SWAN VALLEY ESTATES
AREA STRUCTURE PLAN

PREPARED FOR

SWAN VALLEY HOLDINGS
(Landowner)

Pt. S ½ Sec. 3 TWP 73 Rge 9 W5Mer.

AND

Pt. Sec. 34 Twp 72 Rge. 9 W5Mer.

PREPARED BY:

NORTH STAR PLANNING

FOCUS

MAY, 2008

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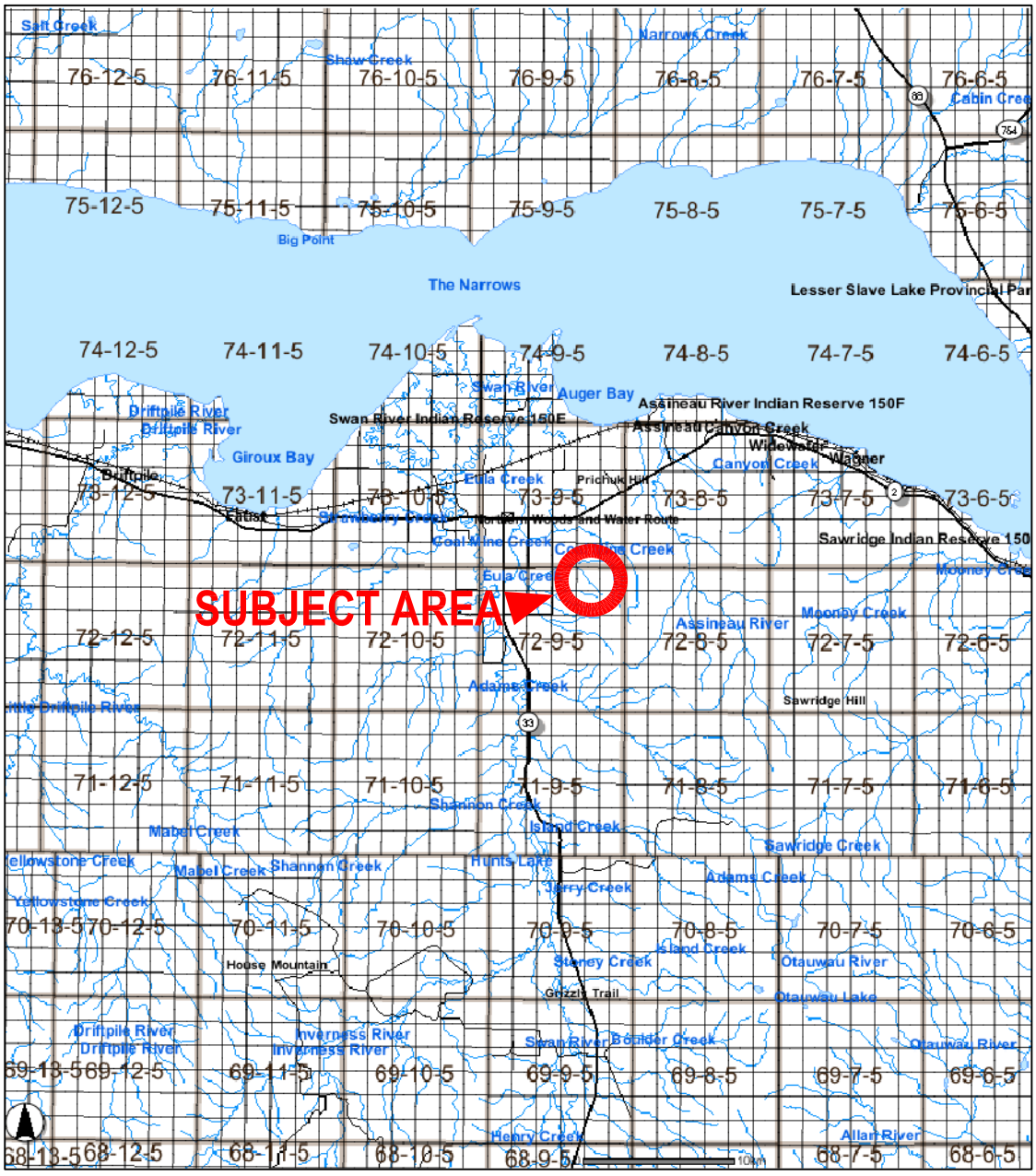
Top Of Bank Stability Report



SWAN VALLEY ESTATES

Area Structure Plan

FIGURE 1

LOCATION MAP

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INTRODUCTION

1.1) PREAMBLE

This Area Structure Plan has been prepared to assist with the further development of a parcel of land south of Lesser Slave Lake within the Municipal District of Big Lakes. The purpose of the Plan is to create a residential community with an attractive setting while respecting the natural features of the property..

This Area Structure Plan will provide an effective land use planning framework for the creation of a multi-parcel country residential community on the lands described in Section 1.2 below. As highlighted in Part II, this Plan will allow for the preservation of the environmentally sensitive lands within the Plan Area while taking advantage of the scenic opportunities provided in this area of the municipality. Part III of this Plan describes the residential community, servicing standards and other information related to the planning process.

1.2) LOCATION & PLAN AREA

The subject parcel consists of:

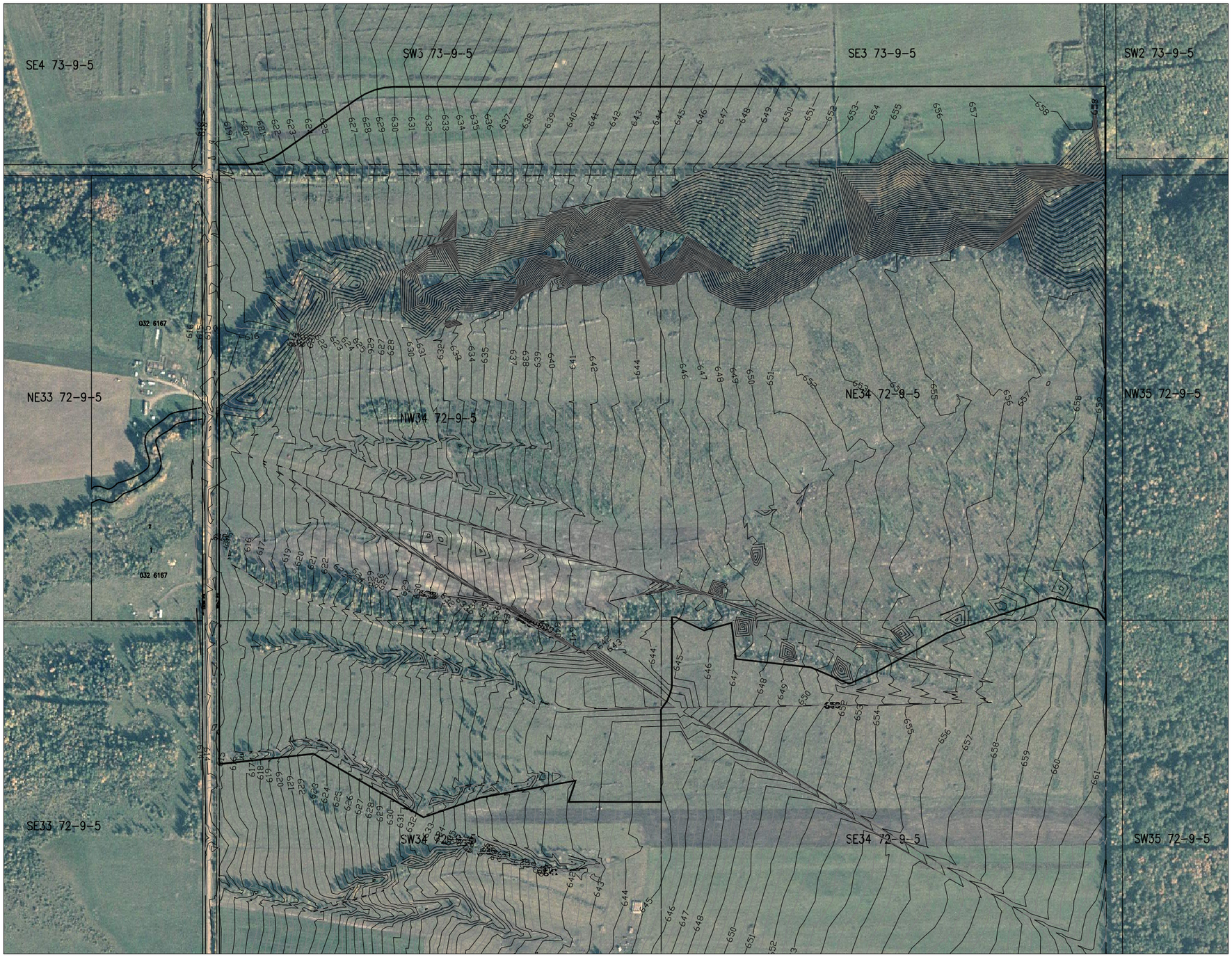
- Pt. S ½ Sec. 3 TWP 73 RGE 9 W5Mer.
- N ½ Sec. 34 TWP 72 RGE 9 W5Mer.
- Pt. S ½ Sec. 34 TWP 72 RGE 9 W5Mer.

The parcel is 178.86 hectares (441.96 acres) in area and is located within the corporate boundaries of the Municipal District of Big Lakes. Access is provided through the local M.D. road system and Range Road # 93.

Figure No. 1, *Location Map*, shows the location of the Plan Area with respect to the surrounding lands south of Lesser Slave Lake. Figure No. 2, *Development Area Map* describes the relief and boundary of the land which is subject to this Plan.

