COUNTY OF VERMILION RIVER
PROVINCE OF ALBERTA
BY-LAW NO. 10-02

A BY-LAW of the County of Vermilion River in the Province of Alberta, to adopt the Industrial / Commercial Area Structure Plan for the SE 5-50-1-W4;

WHEREAS the Council of the County of Vermilion River deems it to be in the public interest to adopt the Industrial / Commercial Area Structure Plan for the SE 5-50-1-W4;

NOW THEREFORE, be it resolved that the Council of the County of Vermilion River, duly assembled, hereby enacts as follows:

1) that the Industrial / Commercial Area Structure Plan for the SE 5-50-1-W4, being Schedule "A" attached to and forming part of this By-Law, be adopted.

2) should any provision of this Bylaw be determined to be invalid, then such provisions shall be severed and the remaining Bylaw shall be maintained.

3) this Bylaw shall come into force and effect upon receiving third and final reading and having been signed by the Reeve and County Administrator.

READ A FIRST TIME THIS 12 DAY OF January, A.D. 2010

SIGNATURE SEVERED
REEVE

SIGNATURE SEVERED
COUNTY ADMINISTRATOR

AND ADVERTISED the 1 day of April, 2010 AND the 6 day of April, 2010 in the Mer.

PUBLIC HEARING held the 14 day of April, 2010.

READ A SECOND TIME THIS 26 DAY OF April, A.D. 2010

SIGNATURE SEVERED
Deputy REEVE

SIGNATURE SEVERED
COUNTY ADMINISTRATOR

READ A THIRD TIME AND FINALLY PASSED THIS 26 DAY OF April, A.D. 2010

SIGNATURE SEVERED
Deputy REEVE

SIGNATURE SEVERED
COUNTY ADMINISTRATOR

REINHART BUSINESS PARK

Area Structure Plan

for SE ¼ 5-50-1-W4
Industrial / Commercial Development

4/13/2011

Prepared for Council Meeting date: 4/14/2011

Reinhart
GROUP OF COMPANIES

Table of Contents

Development Concept and Servicing Plan

This proposal outlines the proposed subdivision and development of approximately 148 acres of SE ¼ SEC. 5 - TP. 50 - RG. 1 - W.4 M into a multi-parcel Business (B) district by Reinhart Holdings Inc. of Lloydminster, Alberta.

Each land parcel will be used for commercial / light industrial purposes.

At present, the proposed development area is zoned as a (B) Business district (refer to figure 2).

Please refer to the Conceptual Diagram (figure 1) for an aerial view of the proposed subdivision. The diagram details the following plan elements:

1. Phases of development
2. Block/lot numbering, location and size
3. Internal roads

Transportation Considerations

External Roads

All three (3) Phases will be accessible via RR 14. Primary routing of traffic from all Phases will be along RR 14 to Hwy 16.

Internal Roads

The proposed development area is partitioned into two pieces by the CN Rail line that traverses the land east to west at approximately its midpoint. The internal road design consists of **two primary Access Roads** that will run from RR14, east to west, at approximately the midpoint of each of these two pieces. Where these roads intersect with RR14, they will feature a wider access point in order to facilitate tractor trailer turning and to allow for better traffic passage in the case of an accident or emergency. There will also be concrete boulevards constructed in the access points in order to safely separate incoming and outgoing traffic.

Road construction will comply with zoning specifications: 30m wide corridor with an 11m top, completed with pavement road surface.

Utilities & Services

Power

Each lot will be serviced by ATCO Electric via either underground or overhead service. Arranging service to the individual lots will be the responsibility of the developer of the lot.

Natural Gas

Each lot will be serviced by ATCO Gas. Arranging service to the individual lots will be the responsibility of the developer of the lot.

Telephone

Each lot will be serviced by Telus via underground. Arranging service to the individual lots will be the responsibility of the developer of the lot.

Water

Each lot will be serviced via private water well(s), with the future possibility for serviced water from the County of Vermilion River or City of Lloydminster. The cost and location of each well (or serviced water) will be the responsibility of the lot developer. Other wells in the area draw from the same aquifer at an average pump depth of ±185 ft. *(refer to figure 5.1-5-7)*

Due to reports of hard water in the area, it will be recommended that each well uses a water purification or softening system if hard water poses a problem to the operations of the tenant/client.

Sewage

The sewage system for each property will be the responsibility of the property owner and will comply with provincial guidelines.

Garbage

Garbage will be the responsibility of the individual land owner and will be hauled to the County Transfer Site in Kitscoty or Lloydminster via QuikPick or some other disposal company.

Phase Staging Plan

This development will have 25 lots covering approximately 131.1 acres, suited to commercial or light industrial use. The lots will be developed and released for sale in three (3) Phases. *(refer to figure 1)*

Phase 1:

Phase 1 will consist of 10 parcels of land bordering RR14. These are Block 1: Lots 1-1 through 1-3; Block 2: Lots 2-1 through 2-3; Block 3: Lots 3-1 and 3-2; Block 4: Lots 4-1 and 4-2, totaling approximately 50.1 acres.

Phase 1 will also see the beginning of construction for the two Access Roads. Clay will be required for the road. It will be serviced primarily from the cutting of ditches.

Additional clay for road or building-up of lower lying land may be serviced from the Water Storage pit, borrow pit(s) or brought in from outside the development.

Phase 2:

Phase 2 will consist of 8 parcels located west of Phase 1. These are Block 1: Lots 1-4 and 1-5; Block 2: Lots 2-4 and 2-5; Block 3: Lots 3-3 and 3-4; Block 4: Lots 4-3 and 4-4, totaling approximately 51.0 acres.

Phase 2 will also see the extension of the two Access Roads.

Additional clay for road or building-up of lower lying land may be serviced from the Water Storage pit, borrow pit(s) or brought in from outside the development.

Phase 3:

Phase 3 will consist of 8 parcels located west of Phases 1 and 2, bordering the west border of SE-5-50-1W4. These are Block 1: Lots 1-6 and 1-7; Block 2: Lots 2-6 and 2-7; Block 3: Lots 3-5 and 3-6; Block 4: Lot 4-5, totaling approximately 30.0 acres.

Phase 3 will see the completion of the two Access Roads.

Additional clay for road or building-up of lower lying land may be serviced from the Water Storage pit, borrow pit(s) or brought in from outside the development.

There will be little (if any) interference with existing acreages to the west: A berm constructed of black dirt cleared from the parcels will be raised along the west edge of Phase 3.

Existing Features

The CN Rail line (Railway Plan 3999 R) traverses approximately east to west at approximately the midpoint of the proposed development area.

EUB History of Pipelines and Wells

A low pressure natural gas pipeline is present along the North side of the CN Rail tracks: ATCO has made an agreement with Reinhart Holdings to relocate the pipeline if required.

Farmland Assessment Rating

As indicated on the Soil Capability map provided by the County of Vermilion River* *(see below)*, the soil within the proposed development area has an Agricultural rating of Class 2 (*moderate limitations that restrict the range of crops or require moderate conservation practices*).

(refer to fugure 3)

**(Based on Government of Canada soil capability classification for Agriculture dataset compiled between 1968 and 1990*

Groundwater Potential Plan

Recent groundwater studies in the area for other developments and well reports conclude that aquifer is able to support additional water draw.

Attached are several recent well reports from the wells on and surrounding SE ¼ 5-50-1-W4, courtesy of the Alberta Environment Groundwater Information System and Telus Geomatics *(figure 5.1-5.7)*. The most common recommended pumping rate in the area is 12 gallons/minute with one report as high as 25 gallons/minute. The average well depth is about 240 ft and pump depth 185 ft.

Topography: Natural Features and Drainage

The proposed development area is relatively flat, varying in height by about 6m from highest to lowest point. Drainage generally occurs towards the NE corner of the development area. (*refer to figure 4)*

Stormwater Management Plan

In light of the Big Gully Stormwater Management Plan (BGSMP) a complete Stormwater Management Plan specific to this development will be commissioned.

Fire Protection

FIRE DISTRICT: BLACKFOOT

Firefighting services of the area in-and-around the development are under the jurisdiction of the volunteer Fire Department located in Blackfoot.

(refer to Appendix: Map 7)

Municipal Reserve

There will be no Municipal Reserve allocated in the subdivision: the required reserve will be bought-back by the developer.

Adjacent Land Usage

East

SW 4-50-1 W4

1) Commercial and Light industrial Park known as County Energy Park.

South

1) Borders Hwy 16

West

SW 5-50-1 W4

1) South part of the land borders an acreage / oilfield company & shop.
2) North part of the land borders Deerfoot Estates.

North

NE 5-50-1 W4

1) 1 acreage and business known as Blythe Vacuum Services Ltd.
2) Agricultural land

(refer also to Appendix: Map 5)

Signage

The development will feature two low maintenance signs; one at each RR 14 entrance stating the companies in the park. Highway 16 signage may also be erected directing traffic to the development.

REINHART DEVELOPMENTS

0 50 100 200 300 400 Meters

0 100 200 400 600 800 1,000 1,200 Feet

1:4,500

EASEMENTS

SE-5-50-1W4

Total land area:	±148.2 acres
Total M.R.:	±0.0 acres
Total Road Allow.:	±10.9 acres (Access Roads)
	±2.3 acres (Easments & North Expansion Allowance)
	±3.0 acres (Future RR14 Widening)

Listed dimension and area are estimates only. Actual values will be decided by surveying.

Reinhart GROUP OF COMPANIES

Box 12628 Lloydminster, AB T9V 0Y4
780-808-2233 office

FIGURE 2: Land Use Bylaw

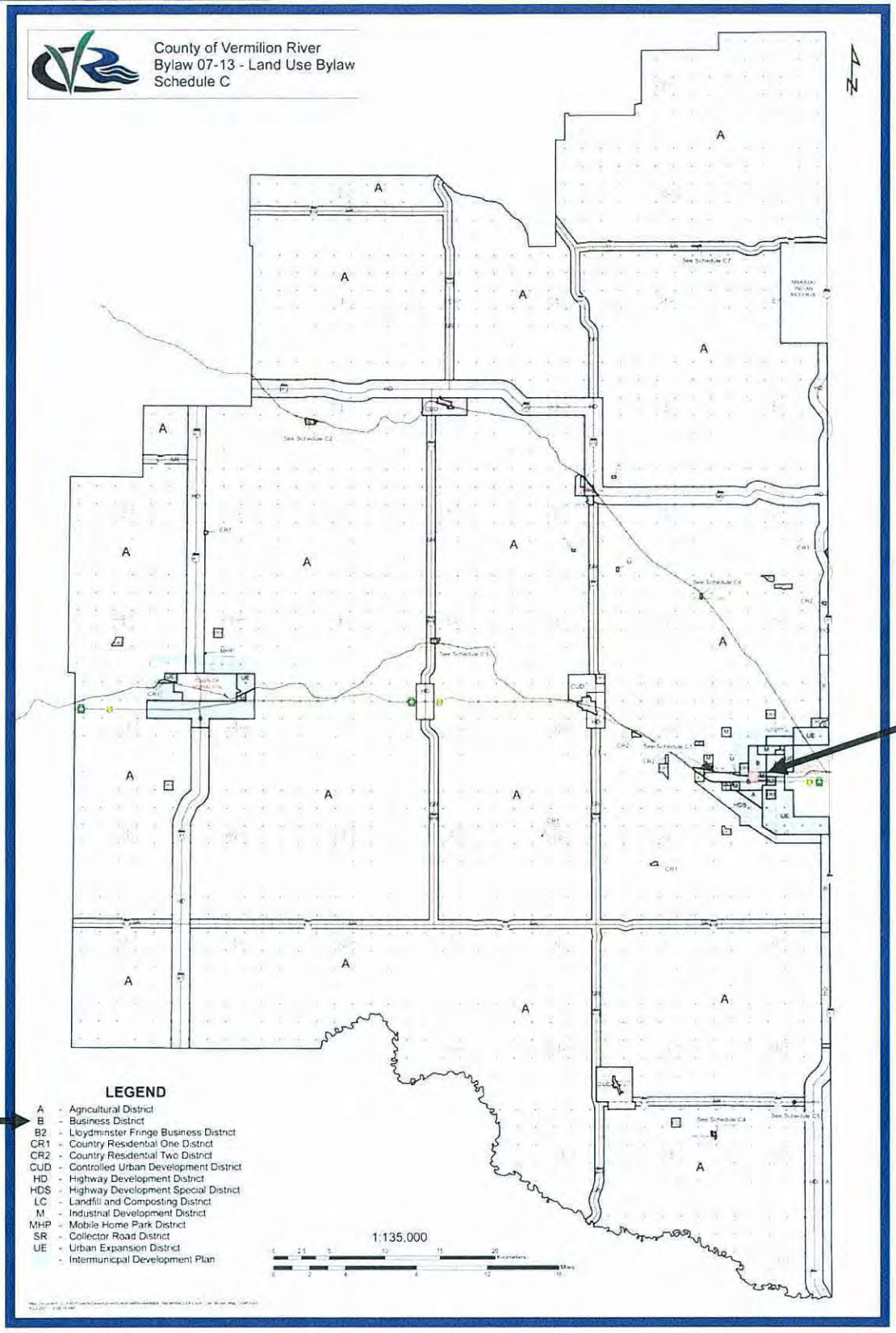


FIGURE 3: Soil Capability for Agriculture

Based on Government of Canada soil capability classification for Agriculture dataset compiled between 1968 and 1990.

