AREA STRUCTURE PLAN

Shannon Estates

SW-26-21-29W4

Deer Creek Land Development Inc.

Submitted to:

Municipal District of Foothills #31

Compiled by

Bowwood Land Services Inc.
R.R. 1, Dewinton, Alberta T0L 0X0
403-995-2225

SHANNON ESTATES
Area Structure Plan

Table of Contents

INTRODUCTION

1.1 PURPOSE

This Area Structure Plan (ASP) has been provided to the Municipal District of Foothills #31 as required by The Municipal Development Plan (MDP) adopted by By-law 139/98 dated October 1, 1998 and the Land Use Bylaw 1/99(LUB) adopted September 30,1999. It is intended to outline future development and subdivision in the SW ¼ of Section 26 Township 21 Range 29 West of the 4th Meridian.

1.2 BACKGROUND

The subject quarter section has had no previous developments or subdivisions

1.3 APPROVAL PROCESS

An Area Structure Plan is identified in the Municipal Government Act

Definitions **616(dd) "statutory plan" means an intermunicipal development plan, a municipal development plan, an area structure plan and a area redevelopment plan adopted by a municipality under Division 4;**

Section 633 of the Municipal Government Act states that, the Council may by bylaw adopt an Area Structure Plan. The Municipal Government Act also states that Council in the process of adopting this plan must comply with provisions of Section 636. 637 and 638 which are quoted as follows:

Statutory plan Preparation **636(1) While preparing a statutory plan a municipality must**

- **(a) provide a means for any person who may be affected by it to make suggestions and representations,**
- **(b) notify the public of the plan preparation process and of the means to make suggestions and representations referred to in clause (a),**
- **(c) notify the school authorities with jurisdiction in the area to which the plan preparations applies and provide opportunities to those authorities to make suggestions and representations,**
- **(d) in the case of a municipal development plan, notify adjacent municipalities of the plan preparation and provide opportunities to those municipalities to make suggestions and representations, and**
- **(e) in the case of an area structure plan, where the land that is the subject of the plan is adjacent to another municipality, notify that municipality of the plan preparation and provide opportunities to that municipality to make suggestions and representations.**

1. INTRODUCTION

APPROVAL PROCESS (cont.)

Effect of plans **637 The adoption by a council of a statutory plan does not require the municipality to undertake any of the project referred to in it.**

Plans consistent **638 All statutory plans adopted by a municipality must be consistent with each other.**

1995 c24 s95

1.4 LEGISLATED REQUIREMENTS

The Municipal Government Act (MGA) outlines the contents that are required to be present in an Area Structure Plan. Section 633 of the Municipal Government Act reads as follows:

Area structure plan **633(1) For the purpose of providing a framework for subsequent subdivision and development of an area of land, a council may, by bylaw, adopt an area structure plan.**

(2) An area structure plan

(a) must describe

(i) the sequence of development proposed for the area,
(ii) the land uses proposed for the area, either generally or with respect to specific parts of the area,
(iii) the density of population proposed for the area either generally or with respect to specific parts of the area, and
(iv) the general location of major transportation routes and public utilities,

and

(b) may contain other matters the council considers necessary.

1.5 MUNICIPAL REQUIREMENTS

The Municipal District of Foothills has outlined when an Area Structure Plan is required or may be required in Section 5.3.5 of the Municipal Development Plan, as outlined below:

5.3.5 An Area Structure Plan drafted in accordance with the guidelines adopted by the Municipality shall be required as part of a Country Residential proposal that would create 8 new lots or more and for proposals of less than 8 new lots an Area Structure Plan may be required if in the opinion of Council one is necessary, due to:

a) the impact the proposal may have on adjoining lands;

1. INTRODUCTION

1.5 MUNICIPAL REQUIREMENTS(cont.)

b) the need to review, in greater detail, the infrastructure requirements of this proposal;
c) the proposal being a continuation of an existing subdivision and leads to a density greater than 8 lots per quarter section;
d) the proposal, in the opinion of Council being phase 1 of a development that will create 8 new lots or more.

1.6 DEFINITIONS AND INTERPRETATIONS

In this plan:

I. "Act" means the Municipal Government Act 1995 and amendments thereto.
II. "Council" means the elected Council of the Municipal District of Foothills #31.
III. "Developer" means the landowner of the subject parcel(s) as listed on the title(s) or their duly appointed agent.
IV. "Land Use Bylaw" means Bylaw 1/99 passed by Council pursuant to the Municipal Government Act which regulates and controls land uses and development controls and approvals within the boundaries of the municipality.
V. "Municipal Development Plan" means the plan adopted by Bylaw 139/98 pursuant to the Municipal Government Act.

VI. "Municipality" mean the Municipal District of Foothills #31
VII. "Plan Area" means the specifically outlined areas that are mentioned in Section 1.1 of this plan and shown in the attached Figure 1.
VIII. "Subdivision Approving Authority" means the Council of the Municipal District of Foothills #31.

All other definitions and interpretations shall have the meaning that is assigned to them in the Municipal Government Act, the Municipal Development Plan or the Land Use Bylaw.

2. PLAN AREA

2.1 LOCATION/OWNERSHIP

The subject parcel is located approximately 2.5 kilometers east of the overpass serving Highways 2 and 2A on Secondary Highway 552 as shown on Figure 1. The subject lands are currently zoned Agricultural as shown on Figure 2. The land is serviced by 48th Street E. a paved municipal road. The plan area is the SW ¼ Section 26 Township 21 Range 29 West of the 4th Meridian comprising 157.7 acres as outlined in Figure 3.

A Copy of the Certificate of Title is attached as Appendix "1" of this document.

2.2 DEVELOPMENT HISTORY

Subject Lands

There has been no development to date on this quarter section.

Adjacent Lands

- The Southeast and Southwest quarters of Section 27 are covered by the "Norris Coulee Area Structure Plan."
- The Northeast ¼ of 27-21-29W4 had one twenty-acre parcel subdivided out, which has subsequently been split into two parcels.
- The Northwest ¼ of 26-21-29W4 has only the first parcel out.
- The Northeast ¼ of 26-21-29W4 had a first parcel out that was subsequently split into two parcels.
- The Southeast ¼ of 26-21-29W4 has only the first parcel out.
- The Northeast ¼ of 23-21-29W4 has been split into five parcels ranging in size from 20 acres to sixty acres.
- The Northwest ¼ of 23-21-29W4 has a five acre first parcel out and a five parcel Country Residential cluster subdivision in the southwest corner of the quarter.
- The Northeast ¼ of 22-21-29W4 has nine parcels of varying sizes.

The majority of the land in this township is County Residential in nature.

2. PLAN AREA

2.3 General Physical Description

The subject land is gently sloping from South to North with a creek bed crossing the Southeast corner. The soil is of varying classes as outlined in the Agrologist's report (Appendix 3). It is presently used as pasture and hayland. Both city and mountain views are present. It is located 14 kilometers from the City of Calgary on a paved highway.

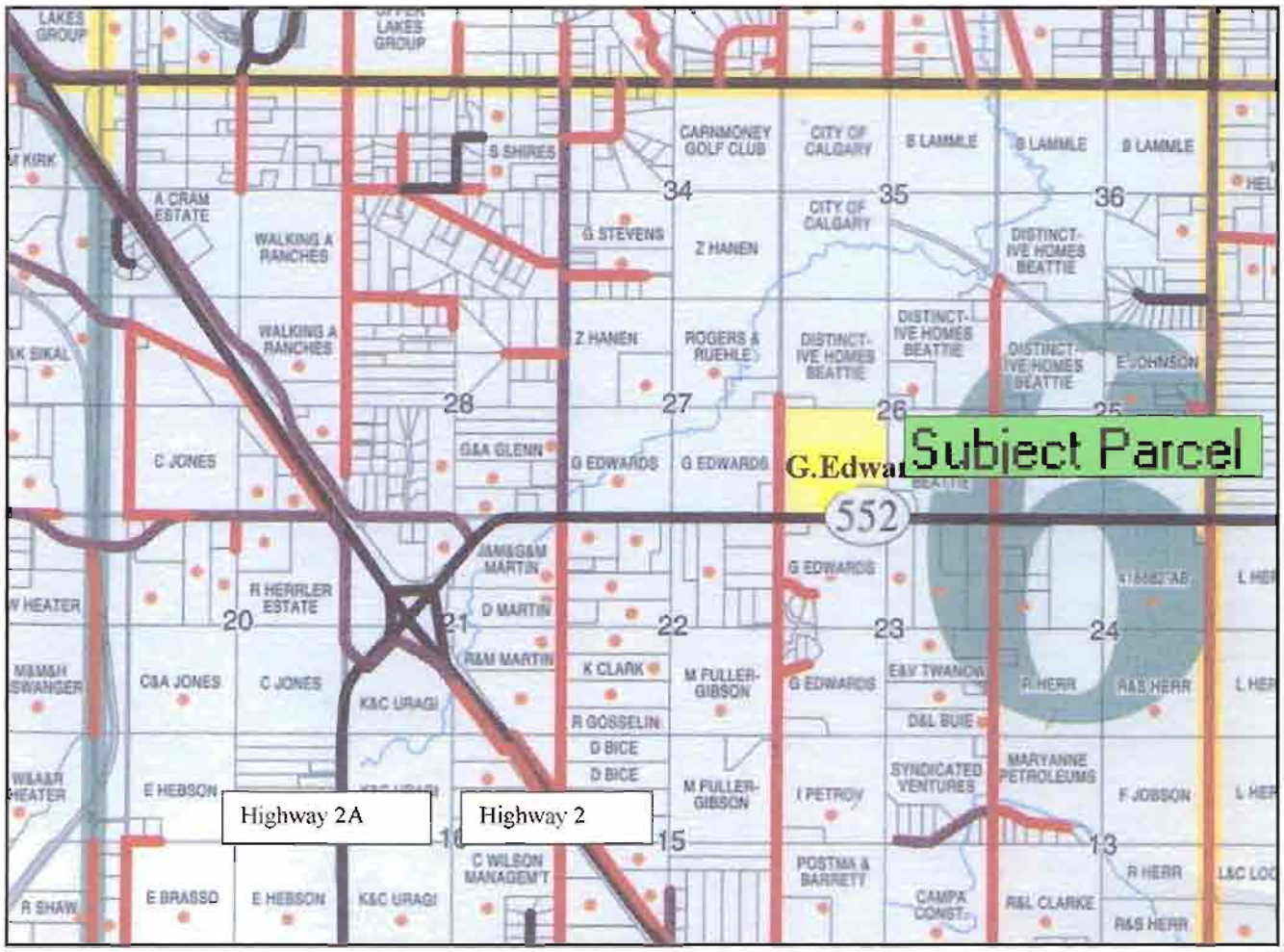
2.4 Topographical Considerations and Constraints

There are no defined water runs other than the creek bed described in 2.4 on this land. The general topography of land presents no constraints for building sites or road construction.

There are some existing native trees in the center of the quarter. The design of the lots is to maximize the use of views and to conserve the native tree. The trees will be incorporated in the Municipal Reserve and the creek bed will be placed in the Environmental Reserve.

2. PLAN AREA

LOCATER MAP



Extracted From Municipal District of Foothills Map – Dated August 15, 1999

Figure 1

2. PLAN AREA

MUNICIPAL ZONING MAP

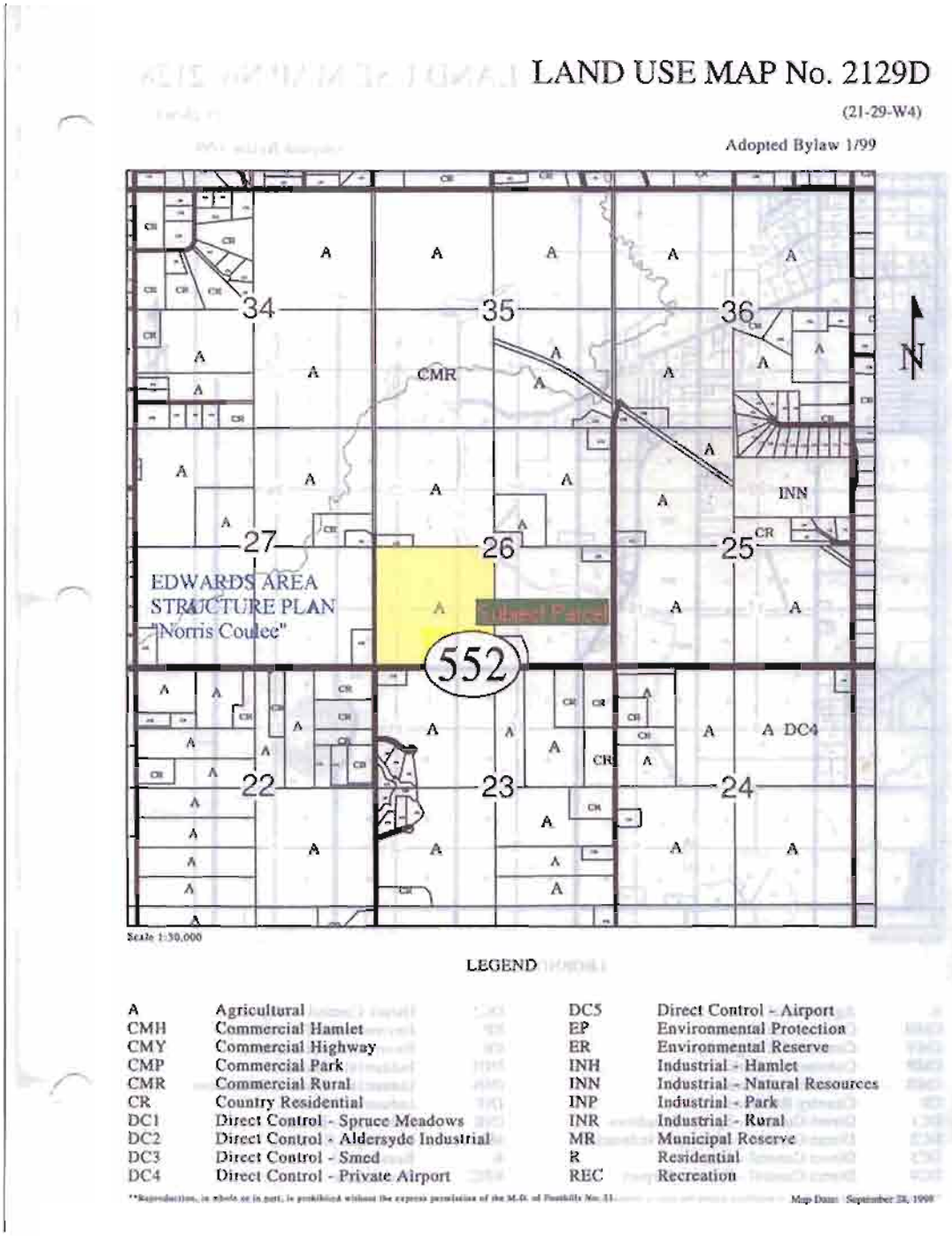


Figure 2

2. PLAN AREA

Plan Area Map

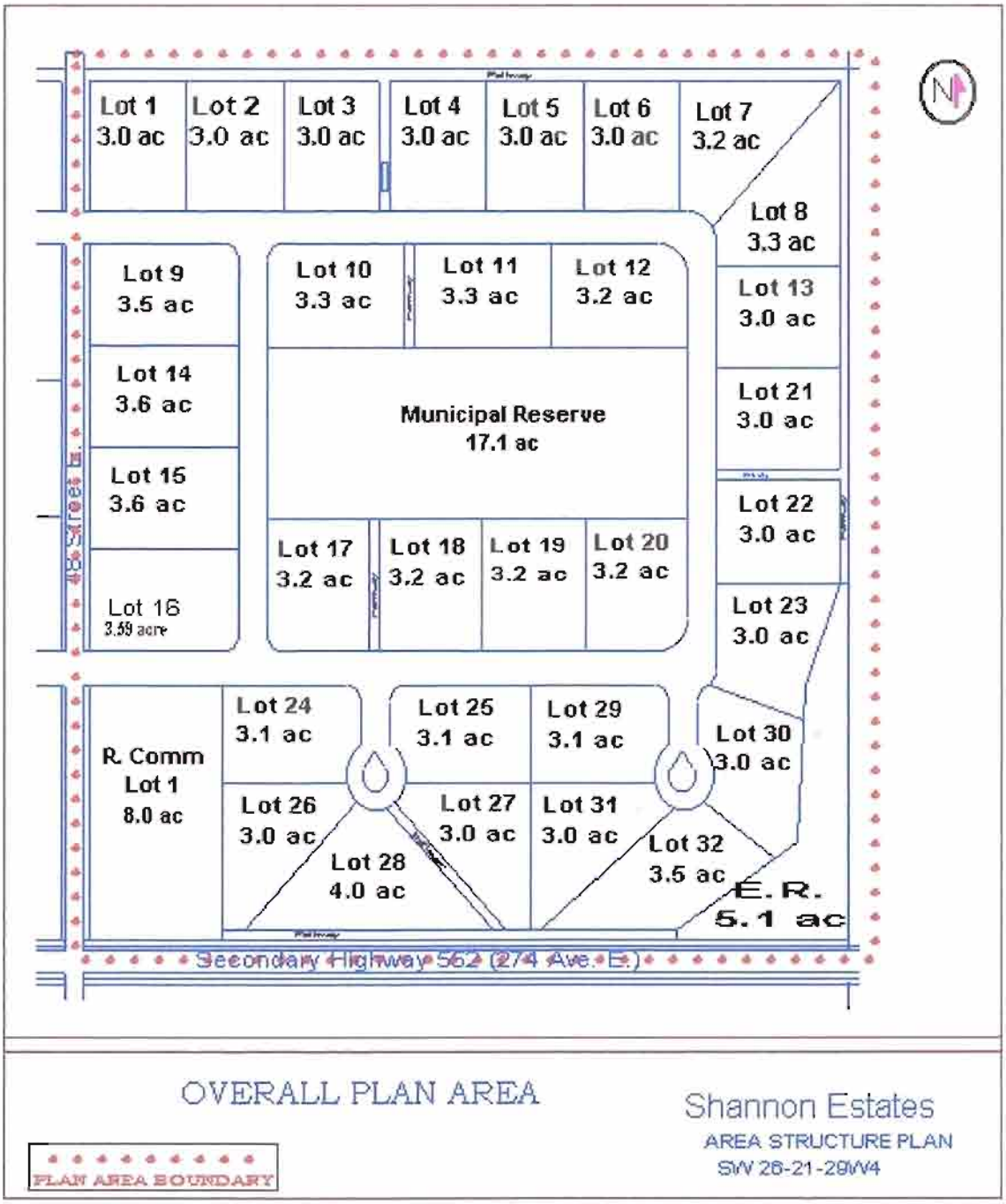


Figure 3.

