calcareous - containing appreciable quantities of calcium carbonate.;
Well graded - having wide range in grain sizes and substantial amounts of intermediate particle sizes.
Poorly graded - predominantly of one grain size, or having a range of sizes with some intermediate size missing.

MODIFIED UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA		
COARSE-GRAINED SOILS More than 50% retained on 75 µm sieve*	GRAVELS 50% or more of coarse fraction retained on 4.75 mm sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	Classification on basis of percentage of fines: Less than 5% Pass 75 µm sieve; More than 12% Pass 75 µm sieve; 5% to 12% Pass 75 µm sieve	$C_U = D_{60} / D_{10}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	GW, GP, SW, SP GM, GC, SM, SC Borderline Classification requiring use of dual symbols	Not meeting both criteria for GW	
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits plot above "A" line or plasticity index greater than 7	
	SANDS More than 50% of coarse fraction passes 4.75 mm sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines		$C_U = D_{60}/D_{10}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			SP	Poorly graded sands and gravelly sands, little or no fines		Not meeting both criteria for SW	
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures		Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures		Atterberg limits plot above "A" line or plasticity index greater than 7	
FINE-GRAINED SOILS (by behavior) 50% or more passes 75 µm sieve*	SILTS Liquid limit <50		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands of slight plasticity	For classification of fine-grained soils and fine fraction of coarse-grained soils.		
	SILTS Liquid limit >50		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts			
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit <30		CL	Inorganic clays of low plasticity, gravelly clays, sandy clays, silty clays, lean clays			
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit 30-50		CI	Inorganic clays of medium plasticity, silty clays			
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit >50		CH	Inorganic clays of high plasticity, fat clays			
	ORGANIC SILTS AND CLAYS Liquid limit <50		OL	Organic silts and organic silty clays of low plasticity			
	ORGANIC SILTS AND CLAYS Liquid limit >50		OH	Organic clays of medium to high plasticity			
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils			

PLASTICITY CHART



*Based on the material passing the 75 mm sieve
Reference: ASTM Designation D2487, for identification procedure see D2488. USC as modified by PFRA

SOIL COMPONENTS

FRACTION	SIEVE SIZE PASSING	SIEVE SIZE RETAINED	DEFINING RANGES OF PERCENTAGE BY MASS OF MINOR COMPONENTS PERCENTAGE	DESCRIPTOR
GRAVEL				
coarse	75 mm	19 mm	>35 %	"and"
fine	19 mm	4.75 mm	21 to 35 %	"y-adjective"
SAND				
coarse	4.75 mm	2.00 mm	10 to 20 %	"some"
medium	2.00 mm	425 µm		
fine	425 µm	75 µm	>0 to 10 %	"trace"
SILT (non plastic) or CLAY (plastic)	75 µm		as above but by behavior	

OVERSIZE MATERIAL

Rounded or subrounded

COBBLES	75 mm to 300 mm
BOULDERS	> 300 mm

Not rounded

ROCK FRAGMENTS	>75 mm
ROCKS	> 0.76 cubic metre in volume

Project: Coalhurst ASP		BOREHOLE NO: **BH001**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 930.04 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) / Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	Elevation (m)
0		Topsoil (200 mm)				
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1		
1		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		S1	2-7-10	929
2				B2		928
3				S2	4-8-8	927
4				B3		926
5				S3	2-3-5	925
6				B4		924
7				S4	4-6-8	923
8				B5		922
9				S5	4-6-8	921
10				B6		920
11				S6	5-8-9	919
12		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.				918
13						

PLASTIC — M.C. — LIQUID (20 40 60 80)

▲ VANE SHEAR (kPa) ▲ (100 200 300 400)

■ BLOW COUNT ■ (20 40 60 80)

◆ UNCONF. SHEAR STR. (kPa) ◆ (100 200 300 400)

● 0.5 x POCKETPEN. (kPa) ● (100 200 300 400)

OTHER DATA

SLOTTED PIEZOMETER

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
	Page 1 of 1

AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH002**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 929.26 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID 20 40 60 80	▲VANE SHEAR (kPa)▲ 100 200 300 400 ■BLOW COUNT■ 20 40 60 80 ◆UNCONF. SHEAR STR. (kPa)◆ 100 200 300 400 ●0.5 x POCKETPEN. (kPa)● 100 200 300 400	OTHER DATA	Elevation (m)
0		Topsoil (200 mm)							929
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1					
1									928
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B2					
2									927
				B3					
3									926
				B4					
4				B5					925
				B6					
5									924
				B7					
6				B8					923
				B9					
7									922
				B10					
8									921
				B11					
9				B12					920
		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.							
10									919
11									918
12									917
13									

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH003**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 927.94 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID (20 40 60 80)	▲VANE SHEAR (kPa)▲ 100 200 300 400 / ■BLOW COUNT■ 20 40 60 80 / ◆UNCONF. SHEAR STR. (kPa)◆ 100 200 300 400 / ●0.5 x POCKETPEN. (kPa)● 100 200 300 400	OTHER DATA	Elevation (m)
0		Topsoil (150 mm)							
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1					927
1									
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B2					926
2				B3					925
3				B4					924
4				B5					923
5				B6					922
6				B7					921
7				B8					920
8				B9					919
9				B10					918
10				B11					917
11				B12					916
12		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.							
13									

LOGGED BY: CA	COMPLETION DEPTH: 9.14 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH004**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 928.45 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	Elevation (m)
0		Topsoil (150 mm)				928
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1		
1		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		S1	4-4-4	927
				B2		
2				S2	2-2-3	926
				B3		
3				S3	2-3-3	925
4 ▼		- very moist		B4		
				S4	4-4-5	924
5				B5		
		- moist		S5	3-6-6	923
6				B6		
				S6	4-5-7	922
7						
						921
8						
						920
9						
		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.				919
10						
						918
11						
						917
12						
						916
13						

PLASTIC — M.C. — LIQUID (20 40 60 80)

▲ VANE SHEAR (kPa) ▲ (100 200 300 400)

■ BLOW COUNT ■ (20 40 60 80)

◆ UNCONF. SHEAR STR. (kPa) ◆ (100 200 300 400)

● 0.5 x POCKETPEN. (kPa) ● (100 200 300 400)

OTHER DATA

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-7-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH005**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 928.73 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID (20 40 60 80)	▲VANE SHEAR (kPa)▲ 100 200 300 400 / ■BLOW COUNT■ 20 40 60 80 / ◆UNCONF. SHEAR STR. (kPa)◆ 100 200 300 400 / ●0.5 x POCKETPEN. (kPa)● 100 200 300 400	OTHER DATA	Elevation (m)
0		Topsoil (200 mm)							
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1					928
1									
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B2					927
2				B3					926
3				B4					925
4				B5					924
5				B6					923
6				B7					922
7				B8					921
8				B9					920
				B10					919
9		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.		B11					918
10				B12					917
11									916
12									
13									

LOGGED BY: CA	COMPLETION DEPTH: 9.14 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH006**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 930.37 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) / Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC — M.C. — LIQUID (20 40 60 80)	▲ VANE SHEAR (kPa) ▲ (100 200 300 400) / ■ BLOW COUNT ■ (20 40 60 80) / ◆ UNCONF. SHEAR STR. (kPa) ◆ (100 200 300 400) / ● 0.5 x POCKETPEN. (kPa) ● (100 200 300 400)	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		Topsoil (300 mm)								930
1		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1						
2		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		S1	2-2-3					929
				B2						928
3				S2	1-2-3					927
4				B3						
		- sand lense (450 mm thick), fine grained, silty very moist								926
5				S3	2-3-4					925
				B4						
6				S4	3-5-5					924
7				B5						923
8				S5	7-7-8					922
				B6						
9				S6	5-7-9					921
10		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.								920
11										919
12										918
13										

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21

AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH007**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 930.62 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) / Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC — M.C. — LIQUID (20 40 60 80)	▲ VANE SHEAR (kPa) ▲ (100 200 300 400) / ■ BLOW COUNT ■ (20 40 60 80) / ◆ UNCONF. SHEAR STR. (kPa) ◆ (100 200 300 400) / ● 0.5 x POCKETPEN. (kPa) ● (100 200 300 400)	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		Topsoil (300 mm)								930
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1						
1										
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		S1	2-4-4					929
2				B2						928
3				S2	2-3-4					
				B3						927
4										
				S3	3-4-5					926
5				B4						
										925
6				S4	2-4-5					
				B5						924
7										
				S5	4-6-8					923
8				B6						
										922
9 ▼				S6	2-6-8					
		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.								921
10										
										920
11										
										919
12										
										918
13										

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
	Page 1 of 1

AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH008**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 932.8 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID (20 40 60 80)	▲VANE SHEAR (kPa)▲ 100 200 300 400 / ■BLOW COUNT■ 20 40 60 80 / ◆UNCONF. SHEAR STR. (kPa)◆ 100 200 300 400 / ●0.5 x POCKETPEN. (kPa)● 100 200 300 400	OTHER DATA	Elevation (m)
0		Topsoil (200 mm)							932
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1					
1		- moist to very moist		B2					931
2				B3					930
3		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B4					
				B5					929
4				B6					928
5				B7					927
6				B8					
				B9					926
7				B10					925
8				B11					
				B12					924
9		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.							923
10									
11									922
12									921
13									920

LOGGED BY: CA	COMPLETION DEPTH: 9.14 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
	Page 1 of 1

AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH009**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 928.61 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) / Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	Elevation (m)
0		Topsoil (200 mm)				928
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1		
1						927
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		S1	2-3-3	
2				B2		926
3				S2	2-2-2	
				B3		925
4						
▼				S3	4-6-8	924
5				B4		
						923
6				S4	2-4-6	
				B5		922
7						
				S5	4-6-10	921
8				B6		
						920
9				S6	4-6-9	
		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.				919
10						
						918
11						
						917
12						
						916
13						

PLASTIC — M.C. — LIQUID (20 40 60 80)

▲ VANE SHEAR (kPa) ▲ (100 200 300 400)

■ BLOW COUNT ■ (20 40 60 80)

◆ UNCONF. SHEAR STR. (kPa) ◆ (100 200 300 400)

● 0.5 x POCKETPEN. (kPa) ● (100 200 300 400)

OTHER DATA

SLOTTED PIEZOMETER

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH010**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 930.73 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID (20 40 60 80)	▲VANE SHEAR (kPa)▲ 100 200 300 400 / ■BLOW COUNT■ 20 40 60 80 / ◆UNCONF. SHEAR STR. (kPa)◆ 100 200 300 400 / ●0.5 x POCKETPEN. (kPa)● 100 200 300 400	OTHER DATA	Elevation (m)
0		Topsoil (200 mm)							
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1					930
1		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B2					929
2				B3					928
3				B4					927
4				B5					926
5				B6					925
6				B7					924
7				B8					923
8				B9					922
9				B10					921
				B11					920
				B12					919
10		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.							918
11									
12									
13									

LOGGED BY: CA	COMPLETION DEPTH: 9.14 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
	Page 1 of 1

AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH011**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 928.08 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID (20 40 60 80)	▲VANE SHEAR (kPa)▲ 100 200 300 400 / ■BLOW COUNT■ 20 40 60 80 / ◆UNCONF. SHEAR STR. (kPa)◆ 100 200 300 400 / ●0.5 x POCKETPEN. (kPa)● 100 200 300 400	OTHER DATA	Elevation (m)
0		Topsoil (150 mm)							928
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1					
1									927
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B2					
2									926
				B3					
3									925
				B4					
4									924
				B5					
5									923
				B6					
				B7					
6		- thin sand lenses, fine grained, very moist							922
				B8					
7				B9					921
				B10					
8									920
				B11					
9				B12					919
		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.							
10									918
11									917
12									916
13									

LOGGED BY: CA	COMPLETION DEPTH: 9.14 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH012**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 928.24 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) / Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	Elevation (m)
0		Topsoil (200 mm)				928
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1		
1						927
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		S1	3-5-5	
2				B2		926
				S2	3-4-6	
3						925
				B3		
4						924
				S3	3-6-7	
5				B4		923
6				S4	5-7-9	922
				B5		
7						921
				S5	4-7-9	
8				B6		920
9				S6	3-4-6	919
		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.				
10						918
11						917
12						916
13						

PLASTIC — M.C. — LIQUID (20 40 60 80)

▲ VANE SHEAR (kPa) ▲ (100 200 300 400)

■ BLOW COUNT ■ (20 40 60 80)

◆ UNCONF. SHEAR STR. (kPa) ◆ (100 200 300 400)

● 0.5 x POCKETPEN. (kPa) ● (100 200 300 400)

OTHER DATA

SLOTTED PIEZOMETER

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH013**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 927.71 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) / Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	Elevation (m)
0		Topsoil (200 mm)				927
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1		
1		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		S1	2-4-4	926
2				B2		925
3				S2	2-2-3	924
4				B3		923
5				S3	2-3-3	922
				B4		
6				S4	2-3-5	921
7				B5		920
8		- sand lense, medium grained, saturated		S5	3-4-5	919
				B6		
9				S6	4-6-7	918
10		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.				917
11						916
12						915
13						

PLASTIC — M.C. — LIQUID (20 40 60 80)

▲ VANE SHEAR (kPa) ▲ (100 200 300 400)

■ BLOW COUNT ■ (20 40 60 80)

◆ UNCONF. SHEAR STR. (kPa) ◆ (100 200 300 400)

● 0.5 x POCKETPEN. (kPa) ● (100 200 300 400)

OTHER DATA

SLOTTED PIEZOMETER

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-7-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH014**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 926.46 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID 20 40 60 80	▲VANE SHEAR (kPa)▲ 100 200 300 400 ■BLOW COUNT■ 20 40 60 80 ◆UNCONF. SHEAR STR. (kPa)◆ 100 200 300 400 ●0.5 x POCKETPEN. (kPa)● 100 200 300 400	OTHER DATA	Elevation (m)
0		Topsoil (200 mm)							926
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown							
1		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B1					925
2				B2					924
3				B3					923
4				B4					922
5				B5					921
6				B6					920
7				B7					919
8				B8					918
9				B9					917
10				B10					916
11				B11					915
12				B12					914
13		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.							

LOGGED BY: CA	COMPLETION DEPTH: 9.14 m
REVIEWED BY: BDT	COMPLETION DATE: 12-6-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH015**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 928.46 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) / Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC — M.C. — LIQUID (20 40 60 80)	▲ VANE SHEAR (kPa) ▲ (100 200 300 400) / ■ BLOW COUNT ■ (20 40 60 80) / ◆ UNCONF. SHEAR STR. (kPa) ◆ (100 200 300 400) / ● 0.5 x POCKETPEN. (kPa) ● (100 200 300 400)	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		Topsoil (300 mm)								928
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1						
1										927
				S1	1-1-2					
2				B2						926
3 ▼				S2	2-3-3					925
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B3						
4		- sand lesne (300 mm), free water								924
				S3	1-3-4					
5				B4						923
6				S4	4-5-6					922
				B5						
7										921
				S5	3-5-6					
8				B6						920
9				S6	3-5-7					919
		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.								
10										918
11										917
12										916
13										

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-7-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH016**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 927.55 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID (20 40 60 80)	▲VANE SHEAR (kPa)▲ (100 200 300 400) ■BLOW COUNT■ (20 40 60 80) ◆UNCONF. SHEAR STR. (kPa)◆ (100 200 300 400) ●0.5 x POCKETPEN. (kPa)● (100 200 300 400)	OTHER DATA	Elevation (m)
0		Topsoil (150 mm)							927
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1					
1									926
				B2					
2									925
				B3					
3									924
				B4					
4				B5					923
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B6					
5									922
				B7					
6									921
				B8					
7									920
				B9					
8									919
				B10					
9				B11					918
		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.		B12					
10									917
11									916
12									915
13									

LOGGED BY: CA	COMPLETION DEPTH: 9.14 m
REVIEWED BY: BDT	COMPLETION DATE: 12-7-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH017**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 926.86 m

SAMPLE TYPE ■ SHELBY TUBE ◪ CORE SAMPLE ☒ SPT SAMPLE ▤ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm	PLASTIC M.C. LIQUID (20 40 60 80)	▲VANE SHEAR (kPa)▲ 100 200 300 400 ■BLOW COUNT■ 20 40 60 80 ◆UNCONF. SHEAR STR. (kPa)◆ 100 200 300 400 ●0.5 x POCKETPEN. (kPa)● 100 200 300 400	OTHER DATA	Elevation (m)
0		Topsoil (150 mm)							
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown		B1					926
1									
		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B2					925
2				B3					
									924
3				B4					
									923
4				B5					
				B6					922
5									
				B7					921
6				B8					
									920
7				B9					
				B10					919
8		- free water							
				B11					918
9				B12					
		End of Borehole at 9.1 m. No sloughing or seepage upon completion. no standpipe installed.							917
10									
									916
11									
									915
12									
13									914

