



THURBER ENGINEERING LTD.

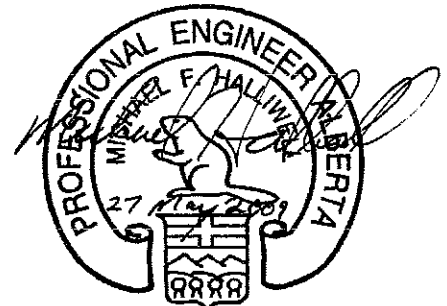
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

**NORTHEAST EDMONTON RING ROAD (HIGHWAY 216)
ADVANCED FUNCTIONAL PLANNING STUDY
MANNING DRIVE TO WHITEMUD DRIVE
LIMITED PHASE I ENVIRONMENTAL
SITE ASSESSMENT**

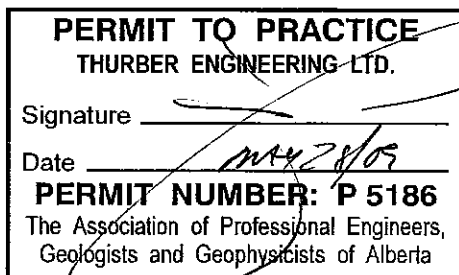
Report

to

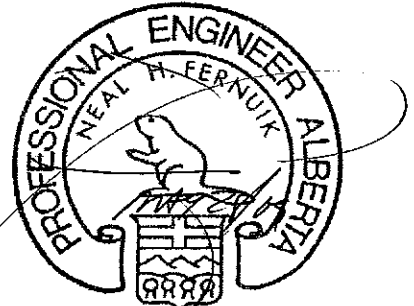
ISL Engineering and Land Services Ltd.



M. Halliwell, CCEP, P.Eng.
Project Engineer



Date: May 27, 2009
File: 19-598-295



N.H. Fernuik, P.Biol., P.Eng.
Review Principal

EXECUTIVE SUMMARY

Thurber Engineering Ltd. (Thurber) was retained by ISL Engineering and Land Services Ltd. (ISL) to conduct a Limited Phase I Environmental Site Assessment (ESA) for the Northeast Edmonton Ring Road (NEERR) in Edmonton, Alberta. The purpose of the Limited Phase I ESA was to provide preliminary environmental information to assist with the functional planning study.

The study area consists of existing highway road alignment for segments of two highways, an existing segment of Meridian Street and portions of the Transportation and Utility Corridor (TUC) to be utilized under the proposed NEERR alignment. The first highway segment is on Highway 216 from 34 Avenue to Highway 16. The second highway segment is along Highway 16 from 17 Street to approximately Clover Bar Road. The remaining area includes approximately 2.4 km of Meridian Street north of Highway 16 and the TUC to Manning Drive. The study area includes segments of four lane, divided highway and associated interchanges, a two lane road and land included in the TUC. There are numerous pipelines and a major railway corridor crossing the study area. The study area has been used for vehicle and rail transportation or agricultural purposes since at least 1949. Prior to development, the areas where highways are present were undeveloped farmland or rural roads.

The quarter-sections on both sides of the highways are surrounded by a mixture of agricultural, commercial, and industrial properties. Areas south of the Sherwood Park Freeway along Highway 216 remain generally agricultural and residential with an assortment of farmsteads and acreages present. Notable exceptions are two schools (one elementary and one former high / former junior high school), a petroleum service station (Salisbury Store), a private airstrip and two cemeteries (South Haven and Our Lady of Peace).

Between the Sherwood Park Freeway and Baseline Road, commercial and industrial developments are present on the west side of Highway 216, including yards for Pioneer Pipeline Carriers, Clearway Recycling (including an aboveground petroleum storage tank), McColeman & Sons Demolition and the Shell Terminal. The west side of Highway 216 between Baseline Road and Highway 16 is dominated by industrial properties such as Enbridge, the

Petro-Canada Refinery and the Air Products Plant. The east side of Highway 216 for the same stretch is predominantly undeveloped agricultural land; however, a former service station was located east of Highway 216 near the Petro-Canada refinery.

Commercial and industrial development is present west of Broadmoor Boulevard along both sides of Highway 16. Properties along Highway 16 east from Broadmoor are predominantly commercial on the north side of the highway and agricultural on the south. Commercial and residential development of the agricultural land south of Highway 16 is underway in many areas. A former service station was present on the south side of Highway 16 just east of the off-ramp from Highway 216 and a second former service station was present on the north side of Highway 16 between Broadmoor Boulevard and Sherwood Drive.

Properties along Meridian Street presently consist of a mixture of commercial, industrial and undeveloped land. The commercial and industrial land includes a former chemical manufacturer (Celanese), borrow pits and the Edmonton Waste Management Centre (Clover Bar Landfill). North of the North Saskatchewan River, adjacent properties include a mixture of residential, agricultural and commercial land use.

Prior to the current developments, the surrounding study area was undeveloped, agricultural land.

In general, the Phase I ESA did not encounter any historical evidence indicating that study area had been impacted by contaminants. However, portions of the study area from Highway 16 to Manning Drive were covered with up to 300 mm of snow at the time of the March 24, 2009 site reconnaissance. Areas of potential environmental concern for the study area are as follows:

- The presence of three cemeteries including two funeral homes; two cemeteries and a funeral home along the west side of Highway 16 between Sherwood Park Freeway and Whitemud Drive and the third cemetery with funeral home south of 167 Avenue and east of 34 Street;
- A petroleum refinery (Petro-Canada) to the west of Highway 216 between Baseline Road and Highway 16;



- The presence of a past landfill (Lafarge location) just south of Highway 16 on the east side of 17 Street;
- An active landfill facility (Edmonton Waste Management Centre) immediately east of Meridian Street north of Highway 16;
- Three petroleum terminals (Enbridge, Kinder Morgan and Shell) along the west side of Highway 216 from just south of Baseline Road to Highway 16;
- Known groundwater contamination between Hayter Road and Highway 16, west of Meridian Street;
- Past and present borrow pit activities, including fill, between Highway 16 and the North Saskatchewan River near Meridian Street;
- Various petroleum storage tanks located at rural residences, borrow pits and commercial facilities;
- Numerous railway lines, including a railway yard, oriented parallel to or crossing the study area;
- One current (Salisbury Store) and three past petroleum service stations along Highways 216 and 16; and
- Extensive oil and gas facilities including; past wells, active disposal wells, approximately 111 known pipeline crossings, several adjacent pipeline corridors and forty-three reported spills/incidents near the study area; and
- Hydrocarbon odours encountered during geotechnical testing in the vicinity of an abandoned pipeline east of the Highway 16 and Highway 216 interchange.

In order to assess the environmental impacts arising from these areas of potential environmental concern, it would be necessary to undertake a sampling and testing program (Phase II ESA) that is beyond the scope of work for a Phase I ESA.

Use of the report is subject to the Statement of General Conditions that is included at the end of the text of this report. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for the proper use and interpretation of this report.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1. INTRODUCTION	1
2. BACKGROUND INFORMATION	2
2.1 Site	2
2.2 Surrounding Areas	3
2.3 Geological Setting	3
2.4 Hydrogeological Setting	4
3. RECORDS REVIEW	5
3.1 Aerial Photographs	6
3.1.1 1949 Air Photos	6
3.1.2 1962 Air Photos	6
3.1.3 1972 Air Photos	8
3.1.4 1982 Air Photos	9
3.1.5 1992/1994 Air Photos	10
3.1.6 2001 Air Photos	10
3.1.7 2007 Air Photos	11
3.2 Alberta Energy and Utilities Board	12
4. INTERVIEW	13
5. ASSESSMENT	13
5.1 Past/Present Operations – Subject Property	14
5.2 Past/Present Operations – Adjacent Properties	14
5.3 Underground or Aboveground Petroleum Storage Tanks	15
5.4 Landfills and Borrow Pits	16
5.5 Sumps and Floor Drains	16
5.6 Polychlorinated Biphenyls (PCBs)	17
5.7 Asbestos	17
5.8 Waste Management, Hazardous Materials and Chemicals Handling	17
5.9 Known Groundwater Contamination	18



TABLE OF CONTENTS (Cont'd)...

5.10	Chlorofluorocarbons (CFC's).....	18
5.11	Oil and Gas Facilities	18
5.12	Railway Operations	19
5.13	Cemetery Operation	19
5.14	Unidentified Substances.....	19
5.15	Odours and Air Emissions.....	19
5.16	Potable Water	20
6.	CONCLUSIONS.....	20

STATEMENT OF GENERAL CONDITIONS

APPENDIX A

- Aerial Photos

APPENDIX B

- ERCB Information Sheets

1. INTRODUCTION

Thurber Engineering Ltd. (Thurber) was retained by ISL Engineering and Land Services Ltd. (ISL) to conduct a Limited Phase I Environmental Site Assessment (ESA) for the Northeast Edmonton Ring Road (NEERR) in Edmonton, Alberta. The purpose of the Limited Phase I ESA was to provide preliminary environmental information to assist with the functional planning study.

The study area for the Limited Phase I ESA consists of existing highway road alignment for segments of two highways, an existing segment of Meridian Street and portions of the Transportation and Utility Corridor (TUC) to be utilized under the proposed NEERR alignment. The first highway segment is on Highway 216 from 34 Avenue to Highway 16. The second highway segment is along Highway 16 from 17 Street to approximately Clover Bar Road. The remaining area includes approximately 2.4 km of Meridian Street north of Highway 16 and the TUC to Manning Drive. The study area includes segments of four lane, divided highway and associated interchanges, a two lane road and land included in the TUC.

A Limited Phase I ESA is conducted to identify potential and actual contamination of land by record reviews, visual site inspection and evaluation and reporting. A Limited Phase I ESA is completed without the benefit of sampling, analytical testing or measurement, and, as such, should not be considered a certificate of compliance. The principal objective of the assessor is to document evidence for potential or actual contamination – not to judge the acceptability of the risks associated with such contamination.

The scope of work for the Limited Phase I ESA was outlined in Thurber's March 25, 2008 proposal to Mr. Ron Newman, P.Eng, of ISL. In general the scope of work consisted of the following:

- undertake a site reconnaissance;
- review historical aerial photographs;
- review Alberta Energy Resources Conservation Board information regarding oil, gas and pipeline activity via the Abadata® database;
- review available Alberta Environment groundwater well information; and
- prepare a report.

The original scope of work was modified to include the north portion from Highway 16 to Manning Drive following Thurber's March 18, 2009 proposal.

Authorization to undertake the Limited Phase I ESA was provided by Mr. Rod Peacock, P.Eng. of ISL.

The geotechnical component pertaining to the scope of work is reported under separate cover.

It is understood that Ecomark Ltd. previously carried out a Phase I ESA at the former Celanese plant site (now Worthington B.P.) and that a Phase II ESA is being carried out at the plant for Alberta Infrastructure. Further assessment of the former Celanese plant is not a part of this Limited Phase I ESA.

Use of the report is subject to the Statement of General Conditions that is included at the end of the text of this report. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for the proper use and interpretation of this report.

2. BACKGROUND INFORMATION

2.1 Site

The study area consists of existing highway road alignment for segments of two highways, an existing segment of Meridian Street and portions of the Transportation and Utility Corridor (TUC) to be utilized under the proposed NEERR alignment. The first highway segment is on Highway 216 from 34 Avenue to Highway 16. The second highway segment is along Highway 16 from 17 Street to approximately Cloverbar Road. The remaining area includes approximately 2.4 km of Meridian Street north of Highway 16 and the TUC to Manning Drive. Aerial photos showing the study area and surrounding areas are included as Drawings 19-598-295-E1 through E12 in Appendix A. The study area includes four-lane, divided highways and associated interchanges, a two lane road and land included in the TUC. There are numerous pipelines and a major railway corridor crossing the study area.

