City of Richmond

Report to Committee

To:	Planning Committee	**Date:**	July 13, 2017
From:	Wayne Craig Director, Development	**File:**	AG 16-734186
Re:	**Application by Sanstor Farms Ltd. for an Agricultural Land Reserve Non-Farm Use (Sand Storage) at 14671 Williams Road**		

Staff Recommendation

That authorization for Sanstor Farms Ltd. to apply to the Agricultural Land Commission for a non-farm use to allow the storage of sand at 14671 Williams Road, be denied.

Wayne Craig
Director, Development

WC:jh
Att. 11

REPORT CONCURRENCE
CONCURRENCE OF GENERAL MANAGER

Staff Report

Origin

Sanstor Farms Ltd. has applied to the City of Richmond for permission to apply to the Agricultural Land Commission (ALC) for a non-farm use for the property at 14671 Williams Road (Attachment 1 – Location Maps). The Agricultural Land Reserve (ALR) non-farm use application proposes to use approximately 5 ha (12.35 acres) of the eastern portion of the site for an outdoor sand storage facility. The remaining 3.3 ha (8.15 acres) of the site is proposed to be improved and used for soil based agricultural production. Attachment 2 indicates the location of the proposed land uses.

This ALR non-farm use application requires consideration and endorsement by Council. If endorsed by Council, the ALR non-farm use application will be forwarded to the ALC for their consideration.

If the non-farm use application is permitted by the ALC, the applicant would have to apply to the City of Richmond to rezone the property to allow a sand storage facility on the subject site, and a Development Permit to address guidelines related to an environmentally sensitive area.

Findings of Fact

A Development Application Data Sheet providing details about the development proposal is contained in Attachment 3.

The current use of the site includes a single-family dwelling near Triangle Road and Williams Road. The western portion of the site is cleared and the eastern portion of the site is a forested wetland, dominated by birch and shrub species.

Mathers Bulldozing, which is a subsidiary of Sanstor Farms Ltd., currently operates a dredged river sand storage facility on lands adjacent to the subject property at 15111 Williams Road. The sand storage facility provides a service to the agricultural community in Richmond by providing salt free river sand to cranberry growers, turf farms, and golf courses. According to the applicant, 25% of their business is from farmers whereas the other 75% of their business is used for non-farm uses such as commercial pre-load for construction sites.

Mathers Bulldozing currently lease a portion of the site at 15111 Williams Road from Ecowaste Industries Ltd. The site is zoned for industrial uses and has been recently approved to redevelop into an industrial logistics park. This redevelopment will result in the eventual displacement of the Mathers Bulldozing depot. Staff have spoken with representatives from Ecowaste Industries Ltd., and subject to the two parties working out an appropriate lease agreement, Ecowaste has advised the use could continue to operate from the Ecowaste property for potentially another 5 years.

The applicant has identified the adjacent subject site as a preferred new location for its sand storage operation because it is close to its current location and existing drainage infrastructure, and is located close to where the river sand is sourced.

Proposed Use

Sand Storage Use: The proposal for the subject property is to use approximately 5 ha (12.35 acres) of the eastern portion of the site for the relocated sand storage facility (Attachment 2). Approximately 150,000 m^3 of dredged river sand would be stored on site with sand piles approximately 5 m (16.4 ft.) high. The footprint of the sand would be approximately 2 ha (5 acres) which is similar to their current operations on the Ecowaste site.

The sand is proposed to be pumped from the Fraser River directly to the site. The dredging infrastructure which is composed of buried and surface input pipe and drainage water conduit are already installed along the western boundary of the existing sand storage facility and would be reconfigured to fit the new site. A detailed engineering review would be conducted by the City, and other relevant agencies, to manage any risks associated with the dredging infrastructure should Council and the ALC approve this non-farm use application.

The area of the property for the sand storage facility would have almost all of the trees and vegetation removed. The surface organic soil would be moved to the adjacent clear area of the property for agricultural purposes. A one to two metre high perimeter berm would be constructed with structural fill built around the sand storage facility to provide isolation from adjacent lands, including the agricultural portions of the subject property. Inside the berm, an intercept drainage canal would be constructed to collect any drainage water from the dredge pumping activity. This water would then be serviced by another pump and piped back into the Fraser River. Inside the intercept canal, a larger berm approximately four to five metres high would be constructed with structural fill to provide containment of the dredged sand. This berm will also provide pre-load stability to the soil to prevent any lateral movement once the sand storage pile is commenced. Water would be used to mitigate dust when it is windy.

As the proposed sand storage use does not have a defined end date, it will impact the site's ability to be used for agricultural purposes. In the event that the sand storage operation is decommissioned, the applicant would reclaim this area for agricultural use. This would involve removal of sand and infrastructure, installation of a sub-surface drainage system, and remediation of the soil, improving it to a Class 2 soil classification. If the non-farm use application is approved by Council and the ALC, staff would secure the proposed soil remediation plan and financial security through the rezoning process.

The site would include proper access for trucks and farming equipment, a scale, an equipment shed, and repurposing of the existing dwelling as an office.

Agricultural Use: The remaining 3.3 ha (8.15 acres) of the site is proposed to be improved and used for soil based agricultural production (Attachment 2). The proposal is to improve this area from a Class 5 to a Class 2 soil classification. This would be done by moving the surface organic soil from the sand storage facility to this area of the subject property, placement of additional subsurface drainage improvements, and improvements to the soil through lime and fertilizer to prepare the soil for a wide range of crops. The soil improvements and subsequent farm plan would be secured through the rezoning process should Council and the ALC approve the non-farm use application.

In BC, the classification system describes seven land capability classes for agriculture (Classes 1 to 7). Class 1 land is considered the best soil for farming with minimal limitations whereas the limitations increase between Class 2 to Class 5 lands. Class 6 and 7 lands have limitations that preclude arable agricultural activities yet are capable of sustaining native and/or perennial uncultivated agriculture.

Surrounding Development

To the North: an "Agriculture (AG1)" zoned property that is largely covered in trees. This property, which is owned by Ecowaste Industries Ltd. is located in the ALR and is part of an upland forest Environmentally Sensitive Area (ESA).

To the East: an "Industrial (I)" zoned property which is proposed to be developed into a multi-phased industrial development (15111 Williams Road). The property is owned by Ecowaste Industries Ltd. and is not located in the ALR. Mathers Bulldozing currently leases part of this property for their current sand storage operations, but will be displaced once construction begins on the new industrial development.

To the South: on the west side of Triangle Road, an "Agriculture (AG1)" zoned property that contains a single detached house, greenhouse farming activity and soil based agriculture. On the east side of Triangle Road, a "Light Industrial (IL)" zoned property that is currently vacant and clear of most vegetation. This site is owned by the City of Richmond.

To the West: an unimproved road right-of-way which is treed and part of an upland forest ESA, and to the west of the road right-of-way is an "Agriculture (AG1)" zoned property containing soil based agricultural activities. The property is located in the ALR.

Related Policies & Studies

2041 Official Community Plan

The subject site is designated as "Agriculture" in the 2041 Official Community Plan (OCP), which permits farming, food production and supporting activities, including those activities permitted in the ALR. Related agricultural policies in the OCP aim to protect, enhance, and "...encourage the use of Richmond's ALR land for farming and to discourage non-farm uses" [Policy j) on page 7-6 of the 2041 OCP].

The proposed outdoor sand storage facility is not consistent with the City's agricultural policies in the 2041 OCP, and therefore requires a non-farm use application to be approved by Council and the ALC. A sand storage facility would be more suited on property that is designated "Industrial" in the 2041 OCP.

Richmond Agricultural Viability Strategy

The Richmond Agricultural Viability Strategy (RAVS), which was adopted by Council in 2003, establishes a long-range strategy for improving the viability of farmland within the City. The RAVS provides a long term vision for the future growth and viability of the agricultural sector in the City, and many of the policies in the 2041 OCP originated from the RAVS. One of several

recommendations in the RAVS is to limit non-farm uses that remove land from agricultural production and to direct non-farm uses to non-ALR lands. The sand storage facility would remove approximately 5 ha (12.35 acres) of land from potential agricultural production, and would not enhance agricultural uses.

Employment Lands Strategy

The 2041 Employment Lands Strategy, which was adopted by Council in 2011, was used in preparation of the 2041 OCP to determine how Richmond can optimize its land base to create a healthy, balanced, diversified and growing economy. With respect to agricultural land, the Employment Lands Strategy indicates that the agricultural land base should be protected and that there is no need to remove land from agricultural production to meet the 2041 Employment Lands Strategy needs.

Zoning – Agricultural (AG1)

The subject property is zoned "Agricultural (AG1)" which provides for a wide range of farming and compatible land uses consistent with the provisions of the ALR. A sand storage facility is not permitted in the AG1 zone. If the proposed non-farm use application is permitted by the ALC, a rezoning application would be required to allow a sand storage facility for the subject site.

Environmentally Sensitive Area Designation

The eastern portion of the subject property (5.39 ha), which makes up 65% of the site, is located within an area that is designated as an Environmentally Sensitive Area (ESA) (Attachment 4). The ESA is part of a 31.4 ha (77.6 acres) freshwater wetland area. The intent of the freshwater wetland ESA is to maintain the areal extent and condition of fresh water wetland preserving vegetation and soils, and maintaining predevelopment hydrology, drainage patterns and water quality. The sand storage facility proposal would have a significant impact on this ESA as most of the vegetation would be removed.

This site is also part of a larger hub site within the Ecological Network Management Strategy (ENMS) that Council adopted in 2015. The ENMS is an ecological blueprint for the preservation of natural land city wide. Through the ENMS the City has committed to protect, restore and connect natural lands and avoid habitat fragmentation.

Any activity or soil disturbance not related to agriculture in this ESA would require a Development Permit (DP). While ESA DPs are considered on a site by site basis, the ENMS focuses at the ecosystem level. The hub that the site is a part of is bordered by existing and potential corridors, and riparian management areas. In the context of private lands covered by DP Areas, the ENMS provides a broader context for how the City assesses natural areas in private lands. As part of the DP application, the applicant would have to assess the impact to the ENMS and identify how those impacts could be mitigated. This will be extremely challenging to accomplish as almost all of the ESA is proposed to be removed.

It is important to note that an ESA DP may be exempt for agricultural activities. To be exempted from an ESA DP, the property owner must prove that they can farm the site, or would be leasing the site to a proven farmer.

Riparian Management Area

A Riparian Management Area (RMA) runs along the south side of the subject property which is part of the Williams Road watercourse. Any impacts to the RMA would form a part of the hydrological and ecological assessment at the DP stage, and the 5m (16.4 ft.) setback would need to be protected from adjacent development as it would be considered industrial land activity and subject to compliance with the Federal Riparian Areas Protection Act, and the Provincial Riparian Area Regulations. Approximately 2,062 m^2 (22,195 ft^2) of site area would be included in the 5 m (16.4 ft.) wide RMA.

Consultation

The subject proposal was reviewed by the City's Agricultural Advisory Committee (AAC), with the following motion supported by the AAC (see Attachment 5 for an excerpt of the July 14, 2016 AAC meeting minutes):

> *That the ALR application as presented to the AAC to allow a sand storage facility on 5 ha of the eastern portion of the site provided that the remaining 3.3 ha of the site is improved for agricultural uses at 14671 Williams Road be supported.*

Staff Comments

Potential Alternative Sites for a Sand Storage Facility

Based on the 2041 OCP and related agricultural policies, an outdoor sand storage facility would be more suited on property that is designated Industrial in the OCP. The property that Mathers Bulldozing currently operates on is designated Industrial in the OCP and is zoned "Industrial (I)". The City's "Industrial (I)" and "Industrial Storage (IS)" zones both allow outdoor storage uses and would allow a sand storage facility. Attachment 6 indicates properties that are designated Industrial in the OCP, and properties that allow outdoor storage uses based on existing zoning.

The applicant has indicated that suitable vacant industrial zoned sites for dredged sand storage are difficult to secure along the Fraser River. Further, the applicant has indicated they would need approximately 5 ha (12.35 acres) of land to support their sand storage business. The applicant has worked with staff from Economic Development and Real Estate to find an alternate site that is large enough, close to the river, and economically feasible. The applicant has also indicated that they have worked with commercial real estate companies, and they have determined that it is extremely difficult to find suitable industrial land along the river for a sand storage facility. Despite these efforts, the applicant purchased the subject property in early 2016 knowing the risks involved in applying for an ALR non-farm use application.

City Real Estate staff recently met with the proponent about the possibility of using two City owned properties at 14940 and 14960 Triangle Road as a sand storage facility. The City owned properties are located across Williams Road from the subject property, on the east side of Triangle Road. The site could accommodate a sand storage facility, subject to rezoning the property from "Light Industrial (IL)" to an appropriate industrial zone.

The City owned properties, which are identified in Attachment 4, would meet the criteria for an outdoor sand storage facility as they are:

- vacant and currently unoccupied;
- not in the ALR, or in an ESA,
- designated Industrial in the 2041 OCP and zoned "Light Industrial (IL)";
- large enough (4.73 ha [11.7 acres]) to accommodate a sand storage facility; and
- near the river sand source and existing dredging infrastructure that the proponent uses at their existing sand storage operations.

City staff presented a lease offer to the proponent, and after considering the terms, the proponent rejected the offer as it was not economically feasible and they expressed concern over the proposed 10 year lease duration. The proponent requested that this application for an ALR non-farm use for the subject property be considered by Council.

At a subsequent meeting with the proponent on July 12, 2017, staff reiterated willingness to revisit the lease discussion given the proponents expressed concern over the term of the lease. City staff also indicated that if a lease arrangement did not provide the long-term certainty required that the City would be willing to consider a potential sale of the City owned properties, subject to Council approval, if the site at 11700 No. 5 Road, which is owned by the proponent, was involved in the transaction (Attachment 7).

Hydro-Geology Assessment

At the request of staff, the applicant submitted a high level overview assessment of the hydro-geology of the subject property (Attachment 8). The report observes that the subject property or adjacent undisturbed sites have not been impacted by adjacent filling activities. Further, the report concludes that the proposed sand storage facility should not have any significant impacts on the hydrogeology of the lands surrounding it so long as the proposed mitigation measures are in place. Mitigation measures would include a berm and canal system surrounding the sand storage facility which would provide effective isolation of the sand storage facility and its activities from adjacent lands, including the agricultural portions of the subject property.

Environmental Assessment

If the non-farm use proposal is approved, the proponent proposes to remove almost all of the trees that comprise of the ESA on the subject property, subject to issuance of an ESA DP. At the request of staff, the applicant has submitted a high level environmental assessment (Attachment 9) of the site to support the non-farm use application and a preliminary tree assessment (Attachment 10). The objective of the environmental assessment was to assess potential mitigation measures to maintain habitat functionality.

Although the applicant proposes to retain remnant vegetation and some narrow corridors that would connect with the larger ESA ecological hub to the north, the proposed sand storage facility would essentially remove most of the existing ESA on the site; this would also occur if the site were farmed. As removal of a significant portion of the ESA would be in conflict with many of the ESA DP guidelines, the applicant would have to consider environmental compensation on

other sites in order to achieve the OCP's policy of net gain, including tree replacement. Even with off-site compensation it is unlikely that a net gain could be achieved. The tree assessment report indicates that the existing forested area is comprised largely of European Birch that are in an advanced state of decline. As the proposal for a sand storage facility would not be exempt from Tree Protection Bylaw No. 8057, a tree removal, retention and replacement plan will be required.

The submitted environmental assessment recognizes that the ESA plays an important role in the ENMA, but also acknowledges that further study is required to assess the impacts of the ENMS. If the non-farm use application is approved by Council and the ALC, this would be reviewed as part of the DP process.

If the non-farm use application is denied, the property owner could farm the entire site. Agricultural cultivation activities including land clearing, field drainage, irrigation, and growing crops are all exempt from the ESA DP guidelines. If the entire site is farmed, this would bring 8.35ha (20.6 acres) of land into agricultural production that is currently fallow. This would be consistent with the 2041 OCPs policies, ALC regulations, and the overall purpose of the ALR to preserve and enhance agricultural land.

To be exempted from an ESA DP, the property owner must prove that they can farm the site, or would be leasing the site to a proven farmer. To demonstrate that the property owner or farmer who is leasing the property is a proven farmer, they would have to submit information indicating they have generated legitimate agricultural income (e.g., government tax records), and this information is to be supplemented by other sources (e.g., a government Farm Number, BC Assessment information, City tax or assessment information).

As part of the ESA DP exemption process for agricultural activities, the applicant would need to submit an approved farm plan and provide security for implementing the farm plan. The applicant has indicated that it would cost up to $300,000 to bring the entire site into agricultural production. This estimate would be revised and secured if the applicant chooses to farm the entire site.

Soil Conditions

According to the applicant's agricultural capability report, the subject property does not contain soil or vegetation which would be typical of a peat bog (Attachment 10). The existing soils have a Class 5 unimproved capability due to poor drainage, high water table, and acidic soil conditions. Any deep rooted crops (e.g., annual or perennial crops) would suffer serious damage. However, shallow rooted crops (e.g., blueberries or leafy vegetables) could be grown if there are some minor improvements that would bring the soil classification to Class 4 (e.g., subsurface drainage improvements, successive applications of lime and excessive irrigation).

The applicant's agricultural capability report indicates that the 3.3 ha (8.15 acres) area that the applicant proposes to farm has been farmed in the past. The proposal is to improve this area to a Class 2 soil classification through the placement of additional organic soil from the area that is proposed for the sand storage facility, additional subsurface drainage and soil improvements. In

the event that the applicant decommissions the sand storage, they propose to reclaim the entire site to a Class 2 soil classification.

Analysis

Option 1: Deny Non-Farm Use Application (*Recommended*)
Staff recommend denying this non-farm use application as a proposed sand storage facility would remove viable farmland from production and such a use should occur on Industrial designated lands. A sand storage facility is not consistent with the following City bylaws and Council adopted strategies:

- Agricultural policies in the OCP which encourages the use of ALR land for farming and discourages non-farm uses;
- Agriculture land use designation in the OCP which is defined as those areas of the City where the principal use is agricultural and food production, but may include other land uses if permitted by the ALC;
- AG1 zone which does not permit an outdoor sand storage facility;
- The Richmond Agricultural Viability Strategy which recommends that ALR lands should be protected and enhanced for farming, and to direct non-farm uses to non-ALR lands; and
- The 2041 Employment Lands Strategy which indicates there is no need to remove land from agricultural production to meet the 2041 Employment Lands Strategy needs.

Staff recognize that the existing sand storage business provides a valuable resource to farmers, and also to non-farmers. However, the purpose of land in the ALR, in the City's Agriculture land use designation, and City's AG1 zone, is to preserve land for agricultural activities, not activities that are accessory or ancillary to agricultural uses such as a sand storage business.

Staff also recommend denying this application as there are alternative sites that could be used rather than utilizing valuable agricultural land. An outdoor sand storage facility would be more suited on industrial designated land, which may be subject to rezoning, or on land that has zoning that already allows outdoor storage. The City's "Industrial (I)" and "Industrial Storage (IS)" zones both allow outdoor storage uses and would allow a sand storage facility. Attachment 6 indicates properties that are designated Industrial in the OCP that have potential to be rezoned for outdoor storages uses, and properties that allow outdoor storage uses based on existing zoning.

The proponent has indicated they cannot find a suitable privately owned or Port owned site due to limited availability and the high costs to either purchase or lease those properties at industrial land rates for a sand storage facility. Further, the proponent has rejected an offer from the City to use City owned land that would meet their siting criteria (e.g., close to river sand source, large enough to accommodate a sand storage facility, not in the ALR). The offer was rejected due to financial reasons reflecting the fact that industrial land has a significantly higher value than agricultural land. Staff are concerned that if the proposed sand storage facility is approved on

ALR land that this could lead to increased speculation on other agricultural land for industrial purposes.

Option 2: Endorse Non-Farm Use Application and Forward to ALC (*not recommended*)
An alternative option is to endorse the non-farm use application and forward it to the ALC for their consideration. If the non-farm use application is permitted by the ALC, the applicant would have to apply to rezone the property to allow a sand storage facility on the subject site, and have a DP issued which addresses the guidelines related to the freshwater ESA.

As part of the rezoning application, the following would be addressed:

- Regulations on the height and volume of the sand piles, in addition to establishing minimum setbacks;
- Registration of a restrictive covenant to secure legal agreements and the final engineering design related to the dredging infrastructure;
- Registration of a restrictive covenant to secure the 5 m (16.4 ft.) RMA buffer along the south side of the property (this would include 2,060 m^2 [22,170 ft^2] of site area), including a riparian management plan;
- Approval of a traffic management plan to ensure public safety of truck traffic;
- Registration of a restrictive covenant to secure dust mitigation measures, and the berm and canal system which may also include financial security;
- Registration of a flood plain covenant, if applicable, identifying a minimum habitable elevation of 3.0 m (9.8 ft.) GSC;
- Registration of a restrictive covenant for soil improvements and a farm plan with a financial security to ensure the 3.3 ha (8.15 ac) area of subject property is farmed; and
- Registration of a restrictive covenant to secure the proposed soil remediation plan and financial security if the sand storage business is decommissioned and reclaimed. This would include removing the sand and infrastructure, installation of a sub-surface drainage system, and remediation of the soil, improving it to a Class 2 soil classification.

As indicated above, a riparian management plan would be required for the industrial portion of the site. For the riparian area along the agricultural portion of the site, farm activity is recognized under the Right to Farm Act and would be exempt from the RMA. However, the City's ENMS supports environmental farm practices that still enhance the form and function of the watercourse. In many cases, riparian setbacks support effective drainage integral to farm activities.

As part of the rezoning process, an ESA DP would be required. As part of the ESA DP process, the following would be required to begin the application review process:

- Impacts, mitigation and compensation measures on the freshwater ESA, including submitting a detailed inventory and conversation evaluation which would include an assessment and recommendations to maintain connectivity to the surrounding ecological network which is part of the ENMS;

- Impacts and mitigation measures on the Riparian Management Area (RMA); and
- Tree removal, retention and replacement plan.

Financial Impact

None.

Conclusion

Sanstor Farms Ltd. has applied to the City of Richmond for permission to apply to the Agricultural Land Commission (ALC) for a non-farm use for the property at 14671 Williams Road. The non-farm use application proposes to use approximately 5 ha (12.35 acres) of the eastern portion of the site for a sand storage facility. The remaining 3.3 ha (8.15 acres) of the site is proposed to be improved and used for agricultural production.

This Agricultural Land Reserve (ALR) non-farm use application requires consideration and endorsement by Council. If endorsed by Council, the ALR non-farm use application will be forwarded to the ALC for their consideration.

Staff recommend that the ALR non-farm use application at 14761 Williams Road to store sand be denied by Council and that Council not forward the ALR non-farm use application to the ALC as this proposal would not be consistent with the City's 2041 OCP agricultural policies, would remove agricultural land out of production, and could lead to increased speculation on agricultural land for industrial purposes. Alternative sites are available, both private and City owned, that are not in the ALR and are industrially zoned which could be suitable for a sand storage facility.

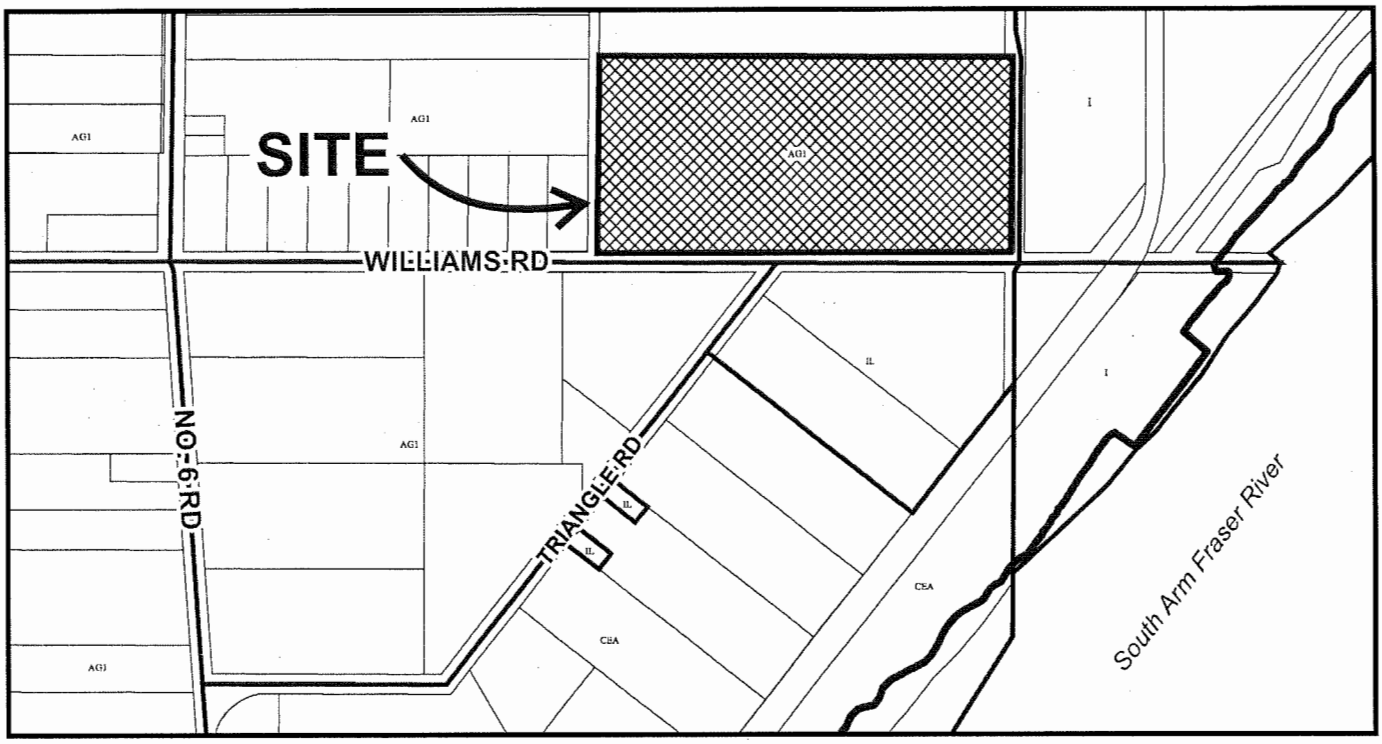
John Hopkins
Senior Planner
(604-276-4279)

