OPUS STEWART WEIR

Lamont Heartland Utility Master Plan

Lamont County

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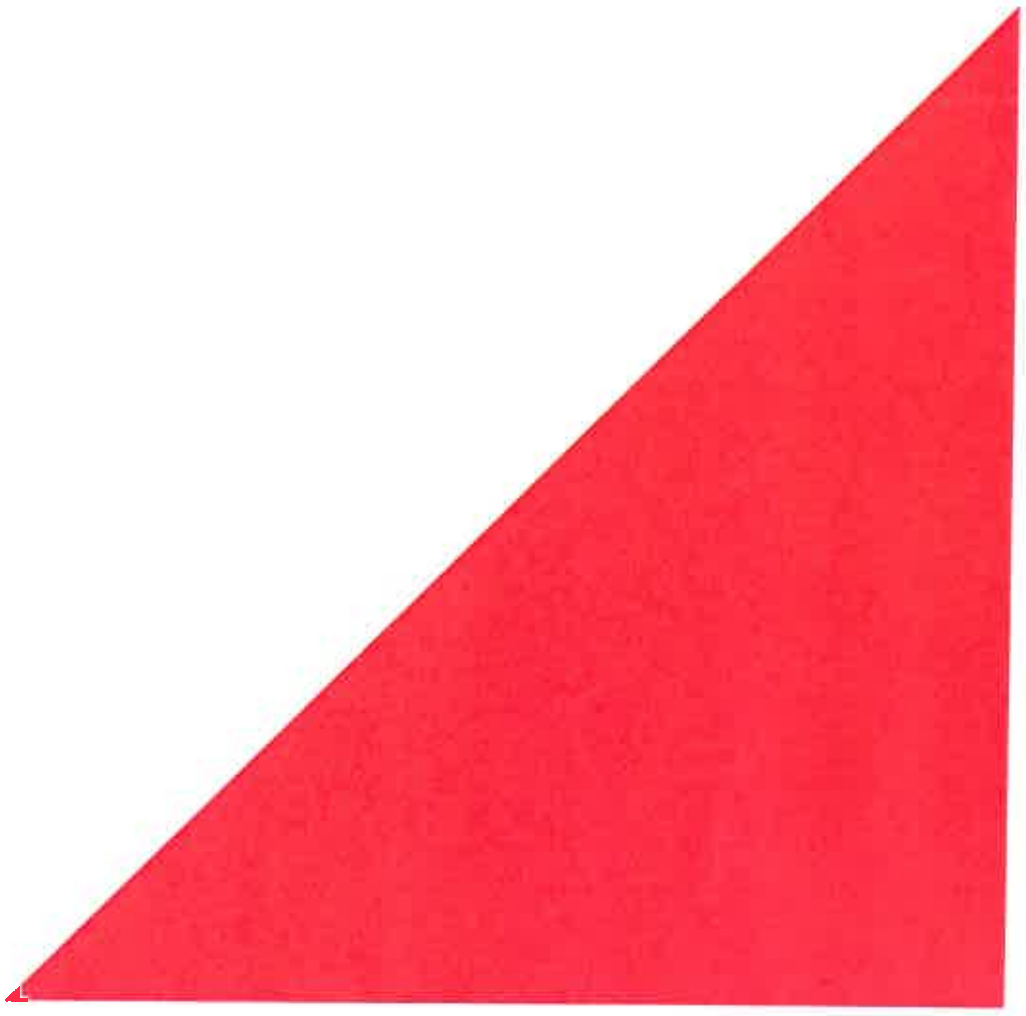
Amended February 2014 by Council Motion to increase study area 0.5m (0.8km) north of Township Road 560.



EXECUTIVE SUMMARY

Background

The purpose of the Utility Master Plan is to review potable water distribution over a 20-year planning horizon, to conduct a technical review of previously identified needs, and to update the infrastructure improvements and capital costs for the upcoming 20-year planning period. This assessment will help determine future water rates and off-site levy requirements. This Master Plan is also a critical component in the development planning process and is intended to harmonize the Lamont County's water servicing strategies for the South Basin Lamont Industrial Heartland District.

The Master Plan provides new infrastructure recommendations to improve servicing, accommodate future servicing, improve system reliability, efficiency, consolidate operating systems, address water quality, and to meet current and future regulatory requirements.

Although outside of the study parameters it is recognised that with increased industrial developments there will be potential for growth in residential and highway commercial developments that will affect servicing demands. Developments will likely occur to the northeast of the study area near existing Hamlets for residential developments. The consideration for highway commercial zoned lands may have substantial servicing requirements which have not been fully explored. Servicing proposals directed to this area should consider phased implementation as a means to reduce the upfront capital investment requirements.

Opus Stewart Weir was retained by Lamont County to complete the Utility Master Plan for the South Basin Lamont Industrial Heartland District.

Study Area

The Industrial Heartland inside Lamont County has a gross area of approximately 2525 ha. This represents a significant commitment to heavy industrial development on behalf of the County. Some land features which favour industrial developments include:

- Large contiguous land parcels (zoned for heavy industrial development);
- Separation from large concentrations of residential development;
- Excellent highway and rail access; and
- Close proximity to existing potable water services.

The existing potable water transmission main is owned and operated by the Capital Region Vegreville Corridor Water Services Commission (CRVCWSC) of which Lamont County is a member. The CRVCWSC can supply Lamont County with 52 m^3/hr. Arrangements to supply a higher rate can be made but will be tied to the storage capacity maintained by Lamont.

The existing water reservoir and distribution system is owned and operated by Lamont County. The current storage capacity is 2500 m^3 and has a current limited distribution network. Major customers of the existing potable water distribution system include Conexus, Triton and Western Asphalt.

Master Planning Process

Having some consensus on utility corridors will be very beneficial in planning for industrial development in the study area. The County can reduce land fragmentation by encouraging parallel or even shared utility right of ways. The industrial developments also need adequate right of ways which can efficiently connect with feed stock supply and market delivery systems outside of the study area. This is primarily a coordination effort and the current stakeholders including: Alberta Industrial

Heartland Association, Alberta Electric System Operator, CN & CP Rail, project proponents and Lamont County.

Provincial grant funding is available to assist remote communities with water and wastewater projects. Although industrial developments do not qualify under these grant criteria, the benefits to downstream communities such as Star and St. Michael warrant an application effort.

Potable water, wastewater and process water demands illustrated in this Utility Master Plan preparation are projections and subject to change as the engineering designs of the developments evolve. Proactive inquiries regarding flow projections should be conducted on a regular basis to ensure that the Utility Master Plan remains current and relevant. Ensuring that infrastructure is in place in time to service the various phases of project development is a major consideration. Upon adoption of this Utility Master Plan, a detailed capital projects schedule should be developed to accurately forecast expenditure requirements.

Servicing Requirements

Water

- Water demand criteria were developed for each service area;
- Water storage capacities were assessed for the projected growth during the 20-year planning period;
- Existing storage capacity of water supply systems, for emergency storage were assessed;
- Additional water supply storage is recommended to improve water quality and quantity, address long-term sustainable supply, to reduce operational costs' and allow for growth in the South Basin Lamont Industrial Heartland District;
- New water mains are recommended to integrate water supply systems, improve reliability, optimize use of existing capacity, address future servicing needs for long-term sustainability, improve water quality and quantity of supply, and to reduce overall operational costs.

The Utility Master Plan recommends a strategy for continued capital improvements of the existing water supply and distribution system. The recommended strategy is to improve system reliability, and to address current and future regulatory requirements.

Amended February 2014 by Council Motion to increase study area 0.5m (0.8km) north of Township Road 560.

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1 INTRODUCTION

1.1 Background

The Alberta Industrial Heartland Association (AIHA) was formally established in May of 1998 by founding members Lamont County, Sturgeon County, Strathcona County, City of Fort Saskatchewan and the Northeast Capital Industrial Association (NCIA). The mandate of AIHA is to foster industrial development within the combined lands of the member components. Today, the Heartland Region encompasses approximately 200 km² and includes the City of Edmonton in its membership. The expectation for the AIHA lands is to see a world class industrial centre focusing on petroleum, petrochemical and chemical processing become a reality and a major economic driver for Alberta's Capital Region far into the future.

Located on the east side of the Alberta Industrial Heartland, Lamont County is a diverse rural municipality with a vast geographic area and an estimated population of 3,872 (2012). Lamont County's Heartland District south basin encompasses 39 quarter sections of land (2,525 ha); there are two adjacent basins to the north within the overall Lamont Heartland District. The rate of development in the Lamont County Heartland District has been slower to materialize then with adjacent Heartland members. Recognizing this Lamont County Council and Administration have set about to develop infrastructure to attract new developments.

Lamont County has established a mandate to supply potable water services to the South Basin of the Lamont Industrial Heartland District, approximately 2,525 ha. Lamont County has retained Opus Stewart Weir to prepare a Water Utility Master Plan to identify a long-term servicing strategy for the South Basin Area of their portion of the Alberta Industrial Heartland.

1.2 Utility Master Plan Objectives

At the outset of the study, the following objectives were identified for the Utility Master Plan:

- Establish a basis of design and design criteria for potable water planning for the South Basin of Lamont Industrial Heartland Region;
- Establish a long-term plan with budgets for South Basin Lamont Industrial Heartland District water distribution system;
- Verify environmental compliance with new and emerging regulations;
- Excludes an analysis of fire flow and fire storage requirements for water supply systems;
- Excludes provisions for rural and urban servicing of water within Lamont County but must assess urban growth downstream on the Vegreville Corridor;
- Allow for long-term capital improvements projects budget and rate planning that arise from the utility master planning process.
- Provide a strategy to address the long term water servicing needs of the South Basin Heartland District, including consideration for existing and future industrial growth;
- Provide water quality and quantity of supply through inter-connection of water mains and water systems;
- Address capacity and condition of existing water facilities;

- Confirm compliance with various operating standards and assess environmental risk;
- Analyze potable water storage requirements within the service area, the intent is not to provide fire flow provisions to the South Basin;
- Plan for municipal rate structures that reflect required capital improvements projects operations, maintenance costs and replacement costs required for system sustainability.

Water Servicing Requirements

- Water demand criteria were developed for each Phase area based on assumed supply volume per hectare;
- Water supply capacities were reviewed with the Capital Region Water Commission and appear to be adequate for the projected growth during the 20-year planning period;
- Existing storage capacity of water supply systems was assessed and indicates that water storage capacity is limited;
- Provisions for water supply to the Hamlets of Star and St. Michael from the last phase of waterline looping were reviewed in our modeling, it is recognized that future expansion to address water quality and quantity via a sustainable piped supply will reduce operational costs and allow for growth in the communities;
- New water mains that provide a full looping are recommended to integrate water supply systems, improve reliability, optimize use of existing capacity, address future servicing needs for long term sustainability, and to reduce overall operational costs are required for the South Basin District to facilitate the industrial development of these lands.

Recommended Servicing Strategies

The Utility Master Plan recommends a strategy for continued capital improvements of the existing water supply and distribution system. The recommended strategy is to improve system reliability, and to address current and future regulatory requirements.

The Utility Master Plan provides new infrastructure recommendations to improve servicing, accommodate anticipated future servicing, improve system reliability, efficiency, consolidate operating systems, and address water quality and to meet current regulatory requirements.

The Utility Master Plan should be reviewed every five years to determine the need for updates in the planning strategy. Over time several changes may be anticipated to occur which may impact the assumptions used to prepare the Plan. As a result the Utility Master Plan will require updating. Significant issues that may affect the Plan include:

- Updated Provincial Regulations;
- Health standards for safe drinking water;
- Sustainable water delivery volumes;
- Provincial Policy Statement;
- Completion of numerous developments requiring infrastructure with higher development levels;
- Additional impacts not anticipated.

1.3 Study Area Description

Lamont County's South Basin Area is located approximately 32 km east of Fort Saskatchewan, 69km northeast of Edmonton as illustrated in Figure 2. The study area is bordered by the Town of Lamont on the southeast, the Town of Bruderheim on the west, Highway 15 to the south, Highway 831 on the east and 0.5 mile (0.8km) north of Township Road 560. The area is serviced by both Canadian National and Canadian Pacific Railways.

1.3.1 Municipalities

There are two municipalities located near the study area which will be impacted by existing and future industrial development. These include the Town of Lamont and the Town of Bruderheim. These communities are members of the Capital Region Vegreville Corridor Water Services Commission (CRVCWSC).

As presented in Figure 2, Town of Lamont is located southeast of the southeast boundary of the Heartland Area. At an approximate population of 1,753 people (Provincial Statistics 2012), the Town maintains 15 kilometres of water mains and is connected to the Capital Region Vegreville Water Service Commission (CRVCWSC) line. The Town of Bruderheim is a growing community located west of the study area. At a population of 1,298 people (Provincial Statistics 2012), it operates 11 kilometres of watermain and also is connected to the CRVCWSC line.