2.2 Surrounding Areas

From 34 Avenue to the Sherwood Park Freeway, Highway 216 is generally surrounded by agricultural lands, including acreages and farmland. Three notable exceptions are the cemeteries (Our Lady of Peace and South Haven) northwest of the intersection of Highway 216 and Whitemud Drive, the Salisbury Store (a petroleum service station and convenience store) and the former school (originally Salisbury High School, later F. R. Haythorne Junior High School, now commercial land) to the southwest of the intersection of Highway 216 and the Sherwood Park Freeway. Continuing north, the east side of Highway 216 remains generally agricultural or residential while the west side is either commercial or industrial lands (including refineries, industrial plants and pipeline and fuel terminals) to Highway 16.

A mixture of commercial and industrial properties surrounds Highway 16 starting at 17 Street and heading east. Undeveloped agricultural land and land currently being developed becomes more prevalent on the south side of Highway 16 east of Sherwood Drive to Cloverbar Road.

Going north along Meridian Street from Highway 16, the first 800 m on the east side is a combination of commercial and industrial properties while industrial lands line the first 1.5 km on the west. Further north, where the TUC meets Meridian Street, the Edmonton Waste Management Centre (Clover Bar Landfill) is present to the east and a gravel pit and the EPCOR Clover Bar Generating Station are present to the west. The TUC crosses several gravel pits before crossing the North Saskatchewan River. North of the river, the TUC is surrounded by predominantly agricultural land with residences, homesteads, farmsteads and some smaller commercial businesses (topsoil sales, trucking yards) and sloughs near Manning Drive.

2.3 Geological Setting

According to Kathol and McPherson (Urban Geology of Edmonton, Bulletin 32, Alberta Research Council, 1975), the surficial geology of the study area varies considerably depending on the location. In general, there is a small amount



(generally between 0 m and 1.5 m, but up to 6 m in places) of glaciolacustrine deposits consisting of surficial deposits and glacial till (unsorted and unstratified unit composed of clay, silt and sand with pebbles and boulders) to a depth of up to 30 m. The surficial materials are underlain by bedrock of the Horseshoe Canyon formation.

The Alberta Environment (AENV) Groundwater Information Centre (GIC), as accessed through the AbaData[®] database, current to February 27, 2009, has records of approximately 250 water wells in the vicinity of these sections of Highways 16 and 216 and the proposed NEERR alignment to Manning Drive. The recorded lithologies from the nearby wells are variable, depending on the location, but appear to be in general agreement with the hydrogeological cross-section prepared by Kathol and McPherson.

Thurber's geotechnical investigation¹ of interchange areas within the study area (issued under separate cover) indicates that the native soils contain little to no glaciolacustrine deposits over clay till to depths of approximately 30 m. Also, in the northern part of the investigation area (near Highway 16), rafted bedrock within the clay till was encountered in several of the geotechnical test holes. In areas where interchange embankments are present, numerous geotechnical logs note the presence of clay, sand, and gravel fill over native soils. With the exception of encountering rafted bedrock, the information on native soils from the geotechnical investigation is in general agreement with the findings of Kathol and McPherson.

2.4 Hydrogeological Setting

Fulton Creek crosses the southern portion of Highway 216 north of 34 Avenue and drains to the Fulton Storm Water Management Facility. Mill Creek is present approximately 1 km to the west of the south end of the study area. The NEERR alignment crosses the North Saskatchewan River; however the river meanders and is within 9 km of the entire study area. Horsehills Creek is present approximately 1 km northeast from the proposed alignment in the northern portion of the study area as shown on Drawing 19-598-295-E12. There are numerous

¹ Thurber Engineering Ltd. "Northeast Edmonton Ring Road Advanced Functional Planning Study, Manning Drive to Whitemud Drive, Geotechnical Investigation." Volumes 1 and 2. File 19-598-298.



sloughs, unnamed creeks and slough areas located within 600 m of the roadways along Highway 216 and near the proposed interchange at Manning Drive. According to work by R. Bibby ("Hydrogeology of the Edmonton Area (Northwest Segment), Alberta", Earth Sciences Report 74-10, 1974), the regional groundwater flow in the southern part of the study area, near Highways 16 and 216, is northwest towards the North Saskatchewan River. The southern portion of the study area has a slight northwest slope and regional surficial water flow is anticipated to be towards the North Saskatchewan River.

North of the North Saskatchewan River, the regional groundwater flow is north-easterly, parallel to the river and the buried Beverly Channel. The portion of the study area north of the North Saskatchewan River has a slight south-easterly slope and the regional surficial water flow is anticipated to be towards the North Saskatchewan River or Horsehills Creek.

3. RECORDS REVIEW

For ease in referencing the large industrial sites along Highway 216 between Baseline Road and Highway 16, the current operating names have been used. Table 3.1 provides a reference for operating names that may appear in historical records for the area.

TABLE 3.1
SUMMARY OF OPERATING NAMES
INDUSTRIAL SITES – HIGHWAY 216 BETWEEN BASELINE ROAD AND HIGHWAY 16
NEAR EDMONTON, ALBERTA

CURRENT OPERATING NAME	PAST OPERATING NAMES
Petro-Canada	British American Oil Company
EPCOR	Edmonton Power
Kinder Morgan	Trans Mountain Pipelines, Terasen Energy
Enbridge	Interprovincial Pipe Line
Shell	No change

3.1 Aerial Photographs

Historical air photos were reviewed from 1949 (earliest available), 1962, 1972, 1982, 1994 (1992 for the northern portion due to availability of air photos), 2001 and 2007 (most recent available, not complete) at the Alberta Sustainable Resource Development air photo library in Edmonton, Alberta.

3.1.1 1949 Air Photos

The 1949 air photo shows scattered acreages and farmsteads along both sides of Highway 216 (then Highway 14) south of Baseline Road. A petroleum service station is visible to the south of the investigation area, near the curve of Highway 14. The Canadian National (CN) rail line is present to the west of Highway 216, oriented in a northeast direction until just north of the future Whitemud Drive. The line comes back northeast to cross Highway 16 near 17 Street. Northwest of the intersection of Highway 216 and Baseline Road, the initial six storage tanks at the Enbridge facility are visible. Further north, the initial development of the Petro-Canada refinery is also present on the west side of Highway 216. A few scattered homesteads and farmsteads are visible along Highway 16.

A Canadian Pacific Railway (CPR) line is present as it crosses Highway 216 just south of Highway 16. Approximately 800 m north of Highway 16, a CN rail line crosses Meridian Street and two farmsteads are present north of the tracks. A gravel pit is visible on the east side of Meridian Street further to the north (current Edmonton Waste Management Centre location) and evidence of a recent pipeline installation is visible to the west. Properties along the alignment north of the river are generally undeveloped agricultural land with scattered farmsteads. Both rail lines, Fort Road and Alberta Hospital (then the University of Alberta Project Farm) are visible.

3.1.2 1962 Air Photos

By 1962, there have been numerous changes along the highways. In the south, the transition between Highway 14 and 216 has been re-aligned and a school has

been constructed to the northeast. The service station at the south end of the former alignment remains present. Several of the farmsteads / homesteads along Highway 216 have additional outbuildings and a new subdivision and a school are visible on the west side of Highway 216 just south of what will become the Sherwood Park Freeway. On the edge of the subdivision and south of the school, the Salisbury Store (petroleum service station) has been constructed.

Between the Sherwood Park Freeway and Baseline Road there have been very few changes. The evidence of pipeline installation is less visible and there appears to be a greenhouse to the southeast of the intersection of Baseline and Highway 216. To the north of Baseline Road, additional storage tanks are visible at the Enbridge Terminal and tanks are visible at the Kinder Morgan site. Further north, the Petro-Canada Refinery has added several new tank farms and the refinery itself has been expanded. To the north of the refinery, on the east side of the highway, a petroleum service station is present.

Along Highway 16, a bridge is present over the North Saskatchewan River into Edmonton. East of Meridian Street, the Great West Container building is present on the north side of Highway 16, while a petroleum service station is visible on the south side as shown on Drawing 19-598-295-E1. East of Broadmoor Boulevard along Highway 16, there are sporadic commercial properties, including another petroleum service station on the north side of the highway as shown on Drawing 19-598-295-E1.

To the north of Highway 16, the fibreglass and Celanese plants are visible to the west of Meridian Street. The CN Clover Bar Yard has been developed and several gravel pits continue to operate on the south side of the river. North of the North Saskatchewan River, the properties remain generally unchanged with the exception that Evergreen Memorial Gardens (cemetery) is now visible and additional buildings have been constructed at Alberta Hospital.

Other properties in the vicinity appear otherwise generally unchanged.

3.1.3 1972 Air Photos

In 1972, Highway 14 and Highway 216 have been twinned and a new alignment is present at the transition between the two. The service station to the south of the transition remains visible. Some additional acreages are visible between Highway 14 and the Sherwood Park Freeway. The intersection at Highway 216 and the Sherwood Park Freeway has been redeveloped into its current configuration, with a clover-leaf interchange and additional on/off ramp to the west. A shop building is present to the north of the school, southwest of the interchange. Additional acreages are present in a subdivision just southeast of the interchange. There are few changes between the Sherwood Park Freeway and Baseline Road.

At the intersection of Baseline Road and Highway 216, the greenhouse to the southeast has expanded, as has the Enbridge Terminal to the northwest. Further north, the Petro-Canada Refinery has been expanded again on the west side of the Highway, while a restaurant is visible to the north of the service station on the east, north of the future Petroleum Way.

Along Highway 16, there have been substantial changes. New interchanges have been constructed linking 17 Street and Highway 216 to Highway 16, which has been twinned. Further west, a second Highway 16 bridge crosses the North Saskatchewan River. South of Highway 16, the Lafarge aggregate area (borrow pit) has been constructed and there are commercial properties developed to the southeast of the Highway 16/216 interchange. Further west, an interchange has been constructed at Broadmoor Boulevard. Commercial development continues to the north of Highway 16, east of Broadmoor Boulevard and the petroleum service station between Broadmoor and Sherwood Drive remains visible.

To the north of Highway 16, Hayter Road has been constructed, buildings are present on the Gilead property, the Georgia Pacific plant has been constructed and construction of commercial properties has taken place north of Great West Container. Continuing north, Celanese has continued to grow, the EPCOR Clover Bar Generating Station has been constructed and gravel pits predominate the area up to the North Saskatchewan River. The lagoons for the Edmonton Waste



Management Centre have been roughed in; however, the rest of the property is still a gravel pit. North of the river, the area remains generally unchanged with the exception of additional buildings at the Alberta Hospital, additional residences being visible at scattered locations, the initial development of the Evergreen Trailer Park and the presence of Manning Drive.

Other properties in the vicinity appear generally unchanged.

3.1.4 1982 Air Photos

The 1982 air photos show that properties along Highway 216 south of the Sherwood Park Freeway remain generally unchanged with the exception of a private airstrip which has been constructed to the west of one of the farmsteads. The shop to the north of the school at Highway 216 and the Sherwood Park Freeway has been expanded and to the east, commercial development has taken place to the limits of the next quarter-section.

North of Sherwood Park Freeway, the initial development of the northern portion of the Pioneer Pipeline Carriers site has taken place. Further north, the Shell Terminal is under construction, the sewage station and tower have been constructed and the greenhouse near Baseline Road and Highway 216 has been removed as an interchange has been constructed. Petro-Canada Refinery has been expanded again and the Soil Treatment Plant and initial phases of the Air Products Plant are visible. East of Highway 216, the petroleum service station and restaurant have been removed and Petroleum Way is visible.

Along Highway 16, the Celanese plant has been expanded, Luciak Transport is present and the fibreglass plant and Great West Containers have expanded. Commercial development continues to the north of Highway 16, east of Broadmoor Boulevard.

Further north, O'Hanlon Paving's aggregate yard is visible, the CN Clover Bar yard has been expanded, as has the EPCOR generating station and the gravel pitting operations towards the North Saskatchewan River. The lagoons at the Edmonton Waste Management Centre are now full of water and there is evidence of a pipeline corridor being installed south of the Edmonton Waste Management

Centre. North of the river, residential development has taken place west of 18 Street and south of 153 Avenue. The funeral Chapel is visible at Evergreen Memorial Gardens, as are trailers at the Evergreen Trailer Park, and a greenhouse has been constructed north of 167 Avenue and east of 18 Street.