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-7-21
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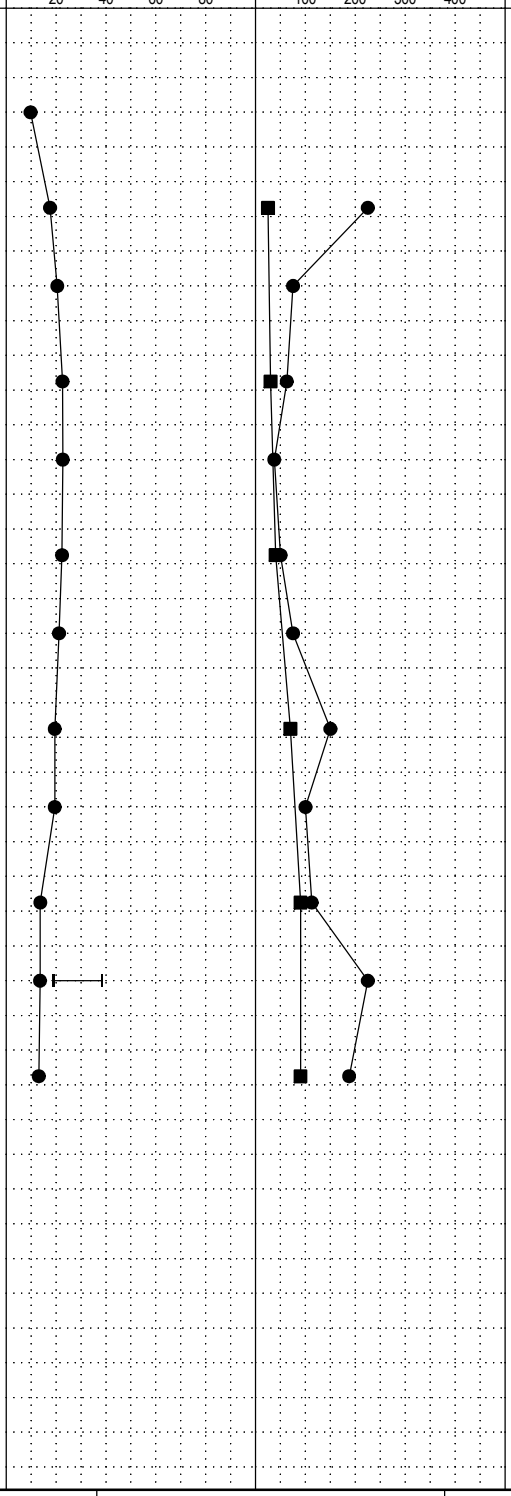
AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

Project: Coalhurst ASP		BOREHOLE NO: **BH018**
Client: 2176168 Alberta Ltd.		PROJECT NO: 2021-163
	Solid Stem Auger	ELEVATION: 927.89 m

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

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

Depth (m) / Water Level	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	BLOWS /150 mm
0		Topsoil (200 mm)			
		Clay - silty, some sand, firm to stiff, damp, low plastic, light brown			
1		Clay Till - silty, trace sand and gravel, stiff, moist, low to medium plastic, olive brown		B1	
				S1	3-3-2
2				B2	
3				S2	2-3-3
4 ▼				B3	
				S3	3-3-5
5				B4	
6				S4	4-7-7
7				B5	
				S5	3-8-10
8				B6	
9				S6	5-8-10
10		End of Borehole at 9.55 m. No sloughing or seepage upon completion. Standpipe installed to 9.1 m. Groundwater level as indicated when monitored on Dec. 20, 2021.			
11					
12					
13					



OTHER DATA

SLOTTED PIEZOMETER

Elevation (m)
927
926
925
924
923
922
921
920
919
918
917
916
915

LOGGED BY: CA	COMPLETION DEPTH: 9.60 m
REVIEWED BY: BDT	COMPLETION DATE: 12-7-21
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AB TRANS BOREHOLE LOG COALHURST ASP.GPJ AB_TRANS.GDT 12-20-21

APPENDIX C – GENERAL CONSTRUCTION GUIDELINES

SHALLOW FOUNDATIONS

Design and construction of shallow foundations should comply with relevant Building Code requirements.

The term ‘shallow foundations’ includes strip and spread footings, mat slab and raft foundations. Minimum footing dimensions in plan should be 0.45m and 0.9m for strip and square footings respectively.

No loose, disturbed or sloughed material should be allowed to remain in open foundation excavations.

Hand cleaning should be undertaken to prepare an acceptable bearing surface. Recompaction of disturbed or loosened bearing surface may be required.

Foundation excavations and bearing surfaces should be protected from rain, snow, freezing temperatures, excessive drying and the ingress of free water before, during and after footing construction.

Footing excavations should be carried down into the designated bearing stratum.

After the bearing surface is approved, a mud slab should be poured to protect the soil and provide a working surface for construction, should immediate foundation construction not be intended.
All constructed foundations should be placed on unfrozen soils, which should be at all times protected from frost penetration.

All foundation excavations and bearing surfaces should be inspected by a qualified geotechnical engineer to check that the recommendations contained in this report have been followed.

Where over-excavation has been carried out through a weak or unsuitable stratum to reach into a suitable bearing stratum or where a foundation pad is to be placed above stripped natural ground surface such over-excavation may be backfilled to subgrade elevation utilizing either structural fill or lean-mix concrete. These materials are defined under the separate heading ‘Backfill Materials and Compaction’.

FLOOR SLABS-ON-GRADE

All soft, loose or organic material should be removed from beneath slab areas. If any local 'hard spots' such as old basement walls are revealed beneath the slab area, these should be over-excavated and removed to not less than 0.9 m below underside of slab level. The exposed soil should be proof-rolled and the final grade restored by general engineered fill placement. If proof-rolling reveals any soft or loose spots, these should be excavated and the desired grade restored by general engineered fill placement. Proof-rolling should be carried out in accordance with the recommendations given elsewhere in this Appendix. The subgrade should be compacted to a depth of not less than 0.3m to a density of not less than 98 percent Standard Proctor Maximum Dry Density (ASTM Test Method D698).

A levelling course of 20mm crushed gravel at least 150 mm in compacted thickness, is recommended directly beneath all slabs-on-grade. Alternatively, a minimum thickness of 150mm of pit-run gravel overlain by a minimum thickness of 50 mm of 20mm crushed gravel may be used. Very coarse material (larger than 25 mm diameter) should be avoided directly beneath the slab-on-grade to limit potential stress concentrations within the slab. All levelling courses directly under floor slabs should be compacted to 100 percent of Standard Proctor maximum dry density.

General engineered fill, pit-run gravel and crushed gravel are defined under the heading 'Backfill Materials and Compaction' elsewhere in this Appendix.

The slab should be structurally independent from walls and columns supported on foundations. This is to reduce any structural distress that may occur as a result of differential soil movements. If it is intended to place any internal non-load bearing partition walls directly on a slab-on-grade, such walls should also be structurally independent from other elements of the building founded on a conventional foundation system so that some relative vertical movement of the walls can occur freely.

The excavated subgrade beneath slabs-on-grade should be protected at all times from rain, snow, freezing temperatures, excessive drying and the ingress of free water. This applies during and after the construction period.

A minimum slab concrete thickness of 100mm is recommended. Control joints should be provided in all slabs. Typically for a 125mm slab thickness; control joints should be placed on a 3 m square grid, should be sawn to a depth of one-quarter the slab thickness and have a width of approximately 3 mm.

Wire mesh reinforcement, 150 mm square grid, should be provided to reduce the possibility of uncontrolled slab cracking. The mesh should be adequately supported and should be located at mid-height of the slab with adequate cover.

Backfill Materials and Compaction

1.0 Definitions

“Landscape fill” is typically used in areas such as berms and grassed areas where settlement of the fill and noticeable surface subsidence can be tolerated. “Landscape fill” may comprise soils without regard to engineering quality.

“General engineered fill” is typically used in areas where a moderate potential for subgrade movement is tolerable, such as asphalt (i.e., flexible) pavement areas. “General engineered fill” should comprise clean, granular or clay soils.

“Select engineered fill” is typically used below slabs-on-grade or where high volumetric stability is desired, such as within the footprint of a building. “Select engineered fill” should comprise clean, well-graded granular soils or inorganic low to medium plastic clay soils.

“Structural engineered fill” is used for supporting structural loads in conjunction with shallow foundations. “Structural engineered fill” should comprise clean, well-graded granular soils.

“Lean-mix concrete” is typically used to protect a subgrade from weather effects including excessive drying or wetting. “Lean-mix concrete” can also be used to provide a stable working platform over weak subgrades. “Lean-mix concrete” should be low strength concrete having a minimum 28-day compressive strength of 3.5 MPa. Standard Proctor Density (SPD) as used herein means Standard Proctor Maximum Dry Density (ASTM Test Method D698). Optimum moisture content is defined in ASTM Test Method D698.

2.0 General Backfill and Compaction Recommendations

Exterior backfill adjacent to abutment walls, basement walls, grade beams, pile caps and above footings, and below highway, street, or parking lot pavement sections should comprise “general engineered fill” materials as defined above. Exterior backfill adjacent to footings, foundation walls, grade beams and pile caps and within 600 mm of final grade should comprise inorganic, cohesive “general engineered fill”. Such backfill should provide a relatively impervious surficial zone to reduce seepage into the subsoil against the structure.

Backfill should not be placed against a foundation structure until the structure has sufficient strength to withstand the earth pressures resulting from placement and compaction. During compaction, careful observation of the foundation wall for deflection should be carried out continuously. Where deflections are apparent, the compactive effort should be reduced accordingly.

In order to reduce potential compaction induced stresses, only hand-held compaction equipment should be used in the compaction of fill within 1 m of retaining walls or basement walls. If compacted fill is to be placed on both sides of the wall, they should be filled together so that the level on either side is within 0.5 m of each other.

All lumps of materials should be broken down during placement. Backfill materials should not be placed in a frozen state, or placed on a frozen subgrade.

Where the maximum-sized particles in any backfill, material exceed 50 percent of the minimum dimension of the cross-section to be backfilled (e.g., lift thickness), such particles should be removed and placed at other more suitable locations on site or screened off prior to delivery to site.

Bonding should be provided between backfill lifts. For fine-grained materials, the previous lift should be scarified to the base of the desiccated layer, moisture-conditioned, and recompacted and bonded thoroughly to the succeeding lift. For granular materials, the surface of the previous lift should be scarified to about a 75 mm depth followed by proper moisture-conditioning and recompaction.

3.0 COMPACTION AND MOISTURE CONDITIONING

"Landscape fill" material should be placed in compacted lifts not exceeding 300 mm and compacted to a density of not less than 90 percent of SPD unless a higher percentage is specified by the jurisdiction.

"General engineered fill" and "select engineered fill" materials should be placed in layers of 150 mm compacted thickness and should be compacted to not less than 98 percent of SPD. Note that the contract may specify higher compaction levels within 300 mm of the design elevation. Cohesive materials placed as "general engineered fill" or "select engineered fill" should be compacted at 0 to 2 percent above the optimum moisture content. Note that there are some silty soils which can become quite unstable when compacted above optimum moisture content.

Granular materials placed as "general engineered fill" or "select engineered fill" should be compacted at slightly below (0 to 2%) the optimum moisture content. "Structural engineered fill" material should be placed in compacted lifts not exceeding 150 mm in thickness and compacted to not less than 100 percent of SPD at slightly below (0 to 2%) the optimum moisture content.

4.0 "GENERAL ENGINEERED FILL"

Low to medium plastic clay is considered acceptable for use as "general engineered fill," assuming this material is inorganic and free of deleterious materials. Materials meeting the specifications for "select engineered fill" or "structural engineered fill" as described below would also be acceptable for use as "general engineered fill."

5.0 "SELECT ENGINEERED FILL"

Low to medium plastic clay with the following range of plasticity properties is generally considered suitable for use as "select engineered fill":

Liquid Limit	=	20 to 40%
Plastic Limit	=	10 to 20%
Plasticity Index	=	10 to 30%

Test results should be considered on a case-by-case basis.

"Pit-run gravel" and "fill sand" are generally considered acceptable for use as "select engineered

fill." See exact project or jurisdiction for specifications. The "pit-run gravel" should be free of any form of coating and any gravel or sand containing clay, loam or other deleterious materials should be rejected. No material oversize of the specified maximum sieve size should be tolerated. This material would typically haves a fines content of less than 10%. The materials above are also suitable for use as "general engineered fill."

Construction Excavations

Construction should be in accordance with good practice and comply with the requirements of the responsible regulatory agencies.

All excavations greater than 1.5m deep should be sloped or shored for worker protection.

Shallow excavations up to about 3m depth may use temporary sideslopes of 1H:1V. A flatter slope of 2H:1V should be used if groundwater is encountered. Localized sloughing can be expected from these slopes.

Deep excavations or trenches may require temporary support if space limitations or economic considerations preclude the use of sloped excavations.

For excavations greater than 3m depth, temporary support should be designed by a qualified geotechnical engineer. The design and proposed installation and construction procedures should be submitted to BDT for review.

The construction of a temporary support system should be monitored. Detailed records should be taken of installation methods, materials, in situ conditions and the movement of the system. If anchors are used, they should be load tested. BDT can provide further information on monitoring and testing procedures if required.

Attention should be paid to structures or buried service lines close to the excavation. For structures, a general guideline is that if a line projected down, at 45 degrees from the horizontal from the base of foundations of adjacent structures intersects the extent of the proposed excavation, these structures may require underpinning or special shoring techniques to avoid damaging earth movements. The need for any underpinning or special shoring techniques and the scope of monitoring required can be determined when details of the service ducts and vaults, foundation configuration of existing buildings and final design excavation levels are known.

No surface surcharges should be placed closer to the edge of the excavation than a distance equal to the depth of the excavation, unless the excavation support system has been designed to accommodate such surcharge.

Appendix C: Phase 1 Environmental Site Assessment

PHASE I ENVIRONMENTAL SITE ASSESSMENT

NE-16-9-22-W4M
COUNTY OF LETHBRIDGE
ALBERTA

ENVIRONMENTAL SERVICES LTD.

Serving Albertans for 20 years
2000-2020

PROJECT NO. WA-21-111309

REPORT TO

2176168 ALBERTA LTD.

PHASE I
ENVIRONMENTAL SITE ASSESSMENT
NE-16-9-22-W4M
COUNTY OF LETHBRIDGE
ALBERTA

WA Environmental Services Ltd.
221 Riverpark Blvd.
Lethbridge
Alberta T1K 0P6

Tel: (403) 381-8141
www.waenvironmental.ca

November 26, 2021

EXECUTIVE SUMMARY

Between November 17th and November 26th, 2021 WA Environmental Services Ltd. (WAES) conducted a Phase I Environmental Site Assessment of a 53.42 ha property located at NE-16-9-22-W4M. The site is situated to the southeast of the town of Coalhurst in the County of Lethbridge, Alberta. It is understood that the assessment is required due to a potential business transaction involving the property.

A summary of environmental concerns identified at the site is presented in Table 1.

The subject site is an undeveloped portion of land and is zoned Rural Agricultural. The site was initially developed as agricultural land in the 1920s and remains as such to the present day. An acreage was developed in the east central portion of the site which remains to the present day.

Surrounding land use is mostly comprised of agricultural properties to the east and south of the site and single family residential to the north and west. The Coalhurst Mine No. 0174 workings (still visible) were located approximately 600 m north of the site. Constructed in 1911, the mine operated until 1936 and closed following an explosion that killed 16 mine workers. The mine operated at a depth of 153 m to 192 m below the entire site. No other concerns resulting from past or present adjacent land use were identified during this assessment.

Presently there are no buildings located on the site; therefore no hazardous building materials were identified at the time of the site reconnaissance.

Based on the information gathered and on observations made during this investigation, the Phase I Environmental Site Assessment has not revealed any evidence of environmental contamination associated with the site.

Depending on the type of the proposed site development, consideration should be given to determining whether or not structural enhancements are required for building foundations to mitigate any potential mine failures below ground. Consideration should be given to carrying out a Mining Subsidence Study at the site and/or retaining a structural engineer to review the potential impacts for mining subsidence related settlement at the site.

Based on our findings, no further environmental investigation of the site is recommended at this time.