1.3.2 Industry

Lamont County's Heartland Area has been established since the adoption of the "Lamont County Industrial Heartland Area Structure Plan" was adopted by Council and amended March 11, 2008. The south basin of Lamont's Heartland area centres on a number of existing industrial facilities. The existing facilities as well as the known proposed projects are presented in Figure 1. It is evident that the pace of development within the next 5-10 years will be busy.

The Lamont Heartland area is posed to capture potential support industry to Upgrader project currently being developed or planned for in the Strathcona and Sturgeon components of the Alberta Industrial Heartland Area.

1.3.3 Topography

The south basin area of Lamont County's Heartland Area comprises typical prairie farm topography, Figure 3. The majority of the land is flat with a general slope ranging from 0.2% to 0.5%. The surface drainage catchment area has defined water courses and drains overland toward the Beaverhill Creek and eventually into the North Saskatchewan River.

1.4 Municipal Assessment Process

Municipal infrastructure projects must meet the requirements of the Alberta Environmental. A Utility Master Plan is a long-range plan that examines the whole infrastructure system and recommends a series of projects to be implemented over an extended period. Utility Master Plans are not prepared to address site-specific problems such as extending water servicing to an area of new development.

The Utility Master Plan recommends a strategy for continued capital improvements of the existing water supply and distribution system. The recommended strategy is to improve system reliability, and to address current and future regulatory requirements. Scope

The Utility Master Plan is to focus on the delivery of potable water service throughout the South Basin of the Lamont Industrial Heartland area. Future proposed projects represent a major investment of industry in this area. The County anticipates this industrial growth will bring economic prosperity and will permanently change the region. As such Lamont County is committed to ensuring that the growth will create a positive influence on the surrounding communities. To provide assurance to local residents that responsible development will occur, the County has initiated several master plan initiatives. In addition to this utilities study, there are associated plans to address transportation services and a plan to proceed with a stormwater master plan.

The County vision is to see the combination of these studies to provide guidance for the development of a local industrial sector that is technically sound, financially viable and environmentally sustainable:

• The Transportation Master Plan has been prepared by Stewart, Weir & Co. Ltd. It provides develop recommendations for a transportation network to meet the needs of residents and industry over the next 25 years.

• The future Stormwater Master Plan will provide for the management of surface drainage, on-site storage and discharge requirements to meet with Alberta Environmental regulatory requirements.

This Utility Master Plan concentrates on the delivery of potable water distribution to maximize the integration of servicing concepts and objectives established by the County to attract industrial proponents to Lamont County's IHA.

Potable Water

The existing water distribution system comprises of a 2500 m^3 reservoir and pump house located at the southwest corner of SE 27-55-20 W4M. A 200mm water distribution main runs north from the reservoir to service the Conexus and Heartland Industrial Park developments. A 200mm service line tees off of this line to deliver water to eastward to service Triton. With current developments at the Conexus lands the current water main will be required to be removed from service within the next 2 years.

Overall, the water distribution system is functioning at a minimal level of service. The development of this Utility Master Plan includes setting reasonable industry performance measures, simulating the existing and future states through computer models, and then determining required improvements. This aspect will allow County staff to assess future development proposals creating a true "living document".

Potable water is required with most construction phase that would be anticipated with industrial site developments and in the operation of the proposed projects. It is proposed that a water distribution system be constructed to service the various projects. This distribution system will be constructed in phases to satisfy the needs of the various projects and will serve planned phasing and budgeting

requirements for the capital improvements required to facilitate the full build-out of the anticipated network.

Process Water

Process water does not form part of the considerations of this Utility Master Plan. The County's access to potable water is restricted by both the volume of the existing reservoir and the amount of water they have access to through the CRCVCWSC. Individual industrial proponents will need to independently evaluate process water servicing configurations available through alternative supply for their project needs

Recommended Future Servicing Strategy

The future servicing strategy recommendations for servicing of the future development lands within the South Basin area of the Industrial Heartland includes, in addition to the construction of network pipes a new reservoir located in the eastern portion of the study area. Although out of the scope of this report providing for this proposed reservoir will allow the County to plan for future service expansion to supply the Hamlets of Star and St. Michael to the northeast.

Figure 4 shows the conceptual future water distribution system under this servicing strategy. The development of the new reservoir will require a new service connection to the CRVCWSC. In addition, some improvements to the currently existing pipe network will be required in order to facilitate future development in specific areas and allow a complete looping of the water distribution network.

Utility Corridor(s)

Utility corridors for the purpose of the water servicing have been highlighted in Figure 4. The County will work with industrial proponents to acquire the identified corridor right of ways. Corridor right of ways are to be 10m in width and are not meant to be incorporated into existing road right of ways. Additional width requirements would be determined based on specific project requirements if warranted based on the future preliminary engineering for specified projects. It is envisioned that the corridors can also be used for other franchised utilities to reduce land fragmentation.

1.5 Study Processes

One of the primary objectives of the Master Plan is to develop infrastructure recommendations that meet the needs of the project proponents, Lamont County and existing customers.

To achieve this, the following steps were considerations in the development of the Utility Master Plan:

- Specific meetings were conducted with the County to review existing industrial developments.
- Development Review Team meetings. The Development Review Team was established by Lamont County to oversee the development of the south basin area of Lamont
- County's Industrial Heartland Area.
- Discussions with CRNWSC about regional water supply.
- Discussions with Alberta Infrastructure and Transportation regarding potential grant funding.

1.6 Planning Horizon

A planning horizon of 20 years was chosen for the utility plan. Detailed growth projections are based on specific development proposals over the immediate 5 to 10 year horizon. Projections between 10 and 20 years are based on general trends. It should be noted that current projections estimates that about 50% of the South Basin Heartland Area (within Lamont County) will be developed within 5 to 10 years and the area will fill out to its maximum potential by about 2034. In this regard, the infrastructure plan presented in this utility plan accommodates the full build out of the area. The specific timing of development will likely vary from 20 years.

1.6.1 Existing and Proposed Industry

As the Lamont Industrial Heartland area is relatively undeveloped a review of existing industry and project proponents could not be used to develop reliable population projections or demands for water services. The basis of the supply demand therefore is based on a uniform volume per hectare method of analysis and modelling profiles. As Lamont County anticipates the specific development to be standalone industries or industries that may provide services to the larger industrial development sector outside of the study area a review of the project listings with the Alberta Heartland Association was conducted. It is recognized that significant variations in servicing needs over the life of any proposed upgrader projects or other listed industrial developments; which supports the use of uniform volumes for analysis. The level of confidence associated with these estimates is relatively variable over the immediate 5-10 year horizon as it is understood that the longer term forecasts for any of these projects are dependent upon factors such as timing, the labour market and the local and international economic climate as well as synergies between proponents that are not overtly advertised but are known to occur.

1.6.2 Future Development

Predicting growth patterns for heavy/medium industrial development is uniquely challenging as each project can fundamentally change the entire plan. It is therefore, critical to achieve some consensus on the location and sequence of major developments. Currently existing and known potential developments would not be reliant on major projects with the neighbouring Heartland Regions. Several planned upgraders in the neighbouring Heartland region have not as yet materialized with only the Northwest Upgrader currently under development in Sturgeon County. Any one of the planned future upgraders if developed could spur support industry growth in Lamont. For the Utility Plan a review with the Heartland Association and neighbouring counties occurred. Additional new upgrade projects and support projects otherwise have been delayed indefinitely.

In order to ensure that the existing infrastructure and planned development of new industrial infrastructure as covered by this Utility Master Plan will not adversely impact the County's ability to service future residential development growth areas are anticipated to be around existing Hamlets. Reasonable growth in anticipated residential development in the fringe area of the Industrial Heartland region should be expected. It would be envisioned the County would direct such growth to occur around the existing communities of Star and St. Michael in order to maximize potential of municipal infrastructure improvements at a minimal cost. Population projections in these areas have

been developed by a review of projected full time positions created by industrial developments. With the planned construction of the Northwest Upgrader located in the Sturgeon Industrial Heartland there is an expected 1500 workers (see Table 1.6.2). Growth projects should be anticipated on a more localized level with the introduction of new and future developments within the Lamont Industrial Heartland area.

Table 1.6.2 Anticipated population increase to region based on the Northwest Upgrader Construction

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Construction Period	1000	2000	2300	2400	2600	2400	900	600	400	400	600	400	400	600
Normal Plant Operations				200	300	400	400	400	400	400	400	400	400	400
Plant Turn Around Period						200			200			200		

The growth of downstream communities was also included in the population forecast review. Additional factors that contribute to the available volume of potable water are the increased service area of the Vegreville water line to service communities further east of Vegreville along the Highway 16 corridor.

2 Potable Water

Potable water is water that has been purified and disinfected to comply with federal and provincial drinking water standards. This includes both treatment and operational standards.

EPCOR Water Service is the potable water service provider for Edmonton Capital Region. As illustrated in Figure 5, EPCOR distributes treated water into regional trunk systems which service communities to a vast area outside of the Edmonton region. Each of the regional water customers has individual water supply contracts with EPCOR which define the supply conditions such as the locations of connection, infrastructure ownership/responsibility and the maximum rate of supply, etc. On a collective basis, the ERWCG pays for the treated water at a bulk rate. The current water supply system is based on a supply peak factor, from EPCOR, of no more than 1.5 times the average day demand.

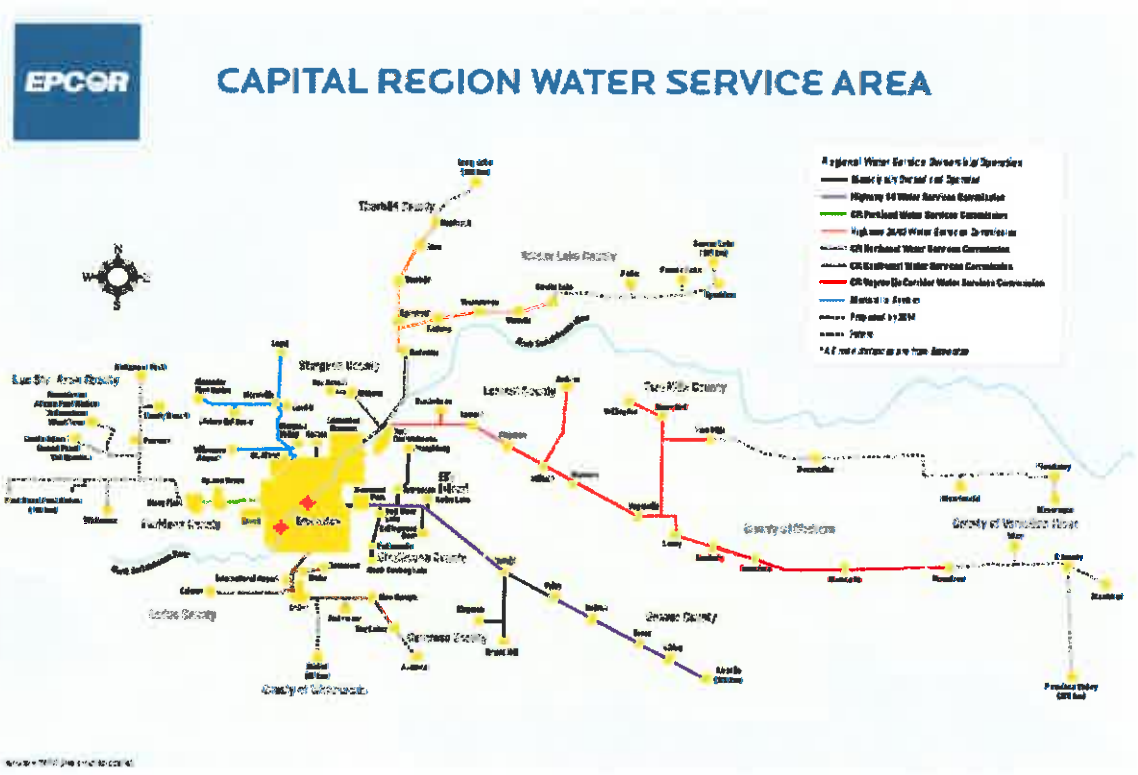

Figure 5

2.1 Existing Infrastructure

2.1.1 Existing Regional Network

The CRVCWSC waterline and the associated water reservoir and pump station were designed to be a regional transmission system. It delivers water at relatively constant flow rates and pressures but was not designed to buffer large demand peaks that would be typical in a water distribution network. The existing customers of this line are required to provide their own reservoir and pumping system(s) to meet their peak hour and fire flow demands. The Capital Region line connection requirement also requires an "air gap" between the supply line and the service connection's reservoir and pumping facilities.