Other properties in the area appear generally unchanged.

3.1.5 1992/1994 Air Photos

By 1994, the petroleum service station near the intersection of Highways 14 and 216 has been removed. To the north of the school and south of 34 Avenue, a racetrack has been constructed while further north, a larger acreage / horse farm is present. North of Whitemud Drive, both cemeteries have been constructed. North of the Sherwood Park Freeway, development of the Pioneer Pipeline Carriers property continues.

Further north, the Shell Terminal and its associated lagoons have been constructed, as has the Envirofuels plant site. North of Baseline Road, the Kinder Morgan, Enbridge and Petro-Canada facilities have all been expanded. The Lafarge area, near 17 Street and Highway 16, appears to be vacant land with no visible evidence of the former borrow pit. Commercial development continues along the north side of Highway 16 from 17 Street to beyond Sherwood Drive.

Continuing north along Meridian Street, the Truck Pride building has been constructed and less gravel operations are apparent up to the North Saskatchewan River. The Raven Crest Golf Course is present on the north side of the river, a greenhouse is visible west of Manning Drive and 167 Avenue and clearing and roadwork for additional housing is evident north of 153 Avenue near 18 Street; however, other properties in the vicinity of the study area appear generally unchanged.

3.1.6 2001 Air Photos

By 2001, an outdoor arena has been added to the school near the transition from Highway 14 to Highway 216. To the north, the racetrack appears to be an earthen surface or in a state of disrepair as compared to the 1994 air photo. At

Whitemud Drive, an interchange has been constructed, as has the Fulton Storm Water Management Facility. A funeral home is visible on the western part of the Our Lady of Peace Cemetery and a new service road access has been installed for cemetery and Salisbury Store access from Highway 216. To the north of the Sherwood Park Freeway, Pioneer Pipeline Carriers now occupies their full property and Clearway Recycling and McColeman & Sons are both visible.

The soil treatment area is visible and appears active to the north of the Shell Terminal, between the Sherwood Park Freeway and Baseline Road. Further north, beyond Baseline Road, the Enbridge Terminal, Petro-Canada Refinery and Air Products Plant continue to add storage tanks or expand. To the north of the Petro-Canada Refinery and west of the Air Products Plant, the Soil Treatment Plant appears to be in full operation with black soil clearly visible.

Along Highway 16, a new bridge is being constructed over the North Saskatchewan River. Development of commercial and industrial properties continues along the north side of Highway 16 to the east of Broadmoor Boulevard. The petroleum service station north of Highway 16, between Broadmoor and Sherwood Drive, appears to have been converted for other uses with one portion of the building and the pump islands removed.

Along Meridian Street, additional buildings are present at the CN Clover Bar Yard and the Edmonton Waste Management Centre has been redeveloped from a former gravel pit. Other gravel pit activity in the area has been reduced. Further north, across the North Saskatchewan River, 153 Avenue has been re-aligned west of 18 Street and residential construction in that area continues.

Other properties in the study area appear generally unchanged.

3.1.7 2007 Air Photos

The 2007 air photos (most recent available and basis for Drawings 19-598-295-E1 through E12) show continuous evolution of the study area. In the south, the transition from Highway 14 to Highway 216 is being redeveloped connecting the southeast portion of the Edmonton Ring Road (also part of Highway 216). To the north, the area formerly occupied by a racetrack has been redeveloped and an

electrical substation is now present. An overpass has been constructed at 34 Street. An aboveground petroleum storage tank (AST) is present at the Clearway Recycling yard to the northwest of the intersection of Highway 216 and the Sherwood Park Freeway.

North of Baseline Road, additional tanks are visible at the Kinder Morgan facility and at the Petro-Canada Refinery, which continues to expand. Further north, near 17 Street and Highway 16, the Lafarge property has been redeveloped with a borrow area and pre-cast concrete manufacturing building present. The Celanese facility, north of Hayter Road, appears to be inactive. Commercial developments on the north side of Highway 16, east of Highway 216 appear generally unchanged.

North of the North Saskatchewan River, residential development continues near 18 Street and 153 Avenue. A topsoil sales business and stormwater pond are visible just south of 153 Avenue, east of 18 Street.

Other properties in the area appear generally unchanged.

3.2 Alberta Energy and Utilities Board

The Alberta Energy Resources Conservation Board (ERCB), as accessed through the Abadata® database (February 27, 2009 update), has records of significant oil and gas related activities along Highways 16 and 216 and Meridian Street. Appendix B includes information sheets showing details related to the ERCB data.

There are six major facilities identified in the area, including one (1) terminal/tank farm, one (1) metering station and four (4) disposal well locations. There are records for fifteen (15) wells, of which twelve (12) are abandoned and three (3) are used for industrial waste disposal. There are also records of forty-three (43) spills and eight (8) complaints lodged against operators in the study area. The spills were generally the result of line strikes, corrosion or mechanical failures and involved water, natural gas, condensate, crude oil, diesel fuel, gasoline and lubricants.

Based on the ERCB information, there are at least 93 known pipeline crossings of Highways 16 and 216 and an additional 18 pipeline crossings along Meridian Street or the proposed NEERR alignment within the study area. The pipeline crossings include twenty-four (24) natural gas pipelines, thirty-three (33) high vapour pressure product pipelines, twenty-three (23) low vapour pressure product pipelines, twenty-three (23) crude oil pipelines, seven (7) mixed gas pipelines and one (1) abandoned pipeline. The approximate locations of the pipeline crossings are shown on the site plan drawings. There are also numerous pipeline corridors in the vicinity; however, these details are omitted from the site plans for clarity. More details regarding the pipeline corridors are available on the information sheets in Appendix B.

The Alberta Environment Groundwater Information System, as accessed directly or via the Abadata® database (February 27, 2009 update), has records of 247 wells (171 domestic, 20 domestic and stock, 6 stock, 4 municipal, 4 domestic and industrial, 19 industrial, 7 investigational, 3 observation and 13 "unknown" or "other") within approximately 400 m of the study area.

4. INTERVIEW

An interview was held with Mr. Paul Wagner, M.Sc., P.Biol., of Ecomark Ltd. regarding the former Celanese plant site. Information from this interview has been incorporated into the assessment (Section 5).

5. ASSESSMENT

The assessment was based on October 16, 2008 and March 24, 2009 site reconnaissances of the study area by Mr. M. Halliwell, CCEP, P.Eng., of Thurber, a historical photograph review and documentation from third party agencies. The northern portion of the study area, from Highway 16 to Manning Drive, was partly covered with snow during the March 2009 site reconnaissance.



5.1 Past/Present Operations – Subject Property

The study area currently consists of a paved highway with associated ditches and right-of-way, paved and gravelled roadways, gravel pit operations and agricultural and residential land. The study area has been used for these purposes since at least 1949. Prior to development, the areas where highways are present were undeveloped farmland or rural roads.

5.2 Past/Present Operations – Adjacent Properties

The quarter-sections on both sides of the highways are surrounded by a mixture of agricultural, commercial, and industrial properties. Areas south of the Sherwood Park Freeway remain generally agricultural and residential with an assortment of farmsteads and acreages present. Notable exceptions are two schools (an elementary schools and a former high school / former junior high school), a petroleum service station (Salisbury Store), a private airstrip and two cemeteries (Our Lady of Peace and South Haven).

Between the Sherwood Park Freeway and Baseline Road, commercial and industrial developments are present on the west side of Highway 216, including yards for Pioneer Pipeline Carriers, Clearway Recycling (including an aboveground petroleum storage tank), McColeman & Sons Demolition and the Shell Terminal. The west side of Highway 216 between Baseline Road and Highway 16 is dominated by industrial properties such as Enbridge, the Petro-Canada Refinery and the Air Products Plant. The east side of Highway 216 for the same stretch is predominantly undeveloped agricultural land; however, a former service station was located east of Highway 216 near the Petro-Canada refinery.

Commercial and industrial development is present west of Broadmoor Boulevard along both sides of Highway 16. Properties along Highway 16 east from Broadmoor are predominantly commercial on the north side of the highway and agricultural on the south. Commercial and residential development of the agricultural land south of Highway 16 is underway in many areas. A former service station was present on the south side of Highway 16 just east of the off-ramp from

Highway 216 and a second former service station was present on the north side of Highway 16 between Broadmoor Boulevard and Sherwood Drive.

Properties along Meridian Street presently consist of a mixture of commercial, industrial and undeveloped land. The commercial and industrial land includes a former chemical manufacturer (Celanese), gravel pits and the Edmonton Waste Management Centre (Clover Bar Landfill). North of the North Saskatchewan River, adjacent properties include a mixture of residential, agricultural and commercial land use.

Prior to the current developments, the surrounding area was undeveloped, agricultural land.

5.3 Underground or Aboveground Petroleum Storage Tanks

Visible evidence of underground petroleum storage tanks UST's (clean-outs, vent pipes or obvious surface patching) or above ground storage tanks (AST's) was not observed on the highways or associated right-of-way at the time of the site reconnaissance.

A pair of gasoline AST's are present within 50 m of the Highway 216 right-of-way to the south of the Sherwood Park Freeway at the Salisbury Store. The Salisbury Store has been a petroleum service station since at least 1962. A review of Petroleum Tank Management Association of Alberta (PTMAA) records indicate that the Salisbury Store has had 4 UST's present on the site; however, visual observations from the site reconnaissance indicate that the UST's may have been removed.

An AST is present on the Clearway Recycling property (Drawing 19-598-295-E4). The observed AST was a farm-style elevated tank and is understood to be used for the fuelling of equipment used on the Clearway property.

At least 72 high-volume petroleum AST's are present in the tank farms of the Shell Terminal, Kinder Morgan Terminal, Enbridge Terminal and the Petro-Canada Refinery and are located within 400 m west of the Highway 216 right-of-way. An additional 19 high-volume storage tanks are present at the Kinder Morgan facility

at a distance of between 400 m and 800 m from the highway right-of-way. These tanks all have secondary containment (containment dykes).

Additional AST's are known to be present at the Edmonton Waste Management Centre, a gravel pit near the North Saskatchewan River, the Raven Crest Golf Course (2) and at some of the farmsteads and commercial/residential properties between 153 Avenue and Manning Drive.

UST's are known to have been present at three other former petroleum service stations; one along Highway 216 across from the Petro-Canada Refinery at Petroleum Way, and two others along Highway 16 between Highway 216 and Sherwood Drive.

5.4 Landfills and Borrow Pits

Thurber is aware of a landfill that was present at the Lafarge facility east of 17 Street and south of Highway 16. The magnitude of this landfill could not be ascertained.

The Edmonton Waste Management Centre (Clover Bar Landfill) is present immediately adjacent to Meridian Street and the proposed NEERR alignment, approximately 2.4 km north of Highway 16. This landfill is active and presently serves as the central processing facility for domestic and commercial streams of recycling and wastes for the City of Edmonton.

The area north of Hayter Road and within 800 m of either side of Meridian Street has been historically used for gravel borrow pit operations. Many of these borrow pit operations have ceased and, other than some residual ponds, appear to have been backfilled. The source of backfill to replace the removed aggregates is not known.

5.5 Sumps and Floor Drains

The study area consists of paved highways and right-of-ways, roads and agricultural land with scattered residences. Therefore sumps, catch basins (other than culverts) or floor drains were not observed during the site reconnaissance.



5.6 Polychlorinated Biphenyls (PCBs)

Numerous pole-mounted transformers are present along the highway right-of-ways, roads and proposed NEERR alignment. Where observed, the transformers visually appeared to be in good condition with no obvious signs of leakage.

5.7 Asbestos

The study area consists of paved highways and right-of-ways, roads and agricultural land with scattered residences. As buildings are present, there is a potential for asbestos containing material (ACM); however, the assessment of buildings for ACM is beyond the scope of work for this Phase I ESA.

