THIS SUBDIVISION AGREEMENT made (in quadruplicate) the 16th day of AUGUST A.D. 1982.

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BETWEEN: NOEL DEVELOPMENTS (ONTARIO) LIMITED, a Company incorporated under the laws of the Province of Ontario, and having its Head Office at the City of Ottawa, in the Regional Municipality of Ottawa-Carleton,

hereinafter called the "SUBDIVIDER"

OF THE FIRST PART:

- AND -

THE CORPORATION OF THE TOWNSHIP OF SOUTH SHERBROOKE,

hereinafter called the "TOWNSHIP",

OF THE SECOND PART.

WHEREAS the lands to which this Agreement applies are shown on a draft Plan of Subdivision attached as Schedule "B", and are located in Part of Lots 13, 14 and 15 in the Fifth Concession of the Township of South Sherbrooke, in the County of Lanark and Province of Ontario.

AND WHEREAS the Subdivider purports to be the owner of the said lands and has applied to the Minister of Housing for approval of a Plan of Subdivision.

AND WHEREAS the Township has recommended to the Ministry that the Subdivider shall service such Plan, and undertake to make such financial arrangements with the Township for the installation and construction of the said services before obtaining the approval of the said Plan by the Ministry.

NOW THEREFORE THIS INDENTURE WITNESSETH that in consideration of the Township recommending approval of the said proposed Plan of Subdivision, and in consideration of the sum of ONE DOLLAR ($1.00) of lawful money of Canada now paid by the Township to the Subdivider (the receipt whereof is hereby acknowledged) and in consideration of the mutual convenants hereinafter expressed, the parties hereto covenant and agree one with the other as follows:

1: In this Agreement:

"Plan" or "Plan of Subdivision" or "Subdivision" means the proposed Plan of Subdivision submitted by the Subdivider for approval and includes the lands described in Schedule "A" and shown in Schedule "B".

"Township Engineer" includes any engineer designated by the Council of the Township.

2: The following Schedules are attached hereto and form part of this Agreement:

"A" Description of lands to which this Agreement applies;

"B" Draft Plan of Subdivision. It is acknowledged by the parties that if the Subdivision Agreement is registered after the Plan is approved, the draft Plan of Subdivision shall be removed and a written description of the lands shall be included;

"C" Schedule of lands for municipal purposes;

"D" Road standards;

"E" Terrain , Hydrogeological and Ecological Analysis, prepared by Water and Earth Science Associates Limited.

"F" Lot development plans for lots 12,21,23,24 and 25.

ROADS

3: The Subdivider agrees that:

(a) The road known as Rainbow Lane on the attached Subdivision Plan (Schedule "B") is and shall remain a private road until assumed by the Corporation of the Township of South Sherbrooke by By-Law.

(b) The Township will accept responsibility for the maintenance and repair of the said road or portions thereof, when the said road is brought up to the standards described in Schedule "D" attached hereto.

(c) Until such time as the road is accepted by the Township, it is understood and agreed that the maintenance and repair of the road is to remain the responsibility of the Subdivider and the users of the road who may purchase lands in the Subdivision from the Subdivider, and the Subdivider acknowledges on behalf of itself, its successors and assigns, the owner or owners from time to time of the lands situated in the Subdivision, that the Township will not accept responsibility for the maintenance and repair of the said road until assumption of the said road is deemed advisable by the Council of the Township and not until it is brought up to standards acceptable to the Ministry of Transportation and Communications.

In the event that the Subdivider or future users of the road being the owner or owners from time to time of the lands in the Subdivision wish the road to be assumed, it is agreed by the Subdivider that it shall be its responsibility, or in the event that all of its land has been conveyed, it shall be the responsibility of the future owner or owners of lands in the Subdivision to bring the road up to the standards above defined at its or their expense.

(d) The Subdivider agrees to make all purchasers of lands from it in the Subdivision aware of the provisions of this Agreement as it pertains to

the roads in the Subdivision and further the Subdivider agrees to obtain from them such acknowledgements or agreements as may be deemed necessary by the Township to give full effect to the terms of paragraphs 3(c) and (d) herein.

(e) The performance by the Subdivider and or the lot owners from time to time in the Subdivision of its or their obligations under this Agreement to the satisfaction of the Township Engineer shall be a condition precedent to the acceptance by the Township of the said works.

LANDS FOR MUNICIPAL PURPOSES

4: The Subdivider further agrees to grant in fee simple, free of charge and free of all encumbrances, unto the Township, the lands set forth in Schedule "C" hereto for municipal purposes other than roads, as indicated on the attached draft Plan of Subdivision, or cash in lieu of lands as set out in Schedule "C" hereto. The deeds for the said lands and easements shall be delivered to the Township's solicitor by the Subdivider before the approval of the said Plan is requested from the Township, with the registered number of the Plan left blank for later filling in. The cost of registration shall be paid by the Subdivider.

DRAINAGE

5: The Subdivider agrees not to interfere in any way with any existing drain or water course, without the written permission of the Township. The Subdivider agrees that the granting of such permission shall not relieve the Subdivider of responsibility for any damage caused by such interference and the Subdivider will indemnify and save the Township harmless against any claims brought against the Township relating to such damage; provided the Township will give the Subdivider opportunity to defend any such claim.

TEST WELL

6: The subdivider covenants on behalf of itself, its successors and assigns that on or before June 30th, 1983, it shall install a test well constructed to the standards specified in Paragraph 7(d) herein. The well shall be test pumped and sampled to verify that adequate domestic water supplies can be developed on each of the Subdivision lots. The Subdivider further covenants to inform prospective purchasers of the lots at the time of offer of sale and purchase, that low yield wells may be experienced and treatment of water may be required. This requirement may be amended or removed by the Ministry of the Environment in writing after the results of the test well are received.

WELLS AND SEPTIC SYSTEMS

7: The Subdivider herein agrees to inform prospective purchasers of the lots at the time of offer of purchase and sale of the provisions of paragraphs 7(a),(b),(c),(d),(e),(f),(g),(h),(i) and (j) herein.

(a) The Terrain, Hydrogeological and Ecological Analysis report by Water and Earth Science Associates Limited should be followed as a general guide for development. (Minor exeptions may be required as dictated by site specific considerations);

(b) Where required, raised tile beds should be constructed with borrow material of a proven high phosphorus absorbtion capability;

(c) The lots shall be made suitable for the installation of sewage systems prior to or at the Building Permit stage to the satisfaction of the Leeds, Grenville and Lanark District Health Unit in accordance with Ontario Regulation 374/81 made under the Environmental Protection Act;

(d) Where bedrock is encountered at depths of less than six meters below land surface, wells drilled on those locations should be cased and grouted to a minimum depth of six meters. Where bedrock is encounterd at depths greater than six meters, casings shall be adequately grouted into the bedrock to a minimum depth of 0.3 meters;

(e) All habitable dwellings and private waste disposal systems shall be set back a minimum of 30 meters from the high water mark of Rainbow Lake and Little Silver Lake and from tributory streams to these lakes;

(f) Existing healthy vegetation and native soil within the 30 meter setback area should be preserved in its natural state;

(g) Dredging or filling along the shoreline of Rainbow Lake or Little Silver Lake or in wetland areas adjacent to the shoreline shall not be done without the prior approval of the Ministry of Natural Resources;

(h) The drainage in the creeks along Lots 1,9,12,21 and 23 shall not be altered without the prior approval of the Ministry of Natural Resources;

(i) Written approval is required from the Ministry of Natural Resources and the Rideau Valley Conservation Authority prior to the installation of any control structures in the Rainbow Lake outlet through proposed Lot 9;

(j) The lot development plans for Lots 12,21,23,24 and 25 attatched hereto as Schedule "F" should be followed as a guide for development.

LAND DEDICATION AND EASEMENTS

8: The subdivider shall forthwith convey to the Township the reserve shown as a block on Schedule "B" hereto annexed. The deed therefor shall be

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registered at the expense of the Subdivider immediately following the registration of the said Plan.

ZONING AND BUILDING RESTRICTIONS

9: The Subdivider agrees with the Township that the Subdivider shall not make any application for and the Township shall not be bound to issue to the Subdivider any building permits for structures to be erected on lots on the said Plan of Subdivision to which this Agreement applies until all of the lands required to be conveyed to the Township and the deeds therefor have been lodged with the Township's Solicitor, and the Subdivider agrees to indemnify and save harmless the Township from any and all claims, demands and causes of action arising out of the provisions of this paragraph.

10: The Subdivider herein covenants and agrees on behalf of itself, its successors and assigns that Lots 9, 17, 18, 19, 20, 21, 22, 23, 24 and 25 shall not be used as a public access or a limited public access to Little Silver Lake; it being understood that this convenant will not in any way limit the normal use, occupation and enjoyment of the lands as cottage property by any person or family.

11: The Subdivider herein covenants and agrees on behalf of itself, its successors and assigns that it will not voluntarily allow any portion of Lot 9 to be used for the purposes of a public highway to link Silvery Lane and Rainbow Lane.

REGISTRATION OF AGREEMENT

12: This Agreement shall be registered by the Township's Solicitor at the expense of the Subdivider immediately following the registration of the said Plan, and the registered duplicate of this Agreement and any deed or deeds of conveyance to the Township, shall be lodged with the Township Clerk.

EASEMENTS

13: The Subdivider herein convenants and agrees on behalf of itself, its successors and assigns to grant such Easements as may be required for utility or drainage purposes and that the said Easements shall be granted to the appropriate authority. The Subdivider herein agrees that all Easements for hydro and telephone shall be located on the roadways within the Subdivision to the extent that this is possible.

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PAYMENT OF ACCOUNTS

14: The Subdivider covenants and agrees to pay to the Township an amount equal to all legal fees and disbursements incurred by the Township for advice with regard to the Subdivision, the preparation of this Subdivision Agreement, and all documents required to be prepared pursuant to it. Copies of the accounts for such services of the Township Solicitors shall be delivered by the Township to the Subdivider forthwith on receipt of such accounts for the Township Solicitors, and the Subdivider covenants and agrees that it shall pay forthwith to the Township or its nominee as accounts are rendered by the Township Engineer, the amount of such accounts.

COVENANTS RUNNING WITH THE LAND

15: The covenants entered into by the Subdivider in paragraphs 3, 5, 6, 7, 10, 11, 13 and 14 are intended to be binding upon future owners of the individual lots shown on Schedule "B" and accordingly shall run with and be a charge upon the lands.

CANCELLATION OF AGREEMENT

16: In the event that the Plan of Subdivision has not been registered within three years from the date of this Agreement, the Township may at its option cancel this Agreement upon notice to the Subdivider.