Table 1 - Summary of Findings and Recommendations			
Potential Source of Contamination	**Level of Environmental Contamination**	**Findings**	**Recommended Action**
Adjacent Properties	None	Surrounding land use is agricultural and residential. No environmental concerns were identified as a result of the present adjacent land use.	None.
Historical Land Use	Low	The site has been undeveloped since the early 1920s and used for agricultural purposes. The site has been undermined by historical coal mining operations between 1911 and 1936	Consideration should be given to retaining a structural engineer to determine whether or not the mining activities pose any risk to surficial settlement as a result of a mine collapse at depth beneath the site.
Underground Fuels and Chemicals	None	None observed or reported.	None.
Aboveground Fuels and Chemicals	None	None observed or reported.	None.
Waste Management	None	No waste is presently being generated at the site.	None.
Spill and Stain Areas	None	None observed or reported.	None.
Wastewater Discharges	None	No wastewater is generated at the site.	None.
Air Discharges	None	None observed or reported.	None.
Polychlorinated Biphenyls (PCBs)	None	None observed or reported	None.
Asbestos	None	None observed or reported	None
UFFI	None	None observed or reported	None.
Ozone Depleting Substances (ODSs)	None	None observed or reported	None.
Lead	None	None observed or reported.	None.
Electromagnetic Frequencies	None	None observed or reported.	None.
Radon	None	See main text of report.	None.
Hydraulic Hoists/Elevators	None	None observed or reported.	None.
Mercury	None	None observed or reported	None.
Mould	None	None observed or reported	None.
Water Supply	None	Currently the site is not serviced for water. A subsurface irrigation pipe is present approximately 375 m west of the east property line and extends from the south property line to the north property line.	None.
Fill Areas	None	None observed or reported.	None.

High - Evidence of actual contamination, **Moderate** - Evidence of potential contamination (significant), **Low** - Evidence of potential contamination (minor), **None** - No evidence of contamination

TABLE OF CONTENTS

LIST OF APPENDICES, TABLES, AND DRAWINGS

APPENDICES

TABLES

DRAWINGS

1.0 INTRODUCTION

WA Environmental Services Ltd. (WAES) was retained by 2176168 Alberta Ltd. to complete a Phase I Environmental Site Assessment (ESA) of a 53.42 ha property located at NE-16-9-22-W4M. The site is situated to the southeast of the town of Coalhurst in the County of Lethbridge, Alberta. A site location plan and a site plan showing adjacent land use are included in Appendix A of this report. It is understood that the Phase I ESA was requested due to potential redevelopment of the property.

The purpose of the Phase I ESA was to identify any actual or potential environmental contaminants associated with the site that exist as a result of current or past activities.

This report is presented in nine sections. Sections 1 and 2 present general information about the project, and describe the scope of work and the methodology used. Section 3 provides a summary of applicable legislation that may be referenced during the assessment. Sections 4 to 6 describe the present and historic conditions of the subject and adjacent properties. Section 7 presents the findings of the site visit. Environmental concerns are identified in this section. Significant environmental concerns and related recommendations are summarized in Section 8. Section 9 discusses the limitations of the assessment and its findings. Supporting information is provided in several appendices at the end of this report. Select photographs are included in the text of this report.

2.0 PHASE I SCOPE AND METHODOLOGY

2.1 Scope of Work

The Phase I ESA carried out by WAES on this property is based on the requirements of the Canadian Standards Association (CSA) Phase I Environmental Site Assessment Information Product, Z768-01, (CSA protocol, reaffirmed in 2018) (CSA protocol) and consists of the following:

- records review;
- interviews with regulatory officials and personnel associated with the site and adjoining properties;
- a site visit; and
- evaluation of information and preparation of the report provided herein.

A Phase I ESA does not include sampling or testing of air, soil, groundwater, surface water or building materials. These activities would be carried out in a Phase II ESA, if required. No enhancements of this assessment were conducted. The professional qualifications of the project team and Insurance Certificates are provided in Appendix B. The contract between 2176168 Alberta Ltd. and WAES to conduct the Phase I Environmental Site Assessment is confidential and has not been included in this report.

2.2 Methodology

2.2.1 Records Review

The applicable search distance for the records review included properties immediately adjacent to the sites and other properties (as identified by aerial photographs, insurance records, etc.) where the potential for environmental contamination of the subject sites was apparent (e.g., petroleum products storage in the immediate area).

No previous environmental reports were provided for review as part of this assessment. A list of records reviewed is included in **Appendix C.**

2.2.2 Interviews

Interviews were carried out to obtain or confirm information on the environmental characteristics of this property. A summary of interviewees and contact information is presented in Appendix C.

2.2.3 Site Visit

The subject property and readily visible and publicly accessible portions of adjacent sites were examined for the presence of actual or potential environmental contamination. All areas of the property were accessible to WAES during the site visit on November 23, 2021.

3.0 REGULATORY FRAMEWORK

Applicable federal, provincial and municipal regulations were reviewed to identify and assess potential or actual environmental contamination at the sites and to develop appropriate recommendations. It should be noted, however, that this assessment did not include a review or audit of operational environmental compliance issues or of any environmental management system (EMS) that may exist for the property. Where required, the documents listed in Appendix D were used as reference material for the completion of the Phase I Assessment.

4.0 SITE DESCRIPTION

4.1 Property Description

The subject site is located in an undeveloped portion of land located southeast of the town of Coalhurst, Alberta. The zoning for the subject site is Rural Agriculture. The site has a plan area of approximately 52.43 ha. There are no buildings located on the site, which is presently vacant and used for agricultural purposes. The legal description for the property is NE-16-9-22-W4M, County of Lethbridge, Alberta. (Drawing 2, Appendix A)

Photograph 1: View of subject site looking southwest from Range Road 223.

4.2 Soil, Topography and Drainage

The site is generally flat. Surface water from the site drains towards ditches located on the perimeter of the site. According to published geological information (Shetsen, 1987[1]), site soils are typically silt and clay, overlying clay till up to 20 m thick. Based on local topography, shallow groundwater flow is suspected to be towards the east, discharging into the Oldman River. The direction of regional (i.e., deep) groundwater flow

[1]Shetsen, I. 1987. *Surficial Geology of Southern Alberta.* Alberta Research Council.

is also predicted to be eastward towards the Oldman River (Tokarsky, 1974[2]).

It should be noted that topography, geologic materials, development of land and soil disturbances influence localized variances in groundwater movement and pattern. In addition, groundwater levels will fluctuate seasonally and in response to climatic conditions.

Photograph 2: Looking at the west boundary of the site. Note: buried LNID canal lateral (arrowed) and residential property to the west of the site.

4.3 On-Site Buildings and Structures

Presently, there are no buildings situated on the site. The site is currently vacant and used for agricultural purposes. A summary of the property information is presented in Table 2.

Table 2 - Summary of Lot Information	
Property	
Current Zoning	Rural Agricultural
Area	Approximately 52.46 ha
Services: Sewer, Water, Electricity	The site is presently not serviced. There is a buried irrigation line located in the centre of the site running north-south.
Building	
Number of Storeys	Presently there are no buildings located on the site.
Exterior Finish	Presently there are no buildings located on the site.
Interior Finish	Presently there are no buildings located on the site.
Foundation	Presently there are no buildings located on the site.
Basement	Presently there are no buildings located on the site.
Insulation	Presently there are no buildings located on the site.
Heating, Ventilating, Air Conditioning	Presently there are no buildings located on the site.
Sumps, Floor Drains	Presently there are no buildings located on the site.
Underground and Aboveground Storage Tanks	Presently there are no buildings located on the site.

Land use of the adjacent properties is identified on Drawing 2 in Appendix A. A summary of this land use is presented in Table 3.

Table 3 - Adjacent Properties - Land Use		
Boundary Side of Site	**Current Activity**	**Potential Sources of Contamination**
North	Residential (Sundance Ridge) and vacant land	None identified
South	Residential acreage	None identified
East	Range Road 223 and agricultural	None identified
West	Residential	None identified

No evidence of actual or potential environmental impact from neighbouring properties was observed on the site during the site reconnaissance.

Photograph 3: View of residential property to the north of the site.

6.0 REVIEW OF HISTORICAL LAND USE AND REGULATORY HISTORY

6.1 Historical Land Use

Historical information describing the site was obtained from a variety of sources as detailed in Appendix C of this report. Lists of historical land uses for the investigated site and adjacent properties are provided in Table 4 and 5, respectively.

Table 4 - Historical Information for the Site

Period/Date	Land Use	Sources of Information
Prior to approximately 1920	Undeveloped	Air photographs, interviews
From approximately 1920 mid to present day	The site has been used for agricultural purposes since the 1920s which continues to the present day.	Air photographs, interviews

Based on information obtained during the historical review, it is unlikely that the presence of the above land use has adversely impacted the site.

Photograph 4: View of the site with acreage located on east central boundary of the site in the distance.

Table 5 - Historical Information for Adjacent Properties

Boundary Side of Site	Comments	Sources of Information
North	The land to the northeast was originally developed as agricultural land and continues to be used as such to the present day. The land to the northwest was developed in the 1970s from agricultural land to a residential subdivision.	Air photographs and interviews
South	The land to the north was originally developed as agricultural land until the mid-1970s when an acreage was constructed, which remains to the present.	Air photographs and interviews

Table 5 - Historical Information for Adjacent Properties		
East	The land to the east across Range Road 223 has been used for agricultural purposes since the early 1920s and remains to the present-day.	Air photographs and interviews
West	The land to the west was used as farmland from the 1920s to the mid-1980s when a single-family dwelling subdivision was developed.	Air photographs and interviews

The complete site was undermined by the Coalhurst Mine No. 0174 from 1911 to 1936.

6.2 Regulatory History

A summary of information obtained from interviews with and/or written requests from regulatory agencies is provided below:

- **Alberta Environment and Parks Environmental Site Assessment Repository**: A review of the ESAR database indicates that they have no records for the subject site.

- **Alberta Environment and Parks, Regulatory Approvals Centre:** Information received from the Regulatory Approvals Centre indicates that they have no record of any approvals having been issued for the site.

- **Environmental Law Centre:** Information received from the Environmental Law Centre indicates that they have no record of Control Orders, Stop Orders, Prosecutions, or Tickets issued regarding the property owner.

- **Safety Codes Council :** Written information received from the SCC states that they have no record of active or abandoned storage tanks registered at the site.

- **Town of Coalhurst Volunteer Fire Department**: Verbal information received indicated that there are no records of violations (of the 2019 Alberta Fire Code) for the site.

- **Alberta Land Titles:** Written information from Alberta Land Titles indicated that previous ownership of the land has not revealed evidence of potential environmental contamination of the site.

- **The Environmental Risk Information Service (ERIS Data):** The ERIS Database was reviewed for the on-site and adjacent lands presence of oil/gas wells, waste management facilities, and Approved disposal sites. No facilities were reported on or adjacent to the site.

7.0 SITE VISIT FINDINGS AND DISCUSSION

The site visit was carried out by Mr. Tim Waters of WA Environmental Services Ltd. on November 23, 2021.

7.1 Fuel/Chemical Handling and Storage

No aboveground fuel storage tanks or chemical handling, storage or disposal activities were observed at the site. No evidence of fill or vent pipes indicating the possible presence of underground storage tanks was observed on site.

7.2 Waste Materials

No hazardous waste is generated at the site.

7.3 Spill and Stain Areas

None observed or reported at the time of the site reconnaissance.

7.4 Wastewater Discharges

None observed or reported.

7.5 Air Discharges

No issues reported.

7.6 Polychlorinated Biphenyls (PCBs)

The past use of PCBs in electrical equipment such as transformers, fluorescent lamp ballasts, and capacitors was common. The federal *Environmental Contaminants Act*, 1976, prohibited the use of PCBs in heat transfer and electrical equipment installed after September 1, 1977, and in transformers and capacitors installed after July 1, 1980. In addition, storage and disposal of PCB waste materials is regulated. No sources of PCB's were observed or reported at the site during the site reconnaissance.

7.7 Asbestos

The common use of potential friable (breakable by hand) asbestos-containing materials (ACMs) (pipe/boiler insulation and fireproofing) in construction generally ceased voluntarily in the mid 1970s. No ACMs were observed or reported at the time of the site reconnaissance.

7.8 Urea Formaldehyde Foam Insulation (UFFI)

The sale and installation of UFFI as thermal insulation began in approximately 1970 and continued until December 1980 when it was banned under the federal *Hazardous Products Act*. UFFI was installed in both new and existing buildings during this period. Evidence of UFFI was not observed during the site reconnaissance.

7.9 Lead

In 1976, the lead content in interior paint was limited to 0.5% by weight under the federal *Hazardous Products Act*. Lead is also associated with plumbing solder and old pipes as well as other lead based products such as wall shielding (x-ray rooms). No evidence of lead based products was observed on-site during the site reconnaissance.

7.10 Ozone Depleting Substances (ODSs)

In 1994, the federal government filed the *Ozone-depleting Substances Regulations* to amend controls on production and consumption of (chlorofluorocarbons (CFCs). Halons, carbon, tetrachloride and methyl chloroform. No sources of ozone depleting substances (ODSs) were observed on-site.

7.11 Radon

Radon gas is a product of the decay series that begins with uranium. Radon is produced directly from radium, which can be commonly found in bedrock that contains black shale and/or granite. Radon gas can migrate through the ground and enter buildings through porous concrete or fractures. Radon tends to accumulate in poorly ventilated basements. Health Canada now recommends that all homeowners have their homes tested for radon. WAES is not aware of radon gas testing for the subject site. Methods that the builder can use to reduce entry routes in new home construction include:

- minimizing cracking of the basement floor slab by properly preparing the sub-slab area (i.e. replacing unstable soil, large stones, etc.) using higher strength concrete, and providing proper curing conditions,
- sealing the basement floor/foundation wall crack,
- sealing around all penetrations of the foundation walls and basement floors by objects such as utility lines (e.g. water, sewer, electrical, natural gas, fuel oil),
- installing a barrier of at least 0.15 mm (6 mil) polyethylene under the basement floor slab or on top of exposed soil in crawlspaces,
- installing special traps in floor drains that allow water to drain but prevent radon from entering the basement, and
- using a solid course of masonry units at the top and bottom of concrete block foundation walls.

Reducing the pressure difference between the home and soil may reduce the amount of radon drawn indoors. Options include:

- installing an insulated duct to provide outdoor air to a gas or oil furnace, boiler or water heater,
- for a forced-air service heating system, installing and insulated duct from the outdoors to the main return-air duct,

equipping a wood or gas fireplace with glass doors that fit tightly and with a supply of outdoor air for combustion and installing a balanced ventilation system such as a heat recovery ventilator (HRV).

7.12 Electromagnetic Frequencies (EMFs)

No high-tension transmission lines were observed near the site. Electro-magnetic frequencies are not anticipated to impact the site.

7.13 Noise and Vibration

There were no major sources of noise and vibration identified on or adjacent to the subject property during the site reconnaissance, with the exception of railway traffic from the CPR Railway south of the site.

7.14 Hydraulic Hoists and Elevators

There were no hydraulic hoists or elevators observed at the subject property during the site reconnaissance.

7.15 Mercury

None observed or reported.

7.16 Mould

None observed or reported.

7.17 Water Supply

Presently the site is not serviced for potable water. A subsurface LNID supply pipe is located in the central portion of the site from the south boundary to the north boundary, used for irrigation purposes.

7.18 Fill Areas

Fill areas on site are likely isolated to the LNID irrigation pipe cover.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The subject site is an undeveloped portion of land and is zoned Rural Agricultural. The site was initially developed as agricultural land in the 1920s and remains as such to the present day. An acreage was developed in the east central portion of the site which remains to the present day.

Surrounding land use is mostly comprised of agricultural properties to the east and south of the site and single family residential to the north and west. The Coalhurst Mine No. 0174 workings (still visible) were located approximately 600 m north of the site. Constucted in 1911, the mine operated until 1936 and closed following an explosion that killed 16 mine workers. The mine operated at a depth of 153 m to 192 m below the entire site. No other concerns resulting from past or present adjacent land use were identified during this assessment.

Presently there are no buildings located on the site; therefore no hazardous building materials were identified at the time of the site reconnaissance.

Based on the information gathered and on observations made during this investigation, the Phase I Environmental Site Assessment has not revealed any evidence of environmental contamination associated with the site.

Depending on the type of the proposed site development, consideration should be given to determining whether or not structural enhancements are required for building foundations to mitigate any potential mine failures below ground. Consideration should be given to carrying out a Mining Subsidence Study at the site and/or retaining a structural engineer to review the potential impacts for mining subsidence related settlement at the site.

Based on our findings, no further environmental investigation of the site is recommended at this time.

9.0 CLOSURE

The American Society for Testing and Materials Standard of Practice notes that no environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. Performance of a standard environmental site assessment protocol is intended to reduce but not eliminate this uncertainty, given reasonable limits of cost and time.

This report has been prepared for the sole benefit of 2176168 Alberta Ltd. This report may not be relied upon by any third party or entity without the express written consent of WA Environmental Services Ltd. and 2176168 Alberta Ltd.

