City of Richmond

Report to Committee

To:	General Purposes Committee	**Date:**	June 30, 2021
From:	Cecilia Achiam General Manager, Community Safety	**File:**	12-8080-12-01/Vol 01
Re:	Soil Use for the Placement of Fill Application for the Property PID: 013-082-434 (4500 Blk No. 8 Road) - Maybog Farms Ltd.		

Staff Recommendation

That the 'Soil Use for the Placement of Fill' application proposing to retain soil deposited in order to facilitate the construction of a cranberry processing facility submitted by Maybog Farms Ltd. for the Property PID: 013-082-434 be endorsed and referred to the Agricultural Land Commission (ALC) for the ALC's review and decision.

Cecilia Achiam
General Manager, Community Safety
(604-276-4122)

Att. 5

REPORT CONCURRENCE	
ROUTED TO:	**CONCURRENCE**
Building Approvals	☑
Development Applications	☑
Engineering	☑
Policy Planning	☑
Sustainability & District Energy	☑
SENIOR STAFF REPORT REVIEW	**INITIALS:**
APPROVED BY CAO	

Staff Report

Origin

The City of Richmond is in receipt of a 'Soil Use for the Placement of Fill' application submitted by Todd May on behalf of Maybog Farms Ltd. (the "Applicant") for the property PID: 013-082-434 (the "Property") located at the 4500 Blk of No. 8 Road. The intent of the application is to retain 3,600 cubic metres of soil (ie. structural fill) that has been deposited on the Property, without the necessary approvals, in order to support construction of a cranberry processing facility.

The Property is situated within the Agricultural Land Reserve (the "ALR") and is subject to provisions of the *Agricultural Land Commission (ALC) Act*, *ALR Use, Subdivision, and Procedure Regulation* (the "Regulation"), and the City's Soil Removal and Fill Deposit Regulation Bylaw No. 8094 (the "Bylaw"). As the soil was deposited without ALC approval and is not exempt under current provincial legislation, the ALC has concluded that an application to retain the soil is considered to be a Non-Farm Use (NFU).

Pursuant to applicable provincial regulations, a NFU soil deposit application requires Council authorization to be referred to the ALC for their review and approval. As such, a NFU soil deposit application must be submitted to the City for review and a decision from Council. Should the application be referred to the ALC by Council, and should it subsequently be approved by the ALC, the Applicant would be required to satisfy any outstanding City requirements, in this case issuance of a development variance and building permit, and registration of a statutory right-of-way to provide access, prior to a soil deposit permit being issued to retain the soil.

The proponent has satisfied all of the City's referral requirements for submission to the ALC.

This report supports Council's Strategic Plan 2018-2022 Strategy #2 A Sustainable and Environmentally Conscious City:

> *Environmentally conscious decision-making that demonstrates leadership in implementing innovative, sustainable practices and supports the City's unique biodiversity and island ecology.*
>
> *2.3 Increase emphasis on local food systems, urban agriculture and organic farming.*

Analysis

The Property is zoned AG1 (Agriculture). The current zoning permits a wide range of farming and compatible uses consistent with the provisions of the *ALC Act* and *Regulation* and the City's *Official Community Plan* and *Zoning Bylaw*.

The Applicant is proposing to retain 3,600 cubic metres of soil deposited onto the Property prior to approval from the ALC and the City. The soil deposited is granular structural fill, intended to support construction of a foundation for a cranberry processing facility.

Uses on Adjacent Lots

- To the North: ALR – Land is in agricultural production
- To the East: ALR – Land is in agricultural production
- To the South: ALR – Land is in agricultural production
- To the West: ALR – Land is in agricultural production

Table 1: Existing Information and Proposed Changes for the Property

Item	Existing	Proposed
Owner/Applicant	Maybog Farms Ltd.	NA
Agent	Todd May	NA
Consultant	Dave Melnychuk, P.Ag.	NA
Lot Size	8.12 ha (20.06 acres)	No change
Land Uses	The Property is currently not in production as the field is being renovated ie. replanted	Cranberry production and cranberry production facility
Official Community Plan (OCP) Designation	Agriculture	No change
ALR Designation	Properties are within the ALR	No change
Zoning	AG1	No change
Riparian Management Area (RMA)	Yes	NA
Environmentally Sensitive Area (ESA)	No	NA

Project Overview

The Applicant is applying to retain 3,600 cubic metres of soil at a depth of approximately 1.0 m over 0.36 ha (0.89 acres) of the Property. The purpose of the soil importation is to establish an area to construct a cranberry processing facility. If approved, the soil shall remain and form part of the foundation for the future building.

The Applicant has also provided the City a building permit application to construct a cranberry processing facility (currently under review) within the soil deposit area. An associated Development Variance Permit (DVP) application (DV21-934707) has also been submitted and is currently under review. The purpose of the DVP application is to increase the permitted area of concrete floor in association with an agricultural building, in order to construct the cranberry processing facility. The AG1 zone currently permits a maximum 750m^2 of concrete construction in association with an agricultural building. The proposed cranberry processing facility will be 2,842 m^2 (30,591 ft^2) in building area. For further explanation regarding the Development Variance

Permit process, please refer to the associated Policy Planning Food Security and Agricultural Advisory Committee memorandum (Attachment 1).

Prior to Council consideration of the DVP, the registration of a Statutory Right-of-Way (SRW) will be required as the property is classified as a no access parcel. Access is proposed through a SRW on the two adjacent lots to the south, which have access to the No. 8 Road overpass. The SRW would only allow access for the farm operation and emergency vehicles (no residential access permitted).

The soil cannot be kept at its current location unless approval is received:

1. From the City on this soil application;
2. From the ALC on this soil application;
3. From the City, including approval from Council, on the DVP and SRW; and
4. From the City for the Building Permit.

The review and approval process for the DVP and SRW is independent to this application. Should the soil deposit application be declined by Council, the Applicant will have to remove the soil but may still proceed with the DVP application, SRW, and Building Permit processes. In the event this occurs, the Applicant would have to wait until both permits are issued in order to put the soil back on to the site (and no further approvals would be required).

Staff Comments

Should the soil deposit application be endorsed by the City and subsequently receive an approval from the ALC and should the Applicant receive approval for the DVP, SRW, and building permit, then a soil deposit permit (the "Permit") will be issued. The Permit will address key issues, including, but not limited to, drainage, security deposits, soil quality, and indemnification for the City.

As the importation of the soil and grading has been completed, typical inspection and oversight protocols cannot be completed at this time. However, City staff have inspected the soil deposited to date and have verified the footprint and location of the deposited soil. In addition, ALC staff conducted an inspection and have not provided any concerns to City staff related to the soil. The Applicant has provided Geotechnical Investigation Report (Attachment 2) and an Agrologist Report (Attachment 3) in support of the soil deposit application.

As noted above, should this application not be endorsed by the City and/or denied by the ALC, the Applicant shall be required to remove the soil to a permitted site.

Richmond Food Security and Agricultural Advisory Committee (FSAAC) Consultation

The Applicant presented the proposal to the FSAAC on June 29, 2021. The Committee voted in favour of the proposal and passed the following motion which will not be officially adopted until the next FSAAC meeting (Attachment 4):

That the Food Security and Agricultural Advisory Committee (FSAAC) support the Agricultural Land Reserve Soil Use for the Placement of Fill Application at PID 013-082-434 (CD 127964) subject to removal of the structural material deposited on the subject property if the proposed farm building is not approved.

In addition, the FSAAC is concerned with potentially setting a precedent by supporting a proposal that deposited material prior to approval. However, the FSAAC recognize that this is not a typical fill application as the structural material is required for a farm building and is not being used for the farm operation.

Agricultural Considerations

The proponent has provided an Agrologist Report (the "Report") prepared by a Dave Melnychuk, P.Ag. (the "Agrologist"). The Report summarizes the existing site and soil conditions (ie. current land capability) and the overall proposal. In addition, the Report outlines the merits of the proposal and the benefits to the Applicant and agriculture in general.

It is understood that the Applicant has chosen the area to construct the facility based on a number of considerations including the area of disturbance was "the least productive portion of the farm". It has been noted that the Applicant stripped and utilized the organic matter elsewhere on the Property prior to importation. Additional reasons for the site choice may be found on page 3 of the Report. As per the Agrologist, "the establishment of a facility [...] which is capable of receiving, handling, packing and distributing fresh cranberries to the local market and beyond will directly support future viability."

Geotechnical & Drainage Considerations

The Applicant has provided a Geotechnical Investigation Report produced by Geopacific Consultants Ltd. The Geotechnical Investigation Report focuses on current soil conditions and outlines site preparation requirements necessary to ensure the project does not impact neighbouring lands.

In addition, the Applicant has also provided a follow-up report regarding preload stability (Attachment 5) indicating that the imported soil will have no negative impacts to neighbouring lands, City infrastructure or private utilities. As per the engineer-of-record, "[a]ll existing City and private infrastructure are well outside a generally accepted 2H:1V zone of influence offset from the base of the preload. Thus, we expect that there would be no offsite impact on the existing ditch and Number 8 Road as a result of the preload activity." The engineer-of-record confirms that the "permanent structural fill placed below the preload is suitable for supporting the proposed building."

Staff have reviewed the Geotechnical Investigation Report, the follow-up report and associated information and have indicated that they have identified no issues of concern at this time. Staff will require an engineered drainage plan as part of the building permit process.

Environmental Considerations

The soil deposition area is within a Riparian Management Area (RMA) that is located on the east property line running along the No. 8 Road unimproved allowance. Staff have reviewed the completed works and can confirm that erosion and sediment control measures are unnecessary at this time given that a large berm separates the reservoir located within the RMA from the completed works.

In addition, as the proposed cranberry processing facility will be – if approved – related to a permitted Farm Use, the *Riparian Areas Protection Act* and *Riparian Areas Protection Regulation* would not be applicable and the proposed project would not trigger any additional municipal requirements with respect to the RMA.

There are no Environmentally Sensitive Areas within close proximity of the soil deposition area.

No trees have been impacted due to the soil deposit operations.

Road and Traffic Considerations

A Traffic Management Plan is not required as the importation of the soil has been completed.

Financial Costs and Considerations for the Applicant

Based on the relatively low volume of soil deposited on the Property combined with the costs-to-date and future costs associated with the proposed project – should the NFU application receive approval from the ALC – staff are of the opinion that typical financial benefits associated with soil deposit projects do not apply with respect to this application. The Applicant has advised staff that the imported soil was purchased from Delta Aggregates Ltd.