NOTICES

17: Any notices required to be given hereunder may be given by registered mail addressed to the other party at its principal place of business and shall be effective as of the date of deposit thereof in the post office.

SUBSEQUENT PARTIES

18: This Agreement and everything contained herein shall enure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

INSURANCE

19: The Subdivider agrees to pay to the Township in like manner as taxes, any additional insurance premiums charged to the Township as a result of this Agreement.

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IN WITNESS WHEREOF the Corporation has affixed its corporate seal attested by the hands of its property signing officers in that behalf, and The Corporation of the Township of South Sherbrooke has affixed its corporate seal, attested by the hands of its property signing officers in that behalf.

SIGNED, SEALED AND DELIVERED)
In the Presence of)
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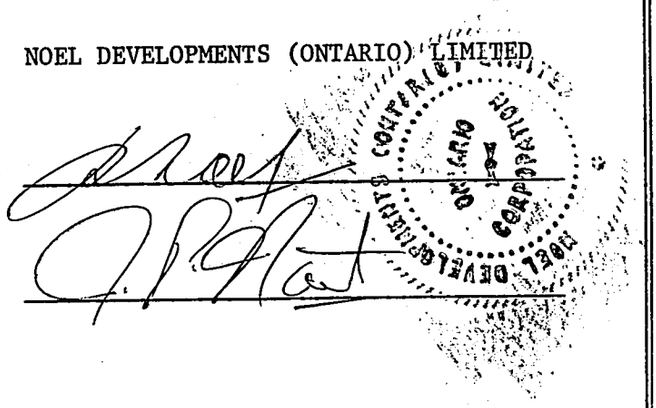
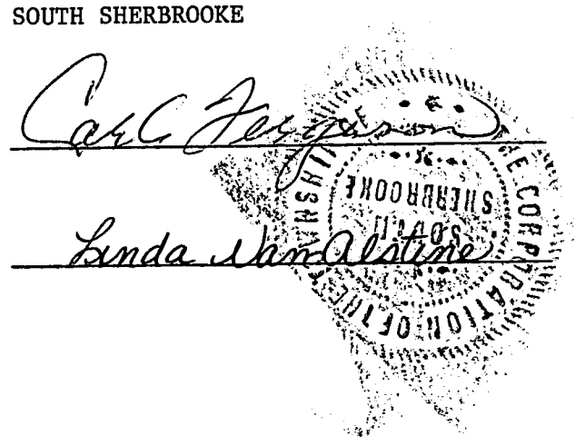
NOEL DEVELOPMENTS (ONTARIO) LIMITED



THE CORPORATION OF THE TOWNSHIP OF SOUTH SHERBROOKE



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SCHEDULES "A" and "B"

All and singular those certain parcels or tracts of land and premises being the North and South Halves of Lot 13, and Part of Lot 14 and 15, Concession 5, Township of South Sherbrooke, County of Lanark and Province of Ontario being more particularly described as :

Lot 1
2
3
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5
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7
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9
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11
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15
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17
18
19
20
21
22
23
24
25

Blocks 26,
27,
28
29

Rainbow Lane

on Registered Plan PL - 29,

SCHEDULE "C"

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1. LANDS FOR MUNICIPAL PURPOSES OTHER THAN PUBLIC HIGHWAYS: -

- One foot reserve.

2. LANDS ON ACCOUNT OF FIVE PERCENT (5%) OR CASH IN LIEU THEREOF: -

(i) $50.00 per lot x 25 lots - $1,250.00

3. LANDS FOR PUBLIC HIGHWAYS: -

(i) Rainbow Lane

SCHEDULE "D"

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ROAD SPECIFICATIONS

Right-of-Way	66 feet minimum
Width of Clearing	40 feet minimum except in steeply rolling or rocky areas 30 feet minimum
Surface Width	18 feet except in steeply rolling and/or rocky areas 14 feet
Shoulder Width	4 feet
Surface Type	Granular "A" with minimum depth of 4 inches
Depth of Granular "C"	Pit run - 8 inch minimum on earth cuts and fills 4 inch minimum on rock cuts and fills
Culverts	15 inch C.S.P. minimum
Ditches	Minimum depth from crown or road to bottom of ditch 1 foot. All ditches to be carried to sufficient outlet
Road Gradient	15% maximum

The quality of materials and method of all road and culvert construction must comply with the applicable Ministry of Transportation and Communication's Specifications.

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Schedule "E"

RAINBOW LAKE-LITTLE SILVER LAKE DEVELOPMENT

Terrain, Hydrogeological and Ecological Analysis

Concession V Parts of Lots 13, 14, 15

South Sherbrooke Township

Derek P. Smith M.Sc. FGAC

Water and Earth Science Associates Ltd.

Harold J. Parsons, Director

Al Macdonald B.Sc.

Bufo Inc.

1.0 Introduction

Water and Earth Science Associates were commissioned by Mr. Jacques Noel, Secretary of Noel Developments (Ontario) Ltd. to conduct an analysis of the hydrogeological, terrain and ecological conditions of a proposed seasonal residential subdivision located on Concession V (parts of Lots 13, 14, 15), Township of South Sherbrooke. (Figure 1)

In order to establish the suitability of the property for development on wells and septic tank systems and provide planning and environmental guidelines as dictated by terrain conditions, the following site factors were studied:

1. the distribution and lithology of bedrock and surficial materials
2. topography and drainage
3. the hydrogeological characteristics of the bedrock aquifer
4. the characteristics of terrain units and their potential to disperse and attenuate septic tank effluent, and
5. the most suitable design of well and septic tank systems.

The results of our investigations are presented in the following report.

1.1 Study Methods

First, a site reconnaissance of the property was made and pertinent published literature about the physiography, geology, ecology and hydrogeology of the Little Silver Lake area was reviewed.

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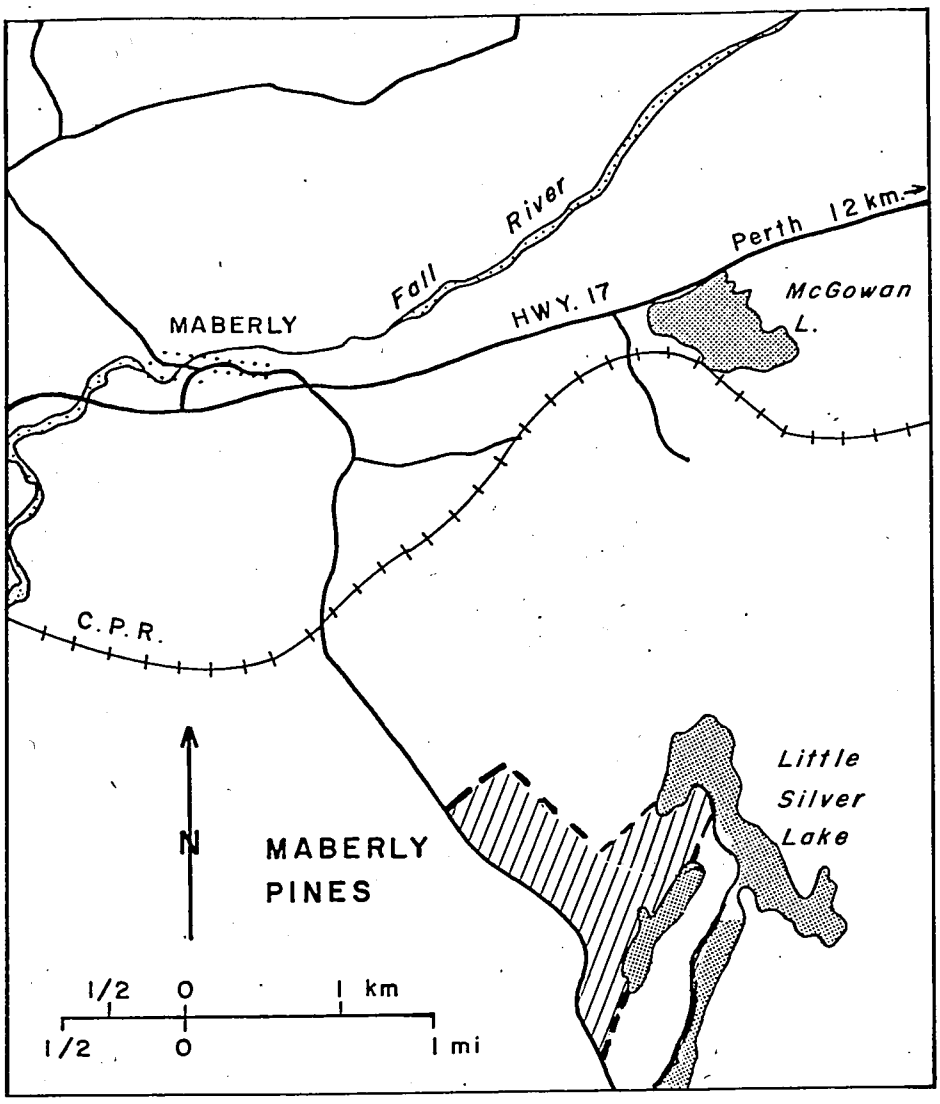

FIGURE I
MABERLY PINES
LOCATION MAP

Then five days of field work were conducted at the site during which time the geology and ecology of the land parcel was mapped at a scale of 1:2400. Large and small scale air photographs were used during this investigation. Field mapping was conducted by geological traversing and hand digging shallow test pits into the surficial sediments.

All published well logs from Concessions 3 - 9 and Lots 11 - 16 of South Sherbrooke Township were collected and analyzed to establish the potential of aquifers within the property. The grain size distribution and hydraulic conductivity of a typical soil sample were measured in the laboratory to determine the suitability of surficial materials for the in-ground disposal of domestic sewage.

Finally, planning documents and government regulations were reviewed as a basis for the recommendations included in this report.

1.2 Physiography

Physiographically, the Rainbow Lake and Little Silver Lake area is made up of a series of bedrock knobs and ridges interspersed with lowland areas. The terrain has a northwest-southeast orientation which is particularly pronounced immediately south of Little Silver Lake (Figure 2). Site topography reflects the peneplanation of this region which was caused by four major glacial advances and retreats. A maximum elevation of 212 metres above sea level occurs near Little Silver Lake, although most bedrock ridges lie at 202 - 210 metres above sea level. Lowland areas occur at elevations which range from 192 to 200 metres above sea level. Some variation in the elevation of swamps occurs across the site.