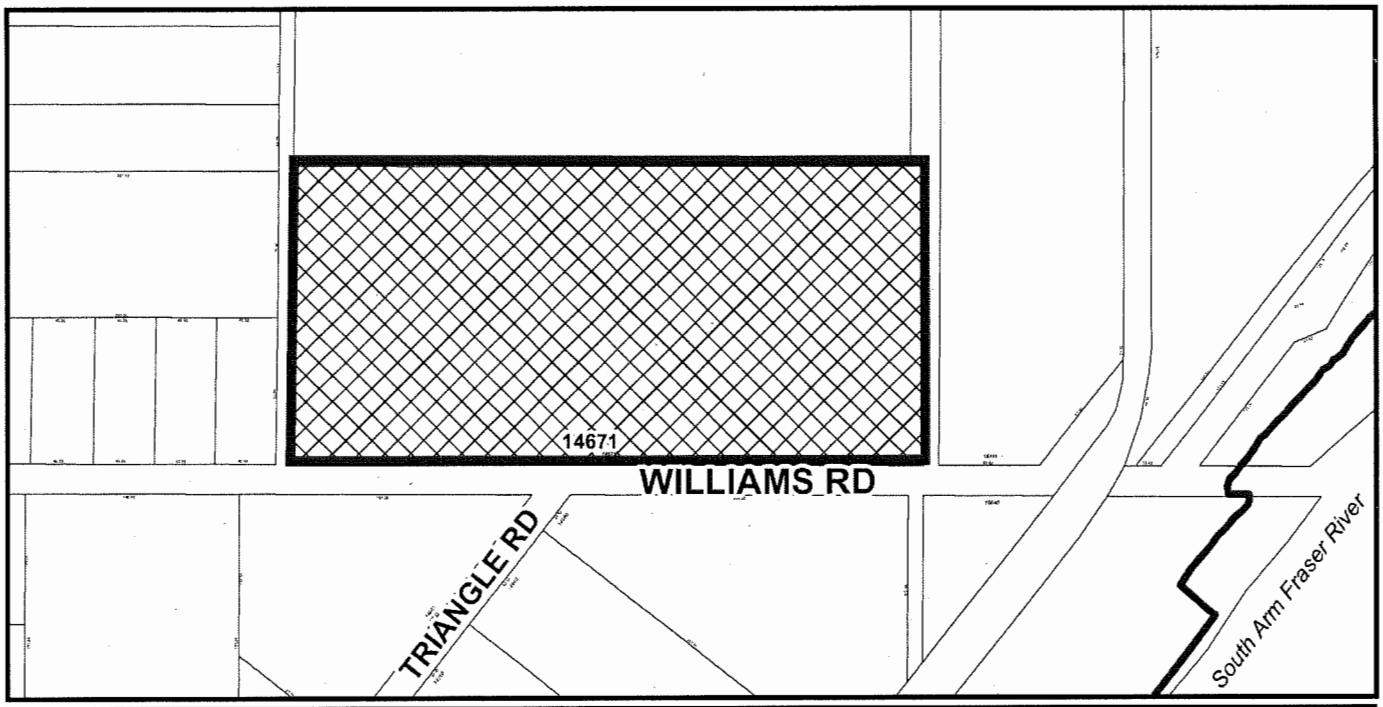
JH:cas

Att. 1: Location Maps
2: Map of Proposed Land Uses
3: Development Application Data Sheet
4: Reference Map for Subject Property, City Owned Lands, and Environmentally Sensitive Areas
5: Excerpt from July 14, 2016 minutes of the Agricultural Advisory Committee
6: Industrial Designated Properties and Properties that Allow Outdoor Storage as a Permitted Use in the City's Zoning Bylaw
7: Map of 11700 No. 5 Road
8: High Level Hydro Geology Assessment prepared by C&F Land Resource Consultants Ltd. dated December 10, 2016

9: Environmental Overview Assessment prepared by Sutherland Environmental Association, Applied Ecological Solutions Corporation, and Strix Environmental Consultants dated February 22, 2017
10: Preliminary Tree Assessment prepared by Arbortech Consulting dated December 14, 2016
11: Agricultural Capability Assessment prepared by C&F Land resource Consultants Ltd. dated April 20, 2016

City of Richmond





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Original Date: 07/04/16

Revision Date:

Note: Dimensions are in METRES

City of
Richmond

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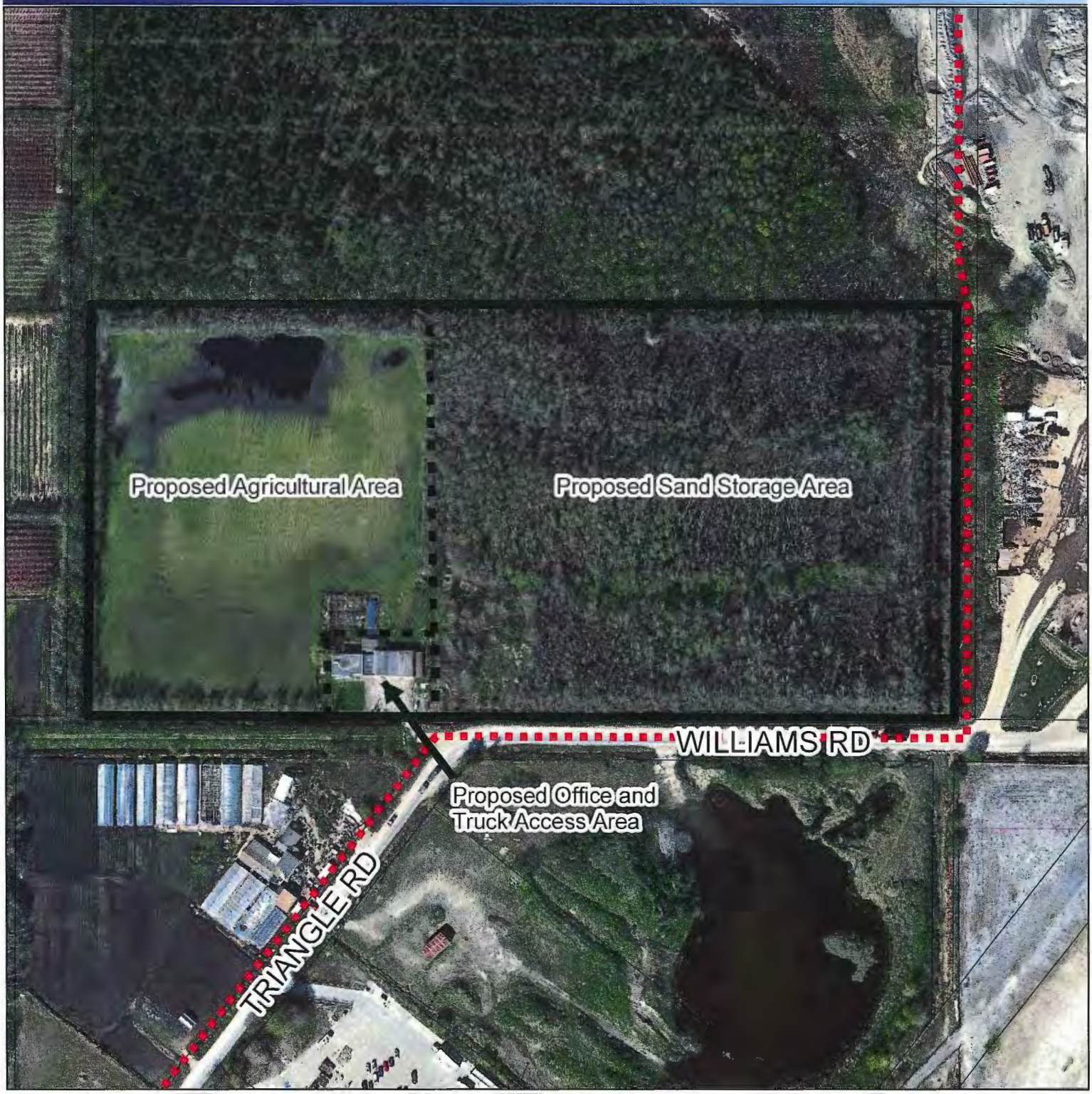
14671 Williams Road: Proposed Land Uses

ATTACHMENT 2



Legend

Subject Property - 14671 Williams Road

ALR Boundary

July 11, 2017
Prepared by Onkar Buttar

Note:
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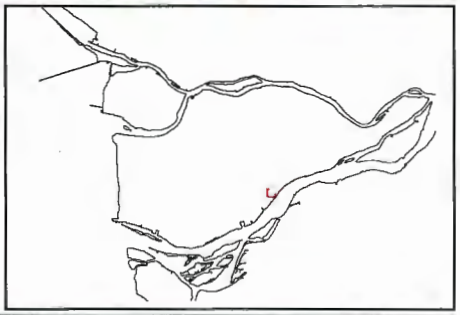

City of Richmond

Development Application Data Sheet

Development Applications Division

AG 16-734186 **Attachment 3**

Address: 14671 Williams Road

Applicant: Sanstor Farms Ltd.

	Existing	Proposed
Owner:	Sanstor Farms Ltd.	No change
Site Size (m^2):	8.3 ha (20.5 acres)	8.3 ha (20.5 acres)
Land Uses:	Single-family dwelling	5 ha (12.35 acres) for a sand storage facility and 3.3 ha (8.15 acres) for agricultural uses.
Agricultural Land Reserve:	In the Agricultural Land Reserve	No change
OCP Designation:	Agriculture	No change
Zoning:	Agriculture (AG1)	No change – will require a site specific text amendment to allow a sand storage facility on an Agriculture (AG1) zoned property.
Other Designations:	Environmentally Sensitive Area (ESA)	Significant impacts to the ESA as a result of the proposed sand storage facility. Will require issuance of an ESA Development Permit.

Richmond

14671 Williams Road

ATTACHMENT 4

Legend

- Subject Property - 14671 Williams Road
- ALR Boundary
- Environmentally Sensitive Areas
- City Owned Industrial Land

July 5, 2017
Prepared by Onkar Buttar

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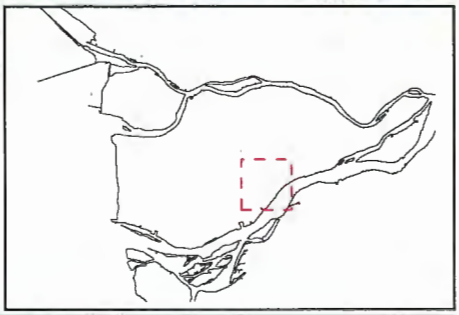


3. Development Proposal – ALR Non-Farm Use Application at 14671 Williams Road

Staff provided an overview of the ALR non-farm use application to use the easterly 5 ha of the subject property for a sand storage facility and to improve the remaining 3.3 ha for agricultural production. The reason for the proposal is that the proponent, which currently operates on an industrially zoned property adjacent to the subject property, will be required to move their operations. This is due to a recently approved development concept for the adjacent property where the business had operated for the past 25 years. The proponent has searched for an appropriate property to relocate their sand storage business, but has had difficulty finding a site that is close to the river and on an industrially zoned property.

The Committee had the following questions and comments:

- In response to whether there were alternative sites for the sand storage, the proponent confirmed that they could not find an appropriate site for their business after consulting with the City of Richmond's Economic Development Officer. Sand is required from the Fraser River to serve local farm businesses. If the business is not located on the proposed site, it may have environmental impacts. If farm businesses were to purchase sand from a vendor located further away, more river and trucking transportation would be required.

- The Committee requested more information about the improvement of soil on the remainder of the site. The proponent explained that there are fertility issues with the existing soil on the site because of its high salinity. If the application is approved, they would improve the soil, grading, and drainage issues. Organic soil at the proposed sand storage location would be transferred to the area that would be farmed. They would ensure that the remainder of the site would be farmed intensively.

- The Committee asked how the sand storage will impact the hydrology of the adjacent field. The proponent noted that no water flows through the neighbouring property as it is located at a higher level from the subject site.

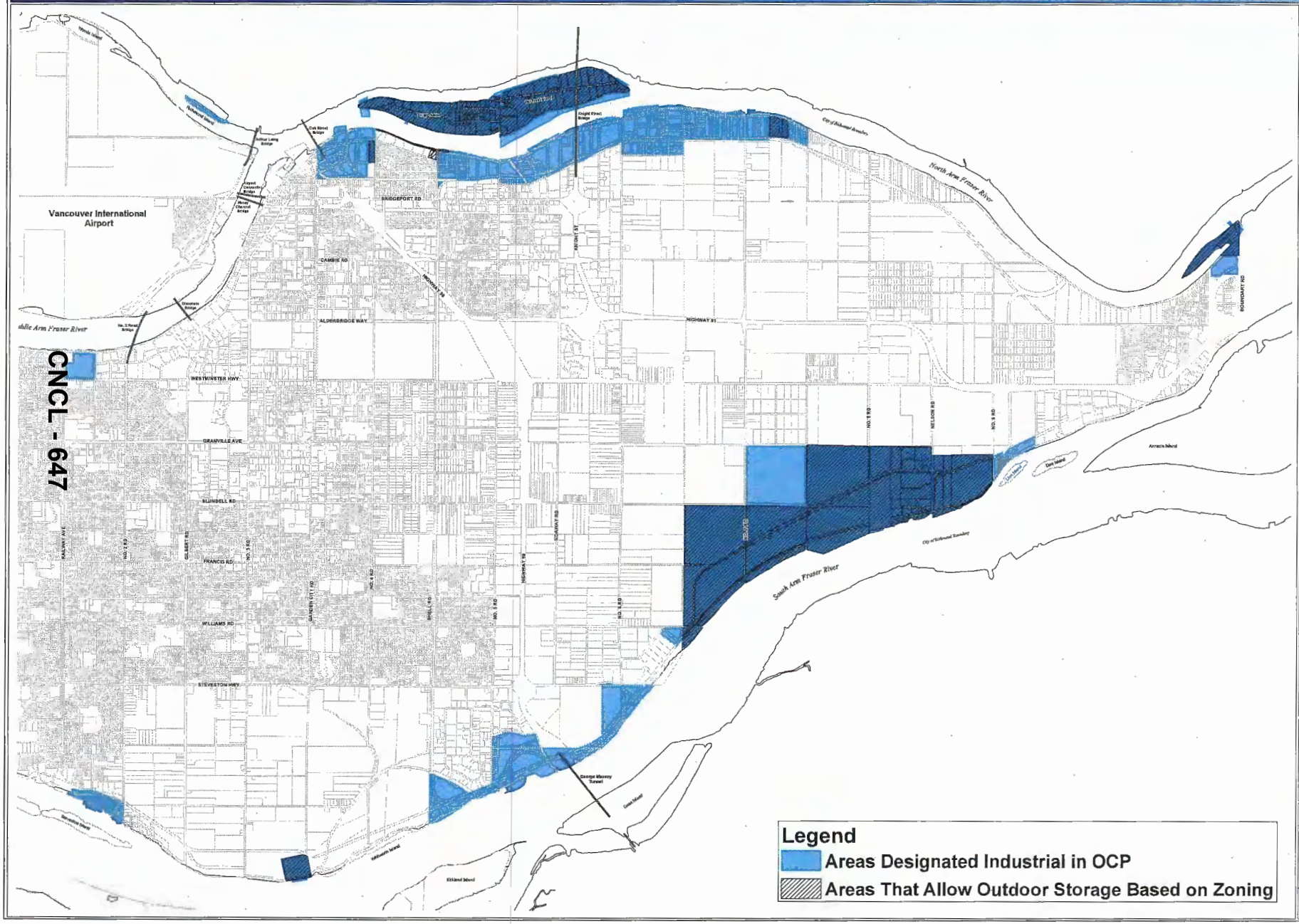
- The Committee asked about the market needs for the sand. The proponent explained that the sand is used to service cranberry bogs and golf courses. The sand is in high demand because of its texture and it is non-saline. It is sold as commercial pre-load and business is viable. The sand stays as permanent fill and is especially needed with the new floodway elevation in agricultural land, for housing, and for structural fill.

The Committee passed the following motion:

That the ALR application as presented to the AAC to allow a sand storage facility on 5 ha of the eastern portion of the site provided that the remaining 3.3 ha of the site is improved for agricultural uses at 14671 Williams Road be supported.

Carried Unanimously

Industrial Designated Properties and Properties That Allow Outdoor Storage as a Permitted Use



June 11, 2017
Prepared by Ordne Botter

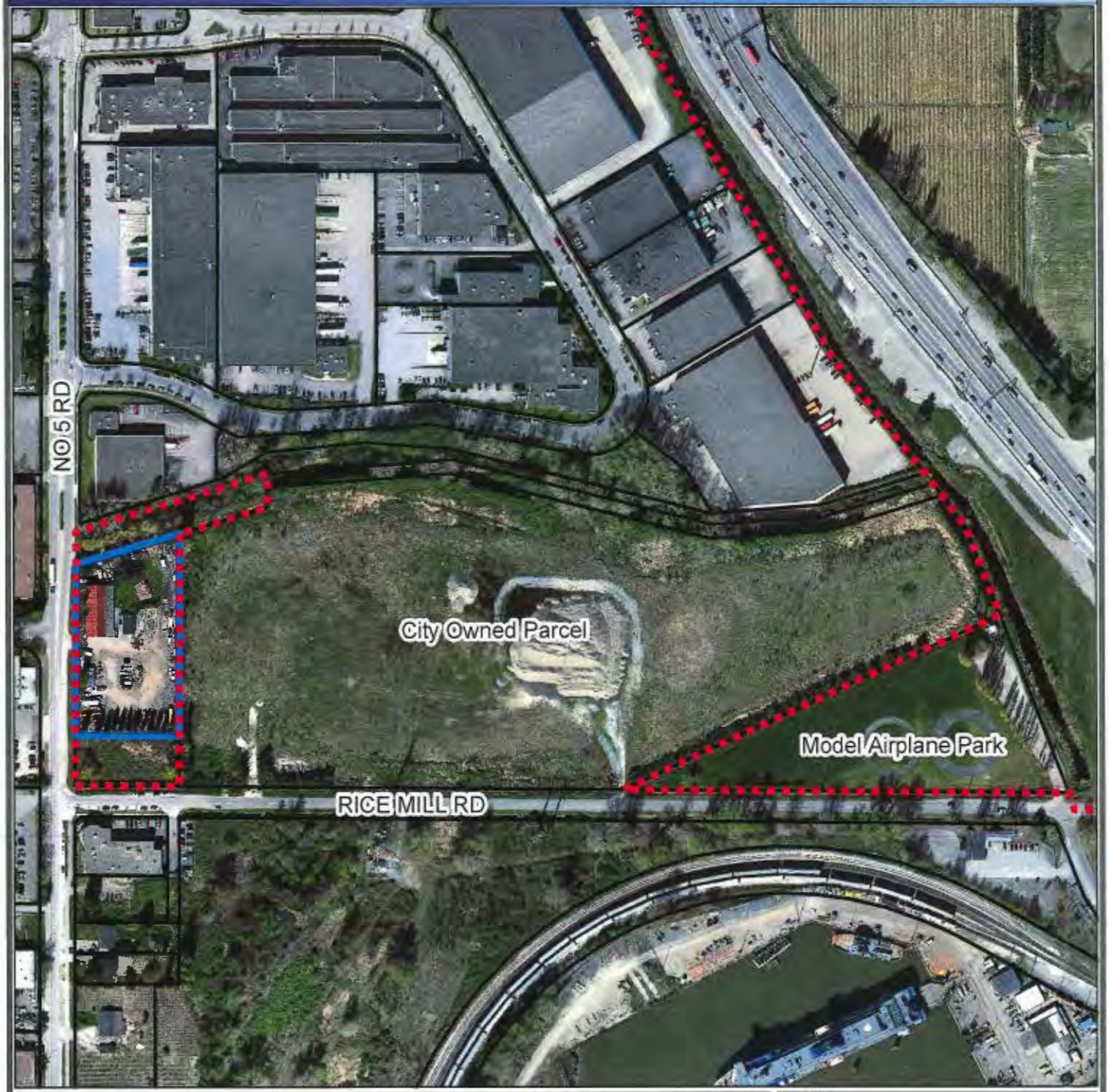
City of Richmond

CNCL - 647

ATTACHMENT 6

ATTACHMENT 7

11700 No 5 Road



Legend

ALR Boundary

Subject Property - 11700 No 5 Road

July 12, 2017
Prepared by Onkar Buttar

Note:
The information shown on this map is compiled from various sources and the City makes no warranties, expressed or implied, as to the accuracy or completeness of the information.
Users are reminded that lot sizes and legal description must be confirmed at the Land Title office in New Westminster.
This IS NOT a legal document, and is published for information and convenience purposes only.

1:3,471

City of Richmond

C&F LAND RESOURCE CONSULTANTS LTD.
4383 Happy Valley Road, Victoria, B.C. V9C 3Z3
(250)474-5072; fax:(250)474-5073; Email: cflrc@shaw.ca

December 10, 2016

Mr. Bruce Mathers
Sanstor Farms Ltd.
11700 Williams Road
Richmond, B.C.

Dear Mr. Mathers:

Re: Request from the City of Richmond for a High Level Overview Assessment of the Hydro-geology on the Property Located at 14671 Williams Road

The City of Richmond has requested submission of a high level (reconnaissance) assessment of the existing hydrology and geologic conditions on the subject lands and surrounding lands together with an assessment of any impacts the proposed sand storage use may have on these conditions.

Brian French, P.Ag. is a registered Agrologist with the B.C. Institute of Agrologists with specific training and experience in soil survey, surficial geology, soil hydrology and land reclamation and is competent to render professional opinion as a Qualified Professional in these areas of expertise. Brian has over 35 years of professional experience in these disciplines and has been qualified as an expert in supreme court hearings.

1. **Surficial Geology**

The surficial geology of the Fraser Lowlands have been mapped by J.E Armstrong in a publication entitled "Surficial and Bedrock Geology of the Fraser Lowland and Coast Mountains near Howe Sound". The mapping associated with this publication is at a very small scale. Lulu Island is mapped as part of the Fraser Delta containing Salish Sediments of shoreline sand and clayey silt; river gravel, sand, clay and silt; peat bogs and swamps. The map does not differentiate any of these parent materials except bog deposits in the NE corner of Lulu Island well removed from the subject property.

The most recent published soil survey information is RAB Bulleting 18: Soils of the Langley - Vancouver Map Area by H.A. Luttmerding, 1981 in six Volumes. Volume 1 maps the subject lands as a complex of Richmond and Annis Soil Series with a narrow sliver of Lumbum - Triggs Series along the north boundary. Volume 3 of the RAB Bulletin 18 describes the parent material of Richmond Series as "40 to 160cm of mainly well decomposed organic materials that overlies moderately fine deltaic deposits.". The parent material of Annis Series is described as "shallow organic accumulations (between 15 and 40cm thick) which overlie moderately fine to fine textured Fraser Floodplain deposits and some lacustrine and deltaic deposits.". Lumbum Series parent material is described as "deep,

partially decomposed, organic deposits at least 160cm thick. .. The underlying mineral sediments are usually either clayey deltaic, silty floodplain or clayey glacio-marine deposits.". Triggs Series parent material is described as "deep (at least 2m) undecomposed organic deposits composed mainly of sphagnum and other mosses.".

I carried out a detailed soil survey and agricultural capability assessment of the northern Ecowaste fill site prior to the filling activity taking place and was able to identify the soil parent materials. This site was subjected to extensive peat harvesting in the past and most of the sphagnum moss had been removed. The remaining peat soils were moderately to well decomposed and were underlain by silty alluvial sediments and blue clay. I also carried out soil survey of the Ecowaste radio grounding site while in the employ of the Agricultural Land Commission and determined that this site was composed of relatively undisturbed coarse peat soils including shallow sphagnum mosses underlain by moderately well to well decomposed peat.

We carried out a detailed soil survey of the subject property at 14671 Williams Road in May of 2016. Our findings confirm that the parent materials on the subject property are generally characteristic of the Richmond Series on the western portion and Annis Series on the eastern portion. We did not find evidence of the deeper Lumbum or Triggs Series on the subject property. In the past, we have carried out detailed soil survey on the northern (ALR) portion of the Ecowaste site and the former AM radio transmission grounding site located immediately north of the subject property and did identify the deeper Lumbum and Triggs soils on these sites as identified in the MOE mapping. The lands immediately east and northeast of the subject property have been subjected to significant filling with inert industrial waste and transient loading from the operation of the current Mathers Bulldozing dredge sand depot. These activities have had a significant impact on the native soil and hydraulic conditions on these lands.

I was involved with the Ecowaste inert industrial landfill site for many years and observed the changes on the soil and hydraulic conditions over time as the filling progressed. Clearly there was evidence of soil dewatering, compaction and settlement as the fills increased in depth and time passed. Impacts on adjacent lands were carefully monitored and there was little or no evidence of lateral or rotational displacement caused by the filling. Similarly, there were no significant changes to drainage patterns on these adjacent lands which could be attributable to the Ecowaste activities. This may be attributable in part to the careful development of a perimeter berm early in the development of the northern fill property which was in the ALR. The filling activity on the southern parcel, including the area adjacent to the subject property, occurred well before I was involved with Ecowaste.

The soil loading which occurs with the Mathers operation is transient as sand is placed and removed on a regular basis. Compaction, dewatering and geodetic settlement has

undoubtedly occurred on the contemporary sand storage areas over the last 25 years but these effects would have been manifested early in the operation. Little if any isostatic rebound would be expected if the sand loading ceased.

We have noted that encroachment of the sand pile has occurred onto the City of Richmond Savage Road right of way. This encroachment extends partially onto the Ecowaste Industries land lying to the west and formerly used as a radio transmission grounding site. A review of historic aerial photography shows that these encroachments have been occurring for at least twenty years without apparent concern or action by either land owner. A series of these photographs with the bounds of the encroachment shown are attached hereto. Bruce Mathers has informed me that they have removed most of the sand spillage from the Ecowaste site and re-exposed the underlying peat soil but a small area is still impacted by the main sand storage pile. The sand pile still encroaches on the Savage Road ROW. A topographic plan showing the 2011 conditions in the affected area of the site is attached.

I attended to a site inspection of the current sand storage area on the Ecowaste site with Bruce Mathers on November 22, 2016. I observed the active dredging and placement of sand on the site. The encroachment onto the Savage Road ROW and the Ecowaste site was observed from the top of the sand pile. Photographs of the site and sand placement operation area attached. Mr. Mathers explained the operation and actions recently taken to remove sand from the Ecowaste site which had spilled periodically in the past when containment dykes had been breached. He indicated that they were in discussion with the City of Richmond regarding a cooperative procedure for rehabilitation of the Savage Road ROW to meet City plans for use of this corridor.

2. Hydrology

The hydrology of the Richmond area is relatively simple. Most of the undeveloped portion of Richmond lies slightly above geodetic mean sea level at +/- 1.0 metres elevation but there are some areas which are depressional at or slightly below 0 metres elevation and some raised bog and recent flood deposit areas which exceed 1.0 metres. Historic peat extraction on the sphagnum peat areas (Lumbum and Triggs Series soils) has resulted in depressional topography on much of this area.

The hydrology of Richmond is strongly influenced by the Fraser River which surrounds the Island. Similarly, the proximity to the Straight of Georgia and salt water influences the hydrology. Virtually all areas of Richmond are protected by earthen dykes and either gravity floodgates or mechanical pumps. The subject property and surrounds are controlled by the No. 6 Road pump station which establishes the local ditch water levels. The subject property is surrounded by open ditches connected to this system. The subject property is at the eastern extremity of the No. 6 Road ditch system. Lands to the east are serviced by the No. 7 Road

ditch. The Fraser River is influenced by diurnal tidal action and a tidal surge and ebb impacts the water table on the Island. Similarly, there is a salt water wedge of heavier sea water which underlies the fresh water flow of the Fraser River and the extent of this salt water intrusion depends on freshet flows and tidal action. In general, the effects of the tidal action and salt water intrusion on the land area of Richmond are controlled by the dykes and isolation provided by the pumps and gravity flood boxes. However, at some times, back flow from the river is allowed to provide irrigation water in the ditches and during extreme freshet events to bolster the dykes against subsurface flows. Careful monitoring of the salinity of the back flow water is necessary in order to ensure that saline water is not introduced into the ditches used for irrigation.

The water levels in the ditches surrounding the subject property are commonly near surface soil levels in the late fall, winter and spring. This makes subsurface drains ineffective as there is little or no drainage invert available. As a result, the land floods early in the fall and dries up very late in the spring increasing the risk of crop loss, delaying planting and increasing the risk of crops drowning from late spring rains. The only way to eliminate this risk would be to install a dyke around the entire property and install a small, local pump station to move the water into the local ditch system.

The subsurface hydrology on the subject property is controlled by the subsoil stratigraphy. The organic soils have a very high water holding capacity and retain all incident rainfall until saturated. The underlying silty subsoils are generally unsaturated with massive structure and have a very low hydraulic conductivity which severely restrict downward water flow. Most drainage of incident precipitation in this situation is provided by overland flow and evaporation. Below the silty clay subsoil layers, generally at less than two metres depth, the subsoil changes abruptly to dense, amorphous sand which is saturated and generally saline. The water in the underlying sands is in a reduced state and contain high levels of Iron in the reduced (Fe^{2+} state) which rapidly oxidizes to the Fe^{3+} state when exposed to oxygen at the surface. The salinity and iron staining conditions render the ground water in most of Richmond unsuitable for either domestic or irrigation use.