1.3) RELEVANT LEGISLATION, BYLAWS AND SUPPORTING DOCUMENTS

This Area Structure Plan has been prepared in accordance with the following Bylaws and Statutes of the Municipal District of Big Lakes and the Province of Alberta.



SWAN VALLEY HOLDINGS

Area Structure Plan for Swan Valley Estates

in
Sec. 34 72-9-W5M
and a Portion of the
South Half of SEC. 3 73-9-W5M

ASP Plan Boundary

FIGURE 2

DEVELOPMENT AREA MAP

FEB., 2008
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1.3.1) MUNICIPAL DISTRICT OF BIG LAKES MUNICIPAL DEVELOPMENT PLAN

This Plan has been prepared with due regard to the applicable policy directions of the Big Lakes Municipal Development Plan. In particular, consideration was given to:

- Section 2.2 which requires minimum lot area of 1.2 ha. (3.0 acres) for multi-parcel county residential development,
- Section 2.4 which requires a sufficient setback from slopes to mitigate erosion,
- Section 3.2 which requires the Developer to be responsible for all infrastructure improvements required to service the property, and
- Section 3.3 which requires all reserve lands to be dedicated in the form of land.

1.3.2) MUNICIPAL DISTRICT OF BIG LAKES LAND USE BYLAW

This Plan has been prepared in conformance to the applicable policy directions of the Big Lakes Land Use Bylaw. In particular, specific attention is given to the Country Residential Estate (CR-E) District.

- Land Use District Status: The Developer has applied to re-district the lands to a Land Use District that would accommodate the residential community described in this Plan.

1.3.3) MUNICIPAL GOVERNMENT ACT AND LAND USE POLICIES

Section 633 of the Act sets out the requirements for an Area Structure Plan. The basic requirements of an ASP are adhered to in this Plan. Further, this Plan has been prepared to conform to the policy directions of the Provincial Land Use Policy. Future subdivision in accordance with this Plan will conform to the requirements of the provincial regulation associated with the *Act*.

1.4) INTERPRETATION OF PLAN POLICIES

It is not intended that the policies of this Plan be "*fixed in stone*" or inflexible. As changing conditions dictate, this Plan will be reviewed and amended as required by the municipality.

PHYSICAL INVENTORY

2.1) LOCATION AND CONTEXT

The property is located approximately 3.2 kilometres (2.0 miles) south of Highway #2 on Range Road # 93. The land is incised by a number of ravines and features a general downwards slope towards the west; providing excellent scenic views of the more mountainous areas further west and southwest.

The land is currently farmed and is surrounded by a number of other smaller farms. No buildings are currently located within the Plan Area.

The nearest urban centre is the Village of Kinuso, approximately 13 kilometres (8 miles) by road to the northwest.

2.2) CURRENT LAND OWNERSHIP

In total, there are six quarter-sections included in whole or in part as part of this Plan. All of Section 34 is owned by Swan Valley Holdings. The south portion of Section 3 is owned by the Tanghe family. It is the intent under this Plan that as part of an initial subdivision approval that the Tanghe lands within the proposed residential community will be consolidated with Section 34.

2.3) SUBDIVISION HISTORY

The six properties that comprise the parcel subject to this Area Structure Plan are currently unsubdivided.

2.4) TOPOGRAPHY AND VEGETATION

The principal feature within the parcel is a network of incised valleys that slope eastwards. The remainder of the parcel is under cultivation. Forested areas are primarily covered with deciduous trees. Except for portions of a narrow shelterbelt located on the north boundary of NW34, none of the treed areas are to be cleared to accommodate the residential community described under this Plan.

The property has an almost uniform downward slope towards the west. The highest elevation on the parcel is approximately 672 metres[1], located in the northeast corner of the parcel. The southeast corner of the parcel has an elevation of 665 metres. The west boundary of the parcel is approximately 615 metres.

Outside of the valleys the slope of the land varies from 3.6% on the north boundary of the parcel to 2.8% in the centre of the parcel and 3.1% on the south boundary of the parcel.

2.5) GEOTECHNICAL & ENVIRONMENTAL CONSTRAINTS

Parkland Geo-environmental Ltd[2]. evaluated the top of bank for the north half of Section 34 with respect to bank stability. The report includes a general geo-technical evaluation of Section 34 though the focus was on the north ravine.

Though there are a number of valleys within the parcel, the valley on the north boundary of the parcel is the most significant. The other valleys do not pose any slope stability concerns to residential development, though reasonable environmental safeguards are proposed in this Plan to minimize environmental impacts.

The north valley has experienced multiple slides of varying degrees in the last 50 years, however, the overall slope of the valley is stable. As part of the geotechnical evaluation a setback requirement for the development of permanent foundations is recommended. The setback requirement varies from 5 metres to 17 metres and is described in the report.

In order to minimize slope erosion it is critical to minimize concentrated run-off from development sites to the crest of the slopes. Direction of the run-off towards the roadways is recommended. Furthermore, it is recommended that septic systems be no less than 30 metres from the crest of the slope. Finally, it is recommended that the crest of the valley be allowed to remain natural.

Soils within the Plan area are generally clay soils with a depth that varies from 0.1 to 0.3 metres. Underlying soils are also clays through most of the

[1] Contours Prepared by Focus Corporation, 2007.
[2] Parkland Geo-Environmental Ltd., Swan Valley Residential Subdivion: Top of Bank Stability Analysis, N1/2 4-72-9-5, 2007.

Plan area with depths ranging from 4.6 to 6.0 metres. Some sandy and sandstone areas also exist within the parcel.

2.6) POTABLE WATER EVALUATION

A groundwater evaluation was not prepared as part of this Plan as a regional cooperative water system adjoins the development area. This Plan has been prepared with the understanding that the entire residential community will be serviced with the regional water system. The Developer shall pursue an agreement with the potable water utility service provider, the Kinuso Water Co-op for this purpose.

2.7) FRANCHISE UTILITIES

Power, natural gas and telephone service lines are located on the west adjoining County road allowance (Range Road #93).

DEVELOPMENT CONCEPT

3.1) OVERVIEW

The Swan Valley Estates Area Structure Plan is to accommodate a country residential community that will allow for a range of housing types and activities. A detailed description of the residential community is provided below and is described graphically on Figure No. 3*: Area Structure Plan*:

3.2) RESIDENTIAL DEVELOPMENT

This Plan is designed to accommodate 60 residential lots with an average lot area of 1.8 hectares (4.46 ac.). Lot sizes may range from 1.21 ha. (3.0 ac.) to 2.02 ha. (5.0 ac.) under the Country Residential Estate District (CR-E).

Each lot affords a scenic view of the western facing hills. The slope of the property will minimize visual obstruction of the views from residential sites.

Housing will consist of standard stick built dwellings and manufactured homes. Accessory land uses include bed and breakfasts, a childcare facility, a family care dwelling and home based businesses. Application of the Fire Smart program will be encouraged.

In total, 108.39 hectares (267.76 ac.) or 61% of the parcel has been designated for residential development.

3.3) POPULATION ESTIMATES

It is estimated that the additional 60 dwellings created by Swan Valley Estates will result in an additional population of 174 persons[3]. Further, it is estimated from Statistics Canada data that approximately 24% or 42 persons will be students.

3.4) PHASING

It is intended to develop the residential portion of the Swan Valley Estates Area Structure Plan as a single phase.

[3] Base upon an average household population of 2.9 persons, Statistics Canada, 2006.

SE4 73-9-5

SW3 73-9-5

SE3 73-9-5

SW2 73-9-5

FUTURE DEVELOPMENT BY OTHERS

E.R.

NE33 72-9-5

NW34 72-9-5

NE34 72-9-5

NW35 72-9-5

1 P.U.L.

SE33 72-9-5

SW34 72-9-5

SE34 72-9-5

SW35 72-9-5

SWAN VALLEY HOLDINGS

Area Structure Plan for Swan Valley Estates

in
Sec. 34 72-9-W5M
and a Portion of the
South Half of SEC. 3 73-9-W5M

ASP Plan Boundary

FIGURE 3

AREA STRUCTURE PLAN MAP

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3.5) ENVIRONMENTAL CONSIDERATIONS

To protect the natural features of the Plan area the setback requirements recommended in the slope stability evaluation will be adhered to. In addition, three ravine/valley Environmental Reserve Lots and one smaller Environmental Reserve Lot are proposed to enhance environmental protection. All lands within the top of bank setback requirement are included within the environmental properties described in this Plan.

As part of the design component of this Plan, particular attention was given to restrictive agreements registered on the certificate of titles for all properties within the Plan Area. The purpose of the agreements is to protect the integrity of the watercourses and ravines described in this Plan. The larger ravine ER lots include all of the land described within the restrictive agreements. In total, 50.90 hectares (125.77 ac.) or 28% of the plan area has been designated as Environmental Reserve.

The smaller Environmental Reserve (ER) Lot is located south of Lot 61. This lot has been identified for ER designation due to a lack of building site and the presence of a ravine slope on three sides.

At the discretion of the municipality and the Crown of Alberta, the lands within the ravines could be transferred back to the Crown as an alternative to Environmental Reserve designation.

3.6) PARK RESERVE ALLOCATIONS

As the residential lots described in this Plan are large in area, it is anticipated that there would not be a significant benefit to having a parkland dedication in the form of land in addition to the land designated for Environmental Reserves. The development of walking trails is discouraged by both the Developer and the municipality at this time.