For example, the large pond in the northwest corner of the site has a 192 metre water level while a small waterbody near the highway to the south of the property lies at a 200 metre elevation.

2.0 Site Geology

The Little Silver Lake area is a good example of the Precambrian Terrain which characterizes much of the Canadian Shield of Ontario and Quebec. Ancient Precambrian rocks, last deformed by the Grenville Mountain Building episode which occurred about 950 million years ago, are overlain by a thin veneer of much younger glacial and non-glacial sediments. An irregular glaciated topography with an immature drainage pattern and numerous beaver ponds in lowland areas typify this terrain type.

The geology of the Little Silver Lake site is summarized in chart form as Table 1 of this text. A brief discussion of bedrock and surficial deposits is included below. The reader is referred to the geological references cited in the bibliography of this text if more details of the geological history of the Perth-Maberly region are of interest.

2.1 Bedrock Geology

The site is underlain by a Precambrian crystalline basement complex which includes biotite gneiss, diorite, migmatite, marble, quartzite, pegmatite and related paragneissic rocks. Bedrock is foliated with a northeast - southwest trend and near vertical dips.

The upper rock surface is striated, plucked and grooved and indicates that the last movement of glacial ice across this region was

GEOLOGICAL AGE			LITHOLOGY	THICKNESS	SLOPE	GEOLOGICAL HISTORY
SURFICIAL DEPOSITS	QUATERNARY	← Recent	Soils; podzols, acidic and immature. Bog deposits, muck and peat, areas of fen vegetation, marsh.	5 to 10 cm	flat	Formed by interaction of biological, climatic and geological elements. Controlled by beaver population or formed in poorly drained lowlands, produced by high organic deposition in wet areas.
		← Pleistocene	Glacial till, angular pebbles and boulders with a silty sandy brown matrix; pebbly sand facies overlies till.	.3 m to greater than 1 metre	deposited as thin veneer on sloping bedrock	Direct deposit from glacial ice; glacial till ground moraine. Sandy facies restricted to poorly developed small drumlin in structures.
BEDROCK	PRECAMBRIAN		Migmatite, biotite gneiss, diorite, marble, pegmatite and other granitized paragneisses	unknown	5 - 40% slopes, steep escarpment in places.	Eroded roots of the Grenville Mountains (950 million years old).

Table 1: Summary of Geological History

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in a northeast to southwest direction. Bedrock outcrops at the ground surface throughout the property and forms abrupt bedrock escarpments in many places.

Small outcrops and escarpments are present throughout parts of the land parcel forming a rugged microrelief.

Some evidence of minor open pit feldspar mining activity is present on the property, although excavations are too small to comprise a constraint to site planning.

2.1 Surficial Geology

Bedrock is covered by a veneer of glacial till ground moraine over most of the property. The distribution of the till material and bedrock outcrop areas is shown on map 2 of this report.

The till ground moraine material is composed of angular granitic pebbles and cobbles with a fine sand and silt matrix. In several areas of the property, poorly stratified pebbly sand deposits are found associated with the till ground moraine. These deposits apparently range up to 5 metres in thickness, lie stratigraphically above the till material and are oriented parallel to the direction of the last ice movement. They are interpreted as being very poorly developed small drumlin structures based on this evidence. The major drumlin is located just south of the property boundary near Little Silver Lake (just outside area of Figure 2) and has been partially quarried for borrow material. Similar deposits were noticed in several areas of the site but were mapped as a sand facies of the till ground moraine material due to their diffuse form and thinness.

The composition of a typical sample of the till ground moraine material was analyzed in the laboratory with the following results:

Grain Size Distribution	Clay	2 %
	Silt	18%
	Fine Sand	36%
	Medium Sand	12%
	Coarse Sand	8%
	Gravel	24%

Permeability (using Falling Head Permeameter) = 2.42×10^{-4} cm/sec.

Where present, the till unit is usually only a few centimetres to half a metre in thickness on ridge tops. However, in valley areas, a till thickness of 1 metre or greater was found during field investigations.

Swamp deposits include poorly drained black organic soils, muck and peat deposits. Their distribution is restricted to lowland areas and have been greatly extended in recent years by the activities of the beaver population in the area.

In general, soils formed on the sandy till ground moraine are poorly developed, are from 10 to 20 centimetres thick and have a poor potential for agricultural crop production.

3.0 Hydrogeology

In order to provide information on potential well yields and groundwater quality within the Rainbow Lake-Little Silver Lake subdi-

vision, existing well logs recorded with the Ministry of the Environment from Concessions 7,8,9, Lots 11 to 16 have been assembled and analyzed.

The Precambrian bedrock is the only geological unit in the study region with the potential to provide adequate quantities of groundwater for domestic water supplies. Surficial materials are too thin and discontinuous in nature to furnish reliable water sources. Therefore, dug or driven wells are considered unsuitable for use on this property.

Knowledge of the recharge characteristics, water supply potential and groundwater quality of the Precambrian aquifer is an important factor in the planning of any development of this site. A brief discussion of these points is included in the following sections.

3.1 Recharge Characteristics

Groundwater movement in the Precambrian basement rock is controlled by variations in topography between highlands and lowland areas and the pattern and extent of the fracture system present. Figure 3 illustrates in a theoretical manner how the precipitation which falls on upland recharge areas will flow downwards into the saturated groundwater zone below the water table and hence, in a lateral direction towards lowland swamp and stream discharge zones.

Saturated hydraulic gradients in Precambrian terrain are impossible to measure without detailed drilling data. Gradients in the unsaturated near-surface fracture system, however, should reflect surface topography variations and the orientation of fracture patterns closely and are typically quite high (0.2 to 0.7). Infiltration rates

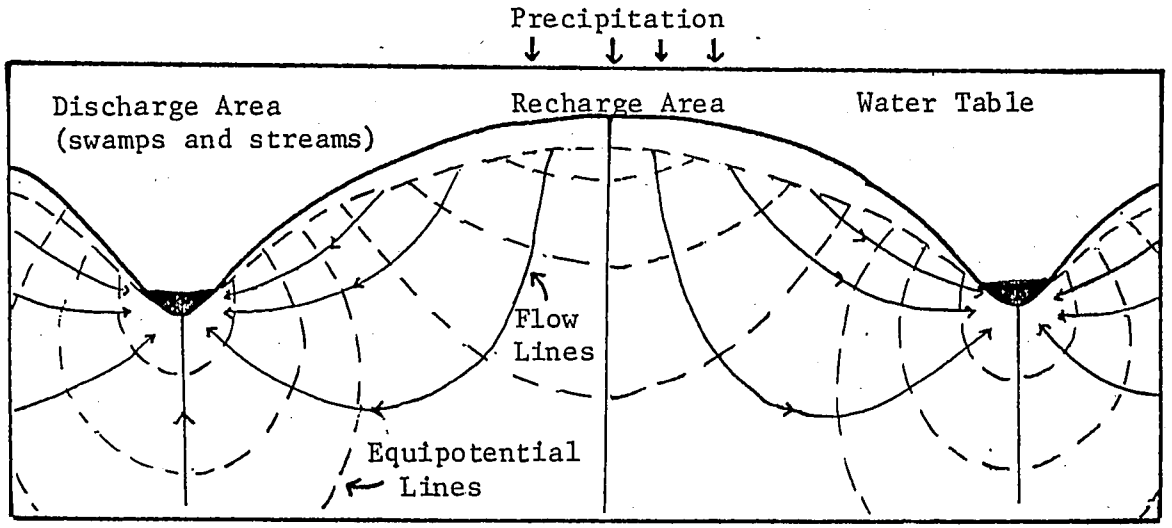

Figure 3: Idealized Model illustrating Groundwater Flow from Recharge on the Topographic Highs to Discharge in the Valleys (Hubbert, 1940)

and groundwater flow velocities should be high in this terrain but cannot be calculated because measurements of the bedrock fracture permeability have not been made. However, groundwater movement in the order of 25 - 50 metres per year is considered a reasonable estimate based on theoretical calculations.

Based on this information, wells should be located on highland areas, for two reasons:

a) septic tile weeping beds can then be located at lower elevations and will flow away from, not towards water wells

b) wells will be recharged by precipitation and will be located at a sufficient distance from lowland marsh areas to avoid drawing water from these sources. Marsh water is often of poor quality due to high organic acid concentrations, low pH or colour and odour problems.

3.2 Aquifer Potential

The water wells for all domestic wells utilizing the Precambrian bedrock aquifer in Concessions 7, 8 and 9, Lots 10 to 16 have been analyzed to provide an assessment of the groundwater supply potential in the Rainbow Lake-Little Silver Lake Subdivision. The 17 logs recorded with the Ministry of the Environment are included as Appendix B in this report. There is no well log information from the proposed subdivision with existing cottages along Silver Lake using lake water as a water source.

Well yields in Precambrian terrain vary as a function of the degree of fracture (i.e. fracture permeability) of the bedrock.

Well yields can vary significantly within short distances (i.e. 100 metres or less) in this rock type. It should be noted that fractures usually decrease in density with depth along the metamorphic foliation and the joint pattern in granitic rocks. Well yields are usually not significantly increased if wells are drilled beyond 50 metres as a consequence.

Water was found from 10.0 to 38.4 metres below the ground surface (mean = 21.3 metres) in these wells with a static level variation of 1.21 to 10.0 metres (mean 16.5). Well data are too sparse to permit an analysis of fracture system patterns using depth histograms. However, well depths vary from 8.2 to 35.0 metres which indicate that near surface fracture systems are supplying adequate water supplies from existing residences.

To evaluate well yields, each log was examined and classified as follows:

	Number of Wells
Poor yields (drawdowns were high, 25 - 75' after short term (1-2 hr) pump tests at 5 gpm or less)	12
Moderate yields (drawdowns were fairly low, less than 50' after short term pump tests at 5 - 10 gpm)	3
Good yields (drawdowns were low after short term pump tests at greater than 10 gpm)	2
TOTAL	17 wells

The following conclusions can be drawn from this analysis:

a) twelve of the existing wells in this area have yields close

to the minimum required to service a domestic residence (4 igpm or 18 litres per minute). Wells should be drilled and constructed as per the recommendations oulined in Section 4.1 to maximize the well yields and eliminate potential contamination problems.

b) it is unlikely that high volume wells of 200 litres per minute or greater could be drilled on this site. Development planning should preclude high volume water usages as a consequence.

3 .3 Water Quality

The water quality of groundwater from existing wells in the Little Silver Lake area is reported to be fresh, colourless and odourless. This is most likely the case on the study property.