3. Impacts of Proposed Sand Storage Facility on the Soils and Hydrology

The proposed sand storage facility will have an impact on the footprint of the facility. The land will be cleared and the organic layer stripped and moved to the adjacent cleared and farmed area in order to improve the soil and drainage conditions on this land. A 1 to 2 metre high perimeter berm constructed with structural fill will be built around the perimeter of the sand storage facility with its outside toe set back from any required buffers. This berm will provide isolation from adjacent lands. Inside the berm, an intercept drainage canal will be constructed to collect any stray drainage water which might escape during the dredge pumping activity. Inside the intercept canal, a larger berm some 4 to 5 metres high will be

constructed with structural fill to provide containment of the dredged sand. This berm will also provide pre-load stability to the soil to prevent any lateral movement once the sand storage pile is commenced. Under normal dredge pumping circumstances, all the dredge water is collected in a local settling pond within the inside bermed area and pumped back into the river through a backflow pipe. Any transient water collected in the canal will discharge into a settlement pond which will be serviced by another pump connected to the main discharge pipe into the Fraser River. The berm and canal system will provide effective isolation of the sand storage facility and its activities from adjacent lands, including the agricultural portions of the subject property.

Experience obtained from the contemporary Ecowaste filling activity provides an ability to predict any impacts of the proposed sand storage facility on surrounding lands. The surficial geology on the subject property proposed for sand storage will allow for a predictable influence on the underlying soils and hydrology. With the organic layer removed from the site the base for the working area containing the access road, scales, office and truck marshaling area will be pre-loaded with approximately two metres of sand capped with road mulch or asphalt. Minor settlement can be expected with a two metre pre-load as the silt layer and the underlying sand is dewatered. The area proposed for sand stockpiling will be exposed to a pre-load surcharge of up to eight metres for intermittent periods. Settlement on this area will be more significant but is limited by the dense packing in the underlying sands. Most of the settlement will be from dewatering of the sand pore spaces.

In terms of impact on surrounding lands, including the proposed agricultural use on the subject property, the lateral impact of this use should be minimal because the direct impacts are imparted to relatively stable unstructured silty clay and massive sand soils. These soil types are not subject to the lateral displacement effects exhibited in blue clays and deep organic soils when put under load. The resultant loads from pre-load on these silty clay and sand soils are generally in the normal or vertical direction with minimal forces directed laterally. This has been borne out by the historic experience on the filled lands to the east. There will be a change in the hydrology directly under the pre-loaded areas as the soils become dewatered to variable depths. However, there is little evidence that the inevitable dewatering which has occurred on the Ecowaste site has had any noticeable effect on the water table or drainage on the adjacent lands to the west. There is a cranberry bog immediately west of the Ecowaste fill site and immediately south of the Country Meadows Golf Course filled area; and the bog is performing well right up to the property line. Cranberry bogs are probably the most sensitive agricultural use in terms of water control and grade control. By increasing the topsoil depth on the agricultural portion of the subject property, any unlikely drainage impact would be mitigated. There may be a short term instability in the local water table as the preload and dewatering takes effect but this is expected to stabilize rapidly as ground water is very mobile in the underlying sands.

A report entitled "Overview Environmental Assessment Terrestrial and Wetland Ecology" has been prepared by Phil Sutherland of Strix Environmental Consulting. Mr. Sutherland concludes that the subject site exhibits very limited environmental value and does not include sensitive Sphagnum Bog habitat. He notes that sphagnum bog vegetation exists to the north of the proposed sand storage area. The area immediately north of the proposed sand storage area was cleared of all vegetation some 36 years ago to facilitate an AM radio transmission grounding field. Some regrowth of vegetation has occurred since this facility was abandoned some years ago. The original bog vegetation with late seral to climax vegetation including Shore Pine is limited to the area immediately north of the agricultural area. It is very unlikely that the changes to the soils, ground water regime or drainage which may be caused by the sand storage facility would influence this bog area so long as the perimeter intercept drainage channels are installed and setback buffering is provided on the north boundary of the proposed sand storage area.

While historic encroachment onto adjacent lands has occurred on the current Mathers Bulldozing sand storage site, the proposed new site will be designed and built with protections against any encroachment outside the bounds of the facility either by sand material, water or lateral impact. As noted earlier, Mathers Bulldozing has indicated that it will work with the City of Richmond to rehabilitate the area of the right of way encroached upon and ensure that the Ecowaste western property has any residual sand removed.

4. **Decommissioning Of the Site if Facility is Closed**

A decommissioning and land rehabilitation plan has been discussed in our Soils Report. Because the depth of silty clay subsoil underlying the preload is relatively thin, aggressive subsoiling will be able to re-establish drainage pathways and loosen the compacted soil. In fact, the subsoil conditions may be enhanced from the current compacted state. Isostatic rebound of the dewatered underlying sand is uncertain but some rebound may be expected as the sand becomes re-watered and pore pressure increases. However this effect, if any, will be minimal. The target rehabilitated elevation is 1.0 metre geodetic and will be made up with river sand. While the growing medium will be different than the original shallow organic over silty clay profile, a significant depth of compost will be added to the surface sand to create a well drained and fertile growing medium. Ground water in this area is unsuitable for irrigation and disturbance of the underlying aquifer is irrelevant for agricultural or domestic use. Any possible displacement of the aquifer caused by the proposed facility would be overshadowed by the current and historic impact caused by the massive filling activities resulting at the Ecowaste and Former Vancouver Landfill sites to the east. Also, significant filling has occurred on the Country Meadows Golf Course to the north.

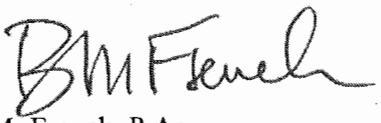
5. **Summary**

The surficial geology of the subject property would be relatively immune to causing lateral impacts on surrounding lands as a consequence of having the sand storage facility located on it. Minor settlement and displacement of ground water is expected when the pre-load surcharges are experienced. These impacts should be very localized and not extend beyond the boundaries of the use. The aquifer underlying this site has no utility for domestic or agricultural use. The terrestrial environmental study by Phil Henderson describes the vegetative and habitat values on the subject property and surrounds and concludes that sensitive bog vegetation and habitat is limited to the area northwest of the proposed sand storage site. As noted, lateral impacts on the surficial geology and aquifer are unlikely to impact this distant site. The mature bog vegetation immediately north of the proposed agricultural improvement area will be buffered with a low berm along the north property boundary of the subject property to maintain the current depressional topography and seasonal flooding to the north.

The extensive filling which has occurred on the lands to the east together with filling on the lands to the south and southwest of the subject property and further north at the Country Meadows Golf Course have already impacted the surficial geology and hydrology of the area. The subject property or adjacent undisturbed sites have not been impacted by these filling activities and it can be deduced that similar loading as proposed with the sand storage facility on the subject property should not have any significant impact on lands surrounding it so long as the proposed mitigation measures are in place.

Yours very truly,

C&F LAND RESOURCE CONSULTANTS LTD.

Per: 

Brian M. French, P.Ag.

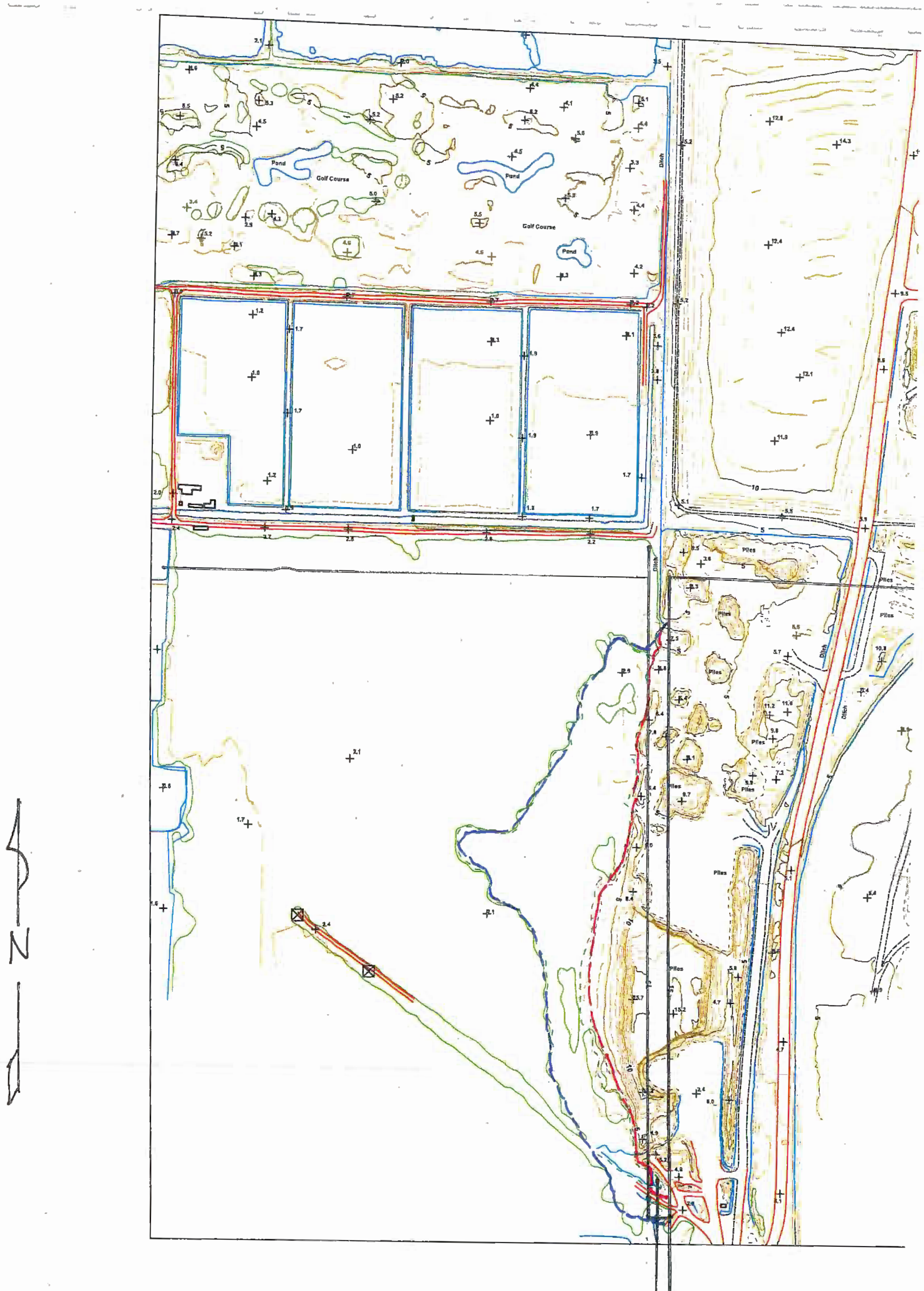
2016 Photo

LEGEND

- Sand encroachment
- Vegetation impact

N

City of Richmond Interactive Map



MATHERS BULLDOZING / ECOWASTE SITE
2011 TOPOGRAPHIC SURVEY.

LEGEND:

- - - Sand encroachment
- - - Vegetation impact

City of Richmond Interactive Map

Legend

- Major Street Names2
- Parks
- Strata
- Property
- Aerial Photo 2011

2011 PHOTO

Legend

- Sand encroachment
- Vegetation impact

N

183.4 0 91.72 183.4 Meters

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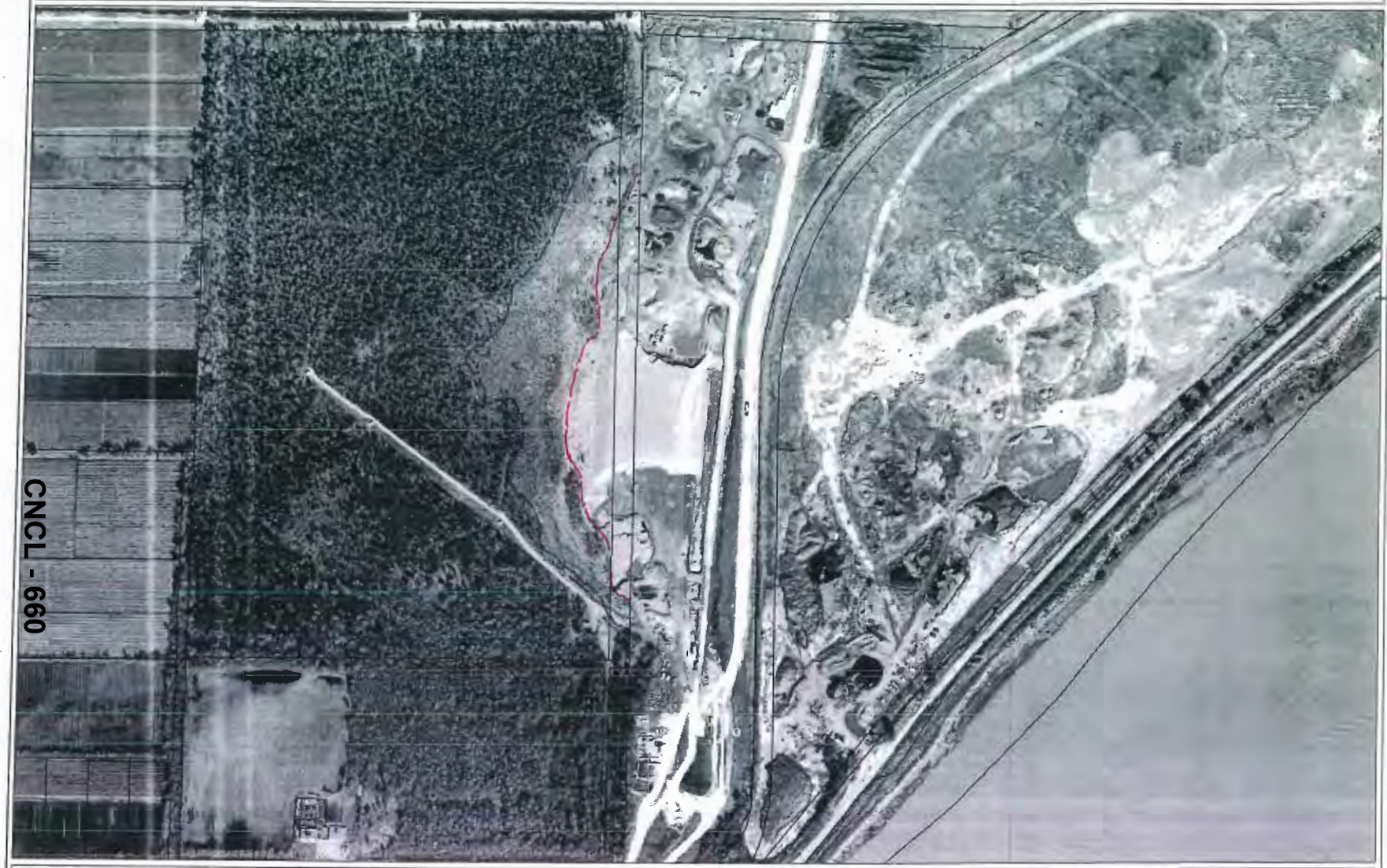
City of Richmond Interactive Map



Legend
- Major Street Names2
- Parks
- Strata
- Property
- Aerial Photo 2009

2009 Photo

Legend
- Sand Encroachment
- Vegetation impact

N

183.4 0 91.72 183.4 Meters

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City of Richmond Interactive Map

Legend

- Major Street Names2
- Parks
- Strata
- Property
- Aerial Photo 2007

2007 Photo

Legend

- Sand encroachment
- Vegetation impact

N

183.4 0 91.72 183.4 Meters

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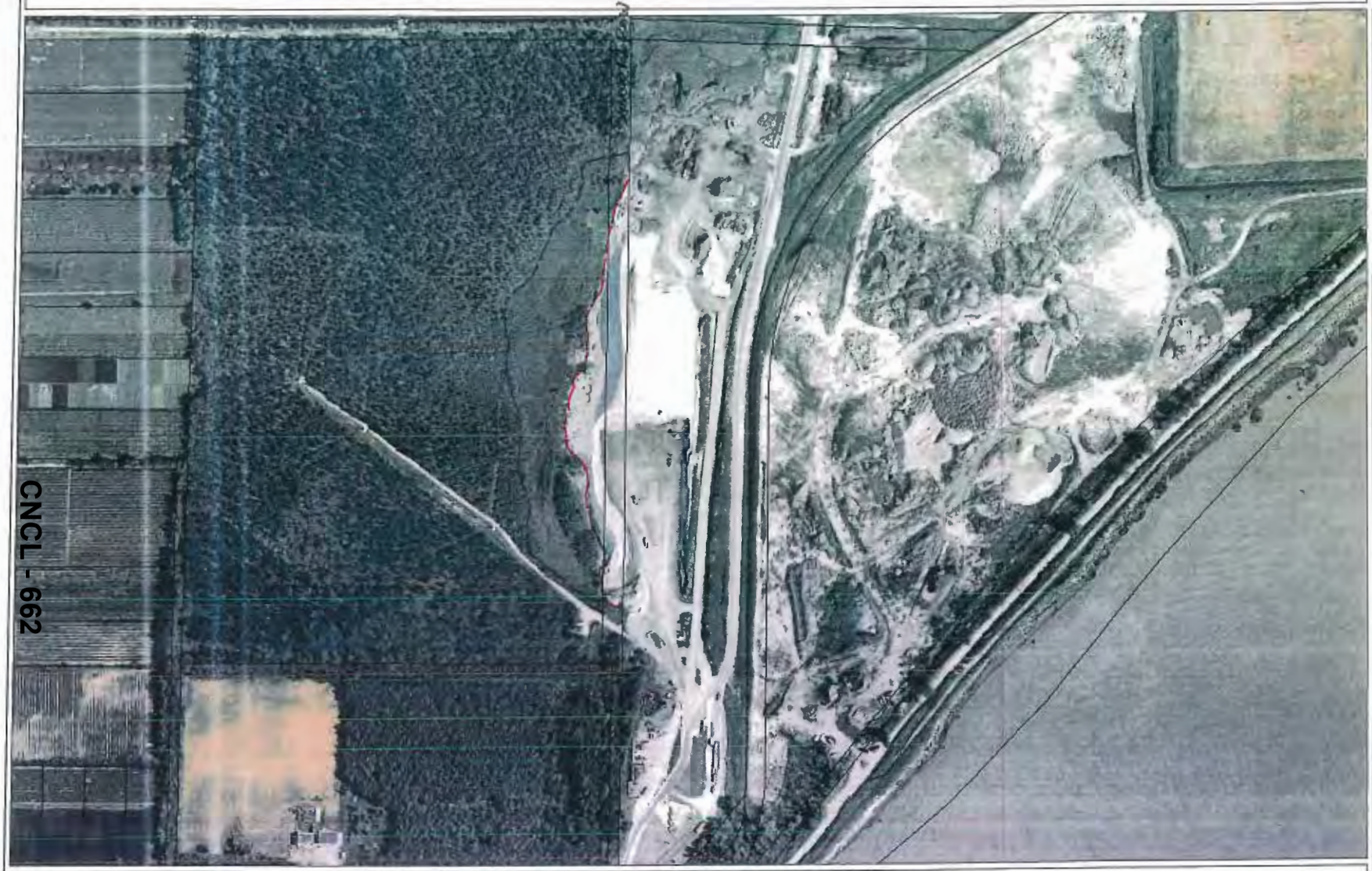
City of Richmond Interactive Map



Legend

- Major Street Names2
- Parks
- Strata
- Property
- Aerial Photo 2005

2005 PHOTO

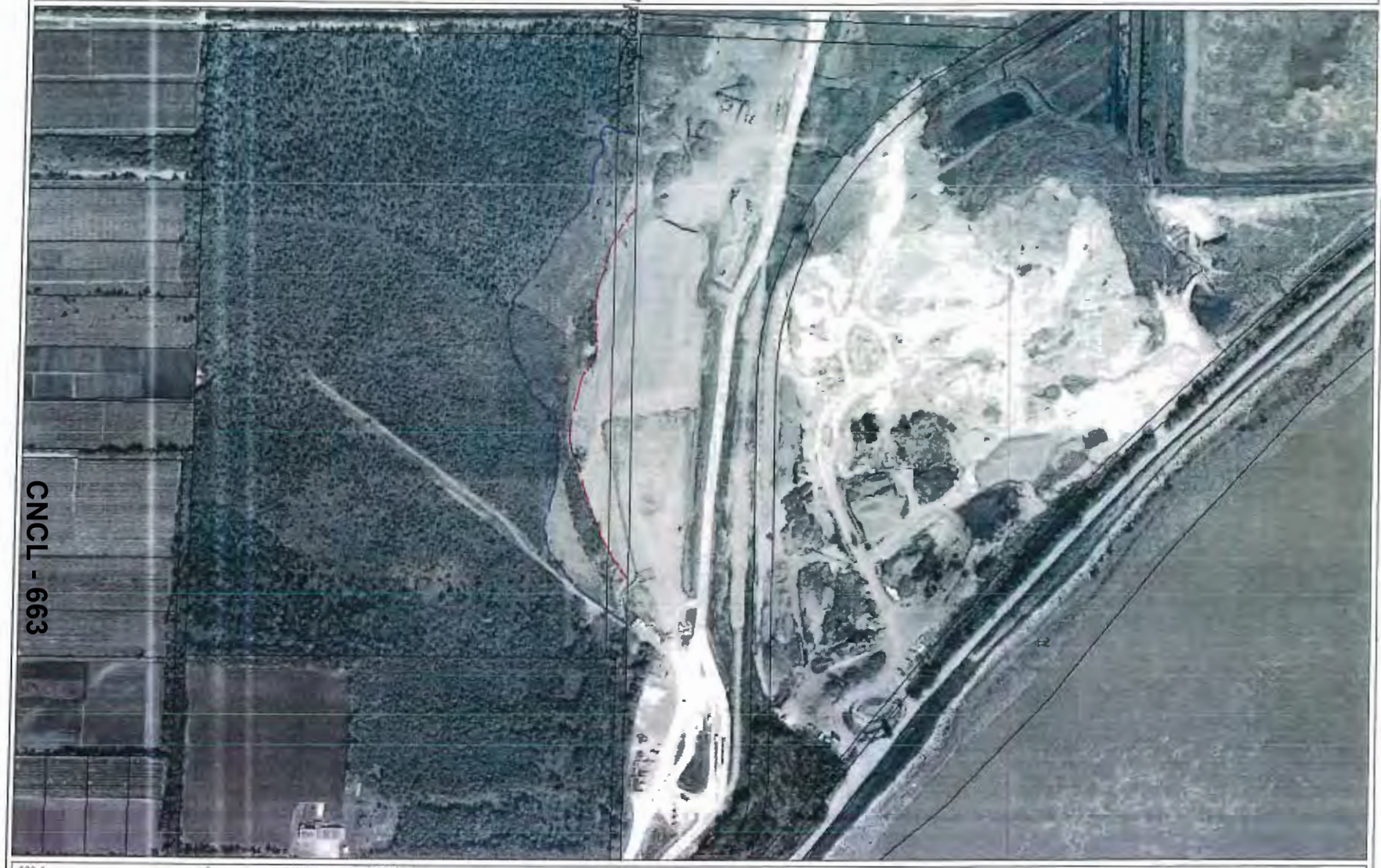
Legend

- Sand encroachment
- Vegetation impact

N

183.4 0 91.72 183.4 Meters

City of Richmond Interactive Map



Legend

- Major Street Names2
- Parks
- Strata
- Property
- Aerial Photo 2002

2002 PHOTO

LEGEND

Sand encroachment

Vegetation impact

N

183.4 0 91.72 183.4 Meters

MAY 1998 PHOTO.

LEGEND

- - - Sand encroachment

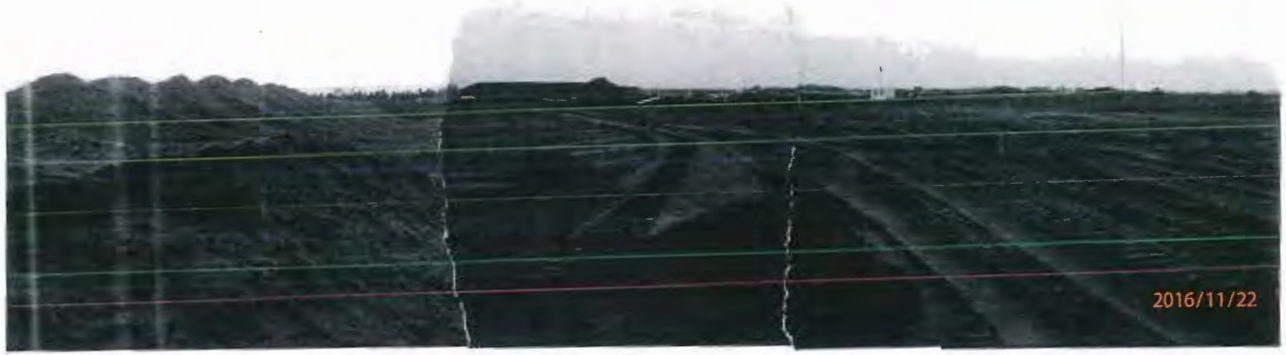
- - - Vegetation Impact

MATHERS BULLDOZING - DREDGE SAND STORAGE FACILITY: November 22, 2016

S↑ N↑

Pan view of sand stockpile along Savage Road ROW alignment

NNW↑ E↑



Pan view of sand stockpile with new dredge sand

MATHERS BULLDOZING - DREDGE SAND STORAGE FACILITY: November 22, 2016

Pan view of dredge drainage water sump and pumping return to River

Dredge vessel in Fraser River unloading to Mathers site

dge discharge and return water lines

dge discharge and return lines crossing Triangle Road to Mathers

ENVIRONMENTAL OVERVIEW ASSESSMENT

14671 WILLIAMS ROAD RICHMOND, BC

- FINAL (REVISION 1) -

Prepared for:

Bruce Mathers
Sanstor Farms Ltd.
11700 No. 5 Road
Richmond, BC V7A 4E7

Prepared by:

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Strix Environmental Consultants
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AESC Project No. 216-012-1

February 22, 2017

TABLE OF CONTENTS

FINAL REPORT (REVISION 1)

This report revision addresses Final Report comments submitted by the City of Richmond. These comments are addressed as follows:

1. Addendum 1 at the end of the main report text addressing the City comment regarding the Ecological Network.
2. Revised wording to replace all references to the term 'ditch' with 'channelized watercourse' addressing the City comment regarding report terminology.
3. Revisions to Section 6 (Implications of the Riparian Areas Regulation) to better define the Regulation use of the term 'ditch'.

This Final Report (Revision 1) supersedes the report entitled:

Overview Environmental Assessment – Final – 14671 Williams Road, Richmond BC. Dated November 25, 2016.

1. INTRODUCTION

Applied Ecological Solutions Corp. (AESC), Sutherland Environmental Associates and Strix Environmental Consulting have completed an aquatic and terrestrial overview assessment of the above referenced property as required by the City of Richmond (City) to provide supplemental information in support of a land use application of this site. Specifically, the City requires this assessment to provide environmental context to the proposed land use of the subject property as it pertains to the existing City ecological mapping and potential environmental constraints.

The Proponents and study team are aware of encroachments into the Environmentally Sensitive Area on the property immediately north of the study area.

2. STUDY AND REPORT CONTEXT

Project Team

The following environmental team members contributed to this report:

Reporting and Compilation	Aquatic Overview Field Investigations / Reporting	Terrestrial Overview Field Investigations / Reporting
Craig T. Barlow, R.P.Bio., QEP Applied Ecological Solutions Corp.	Duncan Sutherland, MRM, R.P.Bio. Sutherland Environmental Associates	Phil Henderson, R.P.Bio. Strix Environmental Consulting

Field Review

This report relies heavily on an aquatic and terrestrial field review completed jointly on November 3, 2016. Field review was completed on foot utilizing available access points. Attending a portion of the field review was Brian French (C&F Land Resource Consultants Ltd.) and John Mathers (landowner representative).

Interpretation

Information and professional opinions provided in this report are based wholly on the following:

1. Observations and findings resulting from the field review conducted (with Brian French, P.Ag., C&F Land Resource Consultants Ltd.)
2. Review of available online ecological and drainage information archived on the City Interactive Mapping[1],
3. Review of available regulatory aquatic information from the following information online resource queries:
   a. Habitat Wizard[2],
   b. Fisheries Information Summary System online fish presence and habitat database[3],
   c. BC Conservation Data Centre[4] (vegetation and wildlife component only).