Any use a third party may make of this report, or any reliance on decisions made based on it, are the responsibility of such third parties. WA Environmental Services Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Some of the information presented in this report was provided through existing documents and interviews. Although attempts were made, whenever possible, to obtain a minimum of two confirmatory sources of information, WA Environmental Services Ltd. in certain instances, has been required to assume that the information provided is accurate.

The conclusions presented represent the best judgement of the assessor based on current environmental standards and on the site conditions observed on November 23, 2021. Due to the nature of the investigation and the limited data available, the assessor cannot warrant against undiscovered environmental liabilities.

Should additional information become available WA Environmental Services Ltd. requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

Respectfully submitted,

WA ENVIRONMENTAL SERVICES LTD.

ASSOCIATED ENVIRONMENTAL SITE ASSESSORS OF CANADA INC. CERTIFIED ENVIRONMENTAL SITE ASSESSOR BEVERLY WATERS C.E.S.A.

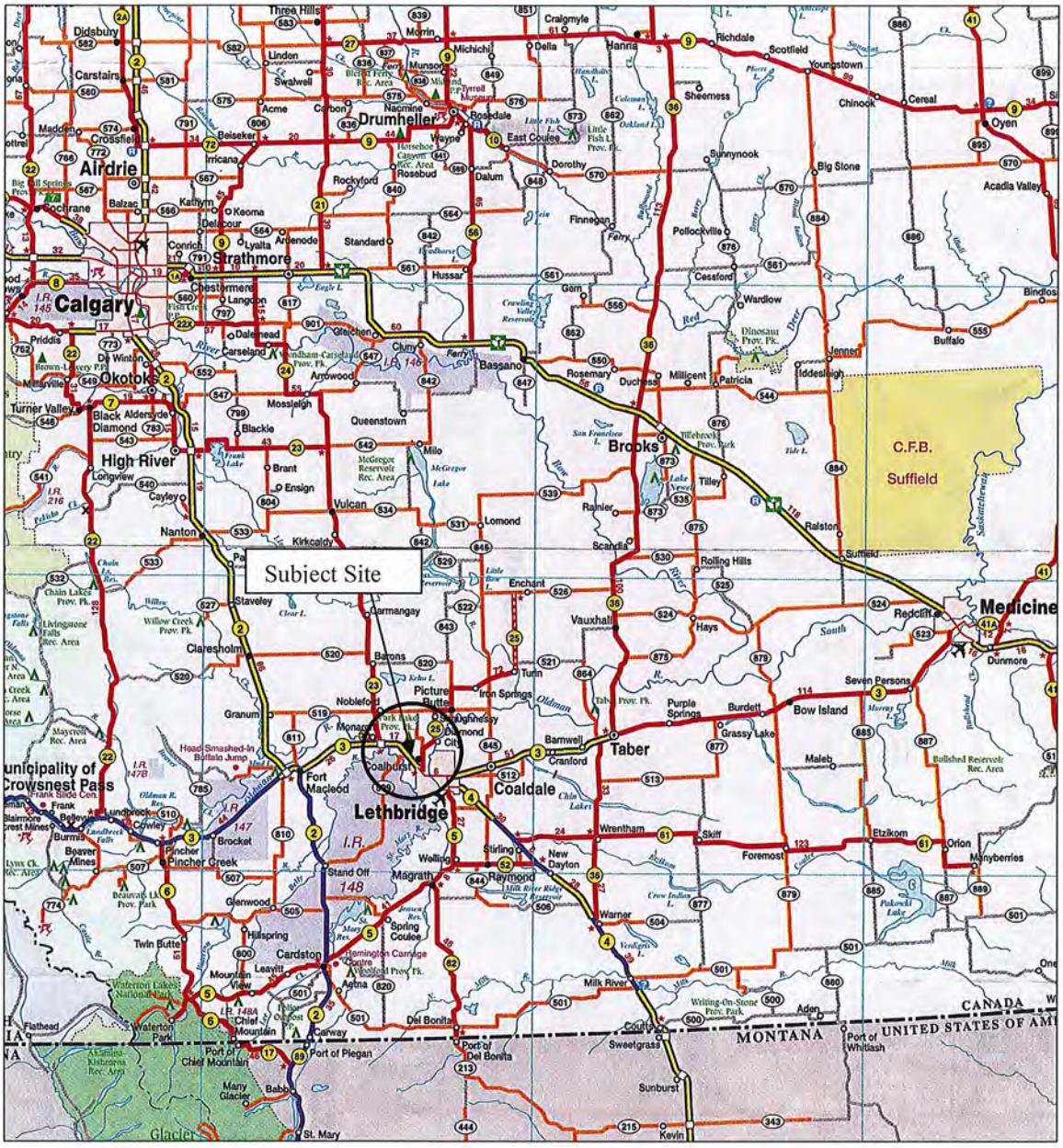
NOV 2021

Tim Waters, C.E.T.
Project Manager

Bev Waters, C.E.S.A.
Senior Reviewer

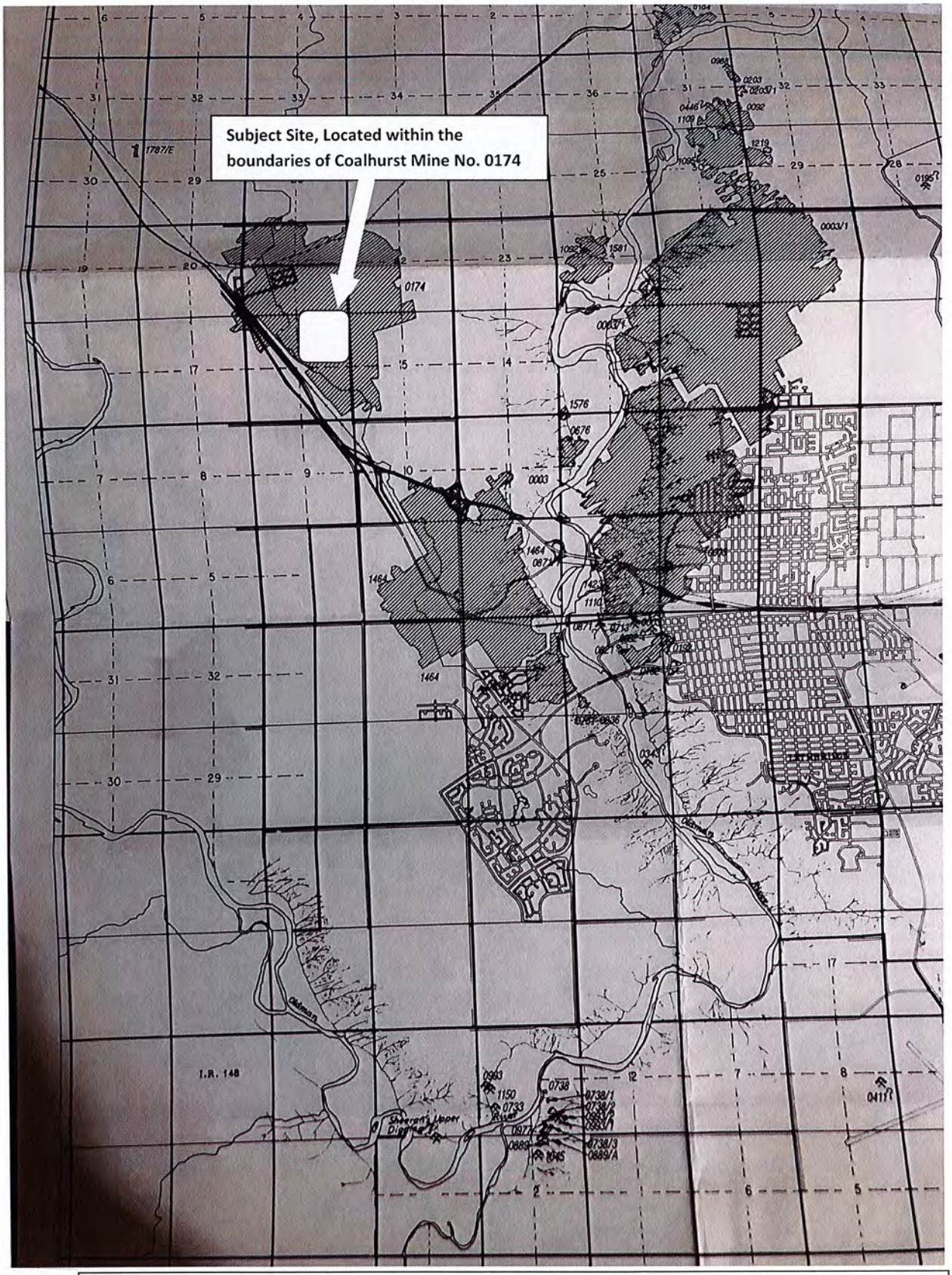
APPENDIX A

SITE PLANS



WA ENVIRONMENTAL SERVICES LTD.	Date: November 26, 2021	Drawn by: TGW	Project: Phase I ESA
	Title: Drawing 1 Site Location Plan NE-16-9-22-W4M County of Lethbridge, Alberta		Project No.: WA-21-111309 Client: 2176168 Alberta Ltd.

WA ENVIRONMENTAL SERVICES LTD.	Project: Phase I Environmental Site Assessment	Project No: WA-21-111309	Date: November 25, 2021
	Location: NE-16-9-22-W4M County of Lethbridge, Alberta	Drawn By: TGW Reviewed By: BFW	Client: 2176168 Alberta Ltd.
	Drawing 2: Site Plan Showing Adjacent Land Use		



Drawing 3: Location of Coalhurst Coalmine No. 0174 (1911 to 1936)

Courtesy: *"Lethbridge: Its Coal Industry"* Alex Johnston, Keith G. Gladwyn, L Gregory Ellis

WA ENVIRONMENTAL SERVICES LTD.

APPENDIX B

ASSESSOR QUALIFICATIONS

INSURANCE CERTIFICATES

Associated Environmental Site Assessors of Canada

AESAC

this is to acknowledge that

Beverly Waters

has been qualified for the Certified Environmental Site Assessment Designation

C.E.S.A.

Certified Environmental Site Assessor - Phase 1
according to AESAC's National Certification Programme

signed and sealed this day of October 7th, 2004

Brian Lazak, President

LLOYD'S

ARCHITECTS/ENGINEERS PROFESSIONAL LIABILITY INSURANCE

Effected with certain Lloyd's Underwriters ("the Insurer") through
Lloyd's Approved Coverholder ("the Coverholder")
SOUTH WESTERN INSURANCE GROUP LIMITED
401 The West Mall, Suite 700, Toronto, ON M9C 5J5

DH (10/06/2021) PLAE

DECLARATIONS
THIS IS A CLAIMS-MADE PROFESSIONAL LIABILITY INSURANCE POLICY
PLEASE READ CAREFULLY

RENEWAL POLICY

This declaration, together with the policy wordings and endorsements, if any, issued to form a part thereof, completes this policy.

POLICY NUMBER

LAP 980175
REPLACING POLICY No.:

BROKER SCHWARTZ RELIANCE INSURANCE
300-10TH STREET SOUTH
LETHBRIDGE, AB T1J 3Y5

1. **NAME OF INSURED** WA ENVIRONMENTAL SERVICES LTD.

   MAILING ADDRESS 221 RIVERPARK BLVD. WEST
   LETHBRIDGE, AB T1K 0P6

2. **POLICY PERIOD** From: June 08, 2021 To: June 08, 2022

   Both days at 12:01 a.m. Standard Time at the Mailing Address of the Named Insured as stated herein

3. **LIMIT OF LIABILITY**

   (a) $2,000,000 Each Claim - Includes Claims Expenses

   (b) $2,000,000 Annual Aggregate - Includes Claims Expenses

   The total Limit of Liability of the Insurer, including Damages and Claims Expenses, for all Claims first made against the Insured and reported in writing to the Insurer during the Policy Period shall not exceed in the Aggregate, the limit stated herein.

4. **SELFINSURED RETENTION** $ 7,500

   The Self-Insured Retention amount shall be separately applicable to each Claim first made during the Policy Period and shall apply to Damages and Claims Expenses.

5. **PREMIUM** $ 12,210

   MINIMUM EARNED PREMIUM 30%

6. **RETROACTIVE DATE**

   June 08, 2000 - Primary $1,000,000 Limit
   June 08, 2011 - $1,000,000 excess of $1,000,000 Limit

   Coverage shall apply only to those Claims or those matters reported pursuant to the terms and conditions of the Policy arising out of Professional Services described in Definitions X and performed subsequent to the date stated herein.

7. **NOTICE OF CLAIM TO:**

   South Western Insurance Group Ltd.
   1.855.801.0299
   swgclaims@scm.ca

8. **NOTICE OF ELECTION TO:** SOUTH WESTERN INSURANCE GROUP LIMITED
   401 The West Mall, Suite 700
   Toronto, ON M9C 5J5

9. **FORMS AND ENDORSEMENTS ATTACHED HERETO:**

AFB-A&E	Architects/Engineers Professional Liability Insurance
LBA-041B	Rain Screen Exclusion
LSW-559	Retroactive Limitation Clause
LBA-070	Asbestos Exclusion
NMA-1477	Radioactive Contamination Exclusion Clause
NMA-1978	Nuclear Incident Exclusion Clause - Liability Direct (Broad)Canada

NMA-2962	Biological or Chemical Materials Exclusion
NMA-2918	War and Terrorism Exclusion
MIN-EARN1	Minimum Earned Premium Endorsement
AMDEND	Amendatory Endorsement
623AFB0089	Short Rate Cancellation Table
623AFB0097	Warranted No Higher Limits Endorsement
L648B-20	Cyber Exclusion Endorsement

10. This Policy has been issued based on the information contained in the Application signed and dated April 28, 2021 and No Claims Declaration dated May 26, 2021.

IDENTIFICATION OF INSURER / ACTION AGAINST INSURER

This insurance has been effected in accordance with the authorization granted to the Coverholder by the Underwriting Members of the Syndicates whose definitive numbers and proportions are shown in the Table attached to Agreement No. B1921KC000080U (Hereinafter referred to as "the Underwriters"). The Underwriters shall be liable hereunder each for his own part and not one for another in proportion to the several sums that each of them has subscribed to the said Agreement.

In any action to enforce the obligations of the Underwriters they can be designated or named as "Lloyd's Underwriters" and such designation shall be binding on the Underwriters liable hereunder as if they had each been individually named as defendant. Service of such proceedings may validly be made upon the Attorney In Fact In Canada for Lloyd's Underwriters, whose address for such service is 1155, rue Metcalfe, Suite 2220, Montreal, Quebec, H3B 2V6.

NOTICE

Any notice to the Underwriters may be validly given to the Coverholder.

In witness whereof this policy has been signed, as authorized by the Underwriters, by **SOUTH WESTERN INSURANCE GROUP LIMITED.**

Per

John A. Barclay, President & CEO

The Insured is requested to read this policy, and if incorrect, return it immediately for alteration.

In the event of an occurrence likely to result in a claim under this insurance, immediate notice should be given to the Coverholder whose name and address appears above. All inquiries and disputes are also to be addressed to this Coverholder.

This policy contains a clause which may limit the amount payable

For purposes of the *Insurance Companies Act* (Canada), this document was issued in the course of insurance business in Canada of the Insurer(s) participating on this policy.

Commercial Insurance
Declaration Pages
Policy 5A1276036

Intact Insurance Company
1200, 321 - 6th Avenue S.W.
Calgary, AB T2P 4W7

Insured name and postal address
WA Environmental Services Ltd
221 Riverpark Boulevard W
Lethbridge, AB T1K 0P6

Broker 05050
Schwartz Reliance Insurance
300 10 Street South Lethbridge, Alberta
T1J 2M6

General Information

Intact Insurance Company hereinafter called the Insurer.

Type of Document	RENEWAL
Policy Period	**From** June 9, 2021 **To** June 9, 2022 12:01 A.M. local time at the postal address of the Insured shown above
Insured's Business Operations	Environmental Consultants
Billing Method	Direct Bill
	Total Policy Premium **$2,222**

Save paper, add convenience!
Ask your broker how you can receive your documents electronically.