4.0 Type of Development

It is understood that the Rainbow Lake-Little Silver Lake subdivision will be a seasonal recreational development. As a consequence, septic tanks will be used primarily during summer months and water requirements will be lower than in permanent subdivisions. The recommendations proposed in this report however, are based on the assumption that some winter utilization may also occur and that coversion of dwellings to yearly use is a possibility i.e. that the development is a year-round subdivision. A zoning of the subdivision to seasonal use however, should provide a large safety factor to guarantee the integrity of groundwater supplies.

4.1 Suitability for Development

Six terrain units, or land types having a unique association

of lithological, ecological and topographic characteristics have been identified on this property from our field work. These are:

1. bedrock, highly sloping
2. bedrock, flat
3. thin till over bedrock
4. thick till and sand over bedrock
5. thick till, poorly drained
6. beaver swamp

The distribution of each terrain unit is mapped on Figure 2 of this report while their characteristics are summarized as Table 2.

Terrain Unit 1 (bedrock, sloping) has limited capability to attenuate septic tank effluent in its natural state due to the thin nature of the soil cover in these areas. High slopes, abundant outcrops and rock escarpments are major planning constraints throughout this unit. Terrain Unit 1, generally speaking, is not recommended for the installation of septic tank systems.

Terrain Unit 2 (bedrock, flat) has the same constraints as Unit 1 but slopes are usually less than 10% and till material is thicker in isolated pockets. Development on large lots (2 - 3 acres) is considered feasible on this unit provided tile beds are fully raised and well to septic tank spacings of 30 - 50 metres are instituted. Lot planning will require locating suitable tile bed locations first and locating dwellings second in respect to these areas.

Terrain Unit 3 and 4 are distinguised on the basis of till depth. A typical sample of the silty sand till ground moraine gave a falling

TERRAIN UNIT	LITHOLOGY OF UNIT	THICKNESS OF SURFICIAL MATERIALS	HYDRAULIC CONDUCTIVITY	WATER TABLE DEPTH	SLOPE	SUITABILITY FOR CONVENTIONAL SEPTIC TANKS	WELL TO SEPTIC TANK SPACINGS	RECOMMENDED SEPTIC SYSTEM DESIGN
1	Bedrock, sloping, very thin veneer of till	0 - .3 m	greater than 2.43 x 10^{-4} cm/sec where coarse grained and thin	below bedrock surface	5 - 40% with rock escarpments	very poor, not recommended for development	-	-
2	Bedrock, flat outcrop with pockets of till	0 - 1.0 m in pockets	as below	below bedrock surface	0 - 20% rolling, rugged microrelief	poor	30 - 50 metre wells to be "upstream" from tile beds	fully raised 1 m tile beds with soil mantles
3	Thin till over bedrock	.5 - 1.5 m blanket	tested at 2.43 x 10^{-4} cm/sec	below bedrock surface	5 - 10%	fair to good	30 m	partially raised (.5 - 1.0 m) tile beds with soil mantles
4	Thick till and sand over bedrock	1.0 m blanket	as above	well drained, below bedrock surface	5 - 10%	excellent	30 m	septic tanks as per Ministry of Environment standards
5	Thick till poorly drained	as above	as above	within .5 m of surface	0 - 40%	poor no development	-	-
6	Beaver swamp	unknown	low	at surface	0%	nil no development	-	-

Table 2: Rainbow Lake-Little Silver Lake
Development Potential of Terrain Units

head permeameter reading of 2.43×10^{-4} cm/second. Table 3 summarizes published literature comparing both permeability (hydraulic conductivity) and percolation test data for different types of surficial geological materials.

Permeability is expressed as both cm/second and minutes per inch in this Table. It is impossible, however, to relate percolation times and permeability measurements directly because permeameter readings are accurate saturated flow velocity measurements done in the laboratory while percolation readings are simple field tests. Percolation tests are often highly inaccurate due to problems of stratigraphic variation, compaction and partially saturated test holes. Also, percolation tests usually give higher (i.e. more permeable) results due to the presence of temporary structures in the soil horizon (rootlets, worm burrows, fissures, cracks, thin pervious soil lenses, etc.)

The Maberly Pines till sample has a permeability of 2.43×10^{-4} cm/second (or 175 minutes per inch if percolation could be calculated directly). According to Bernhart (1972) however, this permeability would yield a field percolation test near 60 minutes/inch and would be an excellent, although slightly impervious porous media for the attenuation of septic tank effluent.

In Terrain Unit 3 and 4 where till thickness is less than 1 metre, partially raised tile beds should be required. Minimum lot sizes of 1 acre are suggested for these units.

Poorly drained till areas have been mapped as Terrain Unit 5 (Figure 2). These areas would require fill and drainage work during development and should be avoided whenever possible.

Terrain Unit 6 is swampland with no potential for development. These areas are highly sensitive ecological zones and should not be filled or altered in any manner.

Rainbow Lake
Little Silver
Lake
Sample

Table: Approximate Correlation of Percolation Rates and Permeability Measurements

2.43×10^{-4} cm/sec.

Percolation Rates (x)
(Bemart 1972)

t in Minutes per inch

1 - 5	5 - 30	30 - 60	60 - 120	120 - 180
Medium Sand	Fine Sand to Sand and Silt	Loam and Silt Soils	Clay and Silt Soils	Heavy Clay Soils

Correlation Based on Lithology not Calculations
(Refer to Section)

Hydraulic Conductivity
(Todd 1959)

10 | 1 | 10^{-1} | 10^{-2} | 10^{-3} | 10^{-4} | 10^{-5} | 10^{-6} | 10^{-7} | 10^{-8}

centimetres/second

Clean Gravel	Clean Sand, Sand/Gravel Mixtures	Very fine sands, glacial till, silt and clay mixtures	Unweathered Clay

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Well and septic tank design and site investigation recommendations are included in the following sections for each terrain unit.

4.1 Recommended Well Design

To minimize the risk of well water contamination and maximize well yields:

1. All wells should be drilled with a cable tool rig or an air rotary rig. Wells should be drilled slowly to minimize blockage and sealing of the fine joints and fractures in the bedrock which are the source of water in the Precambrian bedrock. In addition, wells should be surged every 5 metres during construction. Rotary drilling using "down-the-hole Hammer" technique (i.e. air percussion) seals fractures and result in low yields, over-deepened wells and high well construction costs.

2. All wells should be properly cement-grouted one casing length(about 7.5 metres) into bedrock to seal off near surface fractures close to the well which have a high potential to permit contaminated surface water from recharging the well.

3. Wells should be drilled at least 50 metres from swamps and marshes to avoid the possibility of recharging wells with poor quality water. Swamp water is often enriched in organic acids and may have an objectionable colour and odour.

4.2 Tile Field Design Recommendations

1. It is recommended that the capacity of septic tanks and the lengths of weeping tile used by increased be increased by a

factor of 1.5 over Ministry of Environment guidelines. It is felt that most septic tank systems are underdesigned for the capacity loadings placed on them by modern household appliances (e.g. dish-washers).

2. It is recommended that tile bed or well spacings within individual lots be increased to between 30 and 50 metres as a safety factor in order to minimize any risk of contamination of potable well water. Tile beds should be located blow wells to permit effluent to flow away from and not towards water supplies.

3. Septic tanks on Terrain Units 2 and 3 will require raised tile bed installations. A diagram of this design is included as Figure 4 of this report.

4. Where slopes are high (5 - 10%), tile bed construction will require:

> that a 40 x 50' minimum area be infilled with semi-permeable material to reduce the slope to less than 1%
>
> and
>
> that a mantle of fill (20' minimum width by 2' depth) be constructed around the tile bed.

A generalized sketch of these conditions is included as Figure 5.

Tile bed construction on slopes of 10 - 25% is difficult and might require extensive remedial work with heavy construction machinery. These cases should be designed and approved on an individual basis.

5. Precambrian terrain (especially Terrain Units 1, 2 and 3) which are to be developed for seasonal and recreational uses, have a