3. PLAN GOALS AND OBJECTIVES

1. To set out a plan of orderly development for the subject lands.
2. To create thirty-two Country Residential lots, one Rural Commercial lot, a Municipal Reserve lot that best utilizes the land base and an Environmental Reserve lot that recognizes the natural environmentally significant aspects of the area.
3. To develop a pathway system that provides recreational trailways to the Municipal Reserve lot for all lots in the subdivision as well as the neighboring subdivision to the west.
4. To develop a transportation network providing safe and easy access to Secondary Highway 552 and to the proposed school sites on the adjacent lands to the west.
5. To avoid development on environmentally sensitive lands.
6. To ensure that the proposed development conforms to the goals and objectives of the Municipal District of Foothills Municipal Development Plan.
7. To provide a mechanism of amending the Municipal District of Foothills Land Use Bylaw so that all development conforms to the Bylaw.

4. PLAN POLICIES

4.1 PLAN CONCEPT

In order to meet the Plan's objective, this Plan incorporates a development that will be comparable to adjoining parcels and compatible with the general area. This plan will facilitate the growing demand for Country Residential lots while still maintaining a large portion of the naturally treed land for community use and enjoyment.

The Commercial parcel will meet the needs of a growing community that presently has very limited commercial amenities within easy travelling distance.

The Municipal Reserve lot is designed around the treed land. The internal lots on the development have access to the Municipal Reserve by means of a walkway off the internal road system and around the perimeter of the land where road access is unavailable.

The Environmental Reserve lot is located along the western edge of the Snake Creek ravine and protects this part of the ravine from having any development pressures.

Overall plan is shown in Figure 4. Figure 5 gives the same plan over an aerial photograph. Figure 6 shows the topographical survey of the property with one-meter contours.

4. PLAN POLICIES

4.1 PLAN CONCEPT

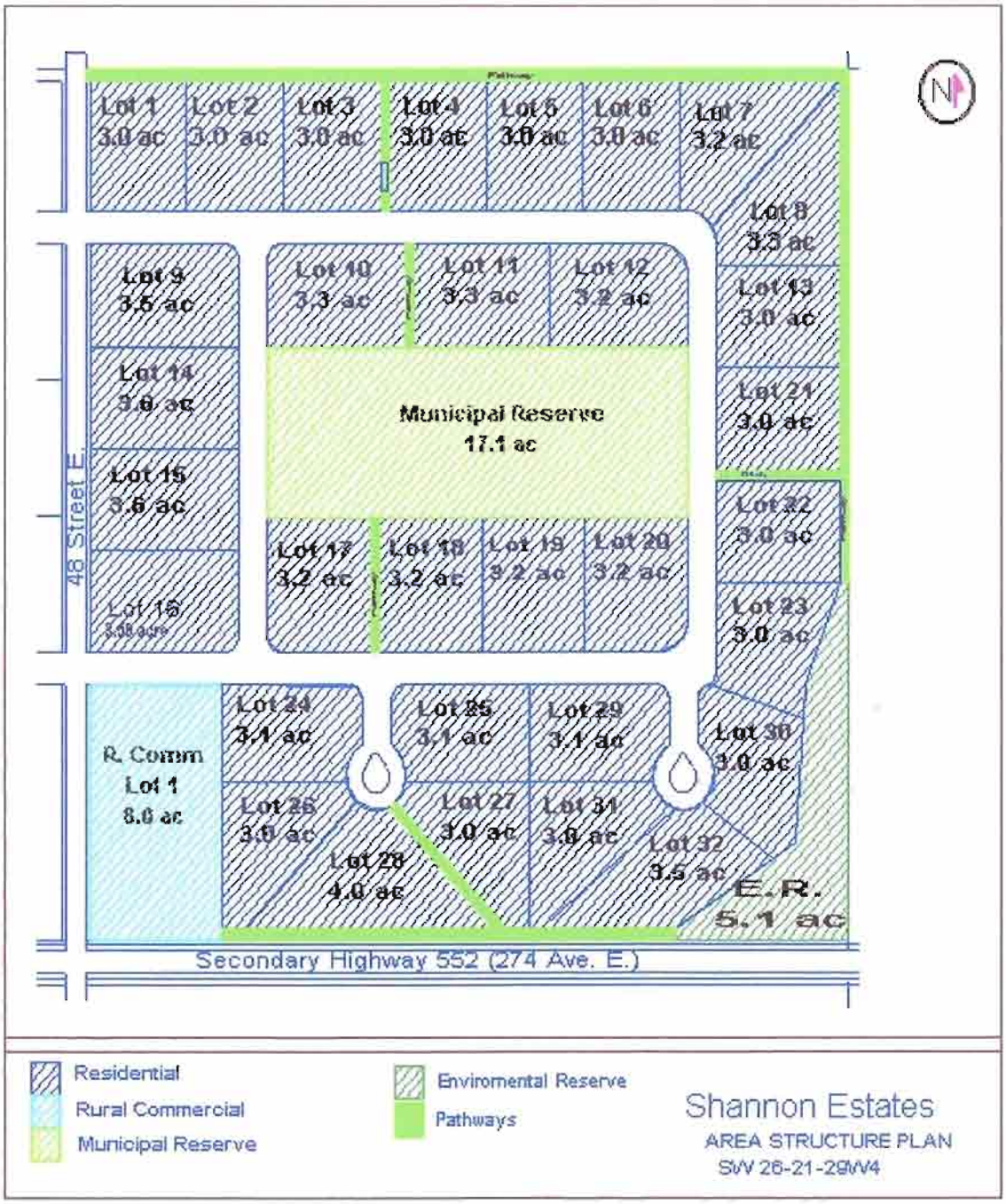


Figure 4

4. PLAN POLICIES

4.1 PLAN CONCEPT

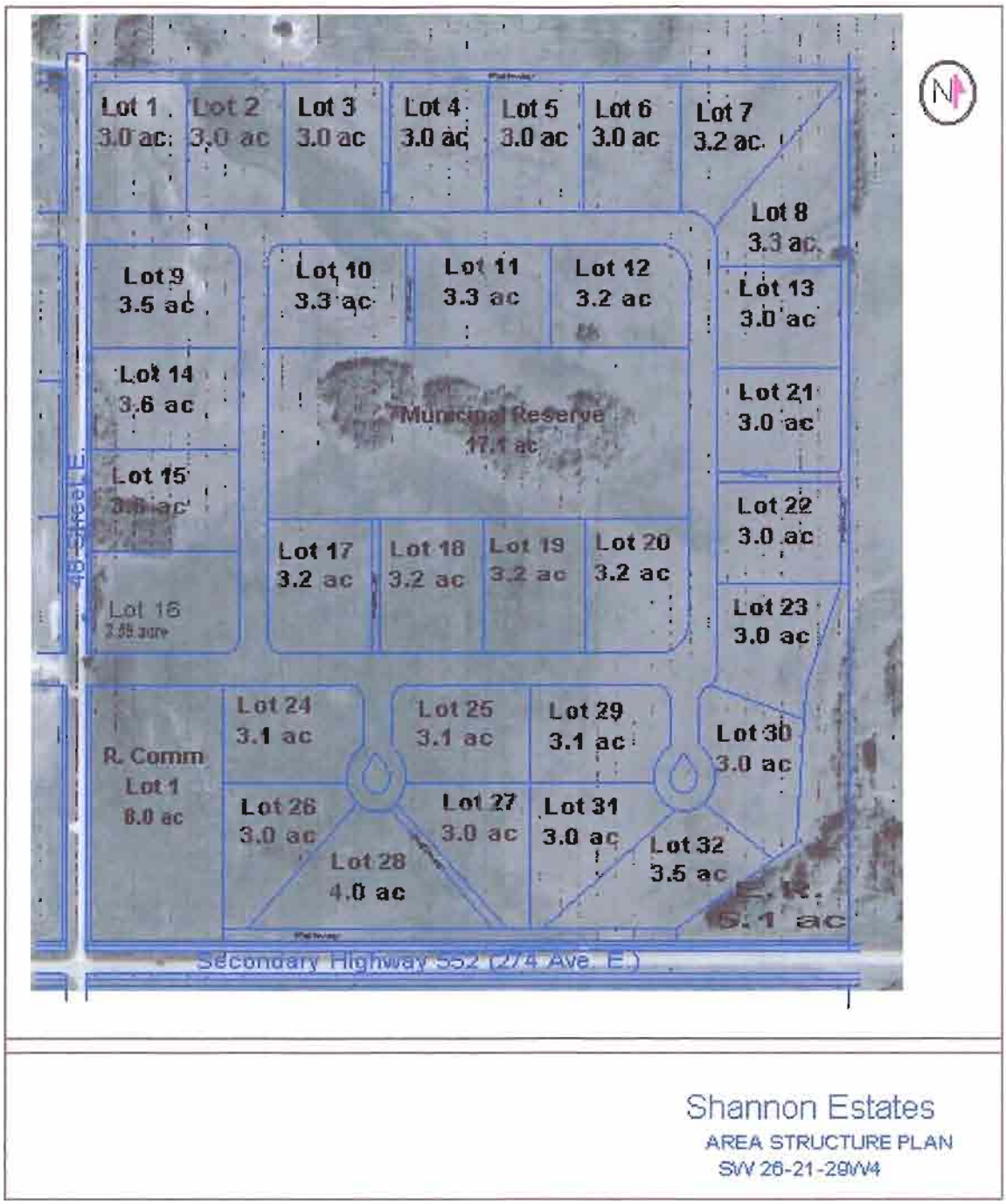


Figure 5

4. PLAN POLICIES

4.1 PLAN CONCEPT

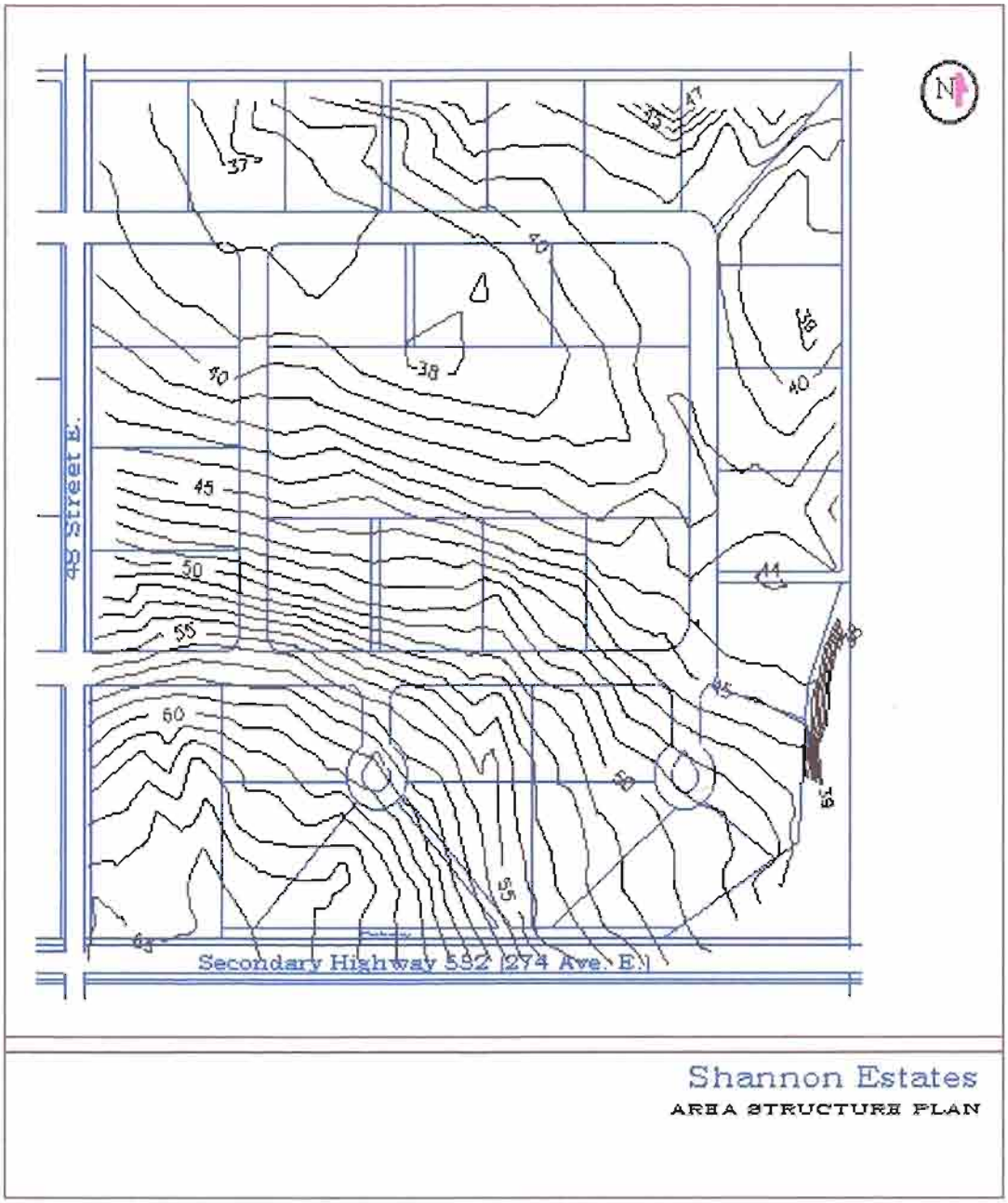


Figure 6

4. PLAN POLICIES

4.2 LAND USES

Zonings

a) Country Residential

The area designated for the residential development under this Plan is currently zoned Agricultural District under the Municipal District of Foothills Land Use Bylaw. Prior to proceeding to subdivision, the Plan Area will be redesignated to Country Residential to comply with the provisions of the Municipal District of Foothills Municipal Development Plan and the Municipal District of Foothills Land Use Bylaw. All lots will have a minimum parcel size of 3 acres (Figure 4) with over one acre of developable land (Figure 7). All Country Residential lots in the subdivision will access onto the internal road with no access permitted onto 48 Street (Figure 8). The maximum density allowed would be the thirty-two Residential lots outlined in this plan.

4. PLAN POLICIES

4.2 LAND USES

Zonings

b) Rural Commercial

The area designated Rural Commercial is for the purposes of a convenience store with gas bar and a coffee shop with related indoor storage and office space. No residential uses will be allowed on the premises. The design of the building will be subject to building restrictions that compliment the building restrictions imposed on the residences within the subdivision and will be governed by the drawing submitted to Council at the Public Hearing (Appendix 5)

The need for a commercial outlet has come about for the following reasons:

1. Growing population in the area
2. Deerfoot Trail extension and related roadway improvements removing existing facilities and making access to facilities at Dewinton much more difficult
3. The need for an additional postal outlet in the area

The Commercial lot will be landscaped with berms and trees around the perimeter; this along with the natural topography of the lot will screen the neighboring properties from the site thereby reducing neighborhood impact. Similar landscaping to the area around the tree farm and the pond on Norris Coulee Estates will be implemented.

The access points for the commercial area will be off 48 Street and the internal road system. The actual locations will be established in the Development Permit process and will be to a standard established by the Municipality in conjunction with Alberta Infrastructure.

The water source for this area is intended to be a drilled well that is licensed under the Water Act and meets or exceeds all the requirements of the Water Act and the Public Health Act for a development of this nature. The sewage will be by septic tank and field that must meet the requirements of the Municipality and the applicable Provincial statutes in place at the time of development.