CRVCWSC is obligated to supply each member with required demand; however, each member must have a two day (48 Hours) storage capacity in place to meet their customers' demands.

The existing supply rate from Capital Region line is 52 m^3/hr. The CRVCWSC can supply water at a higher rate but there is no necessity for that at this stage due to low demand. The inherent risk with the existing reservoir, should there be a supply interruption, can only be addressed by expanding the

reservoir capacity at the current reservoir location or by providing a new reservoir at a planned stage of the water distribution network expansion.

2.1.2 Storage and Pumping

The Lamont county existing 2500 m^3 reservoir is supplied by the Vegreville waterline via an air break feed. The pump house floor elevation is 681.98 m and consists of three distribution pumps delivering water through a 200 mm distribution line. The pumps flow rate is 52 m^3/hr each and operate between 45-55 psi pressure. The reservoir and pump house is controlled through a common SCADA (Supervisory Control and Data Acquisition) system.

2.1.3 Performance Assessment

The existing system has provided continuous and trouble free service for over 30 years. Based on present computer modelling of the system hydraulics and reviews of recent work (EXH Engineering 2005), the line is adequate to meet existing and future demand up to phase 3 based on the information provided by the County of Lamont about their future industrial demands and projected developments. The existing system would also be adequate to service the area's projected demands beyond the year 2026 based on historic growth trends of 1 to 3 percent per year. As the current customers of this water system own and operate their own reservoir facility, the impact of a line break (due to its age and material) and therefore, supply disruption, is somewhat minimized but Lamont County will need to expand its storage capacity.

The proposed heartland developments will be a significant addition to the existing potable water demand. Simple expansion to the existing infrastructure is likely not sufficient to meet this new demand. In this regard, new approaches to potable water servicing must be developed.

2.2 Potable Water Demand

Water consumption varies significantly depending on the type of development, weather and a variety of other factors. It is important to identify and understand the demand characteristics of the various customer groups in the planning and design of water supply systems. For this utility master plan, these demands can be categorized for discussion purposes as follows:

- Existing Customers
- Industrial Project Proponents
- Highway Commercial Development
- Residential Developments (expanded service to the Hamlets of Star and St. Michael)

The majority of the demand within the first ten years is attributable to industrial project construction. A peak can be noted around 2019 and the demand subsequently drops off until later years when the residential developments begin to become dominant in this area's overall water demand.

2.2.1 Existing Customers

Lamont County has a limited water distribution network with three customers receiving water supply. The current water distribution main crosses the transhipping rail yard at Conexus and will require as Phase one of the planned improvements to be relocated into a Utility easement to the east side of Range Road 202. The existing customer base includes; Conexus, Triton and Western Asphalt.

Historic data and employee records were not available to provide average daily demands. As there will be peak flow concerns, future industrial developments will be required to provide onsite two day supply storage in the event of a supply interruption or system maintenance issue.

Salt cavern development by any water customer will create supply demands that will challenge the existing reservoir capacity.

Based on industry standards, the average daily consumption of industrial plant site personnel is approximately 100 Litres per capita per day (Lpcd). This demand can double during the summer months when the demand peaks. A ratio between maximum day to average day demand of 2.0 has been applied which is typical for the Edmonton region.

For modelling purposes, an annual 3% increase was applied to all of the downstream communities to account for growth in this area. Sizing of new infrastructure for the Lamont Industrial Heartland South Basin water distribution network do not specifically include the downstream flows.

2.2.2 Industrial Project Proponents

Industry developments at the time of the preparation of this study were; Maxium Power, Graymont, Heartland Industrial Park, Blue Horizon, Canadian Heartland Lamont, Albert Midland Railway Terminal, Federated Cooperatives and MEG Energy. Known information from the identified industries represents their current plans and is subject to change.

Domestic water consumption in industrial plant sites represents a major future demand within the Heartland Area. With the proposed developments, there will be a surge in construction activity and therefore water demand in this category. Based on historic flow records, a per capita consumption of 100 Litres/day is attributed to this demand category.

Lamont County views this large volume of water need to be delivered via a piped network to be constructed in phases and providing points of service connection at each project location. The distribution of this water within the project area will remain the responsibility of the individual projects or their contractors.

2.2.3 Highway Commercial

Highway commercial development is currently not expected and was not a consideration within this study. Typically highway commercial would parallel heavy industrial developments. Future considerations by Lamont County may include the development of a Highway Commercial land use district; should this occur revisions to the Water Master Plan will be required.

Water and wastewater servicing for highway commercial can be very significant when compared with the needs of heavy industrial developments. In part, this is due to the variability of the potential developments

and their need for potable water. For example truck stops, hotels, car washes and restaurants typically fall in the category of highway commercial.

Future considerations for a separate reservoir and pumping facility will be required for the consideration of a Highway Commercial District to buffer the peak hour demand and satisfy fire flow requirements. A ratio of 4.0 should be used to account for peak hourly demand and 2.0 for maximum daily demand. For fire protection, the system will likely need to provide up to 200 Litres per second for duration of 3 hours, based on the international standard for fire protection.

2.2.4 Municipal and Country Residential Developments

Country residential development and municipal expansion do not form part of the scope of the Heartland Utility Master Plan. However in consideration of the opportunity to provide future water service connection to the Hamlets of Star and St. Michael we have ran a modelling component with the Phase 4 expansion. Considerations for the future reservoir expansion location being located in the northeast quadrant of the South Basin would facilitate the ease of expanded services to these communities and potential new country residential subdivision clusters within the area of Star and St. Michael. It is recognised the development of prestigious acreage subdivisions in neighbouring Heartland municipalities has become a hallmark of success and desirable living conditions and Lamont County will need to consider how these future types of developments will be serviced. Country residential development within the fringe areas of the Lamont Industrial Heartland is expected to grow concurrent with the industrial development. This development must be accounted for in the future potable water system planning.

Water consumption of country residential developments can vary significantly depending on what the water may be used for. In the Edmonton area, pure domestic consumption ranges between 200 and 280 Lpcd in a single family dwelling. Typically, summer outdoor consumption will increase the demand significantly during this period and would bring the overall annual consumption to well over 300 Lpcd.

For planning purposes it is recommended that 320 Lpcd be used. This would represent modern housing developments that utilize low flow facilities and makes some provision for outdoor water usage. The maximum day factor applied is 2.0. It is evident from Sturgeon and Strathcona County that country residential developments will become the dominant customer group within the 20 year planning horizon as the water demand caused by initial construction of the proposed projects levels off.

The hourly peaks of country residential developments are expected to be addressed by individual developments through the construction of peaking and fire protection storage facilities. The same connection requirements (storage and air gap) currently specified by the CRVCWSC are expected to apply to all future connections.

2.3 Design Criteria

2.3.1 Water Demand

Demands for future heartland industrial uses are not based on land uses but on projected demand based on existing industrial clients and information provided by the County of Lamont.

The following demands design criteria are taken from the County design guidelines and construction standards:

Average daily consumption (ADD, industrial)	100 litres/capita/day
Average daily consumption (ADD, residential)	320 litres/capita/day
Peak Hour Demand (PHD)	4.0 x average day
Max Day Demand (MDD)	2.0 x average day
Min residual pressure (fire flow+max day)	140 kPa (20 psi)
Min residual pressure (peak flow)	280 kPa (40 psi)
Maximum velocity	3.0 m/sec (peak hour)
Water tank storage capacity	2.0 x Maximum Day demand

2.3.2 Fire Flows

The proposed water distribution system is not expected to provide fire flows. Individual industrial proponents that require fire flow for their facilities will need to plan for dedicated on-site fire water storage.

2.3.3 Pipe Sizing

Minimum Distribution Main Size (Industrial)	200mm
Minimum cover for frost protection	3.0 m

2.3.4 Portable Water Servicing Scenarios

Potable water servicing expansion in the south basin Heartland Area has been divided into five phases. Figure 4 presents the proposed infrastructure configuration. The following summarizes the proposed servicing scheme; adjustments are feasible to this planned schedule. Such changes must be allowed for if economically viable and supported by new industry. The rationale for this servicing proposal is discussed in further detail in subsequent sections.

- **Phase 1**

  A 200mm distribution line is proposed from the existing 200mm watermain junction at Range Road 202 north to Township Road 560 is required and to be constructed as part of the initial phase to service the new heavy industrial project developments. The existing pump station at

the reservoir will pressurize this initial new pipe expansion. The initial phase of the water main will service developments including Graymont, Maxim Power, Western Asphalt and MEG. These developments will need to provide for the design and construction of service lines to facilitate their developments prior to the planned phasing of watermain construction reaches their areas of planned developments.

- **Phase 1 Extension**

  A 200mm distribution line is proposed for this extension and to be constructed west of from the intersection of the RR 202 & TWP RD 560 westward intersection to RR 203 and southward into the Heartland Industrial Park subdivision.

- **Phase 1 Extension Loop 1**

  A loop is required to extend the water distribution network south ward from The Heartland Industrial Subdivision along RR 203 and eastward to the existing 200mm watermain junction from which water main extents to the Triton Plant. This will complete a looping circuit.

- **Phase 1 Extension Loop 2**

  A 200mm proposed distribution line from out of the pump house existing 200mm distribution watermainto be constructed to the eastward to RR 202 and continued north to connect with the existing line to complete a closed looping of the system.

- **Phase 2**

  A 200mm distribution line is proposed for phase 2 to meet the demand of the area to the east & west of RR 201. It will loop from the intersection of RR 202 & TWP 560 eastward to RR 201 south to TWP 554 and back to RR 202 would be the next major expansion of the water distribution network.

- **Phase 3**

  A 200mm distribution line is proposed for phase 3 to meet the demand of the area to the east & west of RR 200. It will loop from the intersection of RR 201 & TWP 560 eastward to RR 200 south to TWP 554 and back to RR 201 would be the next major expansion of the water distribution network

- **Phase 4**

  A 200 mm distribution line is proposed for phase 4 to meet the demand of the area to the west of RR 195. The last loop is required to extend the water distribution network east ward from RR 200 eastward on TWP Road 560 to RR195, southward about 1600m and back west to RR 200. This loop will only need to be constructed when demand in the eastern portion of the south basin Heartland Area warrants its construction.

- **Phase 5**

  A 200 mm distribution line is proposed for phase 5 to meet the demand of the Hamlets of Star and St. Michael. The line will be extended from the intersection of RR195 & TWP 560 eastward to Hamlet of Star and St. Michael. The proposed future watermain is to provide the two hamlets with their portable water need.

Although the Highway Commercial and Country Residential is not part of this master plan, the existing water reservoir poses limitations in the storage and supply capability in case these two areas to be added in the future with some fire protection requirements. Options reviewed include: expansion of the existing reservoir capacity and construction of a new reservoir/pump facility further to the east within the industrial distribution network.

There are additional options available subject to many factors that Lamont County will need to consider for future capital projects and decision on future planning/development scenarios. A reservoir location to the west of the Town of Lamont could allow for expansion south of Highway 15 for highway commercial development. A reservoir location in the northeast quadrant closer to TWP RD 560 and HYW 831 could allow for water service expansion across the highway to service the Hamlets of Star and St. Michael or allow for highway commercial on HWY 831. These potential servicing scenarios are outside of the context of the Industrial Utility Master Plan but have been recognized as legitimate options that may be pursued by Lamont County and would necessitate change to the Heartland Utility Master Plan.

A new reservoir and pump station will be required as the south basin Heartland Area develops and to meet the demand of Hamlet of Star and St. Michael at Phase 5. This new reservoir will supplement the existing capacity of the original reservoir and to provide 2 days of storage buffer. The volume of storage is sensitive to meet the demand differentials between MDD and PHD. This compensates for the fact that a 10% variation in the maximum day demand would cause a 40% change in storage requirements. The demand peaks used in this study are based on educated assumptions based on historic trends in neighbouring regions as the Lamont south basin area is relatively undeveloped at this time. Timing for this expansion is currently estimated to coincide with the addition of projects in the south basin of the Industrial Heartland area. However; this will need to be reviewed relative to actual consumption and peak buffering requirements.

2.3.5 Recommended Servicing

The following summarizes the potable water servicing recommendations for the South Basin Lamont Heartland Area:

Servicing Scenario for all 5 phases where the water distribution system provides for the maximum day demand without fire flow in the heavy industrial area is recommended. Based on discussions with project proponents and the Lamont Infrastructure Review Team, fire protection on the industrial sites is an integral part of the each facility's design. In addition, consideration by future major developments will need to review with Lamont County and plan for its own potable water reservoir and pump station to buffer its peak hourly demands and provide for two day storage. As the provision

of fire flow in the heavy industrial area would add approximately $13.7 million to the servicing costs, it is not recommended.