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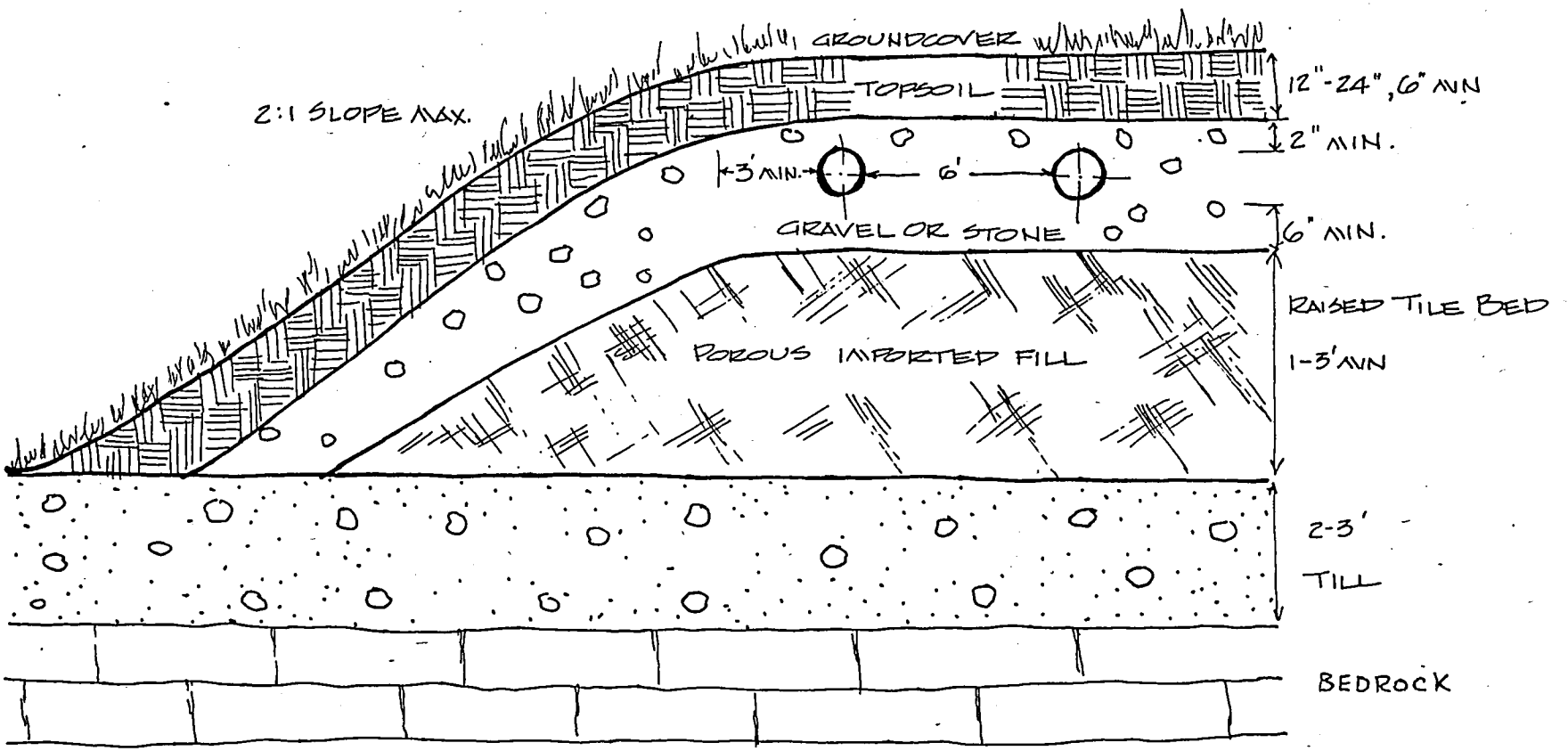
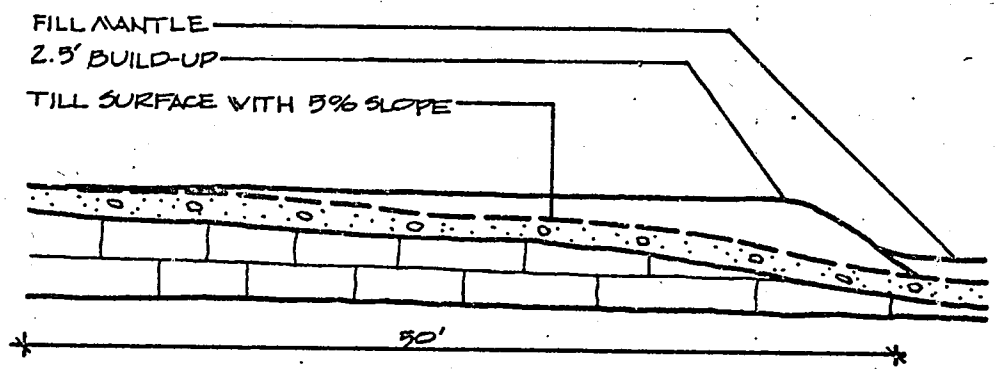
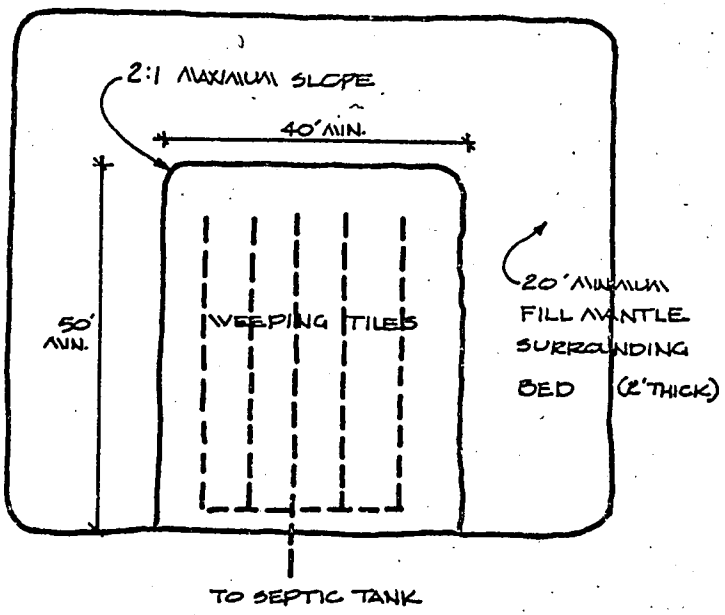


FIGURE 4 RECOMMENDED DESIGN OF LEACHING BED WHERE THIN TILL UNIT IS PRESENT

FIGURE 5: RECOMMENDED SEPTIC TANK TILE BED DESIGN ON SLOPING TERRAIN (10% MAX. SLOPE)



CROSS SECTION SCALE: 1"=10'



PLAN VIEW SCALE 1"=20'

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high potential to be serviced with Humus toilets (or some other alternative sewage system brand which does not utilize in-ground disposal methods). These toilets are functional, economical and eliminate all risk of groundwater pollution.

4.3 Site Inspections

It is recommended that a lot by lot field survey of potential tile field locations be made upon completion of the concept plan with officials of the Public Health Unit, Perth Ontario.

Any possible problems with tile bed sitings due to localized drainage channels, minor escarpments or soil thickness variations, would be identified at this time. In addition, any inaccuracies in the base map or contours which might effect site layouts would be verified at this time.

Please note that this is not a lengthy procedure but has recently become a general requirement of the Ministry of the Environment for this type of terrain.

5.0 Vegetation and Wildlife

Methodology and Format of Ecosystem Analysis

To assess the vegetation and wildlife components for ecological constraints to development, the site was divided into natural ecosystems. An ecosystem can be defined as the interaction and interdependence of all physical and biological components of any area. The physical and vegetation parameters of an individual ecosystem constitute a biotope. For this discussion, the study site has been categorized into upland biotope, lowland biotope, open field biotope

marsh and swamp biotope and lake and shoreline biotope. Each biotope is described under the following headings:

- description and distribution
- threatened species or unique associations
- species of economic importance
- constraints to development

The vegetation component of each biotope is described with regards to species composition and distribution. The discussion of unique associations at particular sites includes consideration of abundance of species and significance of the association of plants and animals to the biotope. Decisions concerning the presence of rare and endangered species are based upon each species' range, the occurrence of suitable habitat, and records in the scientific literature. Species of economic importance include game species of birds and animals, sport fishes, fur-bearers and commercial forest tree speices. Canada Land Inventory capability maps for ungulate, waterfowl and forestry production are referred to where applicable. Constraints to development were derived after evaluating sensitivities of the ecosystems to the types of disturbance generated by seasonal development. Areas of high and moderate sensitivity have been mapped on Figure 2 of this report as a guideline for subdivision planning.

5.1 Upland Biotope (Terrain Units 1 and 2)

A. Description and Distribution

The upland biotope is composed of high, well-drained areas that may be forested or shrub covered and partially bare. The forested portions of upland sites are covered by stands of red oak

but varied micro-relief promotes some growth of sugar maple and white birch in more moist situations. Thin soils on high ground are dominated by juniper shrubs that may be associated with small oaks. Small bare rocky sites are scattered intermittently throughout the juniper shrub areas.

B. Unique Associations

No rare or endangered species or unique associations were observed in the upland biotope on the Rainbow Lake-Little Silver Lake property.

C. Species of Economic Importance

During the site reconnaissance on November 16, 1978, three ruffed grouse were flushed from juniper shrubs in the upland areas. These birds are an important upland game species that are hunted during the autumn months. Another game species, snowshoe hare, inhabit areas of scrub vegetation and secondary growth as well. Although the property has moderately severe limitations to the production of ungulates (Canada Land Inventory 1970), a deer was observed on the site in November. Deer may inhabit or wander through the property where there is suitable browse and cover.

The land has severe limitations to the growth of commercial forests of red pine and red oak because of either soil moisture excesses or thin soil layers (Canada Land Inventory 1971).

D. Constraints to Development

Upland clearings have a low degree of ecolocial sensitivity and are suitable for development.

5.2 Lowland Biotope (corresponds to parts of Terrain Unit 3, 4, 5)

A. Description and Distribution

The lowland biotope includes the low-lying, well-drained areas where there are deeper soil deposits and also areas associated with the swamps. The forest stand is composed largely of poplars and sugar maples with white birch and some eastern white cedar. The understory consists of red osier dogwood, willows and ash shrubs. There is a stand of white pine along ridges and low-lying areas between the north end of Rainbow Lake and Little Silver Lake. The stand composition changes to a predominance of oak on the ridge hillsides as the soil moisture conditions become drier. Oak stands are not mature but consist of scattered mature individuals among younger trees.

B. Unique Associations

No rare or endangered species or unique associations were observed in the lowland biotope.

C. Species of Economic Importance

The low-lying areas of Rainbow Lake-Little Silver Lake property have severe limitations to the growth of hard maple commercial forests because of moisture excesses and shallow soil conditions. Ruffed grouse and snowshoe hare are found in virtually all areas of the acreage including the lowland biotope.

D. Constraints to Development

The tree growth in the low areas prevents surficial erosion and is an important input of organic matter (via leaf litter) into the soil. Existing vegetation on the hillsides helps to stabilize the thin soil that has been deposited on these slopes. Tree cutting

should be minimized therefore, during construction activities in this terrain unit.

5.3 Open Field Biotope (corresponds to parts of Terrain Units 3 & 4)

A. Description and Distribution

The rugged and shallow and stony soils place severe limitations on agricultural practices in these terrain units. While some open field areas were once cleared for agriculture, they are currently either being used for grazing purposes while other clearings have been left fallow for several years. Unused fields have early successional growths of golden rod, milkweed, staghorn sumac, hawthorn and some poplar saplings. Areas with scrub vegetation provide habitat for ruffed grouse, eastern cottontails, snowshoe hare, raccoon and fox.

B. Unique Associations

No rare or endangered species or unique associations are present in the open field biotope.

C. Species of Economic Importance

Upland game associated with fields, clearings and the vegetation on the edge of these openings include ruffed grouse and snowshoe hare. As previously stated, deer may wander through the property where there is suitable browse and cover.

D. Constraints to Development

The fields and clearings are the most suitable areas for development. These sites, some originally chosen for use as pastures, are the best drained and deepest soiled areas on the property.

They do not have a high degree of ecological sensitivity as they have been disturbed by human activity in the recent past.

5.4 Marsh and Swamp Biotope (corresponds to Terrain Unit 6)

A. Description and Distribution

At the south end of Rainbow Lake, along the shallow margins and extending to the Westport-Maberly Road, marsh vegetation consisting of cattails, bulrushes and grasses grow in submerged and water-logged soils. Ash, dogwood and willow shrubs are proliferant in the poorly drained conditions that exist around the perimeter of the lake.

Throughout the rest of the property, there are extensive permanently flooded low-lying areas. These swamps, created by beavers disturbing the natural drainage, are filled with dead and rotting trees, notably poplar. Shrubs, including willow and ash, grow on wet sites at the swamp edges.