5.8 Waste Management, Hazardous Materials and Chemicals Handling

A small amount of litter was present on the highway right-of-way and along some roadways at the time of the site reconnaissance. Hazardous materials or chemicals were not observed on the highway or roadways at the time of the site reconnaissance. Hazardous materials and/or chemicals, specifically those related to hydrocarbons, are anticipated to be present at various facilities adjacent to the highway right-of-ways, including the Petro-Canada Refinery, Enbridge, Air Products Plant, Kinder Morgan and Shell Terminal.

Chemicals are transported via the CN and CP rail lines and within the CN Gold Bar Rail Yard, north of Highway 16. Both railways maintain a spill response program in case of leak or train derailment. Both CN and CP are required to report spills and derailments to the Transportation Safety Board of Canada (TSB). A review of incident investigations posted on the TSB website did not identify any spills or incidents for either railway in the study area. As of the date of this report, neither railway has responded to a request for information regarding spills or incidents within the study area.

The Edmonton Waste Management Centre is a combination recycling, compost and landfill facility. The Centre does not handle hazardous wastes and does have a leachate collection system in place.

5.9 Known Groundwater Contamination

A discussion with Mr. Wagner regarding the Celanese property and area indicated the presence of a groundwater contamination plume. The plume, from the area of a former herbicide plant located west of Meridian Street between Hayter Road and Highway 16, is known to be moving northwest under Hayter. The contaminated groundwater is recovered and sent to a disposal well on the former herbicide plant property.

Thurber is also aware of a deep groundwater plume being present on the north end of the former Celanese facility that extends towards the EPCOR Clover Bar Generating Station.

5.10 Chlorofluorocarbons (CFC's)

The study area consists of paved highways and right-of-ways, roads and agricultural land with scattered residences. Potential CFC sources (refrigerators, air conditioning units or coolers) were not observed during the site reconnaissance but may be present within the residences.

5.11 Oil and Gas Facilities

The Alberta Energy Resources Conservation Board (ERCB), as accessed through the Abadata® database (February 27, 2009 update), has records of significant oil and gas related activities along Highways 16 and 216 and Meridian Street. Appendix B includes information sheets showing details related to the ERCB data.

There are six facilities identified in the area, fifteen (15) wells, of which twelve (12) are abandoned and three (3) are used for industrial waste disposal, and records of forty-three (43) spills and eight (8) complaints. The site reconnaissance identified a petro-chemical refinery (Petro-Canada) and several petroleum terminals (Enbridge, Keyera and Shell) adjacent to the study area on the west side of Highway 216 between Highway 16 and Baseline Road.



Based on the ERCB information, there are at least 93 known pipeline crossings of Highways 16 and 216 and an additional 18 pipeline crossings along Meridian Street or the proposed NEERR alignment within the study area. The pipeline crossings include twenty-four (24) natural gas pipelines, thirty-three (33) high vapour pressure product pipelines, twenty-three (23) low vapour pressure product pipelines, twenty-three (23) crude oil pipelines, seven (7) mixed gas pipelines and one (1) abandoned pipeline.

A geotechnical test hole (report issued under separate cover), advanced near the abandoned pipeline east of the interchange at Highway 16 and 216, encountered hydrocarbon odours at a depth of 3.8 m – 4.5 m.

5.12 Railway Operations

Railway lines cross or are present in close proximity to the study area at numerous locations. The rail lines observed range from local spurs up to a large rail yard (CN Clover Bar Rail Yard).

5.13 Cemetery Operation

Two cemeteries, including one with an on-site funeral home, are present along the west side of Highway 216 between Sherwood Park Freeway and Whitemud Drive. A third cemetery, also with an on-site funeral home, is located approximately 500 m off the proposed NEERR alignment south of 167 Avenue and east of 34 Street.

5.14 Unidentified Substances

Unidentified substances were not observed at the time of the site reconnaissance.

5.15 Odours and Air Emissions

Strong, pungent or noxious odours were not observed during the site reconnaissance. Hydrocarbon odours were noted during the geotechnical investigation (report issued under separate cover) of the interchange at Highways

16 and 216. The test hole where the odours were observed is to the southeast of the eastern cloverleaf of the interchange, towards the location of an abandoned pipeline as shown on Drawing 19-598-295-E1.

5.16 Potable Water

The City of Edmonton and Town of Sherwood Park receive their drinking water from the North Saskatchewan River via City of Edmonton water treatment plants and a domestic water distribution system. Rural properties in the area typically make use of groundwater wells or cisterns and water delivery for potable water.

The Alberta Environment Groundwater Information System, as accessed directly or via the Abadata® database (February 27, 2009 update), has records of 247 wells (171 domestic, 20 domestic and stock, 6 stock, 4 municipal, 4 domestic and industrial, 19 industrial, 7 investigational, 3 observation and 13 “unknown” or “other”) within approximately 400 m of the study area.

6. CONCLUSIONS

The Limited Phase I ESA was based on a site reconnaissance, a historical air photo review, interviews and documentation from third party agencies. These are generally accepted environmental practices to identify available information on the property relating to environmental contamination for a Limited Phase I ESA.

In general, the Phase I ESA did not encounter any historical evidence indicating that study area had been impacted by contaminants. However, portions of the study area from Highway 16 to Manning Drive were covered with up to 300 mm of snow at the time of the March 24, 2009 site reconnaissance. Areas of potential environmental concern for the study area are as follows:

- the presence of three cemeteries including two funeral homes; two cemeteries and a funeral home along the west side of Highway 16 between Sherwood Park Freeway and Whitemud Drive and the third cemetery with funeral home south of 167 Avenue and east of 34 Street;
- a petroleum refinery (Petro-Canada) to the west of Highway 216 between Baseline Road and Highway 16;



- the presence of a past landfill (Lafarge location) just south of Highway 16 on the east side of 17 Street;
- an active landfill facility (Edmonton Waste Management Centre) immediately east of Meridian Street north of Highway 16;
- three petroleum terminals (Enbridge, Kinder Morgan and Shell) along the west side of Highway 216 from just south of Baseline Road to Highway 16;
- known groundwater contamination between Hayter Road and Highway 16, west of Meridian Street;
- past and present borrow pit activities, including fill, between Highway 16 and the North Saskatchewan River near Meridian Street;
- various petroleum storage tanks located at rural residences, borrow pits and commercial facilities;
- numerous railway lines, including a railway yard, oriented parallel to or crossing the study area;
- one current (Salisbury Store) and three past petroleum service stations along Highways 216 and 16;
- extensive oil and gas facilities including; past wells, active disposal wells, approximately 111 known pipeline crossings, several adjacent pipeline corridors and forty-three reported spills/incidents near the study area; and
- hydrocarbon odours encountered during geotechnical testing in the vicinity of an abandoned pipeline east of the Highway 16 and Highway 216 interchange.

In order to assess the environmental impacts arising from these areas of potential environmental concern, it would be necessary to undertake a sampling and testing program (Phase II ESA) that is beyond the scope of work for a Phase I ESA.

STATEMENT OF GENERAL CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

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

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

3. BASIS OF REPORT

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

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

INTERPRETATION OF THE REPORT *(continued)*

- c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.
- d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

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



THURBER ENGINEERING LTD.

APPENDIX A

Aerial Photos

Z:\19\19-598-295\19-598-295-1.dwg



LEGEND

- APPROXIMATE LOCATION OF PIPELINES CROSSING HIGHWAYS
- /// PROPOSED STUDY AREA

NOTE: SEE ERCB INFO SHEETS FOR ADDITIONAL PIPELINE INFORMATION

BASE PLAN (2007) PROVIDED BY: ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES

THURBER PROJECT #19-598-295

ISL ENGINEERING & LAND SERVICES LTD.

SITE PLAN (SHEET 1 OF 8)

NEERR-AFPS-LIMITED PHASE I ESA
(CE033/08)

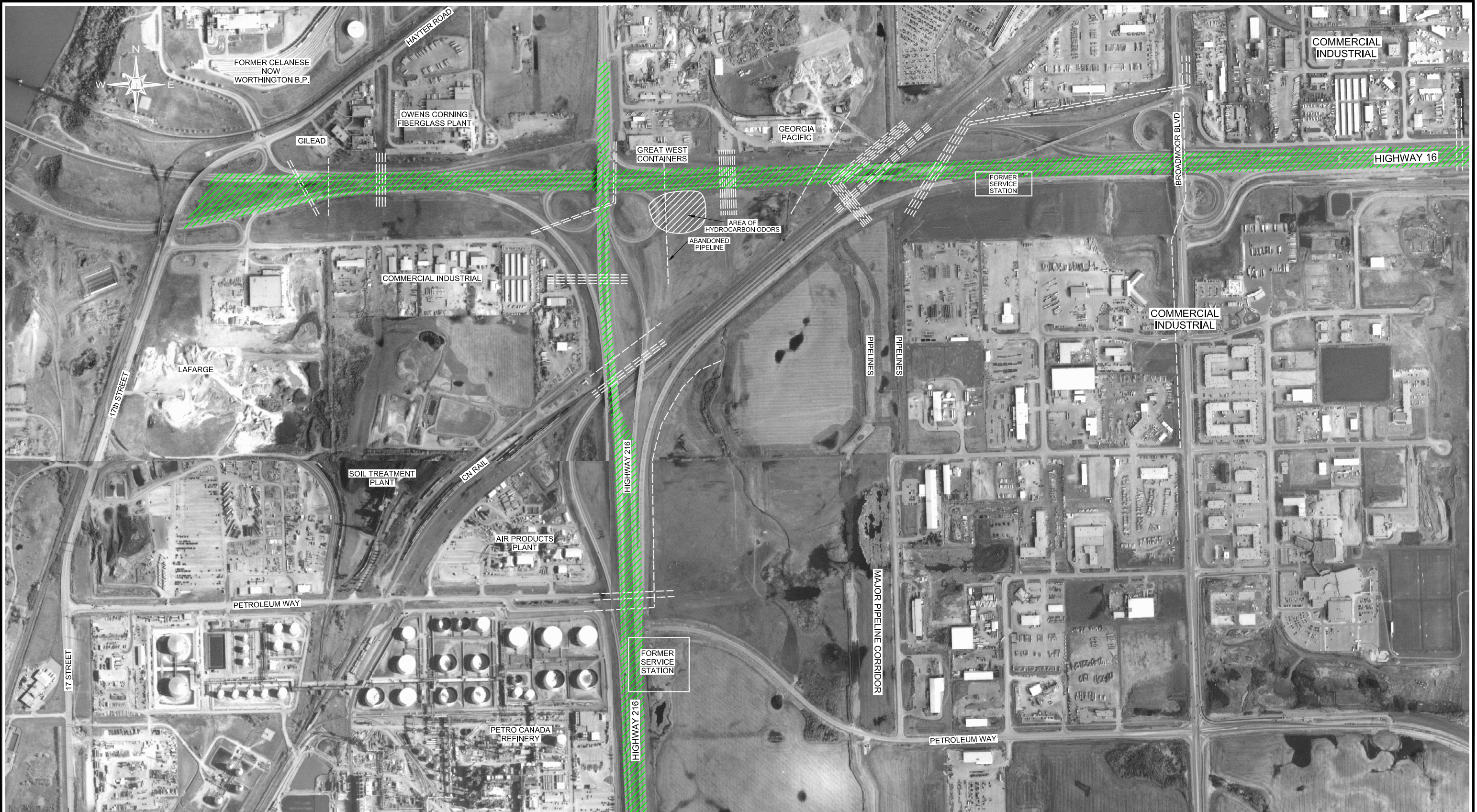
EDMONTON, AB



THURBER ENGINEERING LTD.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

ENGINEER:	MFH	DRAWN:	CMH	APPROVED:	NHF
DATE:	FEBRUARY 2009	SCALE:	APPROX. 1:10,000	DRAWING No.	19-598-295-E1

Z:\19\19-598-295\19-598-295-1.dwg



LEGEND

- APPROXIMATE LOCATION OF PIPELINES CROSSING HIGHWAYS
- //// PROPOSED STUDY AREA

NOTE: SEE ERCB INFO SHEETS FOR ADDITIONAL PIPELINE INFORMATION

BASE PLAN (2007) PROVIDED BY: ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES

THURBER PROJECT #19-598-295

ISL ENGINEERING & LAND SERVICES LTD.