Security Bonds

The Applicant has provided the following security bonds retroactively:

- $5,000 pursuant to s. 8(d) of the current *Boulevard and Roadway Protection Regulation Bylaw No. 6366* to ensure that roadways and drainage systems are kept free and clear of materials, debris, dirt, or mud resulting from the soil deposit activity; and
- $10,000 pursuant to s. 4.2.1 of the current *Soil Removal and Fill Deposit Regulation Bylaw No. 8094* to ensure full and proper compliance with the provisions of this Bylaw and all other terms and conditions of the Permit.

If the proposal is denied, the bonds will not be refunded until the soil has been removed to a permitted site.

Alternatives to Council Approval

Should Council not authorize staff to refer the proposal to the ALC for their review and decision; the application will be considered to be rejected. Should Council not endorse this application, the owner of the Property would be required to remove the soil deposited to date and remediate

the Property back to an agricultural standard under the guidance of a registered professional agrologist.

Financial Impact

None.

Conclusion

Staff is recommending that the 'Soil Use for the Placement of Fill' application for the Property be endorsed and referred to the ALC to determine the merits of the proposal from an agricultural perspective as the proponent has satisfied all of the City's current reporting requirements.

Carli Williams, P.Eng.
Manager, Business Licence and Bylaws
(604-276-4136)

CW:mm

Att. 1: Policy Planning FSAAC Memorandum re. Development Variance Permit Application (29 June 2021)
2: Geotechnical Investigation Report (07 May 2020)
3: Agrologist Report (23 Jan 2020)
4: FSAAC Minutes (29 June 2021)
5: Geotechnical Comments on Preload Stability (05 July 2021)

City of Richmond

Memorandum
Planning and Development Division
Policy Planning

To: Food Security and Agricultural Advisory Committee **Date:** June 29, 2021

From: Steven De Sousa, Planner 1 **File:** DV 21-934707

Re: **Development Variance Permit Application – PID 013-082-434 (Maybog Farms Ltd.)**

The following application is referred to the Food Security and Agricultural Advisory Committee (FSAAC) for review and comments:

Address/Location:	PID 013-082-434 (Attachment 1)
Application Number:	DV 21-934707
Application Type:	Development Variance Permit (DVP) Application
Applicant:	Maybog Farms Ltd. (Todd May)
Site Size:	8.12 ha (20.06 acres)
Zoning:	Agriculture (AG1)
OCP Designation:	Agriculture (AGR)
ALR Designation:	Yes
Surrounding Development:	• North, East, South & West: cranberry farm operations on parcels zoned "Agriculture (AG1)" and located in the ALR.
Background Information:	• In 2018, Council adopted Bylaw 9861 to amend the "Agriculture (AG1)" zone to add regulations for agricultural buildings and structures, and greenhouses to restrict the construction of concrete slabs or other impermeable structures and surfaces at or below the natural grade. • As per the AG1 zone, for agricultural buildings and structures with a concrete slab, an area up to 750 m^2 (8,073 ft^2) is permitted to be concrete construction, hardsurfacing or other impermeable structure or construction. • A property owner may apply to build a larger concrete slab in an agricultural building, subject to Council review and approval process (a Development Variance Permit (DVP) process for a property owner proposing a larger area of concrete floor for agricultural buildings). • A "fast track" review process is applicable to these applications. This would include a concurrent building permit and soil deposit review process, and a "fast track" staff report process.

Project Description & Staff Comments:	• The purpose of the application is to increase the permitted area of concrete floor in association with an agricultural building, in order to construct a cranberry processing facility. • The proposed cranberry processing facility is 2,842 m^2 (30,591 ft^2) in building area. The proposed variance is to increase the maximum concrete slab area from 750 m^2 (8,073 ft^2) to 2,842 m^2 (30,591 ft^2). The purpose of the facility is to support the existing cranberry farm operation, including receiving, processing, packing, and storing farm product. The architectural plans for the proposed facility are provided in Attachment 2. • The proposed facility will receive cranberries harvested from Maybog Farms, with over 400 acres in production, and an average yearly production of over 10,000,000 lbs of cranberries. An Agrologist Report has been submitted with the application (Attachment 3) and includes further details regarding the existing farming operation and rationale for the proposed facility and location. • Since the property is classified as a no access parcel, access is proposed through a Statutory Right-of-Way (SRW) on the two adjacent lots to the south, which have access to the No. 8 Road overpass. The SRW would only allow access for the farm operation and emergency vehicles (no residential access permitted). Prior to Council consideration of the DVP, the registration of the SRW will be required. • A Soil Use for the Placement of Fill Application has also been submitted in association with the proposal, which proposes to retain 3,600 cubic metres of soil (i.e. structural fill) recently deposited onto the Property without Agricultural Land Commission (ALC) or City approval. The purpose of the fill is to facilitate the construction of the proposed cranberry processing facility. Please refer to the accompanying memo from Community Bylaws for more information. • Prior to Council consideration of the DVP, Council and ALC approval of the Soil Use for the Placement of Fill Application is required.

Steven De Sousa
Planner 1

Attachment 1: Location Map & Aerial Photo
Attachment 2: Architectural Plans
Attachment 3: Agrologist Report

GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

1779 West 75 Avenue
Vancouver, BC
V6P 6P2
604-439-0922

Maybog Farms Ltd.
15411 Cambie Road
Richmond, BC
V6V 1T3

May 7, 2020
File:17692

Attention: Todd May

Re: Geotechnical Investigation Report - Proposed Farm Building
4711 No. 8 Road, Richmond, BC

1.0 INTRODUCTION

We understand that a new farm building has been proposed at the above referenced site. Preliminary design drawings prepared by JDG Construction, dated March 28, show an at grade farm building. We expect single level, steel construction, with a clear height of approximately 11 m. Based on our experience with similar projects we anticipate column loading to be in the range of 600 to 800 kN. Floor loading is expected to be in the range of 15 to 25 kPa.

This report presents the results of our geotechnical investigation of the site and presents recommendations for site preparation and building construction. Soil conditions are described in accordance with the Unified Soil Classification System, except as noted otherwise. This report has beep prepared for Maybog Farms Ltd., for their design and construction team, for the project described. We assume that the City of Richmond would rely on the information contained in our report during their review process. Any unauthorized use of this report is prohibited.

2.0 SITE DESCRIPTION

The site is located north-west of the intersection formed by No 8 Road and Highway 91 in Richmond, BC. The site is bound by No. 8 Road to the east, an existing farm building to the south, and farmland to the east and north. The site is presently unimproved, and is used for farming activity. The existing site grades are at an approximate elevation of 0.8 to 0.9 m geodetic, based on the provided drawings. The location of the site relative to adjacent improvements is shown on our Drawing 17692-01, following the text of this report.

3.0 FIELD INVESTIGATION

The subsurface conditions were investigated on April 22nd, 2020 using a track mounted auger drill/CPT rig owned and operated by Uniwide Drilling of Prince George, BC. A total of one Cone Penetration Test (CPT) and four auger test holes were completed at the site. Additionally, shear wave velocity measurements were collected during the seismic CPT sounding. The CPT sounding was advanced to a depths of up to 30.5 m below existing site grades, and the auger test holes were drilled to a depth 9.1 m below existing site grades. The auger test holes were logged in the field by a geologist from our office. Select samples were collected from the auger flights and returned to the laboratory for routine classification and index testing.

Prior to our investigation, Maybog Farms cleared the test locations of buried services. All test holes were backfilled and sealed in accordance with provincial abandonment requirements following classification, sampling and logging.

The CPT is an in-situ testing device which is pushed into the ground employing a hydraulic ram on the drill rig. The cone penetrometer records measurements of tip resistance, sleeve resistance, dynamic pore water pressure, temperature, and inclination in 50 mm increments. Shear wave velocities can also be collected in 1 m intervals when required. The data obtained may be correlated to estimate engineering parameters such as shear strength, relative density, soil behaviour type, and consolidation coefficients. The stratigraphic interpretation was verified with the auger test holes as described above.

The test hole logs are presented on Figure A.01 to A.04 in Appendix A. The CPT sounding data is presented in Figures B.01 of Appendix B. Interpreted Soil Parameters are presented in Appendix C, Liquefaction Assessment in Appendix D and Shear Wave Velocity data in Appendix E. The approximate locations of the test hole and CPT soundings are shown on our Drawing 17692-01, following the text of this report.

4.0 SUBSURFACE CONDITIONS

4.1 Soil Conditions

The soil profile at the site was determined to consist of a thin layer of disturbed brown silt. The surficial silt transitions to undisturbed grey silt at a depth of 0.6 m. The soft to firm grey silt extends to depths ranging between 6.1 to 6.7 m below existing site grades. The silt is underlain by a sequence of silty sand transitioning to sand which extends to the maximum depth of exploration at all test holes. The sand is expected to be underlain by marine silt at depths of about 30 m below existing grades.

A detailed description of the soils encountered is given below.

Upper Silt

The upper silt layer was identified at all test holes onsite, and was noted to extend to depths of up to 0.6 m below existing site grades. The silt layer was noted to have some organics and root fibres. The surficial portion of this soil stratum is expected to be disturbed by farm activity such as tilling and planting. The auger samples recovered from this layer were described as brown and wet. Moisture content within this stratum varried between 55 to 91 percent.

Clayey Silt to Silty Clay (Overbank Sequence)

The upper silt is underlain by a silt sequence ranging between 5.5 to 6.1 m in thickness. The silty clay was observed to be soft to firm and grey in colour. Laboratory testing indicates that moisture contents of this stratum range between 42 to 82 percent, with an average of about 60 percent. Interpreted shear strengths vary between 20 to 50 kPa as shown in Appendix C. The overbank sequence is considered to be moderately compressible under the anticipated loading.

Silty Sand (Transitional Sequence)

The overbank silt is underlain by 0.5 to 1.8 m thick layer or transitional sequence comprised of loose to compact silty sand. Laboratory testing shows the moisture content of the transitional sequence is in the range of 36 percent.

The undrained shear strength was interpretted to be in the range of 40 to 75 kPa, indicating low compressibility under the proposed loads.

Sand (Channel Sediments)

The overbank sequence is underlain by a sequence of channel deposited sands. The slight variations in in-situ density, compressibility, mineralogy and grain size are reflected in the shape of the tip resistance curve of the CPT sounding shown in Appendix B. In general, the Fraser River channels sands at this site are well graded, medium grained, predominately quartz, highly stratified and compact.

Clayey Silt (Marine Deposits)

Although not well defined in the CPT soundings, the channel deposited sands are expected to be underlain by marine deposited clayey silt at depths of approximately 30 m. These deposits are expected to continue to significant depths of about 80 to 100 m below existing site grades. The marine deposits are compressible under heavy loading only.