This policy contains a clause(s) that may limit the amount payable

Senior Vice President, Western Canada

Intact Insurance Company

General Liability

Coverage	Form	Deductible $	Limit of Insurance $
Commercial General Liability Max	LR20-3		
Coverage A - Bodily Injury and Property Damage Liability - Each Occurrence			2,000,000
Coverage A - Liability for Abuse - Aggregate			2,000,000
Coverage A - Products-Completed Operations - Aggregate			2,000,000
Coverage A - Property Damage Deductible - Each Occurrence		1,000	
Coverage B - Personal Injury and Advertising Injury Liability - Per Person or Organization			2,000,000
Coverage C - Medical Payments - Each Person			50,000
Coverage D - Tenants' Legal Liability - Any One Premises		1,000	500,000
S.E.F. No. 96 - Contractual Liability Endorsement	L220-2		
Coverage Territory Amendment - Canada only	L407-2		
Crane and Hoist Operators' Liability Endorsement	L408-2	1,000	100,000
Employee benefit program liability	L410-2		
Aggregate			1,000,000
Each Employee		1,000	1,000,000
Forest and Prairie Fire Fighting Expense Endorsement - Oil and Gas	L416OG-2		
Limit of liability - Aggregate			1,000,000
Limit of liability - Each accident or "occurrence"		2,500	1,000,000
S.E.F. 94 Legal Liability for Damage to Hired Automobiles	L429-1		
Subsection 1 - All Perils		1,000	75,000
S.E.F. No. 99 Excluding Long term Leased Vehicle Endorsement	L431-1		
S.P.F. No. 6 - Standard Non-Owned Automobile Liability Policy	L432-2		
Section A - Third party Liability			2,000,000

General Liability

Coverage	Form	Deductible $	Limit of Insurance $
Absolute Pollution Exclusion Endorsement	L436-2		
Concrete Rip & Tear Liability Endorsement	L440-2		
Limit of Liability - Annual aggregate			50,000
Limit of Liability - Each claim			50,000
Reimbursement			1,000
Employers Liability Exclusion	L442-2		
Sub-contractor's Warranty Endorsement	L450-2		
Minimum Limit of Liability - Aggregate Limit			1,000,000
Minimum Limit of Liability - Per Accident or Occurrence			2,000,000
Amended Professional Services Exclusion Endorsement	L483-2		
Oil and Gas Limitation Endorsement	L508-2		
Deductible: land		5,000	
Deductible: pipelines		50,000	
Deductible: underground		1,000	
Deductible: water		25,000	

Premises, Property and Operations	Rating Base	Rating Information(s)
Environmental Consultants	Flat premium	
Environmental Consultants	Flat premium	

Amount of revenue (receipts) disclosed on file for pricing and coverage purposes* $506,000
*Note – Only operation(s) where pricing is receipts based are included in the amount of revenues shown.

Name: Timothy G. Waters

Position: Senior Project Manager

Education: General Certificate of Education, Advanced Level (Geography/Geomorphology), University of London, England.
SAIT: 1977 to 1979 Soil Mechanics

Relevant Experience:

- Lead assessor on 450 Phase I Environmental Site Assessments of residential, commercial, industrial and institutional properties throughout Alberta and B.C.

- Transport Canada, Lethbridge Airport Fire Training Area. Responsible for Phase III drilling program, sample collection and gathering field data.

- Transport Canada, Medicine Hat and Empress Non Directional Beacon Sites. Responsible for Phase II drilling program and subsequent field monitoring and sampling

- Transport Canada, Pincher Creek, Alberta: Responsible for data collection at three facilities at the Pincher Creek Airport and subsequent sampling of groundwater.

- Federal Business Development Bank, Blairmore, Alberta. Responsible for the safe removal of USTs.

- Alberta Transportation and Utilities, Kipp and Burmis, Alberta. Responsible for the safe removal of USTs.

APPENDIX C

RESOURCE INFORMATION
&

ERIS REPORT

REGULATORY CONTACTS, PERSONS INTERVIEWED, AND HISTORICAL SOURCES

SOURCE	INFORMATION/CONTACT/PHONE NUMBER
Alberta Environmental Protection	Environmental Permits/Approvals Mr. Dennis Eriksen, Regulatory Approvals Centre (403) 427-6311
Aerial Photographs	1969, 1974, 1981, 1991, 2003, 2011
Fire Insurance Maps	Not available for this site
Historical City Directories	Not available for this site
Previous Environmental Reports	None available for this site
Other Sources	Environmental Risk Information System (ERIS) Ms. Cindy Dewing, Environmental Law Centre, (403) 424-5099 Mr. Gerry Letendre, SCC, (780) 413-0099 Interim Fire Chief Mitch Sorsdahl, Town of Coalhurst, Fire Department, (403) 381-3633 Leda Tittsworth Town of Coalhurst Planning Dept. (403) 381-3033 Schwartz Reliance Registry (Land Titles) (403) 320-1010 Sir Alexander Galt Museum Archive Dept. (403) 329-7302 Mr. Lee Perkins, City of Lethbridge, (403) 320-3945 Mr. Dennis Groenenboom: Owner: (403) 330-7760 *"Lethbridge: Its Coal Industry"* Alex Johnston, Keith G. Gladwyn, L Gregory Ellis "A Walk Through Time" Town of Coalhurst Heritage Walking Tour 1913 - 2013

ERIS

DATABASE REPORT

Project Property:	*Coalhurst Phase I* *221 Riverpark Blvd West* *Lethbridge AB T0L*
Project No:	*WA-21-111309*
Report Type:	*Standard Report*
Order No:	*21111800490*
Requested by:	*WA Environmental Services Ltd.*
Date Completed:	*November 23, 2021*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Executive Summary

Property Information:

Project Property:		*Coalhurst Phase I* *221 Riverpark Blvd West Lethbridge AB T0L*
Project No:		*WA-21-111309*
Coordinates:		
	Latitude:	*49.7377013*
	Longitude:	*-112.9188288*
	UTM Northing:	*5,511,234.77*
	UTM Easting:	*361,740.65*
	UTM Zone:	*12U*
Elevation:		*3,052 FT* *930.13 M*

Order Information:

Order No:	*21111800490*
Date Requested:	*November 18, 2021*
Requested by:	*WA Environmental Services Ltd.*
Report Type:	*Standard Report*

Historical/Products:

Aerial Photographs	*Aerials - National Collection*

Executive Summary: Report Summary

Database	Name	Searched	Project Property	Within 0.25 km	Total
AERW	Well Licenses	Y	0	0	0
AGR	Agriculture and Fisheries - Certificates of Approval	Y	0	0	0
AOGW	Alberta Oil and Gas Wells	Y	0	0	0
AUTH	Authorizations	Y	0	1	1
AUWR	Automobile Wrecking & Supplies	Y	0	0	0
CAWD	Waste Management Facilities - Certificates of Approval	Y	0	0	0
CBL	Commercial Activity Risk - City of Calgary Business Licenses	Y	0	0	0
CDRY	Dry Cleaning Facilities	Y	0	0	0
CFO	Confined Feeding Operations	Y	0	0	0
CHEM	Chemical Processing Operations - Certificates of Approval	Y	0	0	0
CHM	Chemical Register	Y	0	0	0
CNG	Compressed Natural Gas Stations	Y	0	0	0
COMPOST	Compost Facilities	Y	0	0	0
CONV	Compliance and Convictions	Y	0	0	0
CTNK	Fuel Sales and Storage	Y	0	0	0
DRWD	Approved Oilfield Waste Management Facilities	Y	0	0	0
EAS	Enforcement Action Summary	Y	0	0	0
EBL	Commercial Activity Risk - City of Edmonton Business Licenses	Y	0	0	0
EEM	Environmental Effects Monitoring	Y	0	0	0
EHS	ERIS Historical Searches	Y	0	0	0
EIIS	Environmental Issues Inventory System	Y	0	0	0
EPST	Alberta Environment & Parks Storage Tanks	Y	0	0	0
EPWN	Environment Protection & Enhancement Act and Water Act Public Notices	Y	0	0	0
ESAR	Environmental Site Assessment Repository	Y	0	0	0
FAC	Facility List	Y	0	0	0
FCON	Federal Convictions	Y	0	0	0
FCS	Contaminated Sites on Federal Land	Y	0	0	0
FIS	AER Incidents & Spills	Y	0	0	0
FOOD	Food Processing Operations - Certificates of Approval	Y	0	0	0
FRST	Federal Identification Registry for Storage Tank Systems (FIRSTS)	Y	0	0	0
FST	Fuel Storage Tanks	Y	0	0	0
FUEL STATION	Edmonton Vehicle Fueling Stations	Y	0	0	0
GEN	Waste Generators Summary	Y	0	0	0
GHG	Greenhouse Gas Emissions from Large Facilities	Y	0	0	0
GPP	Gas Processing Plants	Y	0	0	0
HELP	Alberta Environment's H.E.L.P. (Help End Landfill Pollution) Program Database	Y	0	0	0

Database	Name	Searched	Project Property	Within 0.25 km	Total
HORW	Horizontal Wells	Y	0	0	0
IAFT	Indian & Northern Affairs Fuel Tanks	Y	0	0	0
LANDFILLS	Landfill Registrations	Y	0	0	0
LDS	Identification and Verification of Active and Inactive Land Disposal Sites	Y	0	0	0
LDSI	Land Disposal Sites on Indian Reserves	Y	0	0	0
LUM	Lumber Related Operations - Certificates of Approval	Y	0	0	0
MINE	Canadian Mine Locations	Y	0	0	0
MMB	Metals, Minerals and Building Materials Operations - Certificates of Approval	Y	0	0	0
MNR	Mineral Occurrences	Y	0	0	0
NATE	National Analysis of Trends in Emergencies System (NATES)	Y	0	0	0
NCST	PTMAA Non-Compliant Storage Tanks	Y	0	0	0
NDFT	National Defense & Canadian Forces Fuel Tanks	Y	0	0	0
NDSP	National Defense & Canadian Forces Spills	Y	0	0	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	Y	0	0	0
NEBI	National Energy Board Pipeline Incidents	Y	0	0	0
NEBP	National Energy Board Wells	Y	0	0	0
NEES	National Environmental Emergencies System (NEES)	Y	0	0	0
NPCB	National PCB Inventory	Y	0	0	0
NPRI	National Pollutant Release Inventory	Y	0	0	0
OAM	Operating and Abandoned Mines	Y	0	0	0
OGF	Oil and Gas Facilities - ST102 & ST50	Y	0	0	0
OGWW	Oil and Gas Wells	Y	0	0	0
ORDERS	Enforcement Orders	Y	0	0	0
ORP	Alberta Orphan Wells	Y	0	0	0
PAP	Canadian Pulp and Paper	Y	0	0	0
PCFT	Parks Canada Fuel Storage Tanks	Y	0	0	0
PCG	Petrochemical, Coal and Gas Operations - Certificates of Approval	Y	0	0	0
PES	Pesticide Register	Y	0	0	0
PITS	Conglomerate and Waste Management Facilities	Y	0	0	0
PSP	Alberta Private Sewage Disposal Permits	Y	0	0	0
PTAP	PTMAA Approved (Open) Permits	Y	0	0	0
REC	Hazardous Waste Receivers Summary	Y	0	0	0
RST	Retail Fuel Storage Tanks	Y	0	0	0
SCT	Scott's Manufacturing Directory	Y	0	0	0
SPEC	Special Operation Classifications - Certificates of Approval	Y	0	0	0
WDS	Inventory of Waste Disposal Sites	Y	0	0	0
WSTE	Wastewater Operations	Y	0	0	0
WWIS	Alberta Water Well Information Database	Y	0	0	0
	Total:		0	1	1

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev diff (m)	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

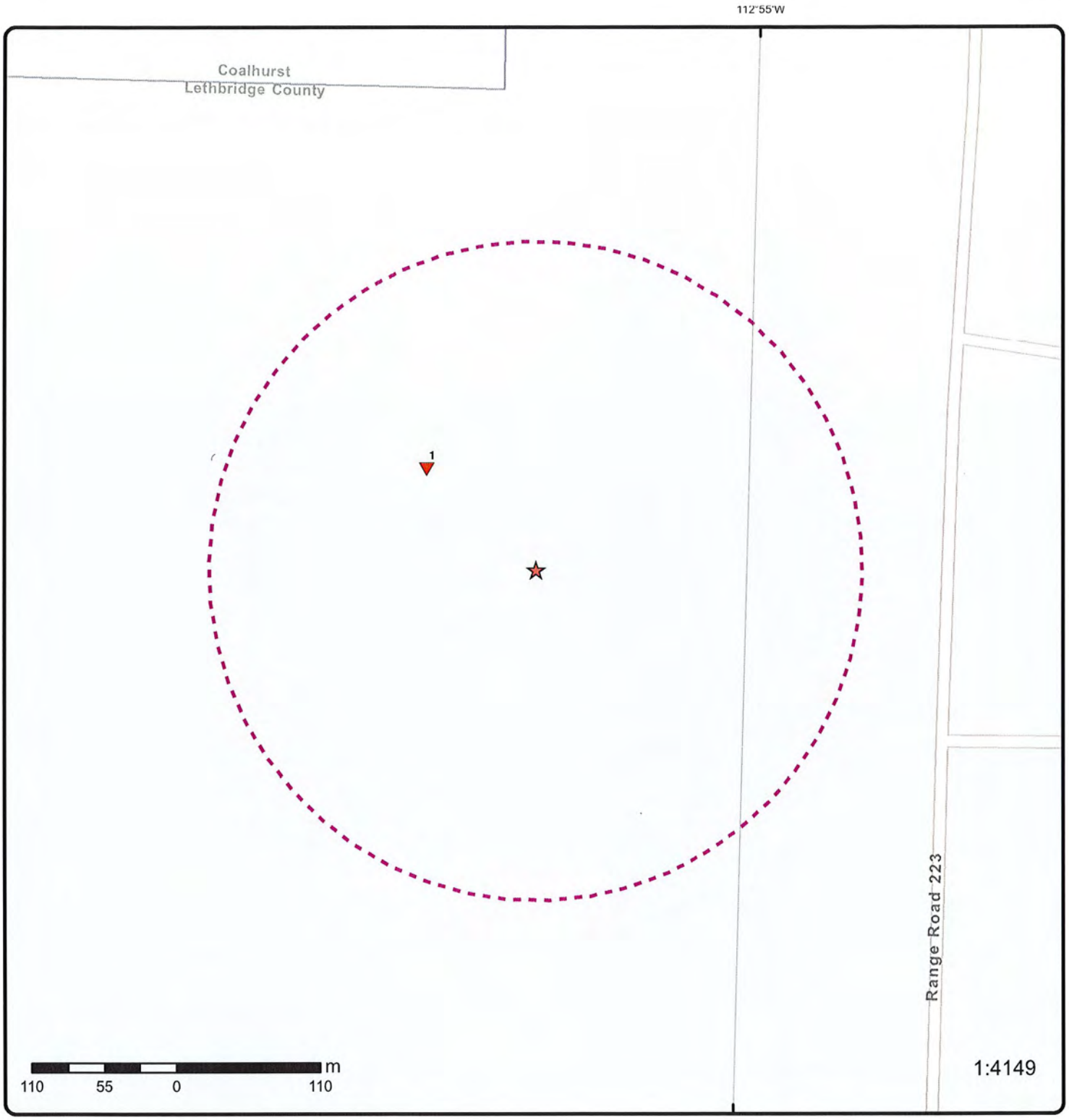
Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
1	AUTH	Seven Generations Energy Ltd.	4;22;9;16;NE AB	WNW/113.0	-0.82	12

Executive Summary: Summary By Data Source

AUTH - Authorizations

A search of the AUTH database, dated Oct 2020 has found that there are 1 AUTH site(s) within approximately 0.25 kilometers of the project property.