The Municipal District of Big Lakes Municipal Development Plan (MDP) requires all municipal reserve dedications to be in the form of land. An amendment to Section 3.3 of the MDP will be included as part of the adopting bylaw for this Plan. The purpose of the amendment will be to allow for money in lieu as an alternative to land dedications for the land subject to this Plan.

To comply with legislative requirements under the above framework, a full 10% of the gross area of the Plan area less ER Dedications and Future Development lands is to be allocated in the form of money in lieu. Money in

lieu of reserves will be accurately determined at the time of survey, but is estimated to be approximately 12.05 hectares (29.79 ac.) or 7% of the Plan Area[4]. Funding through money in lieu would be approximately $1,000.00, based upon 2007 land valuations.

3.7) SERVICING CONCEPT

Swan Valley Estates will be fully serviced to a rural municipal standard.

Franchise utilities (phone, power, and natural gas) will be provided by the franchise operator. Generally, services will be extended through right of ways within or parallel to the internal road system. Where necessary, a right of way for utility purposes will be extended across a residential lot. No right of ways will be designed or constructed in a manner that would conflict with the purpose or intent of the Environmental Reserve lots described in this Plan. Electrical power will be provided above ground.

Waste-water treatment and disposal will be subject to the provisions of the Safety Codes Act and the recommendation of the Geo-technical analysis to maintain a minimum 30 metre setback to the crest of the north ravine.

Potable Water will be provided through an agreement between the Kinuso Rural Water Co-op, the Municipal District of Big Lakes and the Developer. Lot 1 P.U.L. will feature a pumping and storage facility to service the subdivision.

Storm water run-off can be accommodated to a proper engineering standard without the construction of a storm water detention pond or other storm water facility. Bio-swales within the internal road ditches will be sufficient to maintain municipal and provincial water run-off standards. Lots adjoining the ravines will be developed in a manner that will not direct concentrated run-off towards the crest of the ravines. The use of silt fences may be required in certain areas should there be a need to reduce water velocity (i.e. inflows into ravines from road ditches to prevent erosion).

3.8) TRAFFIC CIRCULATION

The Swan Valley Estates community will be serviced for traffic in the following manner:

[4] Municipal Reserves are not included on land designated as Future Development Area

- An amended rural road that provides access to the land north of the north ravine within SW3-73-9-5. Currently, TWP Road 730 extends east of Range Road #93 and crosses the ravine. As part of this Plan it is proposed that the TWP Road be closed within the S ½ of Section 3 except for the westernmost 68 metres (223 feet). As described in Figure No. 3: Area Structure Plan, the TWP Road will be relocated northwards. This will provide additional building sites and allow the TWP Road to avoid encroaching into the ravine area.

- The above-mentioned road is intended to service farmland to the north and 9 residential lots between the road and ravine. At a traffic engineering standard[5] this road will generate approximately 86 trips per day.

- The remainder of Swan Valley Estates will be serviced by a looped road or crescent with three cul-de-sacs. The road design will allow for connectivity to the future development areas described below. Traffic generation will be approximately 488 daily trips per day on two accesses that will service 51 lots.

3.9) FUTURE DEVELOPMENT AREA

Lands designated under this Plan as future development area are intended to remain in agricultural use. Three separate parcels are to be designated in this manner.

- Within SE Section 3 in the northeast corner of the Plan area, a 7.42 hectare (18.33 acres) future development parcel bounded by the ravine on the south and the relocated TWP Road to the north will be created. A possible future land use of this land would be country residential, though building sites are likely slightly restricted by the ravine.

- The remainder of the S ½ of Section 34 shall remain as agricultural lands in two parcels. As mentioned above, the internal road system of Swan Valley Estates and the existing County road system will allow for consideration of a country residential expansion at a later date should that be desired.

[5] ITE Engineering, 7th Edition. Residential Traffic will generate 9.57 trips per day on average.

3.10) INFRASTRUCTURE REQUIREMENTS

All infrastructure improvements required to construct Swan Valley Estates will be provided by the Developer, Swan Valley Holdings, through agreement with the Municipal District of Big Lakes and franchise utilities. Infrastructure standards are described below:

Roads:

The existing Range Road located on the west side of the development is a gravelled surface road that has recently undergone some minor improvements. The existing width of the road is 8.0 to 8.6 metres in width, and is constructed within a 30 metre right of way. The municipal road intersects with Highway 2 approximately 3.2 kilometres north of the north end of the proposed development.

There will be three entrances onto the township road from the subdivision; two from the main development and one from the existing township road located at the north end of the development.

The internal road system will have a 20.12 metre right of way with a 3.5 metre easement on each side of the right of way for the placement of utilities. The finished 7.3 metre wide road surface will have a gravel surface. Utilities would not be located within the right of way except for line crossings.

There will be three cul de sacs constructed within the subdivision. The cul de sacs will be built to accommodate snow storage and have a large enough radius to allow for uninterrupted turning for school buses and emergency vehicles.

Surface Drainage:

Storm water runoff will be channelled through the roadside ditches and/or drainage easements that will eventually discharge into the natural ravines. The runoff will eventually discharge into the existing creek that transverses the property towards the northern limits. This drainage pattern will be similar to what is presently occurring on the undeveloped land.

The sizing and placement of the cross grade and approach culverts, erosion controls and the requirement for any flow reduction system will be evaluated prior to the construction and implemented as required.

Potable Water:

Water supply for the development is proposed to be delivered through the Kinuso Water Co-op. Upgrades to existing co-op infrastructure will provide sufficient volume and pressure to service Swan Valley Estates. Water distribution to each residence will be from a network of smaller diameter lines and air release valves located within a utility right of way. The system would also be looped as much as possible so that should a breakage occur the majority of lots would continue to have service throughout the interruption.

A caveat will be registered against every lot stating, that each residence will have a pressure tank system to ensure that during peak hours of usage the Coop would not have any reduction in pressure.

Emergency Water:

The Developer will work with the County and the Kinuso Water Co-op to establish a storage area for emergency storage and fire fighting purposes on the pumping station site.

3.11) LAND USE DISTRICT REQUIREMENTS

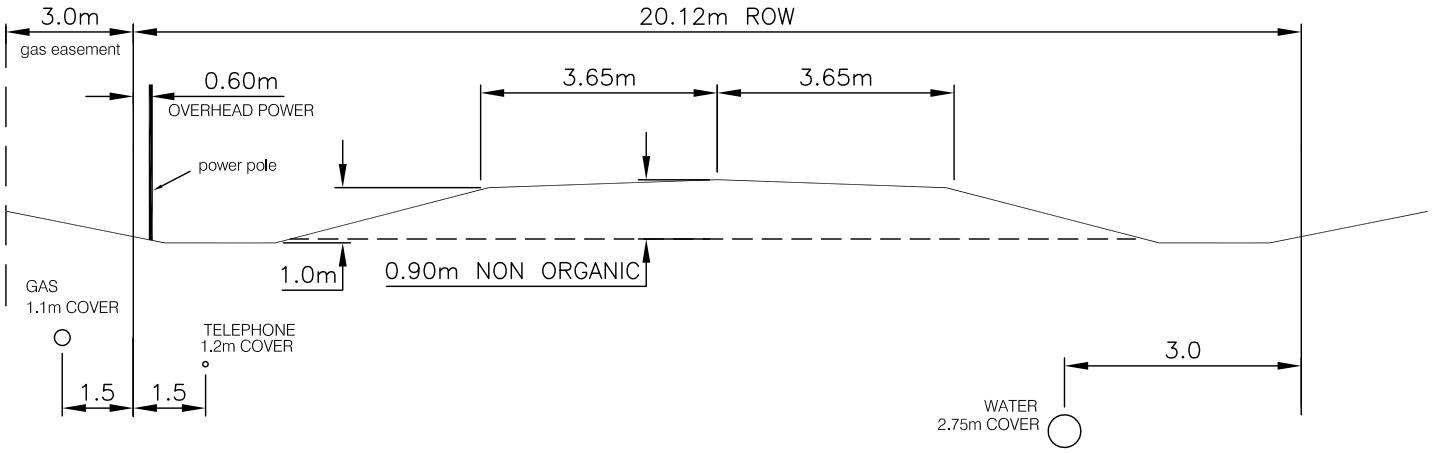
This Area Structure Plan has been prepared in accordance with the requirements of the Country Residential Estate (CR-E) District, as described in the Municipal District of Big Lakes Land Use Bylaw. All lots created and developed shall comply with the CR-E District requirements.

3.12) PLAN APPROVAL PROCESS

This Plan will be approved subject to the minimum standards prescribed under the Municipal Government Act, R.S.A. 2000 and any other requirements that exist for the Municipal District of Big Lakes. In addition, this Plan will comply with the requirements of Alberta Sustainable Resources in respect of the long term maintenance and integrity of the ravines within the Plan Area.

3.13) PLAN AMENDMENT PROCESS

This Plan may be amended in accordance with the provisions of the Municipal Government Act and the requirements of the Municipal District of Big Lakes. It is anticipated that amendments will not be required in the short term, however, should the Plan Area not be subdivided and developed in the next few years, this Plan may require updating to accommodate future planning goals of the municipality. It is not anticipated that a regular review process every few years will be required.



RURAL ROAD TYPICAL SECTION

FUNCTION

ROADS CONSTRUCTED TO MEET STANDARD FOR COUNTY TRAFFIC.

