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AGGREGATE EXTRACTION PLAN

for

Lot 1, Section 16, Range 4, Shawnigan District, Plan 28682

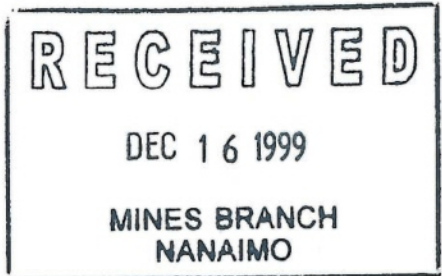
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Date of Report: November 23, 1999

Version: Original

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1. INTRODUCTION

1.1 Description of Plan Area and Process

The Applicants have previously submitted an application to the Cowichan Valley Regional District for consideration of an aggregate extraction proposal under the Soil Conservation Act. The application was forwarded by the Regional District to the Provincial Agricultural Land Commission (ALC) for its consideration. In its July 14, 1999 letter to the Applicants, the ALC granted an approval in principle to extract approximately 504,408 cubic metres of gravel from the property described as **Lot 1, Section 16, Range 4, Shawnigan District, Plan 28682** subject to the receipt of a comprehensive report outlining the agricultural benefits which would accrue to the property as a result of the proposed extraction. The report to be prepared by a qualified Reclamation Agrologist.

1.2 Methods and Process

This report and the accompanying drawings numbered 647-01 to 647-02 have been prepared as required to satisfy the requirements of the ALC conditional approval and obtain a final Soil Conservation Act approval letter from the Commission and obtain a Soil Removal Permit from the Regional District. An approval from the Ministry of Energy and Mines, Mines Branch, Energy and Minerals Division is also required. The report and drawings consider and describe the present state of the land, interim conditions during extraction and procedures for rehabilitation and improvement of the agricultural capability following extraction. This report has seven sections: Introduction; Landforms, Soils and Land Use; Subsurface Exploration; Agricultural Capability; Drainage and Water Features; Soil Management and Rehabilitation Procedures and Aggregate Extraction and Rehabilitation Plan.

1.3 Credentials

The work herein contained has been carried out by or under the direct supervision of Brian M. French, a Professional Agrologist specializing in Soil Science and registered with the B.C. Institute of Agrologists. Mr. French is fully qualified to prepare aggregate extraction and rehabilitation plans for lands in the ALR and he meets all the conditions as outlined in the Commission letter of July 14, 1999.

2. LANDFORMS, SOILS AND LAND USE

2.1 Landforms

One landform was identified on the subject property. This was a glacio-fluvial outwash and fan deposit consisting of deep interbedded sands and gravels. Minor areas within this landform showed evidence of marine influenced ice contact deposits characterized by interbedded silts and fine sands. A very shallow aeolian cap was found on the higher elevations while deeper depths (up to 1 metre) of medium textured aeolian or slopewash were common on the lower reaches.

The Southeast Vancouver Island Soil Survey (MOE Technical Report 30, 1989) mapping suggests that there is a significant wedge of fine textured Marine Blanket (fWb) landform associated with the Fairbridge series within the property. Excavation of numerous test pits within this area did not find evidence of a Marine Blanket although there were some minor areas, as noted above, which may have been subject to some marine influence resulting in accumulations of finer textured veneers generally less than 1 meter in thickness. However the over-riding landform on this property is glacio-fluvial outwash.

2.2 Soils

2.2.1 Existing Mapping

The Southeast Vancouver Island Soil Survey (MOE Technical Report 30, 1989) identifies two soil series on the property at 1:20,000 scale as shown on Figure 2.2.1. The dominant soil mapped was Fairbridge series (coloured blue) and developed from marine parent materials. The subordinate soil was Qualicum series with a minor complex component of Flewett series developed from glacio-fluvial outwash and fan parent materials.

2.2.2 On Site Identification of Soils

Soil profile testing was carried by observation of excavator test pits dug to confirm aggregate reserves and observation of railway bank cuts, road cuts and existing gravel pit faces.