Class 2: Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices.

This designation may change as new information becomes available and land use framework plans come into affect by the province.

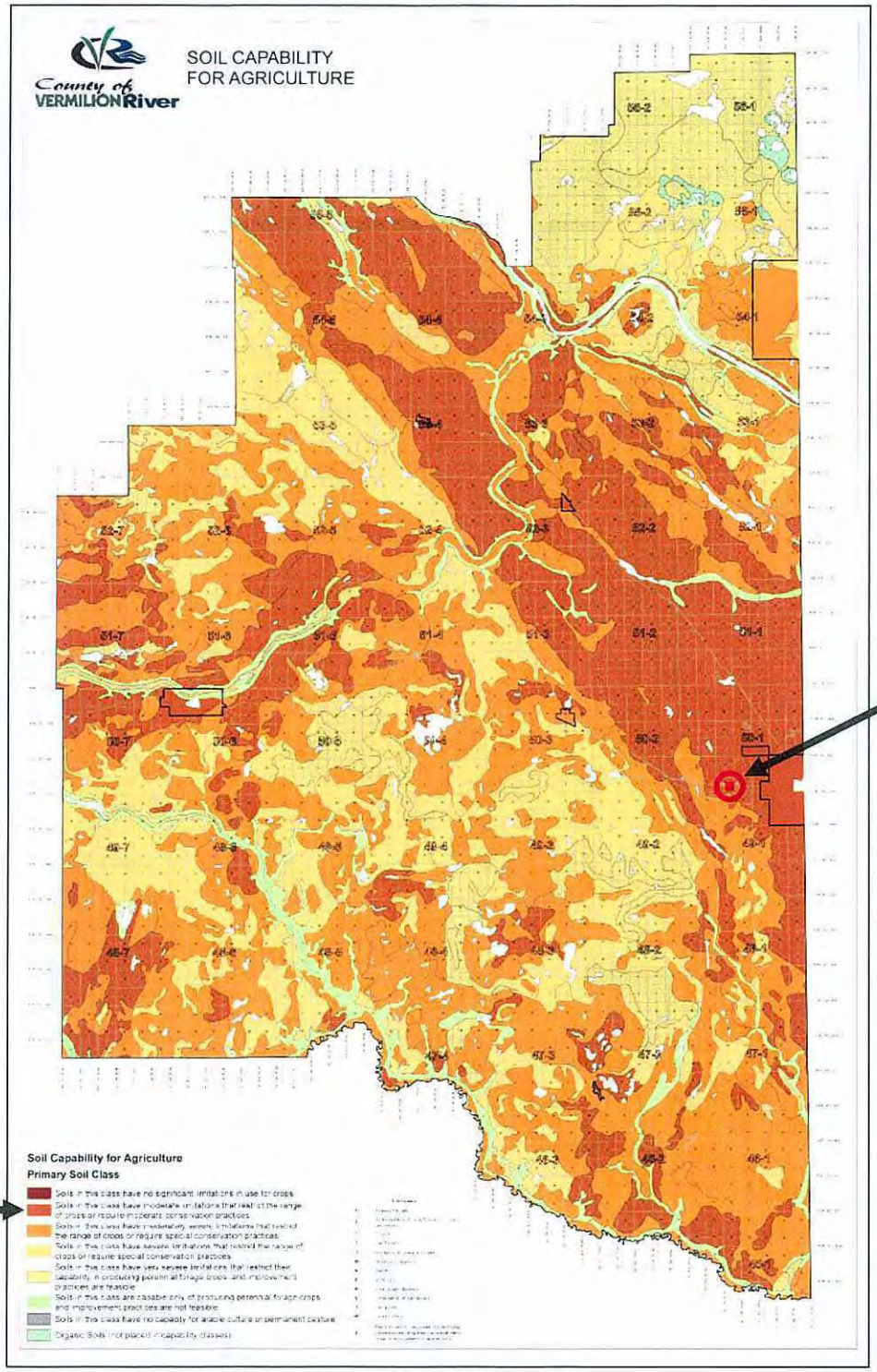
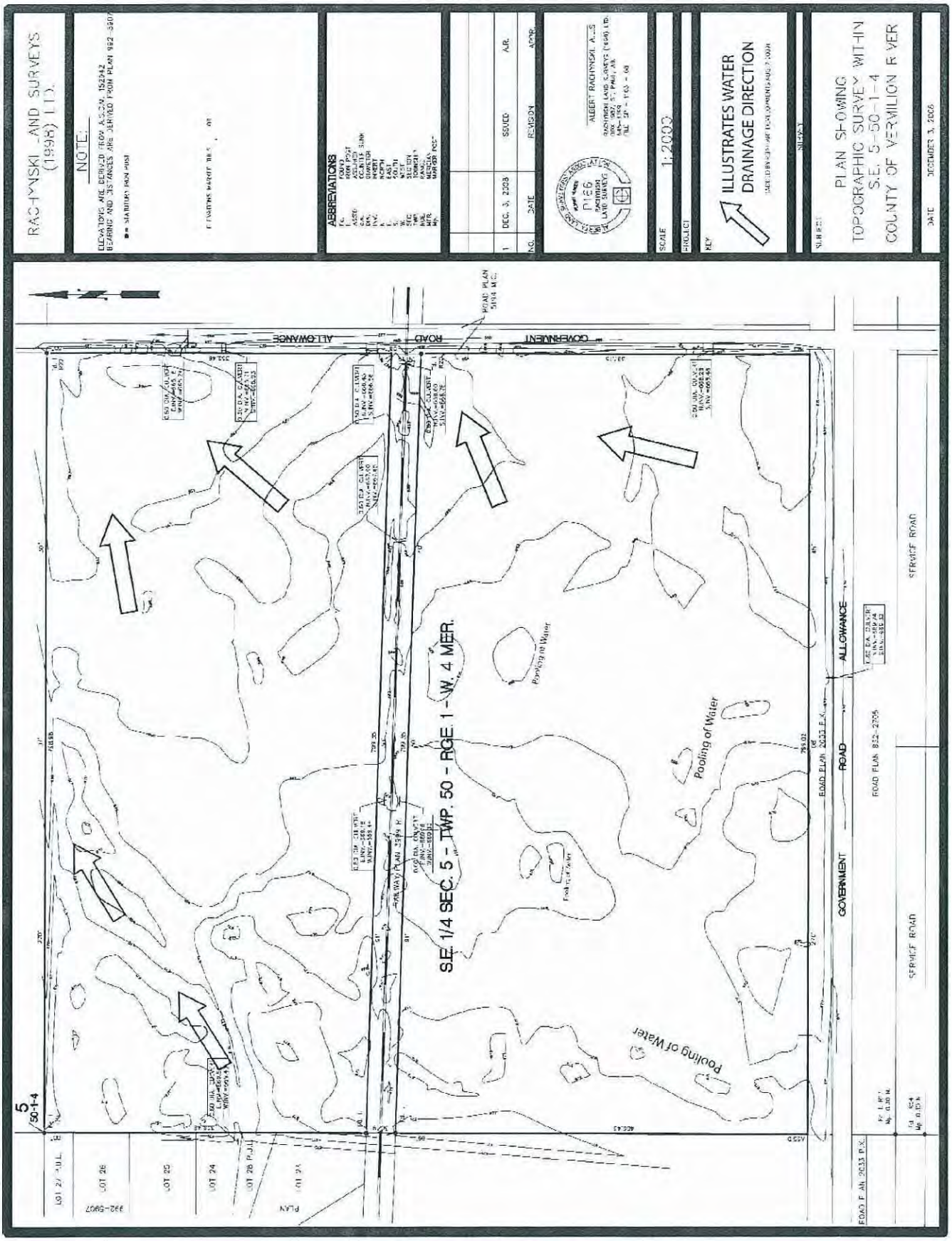


FIGURE 4: Water Drainage and Land Contour Map



Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

1. Contractor & Well Owner Information

Company Name: MCALLISTER DRILLING INC		Drilling Company Approval No: 18299D
Mailing Address: BOX 1189	City or Town: LLOYDMINSTER AB CA	Postal Code: S9V 1G1
Well Owner's Name: WENDEL WALLY	Well Location Identifier:	
P.O. Box Number: 1403	Mailing Address:	Postal Code: S9V 1K4
City: LLOYDMINSTER	Province: AB	Country: CA

2. Well Location

Lot:	Sec:	Twp:	Rge:	West of M:
SW	01	050	01	4

Location in Quarter: FT from N, FT from E, Boundary:

Lot: Block: Plan:

Well Elev: How Obtain:

FT: Not Obtain:

3. Drilling Information

Type of Work: New Well
Proposed well use: Domestic
Reclaimed Well
Date Reclaimed: Materials Used: Unknown
Anticipated Water Requirements/day: Gallons
Method of Drilling: Rotary
Fitting Well No: Rate: Gallons
Gas Present: No: Oil Present: No:

4. Formation Log

Depth from ground level (feet)	Lithology Description
0	Brown Silty Till
17	Brown Fine Grained Sand
25	Gray Silty Till
50	Rocks
87	Gray Till
92	Gray Dirty Sand
160	Gray Till
168	Gray Sandy Till
213	Gray Till
220	Medium Grained Sand & Stone
226	Gray Clean Sandstone
232	Gray Sandstone

5. Well Completion

Date Started (yyyy/mm/dd): 2005/09/27	Date Completed (yyyy/mm/dd): 2005/09/28
Well Depth: 232 FT	Borehole Diameter: 6.25 Inches
Casing Type: Plastic	Liner Type: Unknown
Size OD: 5 Inches	Size OD: Inches
Wall Thickness: 0.258 Inches	Wall Thickness: Inches
Bottom at: 210 FT	Top: FT Bottom: FT
Perforations:	Perforations Size:
from FT to FT	Inches x Inches
from FT to FT	Inches x Inches
from FT to FT	Inches x Inches

Perforated by: Unknown

Seal: Bentonite Chips/Tablets
from: 0 FT to: 195 FT
Seal: Unknown
from: FT to: FT
Seal: Unknown
from: FT to: FT

Screen Type: Stainless Steel — Screen ID: 3 Inches
from: 210 FT to: 220 FT — Slot Size: 0.015 Inches
Screen Type: Unknown — Screen ID: Inches
from: FT to: FT — Slot Size: Inches

Screen Installation Method: Attached To Casing

Fittings
Top: Coupler — Bottom: Plug

Pack: Artificial
Grain Size: 16/32 — Amount: 750 Pounds

Geophysical Log Taken: ELECTRIC
Retained on Files:
Additional Test and/or Pump Data:
Chemistries taken By Driller: No
Held: — Documents Held:
Press Assister Type:
Drop Pipe Type:
Length: FT — Diameter: Inches

Comments:
4 - 180 ALSO COARSE GRAINED, 220 ALSO COARSE GRAINED

6. Well Yield

Test Date (yyyy/mm/dd): 2005/09/28	Start Time: 8:00 AM
Test Method: Air	
Non-pumping static level:	141.437 FT
Rate of water removal:	8.999 Gallons/Min
Depth of pump intake:	200 FT
Water level at end of pumping:	171.00 FT

Distance from top of casing to 23.622 inches ground level

Depth To water level (feet)

Drawdown	Elapsed Time Minutes Sec	Recovery
141.437	0:00	171.000
	1:00	143.077
	2:00	142.224
	3:00	141.995
	4:00	141.798
	5:00	141.676
	6:00	141.634
	7:00	141.568
	8:00	141.568
	9:00	141.535
	10:00	141.535
171.000	120:00	

Total Drawdown: 29.563 FT

If water removal was less than 2 hr duration, reason why:

90% RECOVERY
Recommended pumping rate: 15 Gallons/Min
Recommended pump intake: 190.0 FT
Type Pump Installed:
Pump Type: Sub @ 185
Pump Model: 12 GPM
HP:
Any further pump test information / Nil:

7. Contractor Certification

Driller's Name: GEORGE MCALLISTER
Certification No: VA7828

This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.