4. PLAN POLICIES

4.2 LAND USES

Zonings

c) Municipal Reserve

The area designated for the municipal reserve under this Plan is currently zoned Agricultural District under the Municipal District of Foothills Land Use Bylaw. Prior to proceeding to subdivision, the Municipal Reserve Area will be redesignated to Municipal Reserve to comply with the provisions of the Municipal District of Foothills Municipal Development Plan and the Municipal District of Foothills Land Use Bylaw.

The 10-meter pathways will be part of the Municipal Reserve but are over dedication not to be included in MR calculations. The pathways are to provide ready access to the MR parcel for all residences of the quarter and will be maintained by adjoining landowners. The pathways are designed to supplement the pathways in Norris Coulee Estates, thereby increasing the total pathways available to both developments. All uses and final design of the MR will be to the satisfaction of Council.

A Homeowner's Association must be established and registered by the developer and registered on title. The articles of incorporation must state that the homeowners as a group or individually are responsible for the maintenance of the pathways throughout the development including and vegetation or fencing on the pathways.

Council may request that in addition to the pathways within this plan, the developer be required to construct a pathway along the southern edge of the internal road (within the road dedication) of the initial 15 lot subdivision to the West of this development to either the Municipal Reserve or the existing pathway leading to the proposed school site, and to mark out and appropriately sign a crosswalk area across 48 Street.

4. PLAN POLICIES

4.2 LAND USES

c) Municipal Reserve (cont.)

The Municipal Reserve Requirements set out in the Subdivision Regulations are as outlined below:

AREA	Size	Requirements
Country Residential	104.5 acres	10.45 acres
Commercial	8.0 acres	0.80 acres
Total	112.5 acres	11.25 acres

The Municipal Reserve to be allocated under this Plan is as follows:

Municipal Reserve Parcel	17.1 acres
Pathways	4.5 acres
Total	21.6 acres

This is 189% of the required allocation.

4. PLAN POLICIES

4.2 Environmental Reserve

There is an environmentally sensitive area in the Plan Area where Snake Creek flows beside the southeast corner of the quarter section and this has been set aside as Environmental Reserve. No other areas have been identified as water runs or environmentally significant areas within the Plan boundaries. There is some physical evidence as well as anecdotal evidence that the Snake Creek ravine is a game trail used by both Whitetail and Mule deer travelling to the Bow River.

4. PLAN POLICIES

4.3 Transportation Infrastructure

The project is serviced entirely off of 48th Street East a paved municipal road that dead ends less than a kilometer north of this subdivision and connects to Secondary Highway 552 at the southwest corner of this quarter section. Any upgrading of existing municipal roads or maintenance of same will be established by Council at the time of redesignation of each phase. The internal roadway system is to be built to municipal standards on a 30-meter right of way and will be an asphalt surface. The internal roadways will be constructed utilizing temporary cul-de-sacs for each phase; the design and construction of the roads must meet Municipal standards at the time of construction as established by Council.

The developer will be required to install intersectional upgrades at the intersection of 48 Street and Secondary Highway 552 to the satisfaction of Council upon redesignation of Phase 1 (these proposed upgrades are shown in Appendix 4). With Alberta Transportation assuming control of Secondary Highway 552 any upgrades at future phases will be required to meet their specifications.

The proposed names and access points for the internal roads are shown on Figure 8.

4.4 Phasing

The project will have a phasing schedule as shown on Figure 9 and outlined below:

1. Lots 1-3, 9,10,14-17, MR.
2. Lots 4-8,11-13
3. Lots 18-28
4. Rural Commercial Lot 1
5. Lots 29-32, ER.

The Shannon Estates Area Structure Plan is being phased as an extension to the existing developments proposed on S ½ 27-21-29W4.

Redesignation of Phase 1 of this plan will not proceed beyond First reading until such time as:

a. A minimum of 66% of the lots on S ½ 27-21-29W4 are sold; and
b. A minimum of 50% of the lots on S ½ 27-21-29W4 are developed; and
c. The final phase of Norris Coulee (Tree Farm Area) does not have to be developed prior to Phase 1 of this Plan

4. PLAN POLICIES

4.4 Phasing (cont.)

d. Council has considered the application with respect to the ability to be serviced from individual groundwater wells with minimal impact to the surrounding area;
e. Council has given consideration to the associated transportation network and its ability to handle the additional capacity proposed;

Redesignation of each subsequent phase shall be subject to the same requirements as Phase 1 on a cumulative basis.

Phase 1 is the short-term development, which includes nine residential lots and the total Municipal Reserve dedication, as well as the pathways that abut those lots.

Phases 2 and 3 are the medium term stages of the development and consist of eight lots in Phase 2 and eleven lots in Phase 3. Since these two phases are at opposite ends of the development, either phase could be selected as Phase 2. Phase 4 is the Rural Commercial phase and should the developer decide not to proceed with the Commercial phase the plan may be modified to two (2) residential lots in this area and Phase would be reduced by two (2) lots to reflect this change.

Phase 5 is the very long-term development portion of the land and consists of the final four lots and the Environmental Reserve lot. This portion of the Plan will be used as a tree farm area for such time as required by the developer. This is a similar use as the final phase of Norris Coulee Area Structure Plan.

The balance lands would remain as Agricultural land until each phase was implemented.

4. PLAN POLICIES

Transportation and Access

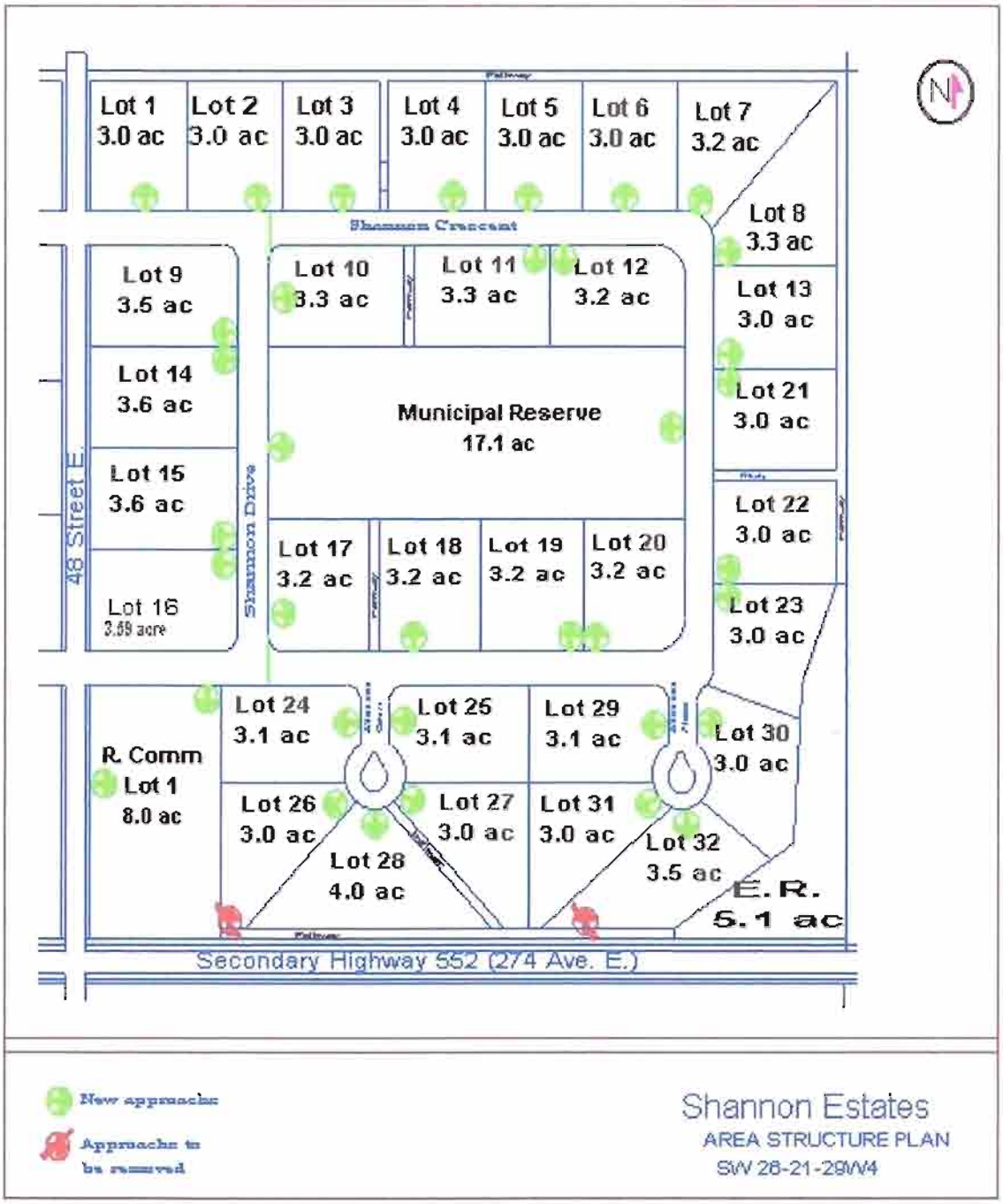


Figure 8.

4. PLAN POLICIES

Phasing

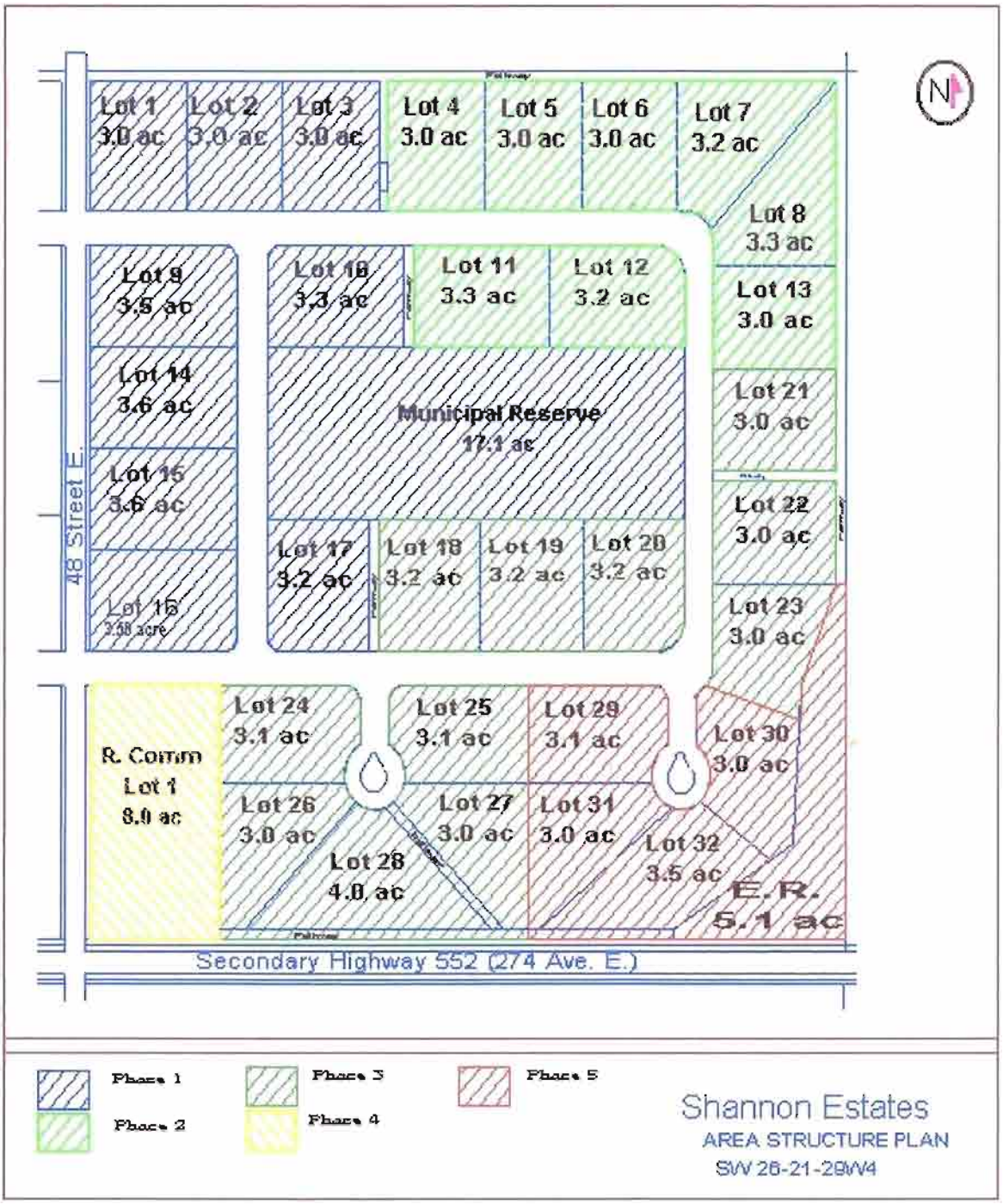


Figure 9

4. PLAN POLICIES

4.5 Density

The Municipal District of Foothills Municipal Development Plan outlines the maximum density provision for Country Residential to be 32 lots per quarter section or 1 lot per five acres. The total number of acres within the plan area is 159 acres. This plan is for the total buildout of the quarter section.

4.6 Neighborhood Impact

The entire area south of Calgary from Highway 2 east to this property and beyond has seen a multitude of developments from 1 or 2 parcels from the ¼ section to Residential development at Heritage Pointe. The natural topographic boundary to this point in time has been the Bow River, the Highwood River and Highway 2.

The two neighboring quarters to the west have been developed by the same landowner and the same building styles and restrictions would apply to this property.

The Municipal Reserve is naturally treed parkland setting centered in the development. Its purpose is to provide the neighborhood an area to enjoy in its natural setting. The previous two developments MR are designed for future school use and it was a consensus that a "Park" was the most desirable use of the land.

4.7 Public Notification and Consultation

The landowner is contacting personally as many of the ratepayers as possible to review the plan with them. There will also be an Open House held at the Dewinton Riding Club (256 Ave. between 16 St. & 32 St.) in late February early March to review the plan. All people on the Municipality's circulation list will receive a letter from the developer inviting them to attend this open house.

5. SERVICING CONSIDERATIONS

5.1 Stormwater Drainage

The existing parcel slopes gently to the north and there is no evidence of any defined water courses on the portion of the Plan Area that is to be developed. The majority of stormwater would appear to be absorbed into the ground or use the ditches of the existing municipal roads. When the internal roads are engineered, the stormwater drainage plan will be incorporated and will follow best management practices whereby post-development flows are no greater than predevelopment flows.

5.2 Domestic Water

There is a number of moderate to high producing wells on the adjoining quarter sections as outlined in the initial water survey done by Groundwater Exploration (Attachment 2). The lots will be supplied by individual wells that are certified by a registered engineer to meet or exceed the requirements of the Water Act. To determine the effects of groundwater usage in each phase a monitoring well must be drilled in a subsequent phase. Monthly readings of the static water level in the monitoring well must be recorded and be submitted to the Municipality on a schedule to be established by Council. These recorded levels are to be taken into consideration by the consulting engineer in their reports for water supply on each subsequent phase.

The water supply for the Commercial component must be a licensed well and meet all requirements of the Water Act.

5.3 Domestic Sewage

The domestic sewage disposal will be by means of septic tank and conventional field system. All installations will require permitting and must meet the requirements of Alberta Safety Codes and Building Codes. A Restrictive Covenant is to be registered on all new titles concurrently with the subdivision outlining that percolation testing be done on each lot prior to the construction of a septic system. All requirements resulting from this test must be completed to the satisfaction of the Municipal Plumbing inspector.

5. SERVICING CONSIDERATIONS

5.4 Shallow Utilities

Electrical service to the plan area is available and no cost easements will be provided and placed on each title prior to registration.

Natural gas service to the plan area is available and no cost easements will be provided and placed on each title prior to registration.

Telephone service to the plan area is available and no cost easements will be provided and placed on each title prior to registration.

The providers of these services will be determined at the time of construction and the municipality will be advised who is the chosen provider.

5.5 Solid Waste Removal

Will be the responsibility of the individual landowner who has a number of private contractors that can be utilized or they may haul the waste themselves to the Foothill's Regional Landfill south of Okotoks.

5.6 Police Service

The plan area is policed primarily by the RCMP detachment from Okotoks for all purposes and secondarily by the Special Constables from the M.D. of Foothills for traffic matters.

5.7 Fire Protection

The plan area is within the fire protection area of Okotoks Volunteer Fire Department and backup protection is also provided from the City of Calgary, High River and Blackie Fire Departments.

5.8 Emergency Medical and Ambulance

The Foothills Regional Emergency Services Commission services this are from its Okotoks station with back up service provided from High River, Turner Valley or the City of Calgary.

5. SERVICING CONSIDERATIONS

5.9 911 Service

911 emergency calling is provided throughout the area and is for all emergency calls including fire, ambulance and police as well as disaster services. This service is manned 24 hours a day/seven days a week by the Foothills Regional Emergency Services Commission.

6. BUILDING RESTRICTIONS AND COVENANTS

The developer will be registering a Developer's Agreement registered on title as a restrictive covenant for each lot which outlines the building envelope allowed so that a minimal impact on neighbors is achieved without lose of view.

The Agreement will also outline size and style of house permitted as well as location of outbuildings.

All houses will be required to install oversize pressure tanks, low volume toilets and water saving shower heads to minimize the impact on the groundwater supply by conserving and managing water usage.