Lower Elevation	Address	Direction	Distance (m)	Map Key
Seven Generations Energy Ltd.	4;22;9;16;NE AB	WNW	112.96	1



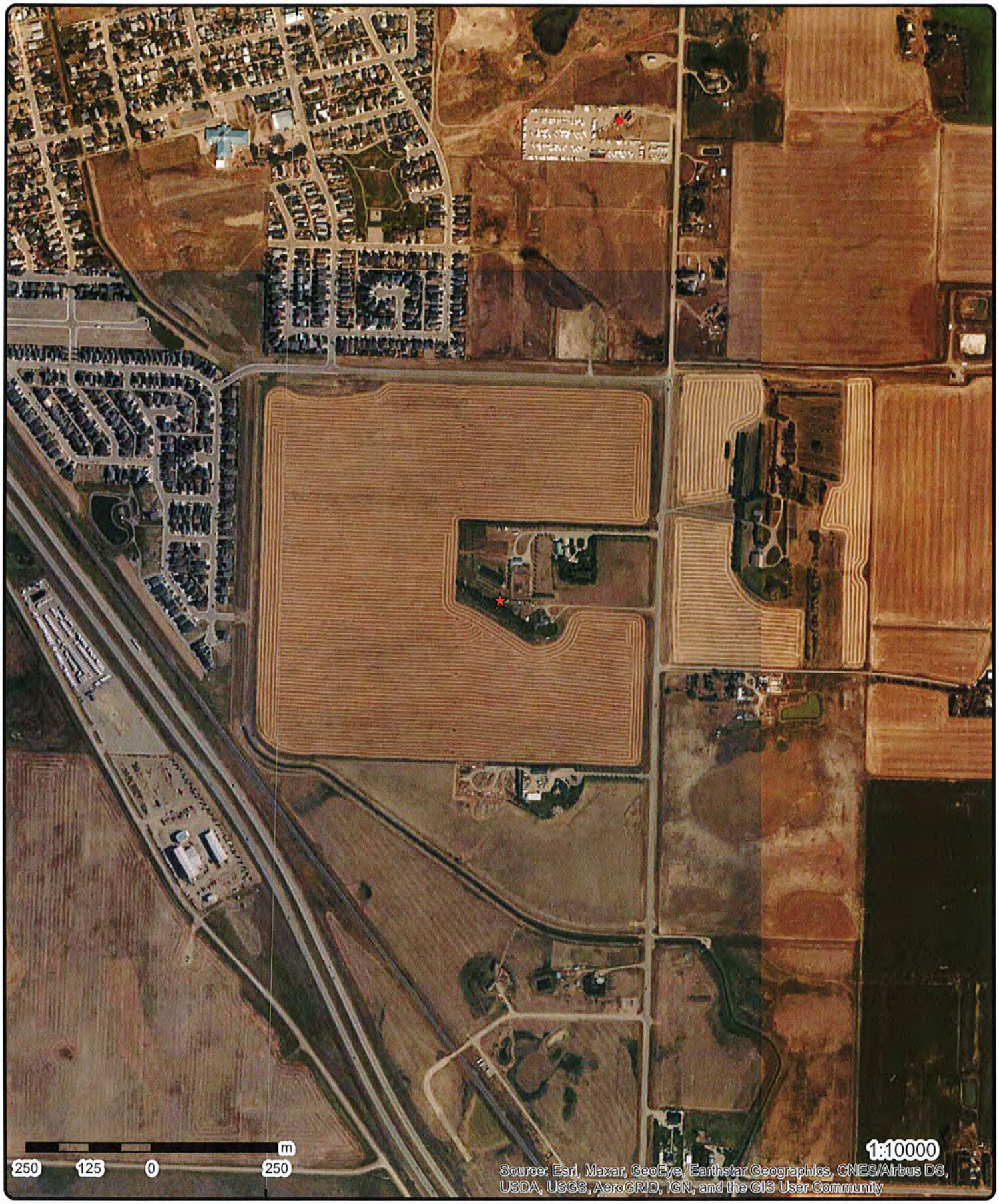
Map: 0.25 Kilometer Radius

Order Number: 21111800490

Address: 221 Riverpark Blvd West, Lethbridge, AB

ERIS

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major Arterial; Minor Arterial
- Local Road
- Service Road; Traffic Circle; Ramp
- Rail
- Beach
- Airport
- Industrial Area
- Military Base
- Aircraft Roads
- Native Reservation
- Hospital
- Shopping & Sports Area
- University/College
- Cemetery; Golf Course
- Parkt (National)
- Park (City/County)

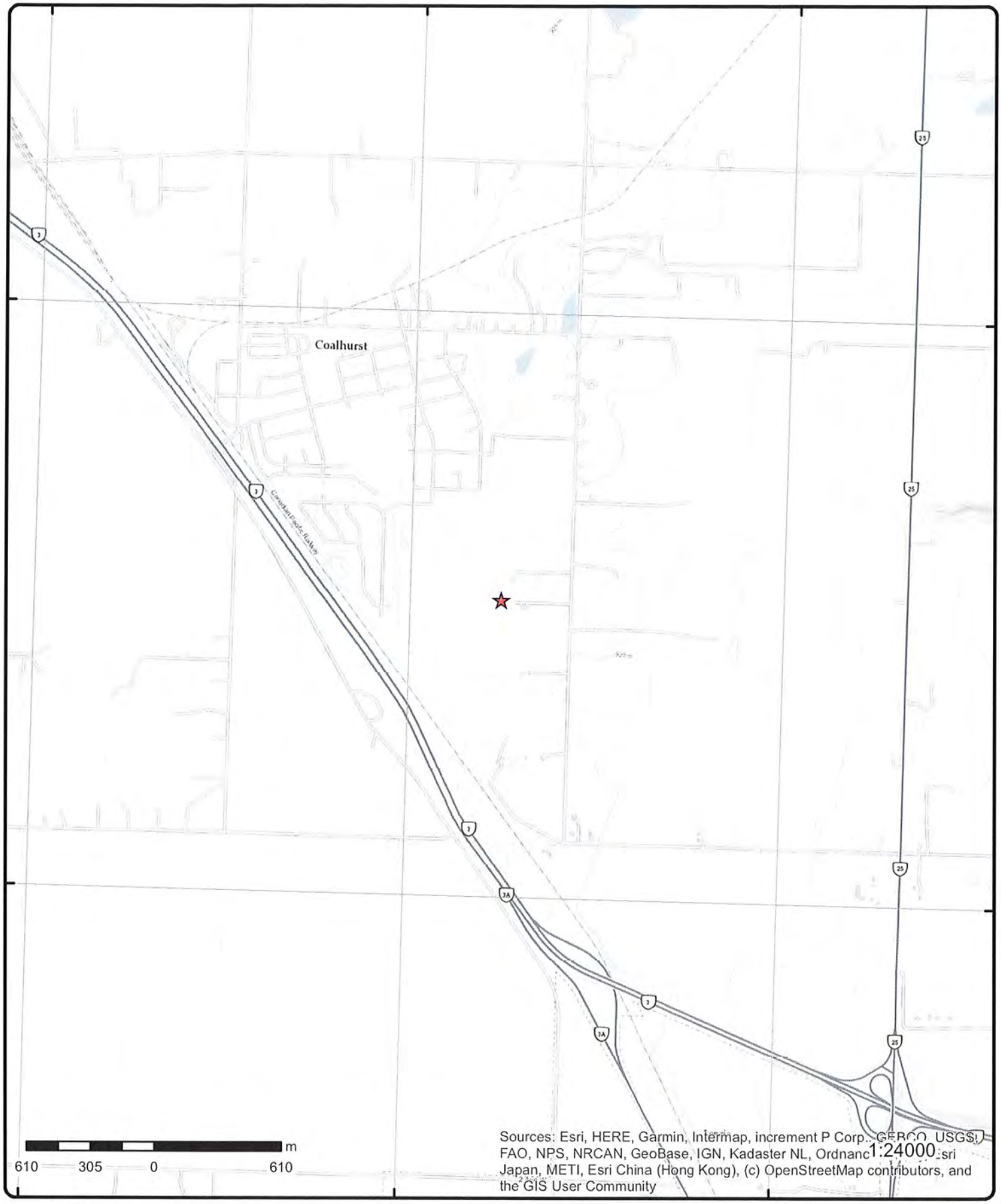


Aerial Year: 2018

Order Number: 21111800490

Address: 221 Riverpark Blvd West, Lethbridge, AB

Source: ESRI World Imagery



Topographic Map

Order Number: 21111800490

Address: 221 Riverpark Blvd West, AB

Source: ESRI World Topographic Map

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	1 of 1	WNW/113.0	929.3 / -0.82	Seven Generations Energy Ltd. 4;22;9;16;NE AB	AUTH

Legal Land Location: NE 16-009-22-W4
Document Title: Document 00418549-00-00 COALHURST/STORM WATER MANAGEMENT/TOWN OF COALHURST - F00418549 is held by Town of Coalhurst, under the provisions of the Water Act. This Approval is currently issued as of Nov. 23, 2018 and expires on Nov. 22, 2043.
Document Url: https://avw.alberta.ca/pdf/00418549-00-00.pdf

Unplottable Summary

Total: 0 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal

Unplottable Report

No unplottable records were found that may be relevant for the search criteria.

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ***Note:*** *Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Well Licenses: Provincial AERW

Locations of Well Licenses made available by the Alberta Energy Regulator (AER) as ST37. Includes Active, Suspended, Abandoned, Drilled and Cased Oil, Gas, Crude Bitumen well licenses, as well as Observation, Injection, Disposal, and Undefined well licences.

Government Publication Date: Jul 31, 2021

Agriculture and Fisheries - Certificates of Approval: Provincial AGR

This database contains approvals for processes pertaining to drying of alfalfa/forage/peat, feedlots, fish farms and feed/seed mills. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Alberta Oil and Gas Wells: Provincial AOGW

The Alberta Energy Utilities Board - now the Alberta Energy Regulator (AER) - maintained a database of oil and gas wells drilled in the province of Alberta. The database contains information on well name, licensee name, license number, location, status, total well depth and date of final drilling. Please note that this database will not be updated, information on wells drilled after September 2003 can be found in the Oil and Gas Wells (OGW) database under the 'Private Source Database' section.

Government Publication Date: 1883-Sept 2003*

Authorizations: Provincial AUTH

Locations associated with Water Act and Environmental Protection and Enhancement Act (EPEA) documents issued by Alberta Environment and Parks (AEP). Includes approvals, licences, registrations, authorizations, permits, and certificates. This list is made available by the Alberta Environment and Parks (AEP).

Government Publication Date: Oct 2020

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 1999-Sep 30, 2021

Waste Management Facilities - Certificates of Approval: Provincial CAWD

This database contains approvals for processes pertaining to waste management facilities (hazardous waste manifesting, waste disposal/incineration/open burning/processing/storage/treatment). Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993 - Jan 2020

Commercial Activity Risk - City of Calgary Business Licenses: Provincial CBL

List of locations with Business Licences for the follow commercial activities: apartment building with 4 or more stories, auto-body shop, fabric cleaning, manufacturing, motor vehicle dealerships and service/repair, and salvage yard/auto wrecking. Data made available by the City of Calgary.

Government Publication Date: Sep 30, 2021

Dry Cleaning Facilities: Federal CDRY

List of dry cleaning facilities made available by Environment and Climate Change Canada. Environment and Climate Change Canada's Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations (SOR/2003-79) are intended to reduce releases of tetrachloroethylene to the environment from dry cleaning facilities.

Government Publication Date: Jan 2004-Dec 2019

Confined Feeding Operations: Provincial CFO

In 1991, the Natural Resources Conservation Board (NRCB) was created to review applications for approval of major natural resource development projects in Alberta. In January 2002, the NRCB was given the responsibility to regulate the Confined Feeding Operation industry. The Agricultural Operation Practices Act defines a confined feeding operation to be: "an activity on land that is fenced or enclosed or within buildings where livestock are confined for the purpose of growing, sustaining, finishing or breeding by means other than grazing, but does not include seasonal feeding and bedding sites." Under the AOPA regulations, all new or expanding confined feeding operations (CFOs) or manure storage facilities are required to make an application for Approval, Registration or Authorization to the NRCB before construction or expansion commences. Geographic coordinates were provided in DLS (Dominion Land Survey) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the Quarter section only.

Government Publication Date: 2002-May 2021

Chemical Processing Operations - Certificates of Approval: Provincial CHEM

This database contains approvals for processes pertaining to the manufacturing and use of chemical products and pesticides. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Chemical Register: Private CHM

This database includes a listing of locations of facilities within the Province or Territory that either manufacture and/or distributes chemicals.

Government Publication Date: 1999-Sep 30, 2021

Compressed Natural Gas Stations: Private CNG

Canada has a network of public access compressed natural gas (CNG) refuelling stations. These stations dispense natural gas in compressed form at 3,000 pounds per square inch (psi), the pressure which is allowed within the current Canadian codes and standards. The majority of natural gas refuelling is located at existing retail gasoline that have a separate refuelling island for natural gas. This list of stations is made available by the Canadian Natural Gas Vehicle Alliance.

Government Publication Date: Dec 2012 -Aug 2021

Compost Facilities: Provincial COMPOST

A list of compost facility registrations made available by Alberta Environment and Parks (AEP). Composting facilities operating under a registration are required to follow the requirements in the Code of Practice for Compost Facilities, which outlines the minimum requirements for the design, construction, operation, and reclamation of compost facilities that accept up to 20,000 tonnes of feedstock per year.

Government Publication Date: Dec 31, 2019

Compliance and Convictions: Provincial CONV

This database summarizes the penalties and convictions handed down by the Alberta courts. This database identifies companies and/or individuals that have been found guilty of environmental offenses under Alberta's Environmental Protection Legislation. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Unfortunately, from state of the data, the location that the address pertains to cannot be confirmed.

Government Publication Date: 1993-Mar 2021

Fuel Sales and Storage: Provincial CTNK

List of locations with Business Licences for fuel sales and storage. Data made available by the City of Calgary.

Government Publication Date: Sep 30, 2021

Approved Oilfield Waste Management Facilities: Provincial DRWD

A list of approved first and third party oilfield waste management facilities. First-party receivers can only accept upstream oilfield waste generated by one oil and gas company, but can come from various sites. Third-party receivers can accept upstream oilfield waste from various sites and various generators. This data is made available by the Alberta Energy Regulator (AER).

Government Publication Date: May 20201

Enforcement Action Summary: Provincial EAS

This database maintained by the Alberta Energy Regulator (AER) - formerly the Energy Resources Conservation Board (ERCB) - summarizes high risk enforcement action 1, high risk enforcement action 2 (persistent noncompliance), high risk enforcement action 3 (failure to comply or demonstrated disregard), low risk enforcement action - global REFER and legislative/regulatory enforcement action. Fields will include licensee/company name, non-compliance event, date of enforcement, location, etc.

Government Publication Date: 2007-Mar 2021

Commercial Activity Risk - City of Edmonton Business Licenses: Provincial EBL

List of locations with Business Licenses for the follow commercial activities: cannabis processing or cultivation, construction vehicle and equipment sales/rentals, livestock operation, general industrial, and vehicle repair. Data made available by the City of Edmonton.

Government Publication Date: Sep 30, 2021

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Jun 30, 2021

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Alberta Environment & Parks Storage Tanks: Provincial EPST

List of storage tanks under the purview of Alberta Environment and Parks.

Government Publication Date: Jul 31, 2016

Environment Protection & Enhancement Act and Water Act Public Notices: Provincial EPWN

A list of Public Notices of Applications, Decisions, and Revisions pertaining to applications made to Alberta Environment and Parks under the Water Act (WA) and Alberta Environment Protection and Enhancement Act (EPEA). Dominion Land Survey (DLS) locations provided by the source are subject to accuracy limitations inherent to the DLS system.

Government Publication Date: Feb 28, 2021

Environmental Site Assessment Repository: Provincial ESAR

Environmental site assessments determine the quality of soil and groundwater of a site, particularly at retail gas stations and other commercial and industrial sites. A site assessment does not necessarily mean a site is, or ever was, contaminated. Alberta's Environmental Site Assessment Repository (ESAR) is an online, searchable database that provides scientific and technical information about assessed and/or reclaimed sites throughout Alberta. Search Alberta's ESAR using meridian, range, township, and section values at http://www.esar.alberta.ca/esarmain.aspx to gain access to reclamation certificates and/or associated files (applications, reports).

Government Publication Date: 1960-Aug 2020

Facility List: Provincial FAC

This database contains a complete list of new, active and suspended facilities in Alberta including batteries, gas plants, meter stations, and other facilities. Information provided includes: facility id, facility name, operator name, sub type description, location, facility l license no, and operational status; now includes EDCT (Energy Development Category Type) type and description. Made available by the Alberta Energy Regulator (AER) - formerly the Energy Resources Conservation Board (ERCB).

Government Publication Date: Up to Aug 31, 2021

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government. Includes fire training sites and sites at which Per- and Polyfluoroalkyl Substances (PFAS) are a concern.

Government Publication Date: Jun 2000-Aug 2021

AER Incidents & Spills: Provincial FIS

Received from the Alberta Energy Regulator (AER) - formerly the ERCB (Energy Resources Conservation Board) and EUB (Energy Utilities Board) - this database, which used to be called EISL (Environmental Information System Listing), contains reported environmental incidents beginning in 1975. Descriptions include noise infractions, air quality emissions, oil spills and failures for pipelines, wells, plants, and batteries. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1975 - Aug 2021

Food Processing Operations - Certificates of Approval: Provincial FOOD

This database contains approvals for processes pertaining to the manufacturing of food products. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Federal Identification Registry for Storage Tank Systems (FIRSTS): Federal FRST

A list of federally regulated Storage tanks from the Federal Identification Registry for Storage Tank Systems (FIRSTS). FIRSTS is Environment and Climate Change Canada's database of storage tank systems subject to the Storage Tank for Petroleum Products and Allied Petroleum Products Regulations. The main objective of the Regulations is to prevent soil and groundwater contamination from storage tank systems located on federal and aboriginal lands. Storage tank systems that do not have a valid identification number displayed in a readily visible location on or near the storage tank system may be refused product delivery.