Two soil types were identified on the property. The dominant soil type was the Qualicum series which occupied the higher landscape locations, mainly in the north, east and west. This soil was characterized by a shallow veneer, 10 to 20cm thick, of aeolian material mixed with the underlying coarse gravels resulting in a surface texture of coarse, very gravelly loamy sand. The soil profile was very gravelly and stony throughout. The soil was rapidly drained with very low water holding capacity. The topography was highly variable and ranged from gently sloping to steeply sloping with slopes 5 to 30%. Vegetation

consisted of broom on cleared and abandoned pasture areas and residual, immature Douglas Fir on the remainder.

The subordinate soil type was the Flewett series which generally occupied the lower landscape positions. This property is within a transitional landform and the expression of these series is complex at the interface. The surface texture was generally fine sandy loam to a depth between 30 and 90cm. The surface layer ranged from stone free to slightly stony with total coarse fragment content less than 10%. The soil was well drained with small pockets imperfectly drained in locally depressional areas where finer textured materials has accumulated during deposition. The topography was generally more subdued on this unit with slopes 5 to 15%. The vegetation consisted of broom on abandoned cleared areas and mixed Douglas Fir and Alder on the remainder.

2.3. Land Use

The present land use of the property is rural residential. The northern 1/3 of the property is not in the ALR. One house and one mobile home are located along the western edge of the property. Several barns and other outbuildings of little value are found east of the house. Approximately half the property is cleared and reverting to brush. Photographs of the property and adjacent parcel to the north are included in Appendix A.

The surrounding land uses are as follows:

- a) North: Existing gravel pit, nearly exhausted of material formerly used by the E&N Railway; out of the ALR;
- b) East: E&N Railway right of way; forested parcel and existing gravel pit;
- c) South: Forested vacant property, in the ALR;
- d) West: Forested rural residential property, in the ALR.

3. SUBSURFACE EXPLORATION

3.1 Methods

Primary evidence was gathered by backhoe test pits dug over the subject property to a depth confirming the underlying parent materials. Secondary evidence was gathered by visual examination of cutbanks on roads, railway and gravel pit faces. Well logs were also searched for strata identification.

4. AGRICULTURAL CAPABILITY

4.1 Background

Agricultural Capability is an interpretive classification of land for soil bound agricultural production of a range of crops under normal management inputs. Soil, climate and landscape factors are considered when arriving at a classification for a particular site. A Class rating from Class 1 (no limitations to management) to Class 7 (no capability at all) is applied and Subclass limitations are added to describe the particular limitations contributing to the Classification level. Limiting factors such as stoniness, climate, drainage, and topography are applied. Improvements to the rating may be applied if it is considered economically and technically feasible for the land to be improved by drainage, irrigation, stone removal and sometimes levelling.

4.2 Existing Mapping

The MOE soil mapping has been interpreted for agricultural capability and a 1:20,000 map produced. The subject property was found on Mapsheet 92B.072 (Figure 4.2). The northern portion (Qualicum series) was mapped as 80% Class 5AP - 20% Class 7T, unimprovable due to lack of moisture holding capacity and stoniness. The southern portion (Fairbridge series) was mapped as Class 4A improvable to 80% Class 2D and 20% Class 3TD with irrigation. As noted in section 3, detailed on site inspection found that the area mapped as Fairbridge series is actually Flewett series with glacio-fluvial fan parent materials.

4.3 On Site Interpretation - Subject Property & Adjoining North, Native State (Figure 4.3)

The agricultural capabilities of the property in the native state differ from the MOE interpretation mainly due to the more intensive scale of mapping. The rating applied to the Qualicum soil was the same as the MOE mapping; Class 5AP unimprovable although it was felt that some areas could be even more severely rated due to a lack of moisture holding capacity and local topographic limitations. The Flewett soil area, incorrectly mapped as Fairbridge on the MOE mapping, was classified as 50% Class 4AT - 30% Class 4A - 20% Class 5TA. With irrigation, these ratings would be improved to 50% Class 4T - 30% Class 2T - 20% Class 5T.

The northern property which is out of the ALR and currently unreclaimed gravel pit will be rehabilitated as part of the proposed extraction. The current capability is Class 7E, unimprovable with no agricultural capability except for a small area in the SW corner reserved as a private park which is Class 5AP.