For a more detailed description of the sub-surface soil conditions refer to the individual test hole logs located in Appendix A and the CPT Sounding log in Appendix B of this report.

4.2 Groundwater Conditions

The water table at the site was determined by pore pressure dissipation tests carried out in the clean sand layers present at depth during the CPT soundings. The static water level was found to vary in depth between about 2.0 to 2.1 m below existing grades at our test holes. Groundwater levels are expected to vary seasonally as well as tidally and are expected to rise within 0.5 m of the existing grades. Some surficial ponding and near surface perched groundwater is also anticipated during the wetter months of the year.

5.0 DISCUSSION

5.1 General comments

The proposed farm building is expected to be moderately heavy, steel construction with anticipated column loading to be in the range of 600 to 800 kN on columns. Floor slab loading is anticipated to be in the range of 15 to 25 kPa.

Based on our experience with the surrounding developments, the building areas will require to reach a minimum flood construction elevation of about 3.0 to 3.5 m geodetic. The drawings provided by JDG Construction, dated March 28, 2020 indicate that the finished floor elevation is proposed to be 3.15 m. Existing grade elevations are at about 0.8 m geodetic. Thus, approximately 2.4 m of grading fills will be required to meet the proposed finished floor elevation.

In general, the site is underlain by an upper silt consisting of a brown silt with some organics and root fibres. This upper layer is expected to have been disturbed during farm activity. The upper silt is underlain by a sequence of overbank silt, over channel sands, then marine clay.

The silt layer is considered to be compressible under the anticipated ground stress increases expected for this development. Therefore, it is necessary to prepare the ground for conventional foundations by preloading to reduce the post construction ground settlements of the development. We anticipate that preloads 4 to 6 m high would be necessary to pre-compress the underlying soils to post construction stress induced by grading fills, building loading and floor loading. Preloading for yard areas and heavy traffic is also recommended to reduce long term maintenance requirements. We anticipate a preload height of 1.5 m for yard areas and heavily trafficked areas. Following preload treatment, buildings can be supported by conventional foundation elements.

We are of the opinion that the proposed development is feasible from a geotechnical perspective provided our recommendations outlined in Section 6.0 are adhered to.

5.2 Liquefaction Analysis

It is generally accepted that loose to compact and saturated non-plastic silts and sands are prone to liquefaction or strain softening during cyclic loading caused by large earthquakes. The strength reduction caused by soil liquefaction can cause conventional foundations to punch. Furthermore, once liquefaction has been triggered, experience has shown that significant permanent vertical and horizontal movements may be experienced.

We have completed a liquefaction assessment based on the 1/2,475 design earthquake recommended by the 2018 British Columbia Building Code (2018BCBC) for seismic designs. Natural Resources Canada predicts that firm ground accelerations at the site will be 0.38g for a magnitude 7.0 event with a 1/2,475 return period. However, our past experience in the area indicates that de-amplification of the design earthquake may result in ground accelerations of about 0.25g. Thus, our liquefaction analysis employed a peak ground acceleration of 0.25g. Liquefaction and predicted post liquefaction ground movements are presented in Appendix D, following the text of this report. Analysis of this information indicates that the thick silty sand to sand deposit underlying the site may be prone to ground liquefaction in the even of the design earthquake below a depth of about 7 to 8.5 m below existing site grades.

Assuming the new foundations are constructed approximately at or above current grades, the foundation loading is as specified in Section 5.0, and the structure is designed in accordance with our recommendations there is adequate capacity in the soil profile to prevent post liquefaction punching of foundations. Our analyses indicate the potential for localized liquefaction of sand layers resulting in post liquefaction permanent ground settlements in the range of 100 mm. Due to the significant offset of the Fraser River foreshore, of over 2 km, we expect that lateral spread would be negligable. The predicted movements are based on empirical observations from other earthquake sites around the world on relatively flat ground away from the influence of surrounding structures and should not be taken as exact calculations of movement but rather order of magnitude estimates. Differential settlements should be less than 50 percent of the total settlements predicted. Our calculations of ground movements are based on Tokimatsu & Seed, 1987 and Youd et al. 2002.

6.0 RECOMMENDATIONS

6.1 General Comments

The silts starting at the existing ground surface and extending to depths of approximately 6.1 to 6.7 m are considered compressible under the proposed loading. A preload treatment is necessary to reduce post-construction settlements of the proposed building. The preload is intended to consolidate the compressible soils beneath the site to the level of stress induced by the proposed structure.

6.2 Site Preparation

6.2.1 Site Stripping and Grading

Prior to the construction of the proposed improvements, buried piles, underground services, surficial organic materials, and loose or otherwise deleterious soils must be removed from the construction areas to expose a subgrade of firm silt.

We recommend that the firm silt subgrade be protected with a layer of engineered fill as soon as the subgrade has been approved by GeoPacific, to protect against disturbances. The initial lift of engineered fill should be at least 450 mm and compacted using a roller without vibration. Each subsequent lift should not exceed 300 mm.

Engineered fill in the context of this report is defined as clean sand or sand and gravel compacted in 300 mm loose lifts to a minimum of 95% "Modified Proctor" (ASTM D1557) dry density, with a moisture content within 2% of optimum for compaction.

Generally sand or sand and gravel will provide the best fill under all weather conditions. However, imported glacial till may be used as engineered fill. Due to its relatively high fines content, glacial till fill is considered moisture sensitive, and is difficult to compact during the wetter months of the year. We expect that some level of moisture conditioning will be required for compaction. We envisage that filling operations with these materials may be restricted to the warmer/dryer months of the year. Furthermore, due to the relatively low permeability of these materials they should not be used in any applications where a well draining soil is required. Alternatively, grade reinstatement and permanent fill could be done using engineered fill.

All stripping, fill placement and compaction must be reviewed by GeoPacific.

6.2.2 Preloading

The preload height and duration is directly related to the weight of the proposed structure and the contact stress at the underside of the foundation. We expect that a preload in the range of 4.0 m to 6.0 m from final slab elevations would be sufficient for the expected loading of the proposed development. Yard areas should be preloaded 1.5 m above the proposed finished grades unless elevated maintenance is accepted by the owener of the on-site roads.

We expect that the preload duration would be in the range of 4 to 6 months. Settlements in the range of 150 to 400 mm are expected at the centre of the building preload reducing with distance from the crest of the preload.

Settlement gauges should be installed throughout the building and yard preloads to monitor the settlements. We further recommend that monitoring hubs are installed at the existing ditch, road way and existing structure to the south, to monitor the effects of the preload on the noted improvements. Monitoring of settelment gauges and monitoring hubs must be completed by a registered BCLS.

A detailed preload design plan can be prepared under a separate cover.

Preload filling and settlement gauge data to be reviewed by GeoPacific.

6.3 Building Foundations

The proposed building may be supported on conventional strip and pad foundations after preload treatment. Footings which are founded on engineered fill as described in Section 6.2.1 may be designed on the basis of a Serviceability Limit State (SLS) bearing pressure of 120 kPa for strip or pad footings and a factored Ultimate Limit State (ULS) bearing pressures of 180 kPa.

Regardless of the bearing pressures provided, pad footings should not be less than 600 mm by 600 mm and strip footings should not be less than 450 mm in width. Footings should be buried a minimum of 450 mm below the surface for frost protection.

All foundation subgrades must be reviewed by GeoPacific prior to footing construction.

6.4 Building Settlements

Irrespective of preload treatment, this site will be subject to long term ground settlement due to secondary compression of the deep marine silt. Long term ground settlements of 100 to 200 mm over 25 years are anticipated for all structures, including buildings, pavements and utilities. Differential settlements are expected to be less than 1:300. These estimates can be better quantified after the preload has been constructed and monitored for the first 3 to 4 months.

6.5 Seismic Design of Foundations

The seismic site response classification is "Site Class F" in accordance with Table 4.1.8.4.A of the 2018 BCBC due to the presence of liquefiable soils beneath the site. However, if the fundamental period of vibration of the building is less than or equal to 0.5 seconds, the site class and the corresponding values of F(T) may be determined as described in Tables 4.1.8.4.A, 4.1.8.4.B and 4.8.1.4.C by assuming the soils are not liquefiable. Based on the seismic shear wave velocity data obtained from the SCPT and our calculations the Vs30 is 167 m/s for the site. Thus, the site can be classified as "Site Class E" according to the 2018 BCBC Table 4.1.8.4.A for structures with a fundamental period of vibration equal to or less than 0.5 seconds.

Because of the potential for soil liquefaction and the resulting settlemnts and possible lateral movement, we recommend that the slabs and footings be tied together with reinforcing. In accordance with the 2018 BCBC, we recommend that the foundation provision that "spread footings founded on soil defined as Site Class E or Fshall be interconnected by continuous ties in not less than two directions" as per Section 4.1.8.16 (5).(b). be adhered to regardless of site class recommendation for structural design.

Any structures which have a fundamental period of vibration of more than 0.5 seconds will necessitate that a site-specific dynamic analysis be carried out.

6.6 Slab-On-Grade Floors

Floor slabs should be directly underlain by a minimum of 150 mm of free draining granular material, such as 19 mm clear crush gravel or 19 mm road mulch, compacted to a minimum of 95% of the Modified Proctor Dry Density (ASTM D1557) at a moisture content that is within 2% of optimum for compaction. General grade reinstatement or backfill beneath slab-on-grade areas should be done using engineered fill, as described in Section 6.2.1.

Compaction of the slab-on-grade fill must be reviewed by GeoPacific.

6.7 Foundation Drainage

A perimeter drainage system is not required from a geotechnical perspective as the building proposed is to be constructed at or above the surrounding site grades. The area surrounding the building should be graded to slope away from the building to ensure floor slabs remain dry.

6.8 Utility Design and Installation

We expect that most of the services will be relatively shallow and therefore confined to the surficial mineral fills and firm silt. Where possible, gravity lines should be provided with additional slope and/or capacity to account for the potential future loss of gradient due to onsite settlements.

Utility excavations at or beyond a depth of 1.2 m should be sloped at a grade of 1 horizontal to 1 vertical (1H:1V) or shored in accordance with the latest Work Safe BC regulations. Any excavations in excess of 1.2 m in height requiring worker entry must be reviewed by a professional engineer prior to entry.

Some moderate groundwater seepage may be encountered during excavations, which we expect can be controlled using conventional sumps and sump pumps.

Pipe bedding, backfill materials and compaction requirements should conform to the specifications outlined in the Master Municipal Construction Documents (MMCD).

6.9 Pavement Structures

Following the recommended site preparation outlined in Section 6.2.1, it is our opinion that the minimum asphalt pavement structure specified in Table 1 is adequate to support farm equipment and industrial traffic.