Government Publication Date: May 31, 2018

Fuel Storage Tanks: Provincial FST

List tank sites in unaccredited areas of the Province. Includes active tank sites, sites with tanks temporarily out of service, and sites at which tanks have been removed from the ground. Information in this database was collected according to Alberta Regulation AR 291/95 Storage Tank System Management and to AR 52/98 Fire Code which was formerly the Alberta Fire Code Regulation, 1992 (AR 204/92). The Petroleum Tank Management Association of Alberta (PTMAA) regulated Storage Tanks in unaccredited areas of Alberta from 1994 until June 2020, at which point the Safety Codes Council assumed responsibility for services related to storage tank management.

Government Publication Date: 1985-Jun 2021

Edmonton Vehicle Fueling Stations: Provincial FUEL STATION

A list of sites that have a City of Edmonton business license for Vehicle Fueling Stations. Listing made available by the City of Edmonton.

Government Publication Date: Sep 30, 2021

Waste Generators Summary: Provincial GEN

Under Alberta's Waste Control Regulation, Alta. Reg. 192/96, a generator is a person who consigns hazardous waste for storage, transport, treatment or disposal. As of 2007, Alberta Environment no longer provides detailed information on each waste generator, such as approval number, class, and class description.

Government Publication Date: 1993-Aug 2018

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO2 eq).

Government Publication Date: 2013-Dec 2019

Gas Processing Plants: Provincial GPP

The Alberta Energy Regulator (AER) - formerly the ERCB (Energy Resources Conservation Board) - has an inventory of all Gas Processing Plants in Alberta, with information such as location, names of plant, facility type, operator name, facility license, design capacities, etc.

Government Publication Date: Oct 2016-Oct 31, 2021

Alberta Environment's H.E.L.P. (Help End Landfill Pollution) Program Database: Provincial HELP

The H.E.L.P. Data Tracking and Management Control System was created to provide tracking and management capabilities of industrial landfills in Alberta for the Department of Environment. Detailed information including company name, location, type of landfill, priority, score, status, use and much more is included in this database.

Government Publication Date: June 1988*

Horizontal Wells: Provincial HORW

Defined as drilling directionally at a wellbore inclination angle exceeding 85 degrees, horizontal drilling can help increase resource recovery while minimizing surface impact. Recent improvements in the technology have made it possible to combine horizontal drilling with hydraulic fracturing to help coax oil and natural gas out of tight rock. Today, more than half of western Canada's wells are being drilled horizontally. Data includes: well locations (LE,LS,SE,TWP,RG,M,E), licence numbers, well names, Business Associate (BA) codes, licensee abbreviations, spud dates, final drilling dates, total depth, true vertical depth, and last updated dates. Made available by the Alberta Energy Regulator (AER) - formerly the Energy Resources Conservation Board (ERCB).

Government Publication Date: Mar 2015-Aug 31, 2021

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

Landfill Registrations: Provincial LANDFILLS

A list of landfill registrations made available by Alberta Environment and Parks (AEP). Landfills operating under a registration are required to follow the requirements in the Code of Practice for Landfills, which outlines the minimum requirements for the construction, operation and reclamation of landfills that accept 10,000 tonnes or less per year of non-hazardous and inert waste.

Government Publication Date: Mar 31, 2020

Identification and Verification of Active and Inactive Land Disposal Sites: Provincial LDS

In late 1981, Environment Canada and Alberta Environment initiated a project to identify and verify land disposal sites in the province of Alberta. A point scoring system was used to classify the sites into potential priority 1, priority 2 or priority 3 groups on the basis of the type of waste received at the sites and the site environment. Sites that, according to available information, may pose a hazard to public health and safety or the environment are classified as potential priority 1 sites.

Government Publication Date: Oct 1982*

Land Disposal Sites on Indian Reserves: Provincial LDSI

In late 1981, Environment Canada and Alberta Environment initiated a project to identify and verify land disposal sites in the province of Alberta. This database specifically identifies land disposal sites on Indian Reserves. Information on each site is limited to: location, band, size and general comments.

Government Publication Date: Oct 1982*

Lumber Related Operations - Certificates of Approval: Provincial LUM

This database contains approvals for processes pertaining to the manufacturing of wood products, pulp and paper including the associated water treatment processes. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Metals, Minerals and Building Materials Operations - Certificates of Approval: Provincial MMB

This database contains approvals for processes pertaining to the manufacturing of building materials, metals, and mineral products. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Mineral Occurrences: Provincial MNR

The AMDO (Alberta Mineral Deposits and Occurrences) application was created by the Minerals and Coal Geoscience Section of the Alberta Geological Survey as a database for mineral deposits in Alberta in the early 1990s. This is a one time inventory and will not be updated.

Government Publication Date: 1993-2003*

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

PTMAA Non-Compliant Storage Tanks: Provincial NCST

The Alberta Fire Code requires that storage tanks be registered. Tanks may not be registered because they do not meet minimum equipment standards or the owners have not made the annual registration application or paid the necessary registration fees. Some tank owners have installed tanks without a permit. This source contains information on facilities which have tanks that have ceased to be registered or have never been registered. It is maintained and updated by the Petroleum Tank Management Association of Alberta (PTMAA).

Government Publication Date: Sep 2016-May 31, 2020

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Apr 2018

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Pipeline Incidents: Federal NEBI

Locations of pipeline incidents from 2008 to present, made available by the Canada Energy Regulator (CER) - previously the National Energy Board (NEB). Includes incidents reported under the Onshore Pipeline Regulations and the Processing Plant Regulations related to pipelines under federal jurisdiction, does not include incident data related to pipelines under provincial or territorial jurisdiction.

Government Publication Date: 2008-Jun 30, 2021

National Energy Board Wells: Federal NEBP

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: 1993-May 2017

Operating and Abandoned Mines: Provincial OAM

This data is based on the 2001 edition (revised in 2003), published by the Alberta Energy and Utilities Board (EUB) now the Alberta Energy Regulator (AER). It was a one time inventory of Operating and Abandoned Coal Mines in Alberta. In 1905, Alberta began to catalogue coal mines by assigning a unique number to each operation. This database will provide information on location, mine #, mine name, mine company, life span, amount of coal produced, depth, thickness and other important information concerning the mine.

Government Publication Date: 2001, 2003*

Oil and Gas Facilities - ST102 & ST50: Provincial OGF

List of batteries, gas plants, meter stations, and other facilities in the province of Alberta, made available as ST102 (Parts A and B) and ST50 (B) by the Alberta Energy Regulator (AER).

Government Publication Date: Jun 30, 2021

Oil and Gas Wells: Private OGWW

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-May 31, 2021

Enforcement Orders: Provincial ORDERS

List of enforcement orders issued by Alberta Environment and Parks (AEP). Alberta Environment and Parks encourages compliance with environmental legislation. When individuals, companies, or municipalities fail to comply with legislation, the department has several options to ensure compliance. This listing, made available by the Alberta Government, includes Compliance Orders, Enforcement Orders, Environmental Protection Orders, Orders to Vacate, and Water Management Orders.

Government Publication Date: Aug 31, 2021

Alberta Orphan Wells: Provincial ORP

The Orphan Well Association (OWA) maintains lists of properties designated as orphan by the Alberta Energy Regulator (AER). Includes the location, well ID, licensee name and license number of orphan wells, sites, and facilities that have been identified for the purpose of abandonment, suspension, decommission, and reclamation. Legacy wells under long term care and custody are excluded. Please note that the OWA Orphan List also includes properties with production information from the AER. The OWA makes no representation, warranties, or guarantees, expressed or implied, for the fitness of the data with respect to its use.

Government Publication Date: Jan 2007-Feb 28, 2021

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009-2014

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Petrochemical, Coal and Gas Operations - Certificates of Approval: Provincial PCG

This database contains approvals for processes pertaining to petroleum, coal, and oil and gas processing. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Pesticide Register: Provincial PES

This is a list of Registered Pesticide Vendors in Alberta (retail and wholesale). The pesticide vendor list is comprised of vendors who have both audited AWSA pesticide storage facilities as part of their operation, and those vendors that do not have an audited AWSA pesticide storage facilities. Non-audited retail and wholesale vendors may be selling products that are not covered by the AWSA program, or may be utilizing external AWSA pesticide warehouses. Registration numbers and expiry dates are identified for each operation. If a registration number is not present, the operation's vendor registration is in the process of renewal.

Government Publication Date: 1998-Aug 2015

Conglomerate and Waste Management Facilities: Provincial PITS

This database contains approvals for processes pertaining to the use of gravel pits, sand pits, and clay pits. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Alberta Private Sewage Disposal Permits: Provincial PSP

These permits are private sewage disposal permits that have been issued to owners and contractors. They would include various types of installations including holding tanks, septic tanks, packaged treatment plants, sand filters, fields, mounds, lagoons and open discharges. In 2003 Alberta Municipal Affairs started collecting information and issuing permits using an electronic permitting system. These records include all private sewage disposal permits within the jurisdiction of Alberta Municipal Affairs.

Government Publication Date: 2003-2013

PTMAA Approved (Open) Permits: Provincial PTAP

The Petroleum Tank Management Association of Alberta maintains a list of open permits it has issued within its jurisdiction. Prior to installing, removing, or altering tanks, storage tanks owners must receive approval in the form of a permit from the Authority Having Jurisdiction (in this case, PTMAA).

Government Publication Date: Apr 2016-Apr 30, 2020

Hazardous Waste Receivers Summary: Provincial REC

A waste receiving location is any site or facility to which waste is transferred through a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents receivers of regulated wastes under Alberta's Waste Control Regulation, Alta. Reg. 192/96. As of 2007, Alberta Environment no longer provides detailed information on each waste receiver, such as approval number, class, and class description.

Government Publication Date: 1993-Aug 2018

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999-Sep 30, 2021

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Special Operation Classifications - Certificates of Approval: Provincial SPEC

This database contains approvals for processes pertaining to classifications listed as special operations (i.e. locations owned/operated by municipalities, operations that involve the presence of pesticides). Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Inventory of Waste Disposal Sites: Private WDS

This one time inventory is a compilation of information collected from each region and pertains to active, regulated waste disposal sites within the province of Alberta. In the past, waste disposal sites were registered with both regional and health offices. That process was dissolved and regional landfills were developed. There is no central source of this information. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1998*

Wastewater Operations: Provincial WSTE

This database contains approvals for processes pertaining to wastewater treatment systems. Please note that, as per the source of this database, some of the geographic information may pertain to a head office or mailing address and not necessarily the site of operations to which the certificate applies. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location. Therefore, locations will be accurate to the quarter section only.

Government Publication Date: 1993-2012

Alberta Water Well Information Database: Provincial WWIS

List of wells in the Alberta Water Well Information Database made available by Alberta Environment and Parks, containing approximately 500,000 records with nearly 5,000 drilling reports added annually. Some geographic coordinates have been provided in ATS (Alberta Township Survey system) format but do not contain offsets that are necessary to pinpoint a specific location; some locations will be accurate to the quarter section only. The Province of Alberta advises that the data may not be fully checked, and disclaims all responsibility for its accuracy. This data was previously collected from the Groundwater Information Center of the Natural Resource Service.

Government Publication Date: 1880-Jul 31, 2021

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

APPENDIX D

REGULATIONS

Federal

Legislation

Canada Water Act

- Guidelines for Canadian Drinking Water Quality - 6th edition
- Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments

Canadian Environmental Protection Act

- Chlorobiphenyls Regulations (SOR/91-152)
- Federal Aboveground Storage Tank Technical Guidelines
- Federal Underground Storage Tank Technical Guidelines
- Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum
- Federal Lands Regulations
- Storage of PCB Material Regulations (SOR/92-507)

Fisheries Act

Transportation of Dangerous Goods Act/Regulations

Hazardous Products Act

Policies, Guidelines and Codes

Canadian Council of Ministers of the Environment (CCME)

- Environmental Codes of Practice for Underground Storage Tanks Containing Petroleum Products and Allied Petroleum Products, March 1993
- Environmental Code of Practice for Aboveground Storage Tanks Containing Petroleum Products, 1993

Government of Canada Asbestos Abatement Guidelines, 1991-01-04

Code of Good Practice for Handling Solid Wastes at Federal Establishments (Environment Canada)

Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments (EPS-1-EC-76-1)

Provincial

Alberta Fire Code (2019)

Environmental Protection and Enhancement Act (1993)

Ozone-Depleting Substances and Halocarbons Regulation (2000)

Occupational Health and Safety Act (1993)

Transportation of Dangerous Goods Control Act (1986)

Municipal

Town of Coalhurst Unsightly/Untidy Premises By-law

Town of Coalhurst By-law

Town of Coalhurst Sewer Service By-law

Town of Coalhurst Noise Control By-law

HISTORICAL AERIALS

Project Property:	Coalhurst Phase I 221 Riverpark Blvd West Lethbridge AB T0L
Project No:	WA-21-111309
Requested By:	WA Environmental Services Ltd.
Order No:	21111800490
Date Completed:	November 19, 2021

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

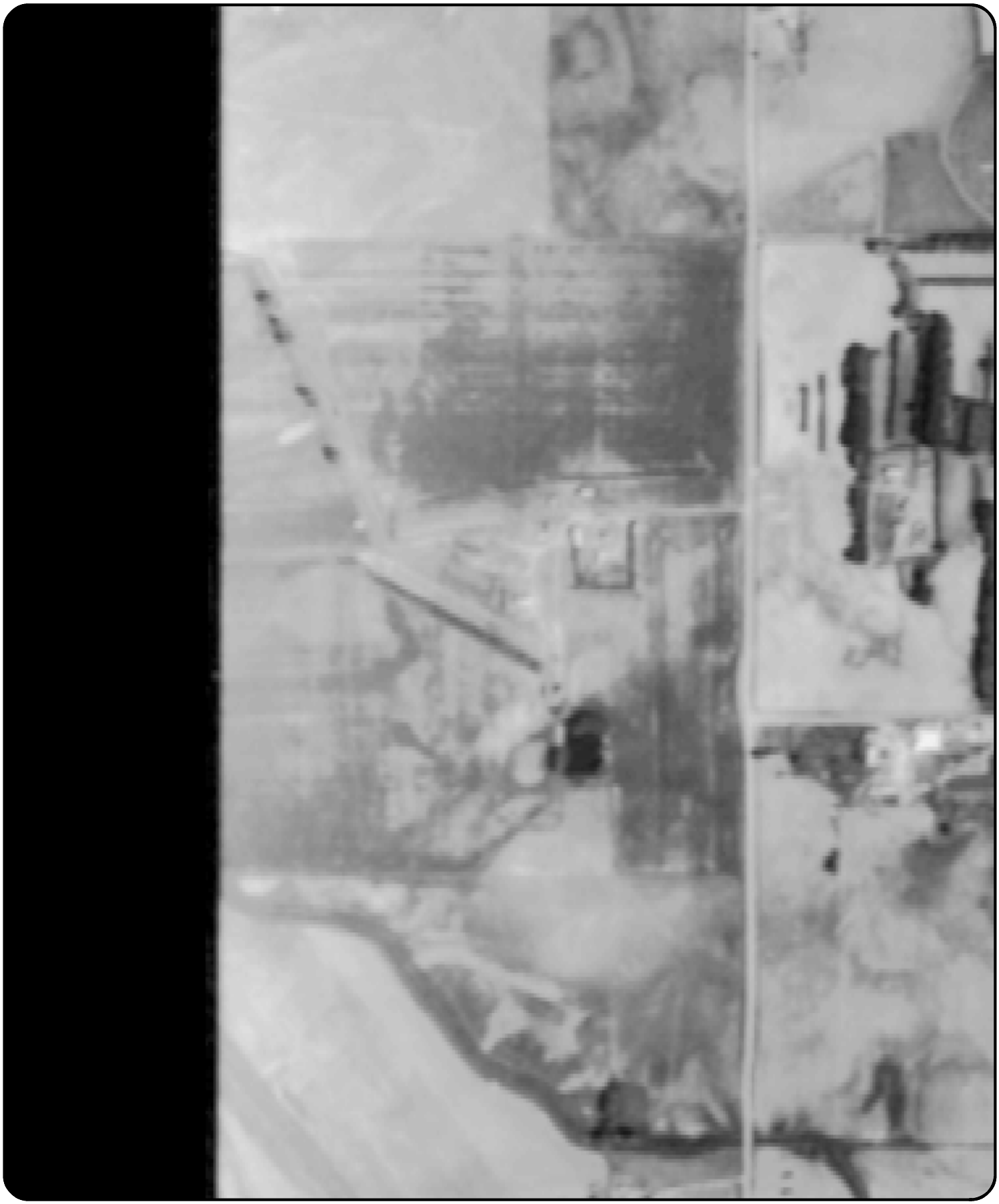
Decade	Year	Image Scale	Source
1920	Not Available		
1930	Not Available		
1940	Not Available		
1960	1963	50000	NAPL
1980	1983	50000	NAPL
1990	1995	70000	NAPL
2000	2002	50000	NAPL

0 0.125 0.25 0.5
Kilometers

Order Number: 21111800490

Year: 1963
Source: NAPL
Map Scale: 1: 10000
Comments: Best Copy Available

ERIS



0 0.125 0.25 0.5
Kilometers

Order Number: 21111800490

Year: 1983
Source: NAPL
Map Scale: 1: 10000
Comments: Best Copy Available

0 0.125 0.25 0.5
Kilometers

Order Number: 21111800490

Year: 1995
Source: NAPL
Map Scale: 1: 10000
Comments:

0 0.125 0.25 0.5
Kilometers

Order Number: 21111800490

Year: 2002
Source: NAPL
Map Scale: 1: 10000
Comments:

Appendix D: Historical Resources Act

HRA Number: 4835-23-0014-001
March 22, 2023

Historical Resources Act Approval

Proponent: 2176168 Alberta Ltd.
Box 71, Coalhurst, AB T0L 0V2
Contact: Bud Hogeweide

Agent: Stantec Consulting Ltd.
Contact: Meaghan Porter

Project Name: **Coalhurst Residential Development (NE 16-9-22-4)**

Project Components: Country Residential Subdivision
Area Structure Plan / Outline Plan
Access Road
Electrical / Utility

Application Purpose: Requesting HRA Approval / Requirements

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

Martina Purdon
Manager, Regulatory Approvals
and Information Management
Historic Resources Management
Branch
Alberta Culture

Proposed Development Location:

MER	RGE	TWP	SEC	LSD List
4	22	9	16	9-10,15-16

Documents Attached:

Document Name	Document Type
Proposed layout	Illustrative Material

Appendix E: Mining Study

phone: 403-331-0941
Email: thurberbruce@outlook.com
Bay G 1710 – 31st Street N. Lethbridge, AB
T1H 5H1

May 19, 2022 Project No.: 2021-163

2176168 Alberta Ltd.
C/O Hogeweide Management & Consulting Ltd.
PO Box 71
Coalhurst AB T0L 0G0

Attention: Bud Hogeweide, President

Re: Coalhurst ASP, Mining Study
NE 16-9-22 W4M
Coalhurst, AB

1.0 INTRODUCTION

As requested, BDT Engineering Ltd. (BDT) has completed a mining study for the proposed residential land development located at NE 16-9-22 W4M, in Coalhurst, AB. The purpose of this study was to review historical coal mining operations in the vicinity of the proposed development and determine if past mining activities have the potential to impact the proposed development.