Water servicing for expansion to the Hamlets of Star and St. Michael or for Highway Commercial Areas should adopt a different standard and would include both peak hour and fire protection servicing. A separate storage and pumping facility will need to be conceived to service these areas which can be phased into the South Basin Industrial water distribution network depending on the pace of future development in these areas. More detailed pipe network planning for these areas is recommended.

Additional easements will need to be considered to allow for expansion to the Hamlets or future highway commercial developments. The easements will need to allow for pipe twining to allow for the completion of waterline looping.

2.4 Modeling

Water CAD was used to perform hydraulic modelling analysis for the proposed distribution watermains network for all five phases. Based on The county of Lamont design parameters (Section 2.4), eight scenarios are applied for simulating all five phases. The demand assumed for the modelling purpose is based on Maximum Daily Demand (MDD) not Peak Hourly Demand (PHD).

For the purpose of this modelling, a 681.98m elevation has been assumed for the reservoir and pump house. The pump house consists of three vertical turbine pumps. A flow rate of 17.4 L/s and static head of 38.7m has been assumed for the pump design curve based on the pump curve data provided by the County. In addition, water mains used in modelling are 200 mm diameter PVC pipes with Hazen-Williams C of 140.

In terms of demand projection, it is assumed that in the pipe network each junction at least has the capacity to serve 50 people. If the junction will service two areas, it will be assigned the capacity to serve 100 people.

In terms of population projection for Hamlet of Star and St. Michael, total of 600 people are accounted for modelling. This number is obtained from total population of Lamont County in 2012 (3872). We assign 250 people to Hamlet of Star and 350 to Hamlet of St. Michael. These numbers can be adjusted based on comments from the County.

Detailed modelling results are enclosed in Appendix A.

In summary, the whole system water demand for all the phases is determined from modeling and listed in Table 1.

Table 1 Water Demand Projection & Storage Requirements

Phase	Maximum Daily Demand (L/s)	Residual Pressure (PSI)	Storage requirements (m^3)
Phase 1	0.716	86-154	124
Phase 1 Extension	1.08	85-153	187
Phase 1 Extension Loop 1	1.08	85-152	187
Phase 1 Extension Loop 2	1.56	85-152	270
Phase 2	3.00	83-154	518
Phase 3	4.68	79-154	809
Phase 4	5.64	67-152	975
Phase 5	10.1	50-126	1745

As shown in the above table, the existing storage capacity of 2500m^3 can serve the new expansion up to phase 4 while meeting the 48hrs storage capacity in place required by CRVCWSC. A new reservoir and pump station will be required as the south basin Heartland Area, including commercial highway, develops and to meet the demand of Hamlet of Star and St. Michael at Phase 5.

2.5 Regulatory Requirements

This section provides a summary of regulations that are relevant for both short and long-term planning of the Lamont Heartland Utility Master Plan infrastructure initiatives.

2.5.1 Current Regulations

Several legislative regulations have implications on the preparation and implementation of a water master plan. The Lamont Heartland Water Master Plan was prepared in review of established standards and guidelines. Design criteria have been referenced from the following standards and guidelines:

2.5.1.1 Environmental Protection and Enhancement Act

The Environmental Protection and Enhancement Act (EPEA) provides for the protection, conservation, and management of Alberta's environment by establishing a responsible and accountable process of decision-making that balances the protection of the environment and the need for Alberta's economic growth applying principals of sustainable development.

The EPEA has several regulatory standards that apply:

- Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems;
- Code of Practice for a Waterworks System Consisting Solely of a Water Distribution System;
- Wastewater and Storm Drainage Regulations;

The potable water objectives established by the Province apply to treated drinking water supplies and is administered by Alberta Environment and Sustainable Resource Development. The standards of quality are considered as minimum standards for the collection, production, treatment, storage,

supply and distribution of water, or the extension or change to any water supply system. Standards include the disinfection of water to prevent waterborne disease, regulations limiting the presence of concentrations of toxic, hazardous, or radioactive substances. Aesthetic water quality objectives may also include temperature, taste, odour, turbidity and colour. These requirements are typically included in the Licencing for each facility or water system.

2.5.1.2 Municipal Government Act

The Municipal Government Act (MGA) enables the municipality to plan where it expects to grow, designate the land use within its boundaries, determine how land will be serviced, and how these services will be paid for.

2.5.1.3 Fisheries Act

The administration and enforcement of the Federal Fisheries Act is under the Federal Minister of Fisheries and Oceans, while reviews under Section 35 of the Act have been delegated to local conservation authorities.

The Fisheries Act provides the basis of planning proposals and site-specific projects and their impact on water quality and fish habitat. The Canadian Council of Ministers of Environment (CCME) developed National Performance Standards and Effluent Discharge Objectives that were originally endorsed by the CCME Council of Ministers on February 19, 2009, and revised limits were published on March 20, 2010. The Conservation Authority(s) can assess fines or not approve projects under this Act.

2.5.1.4 Canadian Environmental Assessment Act and Regulations

The Canadian Environmental Assessment Act (the Act) is the legal basis for the federal environmental assessment process. Regulations under the Act are used to determine if the Act applies and what type of environmental assessment is required, and to prescribe procedures for government departments and agencies to coordinate the environmental assessment process.

An environmental assessment of a project is required before a federal authority exercises one of the following powers or performs one of the following duties or functions in respect of a project, namely, where a federal authority:

- Is the proponent of the project and does any act or thing that commits the federal authority to carrying out the project in whole or in part;
- Makes or authorizes payments or provides a guarantee for a loan, or any other form of financial assistance to the proponent for the purpose of enabling the project to be carried out in whole or in part, except where the financial assistance is in the form of any reduction, avoidance, deferral, removal, refund, remission or other form of relief from the payment of any tax, duty or impost imposed under any Act of Parliament, unless that financial assistance is provided for the purpose of enabling an individual project specifically named in the Act, regulation or order that provides the relief to be carried out;
- Has the administration of federal lands and sells, leases or otherwise disposes of those lands or any interests in those lands, or transfers the administration and control of those lands or interests to Her Majesty in right of a province, for the purpose of enabling the project to be carried out in whole or in part; or

- Under a provision prescribed pursuant to paragraph 59(*f*), issues a permit or license, grants an approval or takes any other action for the purpose of enabling the project to be carried out in whole or in part.

2.5.1.5 Fire Suppression Standards

- Standards on Water Supplies for Suburban and Rural Fire Fighting, 2001
- Alberta Building Code
- National Fire Protection Association
- Water Supply for Public Fire Protection, Fire Underwriters Survey, 1999

2.6 Fire Flow and Storage Requirements

For the purposes of the Utility Master Plan the intent is for each development proponent to be responsible for providing for their own developments fire suppression requirements as determined by Code. This will require the developer's engineer to provide for self-contained fire suppression water supply, pressure pump and gen-set.

Fire flow requirements can be determined in several different manners. The Alberta Building Code specifies minimum requirement for different types of construction and hazard occupancies. The NFPA also defines fire flow requirements in a similar manner. Another source for determining suitable fire protection levels of service is the Water Supply for Public Fire Protection, prepared by the Fire Underwriter's Survey. This document is a reference document prepared by the insurance industry although it is frequently referenced in other standards and guidelines.

Fire flow requirements are subjective and need to be made on a case-by-case basis factoring in the nature of the distribution system, operation and maintenance, fire hazards and of most importance, the capability of the local fire services to make use of the system.

The user of this information is responsible to ensure the accuracy and current Code requirements are met.

Alberta Building Code

Water storage requirements are defined as follows:

$Q = V \times O \times S$

Where:

Q = minimum water storage requirement (L)
V = total building volume (m3)
O = water supply coefficient
S = spatial coefficient

NFPA

The NFPA 1142 Standards on Water Supplies Rural Fire Fighting specifies required storage volumes for fire protection.
Identify Occupancy Hazard Classification
Construction Classification Number
Confirm exposure hazards.
Min water supply = total volume of structure x construction classification number
Occupancy hazard
Classification number

Fire Underwriter's Survey

The fire flow requirements as defined by the Fire Underwriter's Survey are as follows:

$F = 220C\sqrt{A}$
Where:

F = Required fire flow in L/minute
C = coefficient
A = Total floor area in m2

Table 2 - Storage Requirements based on Fire Underwriter's Survey:

Fire Flow Required (l/s)	Duration (Hours)
15	1.0
30	1.0
45	1.25
60	1.5
75	1.75
100	2.0

3 Wastewater

Lamont County does not have a piped sanitary network. Existing services are provided through trucked vacuum services with disposal at regional treatment lagoon facilities. The County envisions that future developments in their Industrial Heartland South Basin will continue to be serviced by this means with each proponent providing with their domestic building construction a septic holding tank that will be vacuum truck serviced for disposal at the sanitary lagoon, Figure 6.

Presently the Town of Lamont provides piped sanitary services which discharge into a treatment lagoon north of the Town site. This facility will not have capacity to accept significant new volume of effluent.

Regionally adjacent Alberta Industrial Heartland members Sturgeon County, Strathcona County are serviced by a separate transmission system that conveys wastewater to the Alberta Capital Region Wastewater Treatment Plant. The City of Fort Saskatchewan also transports sanitary effluent into ACRWC.

Lamont County's treatment lagoon can only accept domestic effluent for treatment. Industrial wastes will need to be controlled and stored separately for treatment or disposal at a receiving facility that can accept such waste effluent.

3.1 Industrial Wastewater

Careful consideration by industrial proponents for the design of their facilities will be required so that proper wastewater servicing is considered and onsite storage capacity is designed for the trucked disposal for treatment offsite at a disposal facility capable of handling industrial effluents.

Proponents will need to undertake water quality and treatment assessments to evaluate the options to handle their waste process water on site and the projection of wastewater discharge only includes domestic sewage at existing County Lagoons.

3.2 Wastewater Servicing

This Utility Master Plan does not include the development of wastewater servicing other than allowing for septic holding tanks for domestic waste and trucked transport to an accepting treatment lagoon. Future servicing options will be considered under a separate or revised Master Plan. Future servicing considerations will include project economics, operational reliability and long term sustainability factors. Currently the economics do not favour an expansion to a piped service system.

4 Process Water

Process water has been eliminated as a consideration of this Utility Master Plan as it is currently not viable for implementation. Prospective heavy industrial projects typically require significant amount of process water. Lamont County does not have access to accessible raw water for example from the North Saskatchewan River or other major surface feature.

For clarity process water, is water used in plant processes such as:

- Makeup water for cooling tower evaporative losses and blow down;
- Feed water for boiler system makeup for steam losses and blow down;
- Utility water utilized throughout industrial facilities, including wash water; and
- Fire suppression water.

Although there are existing facilities at the time this report was prepared that have access to the potable water supply and utilize same for some process water needs these facilities are few and their use of water is considered in the known available supply. Process water is to be considered separately by future industrial proponents and sourced from other than potable water requirement which is intended for human consumption.

Industrial process water supply is not a conventional municipal service; the County will be open to future industry needs for process water and will where possible assist industry source possible process water supply. Industry is requested to employ an environmental stewardship to maximizing the development potential of all lands in the South Basin Lamont Industrial Heartland area.

5 Salt Water

Salt water is a waste by-product product produced from the oil/gas production. There are several waste salt water pipeline right of ways within the study area. The location of these lines is illustrated in Figure 7. Future consideration of a utility corridor could incorporate these existing right of ways.

6 Stormwater

Lamont County stormwater system consists of overland drainage. It is intended that every site will provide for a stormwater management facility onsite to collect surface runoff. The storm ponds will collect any rainfall runoff on the site for use in their processes and could be designed to provide a dry hydrant for use as firewater needs. Each proponent will be expected to have their facilities licenced with Alberta Environment and Sustainable Resource Development. Lamont County will be undertaking the development of a Storm Water Master Plan which will provide guidance into the development of future on-site storage and off-site discharge controls. Current roadside ditches within the South Basin Industrial Heartland are not designed to receive stormwater discharge from individual sites. Each proponent will need to work with the County to ensure offsite improvements are correctly identified and can be constructed as part of their stormwater management facility.

Stormwater management is a multi-jurisdictional matter. Federally, the Canadian government exercises authority over broader issues relating to fish, fish habitat, navigable waters, toxic substance releases and wildlife issues while the Province administers direct approval of stormwater plans under Alberta's *Water Act* and *Environmental Protection and Enhancement Act (EPEA).* Provincial legislation addresses water diversions and water quality planning, stormwater management structures, construction and modification of beds and shores of water bodies, spills, and approvals to use resources and emit contaminants. The focus of municipal responsibility is to protect local interests which may be impacted by changes to flow patterns. This can include development restrictions, nuisance controls, discharge standards and limits, and operational limits.