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Shannon Estates

Appendix 1

Land Title

A. L. T. A.

SOUTH ALBERTA LAND REGISTRATION DISTRICT

REMOTE LAND TITLE SEARCH

SEARCH DATE: 18/12/2000

:NC	SHORT LEGAL	TITLE NUMBER
)22 255 055	4;29;21;26;SW	001 213 711

:GAL DESCRIPTION

:RIDIAN 4 RANGE 29 TOWNSHIP 21
:CTION 26
)ARTER SOUTH WEST
)NTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
(CEPTING THEREOUT:

:AN	NUMBER	HECTARES	ACRES
)AD	7605JK	0.809	2.00
)AD	9210723	0.086	0.213

(CEPTING THEREOUT ALL MINES AND MINERALS

:TATE: FEE SIMPLE

)NICIPALITY: MUNICIPAL DISTRICT OF FOOTHILLS NO. 31

:FERENCE NUMBER: 921 092 103 +1

REGISTERED OWNER(S)

:GISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
)1 213 711	02/08/2000	TRANSFER OF LAND	$525,000	$525,000

NERS

:EER CREEK LAND DEVELOPMENTS INC..
F BOX 16, SITE 4, RR 1
:WINTON
LBERTA T0L 0X0

ENCUMBRANCES, LIENS & INTERESTS

:GISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
)1 213 712	02/08/2000	MORTGAGE MORTGAGEE - LESLIE GILMOUR

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 2
001 213 711

IRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		BOX 232 CROSSFIELD ALBERTA T0M0S0 ORIGINAL PRINCIPAL AMOUNT: $375,000

YTAL INSTRUMENTS: 001 *END OF SEARCH * SR# - J735271 /AR0210
XOR FILE #: REM500/BERGLUND

Shannon Estates

Appendix 2

Water Survey

Groundwater Exploration

#00143

Groundwater Feasibility Assessment
Edwards property: SW-26-21-29-W4M

Submitted to:

Bowwood Land Services

Prepared by:

Groundwater Exploration & Research Ltd
October 2000

Groundwater Exploration & Research LTD

Box 15
Balzac, AB. CANADA T0M 0E0
Phone (403) 226-0330: Fax (403) 226-6593: Email: nowakb@cadvision.com

October 13, 2000
File No: 00143

Bowwood Land Services
RR1
DeWinton, AB.
T0L 0X0

Attention: Wayne Berglund

RE: Proposed Subdivision of the Edwards property at SW-26-21-29-W4M

Enclosed find our letter report which addresses a groundwater feasibility assessment of the Edwards property at SW-26-21-29-W4M in the Municipal District of Foothills.

Background Information

The subject property is located approximately 4 km east of the Okotoks/Highway 2 overpass, on Secondary Road 552 [see enclosed MD map in the Appendix]. At present, the quarter section is undeveloped. An extensive country residential subdivision exists to the west of the property in the south half of section 27; with existing acreages to the southwest in the NE-22 quarter section, and to the southeast in the NE-23 quarter section.

There is an intent to create 32 lots in the SW-26 quarter section, each parcel being approximately 1.2 hectares [3 acres] in size with one commercial lot, approximately 1.82 hectares [4.5 acres] in size.

In accordance with the Municipal District of Foothills regulations, there is a requirement to prepare an Area Structure Plan for subdivisions with 8 or more parcels. This report addresses the feasibility of finding sufficient volumes of groundwater to sustain an additional 33 lots in SW-26-21-29-W4M.

In accordance with the Water Act, a household is allowed to withdraw up to 1250 m^3/year without requiring a license to divert water. Based on the maximum allocation of 1250 m^3/year or 3.42 m^3/day, the total water requirement is 112.9 m^3/day [33 lots x 3.42 m^3/day per lot] for individual wells. For a licensed communal well approach, the water requirement is 1.82 m^3/day [400 gpd/lot] or a total of 60.1 m^3/day.

Geomorphic/Geologic Setting

Much of the land in the area of the SW-26 has a regional slope to the north and the Bow River drainage basin. The elevation change across the SW-26 quarter section is up to 30 meters [Dalemead 82 I/13; 1:50,000 topographic map sheet] based on contour interval spacing. Across the block of nine quarter sections the elevation change is about 69 meters, in a southwest to northeast direction.

The bedrock in the area [Hamilton, Price & Langenberg, 1999: Geologic Map of Alberta; 1:1,000,000] is mapped as the Porcupine Hills Formation of continental origin. The Porcupine Hills Formation consists of pale grey, thick-bedded, cherty, calcareous sandstone; and pale grey calcareous mudstone. Water bearing units in the Porcupine Hills Formation are generally lenticular in geometry and of limited lateral extent.

Ozoray & Lytviak [1974: Hydrogeology of the Gleichen area, Alberta; Alberta Research Council, ESR 74-9] map the area as having a groundwater potential of 33 to 164 m^3/day [5-25 Cgpm]. A spring is indicated along the east boundary of Section 26. In addition, the southwest corner of SW-26 is mapped as an area of artesian flow within a band trending northwest to southeast. The regional groundwater flow direction is toward the northeast and the Bow River drainage basin.

Pertinent Regulations

Country residential subdivision and groundwater supply is regulated by Section 21(2) and Section 23(3) of the Water Act and stated as follows:

Section 21(2):

Subject to subsection (3) and section 23 and any exemptions specified in the regulations, a person who owns or occupies land under which groundwater exists

(a) **has the right to commence and continue the diversion of the groundwater for household purposes, and**

(b) **may not obtain a licence for the diversion of the groundwater for household purposes.**

[**note**: As defined in the Water Act, "household purposes" means the use of a maximum of 1250 cubic meters of water per year per household for the purposes of human consumption, sanitation, fire prevention and watering animals, gardens, lawns and trees].

Section 23(3):

"If, after this Act comes into force, a subdivision of land of a type or class of subdivision specified in the regulations is approved under the Municipal Government Act, a person residing within that subdivision on a parcel of land that adjoins or is above a source of water described in section 21 has the right to commence and continue the diversion of water under section 21 only if

(a) a report certified by a professional engineer, professional geologist or professional geophysicist, as defined in the Engineering, Geological and Geophysical Professions Act, was submitted to the subdivision authority as part of the application for the subdivision under the Municipal Government Act, and the report states that the diversion of 1250 cubic meters of water per year for household purposes under section 21 for each of the households within the subdivision will not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved, and

(b) the diversion of water for each of the households within the subdivision under section 21 is not inconsistent with an applicable approved water management plan.

Water Regulation [AR 205/98]

9(1) Subject to subsection (2), a type of subdivision of land for the purposes of section 23(3) of the Act is a subdivision that results in 6 or more parcels in a quarter section or in a river lot.

In essence, Sections 21(2) and 23(3) of the Water Act ask two basic questions:

[a] Is there sufficient water to satisfy the maximum requirement of 1250 m^3/year for existing plus proposed lots within a given quarter section?

[b] Will the allocated volume of water for each proposed lot result in a significant adverse effect on neighbouring wells and licensed users existing at the time of subdivision application?

Groundwater Well Data

A survey of groundwater well data in SW-26 quarter and the surrounding 8 quarter sections of land was undertaken utilizing available information from Alberta Environment's groundwater database file. A total of 27 well records were available for review. There were no well records from the SW-26 quarters section.

The water well data has been analyzed on the assumption that the water well driller completed wells in the bedrock at the first occurrence of sustainable flow. This concept is applicable notwithstanding the fact that the SW-26 quarter section has topographic relief in the order of 30 meters. A summary of available water well information is summarized in Table 1, appended to this report.

[1] Well depths vary significantly from 6.1 to 152.4 meters over the block of nine quarter sections. The variability in well depth exceeds the topographic relief [69 meters] across the site, indicating that the water bearing zones are not continuous across the immediate area. As a result, a conceptual aquifer model which entails a discontinuous "layer-cake" hydrogeology is applicable.

[2] Preliminary flow estimates vary from 19.6 to 294.5 m^3/day over the regional nine block section with a geometric mean of 63.3 m^3/day.

[3] The variability in well depth implies that water-bearing zones are multi-story through-out the geologic section. The "layer-cake" hydrogeology can be summarized based on 15 meter depth increments using either the bottom of the perforated zone or the total depth of the well. The relationship between depth of completion and flow estimates are tabulated as follows:

Depth Increment (m)	Number of Wells	Flow Estimate (m^3/day)
0-15	2	80.2
15-30	9	70.7
30-45	12	71.5
45-60	2	26.2
60-75		
75-90		
90-105	1	19.6

[4] The above data indicates that the potential flow rates are associated with well depths between 15 and 60 meters. Based on layer-cake hydrogeology, the block of nine quarter sections has a cumulative production potential of 248.6 m^3/day to depths of 60 meters. Limited information is available for wells deeper than 60 meters. This depth interval remains a potential horizon for future groundwater exploration.

[5] It was indicated that there were no existing country residential parcels in the SW-26 quarter section, with the intent to create 33 lots. The Water Act, under section 21(2) allocates a maximum of 3.42 m^3/day [753 Cgpd/lot] to each existing and proposed parcel of land, for household use. The total groundwater requirement for the proposed subdivision is therefore 112.9 m^3/day [33 parcels x 3.42 m^3/day] which is less than the total cumulative production of 248.6 m^3/day within the upper 60 meters of the geologic profile. It is recognized that the short term flow tests given on the water well records may not be indicative of longer term pump tests and sustainable flow rates. It is also recognized that because of the lack of well data in SW-26, there is a risk that surrounding areas may not be reflective of the SW-26 quarter section. A production test well, with a minimum 24 hour pump test would be required to ascertain the groundwater potential in the site-specific, SW-26 quarter section.

[6] The water well data was also reviewed to determine if a drop in regional groundwater table was evident with increased country residential subdivision. The geometric mean non-pumping water level data, for the block of nine quarter sections, are tabulated as follows:

Decade	Number of Wells	Non-Pumping Water Level (m)
1960's	3	7.6
1970's	3	9.8
1980's	4	8.9
1990's	8	6.5
2000's	9	flowing

The data indicates that with increased development over the 1960's period to the late 1990's period, there has been no observable decline in the regional water table. Of the nine wells drilled in 2000, seven of them were flowing wells within the SE-27 quarter section. The SE-27 quarter section essentially coincides with the band of artesian flow indicated on the regional hydrogeology map [Ozoray & Lytviak].

Licensed Users

There are no licensed users within the block of nine quarter sections. As a result, the installation of up to 33 individual wells will not create any significant adverse effects to existing licensed users.

Well Interference

With respect to the potential for well interference as indicated in Section 23(3) of the Water Act, a calculation for well interference, neglecting recharge, at any given distance from the pumping well can be determined from:

$$u = r^2S/4Tt \text{ and}$$

$$s = QW(u)/4*pi*T$$

where:

u and W(u)	=	well function parameters
T	=	transmissive capacity in m^2/day calculated from actual pump test data
S	=	coefficient of storage, dimensionless
t	=	20 years of continuous pumping, in days
s	=	projected drawdown at the neighbouring well and assumed to be one meter or less
Q	=	pumping rate of 1250 m^3/year or 3.42 m^3/day

The calculation for well interference is based on the general assumption that a maximum projected drawdown of one meter, after 20 years of continuous pumping and neglecting recharge is an acceptable drawdown that would not unduly interfere with a neighbouring wells' performance.

With the above defined criteria, critical values for well separation distance and transmissive capacity [TC] can be determined. Acceptable combinations of transmissive capacity and well separation distance are tabulated as follows:

Well Separation Distance (m)	Transmissivity (m^2/day)
25	3.5
50	3.0
75	2.5
100	2.5

For a maximum drawdown of one meter, the critical transmissive capacity is 3.5 m^2/day and a well separation distance of 25 meters. This means, that if one assumes the addition of a single well that will be completed in the same water bearing zone, then as long as the well separation distance is greater than 25 meters and the transmissive capacity exceeds 3.5 m^2/day, then any well interference can be deemed to be acceptable.

Summary of Findings

Based on a feasibility assessment of existing water well information, the following conclusions have been drawn:

[1] There is currently no subdivision in the SW-26 quarter section. The proposed 33 lot subdivision would have a total water requirement of 112.9 m^3/day [33 lots x 3.42 m^3/day per lot].

[2] Based on existing water well flow test information within a block of nine quarter sections, there is a cumulative groundwater potential of 248.6 m^3/day within the upper 60 meter depth. The water requirement for the proposed subdivision is less than the available cumulative groundwater potential. There is, therefore, sufficient potential groundwater reserves to service the proposed 33 lot subdivision with individual wells.

[3] The groundwater supply for the proposed 33 lots can be met by wells completed within varying depth intervals up to 60 meters. Due to the absence of any site-specific water well data, an exploratory test well would be required to substantiate the availability of groundwater reserves.

[4] To minimize a concern for well interference, the critical parameters are a minimum transmissive capacity of 3.5 m^2/day and a well separation distance of at least 25 meters.

[5] The transmissive capacity will need to be calculated on an individual well basis. A minimum well test duration of 12 hours pumping and 12 hours of recovery is sufficient to generate the required data. For a licensed communal well, a minimum flow test of 36 hours of pumping and 36 hours of recovery should be undertaken.

Closure

If you have any questions or comments regarding the assumptions and conclusions drawn in this groundwater feasibility assessment, contact the undersigned at your convenience. It should be noted that the assessment of potential groundwater availability is not a guarantee, but rather an indication of the probability of securing a sustainable groundwater supply. Site-specific well testing is required to confirm an adequate groundwater supply. Thanking your for the opportunity to have been of service, we remain,

Respectfully yours,
Groundwater Exploration & Research Ltd

Bob Nowak

Bob Nowak; Ph.D., P.Geol.
Groundwater Geologist

PROFESSIONAL GEOLOGIST ALBERTA
ROBERT L. NOWAK

PERMIT TO PRACTICE
Groundwater Exploration & Research Ltd.
Signature B. Nowak
Date Oct 25 '00
PERMIT NUMBER:
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Appendix

Table 1
Summary of Groundwater Well Data

Location	Landowner	Date Drilled	Td/Npwl (ft)	Flow Estimate	Completion Interval (ft)
TP21, R29					
NE-26	Hunt	Apr 79	100/18	12 Cgpm/2 hrs	70 - 100
NE-26	Theologian	Oct 93	90/36.5	4 Cgpm/4 hrs	50 - 90
NW-26	Theologian	Sep 93	170/10	4 Cgpm/4 hrs	130 - 170
NW-26	Vernon	Aug 81	20/8	10 Cgpm/2 hrs	na
SE-26	Jeb Holding	Oct 95	55/20	15 Cgpm/2 hrs	25 - 45
NE-27	Rice	Mar 93	70/20	>10 Cgpm/2.3 hrs	40 - 70
NE-27	Fitzpatrick	Mar 90	120/19	8 Cgpm/5 hrs	62 - 75 & 100 - 118
NE-27	Lawson	Aug 82	144/22	45 Cgpm/3.25 hrs	54 - 125
SE-27	Watt	May 66	55/15	4.5 Cgpm/2 hrs	na
NE-22	Yeats	Oct 75	70/25	8 Cgpm/4 hrs	40 - 70
NE-22	Yeats	Oct 88	145/30	15 Cgpm/2 hrs	30 - 85 & 125 - 145
NE-22	Whitlow	Apr 68	97/35	na	57 - 92
NE-22	Dickieson	Aug 90	150/20	45 Cgpm/4 hrs	35 - 40 & 53 - 60 & 70 - 76
NE-22	Sheppard	Jan 90	150/25	15 Cgpm/4 hrs	110 - 150
NE-22	MacLean	Jun 68	88/30	35 Cgpm/na	60 - 82
NE-23	Polara Contractors	Oct 70	110/74	18 Cgpm/1 hr	80 - 106
NE-23	Winnick	Jul 84	500/135	3 Cgpm/6 hrs	280 - 320
NW-23	Western Cattle Co.	Mar 92	175/30.9	4 Cgpm/8 hrs	135 - 175
SE-27	Deer Creek Land Dev	Jul 00	100/11	10.5 Cgpm/13 hrs	70-100
SE-27	Deer Creek Land Dev	Jul 00	120/23	8 Cgpm/13 hrs	85-120
SE-27	Deer Creek Land Dev	Jul 00	135/flwg	6 Cgpm/11 hrs	134-135
SE-27	Deer Creek Land Dev	Aug 00	120/flwg	8.25 Cgpm/12 hrs	119-120
SE-27	Deer Creek Land Dev	Aug 00	50/flwg	7 Cgpm/13 hrs	50-51
SE-27	Deer Creek Land Dev	Aug 00	120/flwg	10 Cgpm/12 hrs	100-120
SE-27	Deer Creek Land Dev	Aug 00	117/flwg	6 Cgpm/15 hrs	115-117
SE-27	Deer Creek Land Dev	Jul 00	120/flwg	7 Cgpm/12 hrs	119-120
SE-27	Deer Creek Land Dev	Jul 00	115/flwg	12 Cgpm/13 hrs	95-115
				flwg = flowing	
				na = not available	

Shannon Estates

Appendix 3

Soil Report

Matrix Solutions

Matrix Solutions Inc.