Table 1: Onsite Pavement Structure

Material	Thickness (mm)	CBR
Asphaltic Concrete	75	N/A
19 mm minus crushed gravel base course	150	80
River Sand Subbase	300	8

Paved areas to be occupied solely by automobiles and light trucks may have the asphalt thickness reduced to 65 mm. Where permeable pavers are to be used, the base course noted above should be replaced with 19 mm clear crush gravel.

The pavement area should be proof rolled prior to the placement of subbase material. The geotechnical engineer should be present on-site to review proofrolling activities. Any soft spots encountered during proof rolling should be excavated and be replaced with river sand subbase.

All base and subbase fills should be compacted to a minimum of 95% Modified Proctor dry density with a moisture content within 2% of optimum for compaction.

7.0 DESIGN REVIEWS AND CONSTRUCTION INSPECTIONS

As required for Municipal "Letters of Assurance", GeoPacific Consultants Ltd. will carry out sufficient field reviews during construction to ensure that the Geotechnical Design recommendations contained within this report have been adequately communicated to the design team and to the contractors implementing the design. These field reviews are not carried out for the benefit of the contractors and therefore do not in any way effect the contractors obligations to perform under the terms of his/her contract.

It is the contractors' responsibility to advise GeoPacific Consultants Ltd. (a minimum of 48 hours in advance) that a field review is required. Geotechnical field reviews are normally required at the time of the following:

1.	Stripping	- Review of proof rolling and stripping of subgrade materials
2.	Fill	- Review of materials, placement and compaction of engineered fill
3.	Preload	- Review of preload placement and settlement gauge data
4.	Subgrade	- Review of foundation subgrades
5.	Slab-on-grade	- Review of slab-on-grade subgrades
6.	Excavation	- Review of temporary slopes and soil conditions

It is critical that these reviews are carried out to ensure that our intentions have been adequately communicated. It is also critical that contractors working on the site view this document in advance of any work being carried out so that they become familiarized with the sensitive aspects of the works proposed. It is the responsibility of the developer to notify GeoPacific Consultants Ltd. when conditions or situations not outlined within this document are encountered.

8.0 CLOSURE

This report has been prepared exclusively for our client for the purpose of providing preliminary geotechnical recommendations for the design and construction of the proposed development. The report remains the property of GeoPacific Consultants Ltd. and unauthorized use of, or duplication of, this report is prohibited.

We are pleased to be of assistance to you on this project and trust that our comments and recommendations are both helpful and sufficient for your current purpose. If you would like further details or would like clarification of any of the above, please do not hesitate to contact us.

For:
GeoPacific Consultants Ltd.

Reviewed by:

Zakhar Okunev, BEng., E.I.T.
Geotechnical Engineer-in-Training

Roberto Avendano, B.Eng., P.Eng.
Senior Geotechnical Engineer

LEGEND:

- SCPT#-# – SEISMIC CONE PENETRATION TEST (SCPT) LOCATION
- TH#-# – TEST HOLE (TH) LOCATION

SITE PLAN

*TEST LOCATIONS ARE APPROXIMATE

REFERENCE:

GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY
1779 West 75th Ave.
Vancouver, B.C. V6P 6P2
P 604.439.0922
F 604.439.9189

DATE:	22-April-2020	
DRAWN BY: SH	APPROVED BY: RA	REVIEWED BY: ZO
SCALE: AS SHOWN		

BARN BUILDING

4711 NO. 8 ROAD, RICHMOND, BC

TEST HOLE SITE PLAN

FILE NO.: 17692

DWG. NO.: 17692-01

REVISIONS.
A.
B.
C.

APPENDIX A - TEST HOLE LOGS

Test Hole Log: TH20-01 (SCPT20-01)

File: 17692
Project: BARN BUILDING
Client: MAYBOG FARMS LTD
Site Location: 4711 NO. 8 ROAD, RICHMOND, BC

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	INFERRED PROFILE — SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 / 0		***Silt*** soft sandy SILT, fine grained sand, some organics and root fibers, brown, wet	0.0	90.6			
2 / 0.6		***Silt*** soft SILT, moderate plasticity, trace wood fibers, grey, moist to wet	0.6	51.0			2.0m water table depth based on CPT analysis
20 / 6		***Sand*** loose to compact silty SAND, fine grained sand, grey, wet	6.1	48.3			
22 / 6.6		***Sand*** compact SAND, fine to medium grained sand, grey wet	6.6	30.3			
29 / 9				28.8			
30 / 9.1		End of Borehole	9.1				

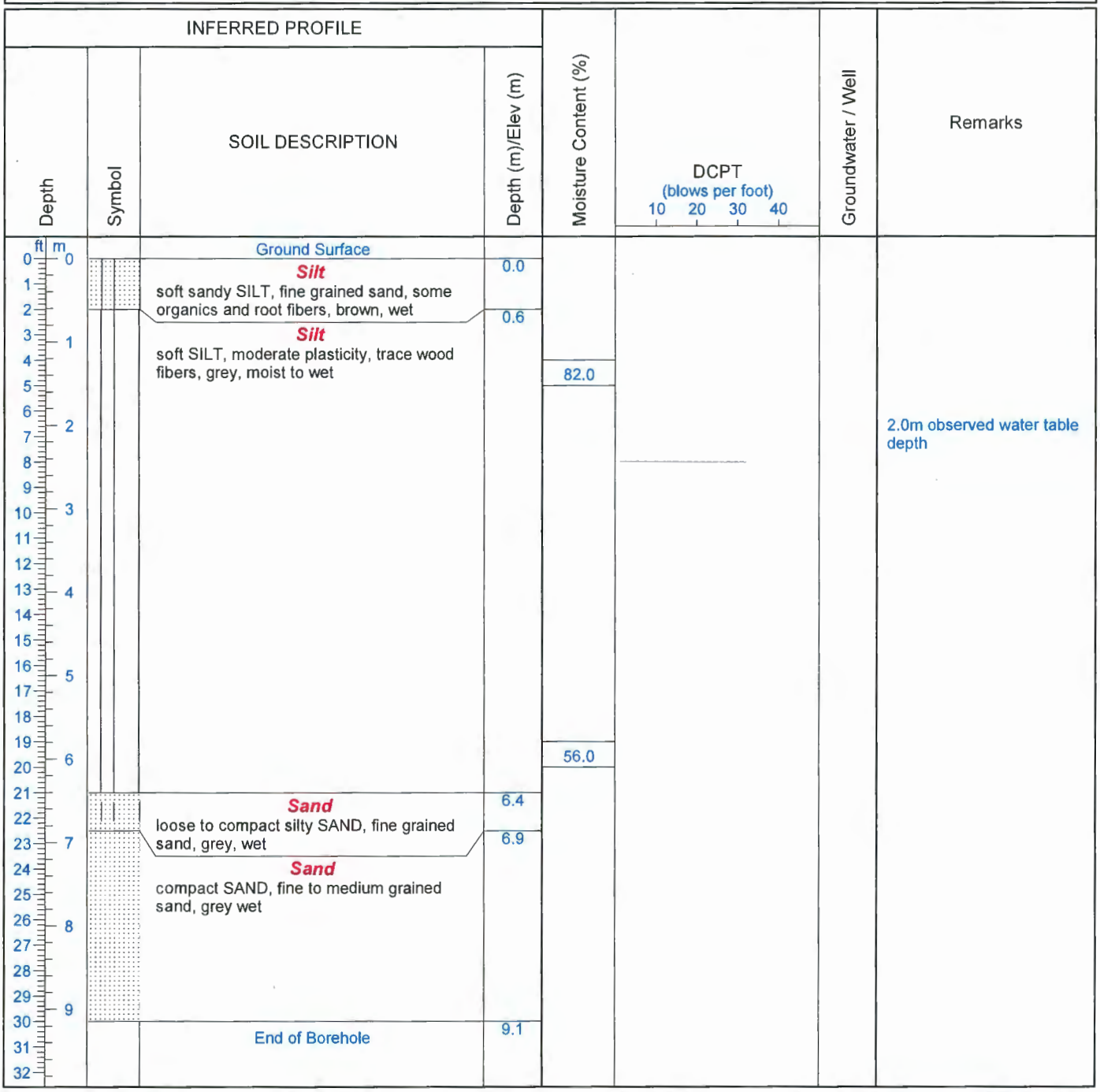
Logged: SH
Method: Solid stem auger
Date: 2020-April-22

Datum: Ground elevation
Figure Number: A.01
Page: 1 of 1

Test Hole Log: TH20-02

File: 17692
Project: BARN BUILDING
Client: MAYBOG FARMS LTD
Site Location: 4711 NO. 8 ROAD, RICHMOND, BC

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189



Logged: SH
Method: Solid stem auger
Date: 2020-April-22

Datum: Ground elevation
Figure Number: A.02
Page: 1 of 1

Test Hole Log: TH20-03

File: 17692
Project: BARN BUILDING
Client: MAYBOG FARMS LTD
Site Location: 4711 NO. 8 ROAD, RICHMOND, BC

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 / 0		***Silt*** soft sandy SILT, fine grained sand, some organics and root fibers, brown, wet	0.0	55.1			
2 / 0.6		***Silt*** soft SILT, moderate plasticity, trace wood fibers, grey, moist to wet	0.6	47.8			2.1m observed water table depth
10 / 3		trace sand at 3.0m		42.4			
22 / 6.7		***Sand*** loose to compact silty SAND, fine grained sand, grey, wet	6.7	36.0			
28 / 8.5		***Sand*** compact SAND, fine to medium grained sand, grey wet	8.5	25.9			
30 / 9.1		End of Borehole	9.1				

Logged: SH
Method: Solid stem auger
Date: 2020-April-22

Datum: Ground elevation
Figure Number: A.03
Page: 1 of 1

Test Hole Log: TH20-04

File: 17692
Project: BARN BUILDING
Client: MAYBOG FARMS LTD
Site Location: 4711 NO. 8 ROAD, RICHMOND, BC

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 / 0		***Silt*** soft sandy SILT, fine grained sand, some organics and root fibers, brown, wet	0.0				
2 / 0.6		***Silt*** soft SILT, moderate plasticity, grey, wet	0.6	73.8			2.0m observed water table depth
13 / 4				48.8			
20 / 6		***Sand*** loose to compact silty SAND, fine grained sand, grey, wet	6.1				
23 / 7		***Sand*** compact SAND, fine to medium grained sand, grey wet	7.0	29.1			
30 / 9		End of Borehole	9.1				