Signature: Yr Mo Day

Water Well Report http://www.telusgeomatics.com/tgpub/ag_water/menu/drilling/report.asp?...

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

1. Contractor & Well Owner Information

Company Name: MCALLISTER DRILLING INC — Drilling Company Approval No: 18299D
Mailing Address: BOX 1189 — City or Town: LLOYDMINSTER AB CA — Postal Code: S9V 1G1
Well Owner's Name: RAYNE'S OFFICE — Well Location Identifier:
P.O. Box Number: — Mailing Address: 3, 6309 - 43 STREET — Postal Code: T9V 2W9
City: LLOYDMINSTER — Province: AB — Country: CA

2. Well Location

Lot: — Sec: — Twp: — Rge: — West of M:
NW — 01 — 050 — 01 — 4

Location in Quarter: FT from N, FT from E, Boundary:

Lot: — Block: — Plan:

Well Elev: — How Obtain:
FT: — Not Obtain:

3. Drilling Information

Type of Work: New Well — Proposed well use: Domestic
Reclaimed Well
Date Reclaimed: — Materials Used: Unknown — Anticipated Water Requirements/day: Gallons
Method of Drilling: Rotary
Fitting Well No: — Rate: Gallons
Gas Present: No — Oil Present: No

4. Formation Log

Depth from ground level (feet)	Lithology Description
0	Brown Till
120	Gray Till
125	Gray Sandy Till
150	Gray Till
170	Gray Sandy Till
180	Gray Till
240	Sandstone
250	Sandy Shale

5. Well Completion

Date Started (yyyy/mm/dd): 2005/04/20 — Date Completed (yyyy/mm/dd): 2005/04/21
Well Depth: 250 FT — Borehole Diameter: 6.25 Inches
Casing Type: Plastic — Liner Type: Unknown
Size OD: 3.5 Inches — Size OD: Inches
Wall Thickness: 0.216 Inches — Wall Thickness: Inches
Bottom at: 250 FT — Top: FT Bottom: FT
Perforations: — Perforations Size:
from FT to FT — Inches x Inches
from FT to FT — Inches x Inches
from FT to FT — Inches x Inches

Perforated by: Unknown

Seal: Bentonite Chips/Tablets
from: 200 FT to: 210 FT
Seal: Unknown
from: FT to: FT
Seal: Unknown
from: FT to: FT

Screen Type: Stainless Steel — Screen ID: 3 Inches
from: 230 FT to: 240 FT — Slot Size: 0.015 Inches
Screen Type: Unknown — Screen ID: Inches
from: FT to: FT — Slot Size: Inches

Screen Installation Method: Attached To Casing

Fittings
Top: Coupler — Bottom: Plug

Pack: Artificial
Grain Size: 16/30 — Amount: 15 Bags

Geophysical Log Taken: ELECTRIC
Retained on Files:
Additional Test and/or Pump Data:
Chemistries taken By Driller: No
Held: — Documents Held:
Press Assister Type:
Drop Pipe Type:
Length: FT — Diameter: Inches

Comments:

6. Well Yield

Test Date (yyyy/mm/dd): 2005/04/21 — Start Time: 7:00 AM
Test Method: Air
Non-pumping static level: — 153.437 FT
Rate of water removal: — 12 Gallons/Min
Depth of pump intake: — 220 FT
Water level at end of pumping: — 189.4 FT

Distance from top of casing to 23.622 inches ground level

Depth To water level (feet)

Drawdown	Elapsed Time Minutes Sec	Recovery
	0:00	189.400
	1:00	164.833
	2:00	161.167
	3:00	144.423
	4:00	142.289
	5:00	137.762
	6:00	135.466
	7:00	134.8
	8:00	134.449
	9:00	134.205
	10:00	134.055
	12:00	133.924
	14:00	133.826
	16:00	133.694
	20:00	133.596
	25:00	133.57
	30:00	133.497
	35:00	133.497

Total Drawdown: 15.906 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 12 Gallons/Min
Recommended pump intake: 200 FT
Type Pump Installed:
Pump Type: Sub @ 200
Pump Model:
HP:
Any further pump test information / Nil:

7. Contractor Certification

Driller's Name: RYAN KRETSCHMER
Certification No: XXXXXX

This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.

Signature: Yr Mo Day

Report 1 Pump Test 1 page1

Water Well Drilling Report

Alberta Environment

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well ID	1501487
Map Verified	Map
Date Report Received	2009/06/22
Measurements	Imperial

1. Contractor & Well Owner Information

Company Name: MCALLISTER DRILLING INC
Drilling Company Approval No: 182890
Mailing Address: BOX 1189
City or Town: LLOYDMINSTER AB CA
Postal Code: S9V 1G1
WellOwner's Name: DITZ, DARREN
Well Location Identifier: DEERFOOT ESTATES
P.O. Box Number:
Mailing Address: 4704 58 AVE
Postal Code: T9V 1A3
City: LLOYDMINSTER
Province: AB
Country: CA

2. Well Location

1/4 or LSD	Sec	Twp	Rge	West of M
05	05	050	01	4

Location in Quarter: FT from N Boundary; FT from E Boundary
Lot: 11 Block: 1 Plan:
Well Elev: FT How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed:
Materials Used: Unknown
Method of Drilling: Rotary
Flowing Well: No
Rate: Gallons
Gas Present: No
Oil Present: No
Proposed well use: Domestic
Anticipated Water Requirements/day: Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Topsoil
16	Brown Silty Till
126	Gray Till
158	Gray Shale
159	Siltstone
174	Brown Sandy Shale
195	Brownish Gray Sandstone
220	Gray Coarse Grained Sandstone
230	Gray Dirty Sandstone

5. Well Completion

Date Started (yyyy/mm/dd): 2008/07/26
Date Completed (yyyy/mm/dd): 2008/07/30
Well Depth: 230 FT
Borehole Diameter: 6.25 Inches
Casing Type: Plastic
Liner Type: Unknown
Size OD: 5 Inches
Size OD: Inches
Wall Thickness: 0.258 Inches
Wall Thickness: Inches
Bottom at: 214 FT
Top: FT Bottom: FT
Perforations
Perforations Size
from: FT to: FT — Inches x Inches
from: FT to: FT — Inches x Inches
from: FT to: FT — Inches x Inches
Perforated by: Unknown
Seal: Bentonite Chips/Tablets
from: 0 FT to: 200 FT
Seal: Unknown
from: FT to: FT
Seal: Unknown
from: FT to: FT
Screen Type: Stainless Steel
Screen ID: 4 Inches
from: 214 FT to: 224 FT
Slot Size: 0.015 Inches
Screen Type: Unknown
Screen ID: Inches
from: FT to: FT
Slot Size: Inches
Screen Installation Method: Attached To Casing
Fittings
Top: Coupler
Bottom: Plug
Pack: Artificial
Grain Size: 15/30
Amount: 750 Pounds
Geophysical Log Taken: ELECTRIC
Retained on Files: ELECTRIC yes
Additional Test and/or Pump Data
Chemistries taken By Driller: No
Held
Documents Held
Pitless Adapter Type
Drop Pipe Type
Length: FT
Diameter: Inches
Comments

6. Well Yield

Test Date (yyyy/mm/dd): 2008/07/30
Start Time: 2:00 PM
Test Method: Air
Non pumping static level: 138.237 FT
Rate of water removal: 8 Gallons/Min
Depth of pump intake: 209.974 FT
Water level at end of pumping: 187.8 FT
Distance from top of casing to ground level: 23.622 Inches

Depth To water level (feet)

Drawdown	Elapsed Time Minutes:Sec	Recovery
138.237	0:00	187.861
	1:00	165.617
	2:00	153.904
	3:00	147.474
	4:00	143.734
	5:00	141.601
	6:00	140.42
	7:00	139.731
	8:00	139.304
	9:00	139.009
	10:00	138.845

Total Drawdown: 49.513 FT
If water removal was less than 2 hr duration, reason why

90% RECOVERY @ 10 MINUTES
Recommended pumping rate: 12 Gallons/Min
Recommended pump intake: 180 FT
Type Pump Installed
Pump Type: AERMOTOR @ 185'
Pump Model: 12 GPM
H.P.:
Any further pumptest information? No

7. Contractor Certification

Driller's Name: WALTER OSMACHENKO
Certification No: A000198
This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature Yr Mo Day

Report 1 Pump Test 1 page1

Water Well Drilling Report

Alberta Environment

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well ID	1501390
Map Verified	Not Verified
Date Report Received	2008/07/29
Measurements	Imperial

1. Contractor & Well Owner Information

Company Name: MCALLISTER DRILLING INC
Drilling Company Approval No: 182890
Mailing Address: BOX 1189
City or Town: LLOYDMINSTER AB CA
Postal Code: S9V 1G1
WellOwner's Name: BRANCONNIER, SHERRI
Well Location Identifier: DEERFOOT ESTATES
P.O. Box Number:
Mailing Address: 5307 48TH AVE
Postal Code: S9V 0V2
City: LLOYDMINSTER
Province: SK
Country: CA

2. Well Location

1/4 or LSD	Sec	Twp	Rge	West of M
SW	05	050	01	4

Location in Quarter: FT from N Boundary; FT from E Boundary
Lot: 16 Block: Plan:
Well Elev: FT How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed:
Materials Used: Unknown
Method of Drilling: Rotary
Flowing Well: No
Rate: Gallons
Gas Present: No
Oil Present: No
Proposed well use: Domestic
Anticipated Water Requirements/day: Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
30	Brown Till & Rocks
110	Gray Till & Rocks
118	Clay
130	Gray Till
154	Clay
168	Sand & Gravel
178	Shale
214	Sandstone
240	Sandy Shale

5. Well Completion

Date Started (yyyy/mm/dd): 2007/09/12
Date Completed (yyyy/mm/dd): 2007/09/12
Well Depth: 240 FT
Borehole Diameter: 6.25 Inches
Casing Type: Plastic
Liner Type: Unknown
Size OD: 5 Inches
Size OD: Inches
Wall Thickness: 0.258 Inches
Wall Thickness: Inches
Bottom at: 200 FT
Top: FT Bottom: FT
Perforations
Perforations Size
from: FT to: FT — Inches x Inches
from: FT to: FT — Inches x Inches
from: FT to: FT — Inches x Inches
Perforated by: Unknown
Seal: Bentonite Chips/Tablets
from: 0 FT to: 180 FT
Seal: Unknown
from: FT to: FT
Seal: Unknown
from: FT to: FT
Screen Type: Stainless Steel
Screen ID: 4 Inches
from: 200 FT to: 210 FT
Slot Size: 0.015 Inches
Screen Type: Unknown
Screen ID: Inches
from: FT to: FT
Slot Size: Inches
Screen Installation Method: Attached To Casing
Fittings
Top: Coupler
Bottom: Plug
Pack: Artificial
Grain Size: 15/30
Amount: 25 Bags
Geophysical Log Taken: ELECTRIC
Retained on Files
Additional Test and/or Pump Data
Chemistries taken By Driller: No
Held
Documents Held
Pitless Adapter Type
Drop Pipe Type
Length: FT
Diameter: Inches
Comments

6. Well Yield

Test Date (yyyy/mm/dd): 2007/09/13
Start Time: 10:00 AM
Test Method: Air
Non pumping static level: 135.627 FT
Rate of water removal: 10 Gallons/Min
Depth of pump intake: 190 FT
Water level at end of pumping: 173.2 FT
Distance from top of casing to ground level: 24 Inches

Depth To water level (feet)

Drawdown	Elapsed Time Minutes:Sec	Recovery
135.627	0:00	173.294
	1:00	148.917
	2:00	140.945
	3:00	138.123
	4:00	137.106
	5:00	136.516
	6:00	136.319
	7:00	136.22
	8:00	136.155
	9:00	136.155
	10:00	136.122

Total Drawdown: 37.566 FT
If water removal was less than 2 hr duration, reason why

90% RECOVERY @ 10 MIN. MEASUREMENTS FROM GROUND LEVEL
Recommended pumping rate: 12 Gallons/Min
Recommended pump intake: 190 FT
Type Pump Installed
Pump Type: AERMOTOR @ 190
Pump Model: 12 GPM
H.P.:
Any further pumptest information? No

7. Contractor Certification

Driller's Name: KENT MCALLISTER
Certification No: 353134C
This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature Yr Mo Day

Report 1 Pump Test 1 page1

Water Well Report http://www.telusgeomatics.com/tgpub/ag_water/menu/drillingreport.asp?...