ASSESSMENT OF ARABILITY
FOR THE
SW1/4 26-021-29 W4M

Report Prepared for:

BOWWOOD LAND SERVICES INC.

Prepared by:

MATRIX SOLUTIONS INC.

April 2001
Calgary, Alberta

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1.0 INTRODUCTION

In response to a request from Mr. Wayne Berglund of Bowwood Land Services Inc., the SW1/4 26-021-29 W4M was inspected on April 12, 2001 by Blair Nicholson, an Agrologist with Matrix Solutions Inc. (Matrix). The purpose of the inspection was to assess the potential for arable agriculture on the property. This report summarizes the findings of the field inspection. All site photographs are contained in Appendix A.

The subject property is located two miles east of the Okotoks overpass in the Municipal District of Foothills, No. 31 (Figure 1). It can be accessed from Secondary Road 552 (274 Avenue E) (Photo 1) which borders the south side of the subject property. The west side of the property is bordered by 48 Street E, which is a paved road at the south end adjacent to Norris Coulee Subdivision (Photo 2). The entire SW1/4 26-021-29 W4M was assessed, approximately 160 acres.

The perimeter of the subject property is fenced. At the time of inspection, the subject property was in pasture (Photo 3) and grain production (Photo 4). Features on the quarter section include rough broken topography (Photo 5), treed areas (Photo 6), buckbrush, (Photo 7) and a dugout (Photo 8). There are no buildings located on the subject property.

The field inspection for this assessment consisted of the following:

- walking and driving over the property;
- describing soil profiles according to the Canadian System of Soil Classification (SCWG, 1998). Soil profile descriptions included common horizon sequences, soil texture (hand), gleying, effervescence and moisture status.
- noting landforms;
- taking slope readings with a clinometer;
- measuring slope lengths;
- taking photographs; and
- in general, looking for any limitations recognized in the two rating systems used to assess agricultural capability.

No soil samples were collected for analysis during the inspection, as soil chemistry was not deemed to be an issue with regard to this property. A digital aerial photograph of the subject property, at a scale of 1:10,000, was used for mapping. The original aerial photograph was flown in 1998 at a scale of 1:20,000.

2.0 RATING SYSTEMS

The two recognized systems for rating arability of land that were used in this report are the Canada Land Inventory Soil Capability for Agriculture in Alberta (Brocke, 1977) and the Land Capability Classification for Arable Agriculture in Alberta (Alberta Soils Advisory Committee, 1987). Both of these systems recognize seven classes, with the limitations for agriculture becoming progressively greater from Class 1 to Class 7.

The Canada Land Inventory (CLI) rating system was developed in the early 1960s. Fourteen different kinds of limitations are recognized in this system as a result of adverse climate, soil or landscape characteristics. The final class placement is based on the most limiting of these three components. The CLI is an interpretive soil capability classification system derived from extrapolating soil survey data, climatic data and crop data, that rates land for arable agriculture under a dryland management system. One published CLI classification (Agriculture Canada Soil Research Institute, 1971), at a scale of 1:250,000, exists for this property (Figure 2). In addition, the more recent (1987) soil survey of the Calgary Urban Perimeter (Alberta Soil Survey Report No. 45), mapped at 1:50,000, reflects a finer tuned boundary placement of these same CLI interpretative standards (Figure 3). Field inspections are necessary to confirm these classifications for local or site-specific developments.

The Land Capability Classification for Arable Agriculture in Alberta (LCCAAA) was developed in the late 1980s, using all of the basic assumptions and guidelines of the CLI system, as well as a system called the Storie Index. It was designed to replace the CLI rating system. The LCCAAA recognized 21 different kinds of limitations and utilized updated agro-climatic information and increased specificity of soil characteristics, as compared to those which are included in the guidelines for the CLI. No published maps exist for the LCCAAA rating system. The ratings are designed to be performed on small-scale, site-specific applications. Use of the LCCAAA is strongly

endorsed by the Alberta Soil Survey, Alberta Environment, Alberta Forests and Wildlife, Alberta Agriculture Food and Rural Development and Alberta Municipal Affairs.

3.0 GENERAL DESCRIPTION OF THE SUBJECT PROPERTY

3.1 Soil Survey of the Calgary Urban Perimeter

The soils of the subject property are described in the Soil Survey of the Calgary Urban Perimeter (MacMillan, 1987). This survey delineates seven map units for the SW1/4 26-021-29 W4M (Figure 3). These map units identify five different soil series for the subject lands, namely Happy Valley (HPV), Rockyview (RKV), Academy (ADY), Eastbow (EBO) and DeWinton (DWT). In addition, one undifferentiated land unit is identified for the subject lands, namely Rough Broken (RB).

Two Happy Valley units are identified. The units are symbolized as HPV1/cb and HPV2/d. Happy Valley is a weakly developed, rapidly drained, black to dark brown grassland soil formed on sandy to coarse loamy glaciofluvial sediments. These sediments are almost always very strongly calcareous. The stone content is generally low. Happy Valley soils are classified as Rego Black. Many happy Valley profiles are subject to erosion by wind and are further described as an eroded phase. This situation is so widespread that most of the surface of Happy Valley soils has been affected to some degree by wind sorting. The subsoils also have a low clay content.

The HPV1 unit is mapped on smooth, level to undulating glaciofluvial landforms. Agricultural use of this unit is limited by droughtiness and erosion. The letters to the right of the slash mark in the map unit symbol represents slope class limits. The slope class limits represented by the letters "cb" are 5-0.5%. The HPV2 unit is mapped on inclined sloping or ridged glaciofluvial landscapes. Agricultural use of this unit is again limited by droughtiness and erosion as well as steep slopes. The slope class limits represented by the letter "d" are 6-9%.

In addition to the Happy Valley units described above, Happy Valley soils are identified on the subject lands in combination with Academy soils. The Happy Valley-Academy unit is symbolized

as HPAD3/d. This map unit symbol reflects the grouping together of two complex mixtures of soils and parent materials.

Academy soils are deep, well drained, black grassland soils. They are classified as Orthic Black Chernozemic soils. The parent material of this unit (HPAD3/d) varies from sandy to coarse loamy glaciofluvial sediments to fine loamy till. The topography is hummocky. Individual hummocks can be a complete mixture of both materials or entirely one or the other. A representative profile of Academy soil has a relatively thin, black surface horizon underlain by a brown oxidized horizon. The unaltered parent material is encountered at depths between 40 and 70 cm. Agricultural constraints to use of HPAD3 units are adverse topography, droughtiness and to a lesser extent, erosion. The slope class limits represented by the letter "d" are again 6-9%.

In addition to the Happy Valley unit described above, Academy soils are identified on the subject lands in combination with Rockyview and Eastbow soils. The Rockyview-Academy unit is symbolized as RKAD5/c. The Eastbow-Academy unit is symbolized as EBAD1/c. These map unit symbols identify a complex of two soils within a polygon.

Rockyview soils are deep, well drained black grassland soils. The parent material is a strong calcareous aeolian veneer overlying till which usually occurs at depths between 50 and 100 cm. This unit (RKAD5) is mapped on slightly rough, undulating, ridged or hummocky morainal landscapes. Rockyview soils are classified as Orthic Black Chernozemics. In situations where the surface horizon is relatively thin, Rego Black profiles are also described. Rockyview is always mapped in association with Academy soils which lack an aeolian veneer. The thickness and degree of development of soil profiles vary widely in this unit. Imperfectly drained soils can comprise large portions of the unit. Weakly developed profiles are common. Agriculturally, soil erosion limits this unit's capability. The slope class limits represented by the letter "c" in the map unit symbol are 2-5%.

Eastbow soils are shallow, weakly developed, black grassland soils. On the subject lands this unit (EBAD1/c) is found on smooth, level to gently rolling morainal landscapes. The unit has a complex mixture of parent materials, whose distribution cannot be predicted from readily observable landscape features. The texture of the top 1 m throughout this unit can be expected to vary from sandy loam to silty clay loam. Thin and weakly developed soil profiles predominate, while deep,

well developed profiles are not as common. A representative profile of Eastbow soil has a thin, black, loamy surface horizon which rests directly on calcareous parent material. Eastbow soils are classified as Rego Black Chernozemic soils. The agricultural constraints to EBAD1 areas tend to be soil erosion and pockets of droughty soils.

The fifth soil series identified for the subject property is DeWinton. The DeWinton unit identified is symbolized as DWT1/ab. DeWinton is a poorly drained, weakly developed, depressional soil formed on recent slough deposits. The slough deposits have a variable texture, contain few stones and are often strongly calcareous throughout their depth. These depressions are located within undulating to hummocky morainal or glaciofluvial landscapes. Material eroded from the surrounding areas collects in the depressions, as does runoff and infiltration water. DWT1 areas are nearly level and vegetation consists primarily of grasses and sedges. DeWinton is classified as a Rego Humic Gleysol, carbonated phase. The slope class limits represented by the letters "ab" in the map unit symbol are 0-2.5%.

In addition to the above five soil series identified for the subject lands, one undifferentiated land unit, namely Rough Broken is identified within the subject property. The unit is symbolized as RB4/f. The number 4 indicates the possibility of different types of parent material, with varying proportions of bedrock. For RB areas, slope steepness is more important than soil properties or climate in determining limitations for agricultural use. This unit is always to steep and irregular for cultivation. Most RB areas are used for pasture. Central drainage channels within the steep valley sides are often imperfectly to poorly drained. The slope class limits represented by the letter "f" in the map unit symbol are 16-30%.

3.2 Site-Specific Evaluation

Following is a description of the 160 acres of the SW1/4 26-021-29 W4M based on the April 12, 2001, site-specific evaluation.

The soils of the subject property have developed in both eolian and glaciofluvial sediments. The eolian deposits are sandy. They are associated with undulating to hummocky topography (Photo 9). The glaciofluvial deposits are heavier-textured. They are associated with low-lying to flat topography (Photo 10).

The undulating to hummocky topography occupies the south and east portions of the quarter section. It is inclined toward the centre portion of the quarter section where the lower lying land is found. This stronger topography is well drained. The slope length is variable. The highest land is located in the southwest corner. Slopes of up to 10% are present. Slopes in the 6-9% range are common on the higher land. Slopes in the 2-5% range are present on the east side of the quarter section. The parent material is calcareous throughout. Calcareous Chernozemic profiles in association with Rego Chernozemic profiles are found almost exclusively throughout this unit.

The low-lying to flat topography is located in the northwest quadrant of the quarter section. This area is a poorly drained basin. Runoff from the adjacent higher sandy landscape contributes to the high moisture level. Heavy clay soils are found in this low area. These soils are not sufficiently open to permit excess water to pass through, thus a high watertable is present. Better drained soils are found on the south and west sides of the unit. Here, slightly higher land is dotted with lower lying wet areas. Mottles and gley layers, indicative of periodic soil wetness, are located further down the soil profile on this slightly higher land. The actual moisture conditions fluctuate considerably depending on topographic position and seasonal weather. In the lowest topographical positions excess water accumulates (Photo 11). Strongly carbonated Gleysolic soils are associated with this unit. At the time of inspection the watertable was located 30 cm below ground surface.

The treed areas (Photo 6) and buckbrush (Photo 7) are located on the margins of the poorly drained unit. The rough broken topography (Photo 5) is located in the south east corner of the quarter section. This area is too steep for cultivation. The dugout (Photo 8) is located along the east boundary of the subject lands. Most of the subject property is presently used for pasture (Photo 3). A small irregular shaped area, west and south of the flattest portion of the undrained basin, is used for cereal production (Photo 4).

4.0 CLI SITE-SPECIFIC EVALUATION

As previously mentioned, CLI ratings have been published for the SW1/4 26-021-29 W4M. However, this information does not constitute a site-specific evaluation, as the information they are based on is averaged over large areas and derived using broad scale aerial photographs and soil

survey information without extensive ground truthing. Field inspections are necessary to confirm these classifications for local or site-specific developments. The published CLI classifications outlined below are provided here for background information purposes only.

The SW1/4 26-021-29 W4M investigated has been classified under the CLI Soil Classification for Agriculture System on Map Sheet 82I Gleichen (Agriculture Canada Soil Research Institute, 1969), at a scale of 1:250,000 (Figure 2). This study delineates one complex unit for the subject property. The subject property is classed as 70% Class 3T, 20% Class 2C and 10% Class 5T. The notation recognizes a complex area rated Class 3, due to adverse topography (T), Class 2 due to climatic conditions (C) and Class 5 due to adverse topography (T). The dominant class appears first in a complex symbol. Of the three components rated, climate is the dryland agriculture factor least easily changed by management.

The most recent published data for the CLI, the 1:50,000 study, identified seven areas for the subject property (Figure 3). The HPV1/cb soil-landscape delineation has been given a CLI classification of Class 3M. This classification denotes an area rated Class 3 due to low available moisture holding capacity (M). The HPV2/d soil-landscape delineation has been given a CLI classification of Class 4MT. This classification denotes an area rated Class 4 due to low available moisture holding capacity (M) and adverse topography (T). The HPAD3/d soil-landscape delineation has also been given a CLI classification of Class 4MT. The RKAD5/c soil-landscape delineation has been given a CLI classification of 50% Class 2T and 50% Class 3TE. This classification denotes an area rated Class 2 due to adverse topography (T) and Class 3 due to adverse topography (T) and erosion damage (E). The EBAD1/c soil-landscape delineation has been given a CLI classification of 70% Class 2E and 30% Class 3M. This classification denotes an area rated Class 2 due to erosion damage (E) and Class 3 due to low available moisture holding capacity (M). The RB4/f soil-landscape delineation has been given a CLI classification of Class 6TI. This classification denotes an area rated Class 6 due to adverse topography (T) and inundation (I).

These classifications are generalized for each soil map unit but are considered to be more specific than the CLI maps which were published in the 1960's at a scale of 1:250,000.

A site-specific CLI classification was done for the subject property, using the CLI manual and is presented as Figure 4. This site-specific CLI classification presents more closely defined boundaries than the above mentioned study and allows for improved characterization of the soil and landscape qualities of the property.

Of the three major components (soils, climate and landscape) under the CLI rating system, only the soil and landscape components were found to be limiting on the subject property. The subclass limitation recognized on the subject property due to unfavourable soil characteristics was low available moisture holding capacity (M). The subclass limitations recognized on the subject property due to unfavourable landscape characteristics were adverse topography (T) and excessive wetness (W). These three characteristics constitute the most important factors limiting agricultural activities on the subject property.

The "M" symbol represents low available moisture holding capacity. This subclass limitation is primarily evaluated on the basis of texture. That is, as the amount of clay decreases, the moisture holding capacity decreases and the degree of limitation increases.

The "T" symbol represents adverse topography, both steepness of slopes and pattern. This subclass applies to areas where topography is considered to be a limitation to agricultural use. Assessment of this limitation includes evaluation of the hazards imparted to cultivation by the degree of slopes as well as those due to irregularity of field patterns and lack of soil uniformity as a result of complex landform patterns.

The "W" symbol represents excessive wetness. This subclass limitation is applied to soils where excess moisture is a limitation. The degree of this limitation is dependent on the duration of the period that these soils remain wet, as this affects the timing of cultivation, seeding and harvest.

In summary, the CLI classification for the 160 acres of the SW1/4 26-021-29 W4M investigated is as follows, with the boundaries as shown on Figure 4. The acreages are approximations, having been derived from a dot grid assessment. The rating symbol shows class placement and limitation.

58 acres - 3M

59 acres - 4M

9 acres - 4W

29 acres - 5W

5 acres - 6T

5.0 LCCAAA SITE-SPECIFIC EVALUATION

Using the LCCAAA manual, a site-specific LCCAAA classification was done for the subject property and is presented on Figure 5. This evaluation allows for improved characterization of the property's limitations over that presented in the CLI site specific evaluation above. Again, the overall classification is governed by the most limiting of the three major components (soils, climate and landscape). The worksheets for the LCCAAA rating system are found in Appendix B.

Under the LCCAAA rating system all three of the major arability components were found to be limiting on the SW1/4 26-021-29 W4M. The subclass limitation recognized on the subject property due to unfavourable climate characteristics is energy (H). The subclass limitation recognized on the subject property due to unfavourable soil characteristics was low available moisture holding capacity (M). The subclass limitations recognized on the subject property due to unfavourable landscape characteristics were adverse topography (T) and excessive wetness (W).

The energy subclass limitation applies to areas where a shortened growing season is a limitation to agricultural activities. The energy rating is based on an effective growing degree day (EGDD). The critical points used for development of the rating were based on known crop requirements and Alberta farming experience. The 1,200 EGDD point delineates the point where wheat drops to a minor component in a dominantly barley system. The subject property rates 1,120 points on the EGDD scale (LCCAAA worksheets Appendix B). Using this up-to-date climatic information available in the LCCAAA rating manual placing the agricultural potential of the subject property in Class 3. This climate rating results in a change from that presented under the CLI classification. The area rated Class 3M has the "H" symbol added because it is equally limited by climatic and landscape constraints.

The low available moisture holding capacity, adverse topography and excessive moisture subclass limitations were covered under the CLI site specific evaluation.