1 http://map2.richmond.ca/Html5Viewer_2_0/Index.html?viewer=RIM
2 http://maps.gov.bc.ca/ess/sv/habwiz/
3 http://www.env.gov.bc.ca/fish/fiss/index.html
4 http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/data-reporting/conservation-data-centre

3. SUBJECT PROPERTY LOCATION / STUDY AREA, LEGAL DESCRIPTION, CURRENT LAND USE & PLANNED USE

Subject Property Location / Study Area

The study area is located on the north (right) bank of the south arm of the Fraser River, approximately 2 km east of Highway 99 (Appendix 1 – Figure 1).

Review of the air photo of the surrounding area immediately north of the study area (Figure 1) showed that there has been some encroachment of the sand storage pile onto the adjacent road right-of-way and the Ecowaste former radio tower site. We understand from the landowner that this encroachment has occurred for many years (as evident in Google Earth historical imagery dating back to 2000) with the knowledge of both the City and Ecowaste without issue.

Recently, Mathers Bulldozing have cleaned up a lot of the sand from the Ecowaste site down to the underlying peat. It is our understanding that negotiations are ongoing with the City regarding ceding additional right-of-way on the subject property. This would involve an agreement regarding removing some or all of the sand on the right-of-way. We did not considered it within the scope of this overview assessment to evaluate the environmental impact of the historic encroachment on vegetation at this time. If the project advances, further assessment may be warranted.

Legal Description

The subject property legal description is as follows:

Address	**Primary Use**	**Legal Description**	**Total Property Area** (hectares)	**Approximate Property Development Area** (hectares)
14671 Williams Road	Forested	Property Roll 029341420; PID No. 003-464-504	8.35	5.00

Current Land Use

A portion of the overall 8.35 ha property is currently utilized as a farm and residence. The 5.0 ha portion of the property related with this overview assessment is currently forested, primarily with hydrophilic plant species, most notably birch and shrub species.

Planned Use

Two land use options for the subject property are being considered. Both are pending the outcome of the City permitting process.

The preferred option is to use the property for sand storage in a similar manner that is currently occuring at the Ecowaste site (Appendix 1 – Figure 1). Alternatively, the land may be cleared and converted to agricultural land. Neither of these proposed land uses included encroachment into or impact on the perimeter channelized watercourse network.

4. ENVIRONMENTAL CONTEXT / FINDINGS

Aquatic

Existing Aquatic Condition

The subject property has a generally low lying, flat topography consisting of previously cleared land, now treed, and cleared land used for farming activities. The subject property is covered with scrub Birch and other moisture tolerant species. The entire property is surrounded by channelized watercourses.

Drainage Overview

The subject property is dominated by a very high water table as evident during the site review (Appendix 2 – Photos 1 & 2). The property as a whole is surrounded by expansive low gradient perimeter channelized watercourses (Appendix 1 – Figure 2; Appendix 2 – Photos 3 & 4) that provide overall drainage of the area.

The linear nature of the channelized watercourses surrounding the property clearly exhibit conditions that suggest they are excavated drainages with the intent of providing positive drainage to the Fraser River (Appendix 2 – Photos 3 & 4). Based on the cursory site overview, these channelized watercourses drain to the roadside channelized watercourse along Williams Road (Appendix 2 – Photos 5 & 6).

The wide east side channelized watercourse appears to flow both north and south depending on water elevations. Both the channelized watercourses along the north perimeter and the south edge along Williams Road drain to the west with the north channelized watercourse turning south at the properties northwest corner then flowing south to join the Williams Road channelized watercourse.

Water flows west along the Williams Road right of way to No. 6 Road channelized watercourse, discharging runoff water south to the Fraser River and a Lift Station at the corner of Steveston Highway and No. 6 Road (Appendix 1 – Figure 1).

Fish Habitat Requirements

For salmonid fish species (i.e. salmon, trout and char), streams must exhibit requisite minimum habitat characteristics to support salmonid fish species during any time of the year. They are:

- Fish passable upstream access to habitat from the marine environment,
- Reliable and persistent flows of clean, well-oxygenated water during any period of the year when fish are likely to use the habitat. This includes dissolved oxygen and pH levels within the thresholds requried to sustain anadromous fish species. The likelihood of acidic groundwater conditions associated with the underlying peat makes water quality inhospitable to anadromous fish species.

  Anadromous (sea run) fish species access streams seasonally during spawning. Depending on the fish species, use of freshwater stream habitats may be only for spawning, egg incubation and immediate migration of emergent fry to the marine environment upon hatching (e.g. Pink Salmon). Others, such as Coho Salmon, remain in fresh water for over one year such that they require viable habitat conditions for overwintering and summer rearing life stages. Resident fish species (those that spend their entire life cycle in fresh water) require reliable perennial flows year round.
- Suitable spawning habitat consisting (generally) of a graded mixture of fine through coarse gravels and cobbles, through which well-oxygenated water can percolate throughout the egg incubation period.
- Protective deep-water refuge consisting of instream complexity, depth to escape from warmer surface temperatures during summer rearing, and overhanging vegetation for emergent fish to

avoid predation. This condition is also required to moderate temperatures to ensure temperatures remain within the threshold for survival.

Some coarse (non-sport) fish species, such as Threespine Stickleback, Pumpkinseed Sunfish, Carp spp. and Goldfish spp[5] etc. are extremely tolerant of persistent, poor water quality conditions. As such, they can survive in water quality conditions that are lethal to salmonid fish species. In particular, during the warm summer months when recharge with clean water is extremely limited, water quality in the subject channelized watercourses is anticipated to be inhospitable to salmonid species of any life stage.

Fish Access to Subject Property Channelized Watercourse Network

For salmonid fish species to utilize the channelized watercourse network at and in the vicinity of the subject property, there must be unobstructed access to the channelized watercourses from the Fraser River for the life stage utilizing the habitat. In this case, there is no spawning habitat available within the channelized watercourse network, which precludes use by spawning adult anadromous salmonids. Furthermore, use during the summer period is extremely unlikely given the likelihood of degraded water quality (i.e. dissolved oxygen levels lethal to salmonids).

Depending on the design of the lift station (near the subject property; Appendix 1 – Figure 1) through which the subject channelized watercourses discharge to the Fraser River, these can be impassable to fish movements unless designed with the purpose of providing safe fish access. It's unknown at this time if this facility is fish passable.

In other areas of the lower Fraser River (e.g. Serpentine River), canal pump stations using an Archimedes-type screw to move water are designed with fish passage in mind. Unless similar fish passage technologies are incopororated into the lift station design, it is unlikely that fish passage is possible without causing fish mortalities. Alternatively, the only other likely way for fish to access this habitat would be by way of surface connected discharge points.

Finally, Coho Salmon juveniles seek out low velocity off-channel refuge areas along their natal stream in which to overwinter. During this life stage, Coho specifically access such habitat to avoid high velocity stream corridors that are prevalent during the winter high flow period. At this site so near to the marine estuary of the Fraser River, out-migrating Coho smolts are sufficiently near the transition to the marine environment that is it unlikely they would seek out off-channel habitat. Instead, they would complete the downstream migration to the marine environment and remain in the fringe areas of the Fraser River estuary to complete their adaptation to marine conditions.

Anticipated Fish Bearing Status

There are no records on any regulatory database on the fish bearing capabilities or status of the channelized watercourses surrounding the subject property.

As this report is an overview assessment only, completion of intensive fish presence / absence sampling or any other aquatic inventory is neither justified or recommended at this time. As such, no fish sampling was conducted in the preparation of this report.

In consideration of the field observations described above and our understanding of fish habitat requirements for salmonids, the perimeter channelized watercourses and lateral flood areas within the subject property do not exhibit critical habitat elements described above to support salmonid fish species at any life stage. While coarse fish species may have colonized these channelized watercourses, these freshwater species are not a consideration under the *Fisheries Act*.

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5 While there are no fish presence records suggesting Carp and Goldfish are present in the subject channelized watercourses, the author is aware that these introduced species have aggressively colonized other streams in the lower Fraser River (e.g. Serpentine River and connected low gradient tributaries including Magnan Creek). These streams have water quality and habitat conditions that are likely similar to the channelized watercourses within the subject property. As such, it is possible that these invasive species may occur in the subject channelized watercourses.

Vegetation and Wildlife

The following information has been excerpted from the terrestrial report prepared by Strix and included in Appendix 3. Please review this report for a complete understanding of the terrestrial condition at the subject property.

Existing On-line Records

The BC Conservation Data Centre[4], which keeps records of organisms of conservation concern, has no records for the subject property. The nearest records for plants or animals of conservation concern are along the Fraser River and one, Northern Water-Meal, was found approximately 3 km to the northwest (Table 1).

Table 1 List of CDC Plants of Conservation Concern Reported to Occur Along the Fraser River

Pointed Rush
Vancouver Island Beggarticks
Flowering Quillwort
Small Spike-Rush
Northern Water-Meal
Henderson's Checker-Mallow

None of these plants can be ruled out altogether from the property but their presence, given the property's current condition and recent history of clearing and development, would seem unlikely.

Vegetation

Review of aerial photographs of the property and cursory views of the forest from along William's Road suggest that the forest comprising the east side of the subject property may support populations of locally uncommon plants, ecosystems and remnants of bog habitat. Bogs occured historically to the north and remnants are present in various areas of Richmond such as the Lulu Island Bog, home of the Richmond Nature Park Society (Davis and Klinkenberg 2008). The presence of abundant Shore Pines (the species that characterize treed bogs in the lower mainland) in the forest to the north of the property supports this notion. A closer look confirms that this is just a notion.

While the limited structural and floristic diversity that characterizes this forest is also characteristic of bogs and related wetland ecosystems, the species that comprise the two are completely different. The study forest has no *Sphagnum* sp. and no species associated with, or adapted to, rare or unique features and conditions.

Two large Shore Pines in the north central area of the forest, a large, dead Western Hemlock, a few small understory Western Hemlock plus a small group of four Black Cottonwoods are the only other species in a forest dominated by the non-native European Birch and the native Paper Birch. Many of the birch are dead or dying, particularly in the east and west portions of the study forest.

The dense shrub layer is comprised mainly of introduced shrubs, the Highbush Blueberry, Himalayan Blackberry and Cutleaf Evergreen Blackberry.

The forest lacks herbaceous vegetation. The ground layer is dominated by one species of moss common to wet substrates.

Overall, plant assemblages reflect a highly disturbed, floristically depauperate forest dominated by non-native species and of low ecological value. This forest bears the scars of past clearing and the influence of surrounding industry and agriculture.

Wildlife Use

Wildlife observed during the field investigation included a Northern Pacific Tree Frog calling near the

middle of the forest and a number of birds including woodpeckers (Downy, Hairy, Northern Flicker) and songbirds (Song Sparrow, Spotted Towhee, Pacific Wren, Bewick's Wren, Black-capped Chickadee, Golden-crowned and Ruby-crowned Kinglets, Northwestern Crows and American Robins). A Red-tailed Hawk was chased by crows over the forest on the property to the north. While no mammals were observed, evidence of American Beaver, Muskrat, Mule Deer and Coast Mole (on an elevated berm) were encountered.

The vegetation attributes provide no unusual, unique or rare features or conditions required by rare or endangered animals. The abundance of non-native plants limits opportunities for all but habitat generalists or those, such as the woodpeckers, that can take advantage of abundant snags.

As part of the larger forest to the north, from which it is separated by 3-4 m wide channelized watercourse, the forest on the subject property provides some protection and remains a functional component of the overall forested ecosystem. Removing any portion of the forest will affect that which remains; the ecological value of any land cannot be considered in isolation.

The small wetland that has developed along the north edge of the agricultural field supports some native plants found nowhere else on the property but none of which is considered rare or endangered. The open water portion is used by waterfowl in winter and the marsh area will be used by insects and birds that favour these conditions during breeding season.

The subject property provides a physical-ecological connection to surrounding features. This connectivity may include dispersal opportunities for plants and animals, and foraging and breeding (nesting, cover, rearing) opportunities for animals. This applies to the forest comprising the east half of the property and the hedgerows and channelized watercourses along the west and south side of the agricultural field occupying the west half of the property.

The surrounding area lacks natural habitat but in light of this, even small corridors such as the extension to the Fraser River south of Williams Road along the Savage Road ROW, local channelized watercourses and patches of remnant vegetation can function as important continuous or stepping-stone dispersal routes. The degree to which they function as dispersal or living habitat and their role in the persistence of plants and animals in the landscape is unknown. However, it cannot be discounted and corridors of natural or semi-natural vegetation and processes should be maintained.

5. CITY OF RICHMOND ECOSYSTEM MAPPING

Environmentally Sensitive Areas (ESAs)

The City mapping provides high level information regarding ecological features within the municipality. Specific to this Project, the following ecosystem components have been evaluated in consideration of the existing conditions on the subject property. The City recognizes they encompass features including marshes, wetlands, beaches and open spaces[6].

ESAs within and near the subject property are shown in Appendix 1, Figure 3.

Riparian Management Areas (RMAs)

RMAs are applied to those watercourses (including channelized watercourses) that are either fish bearing or drain to fish bearing water. Richmond predominantly consists of low elevation lands subject to flooding from tidal activities and / or high water table directly related to the proximity of the marine environment. The City has assigned RMA's based on the following[7]:

Riparian areas are productive ecosystems where terrestrial and aquatic environments meet. Riparian

6 http://www.richmond.ca/sustainability/stewardship/ecology/esa.htm

7 http://www.richmond.ca/sustainability/environment/rar.htm

vegetation stabilizes banks, improves water quality and temperature, contributes nutrients to aquatic environments, and provides habitat. The City's Riparian Management Areas (RMAs) form a critical component of Richmond's Ecological Network.

To meet provincial requirements under the Riparian Areas Regulation, in 2006 the City adopted the Riparian Response Strategy. Under the Riparian Response Strategy, RMA setbacks of 5 m and 15 m on minor and major watercourses were pre-designated in consultation with the Department of Fisheries and Oceans. RMA designated watercourses are wetted the majority of the year with a significant source of ground water, and flow into and support fish life in the Fraser River. Development within or adjacent to an RMA must be approved by the City in accordance with requirements under the Riparian Areas Regulation.

City mapping provides RMA setbacks for channelized watercourses along Williams Road (5 m) and Triangle Road. A 15 m setback is applied to No. 6 Road. RMAs are shown in Appendix 1 – Figure 3.

6. IMPLICATIONS OF THE RIPARIAN AREAS REGULATION (RAR)

Farms registered under the *Farm **Practices Protection** (Right to Farm) Act* are excluded from the RAR process provided the planned works relate directly to farming and agricultural activities. Constructing farm buildings (for example) are not included under RAR. Any other activity on the subject property that is contemplated and is not a farm activity (as defined by RAR) would trigger the RAR process, requiring the completion of an Assessment Report.

The Regulation does not apply to non-fishbearing streams that discharge directly the marine environment.

RAR defines a stream to include any of the following that provides fish habitat:

(a) a watercourse, whether it usually contains water or not;

(b) a pond, lake, river, creek, brook;

(c) a ditch, spring or wetland that is connected by surface flow to something referred to in paragraph (a) or (b);"

While a 'ditch' (channelized watercourse) may be a stream as defined in the Regulation, ditches are treated differently than streams. The Regulation[8] defines a 'ditch' as follows:

Ditches are characterized as being manmade and straight with no significant headwaters or springs. They were constructed to drain property (they often form property boundaries) or roadways and while connected to natural streams they are not part of the natural historic drainage pattern. They are often diked with regulated or seasonal flows.

Riparian setbacks (Streamside Protection and Enhancement Areas; SPEAs) for 'ditches' applied depending on fish bearing status. Non-fish bearing 'ditches' have a 2 m SPEA while fish bearing 'ditches' have a 5 m SPEA.

7. PERMITS AND APPROVALS

City of Richmond

There are no current environmental compliance permitting requirements at this time. Once the land use plans are finalized and accepted by the City, Development Permit applications will be required

8 Section 3.6.5. Riparian Areas Regulation Assessment Methods. Undated.

that may include compliance with the ESA Development Permit Exemption for Agricultural Purposes to allow the reinstatement of a previously existing crossing required to access the property off Williams Road.

Provincial Water Sustainability Act (WSA)

No WSA permitting is required at this time as this report relates to a Permitting process with the City and does not involve any site works.

If and when site works are contemplated, advice from a QEP related to WSA permitting requirements related to culvert installations (if any) and other drainage issues will be provided.

Federal Fisheries Act

No *Fisheries Act* consultation with Fisheries and Oceans Canada (DFO) is required at this time as this report relates to a Permitting process with the City and does not involve any site works.

If and when site works are contemplated, the Owners will complete an online 'Self-assessment' as required by DFO. This process obliges proponents to examine their respective projects at a high level to allow DFO to determine if any aspect of the planned site works require regulatory review and / or causes, or has the potential to cause, 'serious harm to fish'[9]. DFO interprets 'serious harm' to fish as:

- *The **death of fish**;*
- *A **permanent alteration** to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes;*
- *The **destruction of fish habitat** of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.*

8. PROFESSIONAL OPINION

Aquatic

1. For those reasons stated above, the channelized watercourse network surrounding the subject property appears innaccessible and likely inhospitable to anadromous salmonid fish species entering directly from the Fraser River.
2. The subject channelized watercourses cannot support any populations of resident salmonid fish species because of the periodic lack of requisite water quality and quantity within the stream channel. Deeper aquatic habitat that may occur will become isolated from the Fraser River as water levels diminish and potentially it become seasonally dry or disconnected.
3. It is possible that resident coarse fish species may utilize the channelized watercourse network within the subject property as they are tolerant of degraded water quality that is outside of the water quality thresholds for other fish species (i.e. salmonids).
4. The channelized watercourse network around and beyond the subject property undoubtedly provide aquatic habitat for a variety of (non-fish) wildlife species including amphibians, small mammals and birds.
5. The lack of viable fish habitat or stream flows that will sustain salmonid fish species during any life stage suggests that any either of the subject property use options described in Section 3 will not adversely impact aquatic habitat. As there are no plans to alter or encroach into the perimeter

[9] Section 8.2, Fisheries Protection Policy Statement. October 2013 http://www.dfo-mpo.gc.ca/pnw-ppe/pol/index-eng.html#ch82.

channelized watercourse with either land use option, development as proposed will have no residual effects on the use of the channel for aquatic organisms.

Terrestrial

1. The forest lacks herbaceous vegetation with a ground layer dominated by one species of moss common to wet substrates.
2. Overall, plant assemblages reflect a highly disturbed, forest lacking diversity and dominated by non-native species of low ecological value. This forest exhibits evidence of past clearing and the influence of surrounding industry and agriculture.

Wildlife

1. The subject property provides physical-ecological connection to surrounding features, providing connectivity that may include dispersal opportunities for plants and animals, and foraging and breeding (nesting, cover, rearing) opportunities for animals. This applies to the forest comprising the east half of the property and the hedgerows and channelized watercourses along the west and south side of the agricultural field occupying the west half of the property.
2. The surrounding area lacks natural habitat. However, small corridors such as the extension to the Fraser River south of Williams Road along the Savage Road ROW, local channelized watercourses and patches of remnant vegetation can function as important dispersal routes. The degree to which they function as dispersal or living habitat and their role in the persistence of plants and animals in the landscape is unknown. However, it cannot be discounted and corridors of natural or semi-natural vegetation and processes should be maintained wherever possible and not in conflict agricultural use of the property.

9. CLOSURE

This report has been prepared for the developer and City in the ongoing land use planning for this site. Further, it provides an overview aquatic and terrestrial environmental assessment of the subject property based on review of existing information and limited site review. It is not intended as an exhaustive inventory. As such, use of this report is for the purposes for which it is intended. Further guidance on environmental issues will be provided as the site use planning progresses following acceptance by the City.

Sincerely,

Craig T. Barlow,R.P.Bio., QEP

Duncan Sutherland, R.P.Bio.

Distribution Bruce Mathers (Sandstor Farms Ltd.)
Brian French, P.Ag. (C&F Land Resources Consultants Ltd.)
Phil Henderson, R.P.Bio. (Strix Environmental Consulting)
AESC file

ADDENDUM 1

The following addendum has been prepared in response to February 15, 2017 comments issued via email by the City of Richmond on the following report:

Environmental Overview Assessment (Final) – 14671 Williams Road, Richmond, BC
Prepared by Applied Ecological Solutions Corp., Sutherland Environmental Associates and Strix Environmental Consulting. November 25, 2017.

This addendum is specific to the following comment:

Ecological Network: Council adopted the Ecological Network Management Strategy (ENMS) in 2015 that establishes hubs, sites and interconnected corridors. Through the ENMS the City works to connect, protect and restore natural and semi-natural areas in the city, and avoid habitat fragmentation. The subject property at 14671 Williams Road is located within a hub that reflects a larger contiguous Freshwater Wetland ESA.

Please provide an addendum that speaks to the value of the freshwater wetland within the City's ecological network, and identify potential wetland type(s) within larger contiguous wetland including associated lag areas.

ADDENDUM 1

As discussed in Strix (2016), the subject property at 14671 Williams Road partly comprises the southern portion of an Environmentally Sensitive Area (ESA) within the City of Richmond. That ESA is labelled Riverport East and its attributes are presented in Table 1 (RIM 2017). This ESA wraps around a large agricultural field and residence that occupies most of the west half of the subject property. Very narrow treed and shrubby strips of this ESA occupy the north and west portions of the field along channelized watercourses (Figure 1). The eastern half of the property is forested.

Table 1. Details of Riverport East ESA (Environmentally Sensitive Area) from the City of Richmond online mapping (RIM 2016).

ESA Name:	RIVERPORT EAST
ESA Code:	ER-37
ESA Primary Type:	FRESHWATER WETLAND
ESA Secondary Type:	
OCP ESA Type Descriptions	
Perimeter (Meters):	3044.903869
Area (Hectares):	31.422082

Figure 1. The blue area shows that portion of the subject property (surrounding rectangle) that is excluded from the Riverport East ESA. It is an agricultural field and residence. The hatch marks indicate the area covered by the ESA; the large area on the eastern half if forest. (Source: RIM 2017)

Table 2 shows the relative contribution of the ESA area on the subject property (hatched area in Figure 1) to the entire Riverport East ESA (Figure 2).

Table 2. Portion of the Riverport East ESA that is present on the subject property. (RIM 2017.)

Area	ha
ESA Riverport East	31.42
14671 Williams Rd	8.35
portion out of ESA	2.96
total portion in ESA	5.39
% portion of 14761 in ESA	17.15

The Strix (2016) report describes the ecological attributes of the subject property in detail but does not classify it as a *Freshwater Wetland* which is its designation within the City of Richmond's ESA and Ecological Network Management Strategy (ENMS) (Richmond 2015). The City of Richmond defines Freshwater Wetland (FRWT) as,

Areas with vegetation and soils influenced by the presence of freshwater in the rooting zone for plants; includes open, forested, and shrub bogs, swamps, marshes, wet meadows, seasonally flooded fields, and shallow (<2 m or 6.56 ft. depth) ponds and ditches (Richmond 2017).

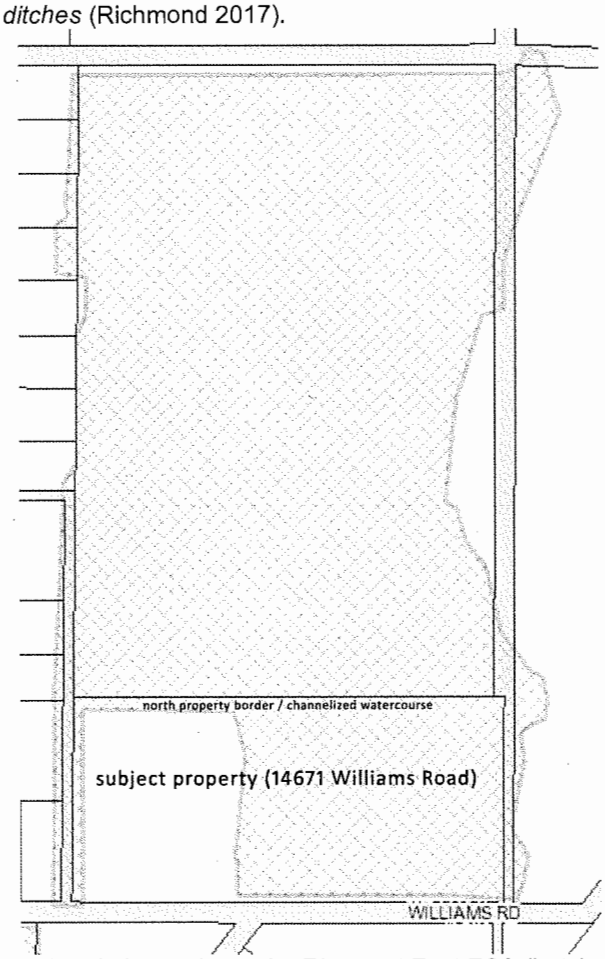

Figure 2. The subject property in relation to the entire Riverport East ESA (hatched area). (Source: RIM 2017)

The east portion of the forest certainly fits within this definition which emphasizes hydrological characteristics, a component of its ecology. The Strix report avoided ecological classification because of the forest's highly altered and degraded ecology resulting from a history of onsite and offsite human disturbance. Any vestiges of its former ecology (discussed in Strix [2016] based on historical vegetation mapping [North et al. 1979]) are no longer apparent and there is no indication that it is on a successional trajectory to any recognized natural ecological community (CDC1 2017; MacKenzie and Moran 2004; Green and Klinka 1994).

The forest in the east half of the subject property consists almost entirely of birch (*Betula* sp.), the majority of which are the exotic European Birch *Betula pendula* (CDC-2 2017; Strix 2016). The shrub layer is comprised predominantly of exotic species and the herb- and ground layer are poorly developed with no occurrences of *Sphagnum* sp. (Strix 2016). The ground is poorly drained and the east portion of the forest, at least at the time of field work (November 3, 2016), was shallowly flooded with water spilling westward from the large channelized watercourse that runs along the Savage Road right-of-way.

The role of the forest as part of an ecological network was discussed in Strix (2016) although not within the context of Richmond's ENMS (Richmond 2015). Its role cannot be appreciated without considerable study but it most certainly plays some role in the ecology of the surrounding area, although its contribution is influenced by its degraded ecological condition. Forest cover, regardless of its naturalness, contributes at least some valuable ecological features including foliage, snags and coarse woody debris which in turn provide food and shelter for animals, substrate for vascular and non-vascular plants, some insularity from adjacent urban, agricultural and industrial activities and features, and possibly climatic and hydrologically moderating attributes such as dispersal of flood waters.

We cannot tell for certain how the forest is developing or will develop, but the abundant dying and dead birch in the forest suggest increased levels of nutrient rich water may indicate a gradual change from a tree-dominated area (forest or treed swamp) to that of a shrub-dominated wetland or swamp, unless water levels decrease. There is no indication that native plant species will gain ground or introduced species will diminish.

Table 3 lists a number of attributes used to identify and assess the ecological network as it relates to the subject property (Richmond 2015).

An assessment of naturalness, based on a scale of 1 (least natural) to 5 (natural) is a key attribute used to define an area. Two designations based on size and naturalness are "hub" (≥ 10 ha and naturalness ≥ 3) and "site" (0.25 - 10 ha and naturalness ≥ 3). The subject property at 8.35 ha, when considered as a contiguous portion of the much larger Riverport East ESA, would qualify as a component of that "hub" but its degraded ecological conditions suggests it has a naturalness score less than 3. The implied ecological contiguity from aerial photographs of the property is not evident on the ground: the channelized watercourse separating the two areas also highlights their distinct vegetation assemblages, notably the abundance of Shore Pine in the north property and the paucity of that species (and any conifers) in the south. Individually, the subject property fits the "site" category for size but again falls short in naturalness which appears to be less than 3 (2) (Table 3).

Table 3. Assessment and rationale for the Richmond Ecological Network Management Strategy attributes relating to the subject property.