RIGHT OF WAY REQUIREMENTS

RIGHT OF WAY 20.12 METRES WITH BACKSLOPING EASEMENT FOR CONSTRUCTION

CROSS SECTION ELEMENTS

FINISHED ROAD TOP 7.3 METRES

GRADE SLOPE 1 METRE VERTICAL @, 3:1

DITCH FLAT BOTTOM @ 3.0m WIDTH

BACKSLOPING MIN. 4:1

GEOMATIC REQUIREMENTS

MAX. GRADIENT 6%

MIN CREST VERTICAL CURVATURE – K45

MIN. SAG VERTICAL CURVATURE – K30

MIN. HORZ. CURVATURE – 300 METRE RADIUS

MAX. SUPER ELEVATION 6%

CROWN RATE 3%

STRUCTURAL REQUIREMENTS FOR ROADWAYS AND APPROACHES

SURFACE AGGREGATE	DESIGNATION 4 CLASS 20 MATERIAL, 3/4 INCH CRUSH, AB. INFRASTRUCTURE SPEC., MIN. 100mm DEPTH
GRADE	0.90 METRE MIN. NON ORGANIC MATERIAL WITH 0.20 METRES OF CLAY CAP.
COMPACTION	UPPER 0.30 METRE 100% S.P.D. BELOW 0.30 METRE 98% S.P.D.
MOISTURE CONTENT	OPTIMUM MOISTURE CONTENT

SWAN VALLEY ESTATES

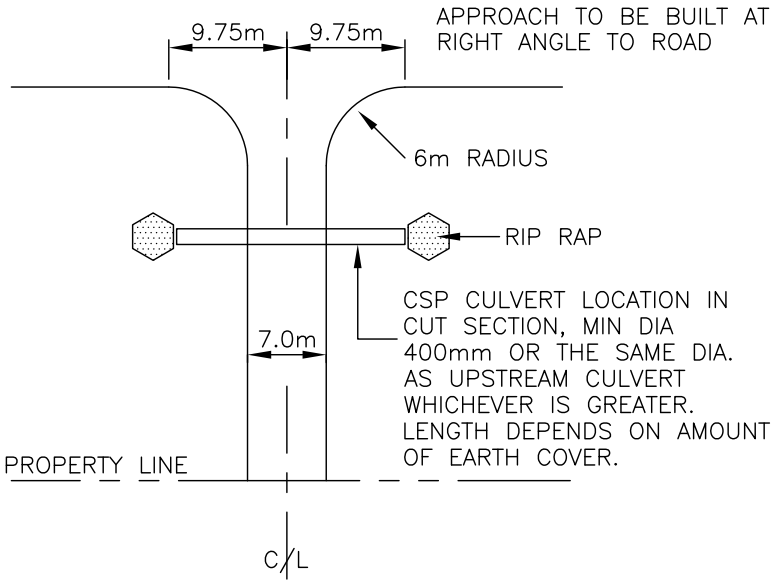
Area Structure Plan

LOCAL ROADS - RURAL STANDARD

AVERAGE TO LIGHT TRAFFIC VOLUMES

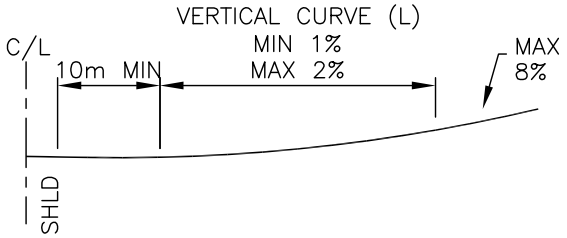
FIGURE 4

FOCUS

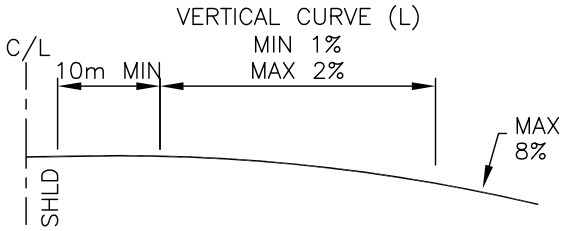


PLAN - PRIVATE APPROACH

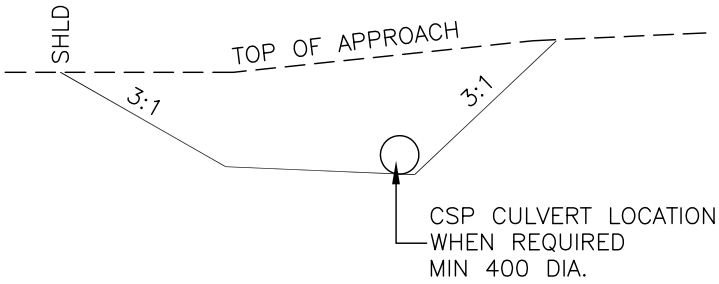
MIN. CURVE LENGTH OF VERTICAL CURVE		
ALGEBRAIC DIFFERENCE IN GRADIENT (%)	LENGTH L (METRES)	
	CREST	SAG
1	6	7.5
2	12	15
3	18	23
4	25	30
5	30	36
6	37	46
7		46
8		46
9		46



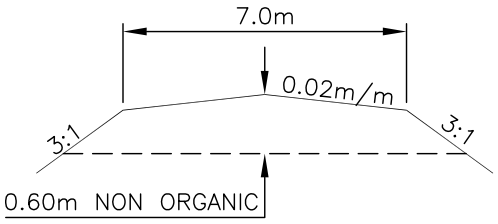
PROFILE - PRIVATE APPROACH IN CUT



PROFILE - PRIVATE APPROACH IN FILL



DETAIL OF DITCH AND CULVERT LOCATION



MIN. PRIVATE APPROACH CROSS SECTION

NOTES:

ALL ENTRANCES ARE TO BE FROM THE INTERNAL ROAD SYSTEM AND ARE TO PROVIDE REASONABLE ACCESS TO THE LOTS, EACH LOT IS TO HAVE A PRIVATE APPROACH.

GRAVEL MUST BE 3/4 INCH CRUSH, DESIGNATION 4, CLASS 20, AB. INFRASTRUCTURE SPEC. AND HAVE A MIN. DEPTH OF 4 INCHES (100mm) COMPACTION

UPPER 0.30m 100% S.P.D.

BELOW 0.30m 98% S.P.D.

SWAN VALLEY ESTATES

Area Structure Plan

PRIVATE APPROACH RURAL STANDARD

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FIGURE 5

APPENDIX

Top Of Bank Stability Report

SWAN VALLEY RESIDENTIAL SUBDIVISION
TOP OF BANK STABILITY ANALYSIS
N1/2 - 34 - 72 - 9 - W5M
NEAR KINUSO, ALBERTA

Prepared for:

FOCUS CORPORATION LTD.
RED DEER, ALBERTA

Prepared by:

PARKLAND GEO-ENVIRONMENTAL LTD.
SHERWOOD PARK, ALBERTA
ED1081

SWAN VALLEY RESIDENTIAL SUBDIVISION
TOP OF BANK STABILITY ANALYSIS
N1/2 - 34 - 72 - 9 - W5M
NEAR KINUSO, ALBERTA

Parkland GEO

EXECUTIVE SUMMARY

A residential development is proposed for the N1/2 of 34-72-9-W5M near Kinuso, Alberta. ParklandGEO was commissioned on behalf of Swan Valley Holding Inc. by Mr. Pat Sinclair of FOCUS Corporation to conduct a slope stability assessment on the Swan Valley Residential subdivision. The site was forested land until a forest fire about two years ago.

The site had experienced multiple slides that occurred more than 50 years ago. Most of the slides appeared to have occurred on the northern side of the ravine. Major activity at the site were the clearing of trees.

Overall, the slope is stable. The set back distances were found to vary along the ravine. The setback distance for permanent foundation line ranged from 5 m to about 17 m. A deep-seated failure is not a significant concern; however, the rate of erosion by the creek at the toe of the slope will govern the long term slope regression.

Fluctuations in the groundwater table affect the stability of the slope significantly, therefore minimizing infiltration from septic systems and future water features(i.e. Ponds) is required.

The site condition is suitable for proposed development provided that the recommended setback distances are maintained.

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1.0 INTRODUCTION

ParklandGEO was commissioned to undertake a geotechnical investigation and top of bank stability analysis of the proposed Swan Valley Residential Subdivision site located near the Town of Kinuso, Alberta. The site was located in the North ½ of Section 34, Township 72, Range 9, West of the Fifth Meridian.

The purpose of this investigation was to determine adequate setback distances for new structures to be constructed adjacent to the top of the slope, as well as to assess the overall slope stability. This report summarizes the results of field and laboratory testing programs and slope stability analysis and presents geotechnical recommendations for set back distances and drainage.

A separate report for percolation testing for septic systems was also prepared by ParklandGEO.

1.1 Scope of Work

The scope of work was outlined in ParklandGEO's Proposal PRO-ED07-04 dated January 28, 2007, to Focus Corporation in Red Deer. The scope of work was to include:

- Contact Alberta 1 Call to locate public utility lines.
- Drilling 32 shallow boreholes to about a depth of 2.0 m to characterize representative site conditions for percolation testing.
- Drill three deep boreholes to about 40 m to assess soil conditions for the slope.
- Carrying out Standard Penetration Tests at depth intervals of 1.5 m and collect disturbed samples at depth interval of 1.0 m.
- Install slotted PVC standpipes in all boreholes to monitor groundwater elevations.
- Conduct a laboratory investigation to assess soil properties. The laboratory testing included moisture content, grain size distribution (sieve and hydrometer), Atterberg Limit tests, concentration of water soluble sulphate, and calcium carbonate content on selected samples.
- Conduct an aerial photograph review to assess for historical slope movement and mass wasting.
- Perform slope stability analysis using SLOPE/W software program to arrive at adequate setback recommendations.