In summary, the LCCAAA classification for the 160 acres of the SW1/4 26-021-29 W4M investigated is as follows, with the boundaries as shown on Figure 5. The acreages are approximations, having been derived from a dot grid assessment. The rating symbol shows class placement and limitation.

58 acres - 3HM
59 acres - 4M
9 acres - 4W
29 acres - 5W
5 acres - 6T

6.0 CONCLUSIONS

The soil capability classification system used in this report is based on several assumptions. Three of these assumptions are: shrubs, trees and stumps are not considered a limitation unless it is not feasible to remove them; good soil management practices that are feasible and practical under a largely mechanized system of agriculture are used; and this system is based on limitations for agriculture and general productive capacity for common field crops.

In conclusion, the April 12, 2001 site-specific evaluation, using the most up to date system of rating land (LCCAAA evaluation), places 58 acres of the SW1/4 26-021-29 W4M into Class 3HM, 59 acres into Class 4M, 9 acres into Class 4W, 29 acres into Class 5W and 5 acres into Class 6T. Class 3 lands have moderately severe limitations. Under good management they are fair to moderately high in productivity for a fair range of crops. Class 4 lands are considered marginal for arable agriculture. They have such severe limitations that they are suited only for a very narrow range of crops and the risk of crop failure is high. Class 5 lands have very severe limitations for sustained arable agriculture. Annual cultivation using common cropping practices is not recommended. The severity of the limitations of these soils renders them unsuitable for annual cultivation. While improvement practices are feasible, their capability is restrictive to the production of perennial forage crops. Class 6 lands have such severe limitations for arable agriculture that cropping is not feasible, even on an occasional basis.

7.0 REFERENCES

Agriculture Canada Soil Research Institute, 1971. "Canada Land Inventory Soil Capability for Agriculture, Kananaskis Lakes Map Sheet Area 82J." Ottawa, Ontario.

Alberta Soils Advisory Committee, 1987. "Land Capability Classification for Arable Agriculture in Alberta (1987)." Edited by W.W. Pettapiece. Alberta Agriculture, Edmonton, Alberta.

Brocke, L.K., 1977. "The Canada Land Inventory Soil Capability for Agriculture in Alberta." Alberta Environment, Edmonton, Alberta.

MacMillan, R. A., 1987. "Soil Survey of the Calgary Urban Perimeter; Alberta Soil Survey Report No. 45." Terrain Sciences Department, Alberta Research Council. Edmonton, Alberta.

Soil Classification Working Group (SCWG), 1998. "The Canadian System of Soil Classification." Agric. and Agri-Food Can. Publ. 1646 (revised), Ottawa, Ontario. 187 pp.

8.0 CERTIFICATION

I certify that I inspected the SW1/4 26-021-29 W4M, as identified in this report on April 12, 2001. Using information from the field inspection and information from previously published CLI map sheet Gleichen 82I at a scale of 1:250,000, as well as the Soil Survey of the Calgary Urban perimeter, the classification of the subject property was done using the guidelines for two systems of classification: the Canada Land Inventory (CLI) Soil Classification for Agriculture and the Land Capability Classification for Arable Agriculture in Alberta (LCCAAA). The subject property is classified by both systems, but the preferred system is the LCCAAA. Therefore, the classification of the SW1/4 26-021-29 W4M inspected is as follows:

58 acres - 3HM
59 acres - 4M
9 acres - 4W
29 acres - 5W
5 acres - 6T

I certify that I have no undisclosed interest, either actual or contemplated, in the property being inspected, nor is the fee contingent on the conclusions reached.

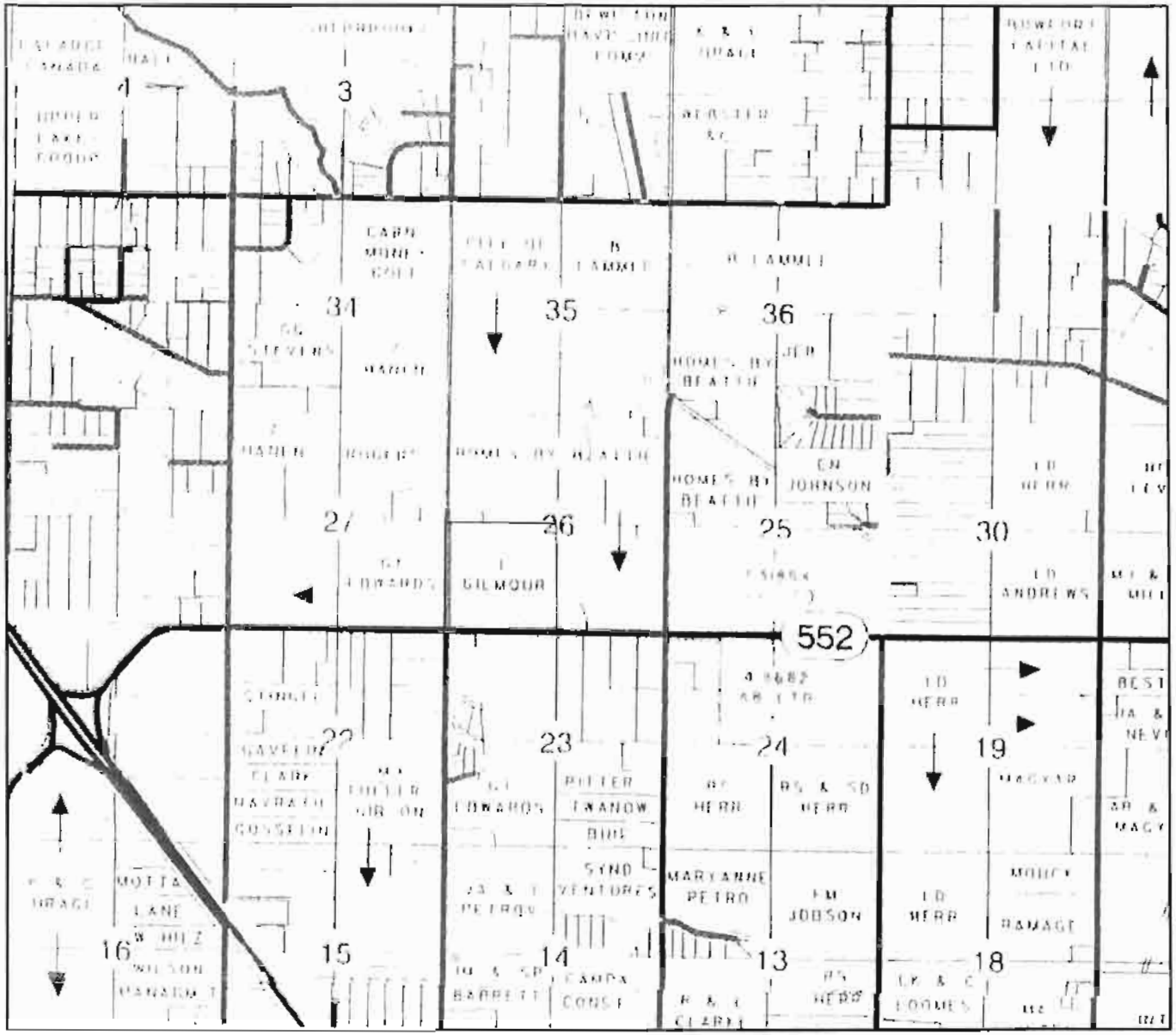
No legal survey was conducted during the inspection and area estimates in this report are approximate, derived from dot grid assessments of aerial photographs. Information provided by others and used in this report is believed to be accurate, but cannot be guaranteed.

This report has been prepared under the Code of Ethics of the Alberta Institute of Agrologists.

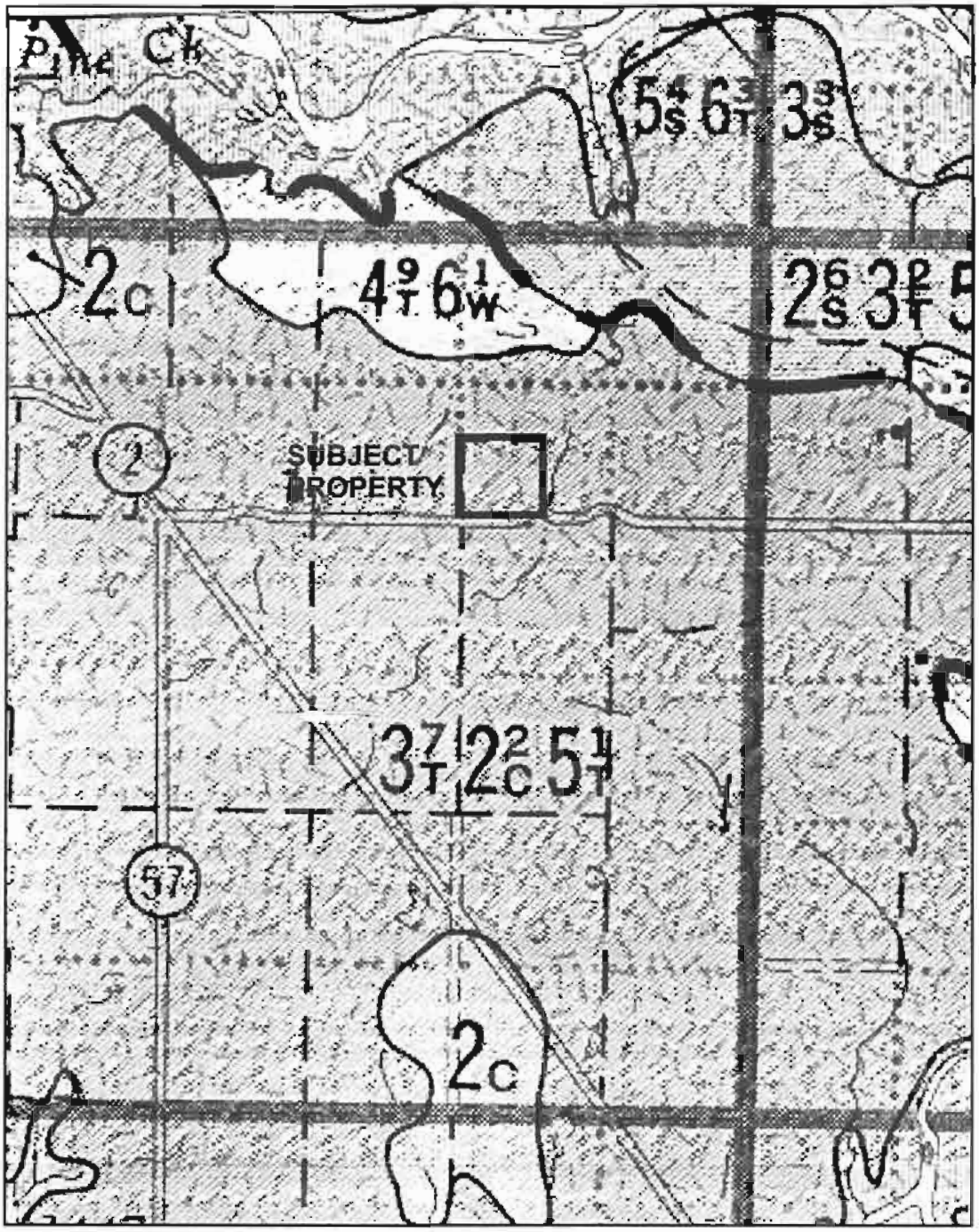
MATRIX SOLUTIONS INC.

Blair Nicholson, P.Ag.
Project Agrologist

April 2001

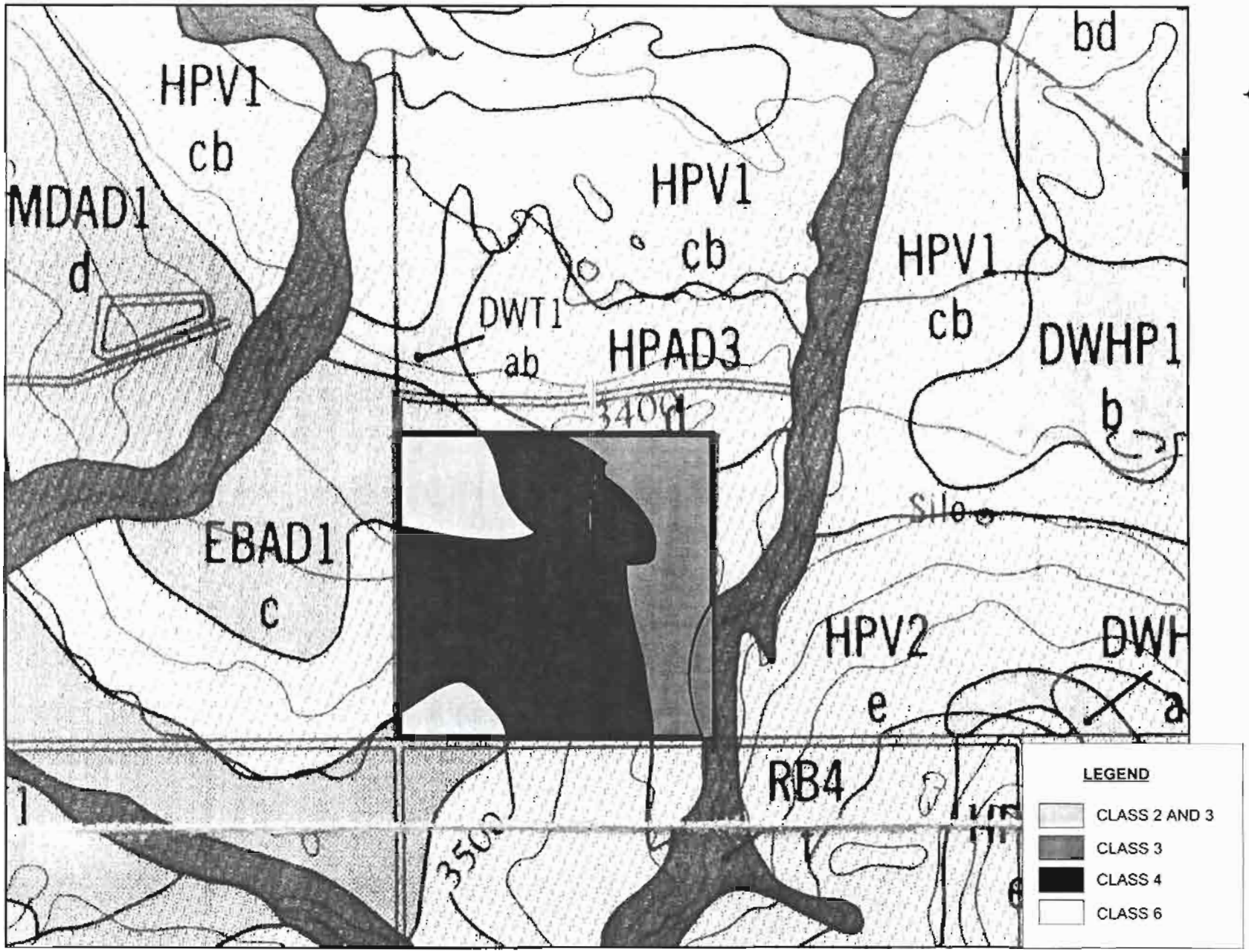


Matrix Solutions Inc.	JOB 2478-402	BY BN/TN	LOCATION OF THE SUBJECT PROPERTY SW ¼ 26-021-29 W4M	FIGURE 1
	DATE 04/16/01	DRWN TN		
	FILE 2478Aerial.cdr	CHKD BN		