B. Unique Associations

The presence of wetlands in a relatively undisturbed tract of land is conducive to a diverse group of wildlife. There is evidence of beaver activity at all the swamp sites and muskrats are almost always associated with them. Although this land is classed as having severe limitations to the production of waterfowl according to Land Capability for Wildlife - Waterfowl, Canada Land Inventory 1971, the extensive swampy sites and the marsh area of Rainbow Lake serve as important resting and feeding locations for migrants. They may also support a small resident breeding population for some species of ducks.

Marshes and swamps are also excellent habitats and important production centres for aquatic invertebrates, amphibians and reptiles.

C. Species of Economic Importance

Waterfowl such as mallards, black ducks and blue-winged teal are important game species despite the severe limitations to waterfowl production classification by the Canada Land Inventory 1971. Beaver and muskrat are fur-bearers that inhabit most of the existing wetland areas but their economic potential is unknown.

D. Constraints to Development

Marshes and swamps are vulnerable to pollution by increased inputs of natural and unnatural substances from development. Road and building construction near marshes and swamps may cause some siltation, particularly in the shallow waters. Inputs of nutrients from sewage effluents change the chemical conditions of the water. Eutrophication destroys the floating and emergent vegetation and is extremely detrimental to populations of waterfowl and other wetland wildlife. No development activities such as dredging or infilling should be permitted in this terrain unit.

5.5 Lake and Shoreline Biotope (Mapped on Figure 2)

A. Description and Distribution

Included in the property is approximately 1,100 m of Little Silver Lake shoreline and 2,100 m of Rainbow Lake shoreline. There is little emergent aquatic vegetation on Little Silver Lake as shore is rocky, steep-sloped and in most locations forested. The depth of water increases rapidly from the lake edge. This lake is a

warm water fishery with such species as smallmouth bass and yellow perch. Rainbow Lake has a rocky shoreline except at the south end where emergent aquatic vegetation is proliferant. Yellow perch and introduced rainbow trout inhabit the lake at the present time. Beaver activity was observed and the lake probably serves as an important resting and feeding site for some migrants and may support a small resident duck population.

B. Unique Associations

No rare or endangered species or unique associations were observed in the lake and shoreline biotope.

C. Species of Economic Importance

Surface-feeding ducks such as mallards, blacks and blue-winged teal as well as diving ducks like ring-necked ducks, scaup, goldeneye and bufflehead are common game species of waterfowl. Sport fishes from a warm water fishery like Little Silver Lake include large and/or smallmouth bass, yellow perch, walleye and northern pike. Approximately 2,000 rainbow trout have been planted in Rainbow Lake. Successful over wintering of the trout will not be known until the spring of 1979, and breeding is unlikely.

D. Constraints to Development

As settling basins, the lakes are sensitive to inputs of sewage and silt. Little Silver Lake and Rainbow Lake are relatively small and not tolerant to inputs of effluents from residential developments. In comparison, other much larger lakes are not eutrophied because of unnatural nutrient enrichment from cottage disposal systems.

The fisheries may be affected as a result of damage to spawning areas. The trout in Rainbow Lake will tend to move upstream (in this case into Little Silver Lake) if the conditions become too severe.

Accordingly, we endorse the development recommendations made for these lakes by the Ministry of Natural Resources (Little Silver Lake Study Report, M.N.R., Lanark District, December 1978);

1. All development, including septic tanks and tile fields should be set back at least 100 feet from the highwater mark. If the physical limitations of a particular lot indicate a greater setback is required, the Ministry will recommend this when reviewing the specific proposal.

2. The disturbance of the natural vegetation within 100 feet of the highwater mark should be discouraged. This will help to stabilize soils, hold back nutrients, and protect the scenic quality of the shoreline.

3. No development, including dredging and/or filling should be permitted within the wetland areas shown on the accompanying map.

4. Future development should be compatible with existing uses on the lake, and should be consistent with the lake's ability to support the proposed area.

Respectfully submitted

Derek P. Smith M.Sc. FGAC

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APPENDIX A

Grain Size Analysis

Matrix of

Glacial Till Ground Moraine

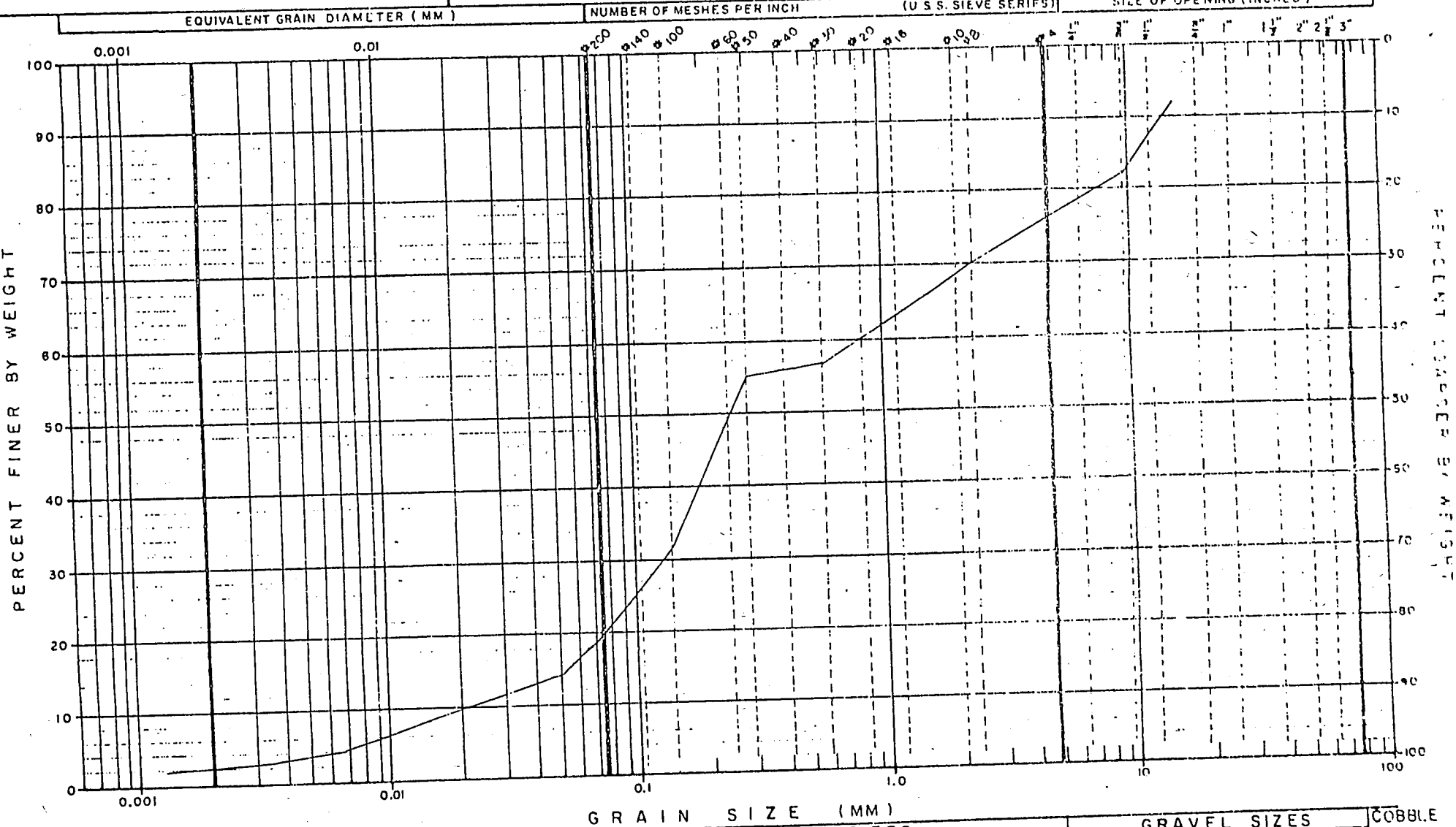
GRAIN SIZE DISTRIBUTION

JOHN D. PATERSON & ASSOCIATES LTD.
Consulting Engineers and Geologists
1479 LAPERRIERE AVE. OTTAWA, CANADA K1Z 7S8

SOIL SAMPLE DESCRIPTION:

Sand - Gravel.

LOCATION: ....
PROJECT: Water & Earth Science Associates
BORE HOLE NO. ..... SAMPLE NO 4
LAB. NO. .....
TESTED BY: S.W. DATE: .....
CHECKED BY: S.W. DATE: Jan, 15/79



REMARKS:

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APPENDIX B

Water Well Logs

Concessions 7, 8, 9

Lots 10 - 16

South Sherbrooke Township

CON	LOT	UTM EASTING NORTHING	ELEV FEET	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG
7	10	377220 4963650	600	6	FR	58	11	76	5	1/00	DO	VILLENEUVE F Tpsl Msnd 0005 Shle 0015 Grey Grnt 0076
7	15	379350 4965130	575	2	FR	78	10	50	1	2/00	DO	SMITH L Msnd 0014 Red Grnt 0115
7	16	380160 4965295	585	6	FR	40	16	48	4	2/00	DO	CONROY J Brwn Tpsl 0001 Whit Lmsn 0036 Blck Grnt 0048
8	11	377220 4964780	610	6	FR	52	10	25	2	1/00	DO	MUNRO S Tpsl 0001 Fill Bldr 0012 Red Grnt 0062
8	13	378040 4965430	609	6	FR	32 64	8	65	2	1/00	ST DO	BRIGGS A Msnd 0007 Blck Grnt 0065
8	14	378100 4965640	600	6	FR	40	10	45	5	3/30	DO	FLEMING Cecil Brwn Msnd 0007 Blck Grnt 0050
8	14	378140 4965800	575	6	FR	35 55	20	63	1	3/00	DO	FLEMING V Brwn Tpsl 0004 Rock 0018 Blck Grnt 0063
8	14	378300 4965870	565	6	FR	40	25	45	5	/30	DO	MARSHALL H Fill 0012 Shle 0016 Grnt 0054
8	14	378500 4965620	625	6	FR	27	11	15	45	/30	DO	MCFARLAND CONSTRUCT Msnd 0004 Red Grnt 0033