SITE PLAN (SHEET 2 OF 8)

NEERR-AFPS-LIMITED PHASE I ESA
(CE033/08)

EDMONTON, AB



THURBER ENGINEERING LTD.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

ENGINEER :

MFH

DRAWN :

CMH

APPROVED :

NHF

DATE :

FEBRUARY 2009

SCALE :

APPROX. 1:10,000

DRAWING No.

19-598-295-E2

Z:\19\19-598-295\19-598-295-1.dwg




LEGEND

- APPROXIMATE LOCATION OF PIPELINES CROSSING HIGHWAYS
- ////// PROPOSED STUDY AREA

NOTE: SEE ERCB INFO SHEETS FOR ADDITIONAL PIPELINE INFORMATION

BASE PLAN (2007) PROVIDED BY: ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES THURBER PROJECT #19-598-295

ISL ENGINEERING & LAND SERVICES LTD.		
SITE PLAN (SHEET 3 OF 8)		
NEERR-AFPS-LIMITED PHASE I ESA (CE033/08)		
EDMONTON, AB		
 THURBER ENGINEERING LTD. GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS		
ENGINEER :	DRAWN :	APPROVED :
MFH	CMH	NHF
DATE :	SCALE :	DRAWING No.
FEBRUARY 2009	APPROX. 1:10,000	19-598-295-E3

Z:\19\19-598-295\19-598-295-1.dwg



BASE PLAN (2007) PROVIDED BY: ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES

THURBER PROJECT #19-598-295

LEGEND

- APPROXIMATE LOCATION OF PIPELINES
CROSSING HIGHWAYS
- ////// PROPOSED STUDY AREA

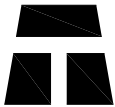
NOTE: SEE ERCB INFO SHEETS FOR ADDITIONAL PIPELINE INFORMATION

ISL ENGINEERING & LAND SERVICES LTD.

**SITE PLAN
(SHEET 4 OF 8)**

NEERR-AFPS-LIMITED PHASE I ESA
(CE033/08)

EDMONTON, AB



THURBER ENGINEERING LTD.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

ENGINEER :

MFH

DRAWN :

CMH

APPROVED :

NHF

DATE :

FEBRUARY 2009

SCALE :

APPROX. 1:10,000

DRAWING No.

19-598-295-E4

Z:\19\19-598-295\19-598-295-1.dwg



BASE PLAN (2007) PROVIDED BY: ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES


THURBER PROJECT #19-598-295

LEGEND

- APPROXIMATE LOCATION OF PIPELINES CROSSING HIGHWAYS
- //// PROPOSED STUDY AREA

NOTE: SEE ERCB INFO SHEETS FOR ADDITIONAL PIPELINE INFORMATION

ISL ENGINEERING & LAND SERVICES LTD.	
SITE PLAN (SHEET 5 OF 8)	
NEERR-AFPS-LIMITED PHASE I ESA (CE033/08)	EDMONTON, AB

 THURBER ENGINEERING LTD. GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS		
ENGINEER : MFH	DRAWN : CMH	APPROVED : NHF
DATE : FEBRUARY 2009	SCALE : APPROX. 1:10,000	DRAWING No. 19-598-295-E5

Z:\19\19-598-295\19-598-295-1.dwg



BASE PLAN (2007) PROVIDED BY: ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES

THURBER PROJECT #19-598-295

LEGEND

- APPROXIMATE LOCATION OF PIPELINES CROSSING HIGHWAYS
- //// PROPOSED STUDY AREA

NOTE: SEE ERCB INFO SHEETS FOR ADDITIONAL PIPELINE INFORMATION

ISL ENGINEERING & LAND SERVICES LTD.

SITE PLAN
(SHEET 6 OF 8)

NEERR-AFPS-LIMITED PHASE I ESA
(CE033/08)

EDMONTON, AB



THURBER ENGINEERING LTD.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

ENGINEER :

MFH

DRAWN :

CMH

APPROVED :

NHF

DATE :

FEBRUARY 2009

SCALE :

APPROX. 1:10,000

DRAWING No.

19-598-295-E6

Z:\19\19-598-295\19-598-295-1.dwg



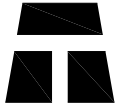
BASE PLAN (2007) PROVIDED BY: ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES THURBER PROJECT #19-598-295

LEGEND

- APPROXIMATE LOCATION OF PIPELINES CROSSING HIGHWAYS
- ////// PROPOSED STUDY AREA

NOTE: SEE ERCB INFO SHEETS FOR ADDITIONAL PIPELINE INFORMATION

ISL ENGINEERING & LAND SERVICES LTD.		
SITE PLAN (SHEET 7 OF 8)		
NEERR-AFPS-LIMITED PHASE I ESA (CE033/08)		
EDMONTON, AB		

		THURBER ENGINEERING LTD. GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
ENGINEER :	DRAWN :	APPROVED :
MFH	CMH	NHF
DATE :	SCALE :	DRAWING No.
FEBRUARY 2009	APPROX. 1:10,000	19-598-295-E7

Z:\19\19-598-295\19-598-295-1.dwg




BASE PLAN (2007) PROVIDED BY: ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES THURBER PROJECT #19-598-295

LEGEND

- APPROXIMATE LOCATION OF PIPELINES CROSSING HIGHWAYS
- ////// PROPOSED STUDY AREA

NOTE: SEE ERCB INFO SHEETS FOR ADDITIONAL PIPELINE INFORMATION

ISL ENGINEERING & LAND SERVICES LTD.		
SITE PLAN (SHEET 8 OF 8)		
NEERR-AFPS-LIMITED PHASE I ESA (CE033/08)		
EDMONTON, AB		

		THURBER ENGINEERING LTD. GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
ENGINEER :	DRAWN :	APPROVED :
MFH	CMH	NHF
DATE :	SCALE :	DRAWING No.
FEBRUARY 2009	APPROX. 1:10,000	19-598-295-E8

Z:\19\19-598-295\19-598-295-2.dwg - E9 - May. 29, 2009



BASE PLAN (2007) PROVIDED BY ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES

THURBER PROJECT #19-598-295

ISL ENGINEERING & LAND SERVICES LTD.

SITE PLAN
(SHEET 1 OF 4)

NEERR-AFPS-LIMITED PHASE I ESA
(CE033/08)

EDMONTON, AB



THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

ENGINEER :	DRAWN :	APPROVED :
MFH	HH	NHF
DATE :	SCALE :	DRAWING No.
MARCH 2009	APPROX. 1:10,000	19-598-295-E9

Z:\19\19-598-295\19-598-295-2.dwg - E10 - May. 29, 2009



BASE PLAN (2007) PROVIDED BY ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES

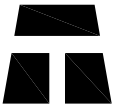
THURBER PROJECT #19-598-295

ISL ENGINEERING & LAND SERVICES LTD.

SITE PLAN
(SHEET 2 OF 4)

NEERR-AFPS-LIMITED PHASE I ESA
(CE033/08)

EDMONTON, AB



THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

ENGINEER :	MFH	DRAWN :	HH	APPROVED :	NHF
DATE :	MARCH 2009	SCALE :	APPROX. 1:10,000	DRAWING No.	19-598-295-E10

Z:\19\19-598-295\19-598-295-2.dwg - E11 - May 29, 2009



BASE PLAN (2007) PROVIDED BY ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES

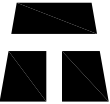
THURBER PROJECT #19-598-295

ISL ENGINEERING & LAND SERVICES LTD.

SITE PLAN
(SHEET 3 OF 4)

NEERR-AFPS-LIMITED PHASE I ESA
(CE033/08)

EDMONTON, AB



THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

ENGINEER :	MFH	DRAWN :	HH	APPROVED :	NHF
DATE :	MARCH 2009	SCALE :	APPROX. 1:10,000	DRAWING No.	19-598-295-E11

Z:\19\19-598-295\19-598-295-2.dwg - E12 - May, 29, 2009



BASE PLAN (2007) PROVIDED BY ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT AIR PHOTO SERVICES

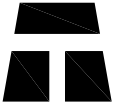
THURBER PROJECT #19-598-295

ISL ENGINEERING & LAND SERVICES LTD.

SITE PLAN
(SHEET 4 OF 4)

NEERR-AFPS-LIMITED PHASE I ESA
(CE033/08)

EDMONTON, AB



THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

ENGINEER :	MFH	DRAWN :	HH	APPROVED :	NHF
DATE :	MARCH 2009	SCALE :	APPROX. 1:10,000	DRAWING No.	19-598-295-E12

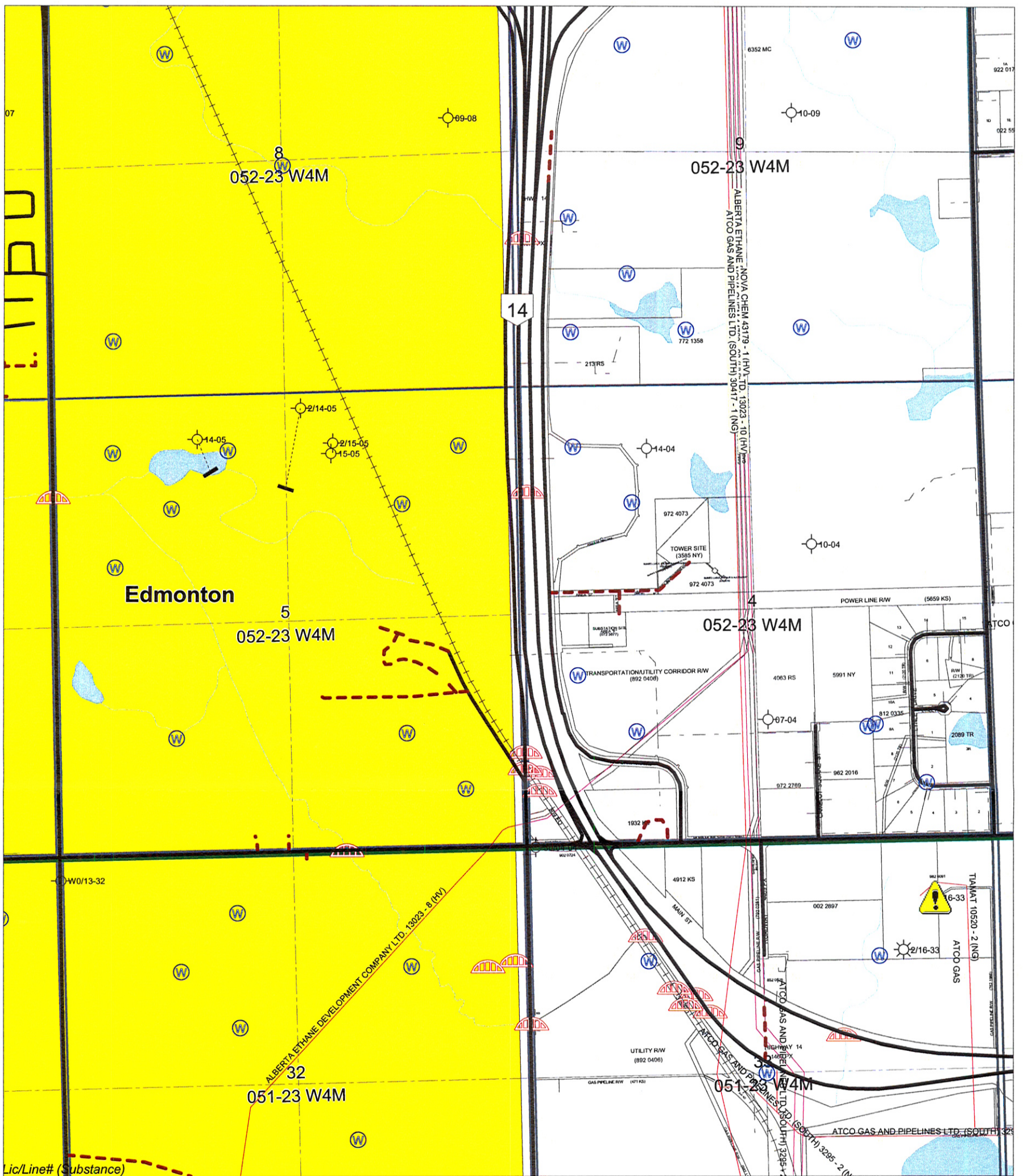


THURBER ENGINEERING LTD.