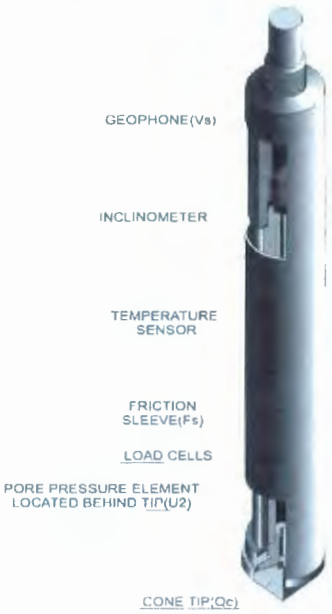
Logged: SH
Method: Solid stem auger
Date: 2020-April-22

Datum: Ground elevation
Figure Number: A.04
Page: 1 of 1

APPENDIX B - ELECTRONIC CONE PENETRATION RESULTS

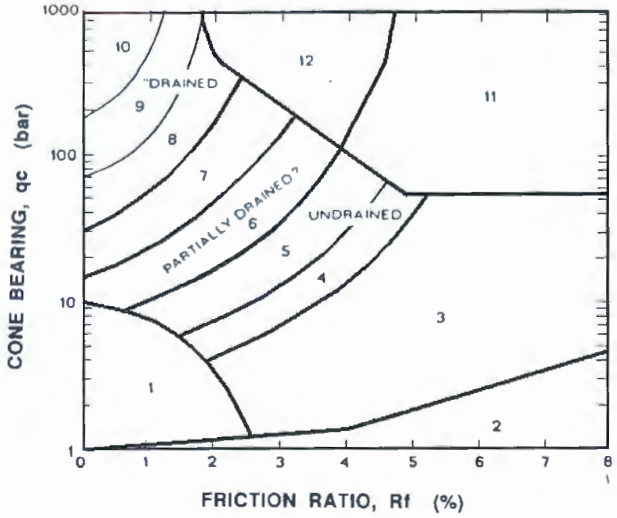
The system used is owned and operated by GeoPacific and employs a 35.7 mm diameter cone that records tip resistance, sleeve friction, dynamic pore pressure, inclination and temperature at 5 cm intervals on a digital computer system. The system is a Hogentogler electronic cone system and the cone used was a 10 ton cone with pore pressure element located behind the tip and in front of the sleeve as shown on the adjacent figure.

Electronic Cone Penetrometer



In addition to the capabilities described above, the cone can be stopped at specified depths and dissipation tests carried out. These dissipation tests can be used to determine the groundwater pressures at the specified depth. This is very useful for identifying artesian pressures within specific layers below the ground surface.

Interpretation of the cone penetration test results are carried out by computer using the interpretation chart presented below by Robertson[1]. Raw data collected by the field computer includes tip resistance, sleeve friction and pore pressure. The tip resistance is corrected for water pressure and the friction ratio is calculated as the ratio of the sleeve friction on the side of the cone to the corrected tip resistance expressed as a percent. These two parameters are used to determine the soil behaviour type as shown in the chart below. The interpreted soil type may be different from other classification systems such as the Unified Soil Classification that is based upon grain size and plasticity.

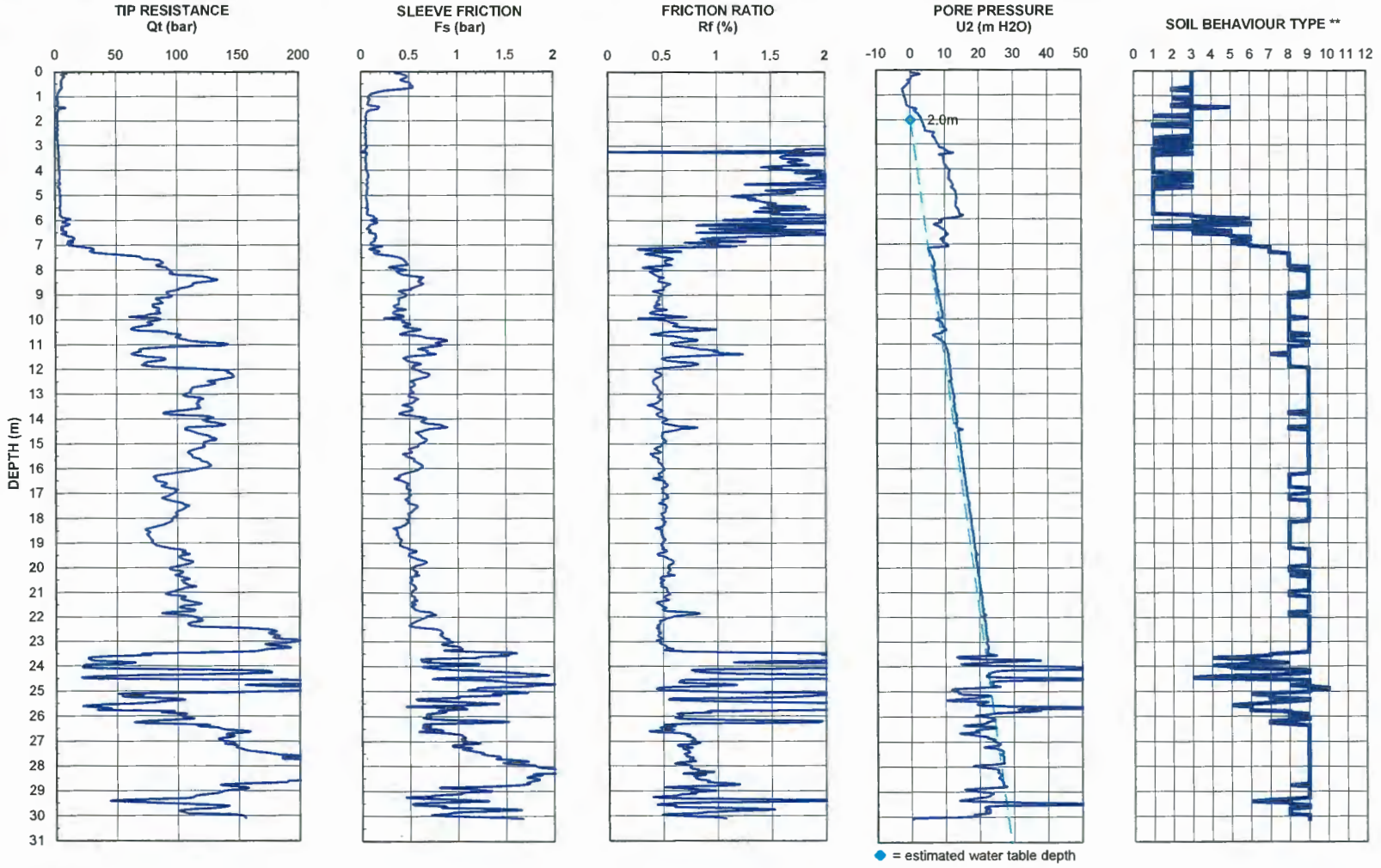


ZONE	SOIL BEHAVIOUR TYPE
1	sensitive fine grained
2	organic material
3	clay
4	silty clay to clay
5	clayey silt to silty clay
6	sandy silt to clayey silt
7	silty sand to sandy silt
8	sand to silty sand
9	sand
10	gravelly sand to sand
11	very stiff fine grained (*)
12	sand to clayey sand (*)

(*) overconsolidated or cemented

1 Robertson, P.K., 1990, "Soil Classification using the cone penetration test", 1990 Canadian Geotechnical Colloquium, Canadian Geotechnical Journal, Vol. 27, 1990.

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2020-Apr-22	MAYBOG FARMS LTD	GeoPacific Project #: 17692
	Sounding: SCPT20-01	4711 NO. 8 ROAD, RICHMOND	Figure: B.01



** Based on Robertson et. al 1986

1 Sensitive Fine Grained
2 Organic Material
3 Clay
4 Silty Clay to Clay
5 Clayey Silt to Silty Clay
6 Sandy Silt to Clayey Silt
7 Silty Sand to Sandy Silt
8 Sand to Silty Sand
9 Sand
10 Gravelly Sand to Sand
11 Very Stiff Fine Grained
12 Sand to Clayey Sand

APPENDIX C - INTERPRETED PARAMETERS

The following charts plot the Standard Penetration Test (SPT) values and the undrained strength of fine grained soils based upon generally accepted correlations. The methods of correlation are presented below.

STANDARD PENETRATION TEST CORRELATION

The Standard Penetration Test $N_{1(60)}$ value is related to the cone tip resistance through a Qc/N ratio that depends upon the mean grain size of the soil particles. The soil type is determined from the interpretation described in Appendix B and the data of Table C.1 below is used to calculate the value of $N_{(60)}$.

Table C.1. Tablulated $Qc/N_{1(60)}$ Ratios for Interpreted Soil Types

Soil Type	Qc/N Ratio
Organic soil - Peat	1.0
Sensitive Fine Grained	2.0
Clay	1.0
Silty Clay to Clay	1.5
Clayey Silt to Silty Clay	2.0
Silt	2.5
Silty Sand to Sandy Silt	3.0
Clean Sand to Silty Sand	4.0
Clean Sand	5.0
Gravelly Sand to Sand	6.0
Very Stiff Fine Grained	1.0
Sand to Clayey Sand	2.0

The $Qc/N_{1(60)}$ ratio is based upon the published work of Robertson (1985)[2]. The values of N are corrected for overburden pressure in accordance with the correction suggested by Liao and Whitman using a factor of 0.5. Where the correction is of the form:

$$N_1 = \sigma^{0.5} * N$$

All calculations are carried out by computer using the software program CPTint.exe developed by UBC Civil Engineering Department. The results of the interpretation are presented on the following Figures.

UNDRAINED SHEAR STRENGTH CORRELATION

It is generally accepted that there is a correlation between undrained shear strength of clay and the tip resistance as determined from the cone penetration testing. Generally the correlation is of the form:

$$S_u = \frac{(q_c - \sigma_v)}{N_k}$$

where q_c = cone tip resistance, σ = in situ total stress, N_k = cone constant

The undrained shear strength of the clay has been calculated using the cone tip resistance and an N_k factor of 12.5. All calculations have been carried out automatically using the program CPTint.exe. The results are presented on the Figures following.