ENMS Attribute	Site Description	Explanation / Rationale
Riparian Areas	Along peripheral channelized watercourses.	Semi-natural to predominantly unnatural (non-native) composition; ecological function: structural attributes > floristic attributes
Hub	At least 10 ha. and naturalness ≥ 3. Component of hub.	Degraded. Some natural attributes. Naturalness estimated below 3 (~2).
Site	0.25 ha to 10 ha and naturalness ≥ 3.	8.35 ha. but degraded. Naturalness estimated below 3 (~2).
Naturalness Value	~2 for forest (ESA).	Predominantly non-native species.
Corridor	Impaired Corridor	Vegetation is deciduous-dominated, predominantly non-native, with a poor native understory and ground layer and gaps. Connection to river: remote; involves traversing hostile features/habitat. Living and dispersal habitat questionable. ~185 m southeast to degraded, non-vegetated shoreline of Fraser River

The riparian areas are similarly devalued by the abundance of non-native species. However, these floristic considerations aside, the structural attributes may fulfill some key riparian functions (shade, insularity, dense vegetation and the production of foliage and fruit). The value of the area as a corridor is limited because of the built and altered environment to the south, east and west. The Fraser River is relatively remote at approximately 185 m southeast. Animals (or dispersing plant propagules) have to make their way through hostile habitat to or from the Fraser River.

The adjacent property and forested area north of the subject property is separated by a channelized watercourse and, since it wasn't the focus of investigation, was only considered as it related to the ecology of the subject property (Strix 2016). Little information was gathered during field work. The one obvious attribute is the much greater abundance of Shore Pine on the north property which appears to increase with distance north of the property boundary. The abundance of Shore Pine suggests bog-like attributes but the lack of *Sphagnum* (peat moss) near the subject property, the channelized watercourses surrounding and draining it, the degraded condition of the subject property, the intense past and present development (agricultural, industrial and residential) around it and the history of the area as described by North et al. (1979) all suggest that it is not a bog. There are no laggs[10] associated with this wetland since it is not a raised bog and there is none nearby. The open water on the periphery of these properties appears to be channelized watercourses in various conditions.

Phil Henderson, R.P.B.

[10] A wet margin (fen) around a raised bog.

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APPENDIX 1
FIGURES

FIGURE 1 PROJECT LOCATION AND SURROUNDING FEATURES (BASE MAPS FROM CITY OF RICHMOND INTERACTIVE MAPPING).

FIGURE 2 STUDY AREA DRAINAGE OVERVIEW

FIGURE 3 PROJECT LOCATION SITE FEATURES

APPENDIX 2

AQUATIC OVERVIEW ASSESSMENT PHOTOS

All photos by Duncan Sutherland (November 3, 2016)

Photo 1 Typical site conditions looking east along north edge of field immediately west of subject property.

Photo 2 Typical site conditions looking west along north edge of field immediately west of subject property.

Photo 3 Typical expansive drainage channelized watercourse looking south along west property boundary

Photo 4 Typical expansive drainage channelized watercourse looking north along east property boundary.

Photo 5 Williams Road channelized watercourse looking east from subject property.

Photo 6 Williams Road channelized watercourse looking west from subject property.

APPENDIX 3

OVERVIEW ENVIRONMENTAL (TERRESTRIAL AND ECOLOGY) ASSESSMENT REPORT

Strix Environmental Consulting

Overview Environmental Assessment Terrestrial and Wetland Ecology 14671 Williams Road, Richmond, B.C.

Prepared for:

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V1M 2R9

Introduction

After a brief on-site meeting and orientation with John Mathers, Brian French and Duncan Sutherland, Phil Henderson of Strix Environmental Consulting began his site investigation to gather information to provide an ecological overview of the terrestrial and wetland features of the property. The property lies within an area that historically was close to large bog located to the north, but which, itself, was likely a combination of willow, spruce and possibly grasslands (Figure 1). The property's proximity to the Fraser River suggests that periodic inundation likely influenced site ecology by introducing silt and nutrients including salts. This would have inhibited the southward spread of the bog to the north and its persistence in this area so close to the river. Recent work by French (2016) indicates a shallow peat layer (25-40 cm) in the eastern forested portion that may have been reduced from historical levels by recent disturbances including land clearing. The presence of Shore Pine (two trees) that are associated with tree bogs of the area – and which is much more abundant in the property to the north – and birch and Western Hemlock that, together, are associated with a degraded bog ecosystem suggests that recent isolation from the river facilitated their establishment in this area from source populations to the north.

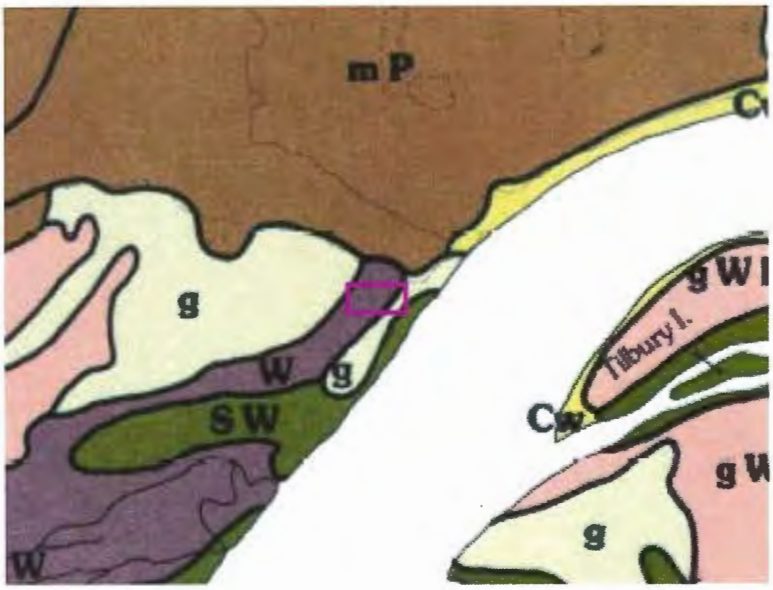

Figure 1. Historical ecological units from North et al. (1979). The subject property (approximate location) is shown by the pink rectangle.
mP = Sphagnum moss with scrub pine, hemlock and spruce (predominantly bog; W = willow; SW = spruce, willow, alder, crabapple, vine maple, briars; and g = prairie (grass).

The City of Richmond's online mapping program (RIM: Richmond's Interactive Map) highlights the forested east half of the property as an Environmentally Sensitive Area (Figure 2). The main forest that comprises the east half of the property is connected to a larger forested area on the adjacent property to the north which is also considered an Environmentally Sensitive Area (Figure 2). Remnants of historical bogs are scattered throughout Richmond (Davis and Klinkenberg 2008) and these are considered of conservation concern because of their rarity in the lower mainland, their susceptibility to degradation (changes in hydrology) and the fact that they support rare and endangered plants and plant communities. Any land thought to have bog-associated attributes is considered of potential ecological significance.

Figure 2. Environmentally Sensitive Areas (hatched area). The property is outlined in pink.

Methods

Much of the forested area was traversed on foot. Plants and animals were noted as were conditions that influence their presence (abundance and distribution). Vegetation plots were established to provide a more complete assessment of plants and ecology. For each 25m x 25m plot, vegetation was recorded in four main vertical layers: tree layer (three sub-layers), shrub layer (two sub-layers), the herb layer and the ground layer. Plots were chosen semi-randomly within areas that appeared to be representative; that is, they appeared, initially, to comprise species typical of that area. Access was limited or hampered in some areas by water and in many areas by dense blackberries.

Many of the trees and shrubs had shed most of their leaves so values of percent cover for these species were probably underestimated. Nonetheless, estimates of cover provide a good indication of plant cover and relative abundance.

Notes were taken on other attributes such as coarse woody debris (branches and logs > 10 cm diameter), snags, tree height, diameter at breast height, spacing and standing water. Photographs were taken plots and of other features.

The majority of time was spent in the forested east half of the property but the agricultural field on the west side of the property was also examined. This included the wetland at the north edge of the field and the hedgerow and trees bordering the west edge of the field. The large drainage channel running north - south at the east edge of the property (along the Savage Road ROW) was examined from the south end using binoculars and camera.

Key locations highlighted in the text, including plot locations are shown in the map in Figure 3.

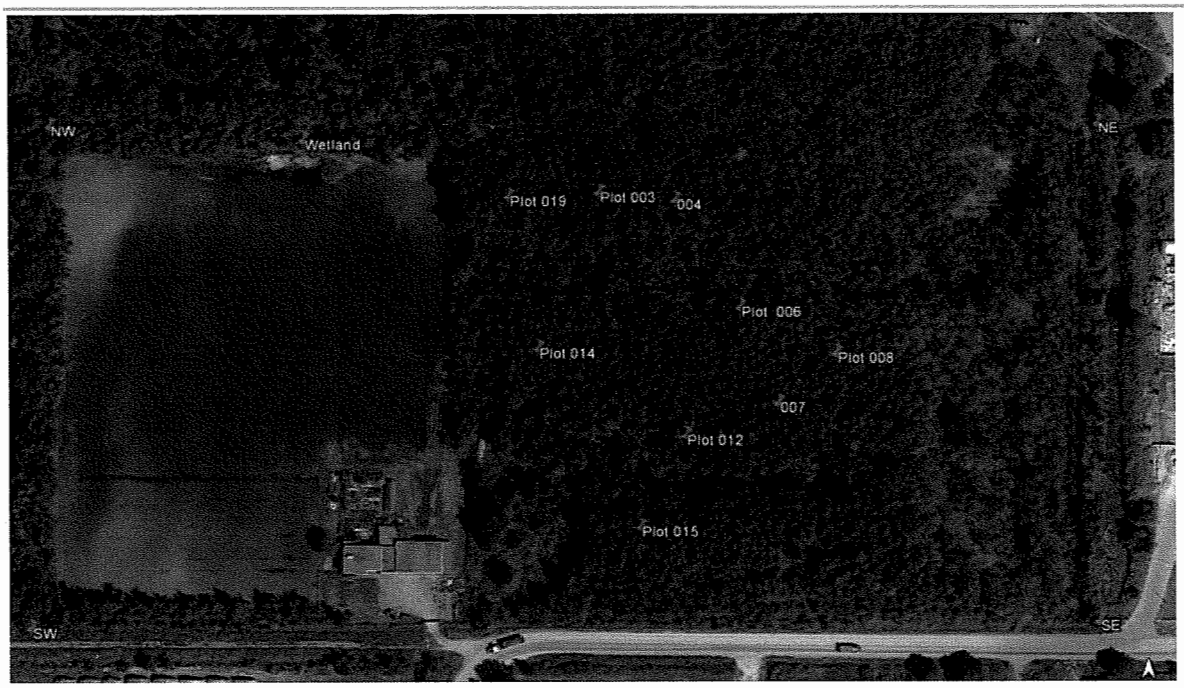

Figure 3. Key plot and feature locations.

Results

An initial review of aerial photographs of the area from French (2016), Google Earth (2016) and Richmond's RIM (2016) suggested that the eastern forested area is an important ecological extension of the forest to the north and that it may support features or populations of plants and animals that are regionally significant. These suppositions were not supported by the field survey.

Vegetation: East Forest Area

Tree cover is dominated by birch of two species: the native Paper Birch *Betula papyrifera* var. *commutata*, which included some of the largest specimens, is outnumbered by the non-native European Birch *Betula pendula*. Many of the birch are dead or appear to be dying. This is particularly true in the south and east portions of the forest. A distinct north-south boundary (at waypoint 007) marks the beginning of the flooded area to the east in which all birch is either dead or dying (Photo 1). Many have been uprooted. At the time of the surveys (November 3, 2016) this area was entirely flooded with 15-20 cm of water save for a few small mounds and the bases of a large standing or uprooted birch. The scattered mounds and root-wads provide unsaturated soils, favourable substrate for non-aquatic plants.

Photo 1: **L**: Looking north from the west edge of the flooded area of dead birch comprising the east portion of the forest.
R: Looking north from wpt. 008, plot centre of Plot 008. Note the berm (linear mound) along the channel in the distance that appears as a thin band of vegetation just above the centre of the photograph.

Two other tree species were noted in the forest: Shore Pine *Pinus contorta* var. *contorta* and Western Hemlock *Tsuga heterophylla*. Two large Shore Pines (~30 cm dbh) are located near the north end of the property just in the eastern half. No other Shore Pines were noted. A few small, sub-canopy Western Hemlock are present in the west central area and one large, dead specimen (~35 cm dbh) is present in the north central area.

Live birch form an average percent cover of 36, dead birch (snags) 2 and Western Hemlock <1. The native Paper Birch was not distinguished from the introduced European Birch in these numbers but European Birch appeared more abundant. Living and dead birch were present in all plots and coarse woody debris (CWD) was quite abundant, particularly in the east and south portions and other areas of excessive water where many of the birch were dead. The diameter at breast height (dbh where bh=1.3 m) averaged from about 15 to 25 cm for birch. The average canopy height was approximately 20 m.

Four introduced species dominate the nine species that comprise the shrub layer. The introduced Highbush Blueberry *Vaccinium corymbosum* was the most abundant shrub by cover class with an average of 43 percent. It was present in six of the seven plots. Together, the two species of introduced blackberries were found in every plot and contributed a combined percent cover of 23 percent. Hardhack *Spiraea douglasii* is the only native shrub that was present in more than one plot; it had a total percent cover of seven percent. In total, introduced species represented an average of 73 percent cover compared to 10 percent for native species. Typical understory vegetation is shown in Photo 2 for Vegetation Plot 012.

Photo 2: Looking south from plot centre of Plot 012 (wpt. 012). Note the Cutleaf Evergreen Blackberry *Rubus laciniatus* (left, foreground), Hardhack (centre, foreground), the few remaining, colourful leaves of Highbush Blueberry (right, foreground) and the clambering Himalayan Blackberry *Rubus armeniacus* (just right of centre, background).

More species were present in the herb layer (11) but cover was sparse. Bracken Fern *Pteridium aquilinum* ssp. *lanuginosum* was the only species found in more than one plot and which occupied an average percent cover greater than two (5 percent).

The moss *Eurhynchium praelongum* which typically grows on wet ground, logs and tree bases, was present throughout the forest but in the flooded east portion was confined to the bases of dead birch, logs and branches. It occurred in six of the seven plots with an average cover of 10 percent. The extensive leaf litter from the birch forest inhibits moss growth on the forest floor. *Hylocomium splendens* was the only other moss recorded in the plots. A very small amount was present in one plot.

Photo 3: Typical view of the forest floor showing the abundant birch leaves that prevent extensive bryophyte growth. Small patches of *Eurhynchium praelongum* are evident amongst the leaves.

Other plants were recorded outside of the plots on meanders through different areas. The linear mound or berm of dirt stretching along the north edge of the property, presumably created by dirt excavated from the adjacent channelized watercourse, rises up to a meter above its surroundings. It provides a well drained surface on which plants less tolerant of water persist. Salal *Gaultheria shallon* and Sword Fern *Polystichum munitum* are two native species that grew here; most others were

introduced shrubs found throughout the forest although Cherry-Laurel *Prunus laurocerasus* was a new addition. Common Foxglove *Digitalis purpurea* is present on and near the mound and *Atrichum undulatum* is the common moss there. *Dicranum scoparium* was another moss present in small patches on the ground and the base of trees. *Homalothecium fulgescens* is present in small patches on tree trunks among the dominant *Eurhynchium praelongum*.

Other mounds of earth from past clearing and excavation provide small areas of greater diversity. Native shrubs that are uncommon elsewhere on the property, such as Coastal Red Elderberry *Sambucus racemosa* var. *arborescens*, appear on these elevated sites. However, Himalayan and Cutleaf Evergreen Blackberries also flourish in these areas, clambering over the large native specimens and inhibiting the growth of herb- and ground-layer plants.

Some of the large wet areas in which most trees have died support a few species not found elsewhere: Small-flowered Bulrush *Scirpus microcarpus*, Clustered-Dock *Rumex conglomeratus*, Common Rush *Juncus effusus*, Lady Fern *Athyrium filix-femina* var. *cyclosorum* (one heavily browsed clump) and a sedge, possibly Grey Sedge *Carex canescens*. Purple Loosestrife *Lythrum salicaria*, an ecologically harmful exotic plant was seen in some wet locations.

Photo 4: Open wetland area amongst dead birch in the north central area of the forest near wpt 004.

Small water-filled depressions (Photo 5) were present throughout the forest but these supported little or no distinct vegetation. The coarse woody debris present in and around them has the potential to support bryophytes other than the common species observed (*Eurhynchium praelongum*) but none was evident. Establishment may take some time as source plants may be remote and much of the coarse wood debris is insufficiently decomposed to provide suitable substrate.

Photo 5: Small, water-filled depressions in the forest.

A group of four Black Cottonwoods *Populus trichocarpa* in the northwest corner of the forest were the only specimens of this species noted.

Common Duckweed *Lemna minor* is abundant along the north channelized watercourse (Photo 6). No other floating aquatic plants were noted. Common Rush is common along the edge of the channelized watercourse.

Photo 6: Looking east along the channelized watercourse at the north property boundary. Note the abundance of Common Duckweed (the green film on the water). The berm or linear mound of excavated earth is on the right side of the channelized watercourse; the adjacent property is on the left.

Clearings in the southwest portion of the forest that extend east of the house and along a linear opening off the field to the north support Reed Canarygrass, other grasses, some Small-flowered Bulrush (probably), Common Rush, Large-leaved Avens *Geum macrophyllum*, Foxglove, Himalayan Blackberry and Cutleaf Evergreen Blackberry.

Vegetation – West Agricultural Area

A shallow wetland of native plant species has formed in a depression at the north end of the agricultural field that comprises the west half of the property. Vegetation is arranged in bands extending south from and roughly parallel to the birch forest and adjacent channelized watercourse at the north edge of the field. Starting at the forest edge of birch and Hardhack, the bands are arranged, generally as Common Rush, Common Cattail *Typha latifolia*, Soft-stemmed Bulrush, open water and cultivated field. Beyond that, on the edge of the cultivated field and on the east edge of the wetland are grasses (including Meadow-Foxtail, probably Water Meadow-Foxtail *Alopecurus geniculatus*, Cursed Buttercup *Ranunculus sceleratus* var. *sceleratus* (probably), Toad Rush *Juncus bufonius* and scattered Common Rush. See Figure 4 and Photo 7, below.

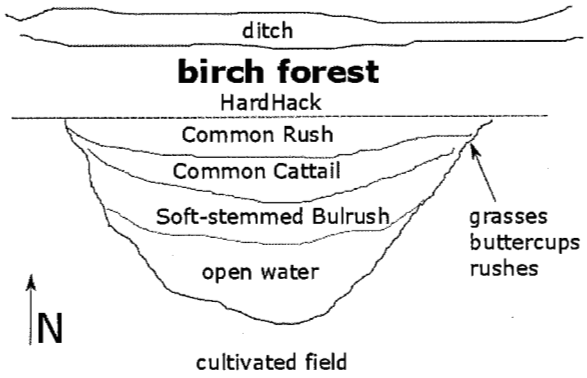

Figure 4. Schematic of vegetation composition for the small wetland at the north edge of the cultivated field. Vegetation is arranged in bands from the north edge of the field. The species are not segregated so neatly as represented in this diagram; the lines are less distinct and species intermix within each band.

Photo 7: View west of the wetland along the north edge of the agricultural field. Note the band of Common Cattail on the right and Soft-stemmed Bulrush on the left, towards the open water.

This assessment does not rule out the possibility that rare plants are present. If any are present it is unlikely that the habitat is critical for their persistence in the landscape.

Animals – East Forest Area

Mammals

An American Beaver *Castor canadensis*-felled birch is present in the northwest corner of the study forest on the channelized watercourse-side berm (Photo 8). Two small soil excavations near this tree indicated the presence of Coast Mole *Scapanus orarius*. Mule Deer *Odocoileus hemionus* scat and tracks in soft earth revealed at least one of the animals responsible for the faint trails running through the forest. Signs of Common Muskrat *Ondatra zibethicus* feedings on Common Rush were present in the water in the flooded area of dead birch in the east half of the property near waypoint/plot 008.

Photo 8: American Beaver-felled tree near the channelized watercourse in the northwest area of the forest.

Birds

Table 1 lists the birds observed in the forest during the field survey, November 3, 2016.

Table 1. Birds observed. Birds are presented in the table by location seen. Note that some birds, especially Ruby-crowned Kinglet, Golden-crowned Kinglet and Spotted Towhee may be the same birds recorded in different locations.

Species: common name	# observed	location in forest	activity
Northwestern Crow	15	northwest	flew into tops of birch trees briefly
Red-tailed Hawk	1	over forest to north	crows chased the hawk as it flew over the forest of the property to the north
Downy Woodpecker	1 male	northwest	foraging on trunks of birch trees
	1	north-central	calling
Golden-crowned Kinglet	5	north-central	in feeding flock with RCKl
Ruby-crowned Kinglet	1	north-central	in feeding flock with GCKl
Spotted Towhee	1	north-central	calling just south of area
Black-capped Chickadee	1+	north-central	heard calling in area
Northern Flicker	3	east, dead birch area	perched in dead birch, flooded east area
Red-winged Blackbird	1	flew over	flew east over forest
Song Sparrow	1	east, dead birch area	call
Pacific Wren	2	east, dead birch area	calling south of wpt./plot 008
Bewick's Wren	1	east, dead birch area	call
Cooper's Hawk / Northwestern Crow (?)	possible nest	south central area	20' up birch, against trunk in branch crotch; poorly developed
Ruby-crowned Kinglet	5	south central area; wpt/Plot 012	foraging, moving through the area with Golden-crowned Kinglet
Golden-crowned Kinglet	2	south central area; wpt/Plot 012	foraging, moving through the area with Ruby-crowned Kinglet
Hairy Woodpecker	1 (female)	south central area; wpt/Plot 012	foraging on birch
American Robin	3	south central area; wpt/Plot 012	flew into the area from the south; moving through the trees/shrubs
Song Sparrow	1	south central area; wpt/Plot 012	calling
Pacific Wren	1	south central area; wpt/Plot 012	calling
Spotted Towhee	1	south central area; wpt/Plot 012	calling

The birds observed in the area are all birds that are expected to occur. The dead birch provide good foraging opportunities for woodpeckers. The dense shrub layer provides good foraging and cover

habitat for the songbirds. The lack of vegetation in the herb and ground layers may reduce foraging opportunities for some species and nesting opportunities for others.

Amphibians

A Northern Pacific Treefrog *Pseudacris regilla* was heard calling in the central portion of the forest.

Animals – West Agricultural Area

Twenty-five Green-winged Teal *Anas crecca* were observed in the wetland pond at the north end of the agricultural field in the morning. They flew off as the field crew approached. Four female American Wigeon *Anas americana* were present on the pond in the afternoon. A female Northern Shoveler *Anas clypeata* was present in a small pond near the west end of the field. It flew to the north pond upon approach.

No other birds were noted on the temporarily flooded portions of the field. These ponds are likely frequented by waterfowl throughout winter and may be used by migrant shorebirds during fall and spring.

Hedgerows

The hedgerow along the west side of the agricultural field is a narrow band of birch fronted by dense growth of Himalayan Blackberry. A channel runs along the middle. The total width of this vegetated band is approximately 23 m (Richmond RIM). The subject property extends approximately 6 m west of the edge of the agricultural field into this band. No birds or other animals were recorded there but it provides suitable foraging, cover and nesting habitat for songbirds and small birds of prey such as Cooper's Hawk *Accipiter cooperii*, Sharp-shinned Hawk *Accipiter striatus* and Merlin *Falco columbarius*. The channel and strip of "forest" provides potential resident and dispersal habitat for small mammals within the property and the surrounding area. Despite the fact that there is little natural habitat and much hostile habitat to the south of the property this corridor provides some connection and potential dispersal routes to channelized watercourses and small, remnant natural features in the broader landscape.

Photo: **L**: View north along the hedgerow on the west side of the agricultural field.
R: View south along the hedgerow on the west side of the agricultural field.

Summary and Discussion

The BC Conservation Data Centre, which keeps records of organisms of conservation concern, has no records for the subject property (CDC 1). The nearest records for plants or animals of conservation concern are along the Fraser River and one, Northern Water-Meal *Wolffia borealis*, was found approximately 3 km to the northwest (Table 2). None of these plants can be ruled out altogether from the property but their presence, given the property's current condition and recent history of clearing and development, would seem unlikely.

Table 2. Species of conservation concern for which records are present in the general area.

Common Name	**Scientific Name**	**BC Status*** (CDC 2)
Pointed Rush	*Juncus oxymeris*	Blue
Vancouver Island Beggarticks	*Bidens amplissima*	Blue
Flowering Quillwort	*Lilaea scilloides*	Blue
Small Spike-Rush	*Eleocharis parvula*	Blue
Northern Water-Meal	*Wolffia borealis*	Red
Henderson's Checker-Mallow	*Sidalcea hendersonii*	Blue

* **Blue List:** Any species or ecosystem that is of special concern. **Red List:** Any species or ecosystem that is at risk of being lost (extirpated, endangered or threatened)

No animals of conservation concern other than fish (Sturgeon) are identified by the BC Conservation Data centre in or near the study area (CDC1).

Aerial photographs and cursory views of the forest from along William's Road suggest that the forest comprising the east side of the subject property (14671 Williams Road) may support populations of locally uncommon plants, ecosystems and remnants of bog habitat. Bogs occurred historically to the north and remnants are present in various areas of Richmond such as the Lulu Island Bog, home of the Richmond Nature Park Society (Davis and Klinkenberg 2008). The presence of abundant Shore Pines (the species that characterize treed bogs in the lower mainland) in the forest to the north of the property supports this notion. A closer look confirms that this is just a notion.

While the limited structural and floristic diversity that characterizes this forest is also characteristic of bogs and related wetland ecosystems, the species that comprise the two are completely different. The study forest has no *Sphagnum* sp. and no species associated with or adapted to rare or unique features and conditions.

Two large Shore Pines in the north central area of the forest, a large, dead Western Hemlock, a few small under-story Western Hemlock plus a small group of four Black Cottonwoods are the only other species in a forest dominated by the non-native European Birch and the native Paper Birch. Many of the birch are dead or dying, particularly in the east and west portions of the study forest.

The dense shrub layer is comprised mainly of introduced shrubs, the Highbush Blueberry, Himalayan Blackberry and Cutleaf Evergreen Blackberry.

The forest lacks herbaceous vegetation and the ground layer is dominated by one species of moss common to wet substrates.

Overall, plant assemblages reflect a highly disturbed, floristically depauperate forest dominated by non-native species and of low ecological value. This forest bears the scars of past clearing and the influence of surrounding industry and agriculture.

The vegetation attributes provide no unusual, unique or rare features or conditions required by rare or endangered animals. The abundance of non-native plants limits opportunities for all but habitat generalists or those, such as the woodpeckers, that can take advantage of abundant snags.

As part of the larger forest to the north, from which it is separated by 3-4 m wide channelized watercourse, the forest on the subject property provides some protection and remains a functional

component of the overall forested ecosystem. Removing any portion of the forest will affect that which remains; the ecological value of any land cannot be considered in isolation.

The small wetland that has developed along the north edge of the agricultural field supports some native plants found nowhere else on the property but none are considered rare or endangered. The open water portion is used by waterfowl in winter and the marsh area will be used by insects and birds that favour these conditions during breeding season.

The subject property provides a physical-ecological connection to surrounding features. This connectivity may include dispersal opportunities for plants and animals, and foraging and breeding (nesting, cover, rearing) opportunities for animals. This applies to the forest comprising the east half of the property and the hedgerows and channelized watercourses along the west and south side of the agricultural field occupying the west half of the property. The surrounding area lacks natural habitat but in light of this, even small corridors such as the extension to the Fraser River south of Williams Road along the Savage Road ROW, local channelized watercourses and patches of remnant vegetation can function as important continuous or stepping-stone dispersal routes. The degree to which they function as dispersal or living habitat and their role in the persistence of plants and animals in the landscape is unknown. However, it cannot be discounted and corridors of natural or semi-natural vegetation and processes should be maintained.