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CON	LOT	UTM EASTING NORTHING	ELEV FEET	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG
9	11	376550 4965345	585	6	FR	50	15	63	1	1/00	DO	GRAY A Msnd 0004 Blck Grnt 0063
9	13	377400 4965620	590	6	FR	68	4	70	1	3/15	DO	MACDONNEL B Tpsl Msnd 0008 Grey Grnt 0068 Grn Grnt Shle 0069 Blck Grnt 0070
9	13	377450 4966277	650	6	FR	115	22	126	5	1/00	ST DO	CONBOY R Shle 0003 Blck Grnt 0126
9	14	377615 4966220	650	6	FR	40	12	16	30	1/00	PS	MABERLY SCHOOL Msnd 0001 Grey Grnt 0048
9	14	377670 4966690	550	6	FR	80	18	100	7	1/30	DO	VANALSTINE K Brwn Tpsl 0001 Grey Grnt 0018 Red Grnt 0040 Grey Grnt 0100
9	14	378020 4965820	595	6	FR	35 80	10	75	2	1/00	DO	ORSER W Clay 0001 Bldr 0011 Grnt 0085
9	16	378400 4967791	607	6	FR	65	33	72	4	1/30	ST	VANALSTINE D Whit Lmsn 0072
9	16	378740 4967676	620	7	FR	30	18	56	5	1/30	DO	VANALSTINE D Brwn Tpsl 0015 Grvl 0018 Whit Lmsn 0056

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SCHEDULE "F"
LOT 12 DEVELOPMENT PLAN

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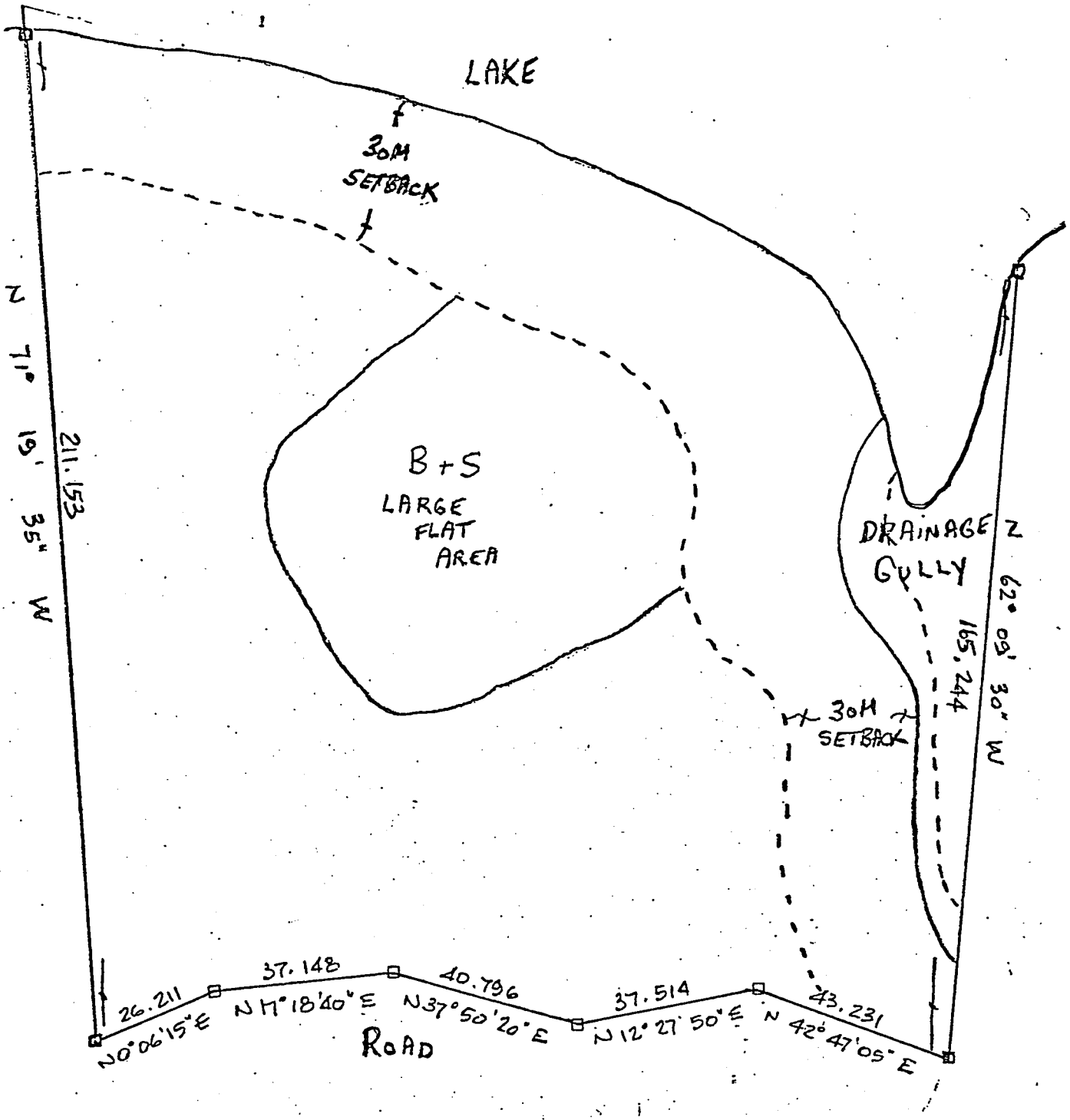


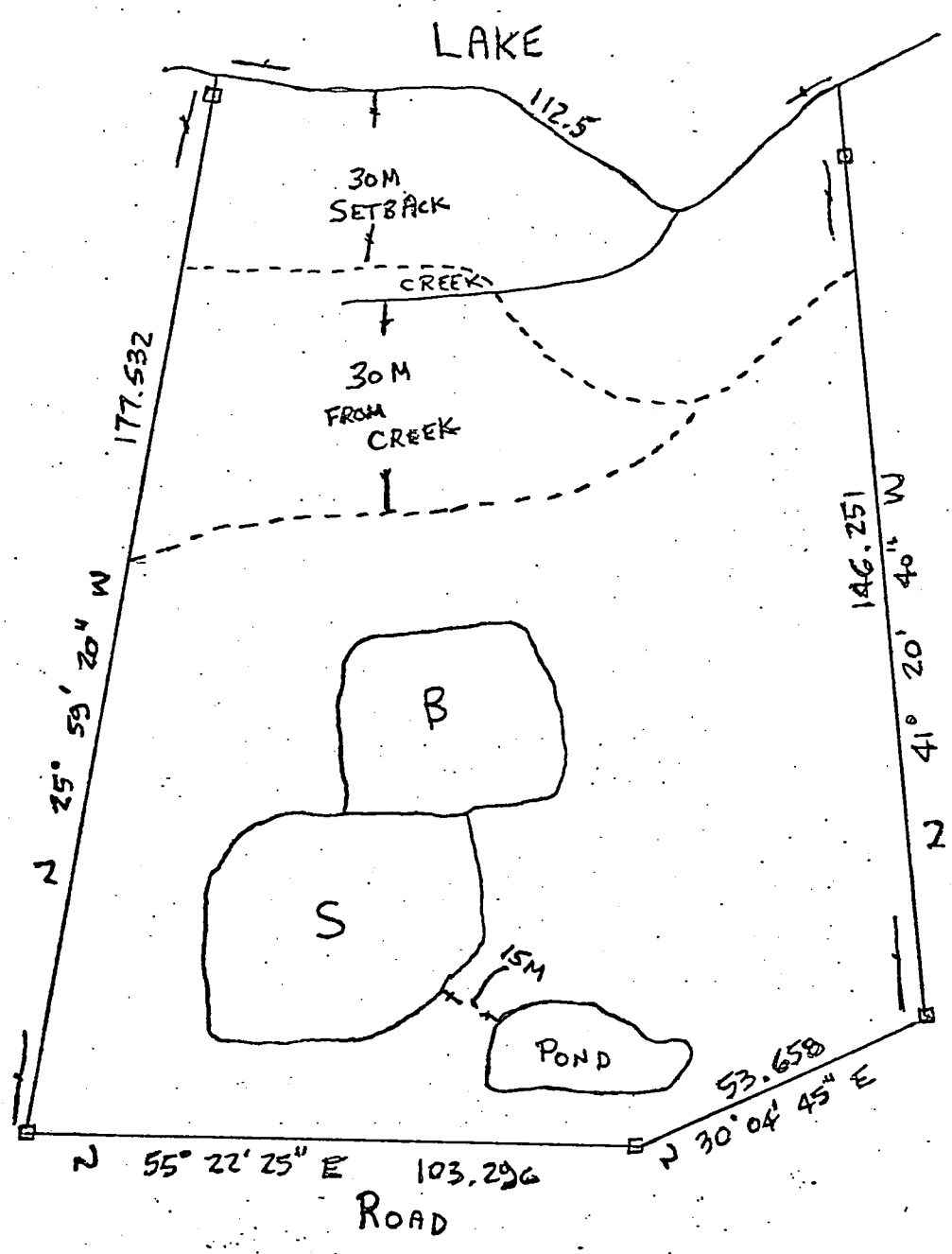
B - Prime Building Area
S - Prime Septic System Site
W - Prime Well Site (ANYWHERE PROPERLY SET BACK FROM SEPTIC SYSTEM)