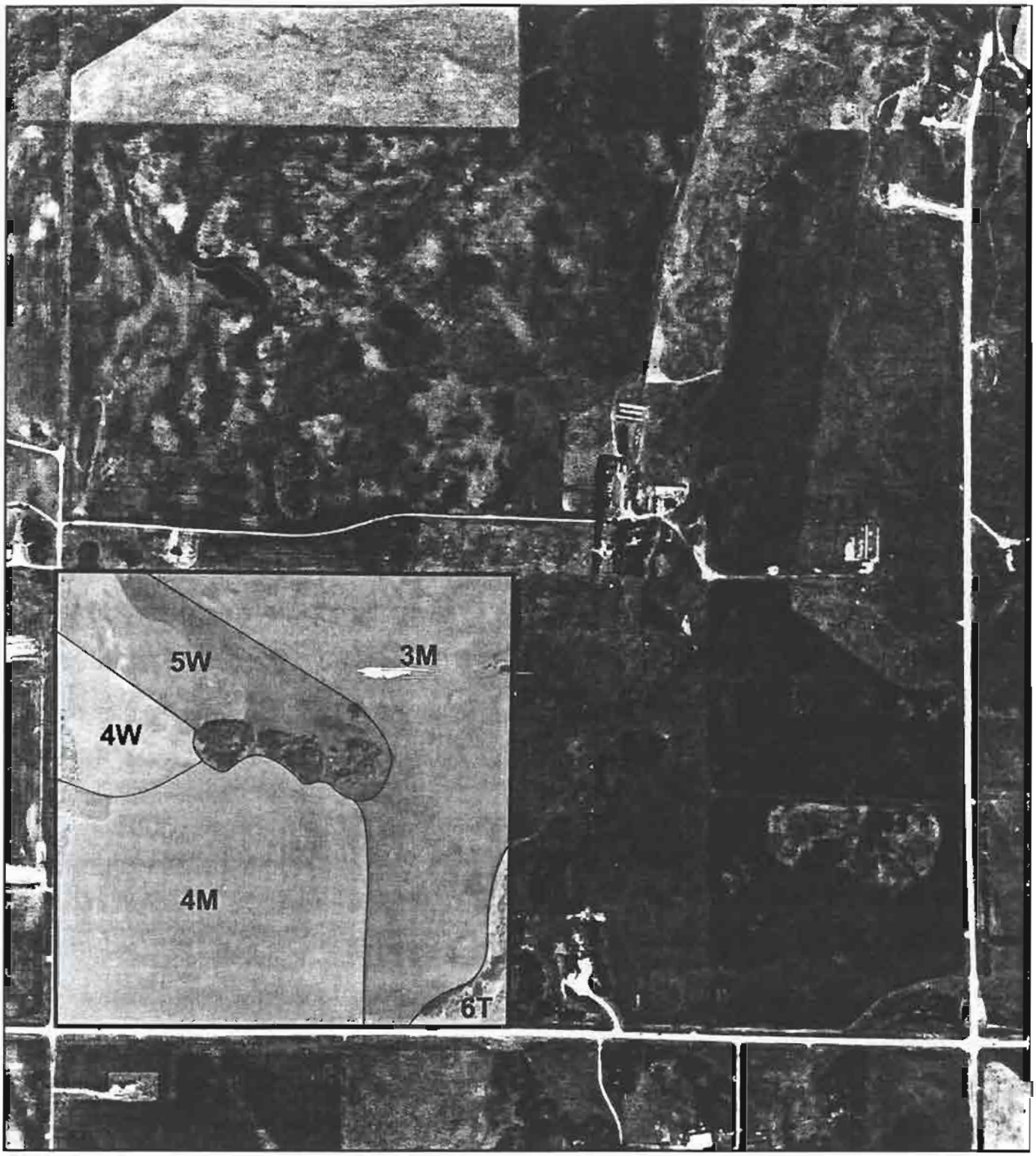
CLASS 3, 2, 5

Matrix Solutions Inc.	JOB 2478-402	BY BN	MAP SHOWING THE PUBLISHED CLI CLASSIFICATION FOR THE SUBJECT PROPERTY SW ¼ 26-021-29 W4M	FIGURE 2
	DATE 04/16/01	DRWN TN		
	FILE 2478CLI.cdr	CHKD BN		



Meridian Solutions Inc.	JOB 2478-402	BY BN/TN	EXCERPT FROM THE CALGARY URBAN PERIMETER SOIL SURVEY SHOWING THE SOIL CLASSIFICATION AND CLI INTERPRETATION FOR THE SUBJECT PROPERTY (SW ¼ 26-021-29 W4M)
	DATE 04/16/01	DRWN TN	
	FILE 2478Alr-1.cdr	CHKD BN	

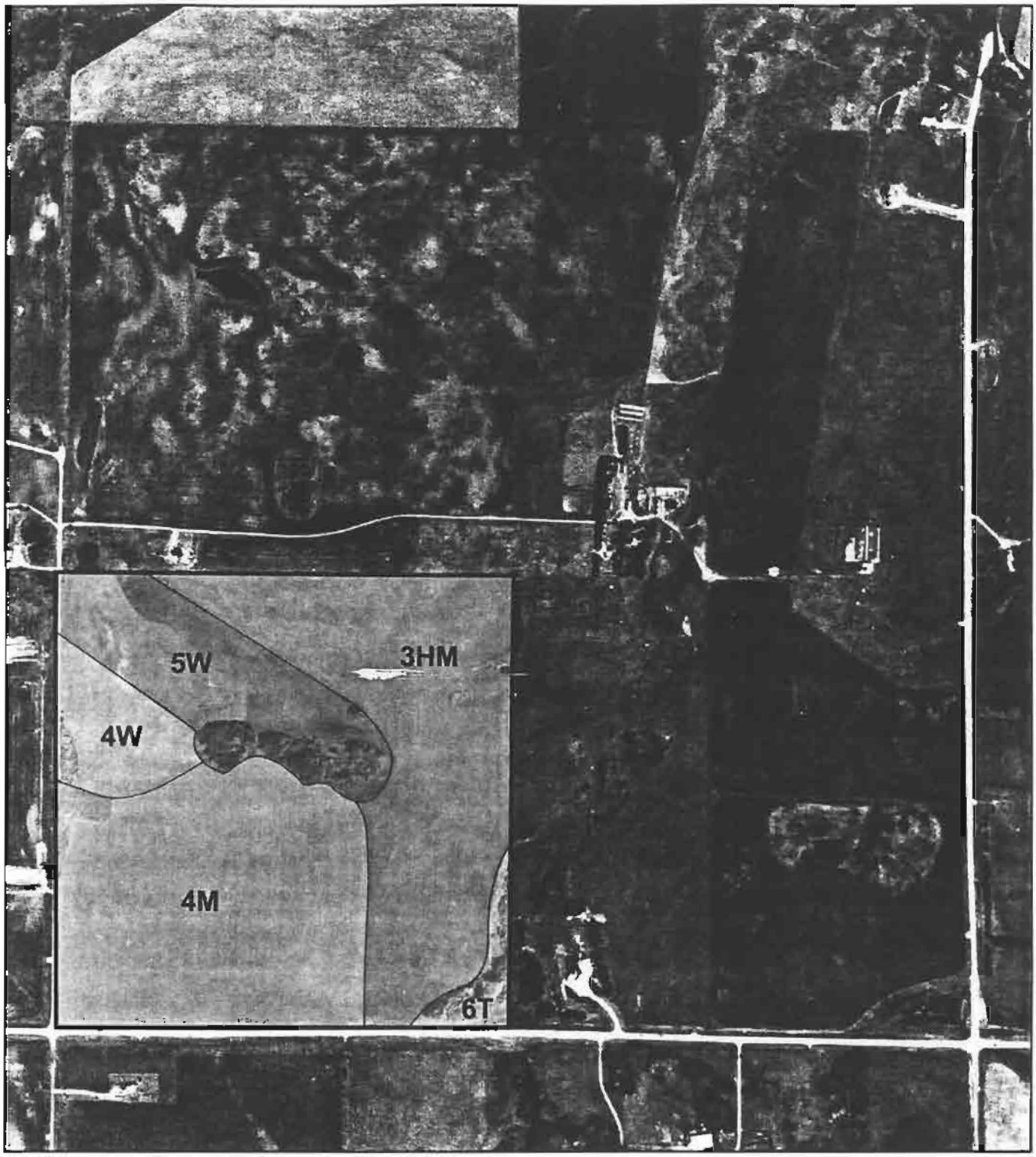
FIGURE 3



Scale 1:10,000

0 200 400m

Solutions Inc.	JOB 2478-402	BY BN	SITE SPECIFIC CLI RATING OF THE SUBJECT PROPERTY SW ¼ 26-021-29 W4M	FIGURE 4
	DATE 04/17/01	DRWN TN		
	FILE 2478FIG4.cdr	CHKD BN		



Scale 1:10,000

0 200 400m

Matrix Solutions Inc.	JOB 2478-402	BY BN	SITE SPECIFIC LCCAAA RATING OF THE SUBJECT PROPERTY SW ¼ 26-021-29 W4M	FIGURE 5
	DATE 04/17/01	DRWN TN		
	FILE 2478FIG5.cdr	CHKD BN		

APPENDIX A

SITE PHOTOGRAPHS

Photo 1: Secondary Road 552, a paved road, which borders the south side of the subject property.

Photo 2: 48 Street East, a paved road, which borders the west side of the subject property.

Matrix Solutions Inc.	JOB 2478-402	BY BN	SITE PHOTOGRAPHS APRIL, 2001	APPENDIX A
	DATE 04/16/01	DRWN TN		
	FILE 2478Photos.cdr	CHKD BN		

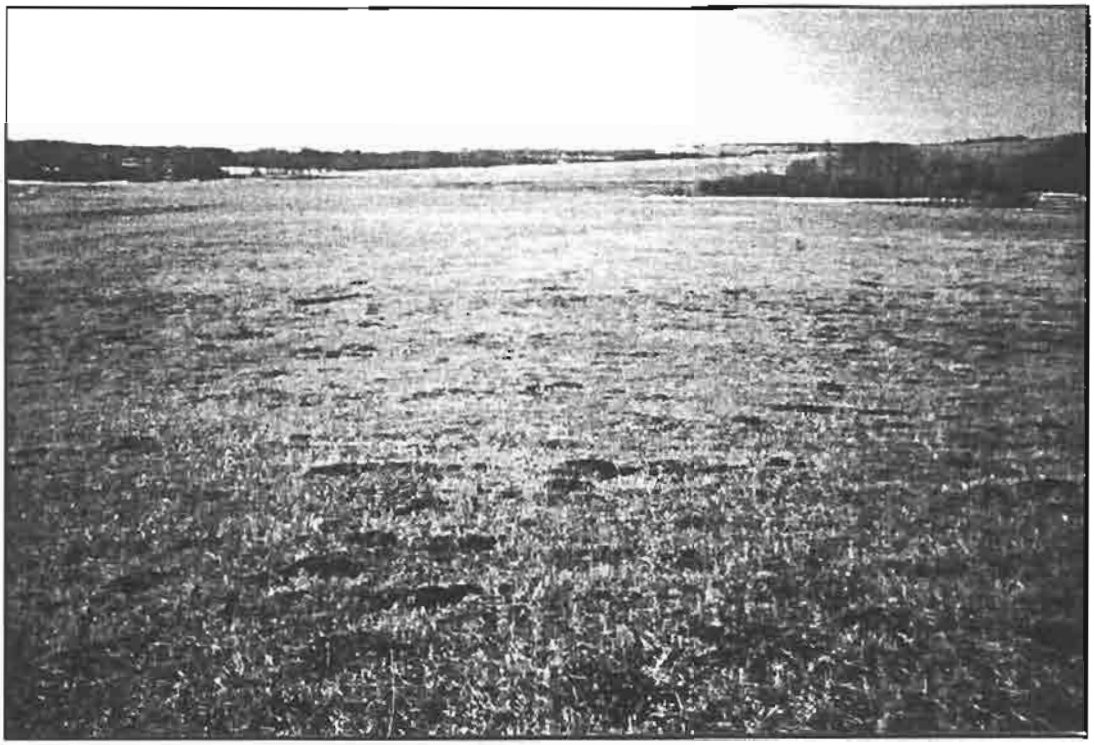


Photo 3: Pasture land on the subject property.

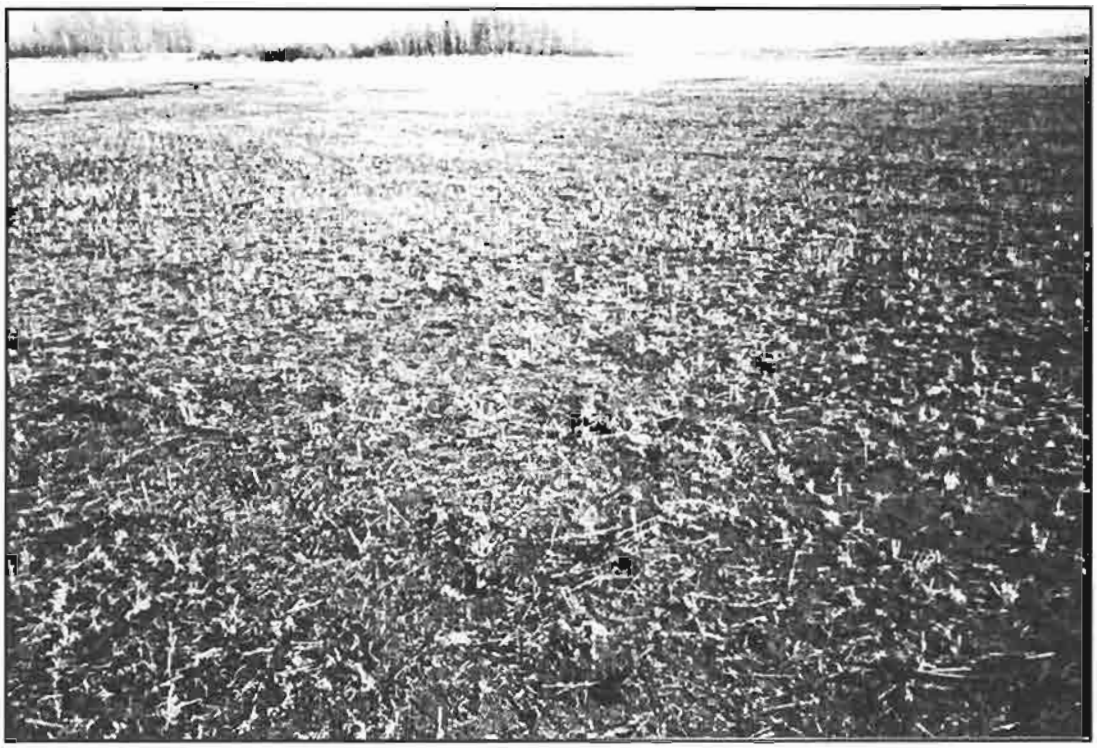


Photo 4: Cropland on the subject property.

Matrix Solutions Inc.	JOB 2478-402	BY BN	SITE PHOTOGRAPHS APRIL, 2001	APPENDIX A
	DATE 04/16/01	DRWN TN		
	FILE 2478Photos cdr	CHKD BN		

Photo 5: Rough broken topography on the subject property.

Photo 6: Treed area on the subject property.

Solutions Inc.	JOB 2478-402	BY BN	SITE PHOTOGRAPHS APRIL, 2001	APPENDIX A
	DATE 04/16/01	DRWN TN		
	FILE 2478Photos.cdr	CHKD BN		

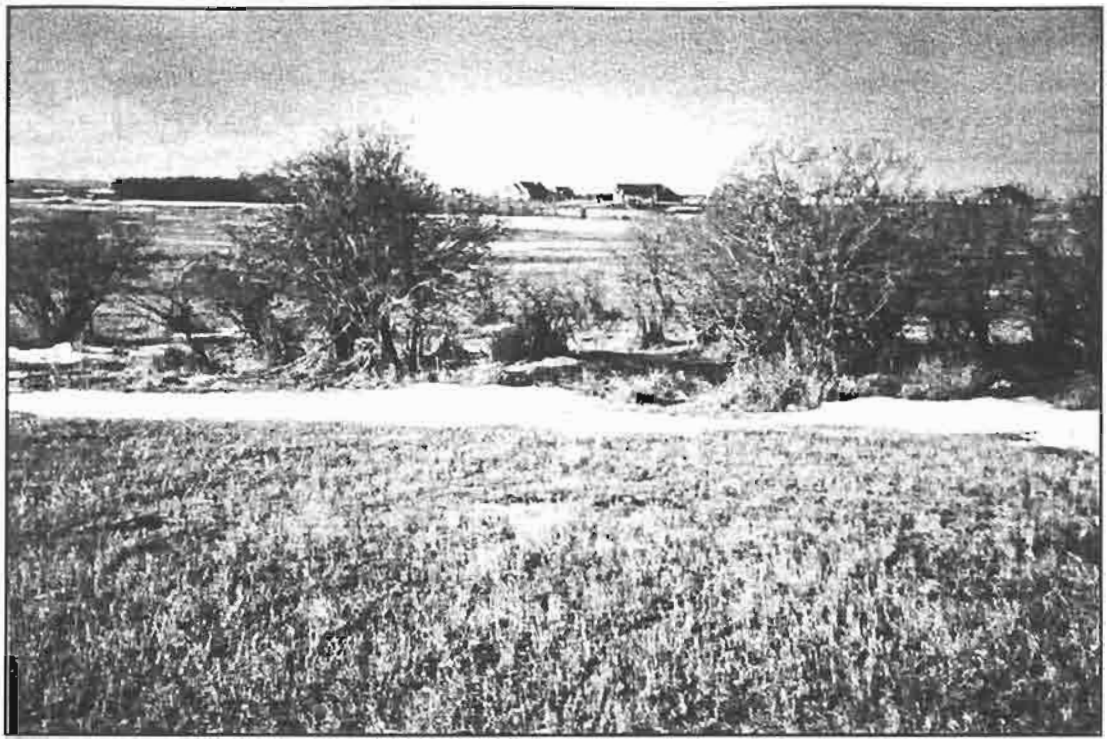


Photo 7: Buckbrush on the subject property.