The goal of the Utility Master Plan is to work within this framework to achieve common objectives. Each of the proposed projects will submit stormwater management plans to the province for approval and it is reasonable to expect that the final onsite practices will meet current environmental standards. The operating license approvals have typically specified stormwater quantity and quality control and, reporting requirements. The process of approval also contains a public input component where the project application is required to advertise for comments. The County or any other entity may voice their concerns during this process.

There are no recorded erosion problems in the study area. A visual inspection conducted in the summer of 2013 suggests that the existing water courses are well established and stable. Existing overland drainage is restrictive. The existing rural road side ditches are not designed ordeveloped for

conveyance of drainage from onsite stormwater management systems and will need to be reviewed further within a future Stormwater Master Plan.

Site drainage management from each industrial development proponent includes the following key features:

1. Site drainage and grading plans that collect stormwater runoff from the developed industrial yard areas and channels this water to a stormwater retention pond.

2. Water in the stormwater pond is retained for process use and for fire fighting purposes. It normally does not discharge after common rainfall events.

3. There will be storms that exceed the holding capacity of the stormwater pond, making discharge control necessary. Alberta Environment requires water quality sampling prior to and during, any discharge events. The rate of discharge is regulated to a predevelopment rate of flow.

4. Any off-site drainage would be channelled around the developed plant areas to maintain riparian right of flow. Based on this understanding, the County has further interest in discharge rate control when roadside ditches must be utilized for the drainage to reach a receiving body of water. The discharge rate can impact local infrastructure and must be carefully addressed. The stormwater management requirements presented have particular emphasis on the stormwater discharge rate control. Post development discharge rates will be required to be established with the proposed Stormwater Management Master Plan.

6.1 Recommended Stormwater Management

The following summarizes the stormwater management principals proposed for the South Basin Industrial Heartland Area. (Until further developed by the Stormwater Master Plan.)

- There should be no culvert or crossing upgrades in this area.
- Each development proposal should be reviewed to ensure that there are no cross basin diversions and, that the riparian flow paths are maintained around the development.
- The allowable post-development discharge rate of 4 L/s/ha is to be provided by all proposed developments.
- The major water watercourses should be surveyed from their confluence(s) with the North Saskatchewan River. This is to ascertain current conditions of these water courses for future monitoring purposes. Local survey control monuments should be established for this purpose. This survey should then be repeated every 1 to 2 years to quantify any changes.

7 Utility Corridors

7.1 Overview

Lamont County recognizes the benefits of aligning core utilities in designated areas and will encourage industry to work together to identify benefitting lands. Some of the anticipated benefits include:

- A reduction to land fragmentation which will improve on the development potential within the Lamont Industrial Heartland Area.
- Preservation of access through the area as industry develops which will include the access to feed stock and other resources as well as transporting product to market. This will be a very important factor to the success of existing and potential new trans-load facilities.
- Will identify which products or utilities could share the same right of way and would benefit from a reduced footprint if they do. It is understood that some separation may also be required.
- From a municipal servicing perspective, preserving common rights of way is essential in being able to construct and maintain common or shared utilities.

The process for defining utility corridors is complex and involves many stakeholders and will require their agreement in order for the concept to succeed. Most of the high pressure pipelines fall under federal regulations or provincial legislation, Lamont County needs to actively participate in the review process of private pipeline applications in order to state its interest.

The purpose creating a "Utility Corridor" section in the "Utility Master Plan" is to ensure Lamont County's has the ability to preserve utility right of way for services that the County intend to provide, and secondly, through communication with other utility providers and project proponents, to identify corridors that may be shared.

7.2 Municipal Services Corridors

The previous sections described the proposed servicing configurations for potable water, wastewater and process water. All of these pipeline alignments are summarized on Figure 8.

The main utility corridors are located on:

- Township Road 650 – this corridor should be preserved from the western borders of the study area through to the easterly boundary. This corridor should be reserved as a minimum 10 meter width to accommodate two pipes plus working easement. The working easement portion can later be utilized by other franchised utilities.

- The north-south alignment along Range Road 202, 201 & 200 represent required north-south corridor requirements to be maintained. The width of these right of ways should also be a minimum of 10 meters to allow two pipes and, should run from the south through to the north study area boundary. The more desirable easement orientation is to the east side of Range Road 202.

7.3 Coordination with Other Utilities

The utility corridors proposed within this report are will allow for existing facilities and future considerations. It should be noted that existing public utility (i.e. road allowances) corridors should be preserved. To this extent, the County should look for opportunities to consolidate individual easements and right of ways in an effort to create contiguous linear corridors. This would make acquisition of right of ways for either public (Figure 9) or private utilities, significantly more efficient.

Planning for major electrical transmission upgrades into this area is currently unknown. It is probable that an east west corridor north of the study area will be required to accommodate this need. The right of way width requirements for a 500 kV transmission line would range from 80 to 100 meters depending on the number of cables and switch gear. (Figure 10)

8 Financing

This review will consider financial ability of Lamont County to undertake the various proposed Phase developments. Consideration for the funding of these required improvements will be by Council approval of annual Capital Budgets and by the collection of Off-site Levies to be collected from each development at the time of the development permit approval process.

The County will need to ensure their established rates include for both the cost of service delivery but also allow for reserves to be established ensuring funding for future replacement projects and infrastructure improvements can be facilitated.

8.1 Capital Costs

An assessment of the capital costs are provided herein. **Table 8.1.1.1** provides a list of the proposed phases for the water distribution construction costs.

8.1.1 Piping

The costs to construct the proposed pipelines for potable water servicing are summarized in Table 8.1.1. Cost estimates shown in the table are preliminary estimates and exclude costs such as land acquisition, geotechnical study and topographic survey.

Table 8.1.1: Project Phase Cost Estimate

Phases	Construction Cost
Phase 1	$963,300
Phase 1 Extension	$1,048,550
Phase 1 Extension Loop 1	$1,027,200
Phase 1 Extension Loop 2	$1,034,325

Phase 2	$2,839,750
Phase 3	$2,848,000
Phase 4	$2,174,500
Phase 5	$5,446,400

* Costs include 20% Contingency and 12% Engineering.

8.1.2 Reservoir and Pump Station

There are two options to provide the storage and pumping capacity needed to service the Heartland area. Option 1 is to expand the existing facility in the southwest corner of the South Basin and, Option 2 is to construct a new standalone facility in the southeast portion of the South Basin area. Under either scenario, the reservoir and pumping facility can be phased to reduce the amount of upfront capital investment.

Presented in Table 2.4.3.2 are the costs for constructing a reservoir either as a standalone facility or, as an addition to the existing reservoir facility. The two (2) and four (4) cells reference to a 10,000 or 20,000 cubic metre reservoir. It should be noted that the cost estimates do not include land purchase costs and, land availability associated with the reservoir expansion. The cost differences between the two options are mainly the result of the pump station and site access facility savings.

Table 2.4.3.2: Reservoir Size Cost Estimate Comparison

Alternatives Cost		
New Reservoir & Pumphouse	(2 Cells, 10,000 m^3)	11,200,000.00
New Reservoir & Pumphouse	(4 Cells, 20,000 m^3)	16,300,000.00
Add 2 Cells to Existing Reservoir	(10,000 m^3)	5,400,000.00
Add 4 Cells to existing Reservoir	(20,000 m^3)	11,300,000.00

* Costs include 25% Contingency and 13% Engineering.

Future considerations for a separate reservoir and pump station to service a highway commercial area is outside the context of this study. The highway commercial facility will need to provide fire fighting as well as peak hour storage. The associated pump station will need to provide for peak hour and fire flows.

8.1.3 Capital Financing

The opportunities for Lamont County to finance capital works for water services is somewhat limited. Opus Stewart Weir has provided a brief discussion of the potential funding alternatives below. These reflect the following financing assumptions:

- Grant Programs, in the recent past, announcements have been made by both the federal and provincial governments regarding capital grants. These programs were predominantly focused on economic stimulus during the recent economic downturn. Presently, limited capital grant funding is available; and hence;
- Off-site Levies, Lamont County will need to rely on Industry paying for the capital expense of construction the required infrastructure to services their developments;
- Reserves, Lamont County will need to establish capital funding via reserve contributions policies. There are two types of reserves, those being more general capital reserves along with long term infrastructure (lifecycle) reserves. Note that these reserves are funded directly by annual contributions from rates;
- Development Service Charges, These are the service connection fees;
- Debt, it is anticipated that Lamont County may need to debenture fund capital requirements under some of the water projects.

8.1.4 Operating Costs

The direct operating costs associated with each phase have been considered within this analysis. Lamont County will need to review or consider preparations of a *Water and Rate Study* to provide the primary basis for operating budget forecasts.

9 Recommendations and Servicing Plan

The recommended solution and servicing plan addresses short-term priority (1-5 year), medium term (6-10 year), and long-term (11-20 year) needs for water and wastewater infrastructure development for the South Basin Lamont Industrial Heartland District. The servicing plan addresses the following water and wastewater issues, needs and opportunities identified under this study in order to satisfy both existing and future servicing demands:

- New water mains to integrate the water supply system and improve reliability of service (initial supply capability);
- New water supply storage to improve reliability, improve water quality and quantity, address long-term sustainable supply, and to reduce operational costs;
- New water mains to optimize the use of existing system capacity and reduce operating costs (completion of water main looping);
- New water mains that address future servicing needs for long-term sustainability
- Provisions in the medium to long range to review the existing lagoon treatment facility to ensure capacity and operational service is maintained to provide for anticipated industrial, commercial, and residential growth within the area;
- Allowance for future expansion of wastewater collection and treatment system to expand servicing to currently un-serviced industrial developments, hamlets, and rural areas in and adjacent the study area.

The Utility Master Plan provides for system integration, reliability, and sustainability through continued system improvements and integration of operating systems within the service area. The

preferred strategy represents a comprehensive plan for capital and operational improvements and defines timing and staging of the works recommended.

The future infrastructure requirements are based on a system-wide approach. The selected recommended solution attempts to satisfy the needs within the South Basin Lamont Industrial District for water and provides for future municipal capital programs and planning.

9.1 Next Steps

When projects are being implemented for specific elements of the Utility Master Plan, it will be necessary to follow the applicable requirements for review and licencing. Projects may need to fulfill additional requirements that will require site specific issues to be considered that are beyond the scope of the Utility Master Plan. Additional evaluation of alternative design and appropriate mitigating measures must be addressed.

Land Acquisition

The recommended water distribution mains and future water storage facility will require a right of way to be acquired. Lamont County will need to acquire additional land as design of these improvements is further developed. The cost of land has not been factored in as this will be site specific. The County will need to start acquisition process of identified utility right of ways to facilitate water construction of the proposed water distribution mains.

Additional on-site and off-site investigations will also be required under the detailed design phase for these projects. The investigations may include: soil and groundwater testing, assessment of wetlands, fisheries and habitats, water quality testing, archaeological/heritage assessments, and traffic studies where construction is the existing right of way easements.

Technical Approvals

Municipal Water and wastewater and drainage systems receive must follow the requirements established under "Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage" and are required to be submitted to Alberta Environment for review and licencing.

Detailed Design and Construction

For the recommended project phases design investigations, detailed design and contract drawings and tender documents will need to be prepared. Following a tendering process, recommended works will be constructed and placed into operations to service the industrial developments. The first Phase of the distribution network should be implemented extending the water main north adjacent to Range Road 202.

Monitoring and Flexibility of Plan

It should be noted that this Utility Master Plan is a living document that was prepared through a review process in order to address issues, needs, opportunities and constraints of the existing water and wastewater systems, identify needed infrastructure and timing based on the South Basin Lamont Industrial Heartland District's needs and the direction and policy of Lamont County.
As time progresses, the adequacy and validity of the Utility Master Plan should be reviewed periodically (every 5-10 years) in order to assess the recommendations contained herein, and to validate the timing and need for improvement of infrastructure. The policies of the municipality and

future legislation may dictate adjustments to the Plan recommendations. Development growth patterns over time may also dictate a different approach to future servicing and timing. As demands fluctuate, there may be a need to implement additional water and wastewater strategies, such as water conservation, unaccounted water management, and water reuse programs.

We recommend that Lamont County continue to implement improvements and capital projects required for sustainability of the water and wastewater servicing systems, with a periodic review of the capital improvements program.

The options of constructing a standalone water reservoir or, to expand the existing reservoir and pump station should be examined. The preferred option should proceed to engineering design and construction as soon as practical. The recommended first phase reservoir installation is 10,000 cubic meters.

The second phase of potable water servicing will be driven by development within study area. This distribution main extension will extend eastward from the initial phase. Each extension of the distribution network will require a full looping of the system is constructed to ensure equalized flow rates and to ensure water is constantly flowing to prevent stagnation of the potable water.