HEALTH UNIT

1:1250
1cm:12.5M

SCHEDULE "F"
LOT 21 DEVELOPMENT PLAN

87205



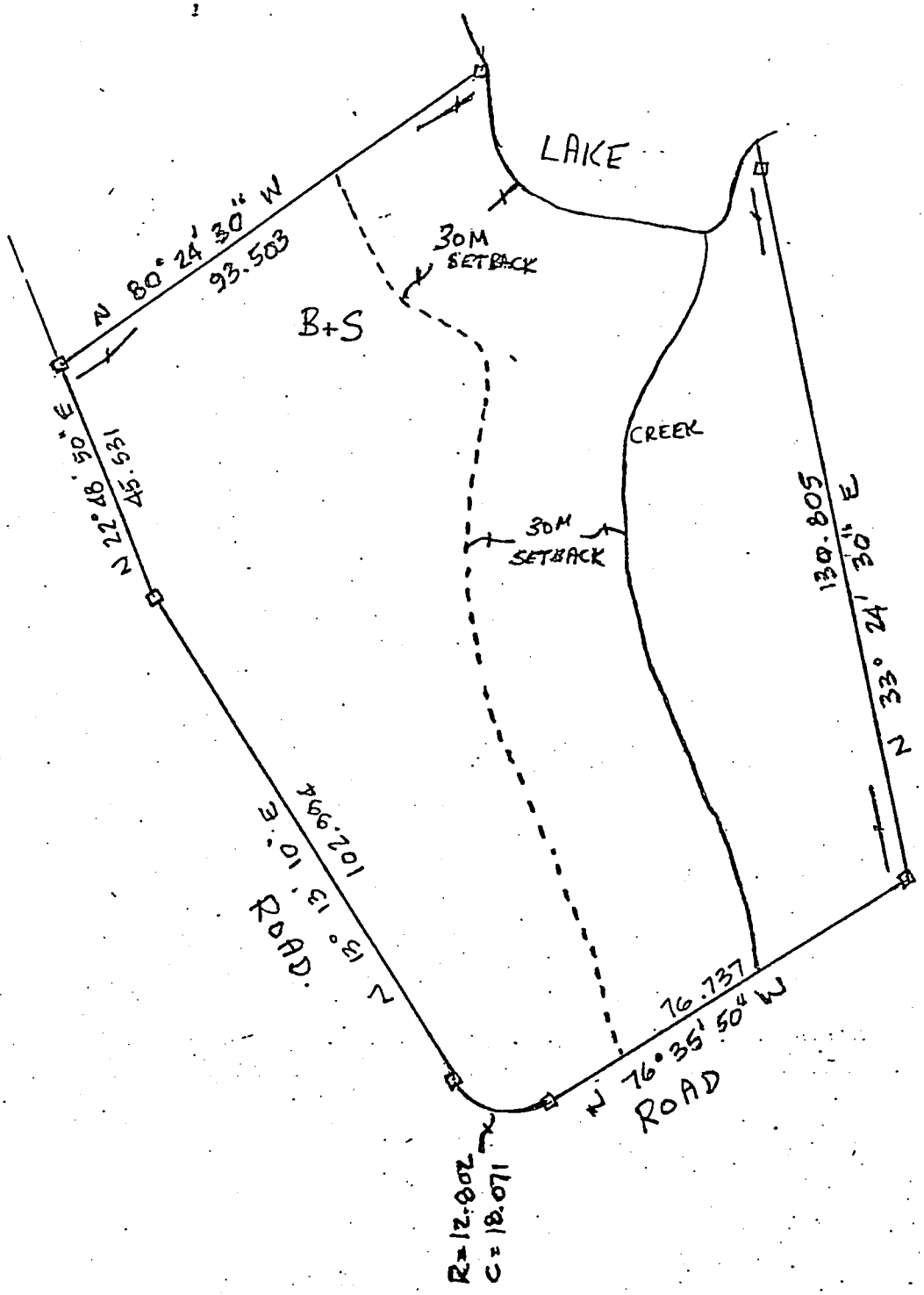
B - Prime Building Area
S - Prime Septic System Site
W - Prime Well Site (ANYWHERE PROPERLY SET BACK FROM SEPTIC SYSTEM)

HEALTH UNIT

1:1250
1cm:12.5M

SCHEDULE "F"
LOT 23 DEVELOPMENT PLAN

87205



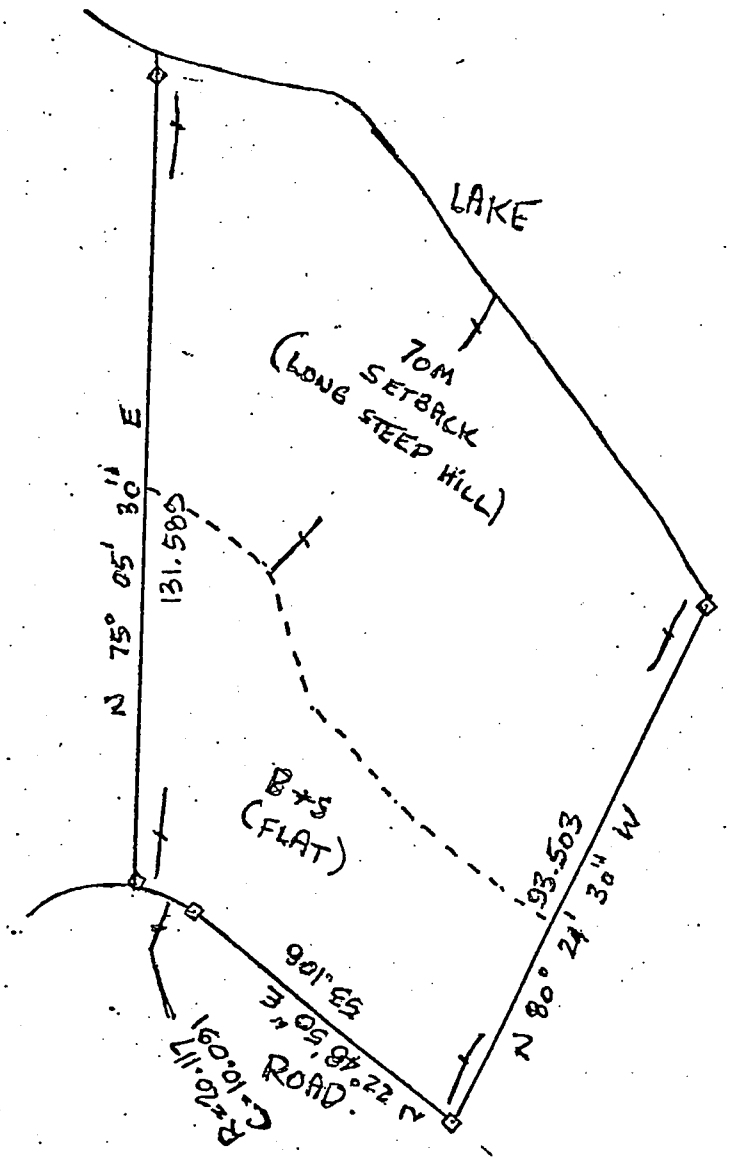
B - Prime Building Area
S - Prime Septic System Site
W - Prime Well Site (ANYWHERE PROPERLY SET BACK FROM SEPTIC SYSTEM)

HEALTH UNIT

1:1250
1cm:12.5M

SCHEDULE "F"
LOT 24 DEVELOPMENT PLAN

87205



B - Prime Building Area
S - Prime Septic System Site
W - Prime Well Site
(ANYWHERE PROPERLY SET BACK FROM SEPTIC SYSTEM)

HEALTH UNIT

1:1250
1cm:12.5M

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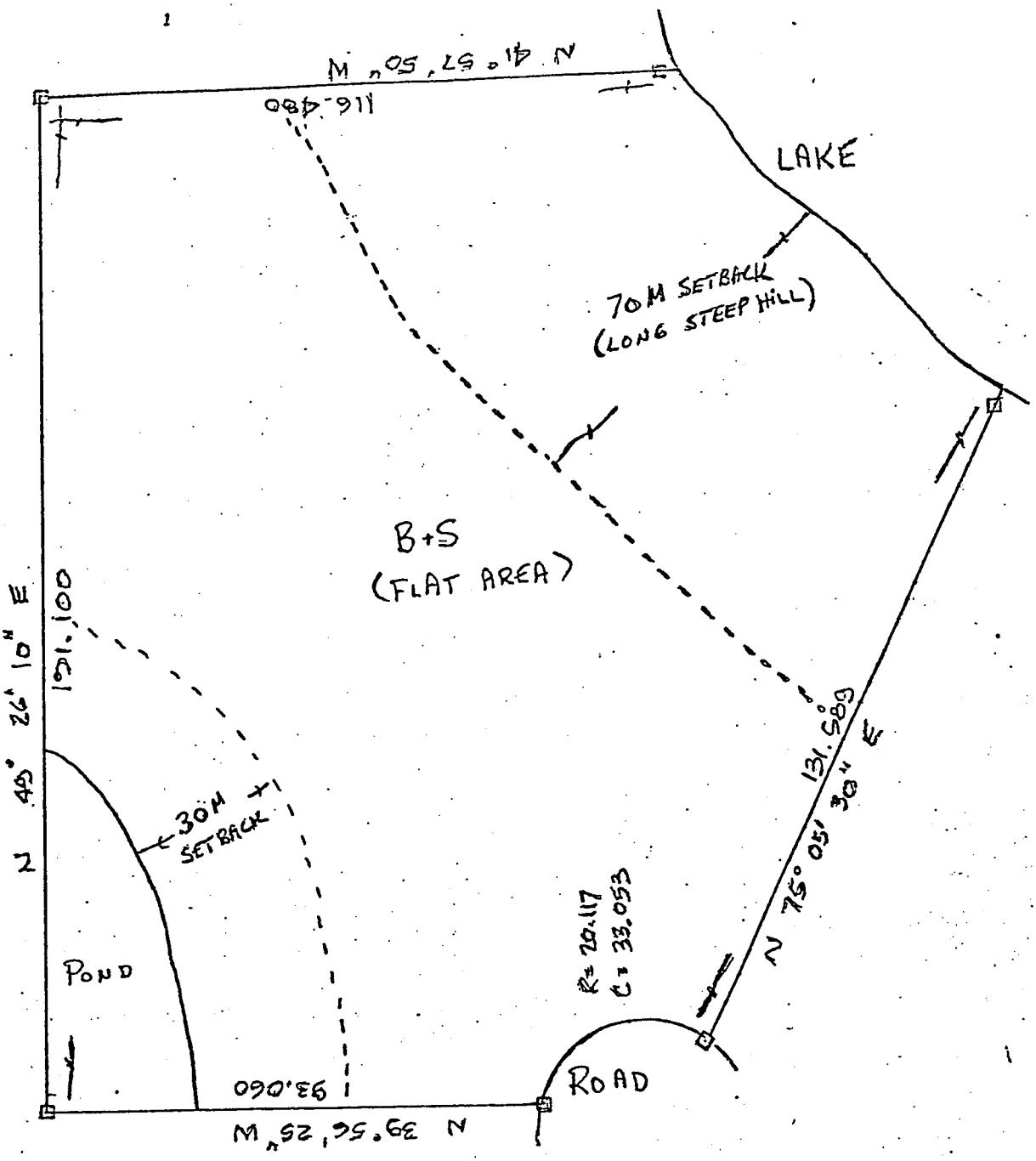
SCHEDULE "F"
LOT 25 DEVELOPMENT PLAN



B - Prime Building Area
S - Prime Septic System Site
W - Prime Well Site (ANYWHERE PROPERLY SET BACK FROM SEPTIC SYSTEM)

HEALTH UNIT

1:1250
1cm:12.5M

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No.
Registry Division of Lanark South (No. 27)
I CERTIFY that this instrument is registered as of
82 DEC 23 PM 4 20
in the
Land
Registry Office
at Perth,
Ontario.

Land Registrar

DATED: August 16th, A.D. 1982.

BETWEEN:

NOEL DEVELOPMENTS (ONTARIO) LIMITED

- and -

THE CORPORATION OF THE TOWNSHIP

OF SOUTH SHERBROOKE

SUBDIVISION AGREEMENT

---

165 I-29
PC 29
Plan 6a[illegible]

FR **75.00