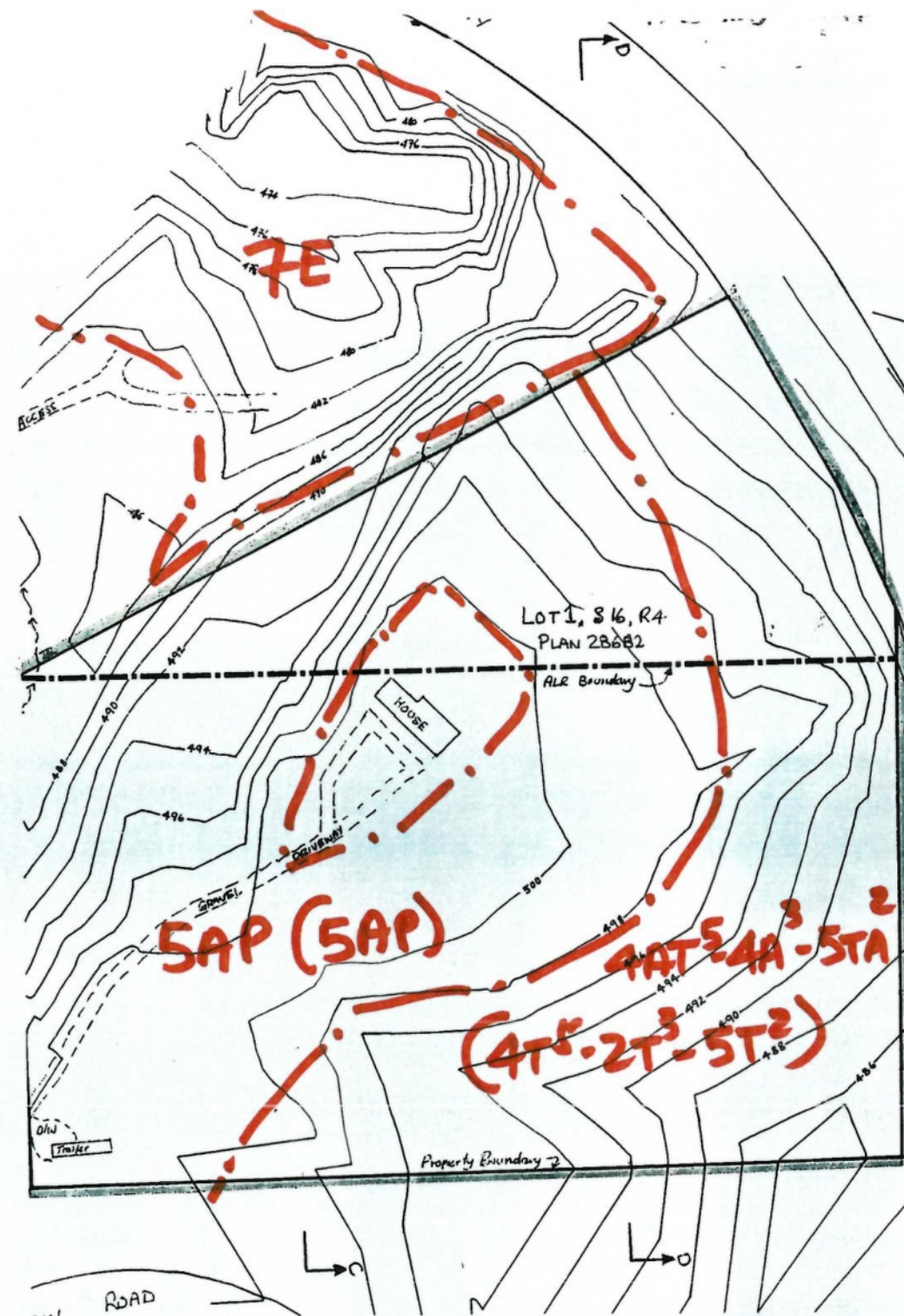
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4.4 After Rehabilitation - Subject Property & Adjoining North (Figure 4.4)