Phil Henderson, R.P.B

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ARBORTECH CONSULTING a division of: ACL GROUP

December 14, 2016

Attn.: **John Mathers**
Mathers Bulldozing
11700 No. 5 Rd
Richmond, BC V7A 4E7

ACL File: **16395**

Project Ref: **14671 Williams Rd Richmond BC**

Re: **Preliminary Tree Assessment**

Dear Mr. Mathers,

As requested, I have undertaken an initial site review of the condition of the existing trees located on the subject property. It is my understanding that land uses changes are being contemplated, and that there are municipal Environmental Sensitive Areas (ESA) and Riparian Management Areas (RMA) designated within and adjacent to this property. The purpose of my report is to inform the planning process as to the general viability and value of the existing trees.

Observations

Figure 1.

- The eastern two-thirds of the subject site is treed with a stand of predominantly European birch (*Betula pendula*) trees growing with dense spacing and forming a partially closed-canopy form (modified through naturally occurring tree decline).
- The age class of the birch trees is estimated to be circa 40 years. This could be confirmed by undertaking a ring count of a representative sample from the stand.

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- The majority of the trees within the stand are infested with bronze birch borer (*Agrilus anxius*) and are suffering varying severities of the related damage and dieback. I estimate that approximately 80% of the trees are infested.
- The south interface of the stand is adjacent to existing BC Hydro overhead power lines aligned along the north side of Williams Road, and a swath of trees along that interface have been topped, many of those trees having been killed as a result.

Discussion

European birch is a non-native tree that was originally introduced for use in landscapes, but that has naturalized in British Columbia. It is especially prolific in naturalizing and colonizing peat bog areas of the Lower Mainland region. The native species of trees and vegetation have been suppressed, in some cases to severely diminished levels. This is the case on this site. The European birch is identified as an invasive plant in BC (see enclosure). The tree species that would be expected to be native and indigent to this site would be dominated by shore pine (*Pinus contorta* 'contorta'). Shore pine appears to be mostly absent on this property. Examples of the native shore pine predominant stand conditions are observed in the vicinity of this site, specifically to the northwest, although some levels of birch naturalization has occurred in those stands.

The bronze birch borer insect has been well established in the Lower Mainland (actually throughout most of the Pacific Northwest) for several decades. The insect infests birch trees exclusively (all local species) by laying eggs in the upper heights of their stems and branches. The larvae advance through various stages of their life cycle by boring and feeding within the conducting tissue of the trees, killing them from the top down. Successive infestations occur lower in the crown of the trees year over year. Depending on the size, age class and health of a tree, infested trees are fully killed within approximately 5 years of initial infestation. Birch trees in good health are less susceptible to infestation, as the insect has adapted to sensing trees that are stressed in terms of their health (i.e. from drought or other environmental influences, or from pruning impacts). The birch genera poorly defend against decay advancement, and rapid decay of those dead parts follows the dieback, weakening those stems to the extent that there is high likelihood of failure (breaking out). There are no practical or feasible controls available, especially for large stands such as on this site and surrounding lands, and there is a lack of native predators to this insect. The mortality of birch trees in our region is expected to continue unabated, and this site combined with the surrounding non-native birch stands in this part of Richmond are actually serving as a massive incubation zone for the damaging insect populations to proliferate.

Currently there are assorted land uses in the perimeters of the tree stand on the subject site that are potential targets for tree and tree parts failing and striking. This includes the perimeters of the site where current active residential, landscape and farming zones interface with the forested lands, and also along the Williams Road frontage where there are overhead power lines and public using the roads. Those zones, as well as any interfaces with the forest stand where new active land uses are proposed, are targets of concern in relation to the dying birch trees. It is recommended that the site be assessed using Tree Risk Assessment Qualification (TRAQ) methods, regulated by the International Society of Arboriculture, in conjunction with the project planning, design and construction.

Conclusions

The forest stands within the subject site, including the zones that are designated ESA and RMA at or near this site, are comprised predominantly of European birch. The majority of those trees are in a severely advanced state of decline from bronze birch borer insect infestation damage. The dying tree stand provide habitat for certain wildlife, and serves as canopy in the urban forest. However, it is my opinion that there are significant negative environmental values of this particular stand considering that it exists as a result of invasive colonization by a non-native tree species.

Thank you for choosing Arbortech Consulting for your tree assessment needs. If you require any further information, please contact the undersigned.

Regards,

Prepared By:	***Certifications and Qualifications of the Author:***	***Contact Information:***
	• ISA Certified Arborist #PN-0730A, • Qualified Tree Risk Assessor (TRAQ), • Certified Tree Risk Assessor #0076, • Certified Wildlife and Danger Tree Assessor • Land Survey Technologist	Office: **604 275 3484** Mobile: **604 813 9194** Email: **norm@aclgroup.ca**
Norman Hol, **Senior Consulting Arborist**		

Enclosures;
UBC Invasive Species Checklist, 2012

E-FLORA BC
INVASIVE, NOXIOUS AND PROBLEM PLANTS OF BRITISH COLUMBIA

March 2012 update

A small number of vascular plants in British Columbia are considered invasive, noxious or problem weeds. These are alien species, usually ones that significantly impact rangelands, affect forestry and forest regeneration, or impact on our wetlands. Some are highly invasive and alter natural ecosystems. Some of these plants are legislated as noxious under the BC Weed Control Act (either province-wide or regionally), or are designated by provincial agencies or invasive plant councils as nuisance, noxious or invasive species and targeted for control. The following list provides a summary of 163 weed taxa that fall into these categories. The list is based upon an original list prepared by Tanya Perzoff and also includes additional taxa that have been recently identified as invasive by BC botanists and species added to the BC Weed Control Act in 2011.

The list does not include native species, although taxa with mixed origin--both native and introduced--have been included (e.g. *Phalaris arundinacea*). Additionally, the list includes only taxa that recognized by the BC Conservation Data Centre as part of the BC flora. The BC flora include all species listed in E-Flora BC.

In British Columbia, the Invasive Alien Plant Program (IAPP) (BC Ministry of Forests, Lands and Natural Resource Operations) tracks the spread of some weed species, and encouarges public reporting of these species through their Report-a-Weed initiative. Species tracked under this program are noted in the list by an asterisk (*).

Please refer to Tanya Perhzoff's original list for sources of species designations by provincial agencies.

Scientific Name	English Common Name	Comments	IAPP
Abutilon theophrasti	Velvetleaf	Noxious	*
Acer platanoides	Norway maple	Minor upland invasive	
Acinos arvensis	Mother-of-thyme	Minor upland invasive	
Acroptilon repens	Russian knapweed	Noxious	*
Aegilops cylindrica	Jointed oatgrass	Noxious	
Aegopodium podagraria	Goutweed	Invasive, often urban	
Agropyron pectiniforme	Crested wheatgrass	Minor upland invasive	
Alliaria petiolata	Garlic mustard	Noxious	*
Amaranthus retroflexus	Redroot pigweed	Nuisance, disturbed sites	*
Ambrosia artemisiifolia	Common ragweed	Minor upland invasive	
Ammophila arenaria	European beachgrass	Invasive, sand dunes	
Ammophila breviligulata	American beachgrass	Invasive, sand dunes	

Scientific Name	English Common Name	Comments	IAPP
Anchusa officinalis	Common bugloss	Noxious	*
Anthriscus caucalis	Bur chervil	Noxious	
Anthriscus sylvestris	Wild chervil	Noxious	*
Arctium lappa	Great burdock	Noxious,	*
Arctium minus	Common burdock	Weed	*
Artemisia absinthium	Absinth	Minor upland invasive	*
Avena fatua	Wild oats	Noxious, disturbed sites	*
Barbarea vulgaris	Winter cress	Agricultural/urban weed	
Berberis thunbergii	Japanese barberry	Agricultural/urban weed	
Berteroa incana	Hoary alyssum	Noxious	*
Betula pendula	European birch	Invasive, bogs	
Brachypodium sylvaticum	Slender false brome	Newly arrived in 2008	
Brassica kaber	Charlock, wild mustard	Noxious, disturbed sites	*
Bromus inermis	Smooth brome grass	Moderate upland invasive	
Bromus tectorum	Cheatgrass	Invasive, abundant	*
Buddleja davidii	Butterflybush	Invasive, spreading quickly	*
Butomus umbellatus	Flowering rush	Noxious, principle wetland invasive elsewhere	*
Calluna vulgaris	Scotch heather	Invasive in bogs in or near urban areas	
Calystegia sepium	Morning glory	Nuisance	
Capsella bursa-pastoris	Shepherd's purse	Nuisance	*
Caragana arborescens	Siberian peashrub	Minor upland invasive	
Cardaria draba ssp. draba	Heart-podded hoary-cress	Noxious	
Cardaria draba ssp. chalapensis	Chalapa hoary-cress	Noxious	
Cardaria pubescens	Globe-pod hoary-cress	Noxious	
Carduus acanthoides	Plumeless thistle	Noxious	
Carduus nutans ssp. leiophyllus	Nodding thistle	Noxious	
Centaurea biebersteinii	Spotted knapweed	Invasive, noxious	
Centaurea diffusa	Diffuse knapweed	Invasive, noxious	*
Centaurea x moncktonii	Meadow knapweed	Invasive	*
Centaurea nigra	Black knapweed	Invasive elsewhere	*
Centaurea nigrescens	Short-fringed knapweed	Invasive	
Centaurea solstitialis	Yellow starthistle	Noxious, invasive	*

Scientific Name	English Common Name	Comments	IAPP
Centaurea stoebe ssp. micranthos	Spotted knapweed	Invasive, noxious	
Chelidonium majus	Celandine	Minor upland invasive	
Chenopodium album	Lamb's quarters	Nuisance, abundant	*
Chondrilla juncea	Rush skeletonweed	Noxious	*
Chorispora tenella	Blue mustard	Noxious	
Cichorium intybus	Chicory	Nuisance, disturbed sites	*
Cirsium arvense	Canada thistle	Noxious, abundant	*
Cirsium palustre	Marsh plume thistle	Noxious, abundant	*
Cirsium vulgare	Bull thistle	Nuisance, abundant	*
Conium maculatum	Poison hemlock	Noxious	*
Convolvulus arvensis	Field bindweed	Nuisance, abundant	*
Coronilla varia	Crown vetch	Agriculture/urban weed	
Crataegus monogyna	European hawthorn	Highly Invasive	
Crupina vulgaris	Parastic dodder	Noxious	
Cynoglossum officinale	Common hound's tongue	Noxious	*
Cyperus esculentus var. leptostachyus	Yellow nut-grass	Noxious	
Cytisus scoparius	Scotch broom	Highly invasive	*
Daphne laureola	Spurge-laurel	Agriclture/urban weed	
Descurainia sophia	Flixweed	Noxious	
Digitalis purpurea	Foxglove	Abundant	
Echinochloa crusgalli	Barnyard grass	Nuisance	*
Echium vulgare	Viper's bugloss	Noxious	*
Elymus repens	Quackgrass	Abundant in disturbed sites	*
Erodium cicutarium	Stork's bill	Noxious	
Euphorbia cyparissias	Cypress spurge	Agriculture/urban weed	*
Euphorbia esula	Leafy spurge	Noxious, agriculture	*
Fallopia x bohemica	Bohemian knotweed	Invasive, noxious	
Fallopia convolvulus	Black bindweed	Invasive	
Fallopia japonica	Japanese knotweed	Invasive, noxious	*
Fallopia sachalinense	Giant knotweed	Invasive, noxious	
Galium aparine	Cleavers	Noxious	*
Galium mollugo	White bedstraw	Minor upland invasive	
Geranium robertianum	Herb-Robert	Abundant	*

Scientific Name	English Common Name	Comments	IAPP
Glyceria maxima	Great manna grass	Noxious, minor invasive	
Gnaphalium uliginosum	Marsh cudweed	Nuisance	*
Gypsophila paniculata	Baby's breath	Nuisance	*
Hedera helix	English Ivy	Invasive, primarily urban	*
Heracleum mantegazzianum	Giant cow-parsnip,Giant hogweed	Noxious, nuisance	*
Hesperis matronalis	Dame's rocket	Minor upland invasive	*
Hieracium aurantiacum	Orange hawkweed	Noxious	*
Hieracium caespitosum	Yellow hawkweed	Nuisance	*
Hieracium pilosella	Meadow hawkweed	Nuisance	*
Hordeum jubatum	Foxtail barley	Nuisance	*
Hypericum perforatum	Common St. Johns-wort	Nuisance	*
Hypochaeris radicata	Hairy cat's ear	Agriculture/urban weed	*
Hyoscyamus niger	Black henbane	Noxious	
Ilex aquifolium	English holly	Invasive, urban forests	
Impatiens glandulifera	Policeman's helmet	Invasive	*
Iris pseudacorus	Yellw flag	Noxious, invasive	*
Knautia arvensis	Field scabious	Noxious	*
Kochia scoparia	Kochia, summer cypress	Noxious	*
Lamium galeobdolon	False lamium	Invasive	
Lamium amplexicaule	Common dead-nettle	Nuisance	*
Lepidium latifolium	Broad-leaved pepper-grass	Noxious	*
Leucanthemum vulgare	Ox-eye daisy	Noxious	*
Linaria genistifolia ssp. dalmatica	Dalmation toadflax	Abundant in disturbed sites	*
Linaria vulgaris	Butter-and-eggs	Noxious	*
Lysimachia nummularia	Moneywort	Minor wetland invasive	
Lythrum salicaria	Purple loosestrife	Noxious, wetland invasive	*
Madia glomerata	Clustered tarweed	Nuisance	*
Madia sativa	Coast tarweed	Nuisance	*
Malva neglecta	Common mallow	Nuisance	*
Matricaria discoidea	Pineappleweed	Abundant in disturbed sites	*
Matricaria perforata	Scentless chamomile	Noxious	
Morus alba	White mulberry	Minor upland invasive	
Myriophyllum aquaticum	Parrotfeather	Invasive	*

Scientific Name	English Common Name	Comments	IAPP
Myriophyllum spicatum	Eurasian watermilfoil	Principle wetland invasive	*
Onopordum acanthium	Scotch thistle	Noxious	
Origanum vulgare	Wild marjoram	Minor upland invasive	
Panicum capillare	Common witchgrass	Nuisance	*
Panicum miliaceum	Wild proso millet	Noxious	
Persicaria maculata	Lady's thumb	Nuisance	
Persicaria wallichii	Himalayan knotweed	Invasive	*
Phalaris arundinaceae	Reed canarygrass	Invasive	*
Phragmites australis ssp. australis	European common reed	Invasive subspecies	
Pinus sylvestris	Scot's pine	Minor upland invasive	
Plantago lanceolata	Narrow-leaved plantain	Nuisance	
Plantago major	common plantain	Nuisance	*
Poa annua	Annual bluegrass	Nuisance	
Poa compressa	Canada bluegrass	Minor upland invasive	
Poa pratensis	Kentucky bluegrass	Minor upland invasive	
Persicaria wallichii	Himalayan knotweed	Invasive, noxious	*
Potamogeton crispus	Curly pondweed	Minor wetland invasive	
Potentilla recta	Sulphur cinquefoil	Noxious	*
Prunus laurocerasus	Cherry laurel	Garden escape, urban	
Ranunculus repens	Creeping buttercup	Noxious, disturbed sites	*
Robinia pseudo-acacia	Black locust	Minor upland invasive	
Robinia hispida	Bristly locust	Invasive, Kokanee Creek Provincial Park	
Rosa multiflora	Multiflora rose	Minor upland invasive	
Rubus armeniacus	Himalayan blackberry	Invasive	*
Rumex acetosella	Sheep sorrel	Nuisance, disturbed sites	*
Rumex crispus	Curled dock	Nuisance, disturbed sites	*
Salsola kali	Russian thistle	Noxious	
Saponaria officinalis	Bouncing bet	Increasing, disturbed sites	
Sedum acre	Mossy stonecrop	Increasingly abundant	
Senecio jacobaea	Tansy ragwort	Noxious	*
Senecio vulgaris	Common groundsel	Nuisance	*
Setaria viridis	Green foxtail	Noxious	*
Silene latifolia ssp. alba	White cockle	Noxious	*

Scientific Name	English Common Name	Comments	IAPP
Silene noctiflora	Night-flowering catchfly	Noxious	*
Silene vulgaris	Bladder campion	Nusiance	*
Silybum marianum	Milk thistle	Noxious	
Solanum americanum	Black nightshade	Common, disturbed sites	
Solanum dulcamara var. dulcamara	European bittersweet	Disturbed sites	
Solanum physalifolium	Hairy nightshade	Noxious	
Solanum rostratum	Buffalo-bur	Disturbed sites	
Solanum triflorum	Cut-leaved nightshade	Disturbed sites	
Soliva sessilis	Carpet burweed	Invasive, increasing	*
Sonchus arvensis	Perennial sow-thistle	Noxious	*
Sonchus asper	Prickly sow-thistle	Nuisance	
Sonchus oleraceus	Common sow-thistle	Noxious	*
Sorbus aucuparia	European mountain-ash	Highly invasive	
Spartina anglica	English cordgrass	Invasive	*
Spartina densiflora	English cordgrass	Noxious	
Spartina patens	Saltmeadow cordgrass	Noxious	
Spergula arvensis	Corn spurry	Nuisance	*
Stellaria media	Common chickweed	Nuisance	*
Tanacetum vulgare	Common tansy	Noxious	*
Thlaspi arvense	Field pennycress	Nuisance	*
Torilis japonica	Hedge parsley	Nuisance	
Tragopogon dubius	Goatsbeard, yellow salsify	Nuisance	*
Tribulus terrestris	Puncture vine	Noxious	*
Tripleurospermum inodorum	Scentless mayweed	Noxious	
Tussilago farfara	Coltsfoot	Agriculture/urban weed	
Ulex europaeus	Gorse	Noxious	*
Ulmus pumila	Siberian elm	Agriculture/urban weed	*
Ventenata dubia	North Africa grass	Noxious	
Verbascum thapsus	Great mullein	Nuisance	*
Vinca minor	Periwinkle	Urban invasive, ravines	

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April 20, 2016

Mr. Bruce Mathers
E. Mathers Bulldozing Co. Ltd.
Sanstor Farms Ltd.
11700 No. 5 Road
Richmond, B.C. V7A 4E7

Dear Mr. Mathers:

Re: Assessment of Agricultural Capability for 14671 Williams Road, Richmond, B.C.

1. INTRODUCTION

1.1 Terms of Reference

You have requested us to carry out a soil survey and agricultural capability assessment and prepare a technical report on the property described as SOUTH HALF OF THE SOUTH EAST QUARTER SECTION 28 BLOCK 4 NORTH RANGE 5 WEST EXCEPT: SOUTH 33 FEET, NEW WESTMINSTER DISTRICT; PID: 003-464-504; civic address: 14671 Williams Road; +/-8.35 hectares. The purpose of this report is to support an application to the Agricultural Land Commission (ALC) to use the eastern portion of the property for storage and processing of sand dredged from the Fraser River main arm.

The property is wholly located within the Agricultural Land Reserve (ALR) and any non-farm use is prohibited unless an approval from the ALC is secured to allow that use. Storage and processing of sand is an industrial use which would required an application under Section 20(3) of the ALC Act. An application made under Section 20(3) must be considered by the City of Richmond and endorsed by a resolution of Council prior to it being considered by the ALC. The City of Richmond may refuse to endorse the application and this ends the application.

1.2 Qualifications and Field Protocols

A soils on site inspection of the subject lands and a review of surrounding lands was carried out on July 9, 2015 and this report summarizes the findings. The fieldwork and reporting was carried out by Brian M. French, P.Ag. an agricultural soil specialist with 38 years of professional experience and fully qualified to carry out soil survey and land capability classification. A resume of experience is included as Appendix A.

This report has been prepared under procedures and guidelines of the Canadian System for Soil Classification, Publication 1646 (1978) and the Land Capability Classification for

Agriculture in British Columbia, M.O.E. Manual 1 (April 1983).

Soil conditions were determined by exposing a series of test pits using an mini-excavator equipped with a clean-out bucket. The pits were exposed to a depth which penetrated the unweathered parent material. A total of six test pits were exposed on the subject property.

This report has eight sections: Introduction, Location and Land Use, Soils, Agricultural Capability, Agricultural Suitability, Proposed Non-farm Use, Impact Analysis and Summary of Findings.

2. LOCATION AND LAND USE

2.1 Subject Property

(See Figure 2.1, 1:2,000 scale Air Photo. The subject property is +/-8.35 hectares in area.

2.2 Zoning

The City of Richmond zoning is AG1, Agriculture. The OCP designation is Agricultural. The land is completely within the ALR as shown on Figure 2.2.

2.3 Surrounding Land Use

North: Radio towers and grounding field, in the ALR;
East: Ecowaste Industries inert industrial landfill and E. Mathers Bulldozing sand storage; all out of the ALR and slated for industrial development;
South: Plastic greenhouses to the southwest, in the ALR and industrial land out of the ALR to the southeast;
West: Market garden and blueberries, in the ALR.

2.4 Subject Properties Land Use

The western +/-160 metres are cleared and this area contains a dwelling in the SE corner of the cleared area. The currently cleared area has been fallow for many years but supported crop production in the past. The remainder of the property is covered in deciduous brush, primarily White Birch. There is evidence that this area was cleared circa 1980 but never actively farmed and has reverted to deciduous brush.

3. SOILS

3.1 Ministry of Environment 1:25,000 Mapping (see Figure 3.1)

The Ministry of Environment Soils of the Langley-Vancouver Map Area, RAB Bulletin 18