Process Water

Lamont County can play an instrumental role in developing a shared process water supply system in the study area. A shared process water supply system can provide significant benefit with respect to the environment, land use efficiency and cost. Both the technical and commercial aspects of a shared process water supply scheme should be pursued.

Stormwater

It is recommended that the major water courses in the study area be surveyed to establish their baseline condition. This survey should be repeated regularly, say every 2 years.

The County should review any proposed maximum rate of discharge to ensure that downstream infrastructure is not compromised.

Utility Corridors

Utility corridors should be reserved along several roadway alignments through the study area including:

- Highway 831;
- Range Road 202;
- Township Road 560.

These corridors should be as wide as possible to accommodate both municipal and franchised utilities. They can also serve plant input and output conduit requirements.

Figures

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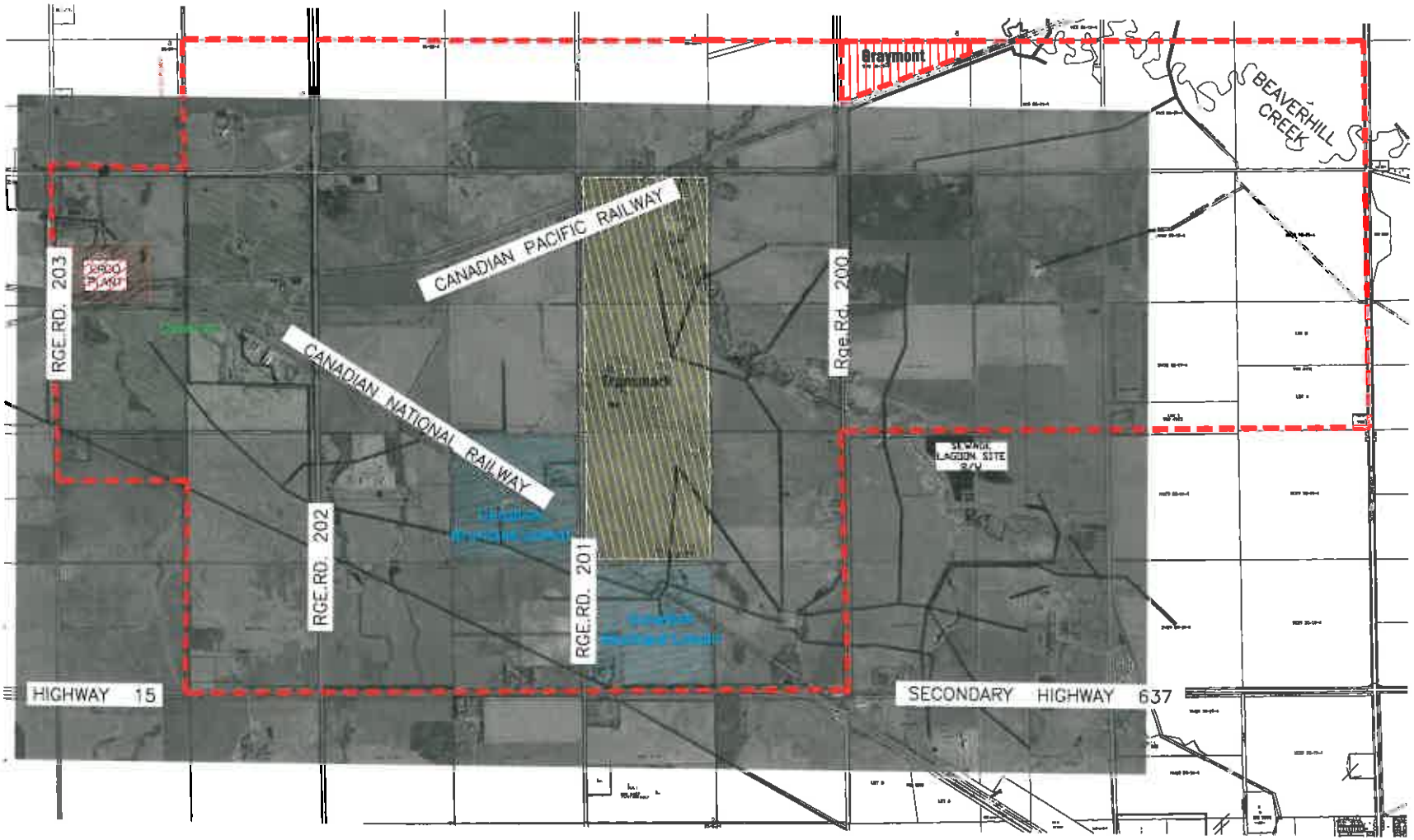
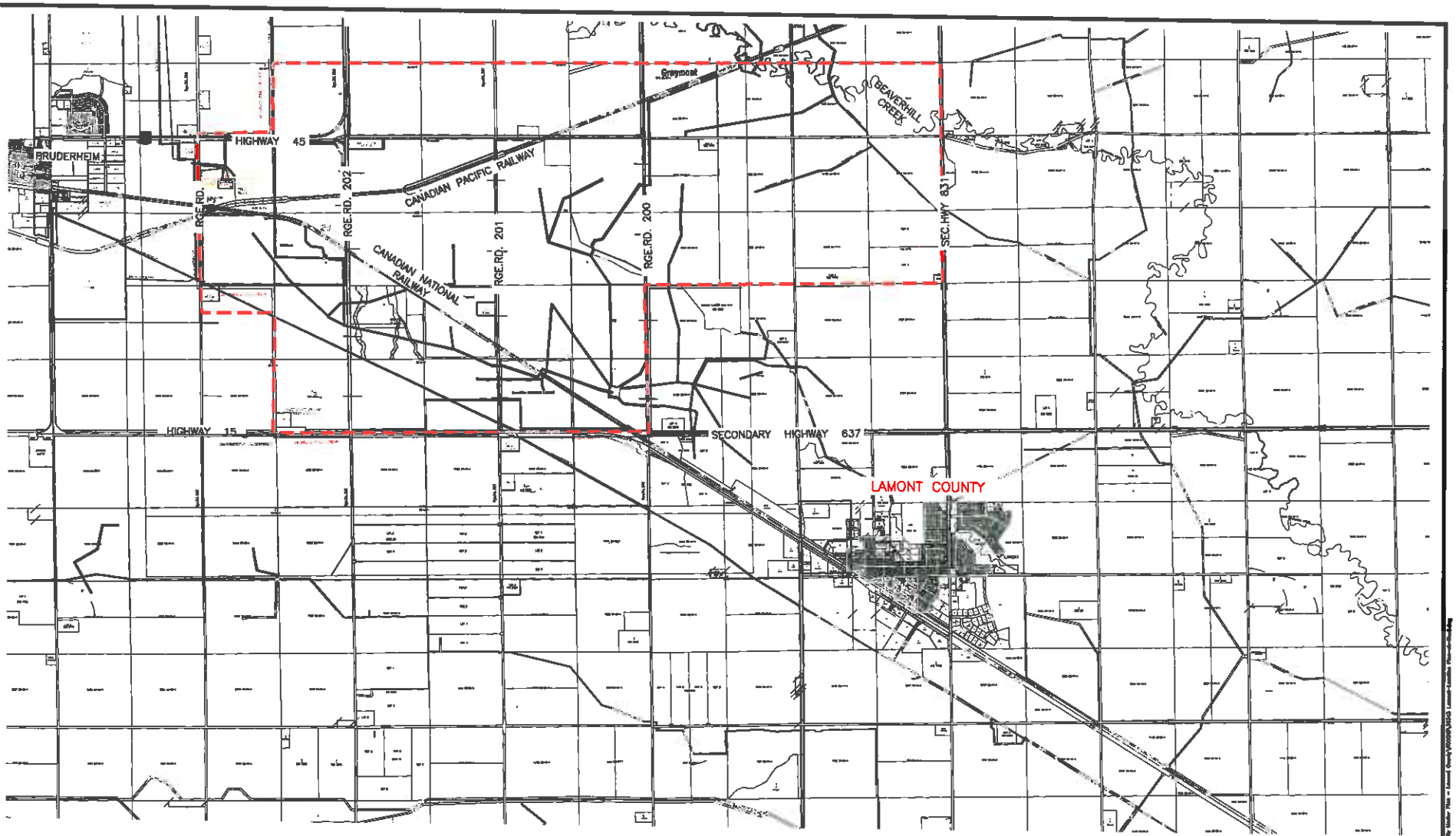
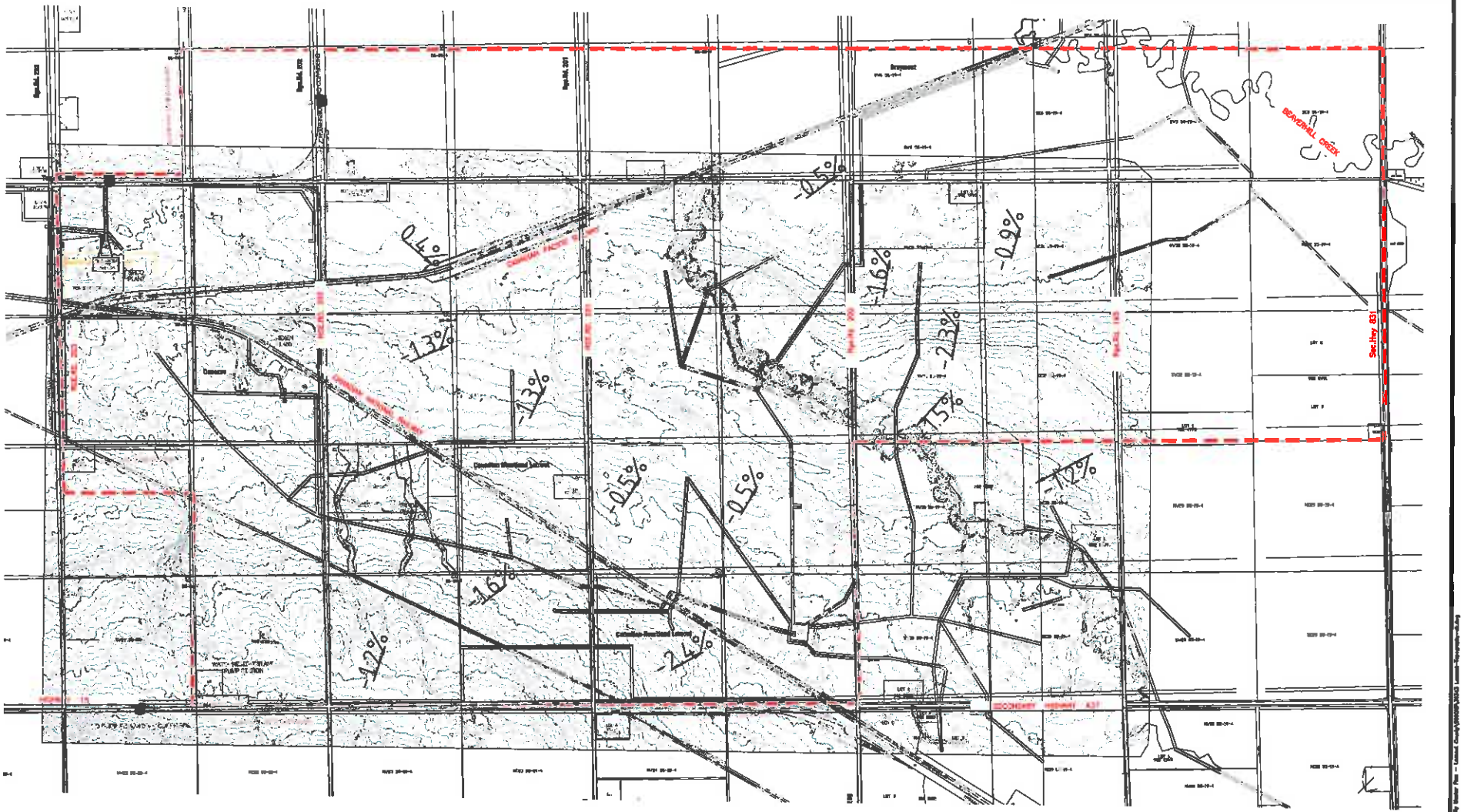


LEGEND	CONSULTANT	LAMONT COUNTY
AREA BOUNDRY	OPUS STEWART WEIR	INDUSTRIAL UTILITY MASTER PLAN
	PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	CONTEXT PLAN
	FILE No.: ED60.38343	NOT TO SCALE — FIGURE 1