The scope of this study was to:

- Collect and review published mining studies within the Lethbridge / Coalhurst area near the area of the proposed development.
- Review existing mine maps.
- Review historic air photos.
- Complete a field reconnaissance to screen for visual indications of historic mine workings.
- Evaluate the collected data and complete a summary report discussing risk associated with historic mine works within the vicinity of the proposed development.

2.0 BACKGROUND

For many years Lethbridge and area were a major producer of coal. The grade of coal mined was particularly well suited to use for domestic heating and most of the coal was transported by rail to urban centers in Ontario. In total approximately 40 million tonnes of coal were mined from a 1.4 m thick seam in the area (Johnson 1982). The mines were typically 110 to 120 m below the existing prairie surface. As a consequence, many of the peripheral areas of the city and surrounding areas are underlain by old mine workings.

3.0 AIR PHOTOGRAPH REVIEW

A select number of historical air photos were reviewed to see if any linear features, or mine workings, including mine shafts, or support facilities were evident on or near the area of the proposed development. The following table provides summary comments on this review.

Table 3.1 Summary of Air Photo Review

Air Photo Review		
Year	**Scale**	**Comments**
1950	1:40,000	Site and surrounding lands are all agricultural in nature. No evidence of any linear features noted on the photograph. Mine workings are noted north of the site in the Town of Coalhurst area.
1985	1:30,000	Farmstead is noted on the site. Further pens, and a dugout, irrigation canal, and tree plantings have occurred on the site. Again, no linear features are noted. Former mine workings are noted north of site in the Town of Coalhurst area.
1999	1:20,000	Similar to 1985. Irrigation canal is filled in now, no other linear features are noted onsite.

4.0 REVIEW OF EXISTING MAPS

As shown on Figure 1, attached, “Coal Mines of The Lethbridge District 1874 – 1982”, this map shows former mine workings beneath the Town of Coalhurst, including the area of the proposed development, NE 16-9-22 W4M (noted in blue on Figure 1). Further, as shown of Figure 2 attached, the “Mine Plan Lethbridge Colliery, Sec. 21, Twp 9, Rge 22, W4M” developed from ERCB files, show details of the mine workings at NE 16-9-22 W4M (illustrated in blue Figure 2). No mine shafts or vents are noted on Figure 2, in the NE 16-9-22 W4M. As shown on Figure 3, which is a continuation of Figure 2, proceeding north, two mine shafts, labelled No. 1 Shaft, and No. 2 Shaft are located north of NE 16-9-22 W4M. In Figure 4 attached, “Imperial Meadows Subdivision Phase III, LSD 2-21-009-22-W4M, Coalhurst Alberta”, the mine shafts area noted in Figure 3, are shown on Figure 4, north of the proposed development at NE 16-9-22 W4M.

5.0 REVIEW OF EXISTING STUDIES

As part of this study, BDT reviewed a number of existing reports and studies regarding mining subsidence in and around the Lethbridge area. The studies reviewed all confirm that typically the coal mined in this region was at a depth of 110 m to 200 m below existing prairie elevation. The mine below Coalhurst was noted to be Mine No. 0174. The depth of the coal seam from prairie level was between 153 m an d192 m below existing prairie elevation. Coal mines used a room and pillar mining approach, as illustrated on the Figures 2 and 3, attached. These studies note, from detailed information on Mine 1464 (Galt No. 8), that the total surface subsidence due to mine collapse was in the order of 300mm. Further, literature indicates that this subsidence occurred within three years of the coal being extracted, regardless of whether the supporting pillars had been removed. Negligible additional surface subsidence was recorded thereafter. Given the mines below the proposed development area closed in the mid to late 1930s, initial subsidence would have occurred many years ago.

6.0 FIELD RECONNAISSANCE

BDT personnel completed a field walk of the entire site looking for evidence of surface mine workings, any historic vents or other shafts, and any evidence of tension cracks. The site walk did not reveal any evidence of impacts from either mining operations or subsidence associated with the mine collapse.

7.0 CONCLUSION

Based on a review of existing reports and literature regarding mining activities near Coalhurst, a review of historical air photos, a review of published maps and a field reconnaissance it can be concluded that coal mining did occur beneath the footprint of the proposed residential development at NE 16-9-22 W4M. Based on existing studies regarding ground surface subsidence from coal mines, it can be concluded that any ground subsidence caused by the mine works would have occurred in the late 1950s or early 1960s, within about three years after the mine operations concluded. The field reconnaissance did not reveal evidence of any mine shafts or vents that would need to be isolated from the developable area. Further, as noted in published figures included in this report, the mine shafts associated with the coal mines beneath Coalhurst, are located in what is now park area, north of the proposed development site.

Given that coal mining did occur beneath the proposed development area, published studies recommend that all footing excavations be observed by a qualified geotechnical engineer. Due to mining subsidence, localized, isolated tensions cracks may be evident in these excavations. Although the bearing capacity of the foundation soils would not be compromised, any tension cracks observed should be excavated to remove any lose infill soils and backfilled with compacted general engineered fill. This recommendation, can also be applied to general construction activities on the site, including underground utility installation.

8.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully Submitted

Bruce D. Thurber, P.Eng.
BDT Engineering Ltd. P13556

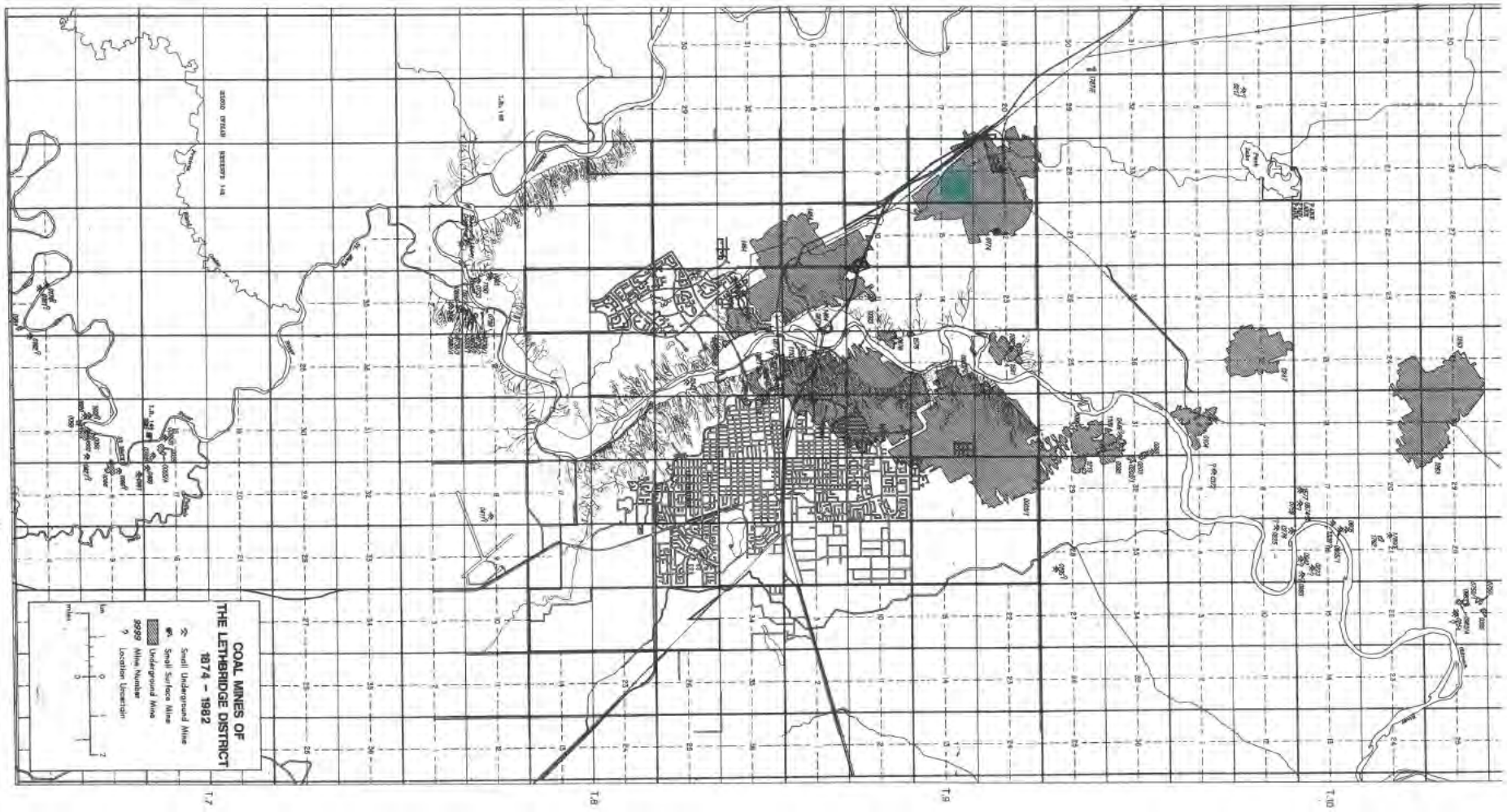


Figure 1: Coal Mines of Lethbridge District 1874 - 1982

Note: Map showing potential underground mining areas at NE-16-09-22-W4

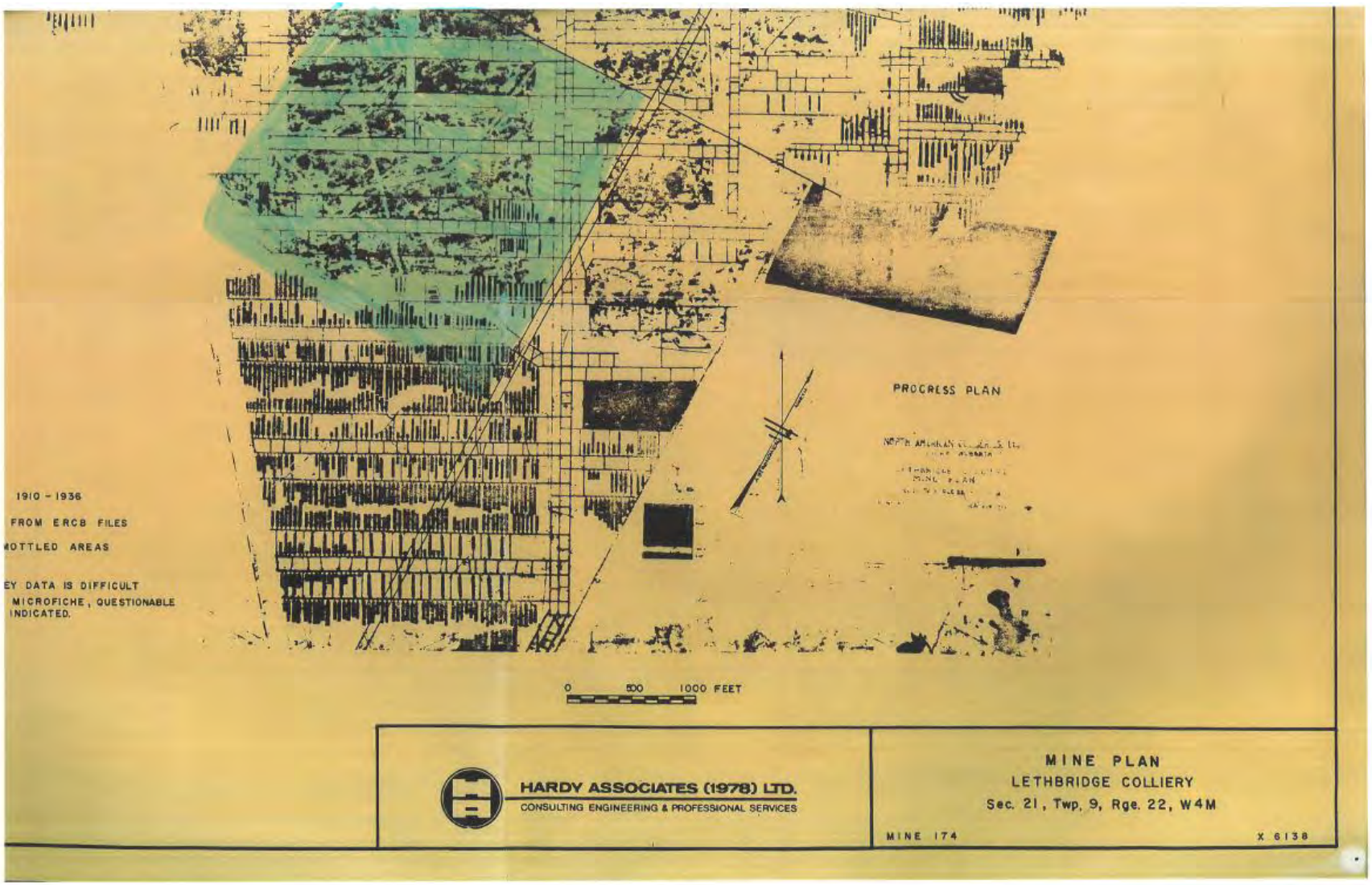


Figure 2: Hardy Associates (1978) Ltd.

Note: Mine plan showing mining works beneath SW-16-09-22-W4

Figure 3: Hardy Associates (1978) Ltd.

Note: Mine plan showing No. 1 & No. 2 shafts north of NE-16-09-22-W4

Figure 4: Site Plan of Existing Conditions EBA 2007

Note: Former mine shaft area (now Imperial Meadows Park) north of NE-16-09-22-W4

Appendix F: ATCO Development Guidelines

DEVELOPMENT GUIDELINES

Below you'll find a short summary of what we'll allow and will not allow within ATCO Transmission (a division of ATCO Gas and Pipelines) rights-of-way.

The following encroachments **may be** permitted within ATCO Transmission rights-of-way (*require an engineering assessment):

- Walking paths
- Minor vegetation
- Irrigation or drainage system crossings
- Utility crossings
- Perpendicular road or rail crossings*

The following encroachments **are not** typically permitted within ATCO Transmission rights-of-way as they increase the risk of damage to the pipeline, restrict access and the ability to inspect the pipeline, and reduce the ease with which the pipeline right-of-way may be identified:

- Buildings or structures (15m setback recommended)
- Storage
- Parking
- Signage
- Fencing
- Trees
- Lighting or electrical installations
- Irrigation or drainage systems (except at crossings)
- Utilities (except at crossings)
- Roads or railways (except at crossings)