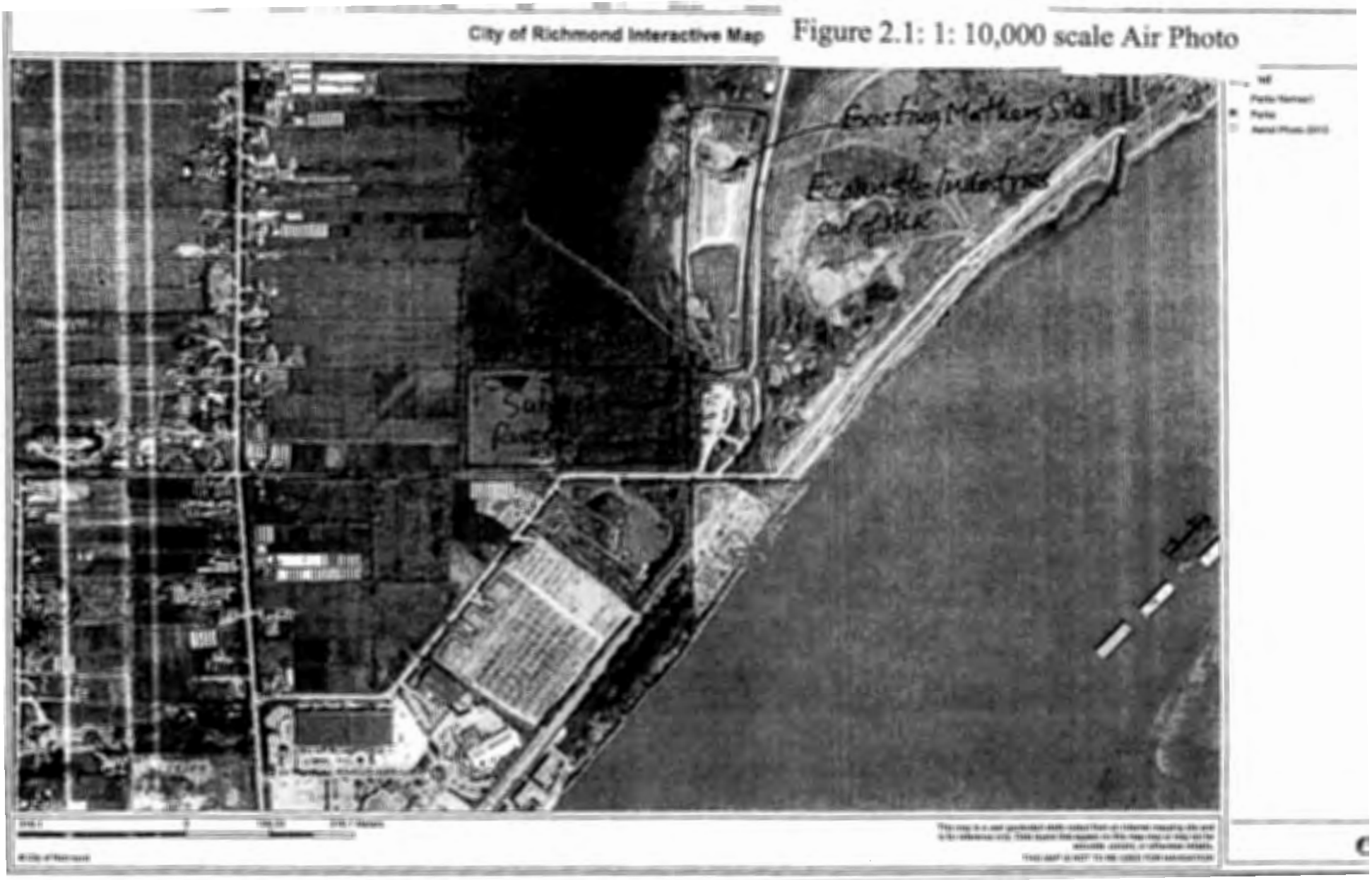


Figure 2.1: 1: 10,000 scale Air Photo

Figure 2.2: ALR Map

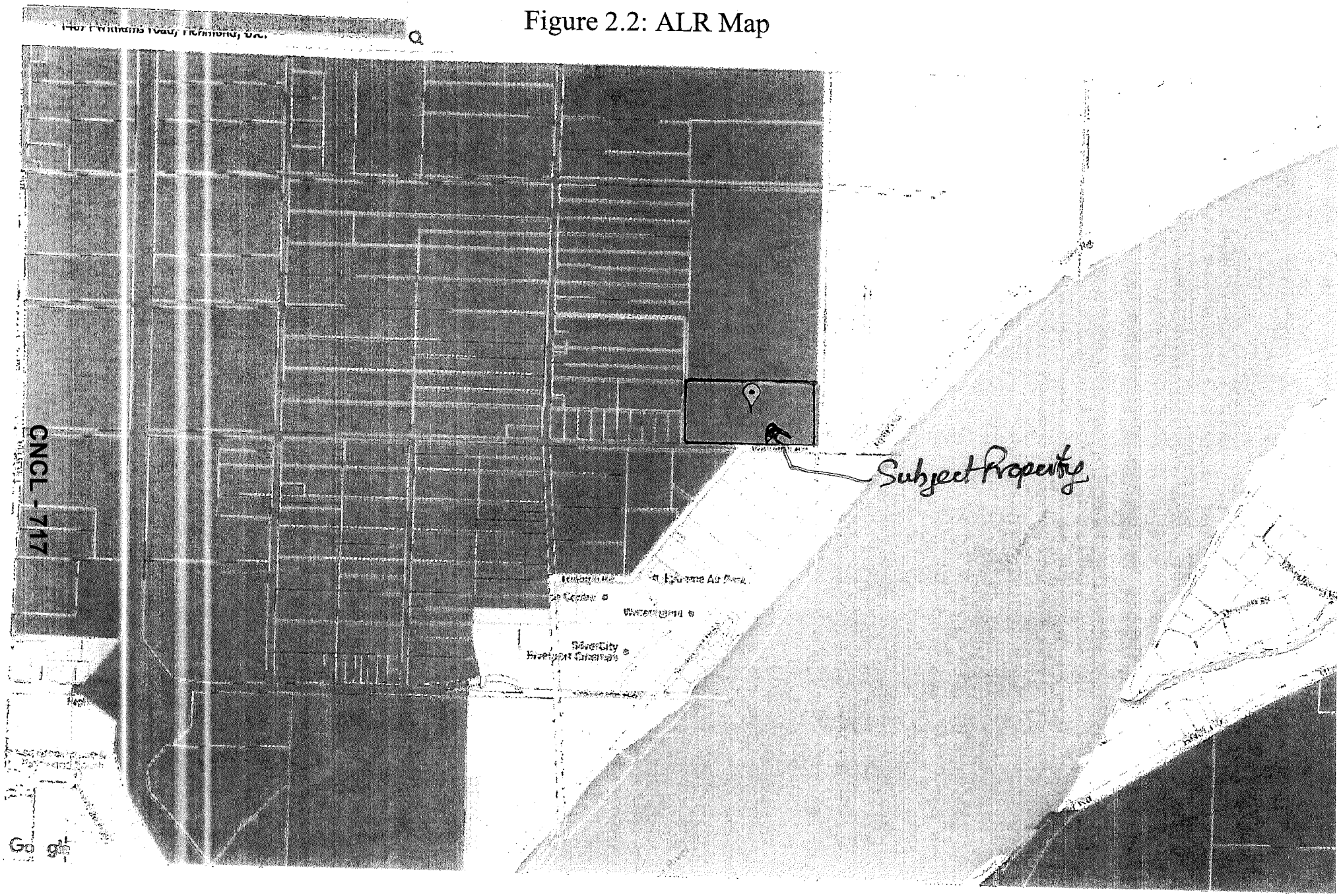
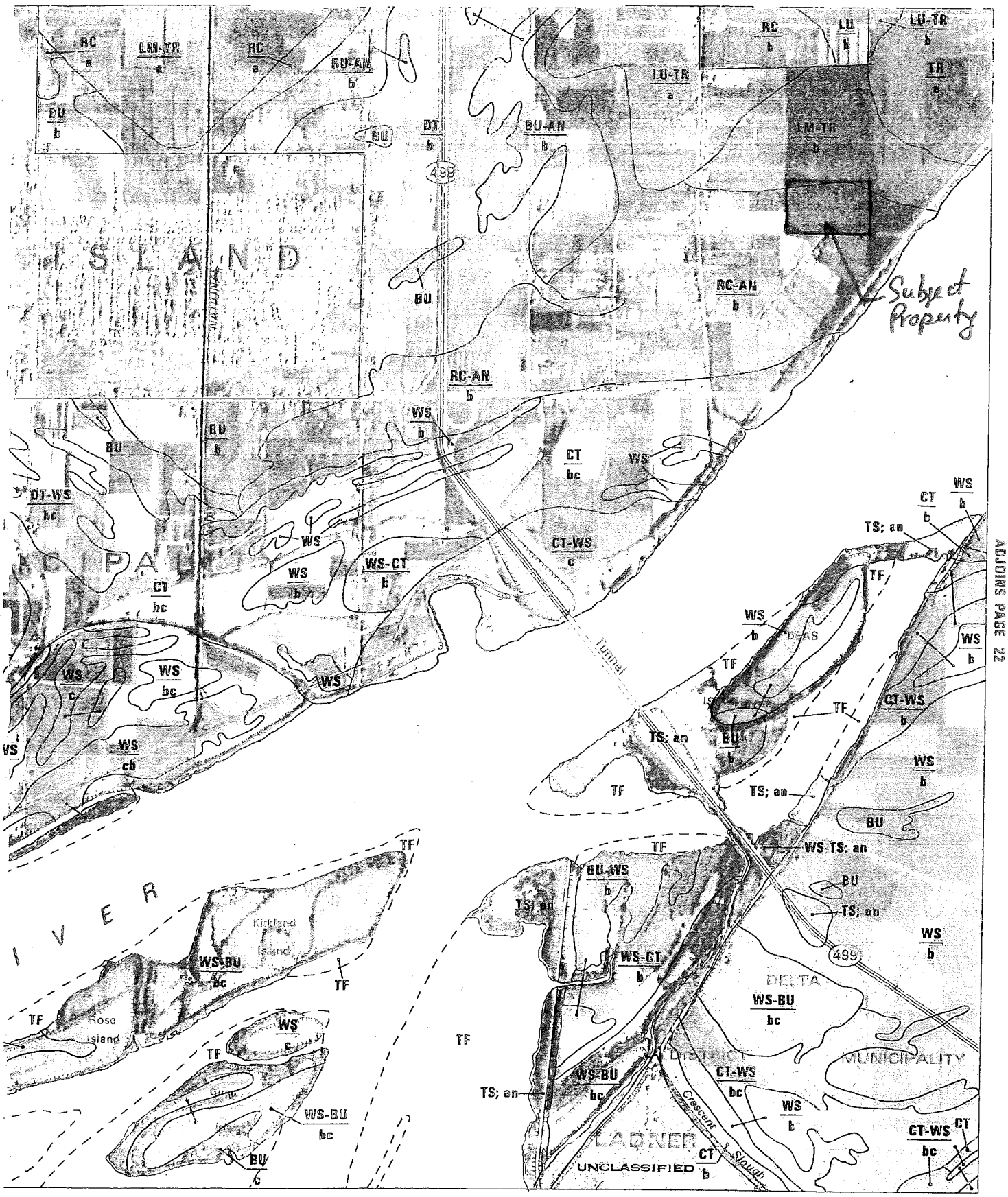


Figure 3.1: MOE 1:25,000 scale Soils Map



at 1:25,000 scale maps the property as a complex of Richmond and Annis Series. Richmond soils are described as being developed from 40 to 160cm of mainly well decomposed organic material overlying moderately fine and medium textured deltaic deposits. Richmond soils are very poorly drained. Agriculturally Richmond soils are limited by mainly high water tables and very acid soil conditions. The underlying subsoils are saline. Liming and subsoil drainage can be employed to reduce acidity and improve drainage.

Annis soils are described as being developed from shallow organic accumulations between 15 and 40cm thick overlying moderately fine to fine textured Fraser River floodplain deposits. Annis soils are poorly to very poorly drained. Poor drainage and heavy subsoil textures limit the usefulness of Annis soils for agriculture. Artificial drainage will widen the range of suitable crops.

3.2 Current On Site Inspection (Figure 3.2)

Six soil pits were excavated with a mini-excavator. Detailed on site inspection and survey at 1:2,000 scale identified two soil units and one anthropic unit on the property. Field notes are included in Appendix B. Laboratory soil test results from Exova are included in Appendix C. Photographs of the soil pits and associated landscapes are included in Appendix D.

3.2.1 Soil Unit I

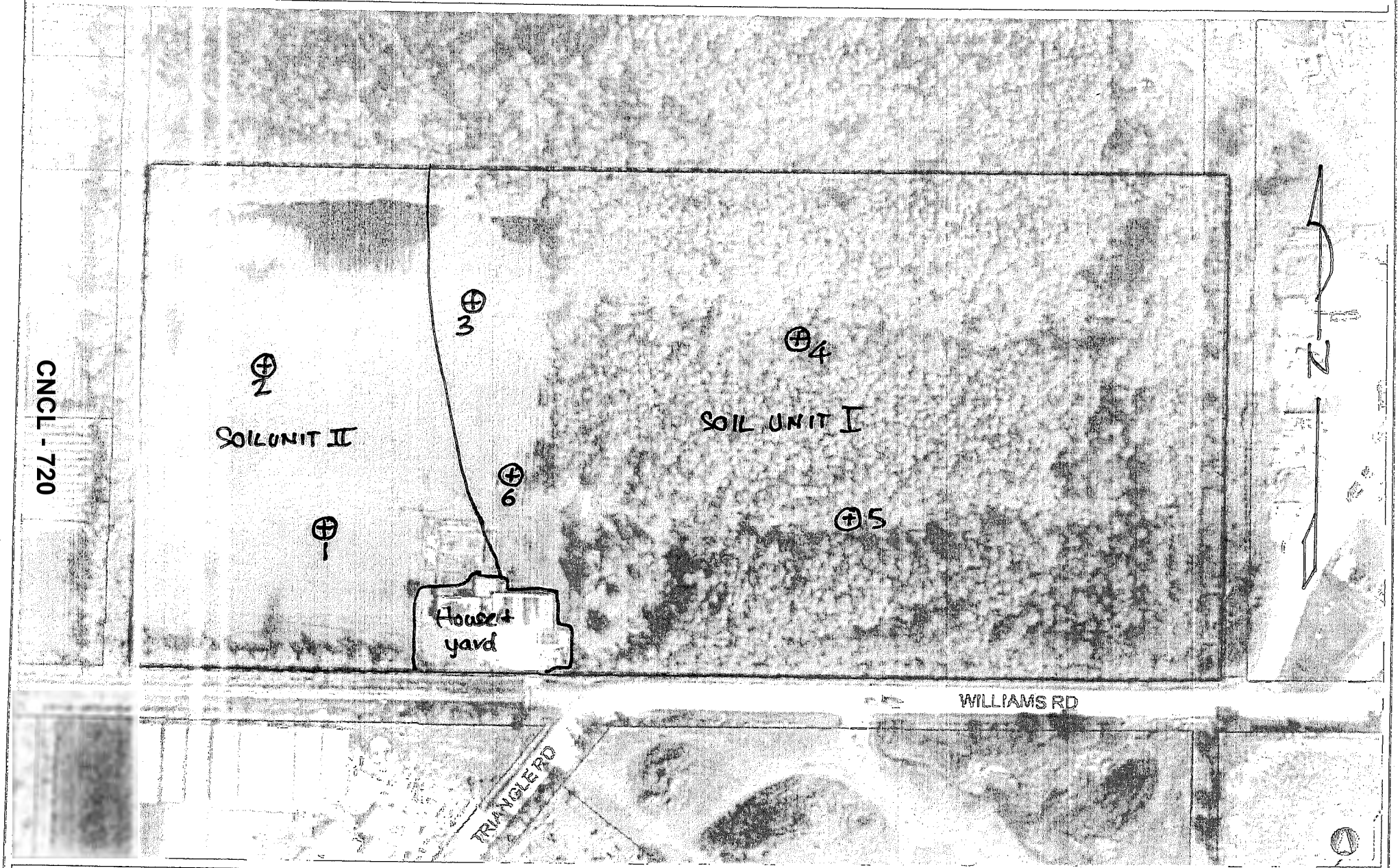
Unit I occupied +/-5.8ha or 70% of the subject area and was the dominant soil unit identified on the subject property and was located on the eastern portion of the property. Unit I was developed from shallow poorly to moderately well decomposed organic peat overlying silty clay and silty clay loam subsoil. The depth of organic surface layer varied from 25 to 40cm in depth. The pH was very low and ranged from 3.8 to 4.0. The electrical conductivity was moderately high, 2.5 to 3.24dS/m, indicating a high salt content. The sulphur content was very high and could be toxic to some plants. The topography was near level to very gently undulating. The vegetation was mostly deciduous brush with some area cleared on the western edge. The vegetation boundary generally followed the soil boundary. This Unit was characteristic of the Annis Series.

A typical soil profile was exposed at Soil Pit # 6 and was described as follows:

OF-M	35 - 0cm	dark reddish brown fibric to mesic organic; near massive structure; common roots; clear boundary to:
Cg	0 - 10cm	grey silty clay loam; massive; no roots.

City of Richmond Interactive Map

Figure 3.2: Current 1:2,000 scale On Site Soils Map



3.2.2 Soil Unit II

Unit II occupied +/-2.93ha or 28% of the subject area and was found on the western, cleared portion of the property. Unit II was developed from moderately well decomposed organic peat overlying silty clay loam subsoil. Two organic horizons were identified, the surface horizon was friable and well decomposed while the underlying organic layer was massive and moderately well decomposed. The surface layer had a near neutral pH of 6.6 while the underlying organic layer had a very acid pH of 3.1. The electrical conductivity was toxic in the lower organic soil at 9.66dS/m. Also, the Sulphur content in this lower layer was very high at greater than 1000mg/kg. The low pH, high E.C. and very high Sulphur content would render this soil toxic to most crops. There is a large depressional area in the centre-north of this unit which would be subject to flooding for extended periods of the year.

A typical soil profile was exposed at Pit #1 and was described as follows:

OM	80 - 50cm	dark reddish brown mesic organic; weak granular structure; friable; common roots; clear boundary to:
OF	50 - 0cm	dark brown fibric peat; massive amorphous structure; saturated; no roots; fairly clear boundary to:
Cg	0 - 10cm+	grey silty clay loam, massive, soft and wet; no roots.

4. AGRICULTURAL CAPABILITY

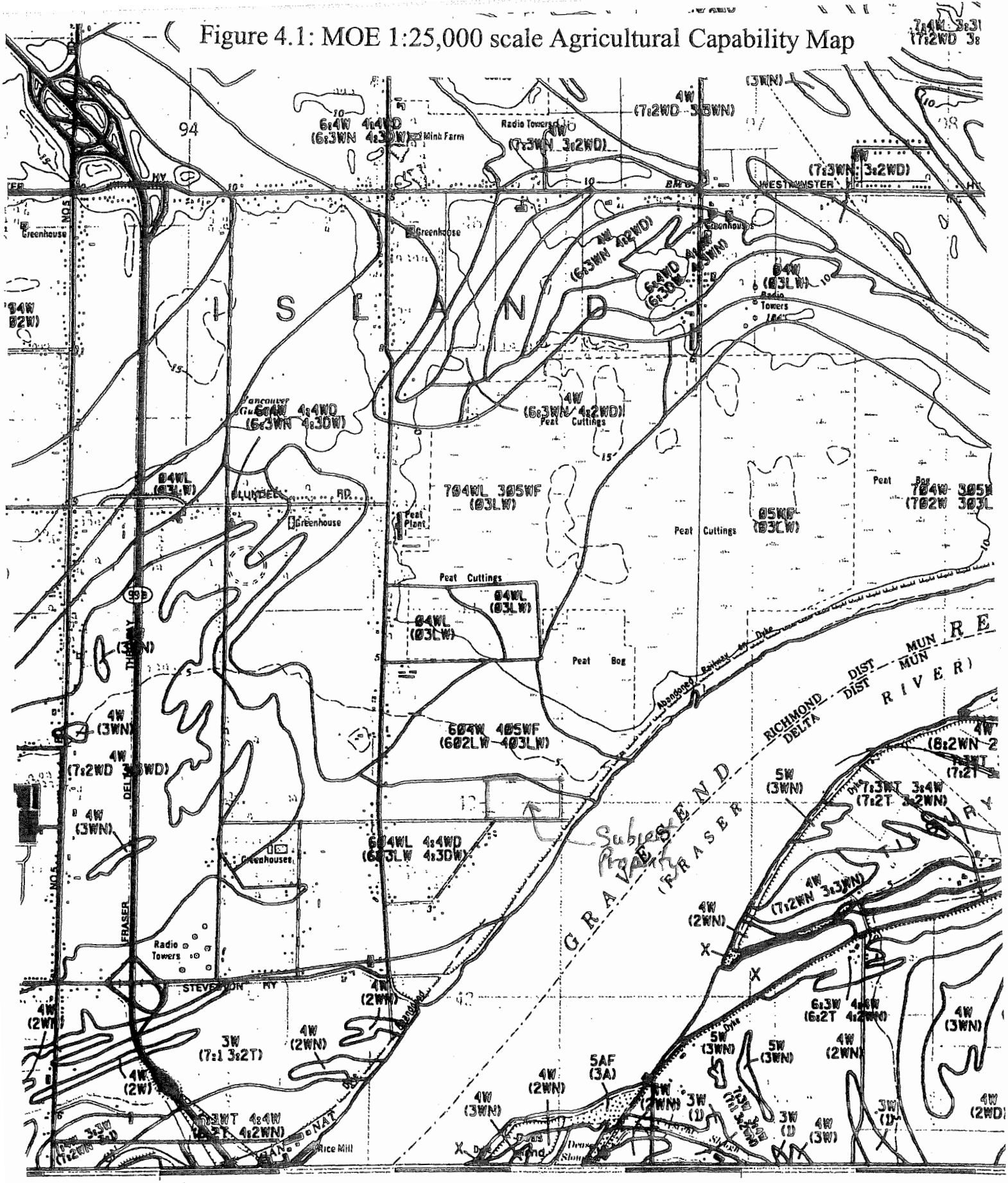
4.1 Ministry of Environment Mapping (Figure 4.1)

The MOE 1:25,000 scale mapping for agricultural capability rated the property as a complex of 60%O4WL - 40%4WD, improvable with drainage and irrigation to 60%O3LW - 40%3DW.

4.2 Detailed On Site Interpretation (Figure 4.2)

Unimproved and improved agricultural capability ratings were applied to the soil units identified on the property. Landscape and climate factors were integrated into the ratings. The Ministry of Environment Land Capability Classification for Agriculture in British Columbia (MOE Manual 1) was used to assign ratings. Excerpts of MOE Manual 1 are included in Appendix E.

Figure 4.1: MOE 1:25,000 scale Agricultural Capability Map

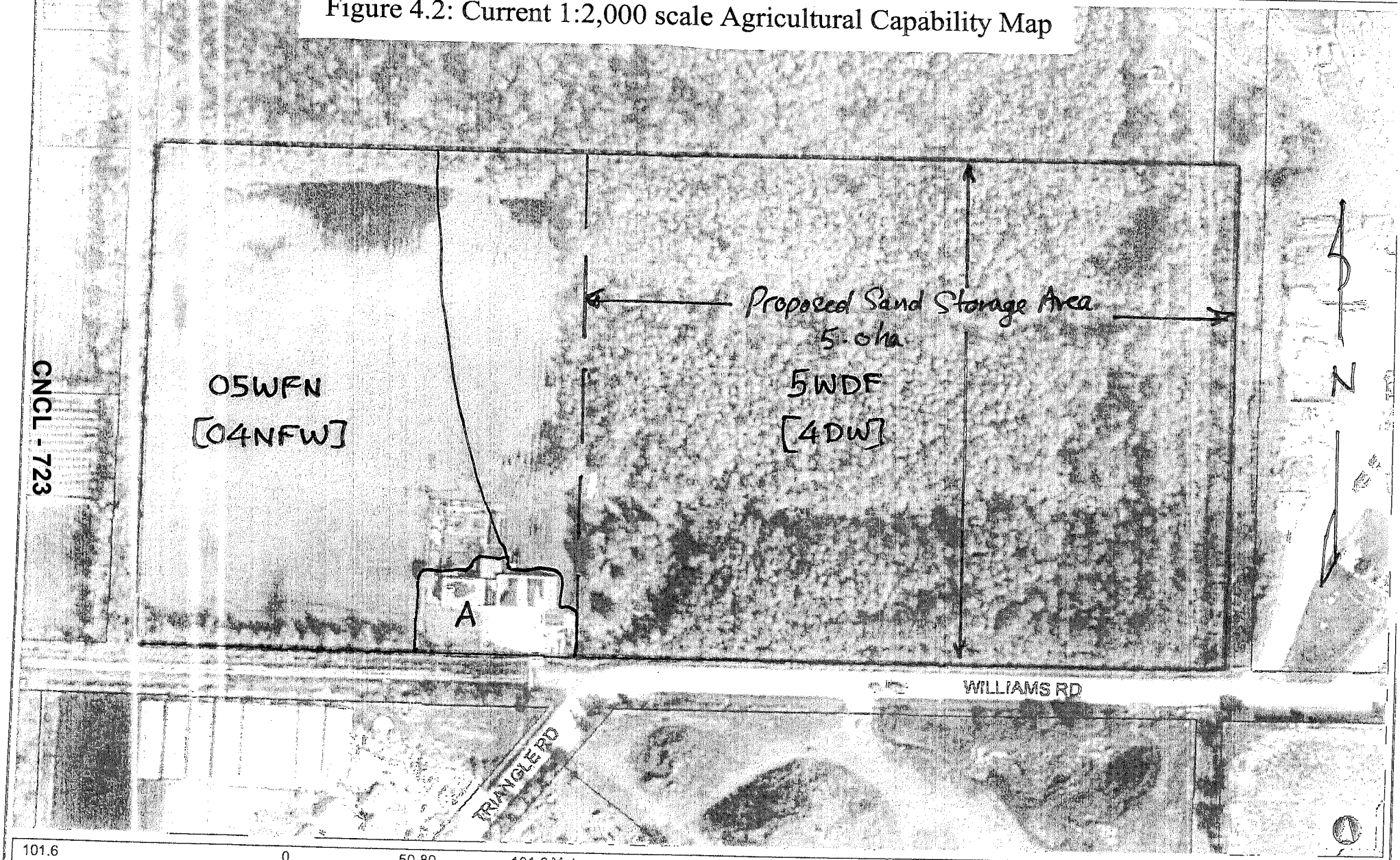


MITCHELL ISLAND

NEW WESTMINSTER DISTRICT

City of Richmond Interactive Map

Figure 4.2: Current 1:2,000 scale Agricultural Capability Map



CNCL - 723

101.6 0 50.80 101.6 Meters

4.2.1 Unit I

Soil Unit I was limited by very poor drainage, low pH and moderately high E.C. The shallow organic surface horizon was underlain by a dense silty clay loam mineral horizon which creates a strong lithologic and hydraulic discontinuity. Most of this unit is in native deciduous forest vegetation. If this site were to be cleared and cultivated, the organic layer would be strongly disturbed and mixed with the underlying unweathered mineral soil. Under cultivation the organic material tends to quickly oxidize and disappear from the soil profile leaving a raw, poorly structured mineral soil unfavorable for crops. These soils are difficult to drain effectively and suffer from high water tables well into the growing season.

An unimproved agricultural capability rating of Class 5WDF was applied and limited improvement could be achieved with subsurface drainage and successive lime applications to Class 4DW. Subsurface drain lines would need to be placed on close spacing to effect improvement in the massive, unweathered mineral subsoil.

4.2.2 Unit II

Unit II was limited by very poor drainage, especially in the depressional area, despite being fitted with subsurface drain lines on 50 foot spacing. The cultivated surface horizon had fairly good structure but the underlying organic soil was massive. The organic subsoil had a very low pH, very high E.C. and very high Sulphur content. Any deep rooted crop would suffer serious damage if it penetrated this horizon. An unimproved agricultural capability rating of Class O5WFN was applied to this unit. With subsurface drainage improved with closer spacing and pumping, successive applications of lime and excessive irrigation to flush out the Sulphur, this unit could be improved over several years to Class O4NFW.

4.2.3 Unit III

Unit III occupied the dwelling, yard and outbuildings on the property and were rated "A" anthropic as disturbed by the activities of man rendering it unsuitable for soil bound agriculture.

4.3 **Summary of Agricultural Capability**

The agricultural capability of the property is summarized in the Table below.

AG. CAP. CLASS	UNIMPR. AG. CAP. (HA)	% OF AREA	IMPROVED AG. CAP (HA)	% OF AREA
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	8.1	98
5	8.1	98	0	0
7	0	0	0	0
Anthropic	0.2	2	0.2	2
TOTAL	**8.3**	**100**	**8.3**	**8.3**

4.4 **Comparison of MOE and Current Ratings**

The current ratings applied to Unit I are similar to those applied by the MOE mapping. A slightly harsher rating has been applied to the soils on the subject property because of the difficult management issues related to the shallow organic layer overlying dense, unweathered silty clay subsoil on Unit I and the fertility issues associated with Unit II. The current survey lowers the unimproved and improved classes by one level over the MOE ratings to account for these site limitations.

5. AGRICULTURAL SUITABILITY

Agricultural suitability is a further interpretation of agricultural potential based on soil, crop, climate and productivity limitations for the site and the area. While agricultural capability is an abstract classification indicating the range of crops which could be grown, agricultural suitability more closely represents the practical commercial options for agricultural use of the land. It has been assumed in making these suitability interpretations that the improvements as required to achieve the improved agricultural capability ratings would be in place. Soil bound uses are discussed for each capability unit. Non-soil bound uses are discussed in general terms.

5.1 **Soil Bound Agricultural Uses**

The shallow organic layer overlying dense, unweathered clay on Unit I would present significant management challenges for growing annual crops. Long term fertility amendments and drainage improvements would be required to bring these soils up to an acceptable standard for a range of crops. Perennial berry crops would be limited to Blueberries but the shallow organic layer and dissimilar unweathered underlying mineral soil

would create rooting limitations. Field crops such as corn or cereals would be poorly suited to this unit due to spring and fall risk of wet soil conditions which would delay planting and harvesting.

In terms of soil bound crops, Unit II on the subject property has moderate to low suitability for shallow rooted crops with moderate to high tolerance for wetness. Leafy vegetables and blueberries are grown on the lands to the west of the subject property with soils similar to Unit II. Deeper rooted annual or perennial crops would be severely limited by the underlying soil conditions.

Forage based agriculture in support of livestock depends on growing forages, field corn and cereals to feed the animals. All of these crops could be grown on the subject parcel but the wet soil conditions are not conducive to livestock rearing due to the potential for foot disease issues, particularly with sheep and cattle. The suitability for forage production is low to moderate since these organic soils are susceptible to invasion by undesirable weeds and rushes in forage and planting and harvesting annual field crops is limited by the wet soil conditions in the spring and fall.

5.2 Non Soil Bound Agricultural Uses

Non soil bound uses include greenhouses, mushroom production, feedlot and pot nursery. The primary limitation on the subject property to these uses is the organic soils which have a very low load bearing capacity for buildings. Any of these uses would require stabilization of the organic soils and preload fill in order to provide a suitable building foundation. It would be unusual to find this kind of development on organic soils for this reason. Plastic hoop cold frame greenhouses are common on these soils and are considered suitable for this site. Otherwise, this site is considered unsuitable for most non-soil bound uses.

6. PROPOSED NON-FARM USE OF LAND

6.1 Background

Mathers Bulldozing, a long standing Richmond business, provides an important service to the agricultural community in Richmond and Delta by providing clean, salt free Fraser River sand to Cranberry growers, West Coast Instant Lawns turf farm and other farmers in need of sand. While pre-load sand is commonly available from building sites, this sand is often contaminated with foreign materials which are harmful in agricultural applications such as topdressing. Mathers is the major supplier of agricultural quality sand in Richmond and Delta and has a long time relationship with the local farm community.

Mathers has received a number of letters from agricultural and golf course customers with land in the ALR who depend on the high quality sand supplied by Mathers Bulldozing. These letters are found in Appendix F.

Mathers retained the services of Bruce Richardson, Vice President Industrial Properties at CBRE Commercial Real Estate company and he summarizes in a letter dated November 17, 2015 his efforts trying to find a suitable relocation site for Mathers Bulldozing during the past five years. This letter is included in Appendix F.

6.2 Proposed Non-Farm Development

Mathers would require approximately 5 hectares of land for their operation which is similar to the area currently occupied on the Ecowaste site. The footprint would be limited to the eastern, forested area of the property.

The vegetation would be carefully cleared and the site grubbed. The surface organic soil would be stripped and moved to the adjacent cleared area and placed in an even layer approximately 0.5 metres thick over the existing soil. Additional subsurface drains would be plowed in between the existing drain lines to provide adequate drainage potential. A buried mainline collector would be installed connected to a sump with a pump to provide an artificial invert for the drains. The local ditches are not generally adequate for proper drainage in the critical spring and fall periods as the water levels are uncertain. The added organic soil would be cultivated, limed and fertilized to prepare a suitable seedbed for a wide range of crops.

Development of the site would be carried out during the summer to ensure that soil damage does not occur from the necessary equipment traffic during the development works.

Mathers intends to contract with a bone-fide farmer interested in farming the western portion of the property once the land renovation work, including soil amendment, fertility amendment and drainage is completed. This will be an attractive and desirable piece of farmland superior to most of the surrounding agricultural lands.

The stripped area proposed for the non-farm use for sand storage would be serially filled with dredge sand and then sold as required to satisfy the dredging schedule on the river. The minimal infrastructure to be installed would include an access, scale and scalehouse in the SE corner, a non-permanent fabric roof equipment shed probably located on the current paved area near the house and use of the existing dwelling as an office. The dredging infrastructure composed of buried and surface input pipe and drainage water conduit are already installed along the western boundary of the existing Mathers site and would be reconfigured to fit the new site.