- Preparation of a report summarizing the findings of the investigation.

Authorization to proceed with the assessment was provided by Mr. Pat Sinclair, project manager at Focus Corporation on behalf of Swan Valley Holdings Inc.

1.2 Previous Investigations

ParklandGEO is not aware of any previous geotechnical investigations having been conducted on this property.

1.3 Site Description

At the time of investigation, the project site was cleared land. The site contained many shallow surficial waterways in the southern portion of the property and a deeply incised ravine transected the property along the northern portion of the site (Figure 1). The ravine valley was covered with dense trees and very shallow depth (about 0.5 m) of water was flowing in the creek. Farmland bordered the site in the north. Areas to the west and to the south of the site were covered with dense trees.

There was visible evidence of past failure and regressions of about 14 to 35 m were observed. Photograph 5 shows a typical view of past failure in the background.

Photographs 1 to 6 show some views of the site.

Access to the site was through Range Road 93 which border the property to the west. The closest major highways were Highway 33 about 3.2 km to the west and Highway 2 about 3.2 km to the north.

1.4 Creek Formation

The creek flows from the northeast corner of the site to the west, with the proposed development being located predominantly along the south top-of-bank but also along portions of the north embankment where room allows. The land rises from west to east such that the creek is the most shallow at the far west end of the development (the downstream end) and is deepest at the east side (upstream end). At the far northeast corner of the proposed development, two creeks merge into one channel (Figure 1).

At the west end of the proposed development downcutting of the creek through the more erodeable clay soils has resulted in a relatively wide creek valley that extends to the top of the sandstone stratum. Once the creek cut into the sandstone bedrock the creek channel became very narrow, as the water was better able to downcut vertically than erode laterally through the sandstone. This has resulted in a tiered bench, with a flood plane located about 3 to 5 m below ground level (Photograph 2).

Large deep seated slope failures would not be expected in this area and none were observed. Two areas of apparently larger slope regressions appear to be due undercutting of the lower sandstone bedrock followed by the failure in the upper clay soils.

2.0 SUBSURFACE CONDITIONS

The soil profile consisted of topsoil overlying a clay or clay till layer which was underlain by sandstone bedrock. Occasional sandy and silty soils were encountered in some boreholes. Detailed description of the soil conditions encountered are provided on the borehole logs in Appendix B, along with the definitions of the terminology and symbol used on the logs.

2.1 Soil Properties

2.1.1 Topsoil

Topsoil was found at the surface in all boreholes. The thickness of the topsoil ranged from 0.1 m to 0.3 m. The topsoil contained some organics, little sand and was black and moist. The topsoil was frozen at some boreholes.

2.1.2 Clay / Clay Till

A clay and/or clay till layer was found underlying the topsoil in most boreholes. The clay or clay till layer consist of some sand and silt and extended to depth of about 4.5 to 6 m. There were also occasional sand and gravel layers in some boreholes. The moisture content in this layer varied from 13% to 32%. The plastic limit of the clay till was in the range of 19.4% and 22.4% and the liquid limit ranged from 28.6% and 42.1%.

2.1.3 Sand

A sand layer was found in Boreholes BH 9, BH 30, BH 31 and BH 34. The sand layer found in BH 9, BH 31and BH 34 was very thin (about 0.1m), whereas the sand in BH 30 extended from surface to a depth of about 2 m. Also, in Boreholes BH 12, BH 16, BH 21 the clay contained appreciable silt and sand size particles.

2.1.4 Sandstone

A sandstone layer was found underlying the clay till in the three deep boreholes (BH 33, BH 34 and BH 35). The sandstone occurred at a depth of about 5 to 6 m. The sandstone was well cemented, dense and dry to damp in moisture content. The hard nature of the sandstone generally resulted in SPT “N”refusals.

An XRD (X-Ray diffraction) analysis was conducted by AGAT Laboratories on a representative sandstone sample from depth of about 15 m in BH 35 to determine the mineralogical composition of the bedrock layer. It was found that the sandstone consisted of mainly sand/silt/clay (quartz, plagioclase feldspar, illite, kaolinite, muscovite, smectite). Minor amounts of calcium carbonate (calcite) were also present.

The Acid Solubility test results on samples taken between depths of 12.0 m and 17.0 m ranged between 4.1 % and 7.1 % indicating the presence of calcium carbonate cementation in the sandstone.

2.2 Groundwater

Groundwater monitoring piezometers were installed in all boreholes. Some of the shallow boreholes drilled were filled with snow-melt runoff and could not give a true groundwater level at the borehole locations. The groundwater levels taken 40 days following drilling are summarized in the following table.

TABLE 1: GROUNDWATER ELEVATIONS
DATE: MAY 15, 2007

Borehole	Depth (m)
4	1.34
6	0.77
17	1.09
30	1.64
33	dry
34	21.72
35	19.78

It should be expected that groundwater conditions will be most adverse after spring breakup and periods of prolonged or heavy rain. The elevation of the water table will vary from year to year according to fluctuations in precipitation.

Borehole data from this investigation suggest that the water table follows the ground profile at some depth from surface. For the stability analysis, a groundwater table as shallow as 0.77 m below ground surface was considered.

3.0 SLOPE STABILITY

3.1 Review of Aerial Photographs

Aerial photographs from the years 1949,1958,1966,1971,1978,1986,1999 and 2006 were used to examine the history of landslide development in the area. The air photos of the area were obtained from Alberta Sustainable Resources and Development. Figures 2 to 7 show the aerial photos.

The 1949 air photo indicates that site was crossed by a small creek valley. There were dense tree cover in the area. There were visible signs of past failures in this air photo. There were small creek channels through the dense trees on the southern section of the site. There was a small farm to the west of the site. The area had one access road from the north.

There appeared to be little change in the 1958 air photo. There were three distinct past failure location on the northern face of the ravine slope. The site was covered with dense trees. More farming to the northwest was visible. The access road dead ended at the ravine crossing.

In the 1966 air photo the failure locations on the northern ravine face were very distinct. The county road on the west side of the site extended to the south bound of the site, across the ravine. More farming activity to the northwest of the site area was also noticed.

In the 1971 air photo the major changes at the area near the site were the extension of the access road further to the south and additional farming to the west. The failure locations appeared to be less distinct in this air photo. Some cut lines and /or access roads through dense trees were visible on the northeast and southwest sides of the site.

There appeared to be little change observed in the 1978 air photo (not included in the report). However, expansion of farming activity was evident further to the southwest of the site.

In 1986, more farms to the west of the site were visible. Also, a cut line was observed at some distance along the ravine on the northern section of the site. More cut lines were also observed in the south portion of the site.

In the 1999 air photo the site appeared to be partly cleared land with tree cover and several shallow creeks running from east to west. The area north of the main creek was cleared of trees and used as farmland. The access road (Range Road 93) was extended further to the south.

In the 2006 air photo the sparsely grown trees on the farm land were removed at the site and only lines of trees were left adjacent to the creeks. Some of the trees on the slope face were also removed.

Though some failure locations were identified from the early air photos they appeared less distinct in the more recent photos due to revegetation. The slides which had occurred in the past along the ravine were older than 50 years and were likely due to creek

downcutting through the upper clay shortly after the last glacial period. The slope bordering the main creek has not experienced any visible regressions or failures since 1949.

3.2 TOB Survey

The Site was surveyed by FOCUS Corporation. A detailed drawing showing different cross-section profiles along the creek was also provided by FOCUS. The cross-section profiles are shown on Figure 8. Three representative cross sections were selected for stability analysis.

Slope angles range from 14 to 34 degrees, but the near vertical slope faces could not be surveyed due to safety concerns.

3.3 Stability Analyses Background

ParklandGEO undertook a detailed slope stability assessment using the borehole log data, surface and profile information from surveying, borehole data and soil parameters from available resources.

The goals of the stability analyses were to:

1. Conduct limit equilibrium analysis and determine the factors of safety for the existing slope on the long term basis.

2. Assess the suitability of the site for development.

3. Determine setback distances of a factor of safety (FOS) of 1.3 for rear development line and 1.5 for building foundations (Long Term Stability Line).

ParklandGEO utilized the Slope/W software program to conduct a limit equilibrium analysis. Critical soil strength data were used for the clay till layer. A summary of the soil strength parameters is presented in the following table.

TABLE 2: ESTIMATED MATERIAL PROPERTIES

Soil	Cohesion (c') (kPa)	Unit Weight (kN/m^3)	Friction Angle (ϕ')
Clay / Clay Till	0	18 - 20	18 - 26
Sandstone	5 - 10	22	37

The sandstone was well cemented and dense. Thus a relatively high cohesion value was assigned for the sandstone layer. The effect of tree roots reinforcement was neglected. The factor of safety was calculated using the Morgenstern-Price Method using a variety of parameters to assess the model sensitivity.

3.4 Stability Assessment Findings

The stability of the slope was examined for shallow and deep failure mechanisms. The groundwater table profile was based on worst case scenario of a high water table within the clay soil. The groundwater table was also assumed to follow the surface profile of the slope.

Three representative sections on the main creek valley, sections 2, 6 and 8, were chosen for the analysis (Figure 1).

SECTION 2

The analysis was generally carried out with a groundwater elevation 0.77 m below surface, which was the highest groundwater level observed at the time of recording.

For such condition the south face is stable with a factor of safety slightly above 1 (FOS = 1.0). The critical slip surface and setback distances are shown on Figure 9. The setback distance are 12 m and 15.5 m for rear property lines and for permanent foundation structure respectively.