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well ID	1501172
Map Verified	Not Verified
Date Report Received	2008/01/21
Measurements	[illegible]

1. Contractor & Well Owner Information

Company Name: MCALLISTER DRL. ING INC. — Drilling Company Approval No: 182890
Mailing Address: BOX 1189 — City or Town: LLOYDMINSTER AB CA — Postal Code: S9V 1G1
WellOwner's Name: MILL CREEK GROUP — Well Location Identifier
P.O. Box Number — Mailing Address: #42, 17 BOUDREAU ROAD — Postal Code: T8N 7K5
City: ST ALBERT — Province: AB — Country: CA

2. Well Location

1/4 or LSD	Sec	Twp	Rge	West of M
NW	[illegible]	[illegible]	[illegible]	4

Location in Quarter: FT from N Boundary; FT from E Boundary
Lot: 3 — Block: 1 — Plan
Well Elev: FT — How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed — Materials Used: Unknown
Method of Drilling: Rotary
Flowing Well: No — Rate: Gallons
Gas Present: No — Oil Present: No
Proposed well use: Unknown
Anticipated Water Requirements/day: Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
14	Brown Till
150	Gray Till
154	Coarse Grained Gravel
150	Gray Till
173	Gray Shale
174	Siltstone
215	Sandstone
216	Siltstone
225	Sandstone
245	Hard Sandstone
250	Gray Sandy Shale
257	Gray Shale

5. Well Completion

Date Started (yyyy/mm/dd): 2007/10/15 — Date Completed (yyyy/mm/dd): 2007/10/22
Well Depth: 257 FT — Borehole Diameter: 6.25 Inches
Casing Type: Plastic — Liner Type: Unknown
Size OD: 5 Inches — Size OD: Inches
Wall Thickness: 0.258 Inches — Wall Thickness: Inches
Bottom at: 224 FT — Top: FT Bottom: FT
Perforations — Perforations Size
from: FT to: FT — Inches x Inches
from: FT to: FT — Inches x Inches
from: FT to: FT — Inches x Inches
Perforated by: Unknown
Seal: Bentonite Chips/Tablets from: 0 FT to: 200 FT
Seal: Unknown from: FT to: FT
Seal: Unknown from: FT to: FT
Screen Type: Stainless Steel — Screen ID: 4 Inches
from: 224 FT to: 244 FT — Slot Size: 0.02 Inches
Screen Type: Unknown — Screen ID: Inches
from: FT to: FT — Slot Size: Inches
Screen Installation Method: Attached To Casing
Fittings
Top: Coupler — Bottom: Plug
Pack: Artificial
Grain Size: 15/30 — Amount: 1000 Pounds
Geophysical Log Taken: ELECTRIC
Retained on Files:
Additional Test and/or Pump Data
Chemistries taken By Driller: No
Held — Documents Held
Pitless Adapter Type
Drop Pipe Type
Length: FT — Diameter: Inches
Comments
150' - 154' ALSO MED. 225' - 245' ALSO FINE.

6. Well Yield

Test Date (yyyy/mm/dd): 2007/10/19 — Start Time: 8:00 AM
Test Method: Air
Non pumping static level: 136.319 FT
Rate of water removal: 12 Gallons/Min
Depth of pump intake: 220.046 FT
Water level at end of pumping: 149.2 FT
Distance from top of casing to ground level: 23.622 Inches

Depth To water level (feet)

Drawdown	Elapsed Time Minutes:Sec	Recovery
136.319	0:00	149.272
	1:00	158.432
	2:00	146.474
	3:00	141.765
	4:00	139.501
	4.60	114.586
	6:00	137.828
	7:00	137.434
	8:00	137.230
	9:00	137.106
	10:00	136.975

Total Drawdown: 12.953 FT
If water removal was less than 2 hr duration, reason why
MEASUREMENTS FROM GROUND LEVEL 92% RECOVERY @ 10 MIN
Recommended pumping rate: 21 Gallons/Min
Recommended pump intake: 200 FT
Type Pump Installed
Pump Type
Pump Model
H.P.
Any further pumptest information? No

7. Contractor Certification

Driller's Name: SHAWN ERB
Certification No: XXXXXX
This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature — Yr Mo Day

Report 1 Pump Test 1 page1

1 of 1 — 7/30/2009 10:09 PM

Water Well Report http://www.telusgeomatics.com/tgpub/ag_water/menu/drillingreport.asp?...

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well ID	1501100
Map Verified	Not Verified
Date Report Received	2008/02/15
Measurements	[illegible]

1. Contractor & Well Owner Information

Company Name: MCALLISTER DRL. ING INC. — Drilling Company Approval No: 182890
Mailing Address: BOX 1189 — City or Town: LLOYDMINSTER AB CA — Postal Code: S9V 1G1
WellOwner's Name: WE CLEAN — Well Location Identifier
P.O. Box Number — Mailing Address: 2306 52 A AVE CLOSE — Postal Code: T9V 2R3
City: LLOYDMINSTER — Province: AB — Country: CA

2. Well Location

1/4 or LSD	Sec	Twp	Rge	West of M
SW	[illegible]	[illegible]	[illegible]	4

Location in Quarter: FT from N Boundary; FT from E Boundary
Lot: 7 — Block — Plan
Well Elev: FT — How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed — Materials Used: Unknown
Method of Drilling: Rotary
Flowing Well: No — Rate: Gallons
Gas Present: No — Oil Present: No
Proposed well use: Other
Anticipated Water Requirements/day: Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
8	Brown Silty Till
17	Brown Sandy Till
57	Gray Till
100	Gray Silt Till
142	Gray Till
206	Gray Sandstone
209	Siltstone
221	Gray Coarse Grained Sandstone
222	Siltstone
233	Fine Grained Sandstone

5. Well Completion

Date Started (yyyy/mm/dd): 2006/10/27 — Date Completed (yyyy/mm/dd): 2006/10/28
Well Depth: 238 FT — Borehole Diameter: 6.25 Inches
Casing Type: Plastic — Liner Type: Unknown
Size OD: 5 Inches — Size OD: Inches
Wall Thickness: 0.258 Inches — Wall Thickness: Inches
Bottom at: 212 FT — Top: FT Bottom: FT
Perforations — Perforations Size
from: FT to: FT — Inches x Inches
from: FT to: FT — Inches x Inches
from: FT to: FT — Inches x Inches
Perforated by: Unknown
Seal: Bentonite Chips/Tablets from: 0 FT to: 200 FT
Seal: Unknown from: FT to: FT
Seal: Unknown from: FT to: FT
Screen Type: Stainless Steel — Screen ID: 4 Inches
from: 212 FT to: 222 FT — Slot Size: 0.015 Inches
Screen Type: Unknown — Screen ID: Inches
from: FT to: FT — Slot Size: Inches
Screen Installation Method: Attached To Casing
Fittings
Top: Coupler — Bottom: Plug
Pack: Artificial
Grain Size: 15/30 — Amount: 1000 Pounds
Geophysical Log Taken: ELECTRIC
Retained on Files: ELECTRIC yes
Additional Test and/or Pump Data
Chemistries taken By Driller: No
Held — Documents Held
Pitless Adapter Type
Drop Pipe Type
Length: FT — Diameter: Inches
Comments
WELL USE IS SHOP. LITH 238 FEET ALSO DIRTY

6. Well Yield

Test Date (yyyy/mm/dd): 2006/10/28 — Start Time: 3:00 AM
Test Method: Air
Non pumping static level: 122.014 FT
Rate of water removal: 10 Gallons/Min
Depth of pump intake: 210.031 FT
Water level at end of pumping: 185.9 FT
Distance from top of casing to ground level: 24 Inches

Depth To water level (feet)

Drawdown	Elapsed Time Minutes:Sec	Recovery
122.014	0:00	185.991
	1:00	156.923
	2:00	139.764
	3:00	129.167
	4:00	123.589
	4.60	122.867
	6:00	122.703
	7:00	122.638
	8:00	122.572
	9:00	122.507
	10:00	122.441
	12:00	122.375
	14:00	122.375

Total Drawdown: FT
If water removal was less than 2 hr duration, reason why
96% RECOVERY
Recommended pumping rate: 12 Gallons/Min
Recommended pump intake: 179.987 FT
Type Pump Installed
Pump Type
Pump Model
H.P.
Any further pumptest information? No

7. Contractor Certification

Driller's Name: SHAWN ERB
Certification No: XXXXXX
This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature — Yr Mo Day

Report 1 Pump Test 1 page1

1 of 1 — 7/30/2009 10:14 PM

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

1. Contractor & Well Owner Information

Company Name: MCALLISTER DRILLING INC.		Drilling Company Approval No: 182890
Mailing Address: BOX 1189	City or Town: LLOYDMINSTER AB CA	Postal Code: S9V 1G1
WellOwner's Name: HOUGHAM, JOHN	Well Location Identifier:	
P.O. Box Number:	Mailing Address: BOX 11947	Postal Code: T9V 3C3
City: LLOYDMINSTER	Province: AB	Country: CA

2. Well Location

Twp	Sec	Twp	Rge	W4/5/6/M
LSD: NE	32	043	01	4

Location in Quarter:
FT from N Boundary
FT from E Boundary

Lot: Block: Plan:
Well Exc: How Obtain:
FT: Not Obtain:

3. Drilling Information

Type of Work: New Well
Reclaimed Well:
Date Reclaimed:
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Materials Used: Unknown
Rate: Gallons
Oil Present: No
Proposed well use: Domestic
Anticipated Water Requirements/day: Gallons

4. Formation Log

Depth from ground level: Feet	Lithology Description
0	Topsoil
03	Brown Silty Till
56	Grey Silty Till
146	Gray Till
160	Sand & Sandstone
168	Hard Siltstone
168	Sandstone
171	Hard Siltstone
212	See Comments Sandstone
215	Hard Siltstone

5. Well Completion

Date Started(yyyy/mm/dd): 2003/03/27	Date Completed(yyyy/mm/dd): 2003/03/27
Well Depth: 215 FT	Borehole Diameter: 6.25 Inches
Casing Type: Plastic	Liner Type: Unknown
Size OD: 4.5 Inches	Size OD: Inches
Wall Thickness: 0.237 Inches	Wall Thickness: Inches
Bottom at: 200 FT	Top: FT Bottom: FT
Perforations:	Perforations Size:
from: FT to: FT	Inches x Inches
from: FT to: FT	Inches x Inches
from: FT to: FT	Inches x Inches
Perforated by: Unknown	
Seal: Bentonite & Cement from: 0 FT	to: 185 FT
Seal: Unknown from: FT	to: FT
Seal: Unknown from: FT	to: FT
Screen Type: Stainless Steel from: 200 FT	to: 210 FT; Screen ID: 4 Inches; Slot Size: 0.015 Inches
Screen Type: Unknown from: FT	to: FT; Screen ID: Inches; Slot Size: Inches
Screen Installation Method: Attached To Casing	
Fittings: Top: Cougar	Bottom: Plug
Pack: Artificial Grain Size: 16/30	Amount: 1000 Pounds
Geophysical Log Taken: ELECTRIC	
Retained on Files: ELECTRIC yes	
Additional Test and/or Pump Data	
Chemistries taken By Driller: No	
Held:	Documents Held:
Pitless Adapter Type: Drop Pipe Type: Length: FT	Diameter: Inches
Comments: 171'-212' SANDSTONE COARSE (HARD)	

6. Well Yield

Well ID:	1506091
Mac Verified:	Not Verified
Date Report Received:	2006/11/02
Measurements:	Imperial
Test Date(yyyy/mm/dd): 2003/03/27	Start Time: 1:00 AM
Test Method: Air	
Non pumping static level:	FT
Rate of water removal:	0 Gallons/Min
Depth of pump intake:	FT
Water level at end of pumping:	182.7 FT

Distance from top of casing to 24 inches ground level:

Depth To water level: feet; Elapsed Time: Drawdown	Minutes Sec	Recovery
	0.00	182.743
	1.00	113.819
	2.00	151.28
	3.00	147.408
	4.00	145.702
	5.00	144.549
	6.00	144.104
	7.00	144.39
	8.00	144.231
	9.00	144.226
	10.00	144.145
	12.00	144.16
	14.00	144.123
	16.00	144.094
	20.00	144.062
	25.00	144.029
	30.00	144.029

Total Drawdown: 11

If water removal was less than 2 hr duration, reason why:

TESTED @ 190' PUMP - 12 GPM

Recommended pumping rate: 12 Gallons/Min

Recommended pump intake: 180 FT

Type Pump Installed:
Pump Type: @ 180' AERMOTOR
Pump Model:
H.P.: 75
Any further pumptest information?: No

7. Contractor Certification

Driller's Name:	LESLIE MCALLISTER
Certification No:	3545502

This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.