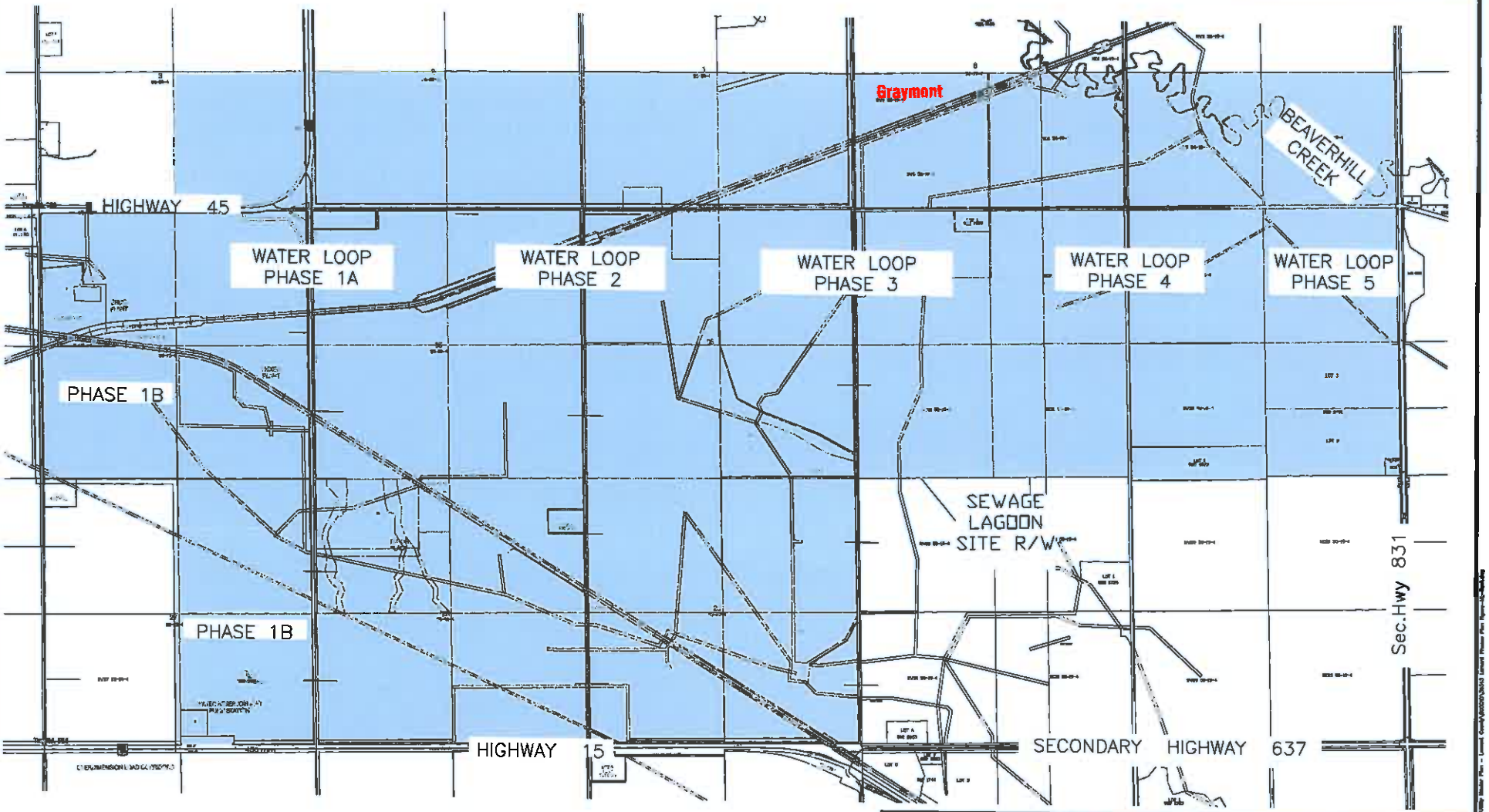


LEGEND	CONSULTANT	LAMONT COUNTY
AREA BOUNDRY	OPUS STEWART WEIR	INDUSTRIAL UTILITY MASTER PLAN
	PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	LOCATION PLAN
	FILE No.: ED60.38343	NOT TO SCALE — FIGURE 2

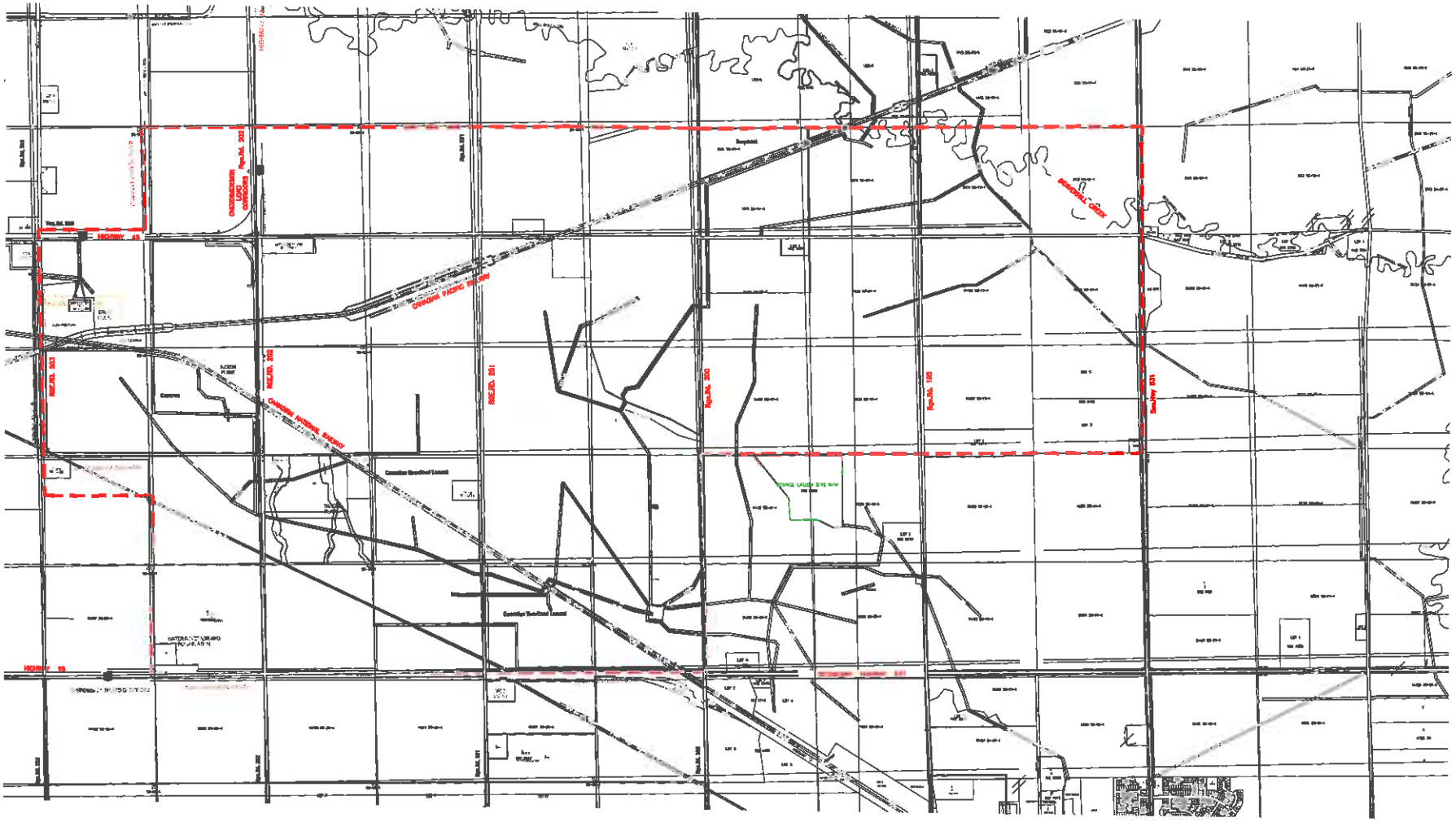
DATE: MARCH 4, 2013



LEGEND	CONSULTANT	LAMONT COUNTY
AREA BOUNDRY CONTOURS MAJOR CONTOURS MINOR	OPUS STEWART WEIR PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	INDUSTRIAL UTILITY MASTER PLAN TOPOGRAPHY
	FILE No.: ED60.36343	NOT TO SCALE FIGURE 3

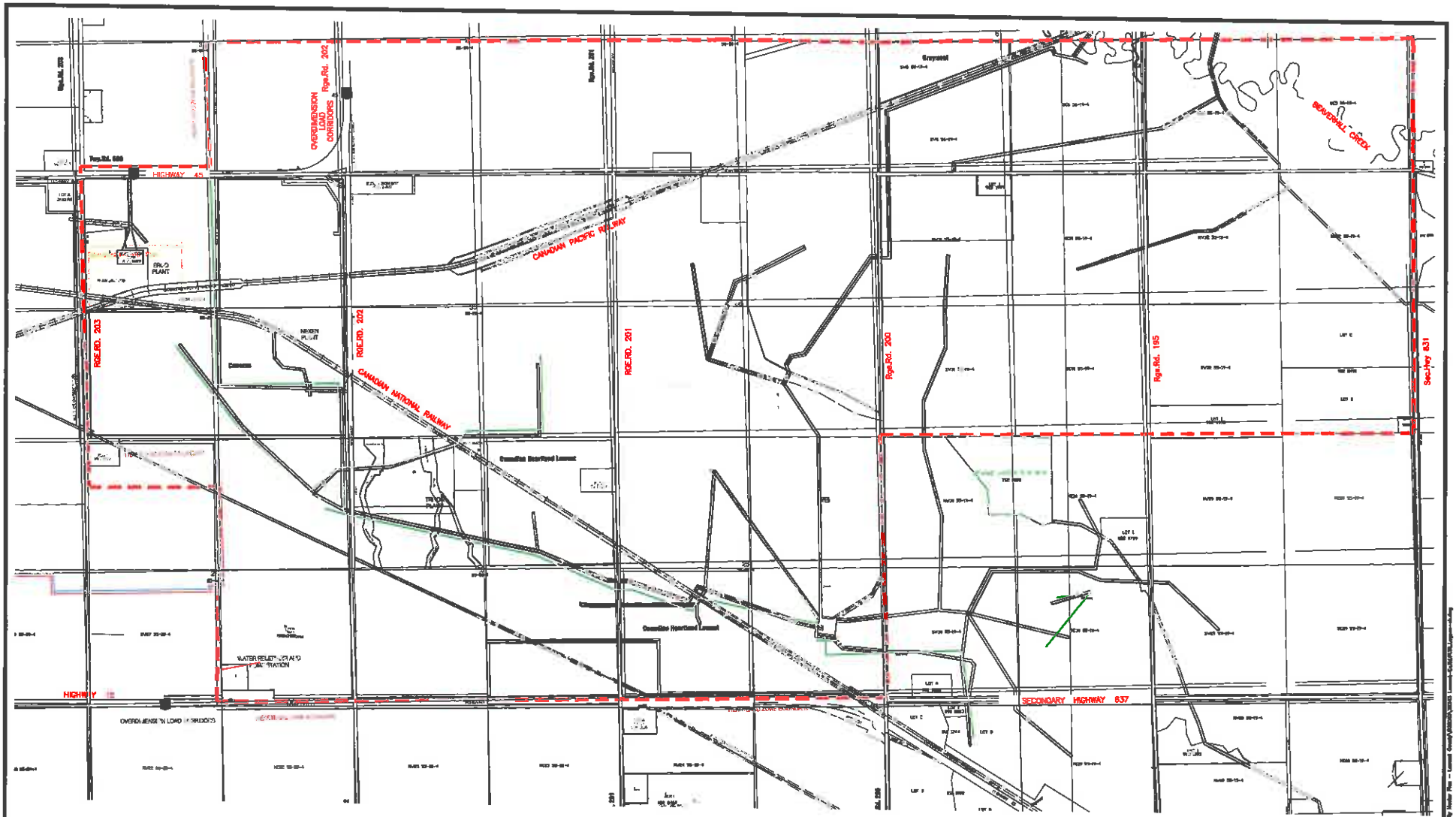


LEGEND	CONSULTANT	LAMONT COUNTY
	OPUS STEWART WEIR PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	INDUSTRIAL UTILITY MASTER PLAN WATER PHASE PLAN
	FILE No.: ED60.38343	SCALE: N.T.S. FIGURE 4