Following extraction of the sand and gravel within the proposed working area; the land will be rehabilitated to an agricultural capability higher than the native condition. The native topsoil layer will, where necessary, be treated by screening through a mechanical screening plant with 25mm screen opening. Most of the proposed extraction area will experience a significant improvement in capability and uniformity of management, going from mainly Class 4 and 5 improved to 63% Class 1, 21% Class 7T sideslopes, 12% undisturbed buffers and 4% buildings. This will be achieved through removal of droughtiness, topographic and stoniness limitations together with the reclaimed soil profile having a uniform thickness of at least 1 metre for ease of irrigation management. The sideslopes of steeply sloping topography will be Class 7T unimprovable. The house will be moved west of the present location allowing more efficient use of the agricultural land. The existing mobile home will remain in the current location in the SW corner.

The northern adjoining property will have a similar finished capability to the subject property with Class 1 on the floor and Class 7T on the sideslopes.

Figure 4.3: 1:2,500 scale On Site Mapping for Agricultural Capability



4.5 Agricultural Capability Summary

The Agricultural Capability ratings applied to the soils on the subject property are as follows:

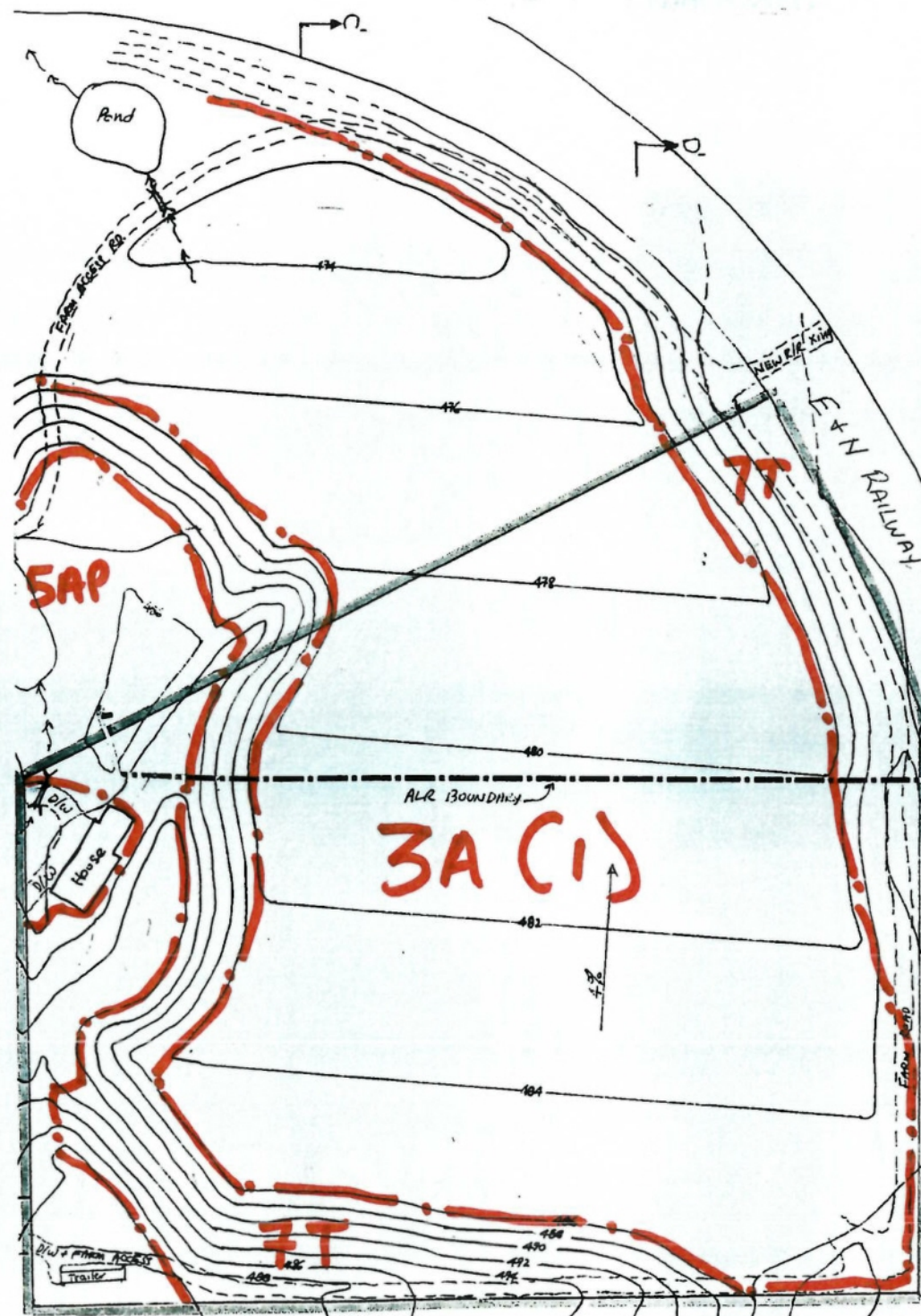
TABLE 4.5

LAND STATUS	UNIMPROVED CAPABILITY	IMPROVED CAPABILITY	AREA (ha)	% OF AREA
CURRENT	5AP	5AP	3.2	56
CURRENT	50%4AT-30%4A-20%5TA	50%4T-30%2T-20%5T	2.0	35
CURRENT	BUILDINGS	BUILDINGS	0.5	9
SUBTOTAL			5.7	100
AFTER REHAB.	3A	1	3.6	63
AFTER REHAB.	7T	7T	1.2	21
AFTER REHAB.	5AP	5AP	0.7	12
AFTER REHAB.	BUILDINGS	BUILDINGS	0.2	4
SUBTOTAL			5.7	100

5. DRAINAGE AND WATER FEATURES

The natural drainage on this property is from north to south with a discharge in the SE corner through a culvert under the E&N tracks. There are no significant natural watercourses on or adjoining the subject property. There is a culvert crossing Leaside Road in the extreme NW corner of the property which carries north through a ditch into a dugout before discharging into a gully flowing north. The water table is at least 3 metres below the lowest excavation elevation proposed as derived from the well record. There are two existing ponds on the property to the north which is not part of this application but which will be rehabilitated concurrently. Overflow from the ponds, which currently act as a sediment ponds, discharge into a forested area providing good dispersion.