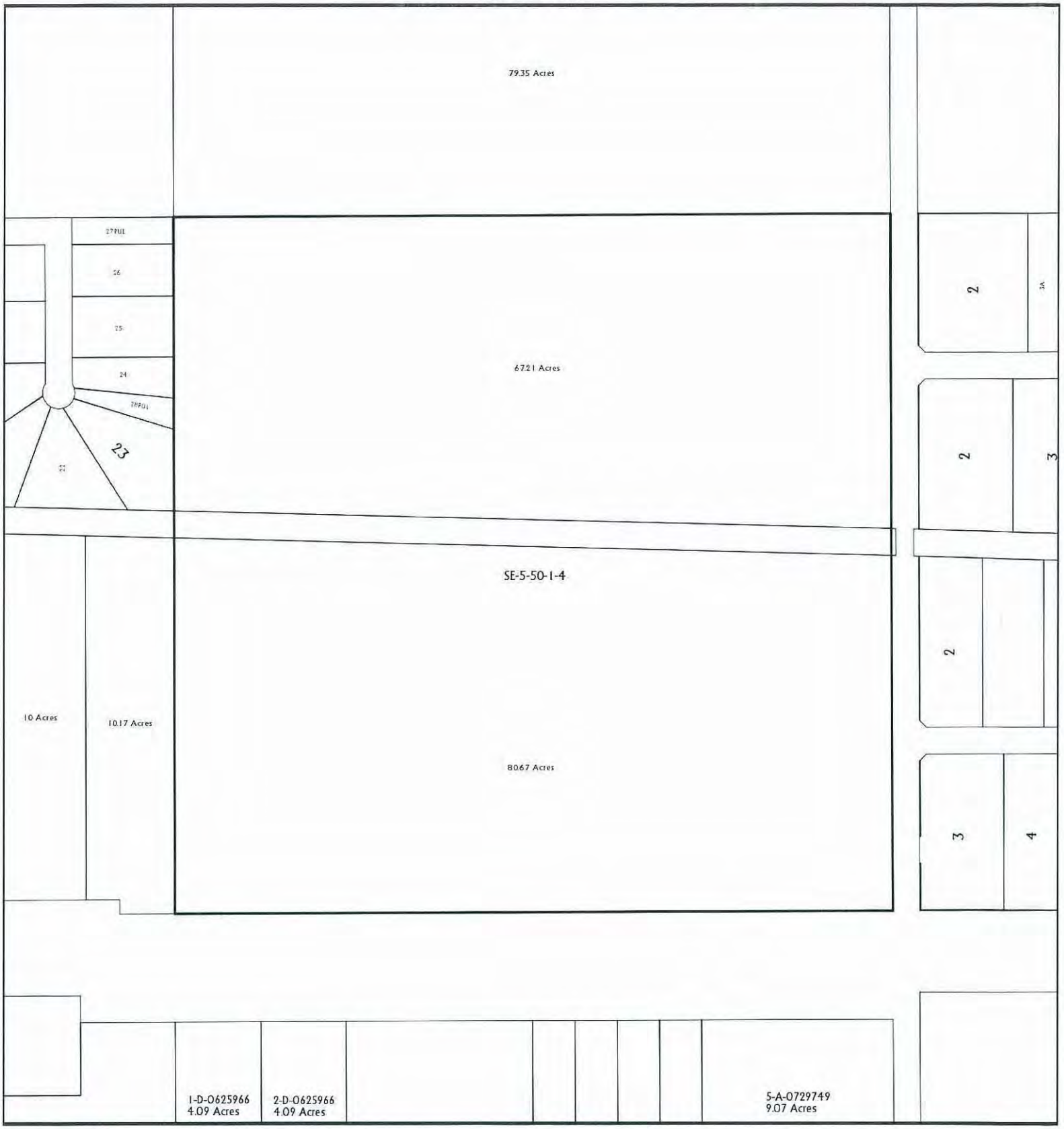
Signature: Yr Mo Day

Appendix

Maps of Proposed Development Area Provided by County of Vermilion River

Map 1 - Proposed Layout

SE-5-50-1-W4



County of VERMILION River

Map 2 - Transportation

SE-5-50-1-W4

County of VERMILION River

0 430 860 1290 1720 m

N

Map 3 - Wells & Pipelines

SE-5-50-1-W4

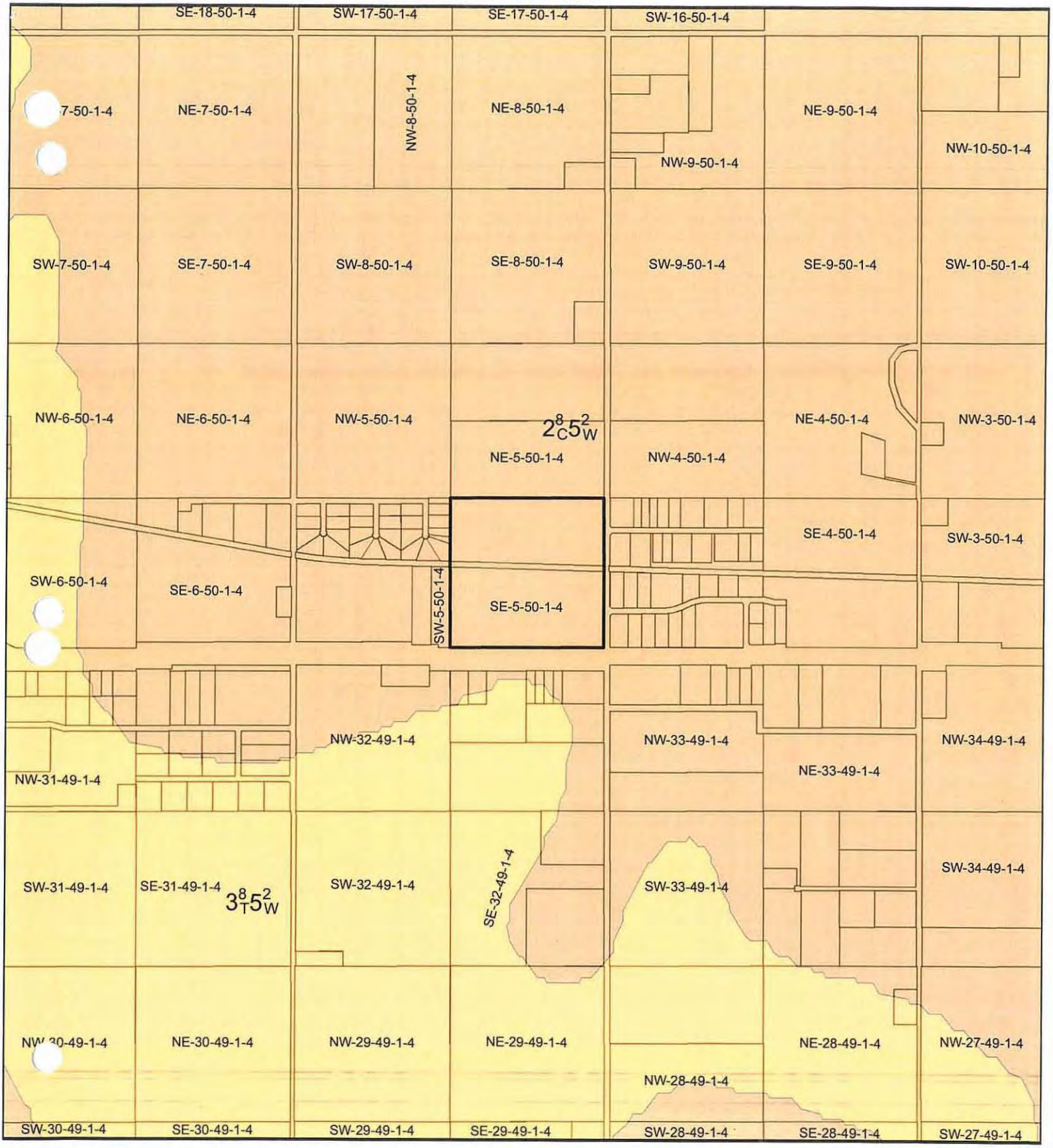
County of VERMILION River

0 430 860 1290 1720 m

N

Map 4 - Soil Capability For Agriculture

SE-5-50-1-W4

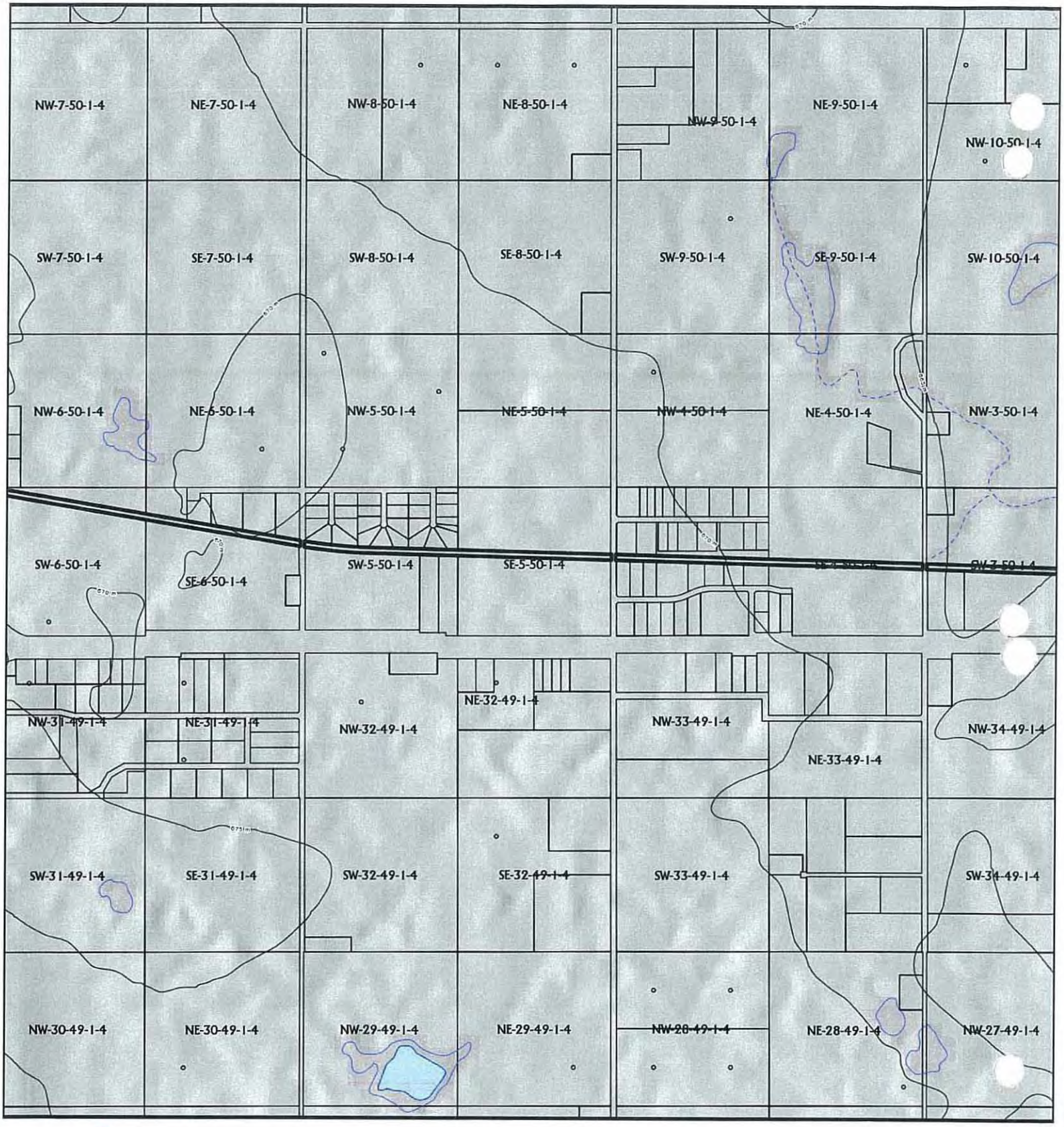


0 500 1,000 2,000 3,000 Meters

N

Map 5 - Drainage

SE-5-50-1-W4



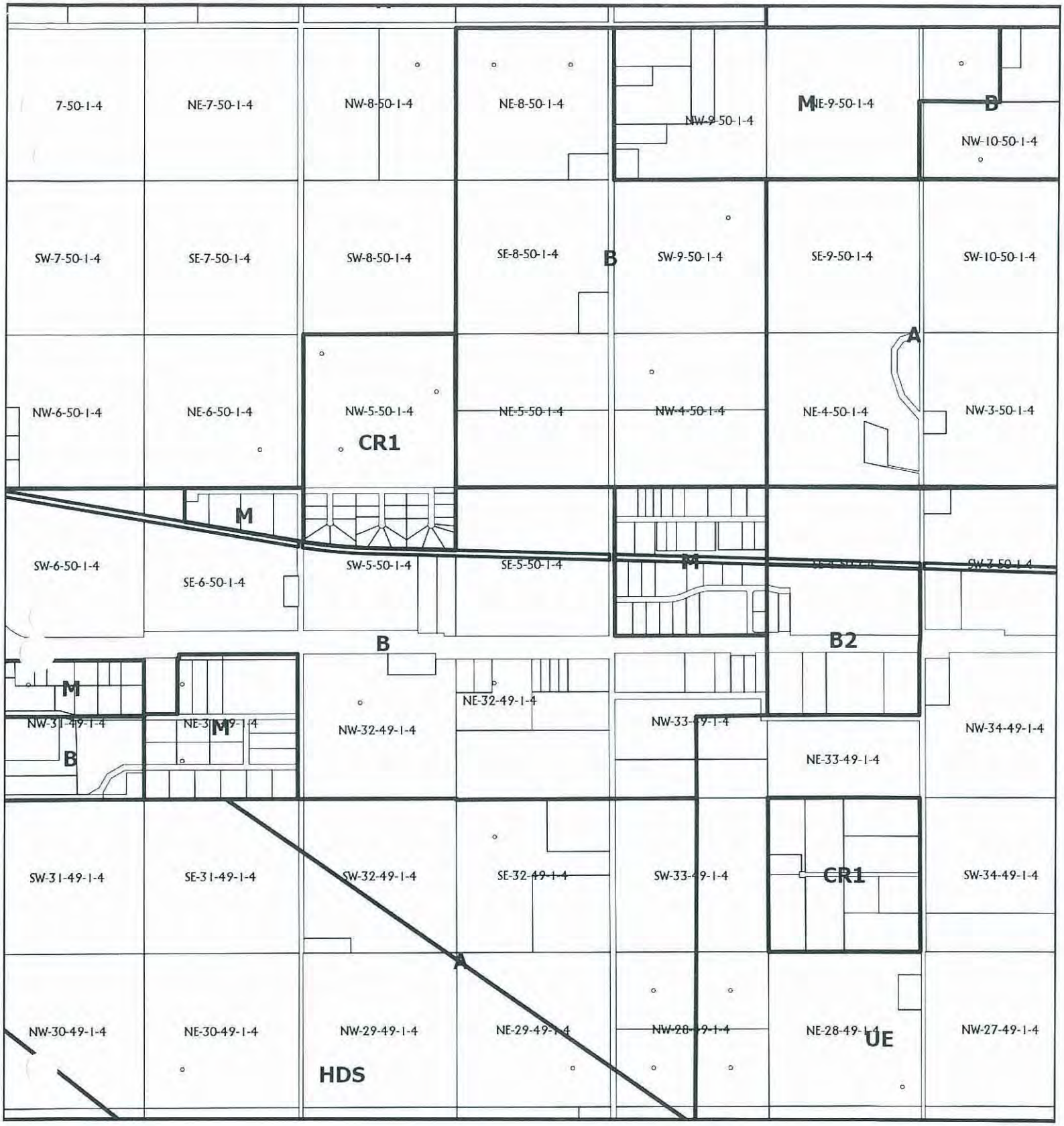
County of VERMILION River

0 1000 2000 3000 4000 m

N

Map 6 - Adjacent Land Use

SE-5-50-1-W4



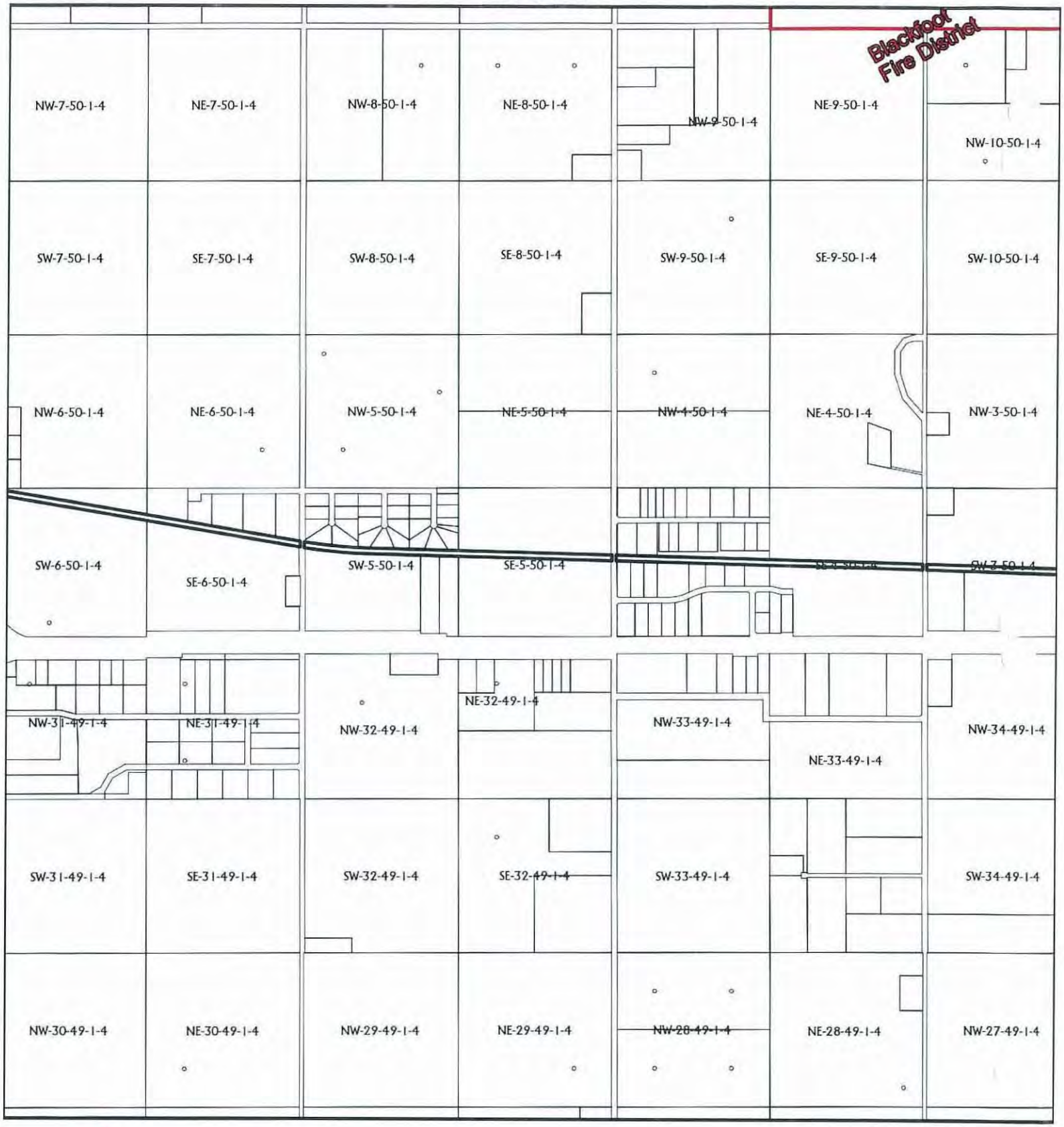
County of Vermilion River

0 1000 2000 3000 4000 m

N

Map 7 - Fire Protection

SE-5-50-1-W4



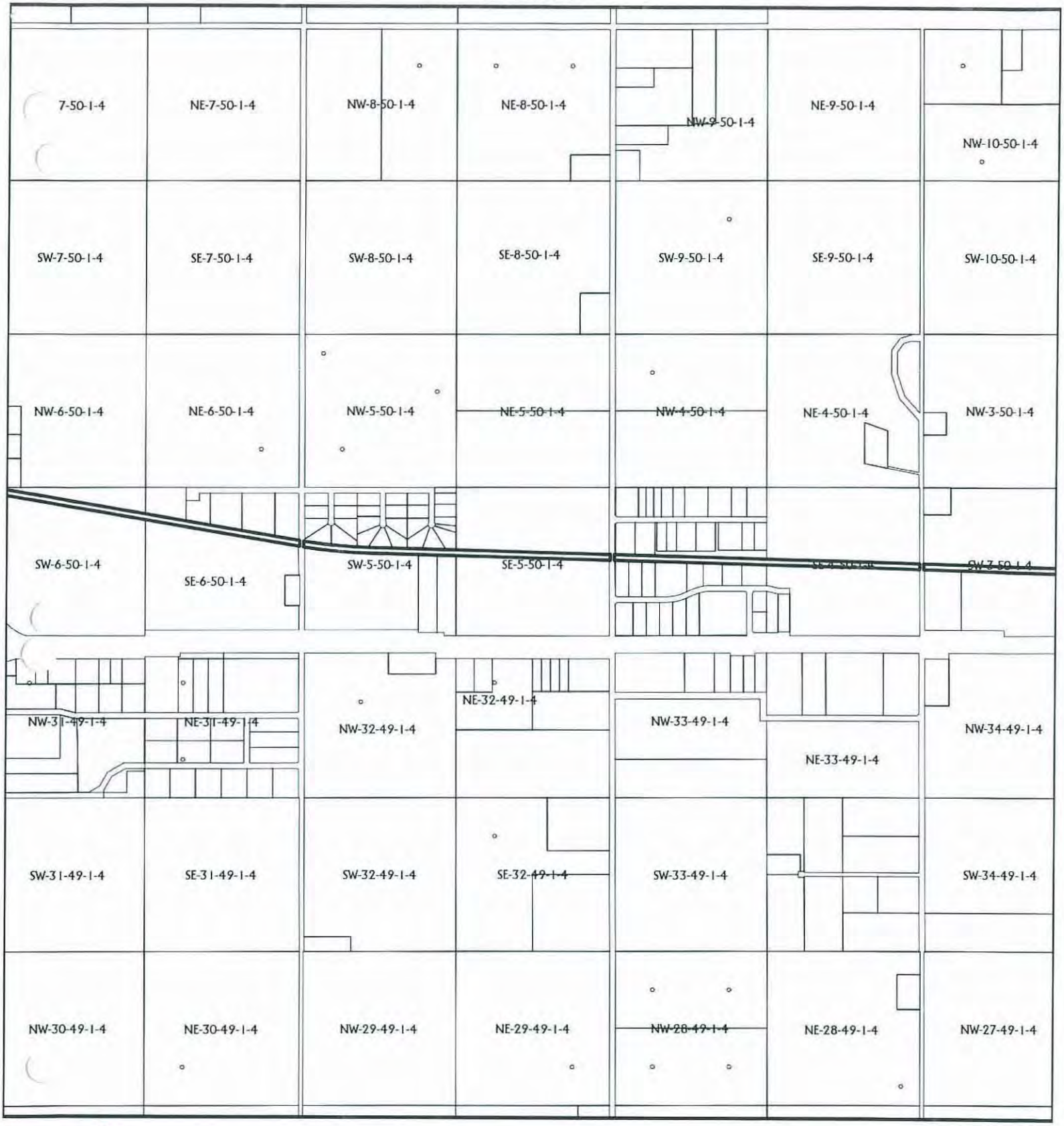
County of VERMILION River

0 1000 2000 3000 4000 m

N

Map 8 - School District

SE-5-50-1-W4



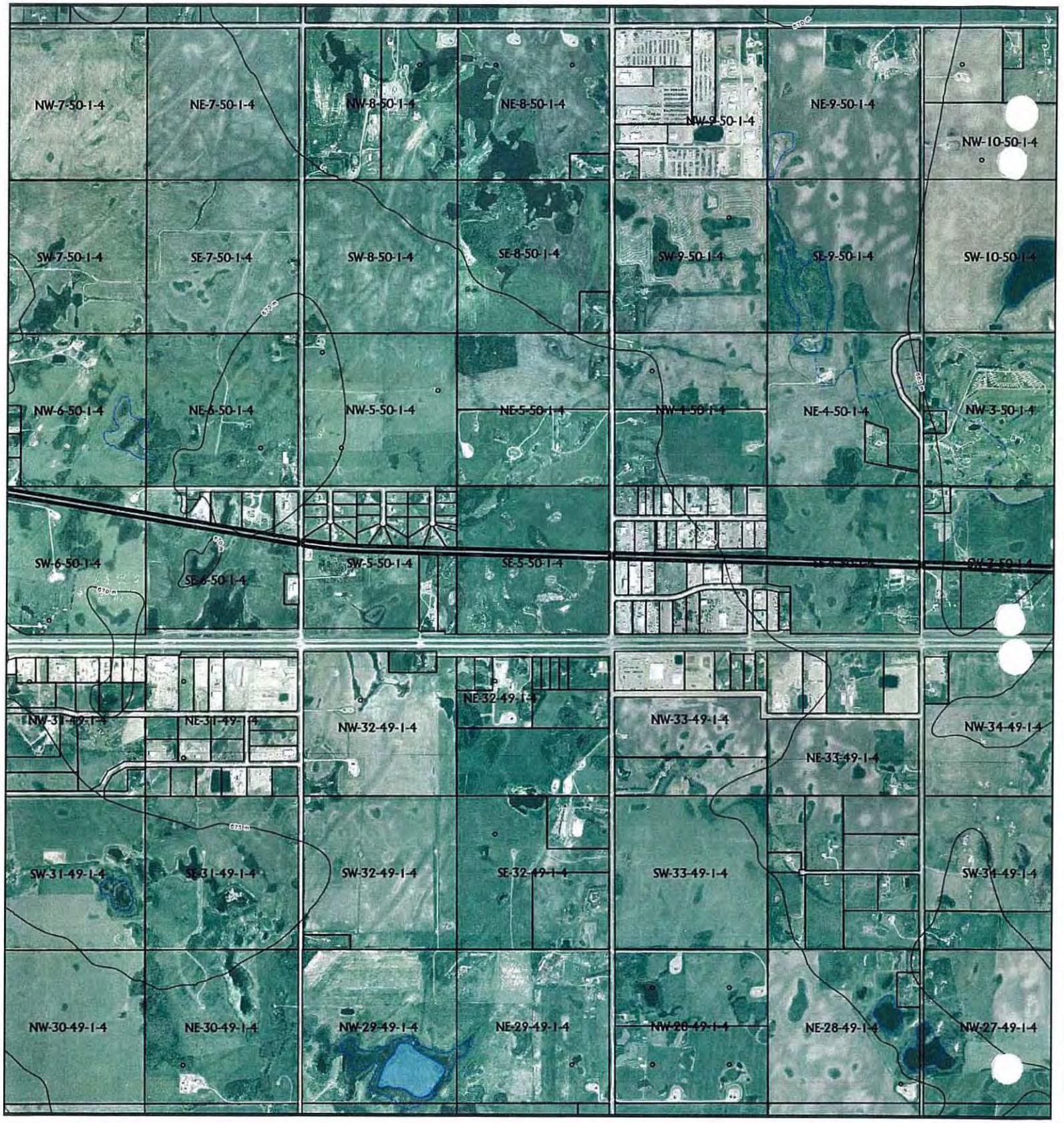
County of VERMILION River

0 1000 2000 3000 4000 m

N

Map 9 - Storm Water Management

SE-5-50-1-W4



County of VERMILION River

0 1000 2000 3000 4000 m

N

Map 10 - Aerial Photograph

SE-5-50-1-W4

County of VERMILION River

0 230 460 690 920 m

N

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

An aquifer assessment was undertaken within the SE ¼ of Section 5, Township 50, Range 1, West of the 4th Meridian, to determine whether sufficient groundwater supplies exist to supply twenty five parcels for a multi-business subdivision.

Aquifers in the area are usually located within sandstone beds of the Ribstone Creek of the Belly River Formation. Analysis of the data provided and calculations of well performance conclude that:

- Sufficient water supplies should be available from the wells, when installed, to provide 200 m^3/year per lot in accordance with Alberta Environment's Groundwater Evaluation Guidelines for the proposed 25 lot subdivision. This is assuming that the aquifers underlying the proposed subdivision have similar general conditions found in the area.
- The water quantity obtained to the wells in the proposed subdivision will not interfere with nearby household, registered or licensed users assuming the well is used for commercial/light industrial use.
- The static water levels in the area appear to be stable. No indications of aquifer dewatering are apparent.
- The groundwater supply source is not likely to be susceptible to contamination from nearby surface water

Water samples analyzed from nearby wells for routine dissolved constituents shows that the groundwater in the area is sodium-bicarbonate type water that is generally acceptable as a potable water source. The total dissolved solids and sodium content in the water exceed the recommended guidelines. As no chemical analysis has been undertaken on the water from any well within the proposed subdivision it is recommended that groundwater samples be collected from any well prior to use and tested for routine parameters as well as bacteria to ensure the water is safe for human consumption.

EXECUTIVE SUMMARY