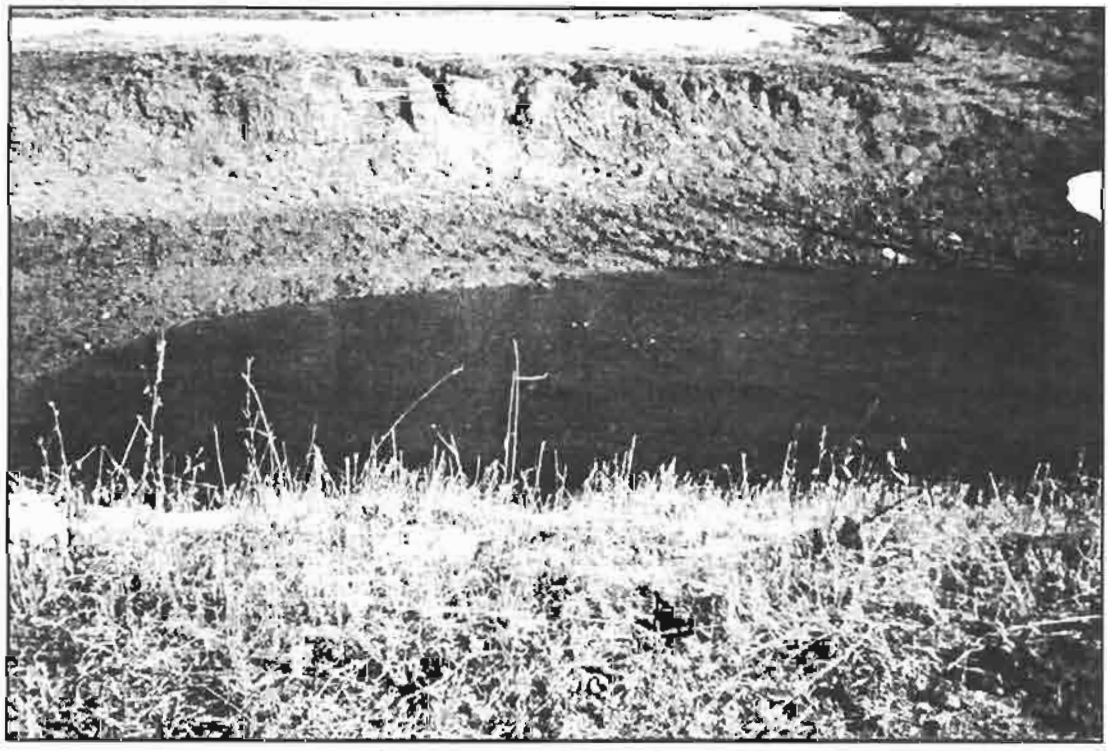


Photo 8: Dugout on the subject property.

Solutions Inc.	JOB 2478-402	BY BN	SITE PHOTOGRAPHS APRIL, 2001	APPENDIX A
	DATE 04/16/01	DRWN TN		
	FILE 2478Photos.cdr	CHKD BN		

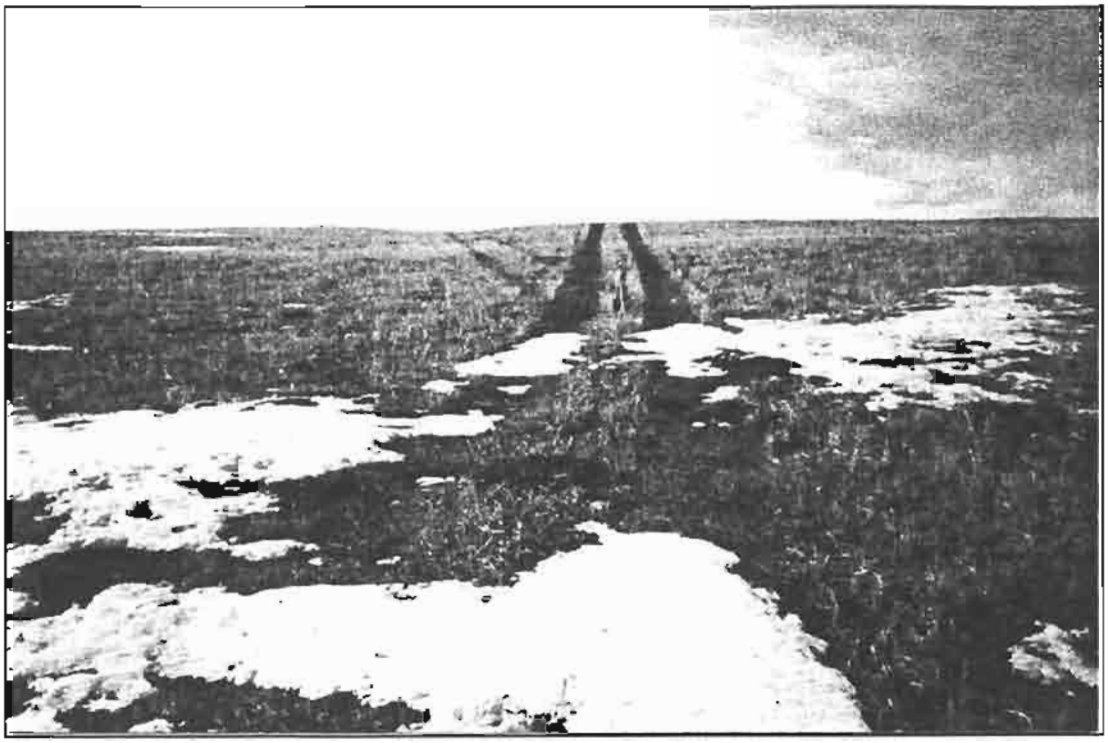


Photo 9: Inclined undulating topography on the subject property.

Photo 10 Flat low-lying topography on the subject property.

Matrix Solutions Inc.	JOB 2478-402	BY BN	SITE PHOTOGRAPHS APRIL, 2001	APPENDIX A
	DATE 04/16/01	DRWN TN		
	FILE 2478Photos.cdr	CHKD BN		

Photo 11: Water on the surface of the low-lying area on the subject property.

Matrix Solutions Inc.	JOB 2478-402	BY BN	SITE PHOTOGRAPHS APRIL, 2001	APPENDIX A
	DATE 04/16/01	DRWN TN		
	FILE 2478Photos.cdr	CHKD BN		

APPENDIX B

WORKSHEETS

AGRICULTURAL CAPABILITY RATING WORKSHEET
(SW1/4 26-021-29 W4M)

Class	Index
1	80 -100
2	60 - 79
3	45 - 59
4	30 - 44
5	20 - 29
6	10 - 19
7	0 - 9

AGRO-CLIMATE (C)

Moisture Component (A)	Value		Deduction
P-PE Index	-260		20
A =	100	-	20 = 80

Energy Component (H)			
E G D D Index	1120		50
H =	100	-	50 = 50

Basic Climate Rating is the lower of A or H = a) 50

Modifying Factors		(% deduction)
Spring Moisture	-35	2
Fall Moisture	-25	0
Hail	8	3
Fall Frost	0	0

Modification deduction 5.5% of a) = b) = 2.5

FINAL CLIMATE RATING = a) 50 - b) 2.5 = 47.5

= Class 3, H Subclass

April 26, 2001

Shannon Estate Area Structure Plan

Concerns:

1) **Water Resources**

- Approval should be withheld until the adjacent Norris Coulee development (all phases) are 80% complete and connected to wells and using the water and a determination made as to the effect (if any) on the remaining wells.

- What impact will a school have on the water resource when 500 (?) kids are using toilets etc. A lot of water will be required and I assume will be provided by yet to be drilled wells.

2) **Traffic**

- Highway 552 will require turning lanes into and out of the development with the density of population in the Norris Coulee and Shannon Estate developments and a school as well. Somebody is going to get killed for sure if nothing is done to improve the road access.

In as much as an approval of the Shannon Estate Structure Plan is in fact an approval of a yet to be received sub-division application, and the fact that the Shannon Estate Development and the adjacent Norris Coulee development are by the same developer (Gary Edwards); I believe the approval of the Shannon Estate Structure Plan should be conditional upon the above noted concerns being addressed as suggested or some other similar conditions being imposed.

Bryan Hamilton
N.E. ¼ 23-21-29-W4

LCCAAA AGRICULTURAL CAPABILITY RATING FORM

Location: SW1/4 26-021-29 W4M			CA.BL BH 1		CA BL BH 2	
			Value	% Ded.	Value	% Ded.
SOILS (S)	1. SURFACE FACTORS	Texture (M) (P-PE = -260)	SL	35	L	25
		Subsoil texture	SL	0	L	0
		Structure (D)	Gran	0	Gran	0
		Org Matter (F)	10YR2/2	0	10YR2/2	0
		Depth of Topsoil (cm) (E)	18	2	20	0
		Acidity (V)	–	–	–	–
		Salinity (N)	–	–	–	–
		Sodicity (Y)	–	–	–	–
		Calcareous (K)	20	20	20	20
		Peaty Surface (O)	–	–	–	–
	Basic Soil Rating		43		55	
	2. SUBSOIL FACTORS	Structure (D)	–	–	–	–
		Depth (R, D, M) (cm)	–	–	–	–
		Acidity (V)	–	–	–	–
		Salinity (N)	–	–	–	–
		Sodicity (Y)	–	–	–	–
	Subsoil Deduction		% =		% =	
	Interim Soil Rating					
	3. DRAINAGE (W)		% =		30% = 16.5	
	Final Soils Rating		43		38.5	
LANDSCAPE (L) Region 4	1. SLOPE (T)	Steepness (%)	10		3	
		Length (m)	75		100	
		LS Factor	(2.3) 43		(0.4) 5	
	Basic Landscape Rating		57		95	
	2. STONINESS (P)	Stoniness Deduction	( ) % =		( ) % =	
	Interim Landscape Rating					
	3. PATTERN (J)	Pattern Deduction	( ) % =		( ) % =	
	Final Landscape Rating					
FINAL RATING			4M		4W	

LCCAAA AGRICULTURAL CAPABILITY RATING FORM

Location: SW1/4 26-021-29 W4M			R.HG BH's 3, 4 and 5		CA.BL BH's 6,7 and 8	
			Value	% Ded.	Value	% Ded.
SOILS (S)	1. SURFACE FACTORS	Texture (M) (P-PE = -260)	CL	20	SL	35
		Subsoil texture	C	0	SL	0
		Structure (D)	Gran	0	Gran	0
		Org. Matter (F)	10YR2/1	0	10YR2/2	0
		Depth of Topsoil (cm) (E)	10	10	20	0
		Acidity (V)	–	–	–	–
		Salinity (N)	–	–	–	–
		Sodicity (Y)	–	–	–	–
		Calcareous (K)	20	20	15	15
		Peaty Surface (O)	–	–	–	–
	Basic Soil Rating		50		50	
	2. SUBSOIL FACTORS	Structure (D)	–	–	–	–
		Depth (R, D, M) (cm)	–	–	–	–
		[illegible] (V)	–	–	–	–
		Salinity (N)	–	–	–	–
		Sodicity (Y)	–	–	–	–
	Subsoil Deduction		% =		% =	
	Interim Soil Rating					
	3. DRAINAGE (W)		60% = 30		% =	
	Final Soils Rating		20		50	
LANDSCAPE (L) Region 4	1. SLOPE (T)	Steepness (%)			4	
		Length (m)			150	
		LS Factor	( )		(0.8) 16	
	Basic Landscape Rating				84	
	2. STONINESS (P)	Stoniness Deduction	( ) % =		( ) % =	
	Interim Landscape Rating					
	3. PATTERN (J)	Pattern Deduction	( ) % =		( ) % =	
	Final Landscape Rating					
FINAL RATING			5W		3HM	

LCCAAA AGRICULTURAL CAPABILITY RATING FORM

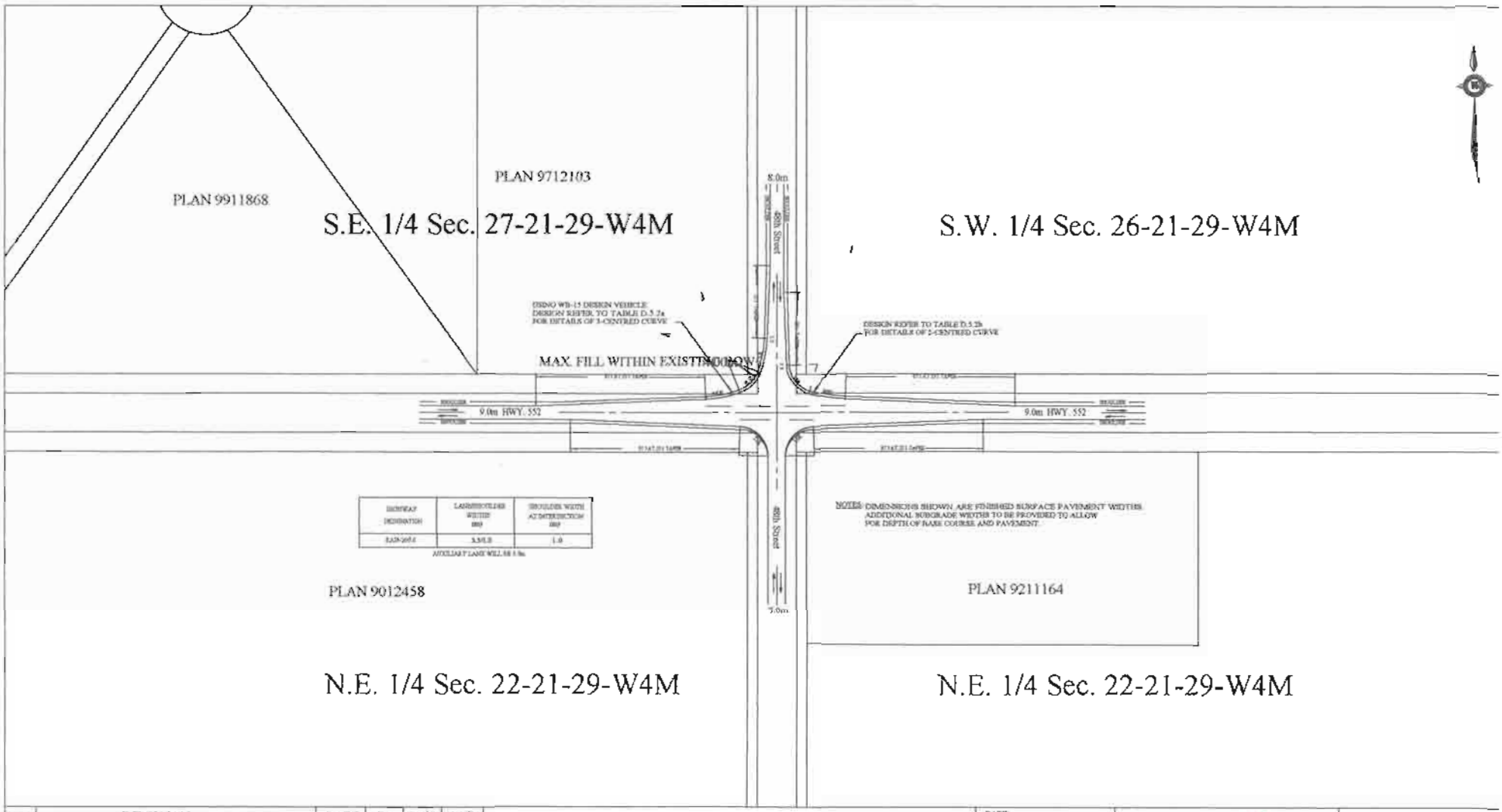
Location: SW1/4 26-021-29 W4M			CA.BL BH 9		R.BL,ca BH 10	
			Value	% Ded.	Value	% Ded.
SOILS (S)	1. SURFACE FACTORS	Texture (M) (P-PE = -260)	SL	35	SL	35
		Subsoil texture	SL	0	S	10
		Structure (D)	Gran	0	Gran	0
		Org. Matter (F)	10YR2/2	0	10YR2/2	0
		Depth of Topsoil (cm) (E)	20	0	10	10
		Acidity (V)	–	–	–	–
		Salinity (N)	–	–	–	–
		Sodicity (Y)	–	–	–	–
		Calcareous (K)	10	10	20	20
		Peaty Surface (O)	–	–	–	–
	Basic Soil Rating		55		25	
	2. SUBSOIL FACTORS	Structure (D)	–	–	–	–
		Depth (R, D, M) (cm)	–	–	–	–
		Acidity (V)	–	–	–	–
		Salinity (N)	–	–	–	–
		Sodicity (Y)	–	–	–	–
	Subsoil Deduction		% =		% =	
	Interim Soil Rating					
	3. DRAINAGE (W)		% =		% =	
	Final Soils Rating		55		25	
LANDSCAPE (L) Region 4	1. SLOPE (T)	Steepness (%)	7			
		Length (m)	100			
		LS Factor	(1.5) 30		( )	
	Basic Landscape Rating		70			
	2. STONINESS (P)	Stoniness Deduction	( ) % =		( ) % =	
	Interim Landscape Rating					
	3. PATTERN (J)	Pattern Deduction	( ) % =		( ) % =	
	Final Landscape Rating					
FINAL RATING			4M		4M	

Shannon Estates

Appendix 4

Intersectional Treatment

AMEC International



NO	REVISIONS	DATE	BY	CK'D	APP'D

Appendix 5 of

Shannon Slopes
Area Structure Plan

DATE	MAY 16, 2001
SCALE	1:2000
DRAWN BY	A. Churchill
CHECKED BY	S. Bartnik
CHECKED BY	
APPROVED BY	

AMEC Infrastructure Limited

M.D. OF FOOTHILLS No. 31
EDWARDS SUBDIVISION
TYPE 2B INTERSECTION - S.H. 552 & 48th

PROJECT NO.	DRAWING NO.
005011	INT 2B–SITE PLAN

Shannon Estates

Appendix 5

Commercial Building

Artists Rendition

Artist's Rendition of Commercial

Appendix 5