APPENDIX B

ERCB Information Sheets

19-598-295 ERCB Information Sheet 1

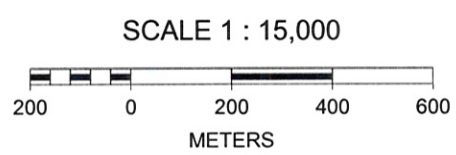


Wellheads

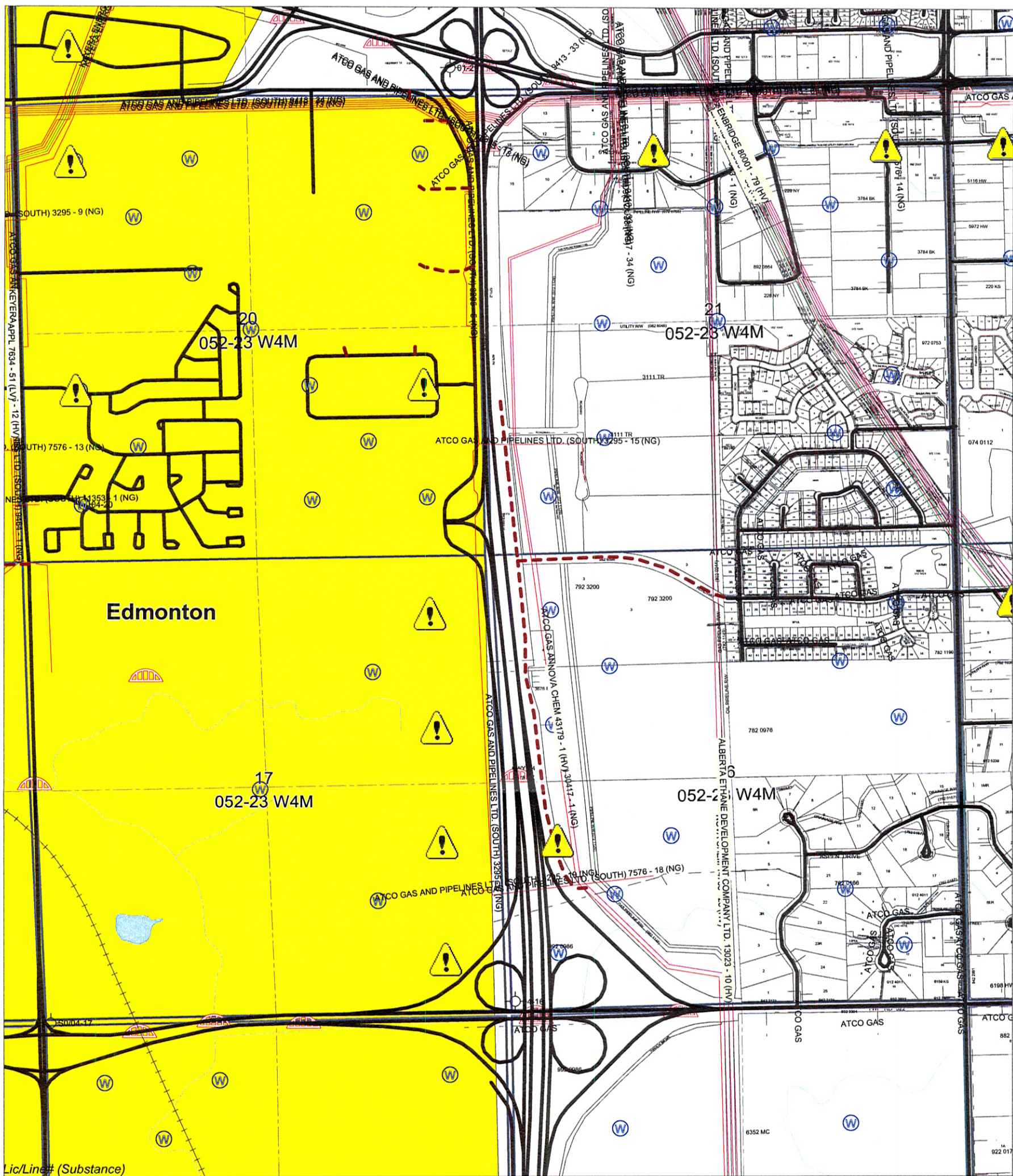
- ✧ Abandoned Wellhead
 - ✧ Suspended Gas Wellhead
 - ✧ Suspended Oil Wellhead
 - ✧ Flowing Gas Wellhead
 - Location Wellhead
 - ✧ Flowing Oil Wellhead
 - ✧ Miscellaneous Wellhead
 - ✧ Water Wellhead
 - ✧ Well Downhole Location
 - Newly Licenced Well
 - Newly Spudded Well
- High Pressure Pipelines
- Gas Pipeline
 - Oil Pipeline
 - Water Pipeline
 - LVP/HVP Pipeline
 - Foreign Pipeline
- (Only when a company is specified.)

Low Pressure Pipelines

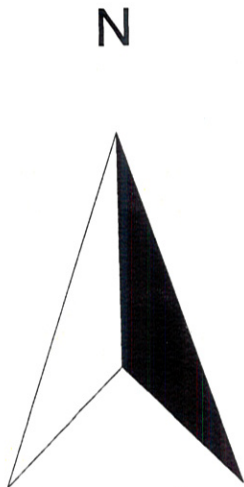
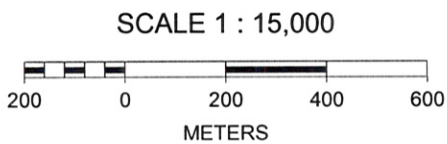
----- Gas Co-op Pipeline



19-598-295 ERCB Information Sheet 2

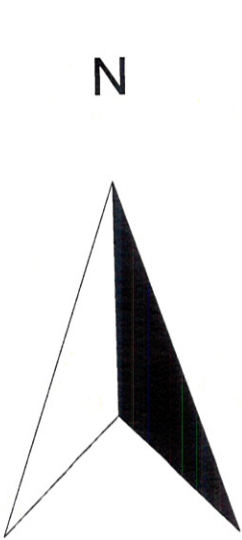
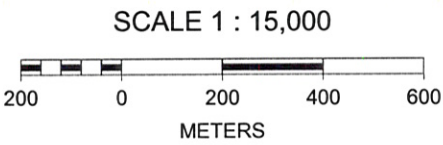
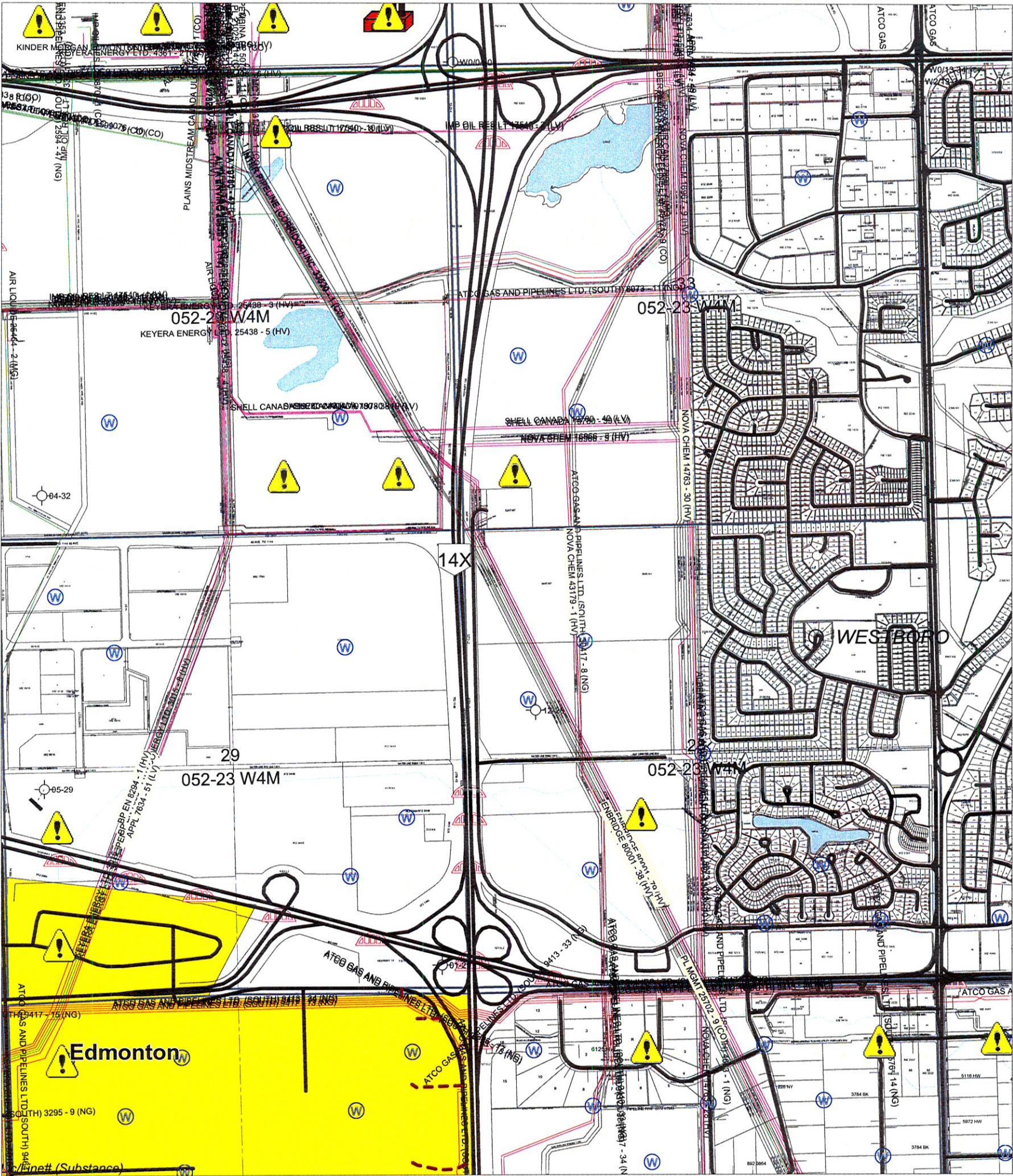


Lic/Line# (Substance)