GENIVAR Inc. (GENIVAR) was retained by Reinhart Group of Companies to complete a traffic impact assessment for a proposed industrial development at SE 5-50-1-W4 in the County of Vermilion River, approximately 5 kilometers west of the City of Lloydminster, Alberta.

The proposed subdivision encompasses approximately 148 acres in total area and is designated as a multi-parcel business district. Each land parcel will be used for commercial / light industrial purposes. The proposed development is bounded by Range Road 14 to the east and by Highway 16 to the south, and will be serviced by direct access on to Range Road 14. The Highway 16 / Range Road 14 intersection was analyzed in this study for the traffic volumes at full build out of each of the three proposed phases of development and at the 20 year horizon (2031).

The following conclusions and recommendations were reached:

- Traffic signals are warranted at the study intersection based on the existing traffic conditions. GENIVAR recommends that traffic signals be installed at the study intersection. However, a roundabout feasibility study should be conducted prior to the installation of traffic signals in accordance with Alberta Transportation requirements.
- When the study intersection is analyzed under stop control on Range Road 14, the southbound traffic will operate at level of service (LOS) E during the PM peak periods in 2013 under background traffic conditions (not including the traffic from the proposed development). If considering the traffic generated by the proposed development at Phase 1, the southbound traffic will operate at LOS E during the AM peak periods and at LOS F during the PM peak periods. The stop control on Range Road 14 will not provide an acceptable LOS for the southbound traffic when Phase 1 of the proposed development is at full build out (2013).
- If the study intersection is under signal control, all traffic movements will operate at LOS C or better with the traffic generated by the proposed development at Phase 1 (2013) included.
- The County of Vermilion River plans to upgrade Range Road 14 to a 4 lane divided highway in the future, which is reflected in the two types of intersection lane configurations that are proposed for the study intersection. Option 1 considers the two-lane situation before Range Road 14 requires four-laning, and Option 2 considers the situation following the four-laning of Range Road 14.
- Option 1 intersection lane configurations will be capable of accommodating the combined traffic at full build out of the entire proposed development (2017). However, Option 1 lane configurations will not provide an acceptable LOS for the combined traffic at the 20 year horizon during the PM peak periods.
- Option 2 lane configurations will be capable of accommodating the combined traffic at the 20 year horizon, and all traffic movements at the study intersection will operate at LOS D or better during both AM and PM peak periods.
- Operational analysis for a WB-23 vehicle manoeuvring the study intersection should be conducted at the intersection's detailed design stage.

Ducks Unlimited Canada
Conserving Canada's Wetlands

Active by nature.

March 11, 2011

Bar Engineering
6004-50th Avenue