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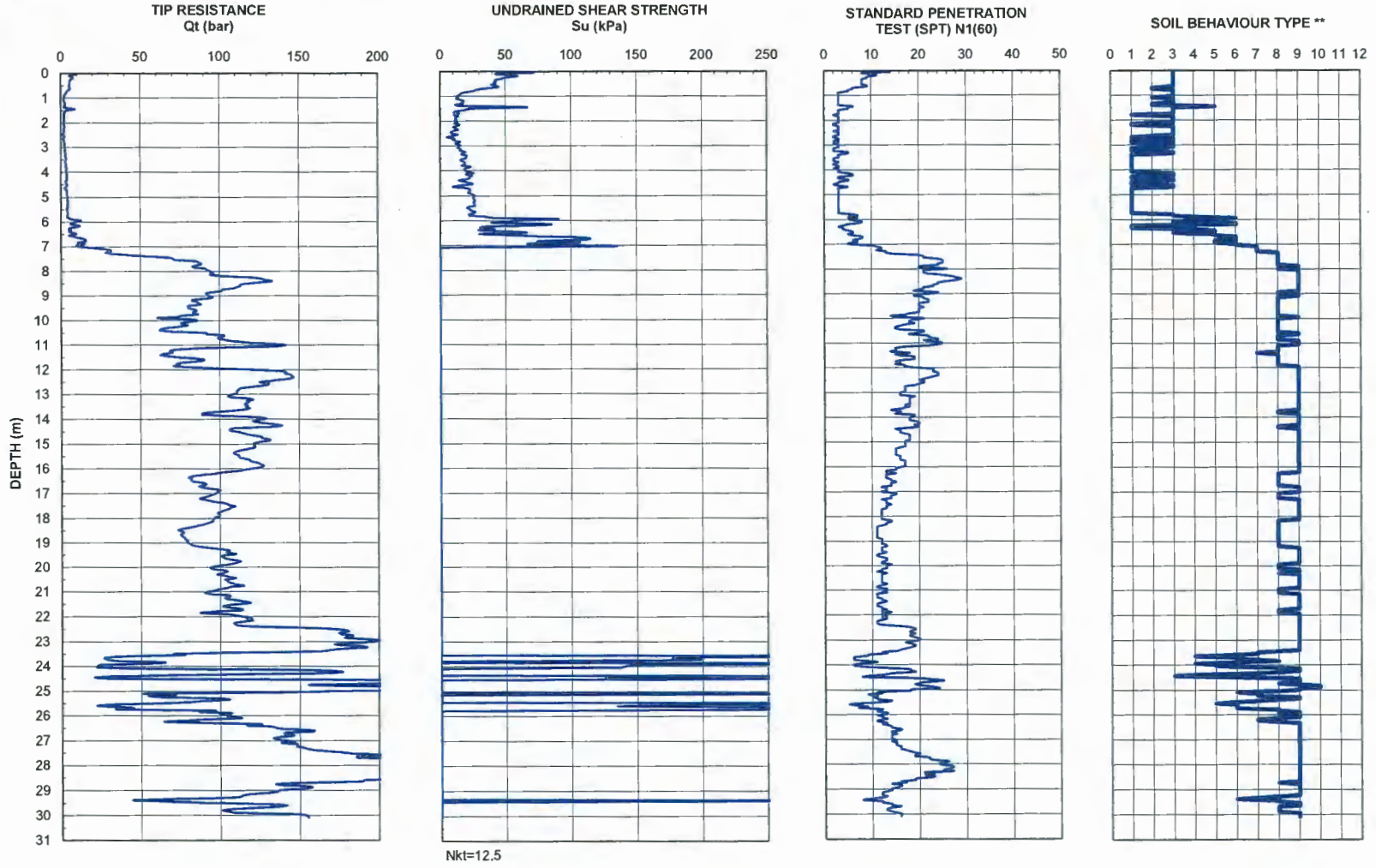
2 Robertson, P.K., 1985, "In-Situ Testing and Its Application to Foundation Engineering", 1985 Canadian Geotechnical Colloquium, Canadian Geotechnical Journal, Vol. 23, No. 3, 1986

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2020-Apr-22	MAYBOG FARMS LTD	GeoPacific Project #: 17692
	Sounding: SCPT20-01	4711 NO. 8 ROAD, RICHMOND	Figure: C.01



** Based on Robertson et. al 1986

1 Sensitive Fine Grained
2 Organic Material
3 Clay
4 Silty Clay to Clay
5 Clayey Silt to Silty Clay
6 Sandy Silt to Clayey Silt
7 Silty Sand to Sandy Silt
8 Sand to Silty Sand
9 Sand
10 Gravelly Sand to Sand
11 Very Stiff Fine Grained
12 Sand to Clayey Sand

APPENDIX D - LIQUEFACTION ANALYSIS

Assessment of the liquefaction potential of the ground has been determined by the Cone Penetration Test (CPT). The method of analysis is presented in the following sections.

FACTOR OF SAFETY AGAINST LIQUEFACTION

The factor of safety against liquefaction calculated here is the ratio of the cyclic resistance of the soil (CRR) to the cyclic stresses induced by the design earthquake (CSR). Where the ratio of CRR/CSR is greater than unity the soils ability to resist cyclic stresses is greater than the cyclic stresses induced by the earthquake and liquefaction will be unlikely. Where the CRR/CSR is less than unity then liquefaction could occur. This ratio is presented as the FOS against Liquefaction on the following charts. Calculation of the factor of safety is based on NCEER (1998)[1] which evaluates the CRR directly from cone penetration test sounding data. The value of the cyclic stress ratio has been calculated based on peak horizontal ground acceleration of the 2015 National Building Code interpolated seismic hazard value.

SEISMIC INDUCED SETTLEMENT

In the event of a significant earthquake, settlement of the ground surface could occur as a result of densification of the looser soil layers as a result of liquefaction or due to the expulsion of sand in the form of sand dykes or sills from beneath the site. Tokimatsu and Seed (1987)[2] suggest a method of analysis for estimating vertical settlements as a result of earthquake induced accelerations. In this method the normalized standard penetration blow counts ($N_{1(60)}$) is compared with the cyclic stress ratio for the induced earthquake to determine the volumetric strain resulting from the earthquake shaking. The volumetric strain is assumed to result in only vertical settlement. The vertical settlement is summed for each depth at which settlement is predicted to occur and accumulated from the bottom of the test hole. The results are presented on the following charts labelled as Settlement.

HORIZONTAL DISPLACEMENT

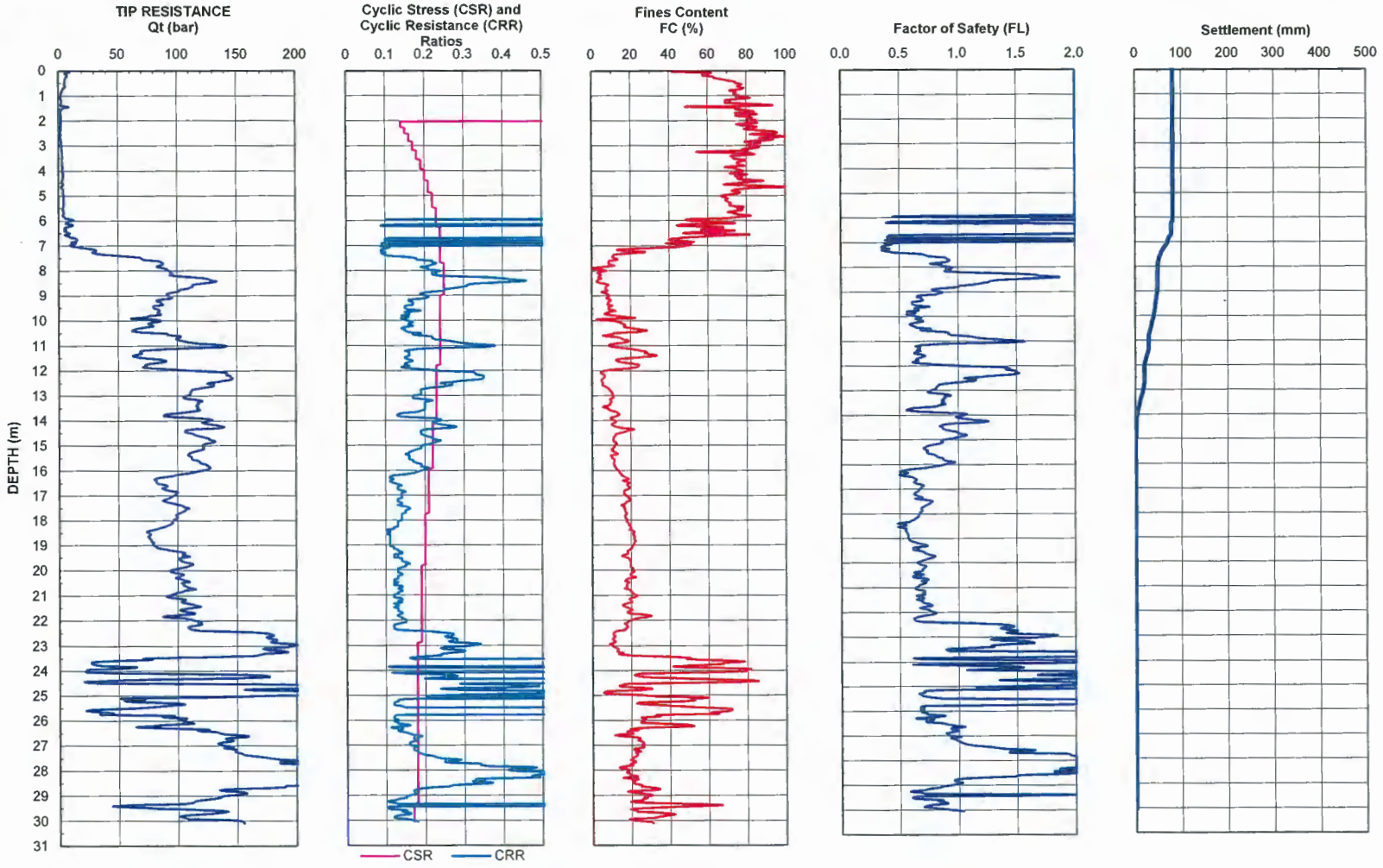
Horizontal ground displacements known as "free field" displacements occur as a result of liquefaction of the ground and are assumed to occur without the influence of any structures. The horizontal displacements presented in our report are generally based upon the lateral spread method by of Youd, Bartlett, & Hansen (2002). Displacements are calculated based on an empirical relationship developed from observations from other earthquake sites on sloping ground or near a free face, such as an abrupt slope. The presence of the proposed embankment on-site is expected to induce a static bias within the soils at the margin of the embankment making the soils and embankment in this area subject to lateral spread induced movements. In the event of a real earthquake of significant magnitude to cause limited liquefaction, actual movements will be influenced by a wide variety of factors including the characteristics of the earthquake including duration, number of significant cycles, variations in peak particle velocity, wavelength, amplitude and frequencies as well as soil damping and variations in density and continuity of the soil layers.