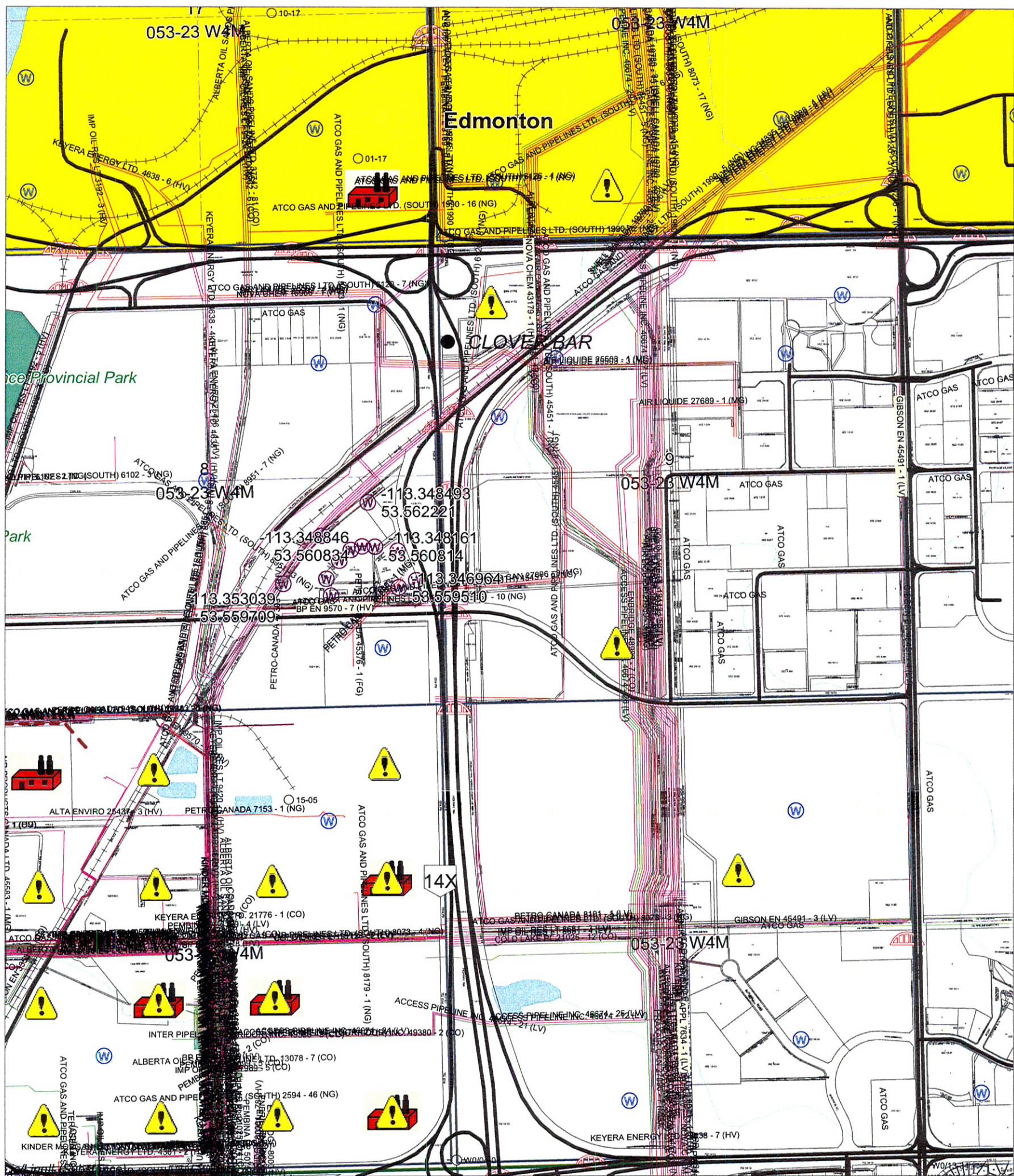
- Wellheads**
- Abandoned Wellhead
 - Suspended Gas Wellhead
 - Suspended Oil Wellhead
 - Flowing Gas Wellhead
 - Location Wellhead
 - Flowing Oil Wellhead
 - Miscellaneous Wellhead
 - Water Wellhead
 - Well Downhole Location
 - Newly Licenced Well
 - Newly Spudded Well
- High Pressure Pipelines**
- Gas Pipeline
 - Oil Pipeline
 - Water Pipeline
 - LVP/HVP Pipeline
 - Foreign Pipeline (Only when a company is specified.)
- Low Pressure Pipelines**
- Gas Co-op Pipeline

19-598-295 ERCB Information Sheet 3



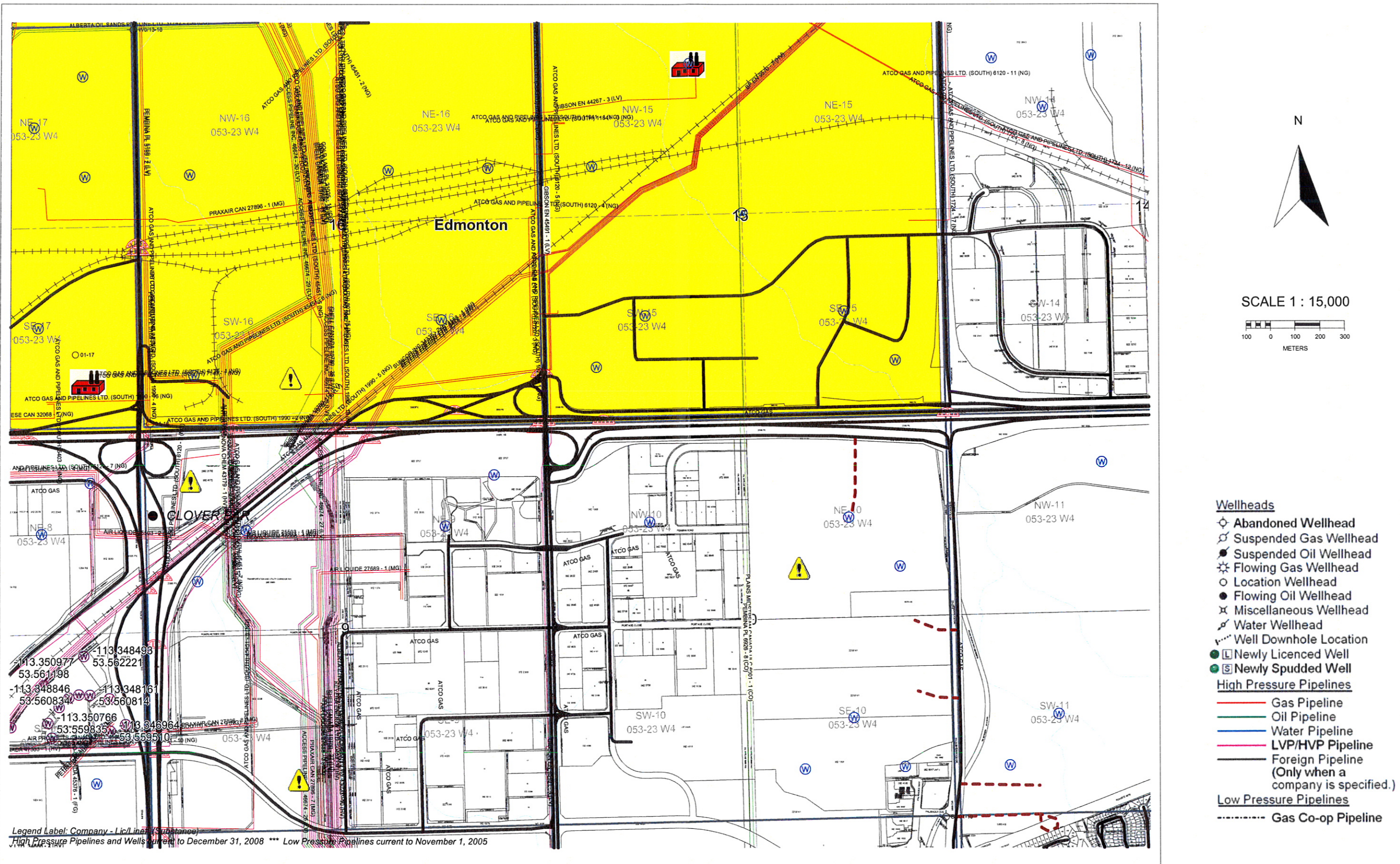
- Wellheads**
- Abandoned Wellhead
 - Suspended Gas Wellhead
 - Suspended Oil Wellhead
 - Flowing Gas Wellhead
 - Location Wellhead
 - Flowing Oil Wellhead
 - Miscellaneous Wellhead
 - Water Wellhead
 - Well Downhole Location
 - Newly Licenced Well
 - Newly Spudded Well
- High Pressure Pipelines**
- Gas Pipeline
 - Oil Pipeline
 - Water Pipeline
 - LVP/HVP Pipeline
 - Foreign Pipeline (Only when a company is specified.)
- Low Pressure Pipelines**
- Gas Co-op Pipeline

19-598-295 ERCB Information Sheet 4

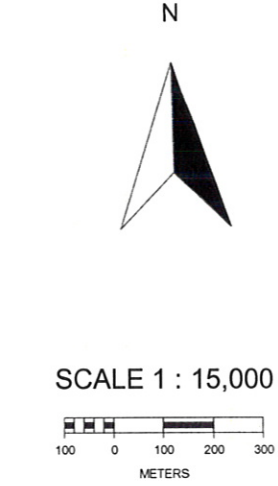
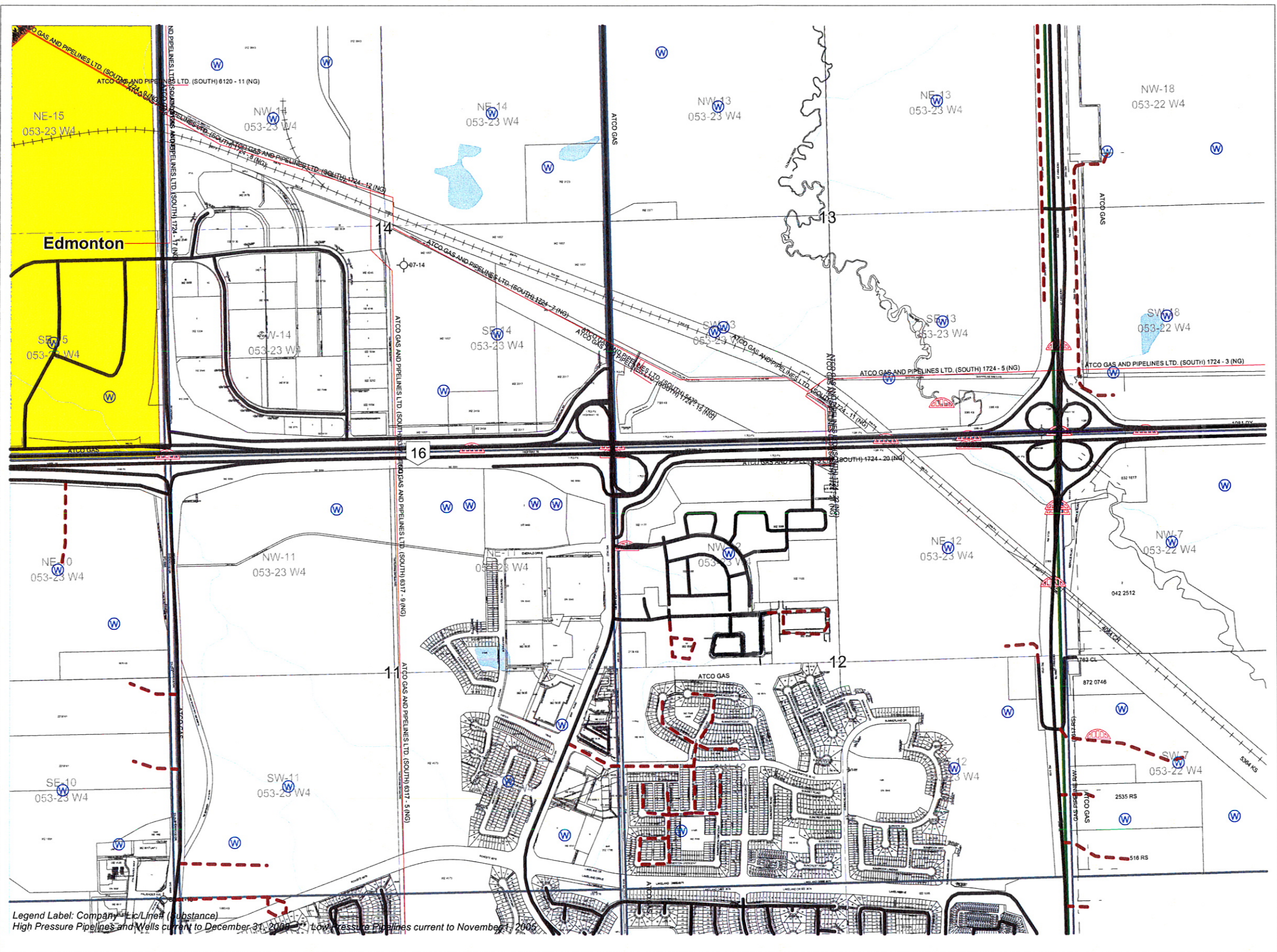