Lloydminster, AB
T9V 2T9

Attention: Rick Collins

Re: Wetland Loss Compensation – Reinhart Subdivision

Ducks Unlimited Canada (DUC) supports the protection of wetlands as the foundation to fulfilling the goals of the North American Waterfowl Management Plan (NAWMP), specifically the Alberta component. In cases where avoidance or minimization of the wetland impacts cannot be achieved, DUC through its proactive wetland restoration efforts supports the mitigation process by providing restoration of drained wetlands as a compensation option resulting in no net loss of wetlands.

DUC is currently engaged in implementing restoration activities for wetland loss compensation options based upon program area implementation. The wetlands to be restored will fall into the Viking initiative and will replace the wetland loss from the proposed development with similar wetland classes within the same major watershed basin. This landscape has been identified as an important wetland restoration area, which will support the recovery of waterfowl, wildlife and biodiversity within the north central region of Alberta.

Following restoration of these drained wetlands, each individual project will be managed consistent with the Alberta NAWMP objectives. These projects and the wetlands associated with them vary in size and class. The restoration of wetlands in this initiative will provide adequate compensation for the wetland loss created by the proposed development.

The proposed development according to the wetland impact assessment supplied by EnviroMak Inc. states that there would be a direct loss of 4.89 hectares of wetland habitat. With the replacement ratio of 3:1, 14.67 hectares of restored wetland habitat will be required. The cost of restoring these wetlands in the Viking initiative being [redacted] this equates to [redacted] as total compensation.

DUC requires written acceptance from Bar Engineering in the space provided below. Please return a signed copy of the proposal to the address outlined below. Once approved by Alberta Environment (AENV), please remit payment to DUC by a certified cheque or Bank draft to the address as indicated on the invoice.

Upon receipt, DUC will provide a confirmation notice for Bar Engineering and AENV's files. This proposal and the fees charged will be available for acceptance for 90 days from the date of issue. Payment must be received within 30 days after approval has been issued from AENV. If these terms are not met, DUC will not be obligated to complete the agreement.

3520 - 1 Avenue SE, Calgary, Alberta, T2Z 3V6, Phone: (403) 201-5577, Fax: (403) 201-5580
Toll Free: 1-800-665-DUCK (3825), E-mail: webfoot@ducks.ca, Website: ducks.ca

Please feel free to call Craig Bishop at (403) 668-0974 if you have any questions or concerns regarding this proposal.

Yours Truly,

SIGNATURE SEVERED

Perry McCormick

Head of Provincial Operations - Alberta

Ducks Unlimited Canada

Cc: Makowecki, Ray – EnviroMak Inc.

Enclosures

I, **Rick Collins**, on behalf of Bar Engineering, do acknowledge and agree to accept the Wetland Loss Compensation proposal and its terms as prepared by Ducks Unlimited Canada.

Signature of **Rick Collins** for Bar Engineering.