The north face of the creek valley at this section is stable due to the shallow slope angle at this side. Figure 10 shows the critical failure plane and factor of safety. A failure condition occurs only when the groundwater table rises to the surface, which is an unlikely occurrence.

SECTION 6

Figure 11 shows the stability analysis of the north face for the groundwater table at 0.77 m below ground surface. The slope is marginally stable with a factor of safety of about 1.00. For this condition, the setback distances are about 6.5 m and 9.0 m for rear property lines and permanent foundation structures respectively.

Stability analysis for the south face with a reduced angle of friction to account for shallow slope angle (about 15 degrees) was conducted. The factor of safety is slightly below 1 and the critical slip surface lies fully within the clay layer. The critical slip surface and safety maps up to a factor of safety of 1.5 are shown on Figure 12. The setback distances for rear property lines and for permanent foundation are 9 m and 11.5 m respectively.

SECTION 8

For this section, the south face of the valley was analyzed and the slope was moderately stable with a factor of safety of the slope close to 1.0. The setback distances for rear property line and for permanent foundation are 7 m and 12 m respectively. Figure13 shows the results of the stability analysis and setback distances for the south face along section 8.

3.5 Material Strength Sensitivity

The critical slip surface was found to lie within the clay layer. Thus variation in strength parameter of clay soil will have impact on the slope stability. The strength parameter of the clay layer was varied to determine the effect on the slope stability. The angle of internal friction was reduced in various decrements. The factor of safety was not sensitive to the variation in friction angle by 1 or 2 degrees. The impact would be significant when the friction angle varied by more than 5 degrees.

The factor of safety was little affected by small changes in unit weight of clay soil. The factor of safety increased by about 2 percent for an increase in unit weight of clay soil by a unit. The setback distance was changed slightly by about 5 percent when the unit weight was varied by one or two units.

The factor of safety and setback distances are less sensitive to variation in strength parameters for the sandstone.

4.0 DISCUSSION

The site has undergone major surficial changes in the past fifty years. The changes were more due to farming activity rather than natural processes.

A review of aerial photos show that the site had experienced multiple large slides that occurred more than 50 years ago. Most of the slides appeared to have occurred on the northern side of the ravine. However, there appears to be no significant instability since 1949. Major activity at the site were the clearing of trees and subsequent farming in the area.

The erosion of the sandstone layer has caused and continues to cause failures on the ravine slope. Natural events such as extreme rainfall and flooding will be a trigger for slope failures. Erosion from the on-going creek flow remains the main factor for instability.

The tree cover will provide additional slope reinforcement for the upper clay and effective cohesion from root uptake of soil moisture. Keeping the tree cover is thus beneficial. The steep sandstone valley walls cannot support significant vegetative cover.

The presence of calcium carbonate (calcite) in the sandstone ranged from 4 to 7 percent indicates that there exists cementation of particles in the sandstone and the assumption of assigning cohesion in the sandstone is thus acceptable.

Further upstream, the creek has created very steep valley sidewalls by undercutting the slope toe along the outside bends. Near vertical slopes are possible due to the cemented nature of the sandstone bedrock, however as the undercutting continues a large slab of sandstone will dislodge and fall into the creek. The exposed sandstone valley faces are not protected from weathering which will remove the soluble calcium carbonate cementatious binder mineral which further weakens the slope face.

The stability analysis indicates that the slopes are generally stable and the site could be developed provided that the recommendation made in the following section are maintained.

The setback distance for permanent foundation line ranged from 5 m to about 17 m. Figure 14 shows the approximate setback distance on the site plan. The intent is that the setback lines be added to the legal subdivision plan(s).

5.0 RECOMMENDATIONS

Based on the review of historical development of site from aerial photo interpretations, field and laboratory studies and stability analysis calculation, the following recommendations are provided. The recommendation emphasizes on buildings construction, drainage issues and other related developments.

The proposed development can be carried out on the site with a setback distances of 8 to 20 m for permanent foundation structures as shown on Figure 14. The setback distances were increased by about 8 m on the outer cuts of the creeks to account for erosion.

Erosion control measures should be implemented as necessary. Site grading should be designed to drain surface water due to rainfall and snow melt away from the slope. All discharge from roof leaders and possible weeping tile systems must be directed away from the top-of-bank and should drain towards the roadway. Roof leaders and/or weeping tile sump discharge should not be directed to the crest or allowed to pond on the ground surface causing increased water infiltration into the slope.

Any septic field should be located at least 30 m away from the crest. Direct discharge from a septic field to the creek would be a possibility if permission from local authority can be obtained.

Swimming pools must not be constructed within 30 m of the top-of-bank. Swimming pools located within 75 m of the top-of-bank must have under drains and double walls so that any leaks can be directed into the storm sewer system or can be pumped to discharge on the ground surface. Stormwater retention ponds placed within 200 m of the top-of-bank should have liners designed by an experienced geotechnical engineer. The location and design of any water features such as ponds, swimming pools and septic fields should be confirmed by a qualified geotechnical engineer.

Removal of existing trees on the slope is not recommended and continued growth of vegetation on the slope and crest area should be encouraged. It is suggested that any new vegetation for this site be selected from native species with deep root system that can grow with a minimum of watering. Excessive watering of lawns and trees near the slope must be avoided. Fill, grass cuttings or construction debris should not be disposed of on or near the slope face.

6.0 LIMITATIONS OF LIABILITY

Geological conditions are variable. At the time this report was prepared, information on the sub-surface conditions was available only at the borehole locations. Therefore, it was necessary to make certain assumptions concerning conditions between the borehole locations.

The recommendations presented in this report, and any subsequent correspondence, are based on an evaluation of information derived from thirty five boreholes, survey of aerial photos and local experience in the north central Alberta. The conditions found are thought to be reasonably representative of the site. If conditions are noted during construction which are believed to be at variance with the conditions described in this report, this office should be contacted immediately.

This report has been prepared for the exclusive use of the Focus Corporation for specific application to the project and site described in this report. It has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranty is made either express or implied.

The recommendations in this report should not be used for any other project nor for any other site. Any persons attempting to apply these recommendations to any other project or any other site, do so at their peril.

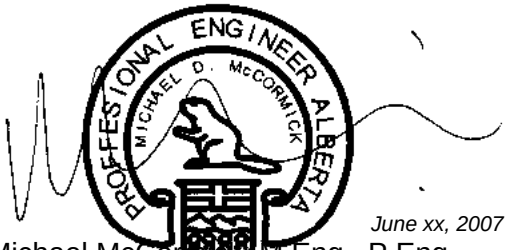
The attention of the reader is drawn to the Consulting Services Agreement - Statement of Limitations in Appendix C.

7.0 CLOSURE

We trust that this report meets with your current requirements. If there are any questions, please contact the undersigned at 780 / 416 - 1755.

Respectfully Submitted,

PARKLAND GEO-ENVIRONMENTAL LTD.
APEGGA Permit to Practice No. P - 8867



June xx, 2007

Michael McCormick, M.Eng., P.Eng.
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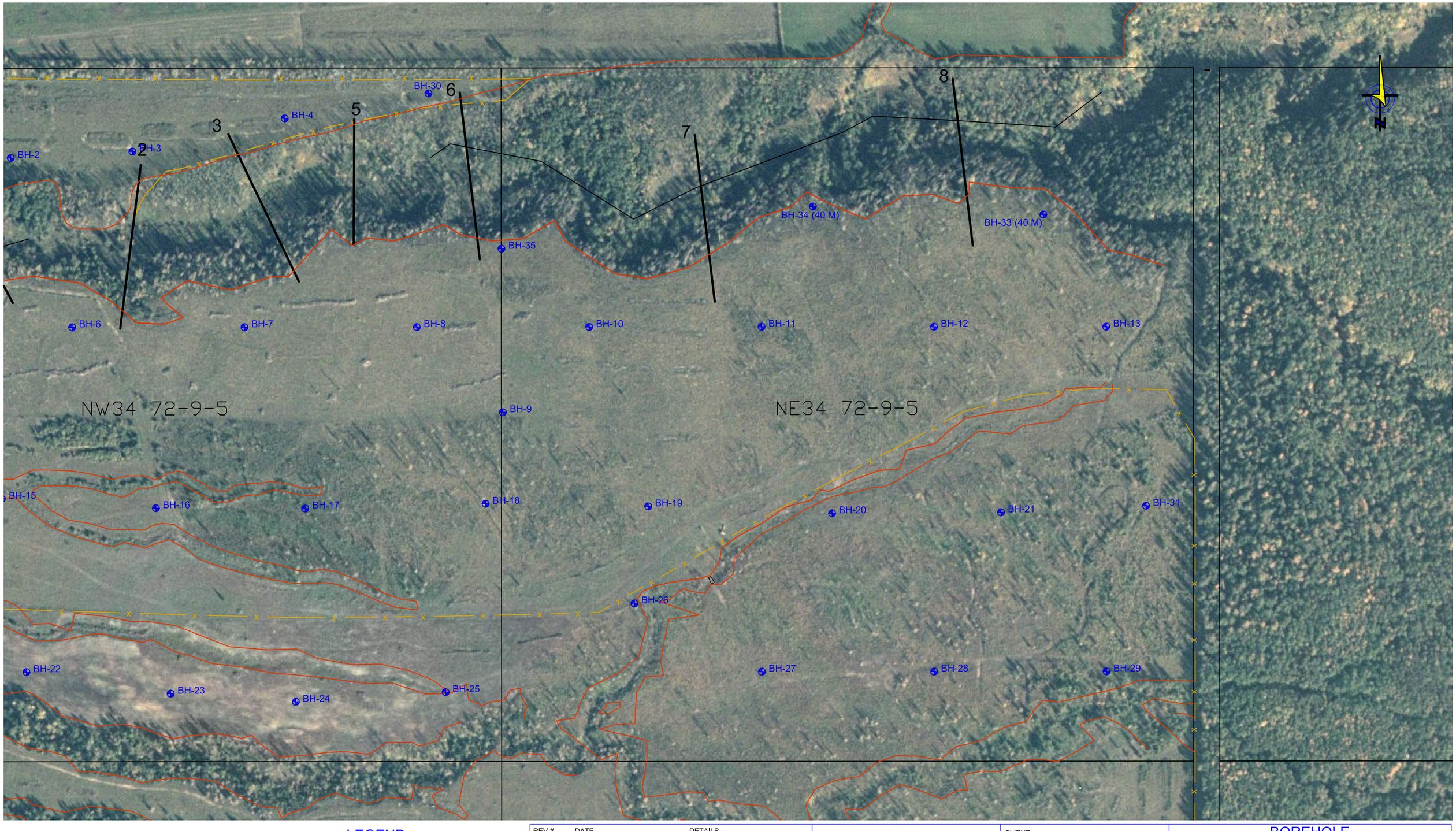
Geotechnical Engineer