1 Youd, T. L., Idriss, I. M. (2001). "Liquefaction Resistance of Soils: Summary Report from the 1996 and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils", Journal of Geotechnical and Geoenvironmental Engineering, Vol 127, 10, pp. 817-833

2 Tokimatsu, K.A.M. and Seed, H.B., 1987. "Evaluation of Settlement in Sands Due to Earthquake Shaking", Journal of Geotechnical Engineering, ASCE, Vol. 113, No. 8, pp. 861-878.

3 Youd, T.L., Bartlett, S.F., Hansen, C.M. (2002), "Revised MultiLinear Regression Equations for Prediction of Lateral Spread Displacements", Journal of Geotechnical and GeoEnvironmental Engineering, Vol. 128, No. 12, pp. 1007-1017

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2020-Apr-22	MAYBOG FARMS LTD	GeoPacific Project #: 17692
	Sounding: SCPT20-01	4711 NO. 8 ROAD, RICHMOND	Figure: D.01



Liquefaction interpretation: PGA = 0.25

magnitude = 7.0

settlement accumulation max depth = 15m

CNCL – 140

APPENDIX E - SHEAR WAVE VELOCITY DATA (Vs)

GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

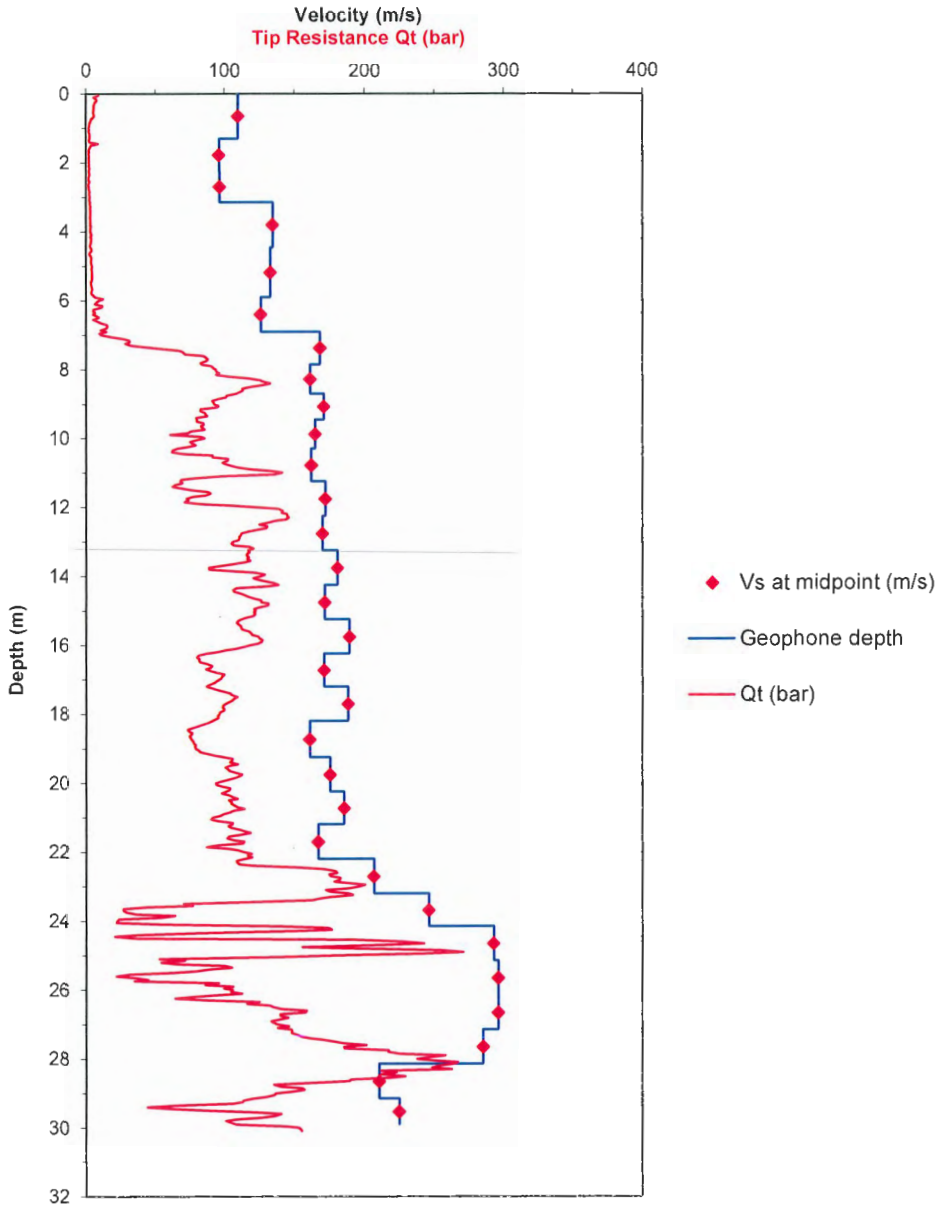
File: 17692
Project: BARN BUILDING
Client: MAYBOG FARMS LTD
Location: 4711 NO. 8 ROAD, RICHMOND, BC
Sounding: SCPT20-01
Date: 2020-Apr-22

Seismic Source: Beam
Source to cone (m): 0.4

Shear Wave Velocity Data (Vs)

Depth (m)	Geophone Depth (m)	Ray Path (m)	Ray Path Difference d (m)	Midpoint (m)	Time Difference (ms)	Shear Wave Velocity Vs (m/s)	d/Vs
1.50	1.30	1.36	1.36	0.65	12.40	110	0.0124
2.45	2.25	2.29	0.93	1.78	9.63	96	0.0096
3.35	3.15	3.18	0.89	2.70	9.24	96	0.0092
4.65	4.45	4.47	1.29	3.80	9.61	135	0.0096
6.10	5.90	5.91	1.45	5.18	10.88	133	0.0109
7.10	6.90	6.91	1.00	6.40	7.93	126	0.0079
8.05	7.85	7.86	0.95	7.38	5.64	168	0.0056
8.90	8.70	8.71	0.85	8.28	5.27	161	0.0053
9.65	9.45	9.46	0.75	9.08	4.38	171	0.0044
10.50	10.30	10.31	0.85	9.88	5.16	165	0.0052
11.45	11.25	11.26	0.95	10.78	5.86	162	0.0059
12.45	12.25	12.26	1.00	11.75	5.81	172	0.0058
13.45	13.25	13.26	1.00	12.75	5.88	170	0.0059
14.45	14.25	14.26	1.00	13.75	5.53	181	0.0055
15.45	15.25	15.26	1.00	14.75	5.83	172	0.0058
16.45	16.25	16.25	1.00	15.75	5.28	189	0.0053
17.40	17.20	17.20	0.95	16.73	5.55	171	0.0056
18.40	18.20	18.20	1.00	17.70	5.30	189	0.0053
19.45	19.25	19.25	1.05	18.73	6.52	161	0.0065
20.45	20.25	20.25	1.00	19.75	5.69	176	0.0057
21.40	21.20	21.20	0.95	20.73	5.11	186	0.0051
22.40	22.20	22.20	1.00	21.70	5.99	167	0.0060
23.40	23.20	23.20	1.00	22.70	4.83	207	0.0048
24.35	24.15	24.15	0.95	23.68	3.85	247	0.0039
25.35	25.15	25.15	1.00	24.65	3.41	293	0.0034
26.35	26.15	26.15	1.00	25.65	3.37	296	0.0034
27.35	27.15	27.15	1.00	26.65	3.37	296	0.0034
28.35	28.15	28.15	1.00	27.65	3.50	286	0.0035
29.35	29.15	29.15	1.00	28.65	4.74	211	0.0047
30.10	29.90	29.90	0.75	29.53	3.33	225	0.0033
						Σ(d/Vs)	0.1789
						average Vs = Σd / Σ(d/Vs)	167

File: 17692
Project: BARN BUILDING
Client: MAYBOG FARMS LTD
Location: 4711 NO. 8 ROAD, RICHMOND, BC
Sounding: SCPT20-01
Date: 2020-April-22



Attachment 3

Agrologist Report

Agricultural Development Plan for a Fresh Cranberry Facility

Report Prepared for:
Maybog Farms Ltd

Jan 23, 2020

Prepared by:
David Melnychuk, P.Ag
19915-37A Avenue
Langley, BC, V3A 2S8
January 23, 2020

Introduction

The success of agricultural enterprises in the City of Richmond will be dependent on a partnership between farmers and its citizens. Finding a balance of farmers willing to reinvest in their farms through horticultural and technological advancements, and the support of local consumers desirous of safe and secure sources of healthy and nutritious foods will ultimately support agricultural viability in this community.

Maybog Farms Ltd is a large well established cranberry farm in the City of Richmond. To ensure continued agricultural viability, they are expanding a value added component to their overall farm operations. The 5th generation farming family is ensuring that the healthful product that they grow will have direct market access in their local communities. Activities are expected to include: sizing, sorting, grading, cooling, storage and packing of fresh cranberries grown on the farm. Finished product will be transported from this location directly to the local and regional market place. Agriculture is changing, and adapting to industry best practices, and embracing value adding is proving to be an important pillar supporting the long term sustainability of the family farm. To reach this goal of economic sustainability will require a facility with the technological advancements and the capacity to handle the volume of cranberry crop grown on their farm.

Proposed location

The following aerial photograph outlines in blue the property located at 4711 # 8 Road, its configuration and size. The property contains approximately 8 hectares and has historically been utilized for cranberry production. The proposed site (0.36 hectares) for the sorting and packing facility is located in the South East corner of the property and is outlined in red , only for illustrative purposes (not a legal survey).

Soil considerations

The original mapping of the *"Soils of the Langley-Vancouver Map Area"* completed by the province of BC in 1980, indicated that the original soils on this property consists of 3 different soil types as described below;

The property is located in a soils transition zone, where the soils transition from the mineral Bates soil (medium textured local stream deposits) with a shallow topping of organic material to an organic Lumbum-Richmond soil with 40 to 160 cm of semi-decomposed organic material underlain with moderately fine textured deltaic deposits. The variance in soil type and depth of organic matter generates several challenges from a crop production perspective when attempting to achieve high yields of top quality cranberry fruit. This is evident in the health of some of the plants with sporadic die off throughout the field. The building site itself has only 5-10 cm of organic material remaining. One of the benefits of the proposal would be associated with increasing organic matter in the inferior production areas, by stripping off the organic material (5-10 cm) from the facility site and distributing the organic matter to enhance the remaining challenged sites in the field.