Ducks Unlimited Canada – Wetland Loss Compensation Proposal

Impacted Wetland Site Information

Clients Name:	Bar Engineering
Development Name:	Reinhart Subdivision
Impact Location:	SE 05-50-01-W4m
Impact Area:	4.89 ha.
Classification System:	Stewart & Kantrud
Impacted Classes:	Class III's
Impacted Watershed:	North Saskatchewan River

Restoration Compensation

NAWMP Initiative:	Viking
Restoration Watershed:	North Saskatchewan River
Replacement Ratio:	3:1
Replacement Area:	14.67 ha.
Compensation Rate:	[redacted]
Total Compensation:	[redacted]
Prepared for:	Bar Engineering
Prepared by:	Craig Bishop Ducks Unlimited Canada
Date:	March 11, 2011

1.0 INTRODUCTION

1.1 Project Objectives and Scope

AMEC Earth and Environmental (AMEC) conducted a surface water runoff analysis to support the development and design of a Surface Water Management System for Reinhart Developments SE-5-50-1-W4 located in the County of Vermilion River (County).

Figure 1 (all figures in Appendix A) shows the location of the study site, and the proposed development area.

This report presents the methodology and results of the analysis defined by the following work scope components:

- Obtain and analyze local precipitation data (rainfall and snowfall) for the purpose of developing suitable design runoff events.
- Delineate drainage catchments, determine areas, and provide estimates on hydrologic response parameters for each sub-catchment (for both current and future land use).
- Provide estimates on time series runoff rates (hydrographs) for the adopted design events (rainfall and snowmelt).
- Provide estimates on the total runoff volume generated by the design rainfall and snowmelt events.
- Develop and route runoff hydrographs through the drainage network to ponds for current and future land use (pre- and post-development conditions).
- Provide a brief report presenting the data and results of the analysis

1.2 Stormwater Release Rate Criteria

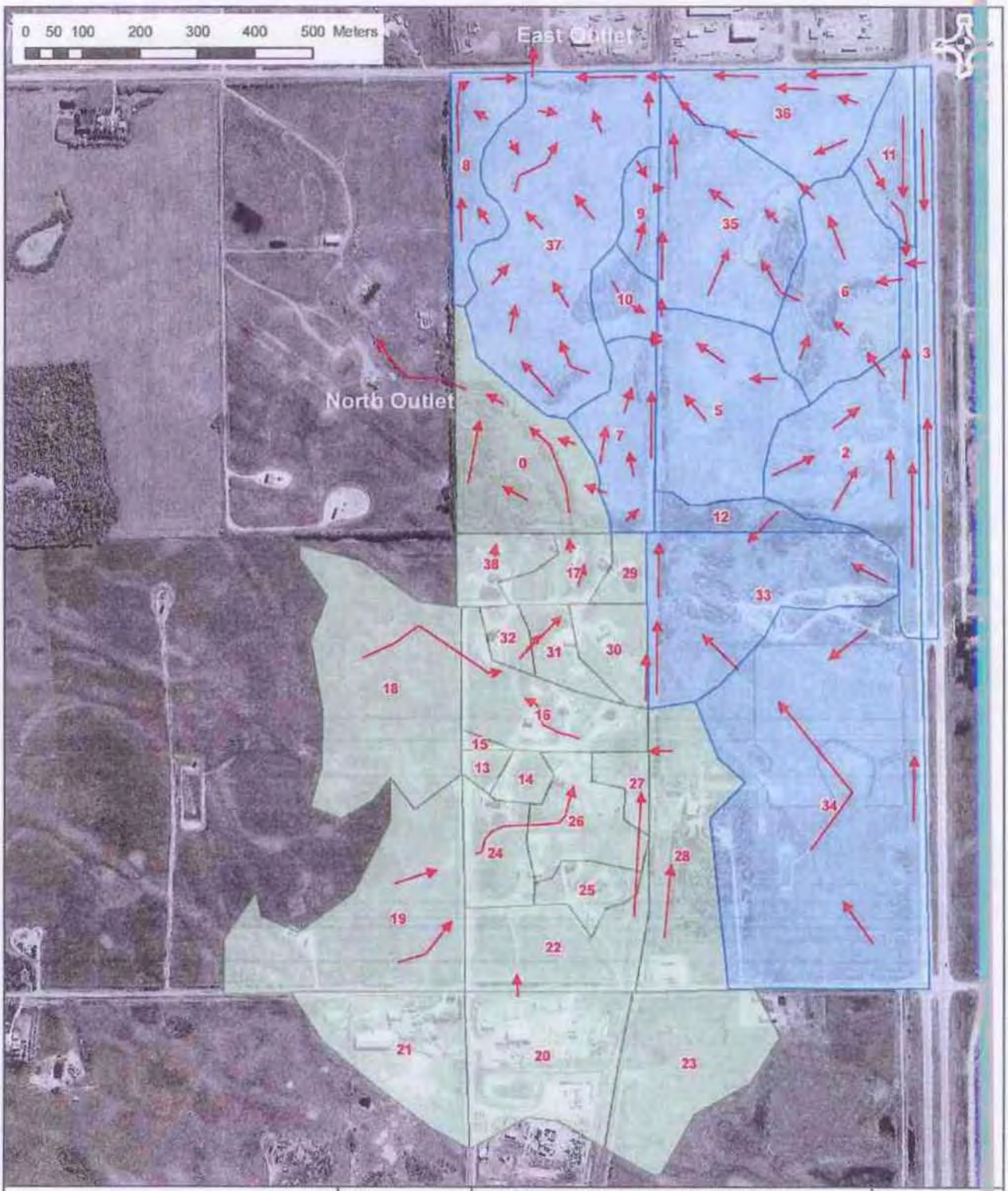
The design of the surface water management pond is controlled by criteria restricting the maximum release rate from the development area. The following four basic criteria relating to surface water releases are applicable to the proposed development area.

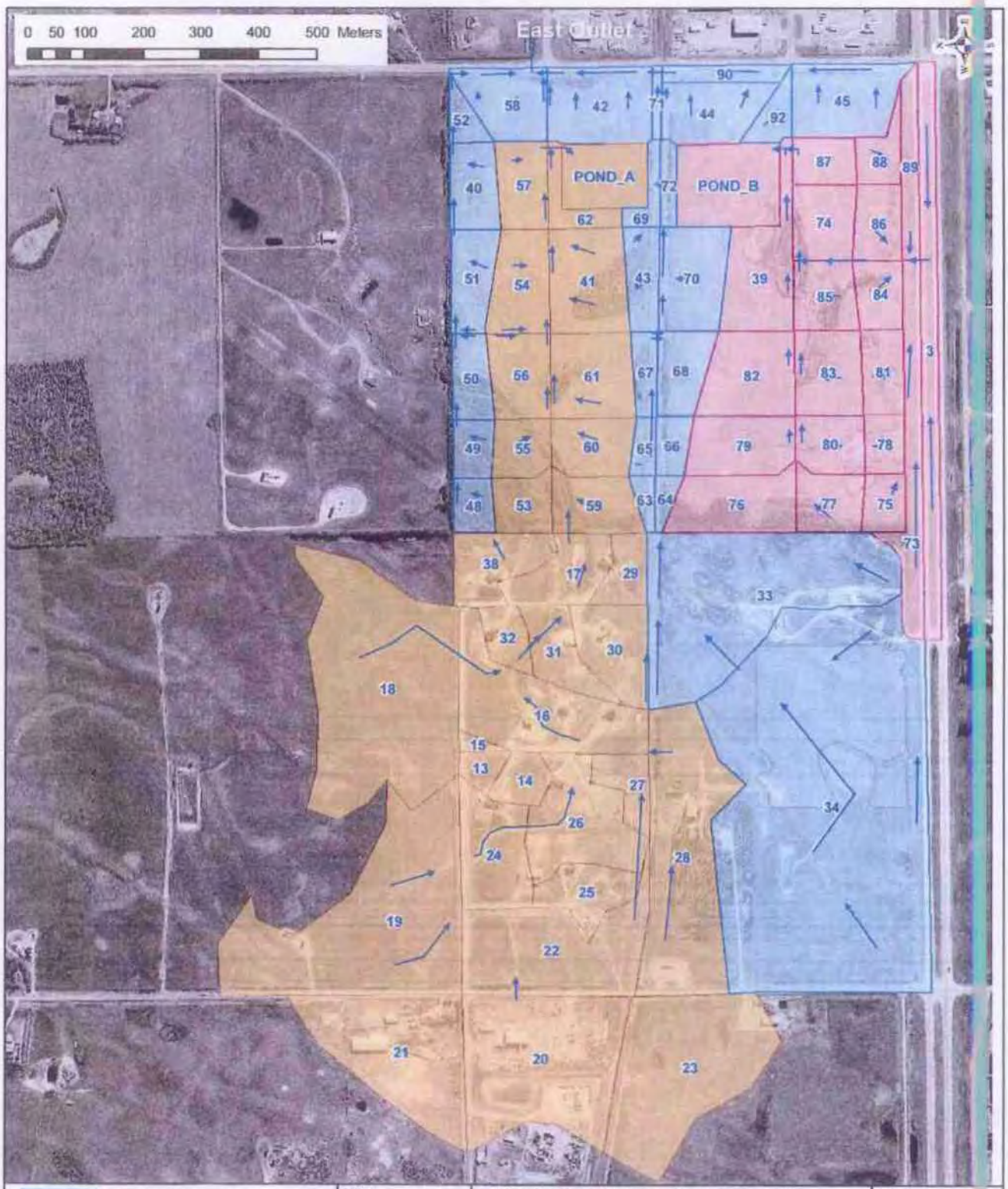
1. Under the County's Stormwater Management Policy (PD 009) any stormwater management plan is to be designed to accommodate 100-year rainfall flood (storm) events.
2. Under the Alberta Environment Stormwater Management Guidelines, peak runoff rates resulting from 100-year storm events (under post-development) should not exceed those under pre-development conditions.
3. Under the County's Master Stormwater Management Plan[1], stormwater discharge from sites serviced by the Northwest Drainage Ditch System are limited to a maximum of 0.75 L/s/ha.
4. Under the County's Master Stormwater Management Plan[1], discharge from County land into the City of Lloydminster storm channel is limited to a maximum of 2.5 L/s/ha.

For the proposed development, criterion 3 applies to the case where flows are serviced by the Northwest Drainage Ditch (north of railway tracks), and criterion 4 applies to the case where flows are directed south of the railway tracks (via the County Energy Park). The type of design event, for which the County release rate criterion applies, is not specified (e.g. average events, large events, or extreme events).

To meet the maximum release rate criterion, stormwater discharges from the development are to be regulated by a pair of interconnected surface water management (SWM) ponds for detention. Outflows from the stormwater ponds are controlled by a pump system. An auxiliary overflow may be required to accommodate very extreme events occurring in sequence.

[1] County of Vermilion River Master Stormwater Management Plan – Draft Report. Clifton and Associates Ltd. 28 January 2009.


0 50 100 200 300 400 500 Meters
East Outlet
North Outlet
38
8
9
37
35
11
10
6
3
5
7
0
2
12
38
17
29
33
32
31
30
18
16
15
13
14
27
34
26
24
28
25
19
22
21
20
23
East Outlet
North Outlet
Pre Development Flow Paths
DWN BY: DJH
CHKD BY: N. van der G.
UTM Zone / Datum: NAD 83 UTM 12N
SCALE: AS SHOWN
PROJECT TITLE: REINHART DEVELOPMENTS
SE-5-50-1-W4
SURFACE WATER ASSESSMENT
FIGURE: Pre-Development Catchments
DATE: February 2011
PROJECT No.: EW1023
REV. No.: 1
FIG.: Figure 2


0 50 100 200 300 400 500 Meters
East Outlet
POND_A
POND_B
East Outlet
East Outlet (via POND A)
East Outlet (via POND B)
Post Development Flow Paths
DWN BY: DJH
CHKD BY: N. van der G.
UTM Zone / Datum: NAD 83 UTM 12N
SCALE: AS SHOWN
PROJECT TITLE: REINHART DEVELOPMENTS
SE-5-50-1-W4
SURFACE WATER ASSESSMENT
FIGURE: Post-Development Catchments
DATE: February 2011
PROJECT No: EW1023
REVISION No: 1
FIG.: Figure 3