Reviewed by:

Mark Brotherton, P.Eng.
Principal Geotechnical Engineer

APPENDIX A

FIGURES
AND
PHOTOGRAPHS



SCALE (metres)

-80 -40 0 40 80 160

LEGEND

- BH — BOREHOLE
- FENCE
- TOP OF BANK LINE
- SECTION LINE

REV #	DATE	DETAILS
3	6/29/07	BOREHOLE LOCATIONS FOR TOB
2	5/01/07	SOIL RESULTS ADDED
1	1/28/07	PROPOSED BOREHOLES ADDED
0	1/28/07	ORIGINAL DWG FROM FOCUS CORP.

DRAWN:	CHK'D.:	REV #:	DATE:
MMc	MDB	1	JANUARY 28, 2007

Parkland GEO

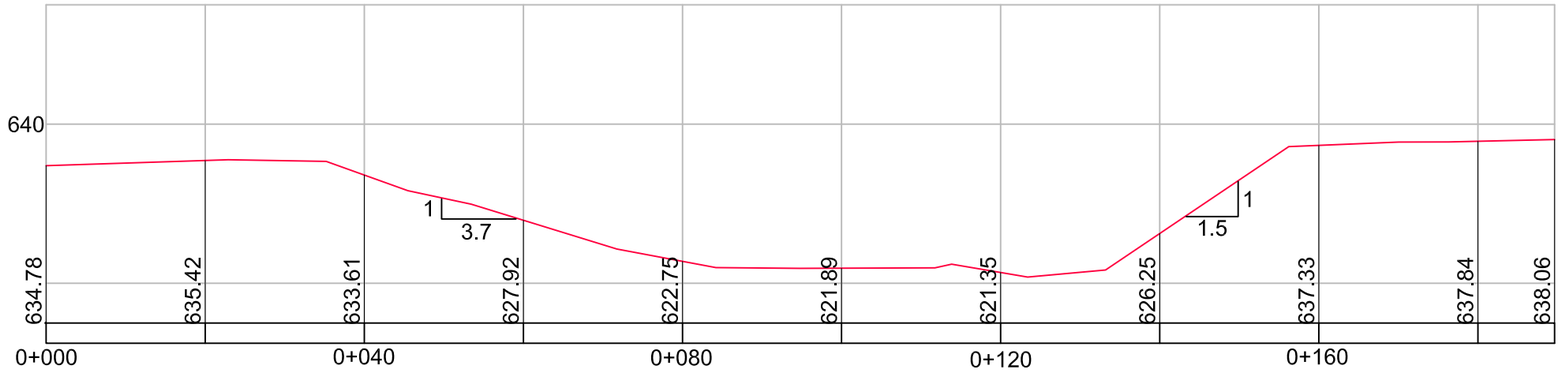
CLIENT: FOCUS

BOREHOLE LOCATIONS

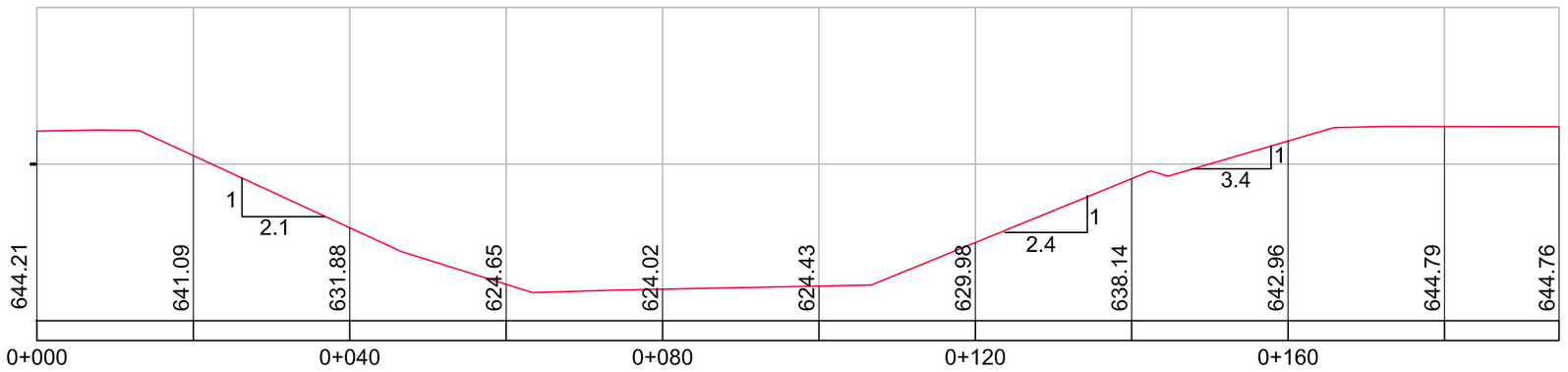
SWAN VALEY RESIDENTIAL SUBDIVISION
N1/2 34 - 72 - 9 - W5M, NEAR KINUSO, AB

SCALE:	JOB NO.	DRAWING NO.
1:4000	ED1081	FIGURE 1

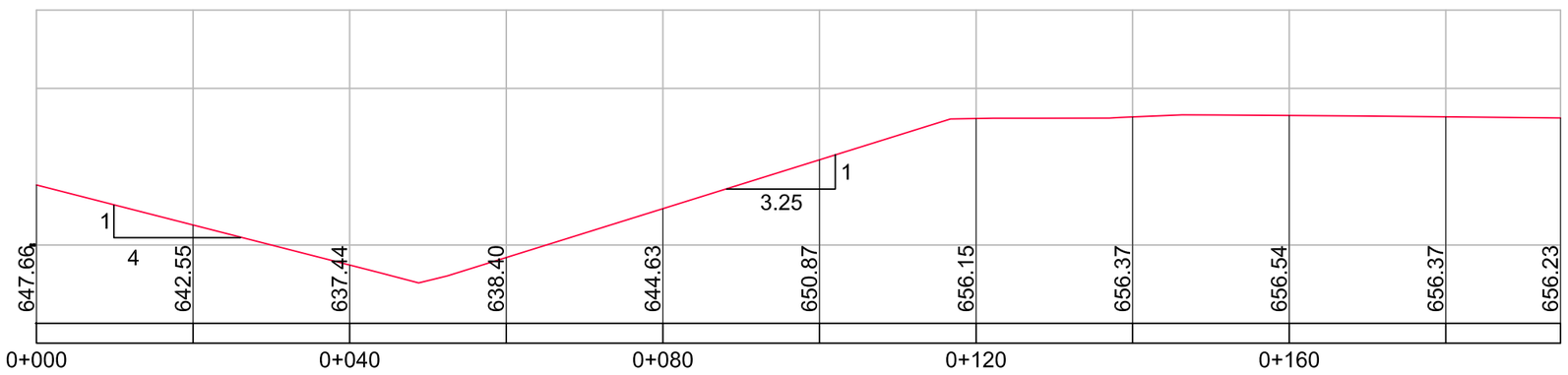
SECTION 2



SECTION 6



SECTION 8



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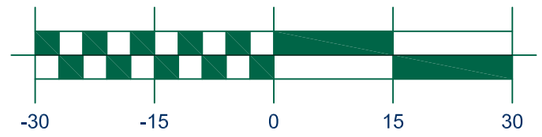