Facility Location

The proposed facility is located in an excellent location for the following reasons:

- The proposed facility site will have a minimal disturbance on the remaining cranberry production area in this field and is located on the least productive portion of the farm.
- The site is adjacent to the other farm buildings and services (i.e., machinery storage and maintenance) located on the property south of the proposed building, minimizing the need to duplicate infrastructure around the packing shed
- Logistically the site is well positioned to receive cranberries from the other fields on the farm.
- On farm facilities minimizes transport times and distances to local markets. Fresh produce logistics are simplified, removing the need to be transported out of the country for further preparation, only to be returned back to the consumer in the locality where it was first grown. This investment is ensuring the product has direct access to local markets in Metro Vancouver and other regions in BC.

Facility

The proposed facility is to receive cranberries harvested from Maybog Farms, with over 400 acres in production, with an average yearly production of over 10,000,000 lbs of cranberries. The facility will be sized to handle a portion of this product, providing the following activities: receiving, cleaning, sizing, colour sorting, grading, cooling, storing and packing.

In terms of size, the facility will be 60 meters by 60 meters, an area of 3,600 square meters (0.36 hectares) on a parcel containing 8 hectares.

The site coverage will be approximately 4 %

Facility as it applies to Provincial legislation

The Farm Practices Act (Right to Farm) states in the definition section regarding **"farm operation"** under (k) means " *processing or direct marketing by a farmer of the products owned or operated by the farmer to the extent that the processing or marketing of those products is conducted on the farmer's farm*".

Further under the Ministers Bylaw Standards for bylaw development in the Agricultural Land Reserve, section in 2.4.5 states that *"Bylaws should not restrict the area of a lot which may be covered by buildings and structures for farm use, to an area less than **35%** or less than 75% for greenhouses."*

The proposed project meets all the Provincial regulations regarding on-farm value added activities.

Comparable agricultural facilities on farms in the Fraser Valley

To provide a perspective on scale and size of agricultural buildings and structures which are common on farms throughout the Fraser Valley, the following examples of farm building and structures are provided for added information. These examples are taken from existing facilities on farms in Delta and Surrey.

- Dairy and Poultry barns and supporting structures – 1 to 2 hectares
- Vegetable Green houses with on farm packaging facilities– over 5 to 10 hectares
- On farm potato and vegetable storage and handling facilities – 1 to 2 hectares

As is evident by many real life illustrations, the sizes of agricultural facilities on farm are trending upwards because of economic pressures and market demand for local food products. There is also an extreme shortage of local packing facilities, often causing local produce to leave the province or country before returning back to consumers in the same marketplace where it was grown.

Final Comments

Maybog Farms is making a major investment in agriculture. The establishment of a facility on their 5th generation family farm which is capable of receiving, handling, packing and distributing fresh cranberries to the local market and beyond will directly support future viability. The proposal reflects the economic realities of farming and illustrates the trends towards value adding of primary agricultural products. Healthy products, grown locally, will be directly available to consumers in their own backyard. The proposal fits in well with provincial regulations and provincial agricultural policy which encourages increased value added activities on farm, leading to a greater share of the product value remaining with farmers who live and work in the local community. The current generation's substantial commitment reflects their vision, that the healthy food grown on their farm be available to the community in which they participate. This thoughtful and deliberate action ensures that farming in Richmond continues to be viable long in to the future.

David Melnychuk, P.Ag
January 23, 2020

City of Richmond

Minutes

Food Security and Agricultural Advisory Committee (FSAAC)

Held Tuesday, June 29, 2021 (7:00 pm)
Webex

In Attendance:

Members: Laura Gillanders (Chair); Mike Bomford; Erzsi Institorisz; Ian Lai; Lynn Kemper; Cory May; Allen Rose; Miles Smart

Non-Members: Councillor Harold Steves (Council Liaison); John Hopkins (Policy Planning); Steven De Sousa (Policy Planning); Carli Williams (Community Bylaws); Mike Morin (Community Bylaws)

Regrets:

Members: Sarah Drewery; Chris Pereira

Non-Members: Mikayla Roberts (Ministry of Agriculture); Shannon Lambie (Agricultural Land Commission)

1. Adoption of the Agenda

The Committee passed the following motion:

That the June 29, 2021 FSAAC Agenda be adopted as presented.

Carried Unanimously

2. Adoption & Signing of the Minutes for June 10, 2021

The Committee passed the following motion:

That the June 10, 2021 FSAAC Minutes be adopted as presented.

Carried Unanimously

3. ALR Soil Use for the Placement of Fill Application & Development Variance Permit Application – PID 013-082-434

Steven De Sousa, Planner 1, Policy Planning, introduced the proposal at PID 013-082-434, provided clarification regarding the two separate applications, and provided the following comments:

- The proposal is to construct an approximately 30,000 ft^2 cranberry processing facility at the subject property, in support of the existing cranberry farm operation;
- The Development Variance Permit application is required in order to vary the maximum lot coverage permitted for agricultural buildings with concrete construction;
- In 2018, Council amended the AG1 zone to limit concrete construction in agricultural buildings (approximately 8,000 ft^2 maximum) and implemented a fast track process for farmers who needed a larger building to support their farming operation;
- Access to the property will be provided through a Statutory Right-of-Way (SRW) on the adjacent lots to the south, which have access from the No. 8 Road overpass. The SRW would only allow access to the farm operation and for emergency vehicles (no residential access is permitted); and
- Prior to Council consideration of the DVP, Council and ALC approval of the associated fill application is required.

Mike Morin, Soil Bylaw Officer, Community Bylaws, introduced the ALR Soil Use for the Placement of Fill Application and provided the following comments:

- The application is being made to retain 3,600 cubic metres of soil (structural fill) recently deposited onto the subject property prior to approval from the Agricultural Land Commission (ALC) or City approval;
- The purpose of the soil importation is to establish an area to construct a cranberry processing facility; and
- If approved, the structural fill shall remain and form part of the foundation for the future building.

Todd May, Applicant, provided the following comments:

- The applicant is a fifth generation farmer with a current focus on cranberry production;
- Majority of cranberry production in the region focuses on processed cranberries (e.g. cranberry juice, sweetened cranberries and dried cranberries);
- The purpose of the proposed cranberry production facility is to process fresh cranberries locally; and
- The facility has been located to minimize impact to the existing cranberry farm operation and utilize existing farm operation infrastructure in the surrounding area.

In response to questions from the Committee, the applicant provided the following additional information:

- The layout and equipment within the facility is designed specifically to process fresh cranberries;
- The material deposited on the property and proposed to be retained is structural material for the purposes of building the proposed cranberry production facility;
- Tipping fees were not received by the applicant for the deposition of the structural material;
- In order to achieve traceability and food safety standards, impermeable concrete construction is required; and
- It is estimated approximately 10% of the current cranberry production (approximately 10 million pounds) will be fresh cranberries, with an opportunity for growth in the future.

In response to question from the Committee, staff noted that due to the soil importation exceeding 0.1 ha and having received no ALC approval in advance of the importation, the ALC has determined that the applicant must submit a Soil Use for the Placement of Fill Application to the ALC.

Discussion ensued regarding the proposed business plan and association with Ocean Spray, the uniqueness of the proposal as the structural material is required for the construction of the building, and the potential to set a precedent by approving a proposal that deposited material without appropriate approvals.

The Committee passed the following motion:

That the Food Security and Agricultural Advisory Committee (FSAAC) support the Agricultural Land Reserve Soil Use for the Placement of Fill Application at PID 013-082-434 (CD 127964) subject to removal of the structural material deposited on the subject property if the proposed farm building is not approved.

In addition, the FSAAC is concerned with potentially setting a precedent by supporting a proposal that deposited material prior to approval. However, the FSAAC recognize that this is not a typical fill application as the structural material is required for a farm building and is not being used for the farm operation.

Carried
with Lynn Kemper and Cory May abstained

Discussion ensued regarding the proposed size of the cranberry processing facility, the size of the associated farm operation, the origin of the AG1 zone regulations limiting concrete construction, and the fast track process for farmers.

In response to questions from the Committee, staff noted that a Statutory Declaration is required as part of the Building Permit process for agricultural buildings to confirm the use is consistent with Zoning Bylaw requirements.

The Committee passed the following motion:

That the Food Security and Agricultural Advisory Committee (FSAAC) support the Development Variance Permit Application at PID 013-082-434 (DV 21-934707).

Carried
with Lynn Kemper and Cory May abstained

4. Next Meeting Date: July 29, 2021

5. Adjournment

Meeting adjourned at 8:45 pm.

Certified a true and correct copy of the minutes of the meeting of the Food Security and Agricultural Advisory Committee of the City of Richmond held on June 29, 2021.

Laura Gillanders Chair	Steven De Sousa Staff Liaison

GEOPACIFIC CONSULTANTS

1779 West 75 Avenue
Vancouver, BC
V6P 6P2
604-439-0922

Maybog Farms Ltd.
15411 Cambie Road
Richmond, BC
V6V 1T3

July 5, 2021
File:17692

Attention: Todd May

Re: Geotechnical Comments on Preload Stability
4711 No. 8 Road, Richmond, BC

We are in receipt of comments sent by Mike Morin, of the City of Richmond to Maybog Farms, dated June 23, 2021. The proceeding outlines the comment/request provided by the City and our response:

- *Please have the geotechnical engineer provide a memo - signed and stamped - confirming (if it is the case) that the soil deposition that has been conducted to date has not (and will not) negatively impact neighbouring lands, City lands/infrastructure (ie. No. 8 Rd allowance), or other infrastructure (ie. private utilities)*

Based on our geotechnical investigation report dated May 7, 2020, the site soil conditions within the proposed development area consists of a thin veneer of topsoil which is underlain by up to a 6 m thick sequence of overbank silt, which is considered to be of moderate compressibility under the anticipated loading. We expect that the building area will be raised with permanent structural fill and then preloaded.

The proposed permanent fill and preload is located on a vacant piece of farmland, directly north of the existing Maybog Farm warehouse structure, and bound by farm land to the north and west. Based on the information provided to us, the nearest infrastructure is located more than 40 m away from the toe of the proposed preload area, to the east, and consists of an existing irrigation ditch along the Number 8 Road right of way. All existing City and private infrastructure are well outside a generally accepted 2H:1V zone of influence offset from the base of the preload. Thus, we expect that there would be no offsite impact on the existing ditch and Number 8 Road as a result of the preload activity.

We further confirm that from a geotechnical perspective, the permanent structural fill placed below the preload is suitable for supporting the proposed building. GeoPacific must review all foundation subgrade and slab on grade compaction prior to placement of structural elements.

We are pleased to be of assistance to you on this project and trust that our comments and recommendations are both helpful and sufficient for your current purpose. If you would like further details or would like clarification of any of the above, please do not hesitate to contact us.

For:
GeoPacific Consultants Ltd.

Reviewed by:

Zakhar Okunev, BEng., E.I.T.
Project Engineer

Roberto Avendano, B.Eng., P.Eng.
Principal