Figure 4.4: 1:2,500 scale Proposed Agricultural Capability



6. SOIL MANAGEMENT AND REHABILITATION PROCEDURES

6.1 General Plan

Due to the small land area and tie in requirements with the non-ALR land to the north, including about 25% of the subject property, phasing of the work is considered impractical. Extraction will proceed from south to north, commencing in the SE corner which establishes the initial grade. Grading and rehabilitation of the existing pit area will proceed coincidentally with the extraction on the subject property.

Drawing GTE-01 shows the existing and proposed final grades for the site, including the property to the north. A gentle 4% slope is proposed from south to north. Sideslopes will be graded at 2:1 with a combination of herbaceous and tree planting cover. Drawing GTE-02 shows typical cross sections for the existing and final condition. Drawing GTE-3 shows interim topsoil storage berms and internal working road network.

Interpretation of subsurface conditions from excavation pits, well logs and observation of cutbanks on the property perimeter indicates that the gravel seam is quite uniform and there is little chance of encountering any significant quantity of overburden or other non-marketable materials within the proposed work area.

6.2 Topsoil Management

Topsoil will be stripped and stored separately for the Qualicum and Flewett soil areas. On the Qualicum area, the topsoil layer is very thin and discontinuous. Stripping of this topsoil will be carried out using an excavator with cleanout bucket. Since this topsoil has a very high stone content and is coarse textured, it will be stored separately from the remaining topsoil. Stripping on the Flewett soil area will be carried out in a single lift using an excavator with cleanout bucket. The depth of stripping will be determined in the field based on texture and evidence of soil development. It is expected that enough soil will be recovered from this area to cover all the rehabilitated area with the finish layer. Topsoil will be stored in berms as shown on the drawing GTE-03. Berms will be shaped with slopes not to exceed 2:1 and be seeded to a cover crop and grass - legume mixture. The soil from the Flewett soil area will be dedicated to rehabilitation of the pit floor area while the Qualicum topsoil will be used to rehabilitate the sideslopes. Blending of aged manures from the owner's dairy farm is encouraged during topsoil replacement.