- Wellheads**
- Abandoned Wellhead
 - Suspended Gas Wellhead
 - Suspended Oil Wellhead
 - Flowing Gas Wellhead
 - Location Wellhead
 - Flowing Oil Wellhead
 - Miscellaneous Wellhead
 - Water Wellhead
 - Well Downhole Location
 - Newly Licenced Well
 - Newly Spudded Well
- High Pressure Pipelines**
- Gas Pipeline
 - Oil Pipeline
 - Water Pipeline
 - LVP/HVP Pipeline
 - Foreign Pipeline (Only when a company is specified.)
- Low Pressure Pipelines**
- Gas Co-op Pipeline

19-598-295 ERCB Information Sheet 5



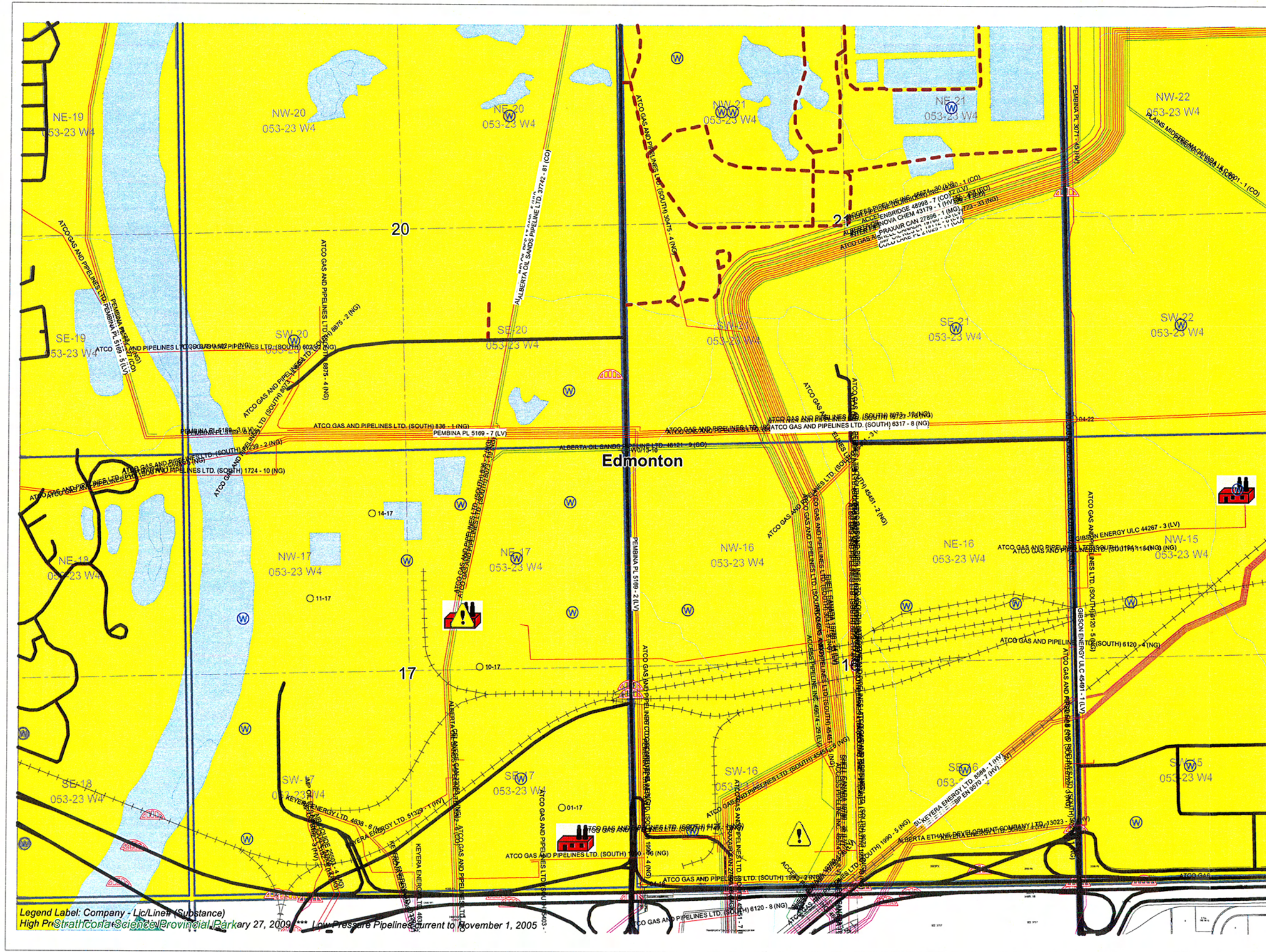
19-598-295 ERCB Information Sheet 6



- Wellheads**
- Abandoned Wellhead
 - Suspended Gas Wellhead
 - Suspended Oil Wellhead
 - Flowing Gas Wellhead
 - Location Wellhead
 - Flowing Oil Wellhead
 - Miscellaneous Wellhead
 - Water Wellhead
 - Well Downhole Location
 - Newly Licenced Well
 - Newly Spudded Well
- High Pressure Pipelines**
- Gas Pipeline
 - Oil Pipeline
 - Water Pipeline
 - LVP/HVP Pipeline
 - Foreign Pipeline (Only when a company is specified.)
- Low Pressure Pipelines**
- Gas Co-op Pipeline

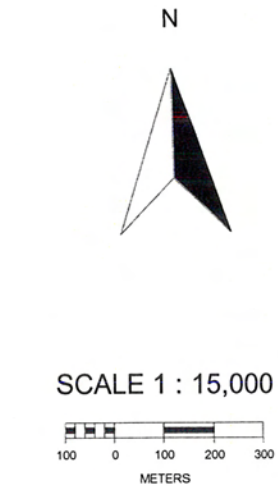
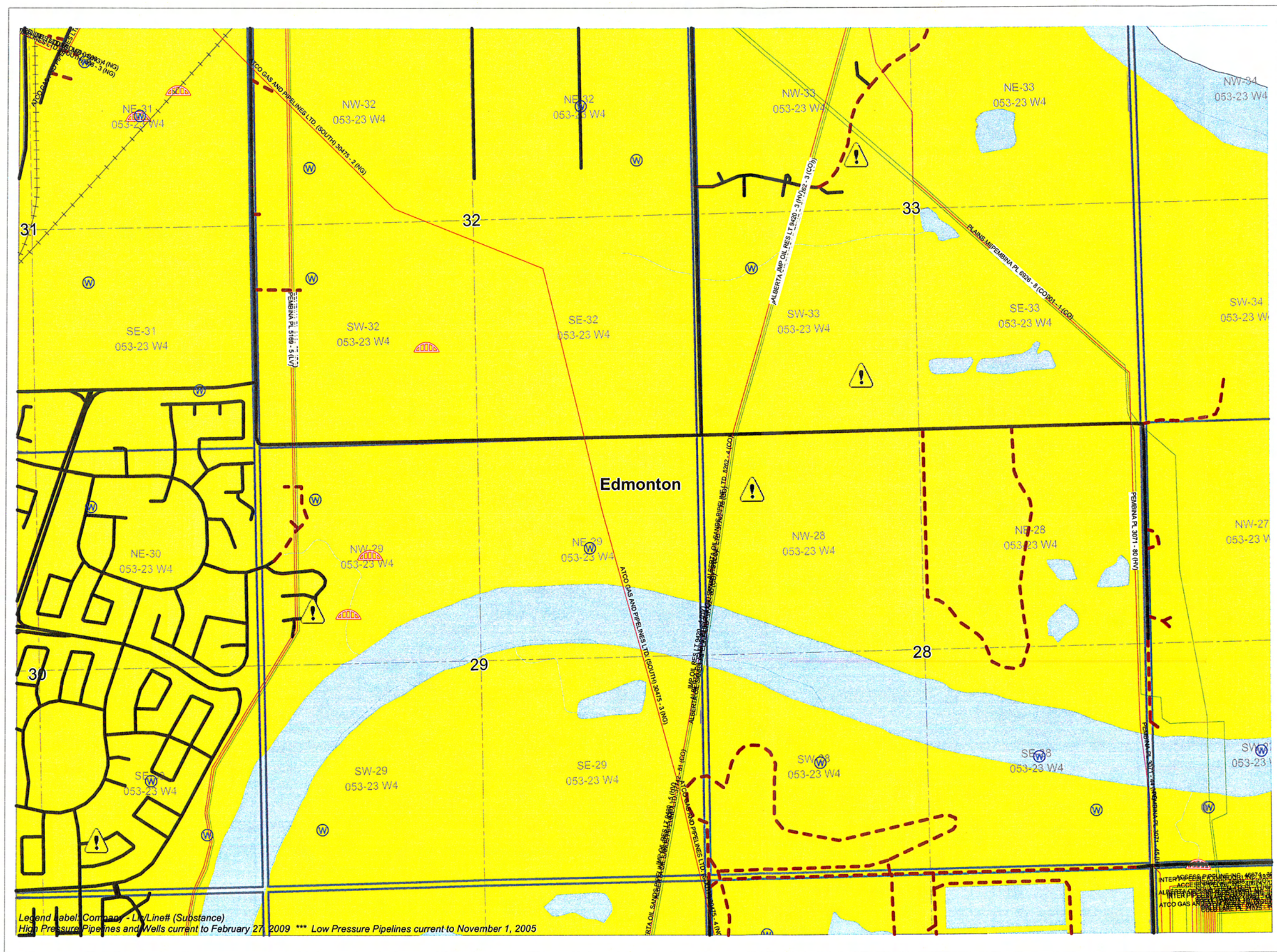
Legend Label: Company/Liner (Substance)
High Pressure Pipelines and Wells current to December 31, 2006
Low Pressure Pipelines current to November 1, 2006

19-598-295 ERCB Information Sheet 7



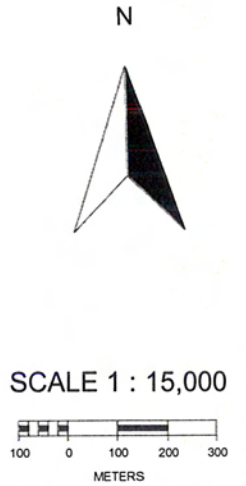
- Wellheads**
- Abandoned Wellhead
 - Suspended Gas Wellhead
 - Suspended Oil Wellhead
 - Flowing Gas Wellhead
 - Location Wellhead
 - Flowing Oil Wellhead
 - Miscellaneous Wellhead
 - Water Wellhead
 - Well Downhole Location
 - Newly Licenced Well
 - Newly Spudded Well
- High Pressure Pipelines**
- Gas Pipeline
 - Oil Pipeline
 - Water Pipeline
 - LVP/HVP Pipeline
 - Foreign Pipeline (Only when a company is specified.)
- Low Pressure Pipelines**
- Gas Co-op Pipeline

19-598-295 ERCB Information Sheet 8



- Wellheads**
- Abandoned Wellhead
 - Suspended Gas Wellhead
 - Suspended Oil Wellhead
 - Flowing Gas Wellhead
 - Location Wellhead
 - Flowing Oil Wellhead
 - Miscellaneous Wellhead
 - Water Wellhead
 - Well Downhole Location
 - Newly Licenced Well
 - Newly Spudded Well
- High Pressure Pipelines**
- Gas Pipeline
 - Oil Pipeline
 - Water Pipeline
 - LVP/HVP Pipeline
 - Foreign Pipeline (Only when a company is specified.)
- Low Pressure Pipelines**
- Gas Co-op Pipeline

19-598-295 ERCB Information Sheet 9



- Wellheads**
- Abandoned Wellhead
 - Suspended Gas Wellhead
 - Suspended Oil Wellhead
 - Flowing Gas Wellhead
 - Location Wellhead
 - Flowing Oil Wellhead
 - Miscellaneous Wellhead
 - Water Wellhead
 - Well Downhole Location
 - Newly Licenced Well
 - Newly Spudded Well
- High Pressure Pipelines**
- Gas Pipeline
 - Oil Pipeline
 - Water Pipeline
 - LVP/HVP Pipeline
 - Foreign Pipeline (Only when a company is specified.)
- Low Pressure Pipelines**
- Gas Co-op Pipeline