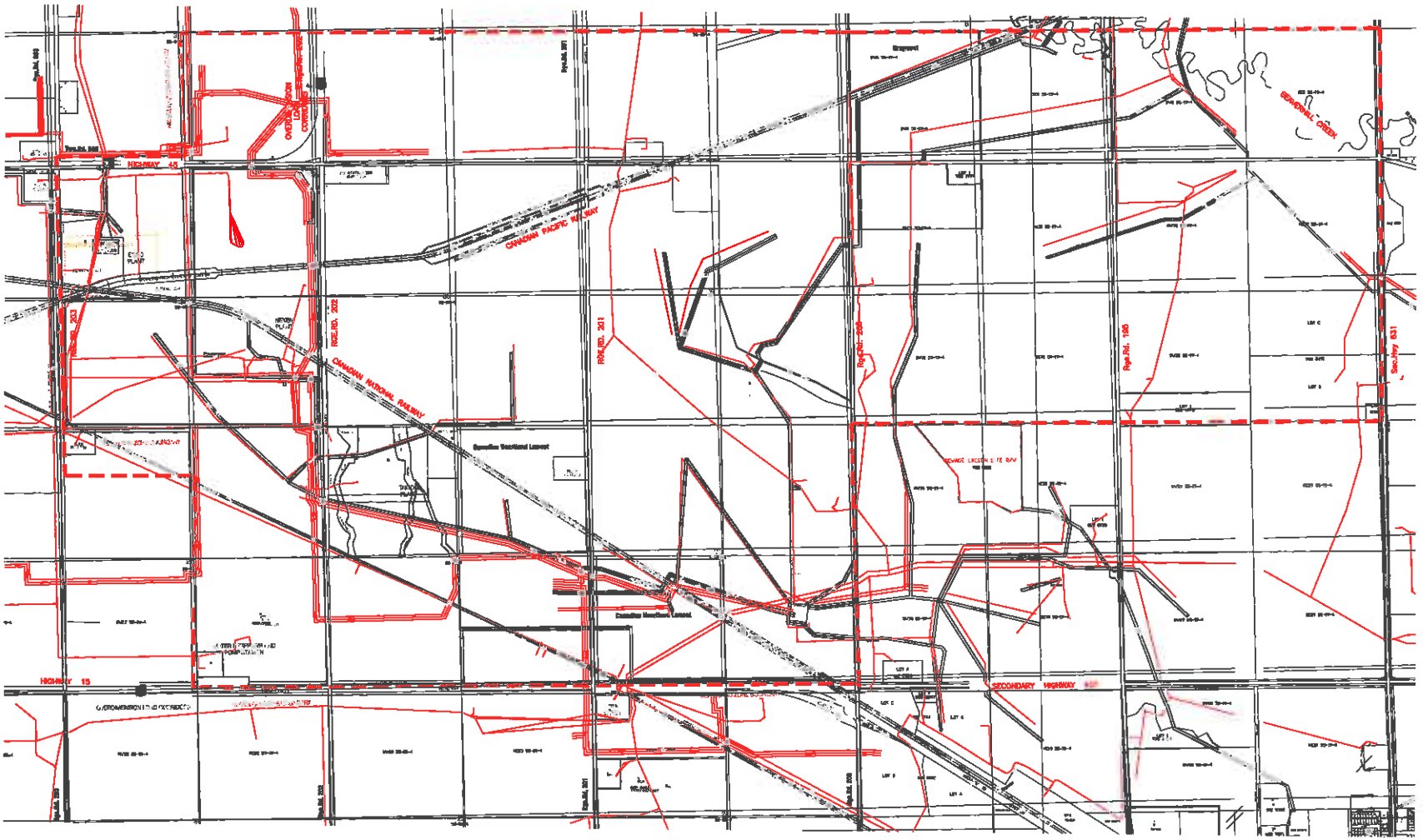
LEGEND	CONSULTANT	LAMONT COUNTY
AREA BOUNDRY LAGOON	OPUS STEWART WEIR PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	INDUSTRIAL UTILITY MASTER PLAN EXISTING LAGOONS
	FILE No.: ED60.36343	NOT TO SCALE FIGURE 6

DATE MARCH 4, 2013



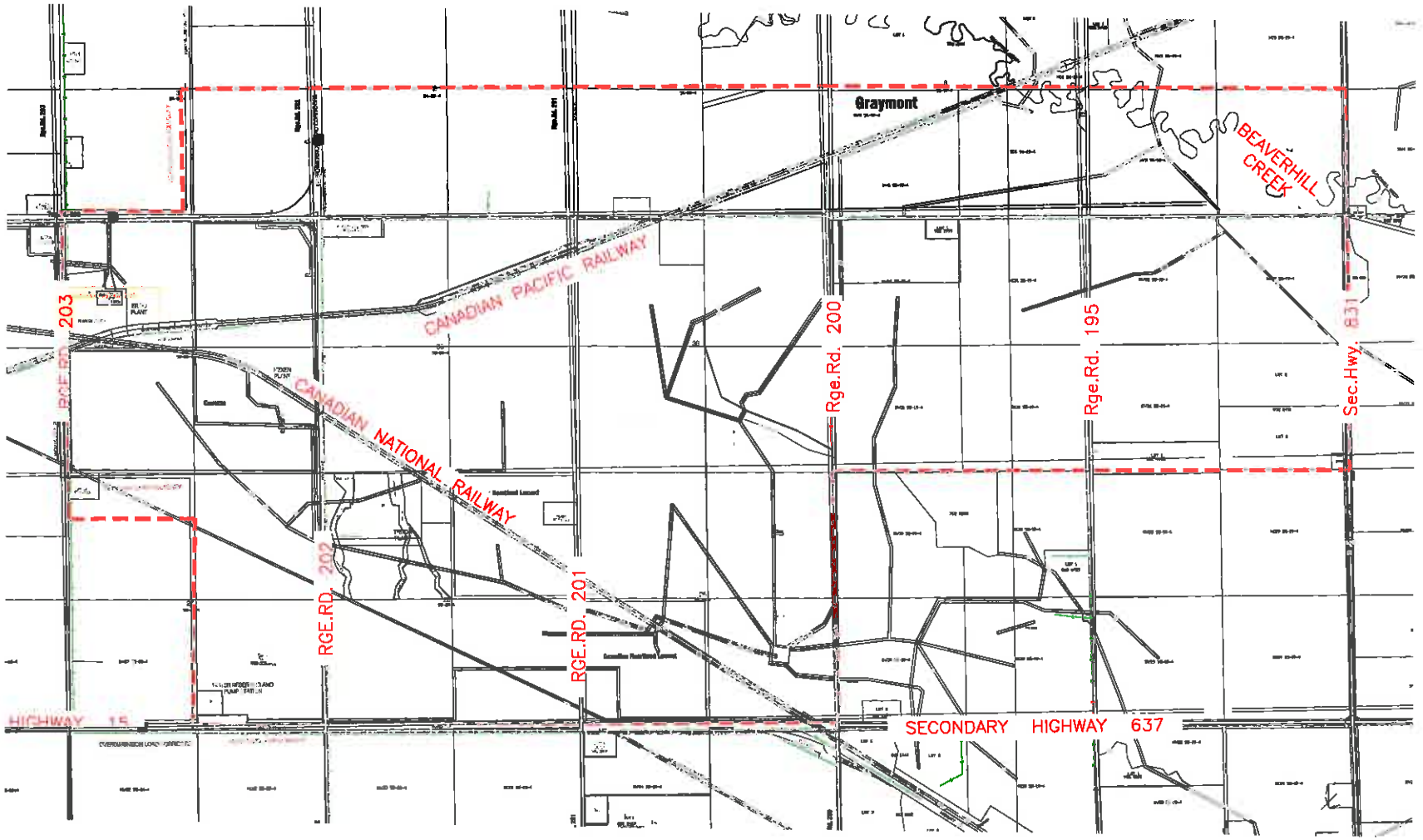
LEGEND	CONSULTANT	LAMONT COUNTY
AREA BOUNDRY SALT WATER	OPUS STEWART WEIR PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	INDUSTRIAL UTILITY MASTER PLAN SALT WATER
	FILE No.: ED60.38343	NOT TO SCALE FIGURE 7

DATE: MARCH 4, 2013

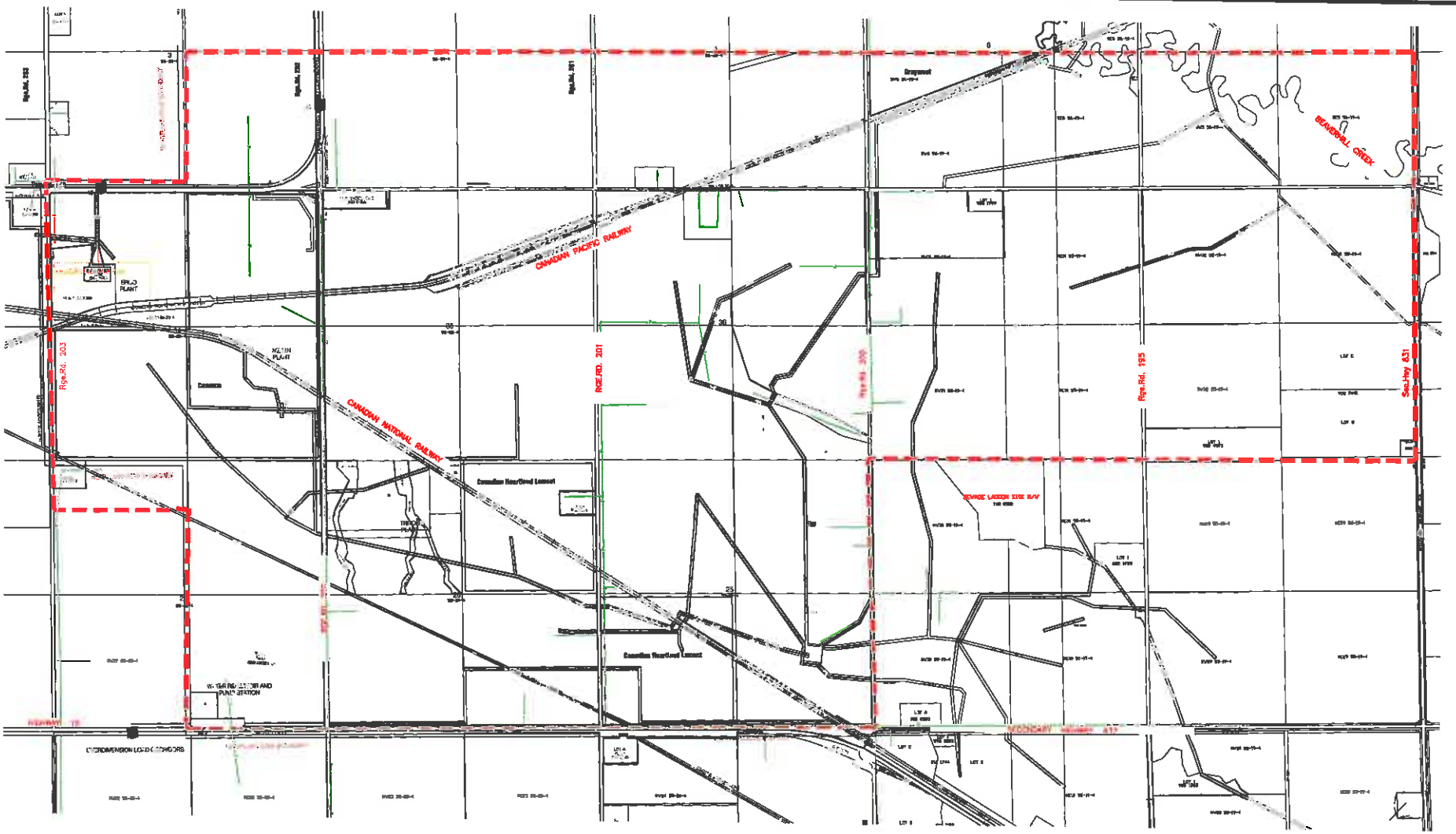


LEGEND	CONSULTANT	LAMONT COUNTY
AREA BOUNDRY PIPELINES	OPUS STEWART WEIR PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	INDUSTRIAL UTILITY MASTER PLAN EXISTING PIPELINES
	FILE No.: ED60.36343	NOT TO SCALE — FIGURE 8

DATED: MARCH 4, 2013



LEGEND	CONSULTANT	LAMONT COUNTY
AREA BOUNDRY CABLE	OPUS STEWART WEIR PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	INDUSTRIAL UTILITY MASTER PLAN EXISTING CABLE
	FILE No.: ED60.36343	NOT TO SCALE — FIGURE 9



LEGEND	CONSULTANT	LAMONT COUNTY
AREA BOUNDRY POWER LINES	OPUS STEWART WEIR PERMIT TO PRACTICE PERMIT NUMBER P 292 The Association of Professional Engineers and Geoscientists of Alberta	INDUSTRIAL UTILITY MASTER PLAN EXISTING POWERLINES
	FILE No.: ED80.36343	NOT TO SCALE FIGURE 10

DATE MARCH 4, 2013