Screening, if necessary, will be carried out during the blending operation. A target depth of 500mm minimum of native plus blend topsoil will be placed on all the floor areas. Sideslopes will be finished with 300mm depth.

A drainage subbase layer shall be placed below the topsoil layer wherever impermeable or slowly permeable materials are found or placed on the subgrade. There shall be at least 500mm of free draining potential above any impermeable layer before placement of topsoil. The drainage subbase material must be tested and approved by the supervising Agrologist prior to placement to ensure that the material is free draining.

Stone removal should not be required if the topsoil management is carried out as described above. If additional material is required to meet the rehabilitation target depths and the stock material has a coarse fragment content greater than 5%, then that material shall be treated by mechanical screening using a final screen opening not greater than 25mm. Screening shall be carried out in such a way as to ensure 95% recovery of fines. Overs shall be re-screened if refusal exceeds this tolerance.

6.3 Water Management

The extraction within the working area will always be contained within the perimeter walls of the excavation. Therefore there will not be any opportunity for off site drainage of surface water. Water collected within the pit area will be dispersed by natural percolation into the permeable pit floor. The natural flow of water from north to south will be reversed with the reclaimed site plan with all drainage directed to the north into a dugout irrigation pond. Overflow from the dugout pond, which will act as a sediment pond, will be discharged to the north into an existing natural, vegetated swale.

There are no anticipated impacts on the drainage of neighbouring lands which would result from the proposed gravel extraction. Similarly, there would not be any impacts on natural watercourses following rehabilitation since all drainage from the site would be directed through a large irrigation storage pond.

6.4 Sub-grade Preparation

Following extraction the subgrade shall be graded smooth at an elevation profile 1.0 metres below the finish grades shown on Drawing GTE-01. A layer of granular, permeable aggregate or sand shall be placed over any impermeable materials to a depth of 500mm. Native sands or gravels on subgrade deemed permeable and free draining need not be so treated.

Topsoil shall be placed in an even layer not less than 500mm thick, or as determined by the Agrologist from topsoil volume estimates, over the rehabilitated sub-grade floor. Care must be exercised during topsoil placement to prevent mixing with the underlying gravel layer.

Sideslope areas shall be covered with no more than 300mm of topsoil recovered from the Qualicum soil area or other suitable material salvaged as overburden during pit operations.

Following completion of the soil rehabilitation the drainage performance will be evaluated. If deemed necessary for proper winter water control, a subsurface drainage system shall be installed by the operator. The drainage system shall be designed by a qualified agricultural drainage specialist. The rehabilitated soil surface shall not be left bare unless planted to row crop, berries or other perennial crop. The use of cover crops over winter is encouraged for all suitable crops including raspberries and strawberries.

7. AGGREGATE EXTRACTION AND REHABILITATION PLAN

7.1 Objectives

The objective of the extraction is to relieve portions of the properties from serious management limitations for soil bound agriculture and effect significant soil and management improvements on the remaining area, including a significant area outside the ALR which will be used for forage production in support of the owner's dairy operation. The droughty soils and topographic limitations severely limit the utility of the land in its current condition for agricultural production. By removing the topographic limitations and reducing the land slopes to no more than 4% on the floor area the property will be improved to Class 1 capability with irrigation and be suitable for a wide range of field crops, forage and specialty crops.

The current house location will be relocated to the west allowing better use of the land for crops. Land lost to buildings and access will be minimized following rehabilitation and development of the land for agricultural production in forage crops.

7.2 Access and Transportation

The internal movement of material will be by truck and loader through a service road along the east property line and thence west across the existing pit property and exiting onto Leaside Road. A E&N Railway crossing has been installed at the east end of the access road to allow access to the small landlocked parcel to the east of the tracks. Eventually, the plan is to construct a road around the cultivated area as shown on the drawing.

The Ministry of Transportation and Highways has recently upgraded the local roads and the additional truck traffic is considered acceptable. Truck routing will be Leaside Road to Thain Road and thence to Shawnigan - Duncan Highway.