REV #	DATE	DETAILS

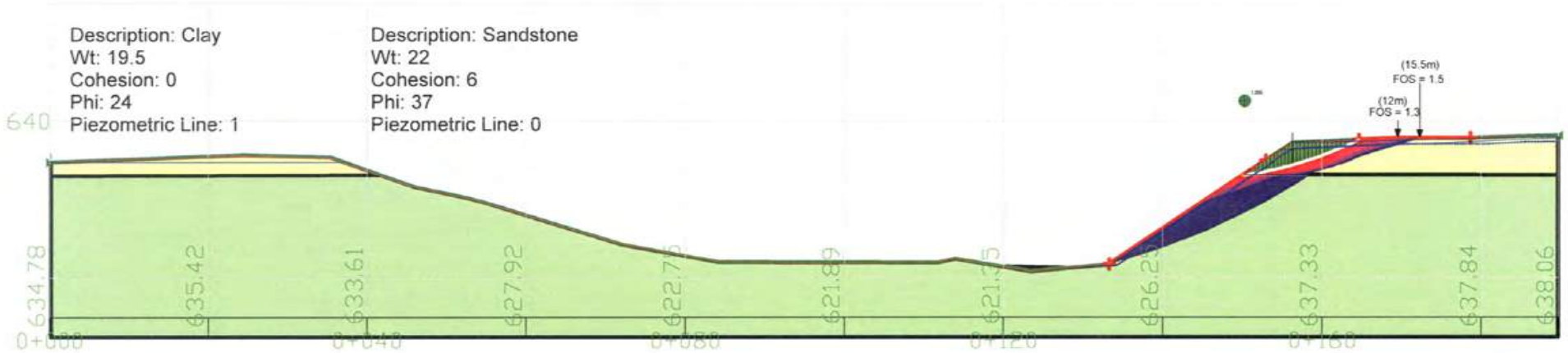
Parkland GEO

CLIENT: FOCUS

CROSS SECTION PROFILES

SWAN VALLEY RESIDENTIAL SUBDIVISION
N1/2 34 - 72 - 9 - W5M NEAR KINUSO, ALBERTA

DRAWN:	CHK'D.:	DATE:
JP	MMc	JUNE, 2007
SCALE:	JOB NO.	DRAWING NO.
1:750	ED-1081	FIGURE 8



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JP	MMc	0	JUNE, 2007

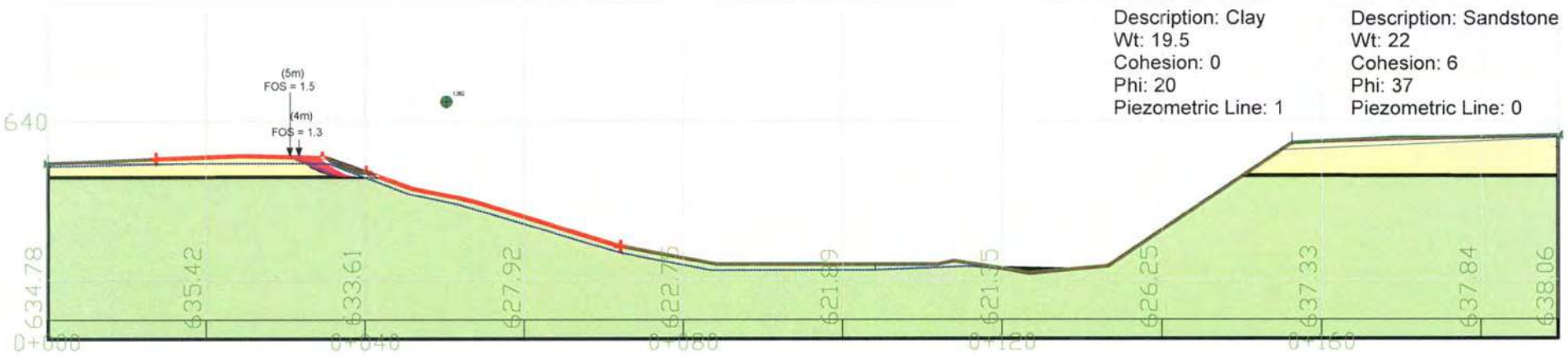
Parkland GEO

CLIENT: FOCUS

STABILITY ANALYSIS OF SOUTH FACE SECTION 2

SWAN VALLEY RESIDENTIAL SUBDIVISION
N1/2 - 34 - 72 - 9 - W5M NEAR KINUSO, ALBERTA

SCALE:	JOB NO.	DRAWING NO.
NTS	ED-1081	FIGURE 9



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DRAWN:	CHK'D.:	REV #:	DATE:
JP	MMc	0	JUNE, 2007

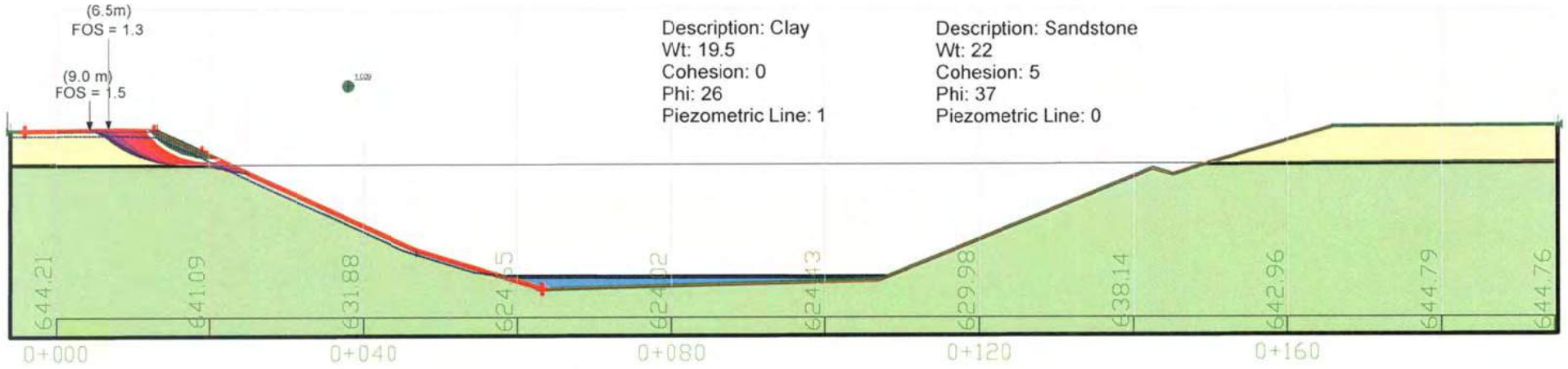
Parkland GEO

CLIENT: FOCUS

STABILITY ANALYSIS OF NORTH FACE SECTION 2

SWAN VALLEY RESIDENTIAL SUBDIVISION
N1/2 - 34 - 72 - 9 - W5M NEAR KINUSO, ALBERTA

SCALE:	JOB NO.	DRAWING NO.
NTS	ED-1081	FIGURE 10



REV #	DATE	DETAILS

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JP	MMc	0	JUNE, 2007

Parkland GEO

CLIENT:

FOCUS

STABILITY ANALYSIS OF NORTH FACE SECTION 6

SWAN VALLEY RESIDENTIAL SUBDIVISION
N1/2 - 34 - 72 - 9 - W5M NEAR KINUSO, ALBERTA

SCALE:	JOB NO.	DRAWING NO.
NTS	ED-1081	FIGURE 11

REV #	DATE	DETAILS

DRAWN:	CHK'D.:	REV #:	DATE:
JP	MMc	0	JUNE, 2007

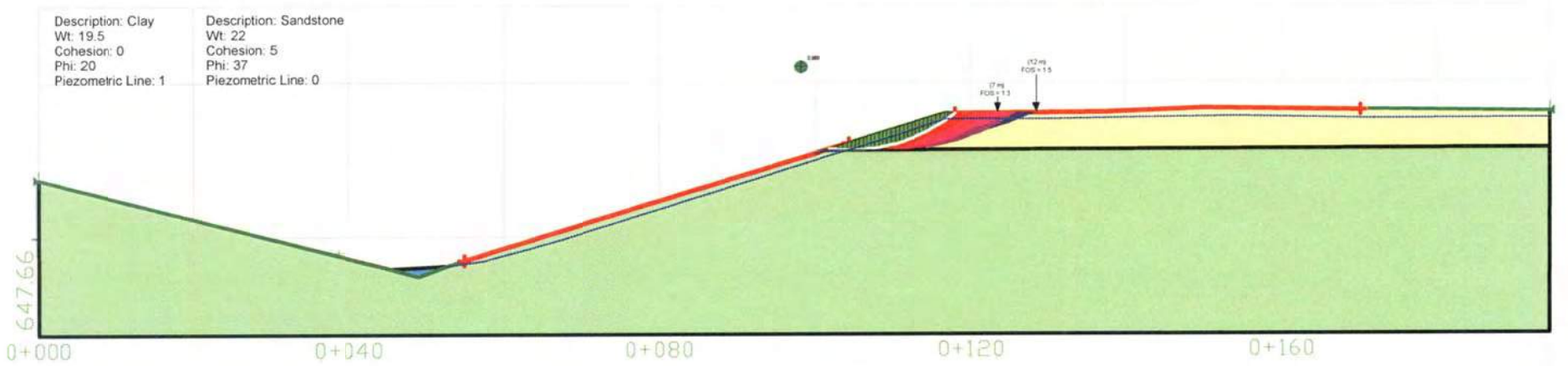
Parkland GEO

CLIENT: FOCUS

STABILITY ANALYSIS OF SOUTH FACE SECTION 6

SWAN VALLEY RESIDENTIAL SUBDIVISION
N1/2 - 34 - 72 - 9 - W5M NEAR KINUSO, ALBERTA

SCALE:	JOB NO.	DRAWING NO.
NTS	ED-1081	FIGURE 12



REV #	DATE	DETAILS

DRAWN:	CHK'D.:	REV #:	DATE:
JP	MMc	0	JUNE, 2007

Parkland GEO

CLIENT: FOCUS

STABILITY ANALYSIS OF SOUTH FACE SECTION 8

SWAN VALLEY RESIDENTIAL SUBDIVISION
N1/2 - 34 - 72 - 9 - W5M NEAR KINUSO, ALBERTA

SCALE:	JOB NO.	DRAWING NO.
NTS	ED-1081	FIGURE 13