7.3 Timing

The estimated extractive life of the pit is 10 years depending on market conditions. Since the shallower extraction will occur at the beginning, there exists an opportunity for an early start on rehabilitation of these exhausted areas. Rehabilitation will be carried out from south to north.

7.4 Extractable Volumes & Depth of Excavation

The estimated extractable volume of gravel from the 5.0 hectare disturbed area is as follows:

EXTRACTABLE VOLUMES

EXTRACTION AREA	VOLUME (M3)	APPROXIMATE TONNE (2t/m3)
LOT 1, PLAN 28682 IN ALR	395,800	791,600
LOT 1, PLAN 28682 OUT ALR	200,700	401,400
TOTAL	596,500	1,193,000

The maximum proposed depth of excavation is 20 metres below existing grade. It was assumed that, on average, the required depth of topsoil plus granular drainage layer would be 1.0 metres over the extraction area for a total volume of 50,000 m3. The extracted volume was calculated based on existing and finish grade profiles so the topsoil/drainage material volume does not affect the total available for extraction.

7.5 Topsoil Volumes

TOPSOIL VOLUMES

REHABILITATION AREA	STRIP VOLUME FROM DISTURBED AREA (M3)	PLACE VOLUME ON FINISHED FLOOR (M3)	PLACE VOLUME ON SIDESLOPES (M3)
LOT 1, PLAN 28682 IN ALR	22,000	12,000	3,000
LOT 1, PLAN 28682 OUT ALR	4,000	6,000	1,000
PCL. A, DD8882W OUT ALR	5,000	6,000	3,000
TOTAL	31,000	24,000	7,000

Note: Up to 20,000 m³ of granular drainage layer may be required to meet the requirements for subgrade preparation. This quantity has been allowed as exclusion from the extractable volume.

7.6 Limitations to Operation

Importation of soil onto the site except as specifically provided for in the terms of the operating permit shall not occur. Processing and screening of imported soil for topsoil, septic drainage fill or other purposes intended for removal from the site is prohibited. Native topsoil piles must be left undisturbed save for cutting and weed control until needed for rehabilitation. No excavation, storage of material or any other pit activity shall occur within 5 metres of any topsoil or overburden pile designated for use in rehabilitation.

7.7 Summary of Benefits

The intent of the work to be undertaken is for land improvement for agricultural purposes. Removal of the significant topographic and soil limitations on this property would not be feasible without the opportunity to remove and sell aggregates to balance to costs of the land improvements. The net benefit to agriculture on the subject property will be significant with an improvement from mainly Class 4 and 5 to Class 1 with irrigation on approximately 63% of the property and sideslope area of Class 7 on some 21% of the area following rehabilitation and completion of the works. The principal improvements to the land will be removal of the topographic limitations and provision of a uniform depth of topsoil with a high water holding capacity and excellent drainage characteristics. The fact that the property has remained unproductive even under the ownership of a bone fide dairy farmer attests to the severe limitations of the land in its present state.

A significant corollary benefit arising from this project will be the voluntary rehabilitation of lands outside the ALR which will be brought up to the same high standard of agricultural capability and production as the land which is in the ALR and the subject of this application. All the land the subject of the rehabilitation will become part of the forage production base of the owners dairy farm operation.

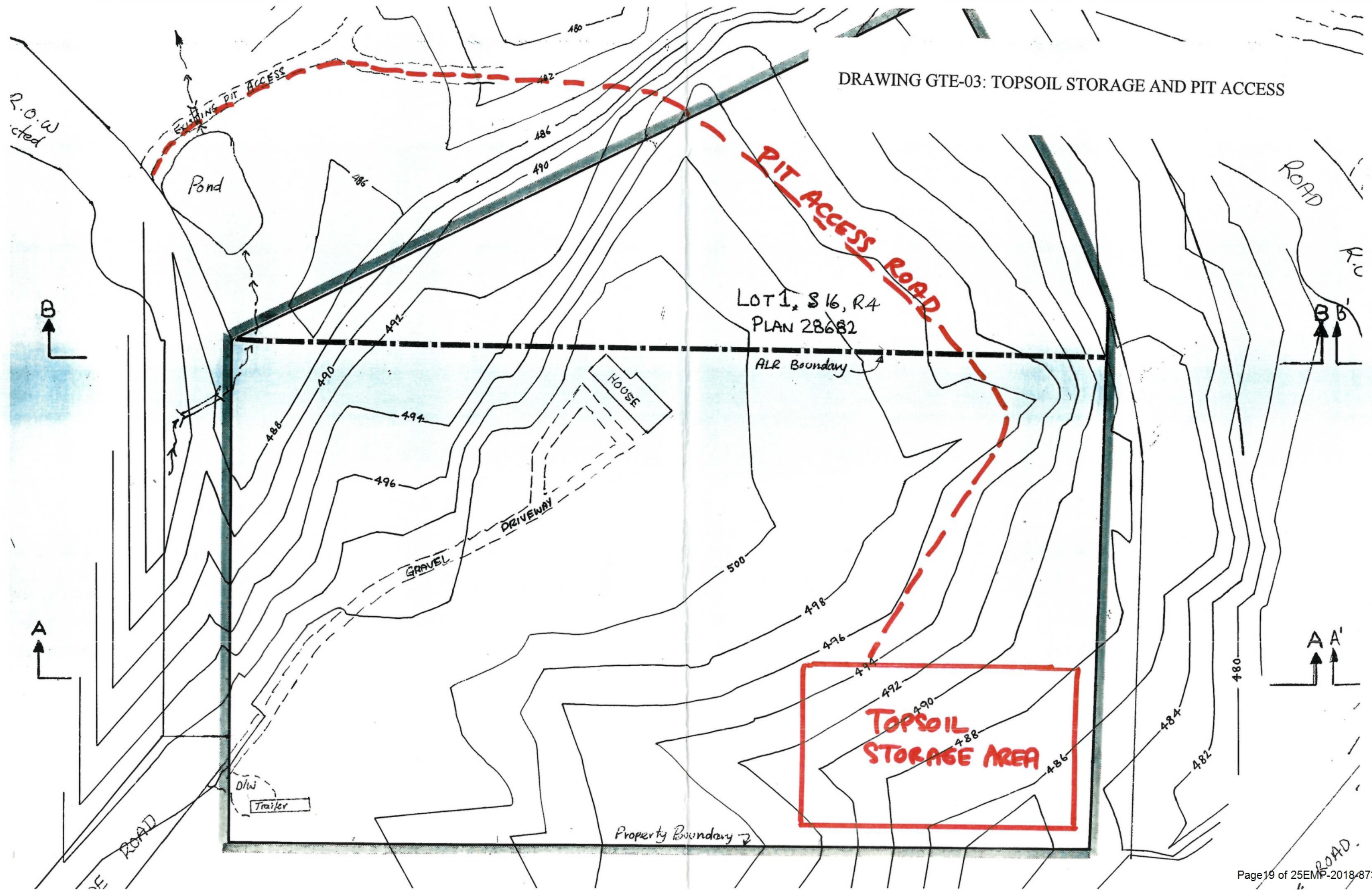
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per: Brian M. French, P.Ag.

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DRAWING GTE-03: TOPSOIL STORAGE AND PIT ACCESS



↑
NE



1(a): Pan view of old pit workings on non-ALR portion at north end of property



1(b): Pan view of park near NW corner of proposed extraction area

Plate 2: G. & B. Truswell; Proposed Gravel Extraction, 07-24-99

W ↑



N ↑

Pan view of proposed extraction area from SE corner of clearing



E ↑

↑
N
Plate 3: G. & B. Truswell; Proposed Gravel Extraction, 07-24-99



Pan view of proposed extraction area from south corner of corral





4(a): continuation of pan view of site from corral



4(b): Access road along east boundary looking north from point within ALR portion



4(c): Access road along east boundary looking north from point near ALR boundary



5(a): Soil Pit #1 located within area mapped as Fairbridge series on MOE mapping
Profile is typical of Qualicum series



5(b): Soil Pit #2 located within area mapped as Fairbridge series on MOE mapping
Profile is typical of Flewett Series with deep aeolian and slopewash fine sandy loam over gravel



5(c): Soil Pit #3 located and identified as in 5(b) above.