6.3 Reclamation if Site Decommissioned

6.3.1 Reclamation Activities

In the unlikely event of Mathers quitting the site, it would be reclaimed for agricultural use. Reclamation would entail:

a) stripping and stockpiling of +/-100,000m3 of sand to be used in reclamation;
b) removal of infrastructure from the site;
c) ripping the native sub-base to a depth of 1 metre in two directions at one metre spacing to loosen the clay;
d) replace stockpiled sand to a depth of +/- 2 metres spread evenly over the disturbed site; the target finished elevation would be 1.0 metres geodetic;
e) import Class A compost onto the site to provide a placed depth of at least 150mm and cultivate into the sand layer top a depth of 400mm;
f) Install a subsurface drainage system consistent with the improved system on the existing field;
f) manage fertility as required to bring the site up to an acceptable agricultural standard for a range of crops;
g) establish a cover crop if a perennial crop is not intended for immediate planting;
h) secure a suitable source of irrigation water either from municipal water supply or ditch water having low salt content.

The final reclaimed agricultural capability would be Class 4A unimproved with improvement to Class 2A with irrigation. This reclaimed land would be highly suited for root crops, leafy vegetables, berries and field crops.

6.3.2 Reclamation Cost Estimate

The estimated cost to carry out the decommissioning and reclamation of the sand storage site in case of closure is as follows:

ACTIVITY	DETAILS	COST
REMOVE INFRASTRUCTURE	REMOVE BUILDINGS & SCALE	10,000
STRIP AND STOCKPILE SAND FOR RECLAMATION ABOVE CLAY BASE	50000M2 AREA 2M DEEP = 100,000M3 @$0.50/M3	50,000
RIP CLAY SUBSOIL TO 1M DEPTH IN 2 DIRECTIONS	RIP WITH DOZER AND RIPPER, 3,000M2/HR FOR TWO TREATMENTS = 25 HRS @ $200/HR	5,000
REPLACE STOCKPILED SAND	100,000M3 @ 0.50/M3	50,000
SUPPLY & PLACE COMPOST	50,000M2 x 0.15M = 7,500M3 @ $15.00/M3 IN PLACE	112,500
DRAINAGE, IRRIGATION, CULTIVATION & SEEDING	50,000M2 @ 0.50/M2	25,000
MONITORING AND SUPERVISION	DURING DECOMMISSIONING AND RECLAMATION	20,000
ESTIMATED TOTAL RECLAMATION COST		**272,500**

Therefore the total estimated cost to reclaim the sand storage site to an acceptable agricultural condition if the sand storage activity were to cease is $272,500. Bonding to secure this eventuality with contingency allowance in the amount of $300,000 would ensure that the site could be returned to productive agriculture.

7. IMPACT ANALYSIS

7.1 Impact of Agricultural Development of Subject Lands on Surrounding Lands

There is no current agricultural activity on the subject property but historic crop production has been carried out on the western portion with the deeper organic soils. Clearing and agricultural development of the eastern forested area would have little or no impact on surrounding lands. The lands to the east are out of the ALR and slated for industrial development. The property to the north is a radio transmission site.

7.2 Potential Impact of Non-farm Use for Sand Storage and Processing on Local and Regional Agricultural Productive Capacity

The subject lands are currently not producing any agricultural crops. Historically the western 35% of the property was in agricultural production while the eastern 62% was cleared circa 1980 but has not been actively farmed and reverted to deciduous brush, today's condition. The intent is to occupy only the eastern portion for the non-farm use and carry out agricultural improvement on the western portion and bring it back into active agricultural production.

Mathers is a major supplier of agricultural sand to Cranberry producers and other farmers including West Coast Instant lawns in Delta which uses substantial quantities of sand to ament its turf fields. Securing high quality, salt free sand is critical for farmers.

While some five hectares of land will be occupied by the sand facility, this land has never been cleared and used for agriculture in recent history. The loss of the agricultural sand source currently provided by Mathers on its Ecowaste site would have a serious impact on farmers who depend on a reliable source of sand. Suitable sites for dredge sand storage are becoming very hard to secure as formerly vacant lands along the Fraser River are converted to higher uses such as warehousing and automobile storage. The non-farm use of this +/-5 hectares of land would not have any impact on local or regional agricultural productive capacity and the proposed improvements to the western portion and leasing to a local farmer would provide increased production capacity on this currently fallow land.

7.3 Potential of Non-farm Use of the Subject Lands for Impact on Surrounding Agricultural Operations

The only agricultural uses are located immediately west of the subject property and a small plastic greenhouse operation to the south of the fallow field. These operations would be buffered by the proposed active agricultural use on the +/-3 hectares on the western portion of the property.

7.4 Precedent of Non-farm Use Triggering Future Applications

The Mathers sand operation is quite unique and there is little opportunity for a similar type of operation to set up in this location. Industrial lands outside the ALR are generally unavailable for this type of use due to the economic pressures for high value commercial and industrial uses to occupy these lands. Mathers have for several years tried to find another location in this area but have been unsuccessful.

8. SUMMARY AND CONCLUSIONS

8.1 Some 8.1 hectares or 98% of the 8.3 hectares on the subject lands have a Class 5 unimproved capability. The area occupied by the dwelling and yard is 0.2 hectares and was rated "A", anthropic with no soil bound agricultural capability. With drainage, irrigation and fertility improvements the Class 5 land would improve to Class 4. If the sand storage facility is allowed, the 3 hectare western area would be improved to Class 2 by the placement of additional organic soil, additional subsurface drainage and fertility amendments.

8.2 Mathers Bulldozing currently operates a dredged river sand depot on lands adjacent to the subject property which are slated for industrial development in the near future resulting in displacement of the Mathers depot. Mathers has canvassed the local area for a suitable non-ALR site without success.

8.3 Mathers provides an important service to the local agricultural community by supplying clean, salt free sand for Cranberry farmers and others including West Coast Instant Lawns in Delta. Clean sand is critical component in these operations.

8.4 Mathers would like to move its existing operation to the subject property and use the eastern +/-5 hectares of the subject property for stockpiling river sand dredged from the Fraser River. This land has never been cleared or used for agriculture in recent history.

8.5 Organic soil stripped from the proposed sand storage site would be placed on the adjacent agricultural land to the west to improve the serious fertility issues on this land.

8.6 In the unlikely event of Mathers ceasing to use the site, it would be reclaimed to a better improved agricultural capability than currently exists, by two classes to Class 2A. The estimated reclamation cost is $272,500 which could be secured by bonding.

C & F LAND RESOURCE CONSULTANTS LTD.

Per: BM French

Brian M. French, P.Ag.

File:\Mathers-williams report

Appendix A: Resume of Experience, Brian French, P.Ag.

BRIEF RESUME OF EXPERIENCE
Brian M. French, P.Ag.

Business Address: **C&F Land Resource Consultants Ltd.**
4383 Happy Valley Road
Victoria, B.C. Canada V9C 3Z3
Tel: (250) 474-5072; Fax: (250) 474-5073
E-mail: cflrc@shaw.ca

Education: B.Sc.(Agriculture) , Honours Soil Science, 1971
Professional Affiliation: Member, B.C. Institute of Agrologists

Professional Experience:

- 3 years as Staff Agrologist with Agricultural Land Commission responsible for technical support to the Commission and staff, attendance to E.L.U.C. hearings, participated in ALR fine tuning reviews;

- 4 years as consultant to the ministry of Lands, Parks and Housing carrying out major reviews of crown land suitability for agricultural leases in Omineca and Cariboo regions;

- 22 years as a soils and land use consultant with a broad spectrum of clients including the Agricultural Land Commission, provincial government, municipal government, Municipal Insurance Association, R.C.M.P. major crimes unit, utility companies, major corporations and individuals. Projects completed include many individual parcel agricultural capability assessments; comprehensive land use plans (Maple Ridge Rural Land Use Plan for ALC); technical mediation (Six Mile Ranch ALR exclusion issue for Ministry of Agriculture); Utility Corridor issues (B.C. Gas Surrey-Langley 42" pipeline project and many other sewer, water and drainage projects for G.V.R.D., F.V.R.D. and others); forensic soil and land use services (technical assistance to RCMP-Vancouver Police Joint Task Force on Picton pig farm sites in Port Coquitlam); agricultural land infrastructure development for drainage, greenhouse development, irrigation and leveling.

- Drainage design and supervision including gravel pit and soil dumpsite storm water management plans; agricultural land drainage; urban rain garden soil specification and analysis of water flow in soils.

- Golf course and sports field development and technical services (design, construction and management for various clients including Vancouver Parks Board, Coquitlam Parks Board, Saanich Parks & Recreation, Oak Bay Parks, Shawnigan Lake School);

- Aggregate industry development and reclamation services; responsible for exploration, permitting, preparation of plans, monitoring of work, supervision of rehabilitation and closure. Major clients include Lafarge Canada, Fraser Valley

Aggregates, Imperial Paving, Columbia Bitulithic as well as several smaller companies throughout B.C.;

- Soil and inert industrial landfill services; responsible for permitting, preparation of operating and rehabilitation plans, monitoring of works, reporting and closure. Involved in numerous significant operations;

- Composting industry services including development of plans to conform to the Organic Matter Recycling Regulation and municipal bylaws; monitoring and closure plans.

Brian French, P.Ag.

March 1, 2016

Appendix B: Field Notes

FIELD NOTES FOR 14671 WILLIAMS ROAD, RICHMOND, B.C.

July 9, 2015

Pit 1: cleared field, wild grass cover; near level topography.

OM	80 - 50cm	dark reddish brown mesic organic; weak granular structure; friable; common roots; clear boundary to:
OF	50 - 0cm	dark brown fibric peat; massive amorphous structure; saturated; no roots; fairly clear boundary to:
Cg	0 - 10cm+	grey silty clay loam, massive, soft and wet; no roots.

Pit 2: cleared field, wild grass cover, near level topography.

OM	65 - 35cm	dark reddish brown mesic organic; weak granular structure; friable; common roots; clear boundary to:
OF	35 - 0cm	dark brown fibric peat, massive, amorphous structure; no roots; clear boundary to:
Cg	0 - 10cm+	grey to grey brown silty clay loam; massive, soft and wet; no roots.

Pit 3: cleared field, wild grass cover; near level topography.

OM	45 - 30cm	dark reddish brown mesic organic, weak granular structure, friable; common roots; fairly clear boundary to:
OF	15 - 0cm	dark brown fibric to medic organic; massive, amorphous structure; no roots; clear boundary to:
Cg	0 - 5cm+	grey to grey brown silty clay loam; massive; soft and wet; no roots.

Pit 4: In wooded area north; white birch overstory; near level to slightly undulating topography.

OF	20 - 0cm	dark reddish brown fibric organic, weak granular structure; very common roots; clear boundary to:
Cg	0 - 20cm+	grey silty clay loam; massive; few roots.

Pit 5: wooded deciduous area south, near level to slightly undulating; white birch overstory.

OF	40 - 20cm	dark reddish brown fibric organic; weak granular structure; common roots; diffuse boundary to:

OM-F	20 - 0cm	dark brown fibric to mesic organic; massive structure; fairly common roots; clear boundary to:
Cg	0 - 20cm+	grey silty clay loam; massive, moderately firm; very few roots.

Pit 6: near south east side of cleared field; near level topography.

OF-M	35 - 0cm	dark reddish brown fibric to mesic organic; near massive structure; common roots; clear boundary to:
Cg	0 - 10cm	grey silty clay loam; massive; no roots.

Appendix C: Exova Soil Test Report

Exova
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W: www.exova.com

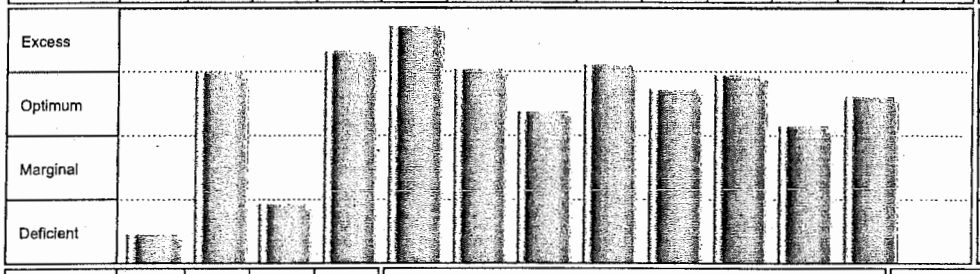
Exova

Farm Soil Analysis

Bill To:	C & F Land Resource	Grower Name:		Lot Number:	1084847
Report To:	C & F Land Resource	Client's Sample Id:	0-40 cm	Report Number:	2030214
		Field Id:	Pit 1 AP	Date Received:	Jul 29, 2015
	4383 Happy Valley Road	Acres:		Disposal Date:	Aug 28, 2015
	Victoria, BC., Canada	Legal Location:		Report Date:	Jul 31, 2015
	V9C 3Z3	Last Crop:	Crop not provided	Arrival Condition:	
Agreement:	101594				

Nutrient analysis (ppm)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl	BiCarbP
0" - 6"	9	>60	70	93	7480	399	377	15.0	15	3.4	8.9	64.1	



Soil Quality

pH	EC(dS/m)	OM(%)	Sample#
6.6	0.86	58.9	5153581

Alkaline	*Very Toxic*	*High*
→ *Neutral*	*Toxic*	*Normal*
Acidic	*Caution*	*Low*
Very Acidic	→ *Good*	*Very Low*

	N	P	K	S
Total lbs/acre	18	120	140	187
Estimated lbs/acre	36	120	140	381

Texture *Sandy Loam* Hand Texture *n/a*

Sand 53.3 % Silt 35.1 % Clay 11.6 %

Ammonium n/a

Lime 0 T/ac Buffer pH 5.9

BS 79.9 %

Ca 70.7 % Mg 6.2 % Na 2.6 % K 0.3 %

TEC 52.8 meq/100g Na 320 ppm

Est. N Release n/a C:N Ratio n/a

*Nitrate-N **Sulfate-S n/a = not analysed

RECOMMENDATIONS FOR BALANCED CROP NUTRITION

	Crop not provided				
Macro-nutrients	Yield	N	P_2O_5	K_2O	S
Growing Condition		To be added (lbs/acre)			
Excellent					
Average					
Your Goal					
Removal Rate (Seed/Total)					
Micro-nutrients	Iron	Copper	Zinc	Boron	Manganese
To be added (lbs/ac)					

The crop is not provided.
Call to request a crop-specific recommendation.

Comments:

Recommendations are based on general research consensus. They should not replace responsible judgement.

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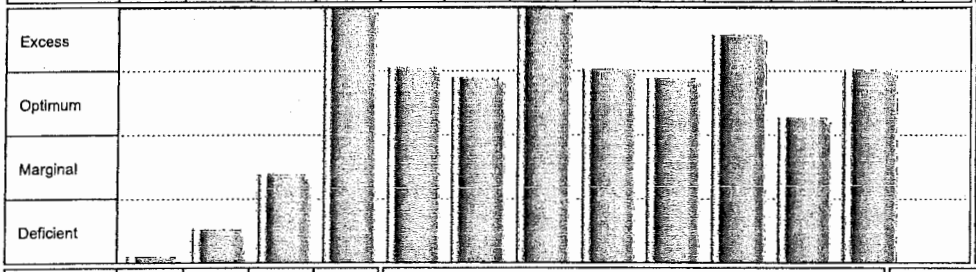
Exova

Farm Soil Analysis

Bill To:	C & F Land Resource	Grower Name:		Lot Number:	1084847
Report To:	C & F Land Resource	Client's Sample Id:	40-100 cm	Report Number:	2030215
		Field Id:	Pit 1 OF-M	Date Received:	Jul 29, 2015
	4383 Happy Valley Road	Acres:		Disposal Date:	Aug 28, 2015
	Victoria, BC., Canada	Legal Location:		Report Date:	Jul 31, 2015
	V9C 3Z3	Last Crop:	Crop not provided	Arrival Condition:	
Agreement:	101594				

Nutrient analysis (ppm)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl	BiCarbP
0" - 6"	<2	8	105	>1000	1600	230	3490	8.9	20	7.3	15	112	



Total lbs/acre	4	16	210	20000
Estimated lbs/acre	8	16	210	40729

*Nitrate-N **Sulfate-S n/a = not analysed

Soil Quality

pH	EC(dS/m)	OM(%)	Sample#
3.1	9.66	34.8	5153582

Alkaline	*Very Toxic*	*High*
Neutral	*Toxic*	*Normal*
Acidic	*Caution*	*Low*
Very Acidic	*Good*	*Very Low*

Texture *Sandy Loam* Hand Texture *n/a*

Sand 62.5 % Silt 28.9 % Clay 8.6 %

Ammonium n/a

Lime 34.4 T/ac Buffer pH 3.5 Est. N Release n/a C:N Ratio n/a

BS 23.2 %

Ca 17.5 % Mg 4.2 % Na 1.0 % K 0.6 %

TEC 45.6 meq/100g Na 100 ppm

RECOMMENDATIONS FOR BALANCED CROP NUTRITION

	Crop not provided				
Macro-nutrients	Yield	N	P2O5	K2O	S
Growing Condition		To be added (lbs/acre)			
Excellent					
Average					
Your Goal					
Removal Rate (Seed/Total)					
Micro-nutrients	Iron	Copper	Zinc	Boron	Manganese
To be added (lbs/ac)					

Comments:

Recommendations are based on general research consensus. They should not replace responsible judgement.

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W: www.exova.com

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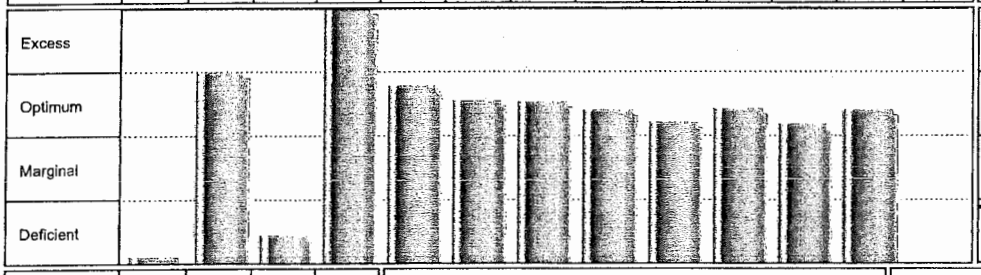
Farm Soil Analysis

Bill To:	C & F Land Resource	Grower Name:		Lot Number:	1084847
Report To:	C & F Land Resource	Client's Sample Id:	0-80 cm	Report Number:	2030216
		Field Id:	Pit 2 OF	Date Received:	Jul 29, 2015
	4383 Happy Valley Road	Acres:		Disposal Date:	Aug 28, 2015
	Victoria, BC., Canada	Legal Location:		Report Date:	Jul 31, 2015
	V9C 3Z3	Last Crop:	Crop not provided	Arrival Condition:	
Agreement:	101594				

Nutrient analysis (ppm)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl	BiCarbP
0" - 6"	<2	>60	33	300	832	152	540	2.5	<5	2	11	45	



Total lbs/acre	4	120	66	599
Estimated lbs/acre	8	120	66	1220

*Nitrate-N **Sulfate-S n/a = not analysed

Soil Quality

pH	EC(dS/m)	OM(%)	Sample#
4.1	1.23	64.1	5153583

Alkaline	*Very Toxic*	*High*
Neutral	*Toxic*	*Normal*
Acidic	*Caution*	*Low*
Very Acidic	*Good*	*Very Low*

Texture *n/a* Hand Texture *n/a*

Sand n/a Silt n/a Clay n/a

Ammonium n/a

Lime 23.9 T/ac Buffer pH 4.1

BS 17 %

Ca 12.0 % Mg 3.6 % Na 1 % K 0.2 %

TEC 34.6 meq/100g Na 80 ppm

Est. N Release n/a C:N Ratio n/a

RECOMMENDATIONS FOR BALANCED CROP NUTRITION

	Crop not provided				
Macro-nutrients	Yield	N	P_2O_5	K_2O	S
Growing Condition		To be added (lbs/acre)			
Excellent					
Average					
Your Goal					
Removal Rate (Seed/Total)					
Micro-nutrients	Iron	Copper	Zinc	Boron	Manganese
To be added (lbs/ac)					

The crop is not provided.
Call to request a crop-specific recommendation.

Comments:

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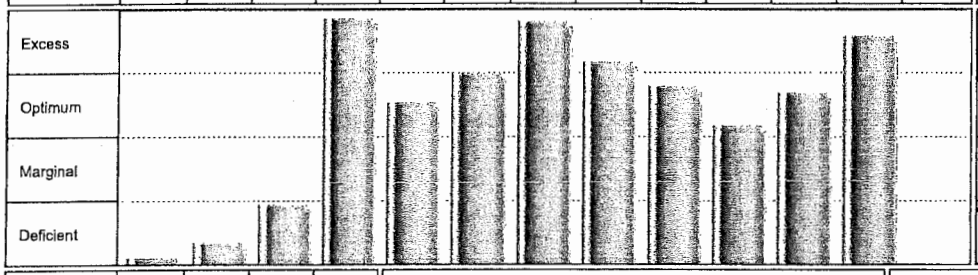
Farm Soil Analysis

Bill To:	C & F Land Resource	Grower Name:		Lot Number:	1084847
Report To:	C & F Land Resource	Client's Sample Id:	0-40 cm	Report Number:	2030217
		Field Id:	Pit 5 OM	Date Received:	Jul 29, 2015
	4383 Happy Valley Road	Acres:		Disposal Date:	Aug 28, 2015
	Victoria, BC., Canada	Legal Location:		Report Date:	Jul 31, 2015
	V9C 3Z3	Last Crop:	Crop not provided	Arrival Condition:	
Agreement:	101594				

Nutrient analysis (ppm)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl	BiCarbP
0" - 6"	<2	<5	70	215	633	257	1800	21.5	20	1	35.3	334	



Soil Quality

pH	EC(dS/m)	OM(%)	Sample#
4.0	2.50	62.3	5153584

Alkaline	*Very Toxic*	*High*	
Neutral	*Toxic*	*Normal*	
Acidic	*Caution*	*Low*	
Very Acidic	*Good*	*Very Low*	

Total lbs/acre	4	10	141	430
Estimated lbs/acre	8	10	141	876

Texture *Sandy Loam* Hand Texture *n/a*
Sand 61.3 % Silt 21.8 % Clay 16.9 %
Ammonium n/a
Lime 31.5 T/ac Buffer pH 3.7

BS 21 %
Ca 7.5 % Mg 5.0 % Na 8.1 % K 0.4 %
TEC 42.3 meq/100g Na 780 ppm
Est. N Release n/a C:N Ratio n/a

*Nitrate-N **Sulfate-S n/a = not analysed

RECOMMENDATIONS FOR BALANCED CROP NUTRITION

	Crop not provided				
Macro-nutrients	Yield	N	P_2O_5	K_2O	S
Growing Condition		To be added (lbs/acre)			
Excellent					
Average					
Your Goal					
Removal Rate (Seed/Total)					
Micro-nutrients	Iron	Copper	Zinc	Boron	Manganese
To be added (lbs/ac)					

The crop is not provided.
Call to request a crop-specific recommendation.

Comments:

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W: www.exova.com

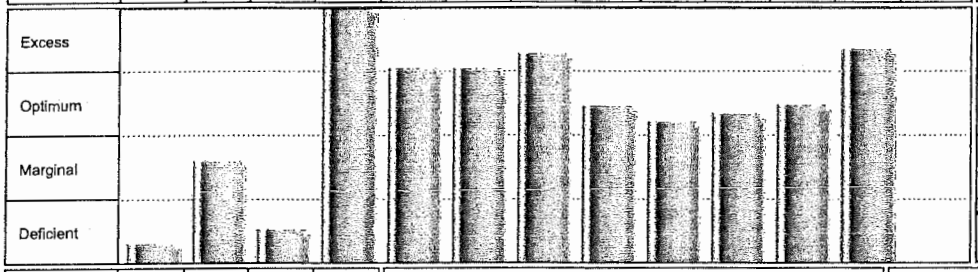
Exova

Farm Soil Analysis

Bill To:	C & F Land Resource	Grower Name:		Lot Number:	1084847
Report To:	C & F Land Resource	Client's Sample Id:	0-35 cm	Report Number:	2030218
		Field Id:	Pit 6 OF	Date Received:	Jul 29, 2015
	4383 Happy Valley Road	Acres:		Disposal Date:	Aug 28, 2015
	Victoria, BC., Canada	Legal Location:		Report Date:	Jul 31, 2015
	V9C 3Z3	Last Crop:	Crop not provided	Arrival Condition:	
Agreement:	101594				

Nutrient analysis (ppm)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl	BiCarbP
0" - 6"	6	21	40	602	1460	427	1300	2.7	<5	2	25.1	241	



Soil Quality

pH	EC(dS/m)	OM(%)	Sample#
3.8	3.24	77.0	5153585

Alkaline	*Very Toxic*	*High*
Neutral	*Toxic*	*Normal*
Acidic	*Caution*	*Low*
Very Acidic	*Good*	*Very Low*

	N	P	K	S
Total lbs/acre	12	42	79	1204
Estimated lbs/acre	24	42	79	2452

Texture *n/a* Hand Texture *n/a*
Sand n/a Silt n/a Clay n/a
Ammonium n/a

BS 27.7 %
Ca 17.0 % Mg 8.2 % Na 2.3 % K 0.2 %
TEC 43.0 meq/100g Na 230 ppm

Lime 27.6 T/ac Buffer pH 3.9 Est. N Release n/a C:N Ratio n/a

*Nitrate-N **Sulfate-S n/a = not analysed

RECOMMENDATIONS FOR BALANCED CROP NUTRITION

	Crop not provided				
Macro-nutrients	Yield	N	P2O5	K2O	S
Growing Condition		To be added (lbs/acre)			
Excellent					
Average					
Your Goal					
Removal Rate (Seed/Total)					
Micro-nutrients	Iron	Copper	Zinc	Boron	Manganese
To be added (lbs/ac)					

The crop is not provided.
Call to request a crop-specific recommendation.

Comments:

Recommendations are based on general research consensus. They should not replace responsible judgement.

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Testing Advising Assuring

Project Information

Project ID:	TRIANGLE RD
Project Name:	MATHERS
Project Location:	Triangle Rd, Rmd
Legal Location:	
PO/AFE#:	
Proj. Acct. Code:	

Billing Information

Company:	CTF Land Resource
Address:	4383 Happy Valley Rd Victoria, BC V9C 3Z3
Attention:	Brian French
Phone:	(250) 474-5072
Cell:	(604) 908-1466
Fax:	(250) 474-5073
E-mail:	ctflrc@shaw.ca
Agreement ID:	
Copy of report:	

Copy of Report To:

Company:	
Address:	
Attention:	
Phone:	
Cell:	
Fax:	
E-mail:	
Copy of invoice:	

RUSH Priority

Upon filling out this section, client accepts that surcharges will be applied to the analysis

Date Required

As Indicated ☐ All Analysis ☐

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples.

Signature

Sample Custody (please print)

Sampled by:

Company:

I authorize Exova to proceed with the work indicated on this form:

Date: Initial:

This section for Lab use only

Date/Time stamp: 15-07-29A11:11 RCVD

Report Results

X	E-mail		Online		PDF		QA/QC Report
	Mail		Fax		Excel		

Special Instructions/Comments (please include contact information including ph. # if different from above).

Include Regulatory Requirements Below:

CNCL-7447

	Sample Identification	Location	Depth ~~in~~ CM ~~FT~~	Date/Time sampled	Matrix	Sampling Method	Number of Containers ↓	CMPT	BSA										
1	PIT 1 AP		0-40	07/09/15			1	✓	✓										
2	PIT 1 OF-M		40-100	07/09/15			1	✓	✓										
3	PIT 2 OF		0-80	07/09/15			1	✓	✓										
4	PIT 5 OM		0-40	07/09/15			1	✓	✓										
5	PIT 6 OF		0-35	07/09/15			1	✓	✓										
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			

Indicate below any deficiencies in the condition of samples:

	Were Exova supplies used?
	Was there any damage to the shipping container?
	Were the containers packaged well?
	Were any extra samples received (document below)?
	Are samples within recommended holding times/temp?

ED 120-00

Environmental Sample Information Sheet

Note: Proper completion of this form is required in order to proceed with analysis

Please indicate any potentially hazardous samples

Page of Control # B047204

In LOT: 1084847 COC

Shipping:

COD Y/N

Cooler temp:

and size of coolers received:

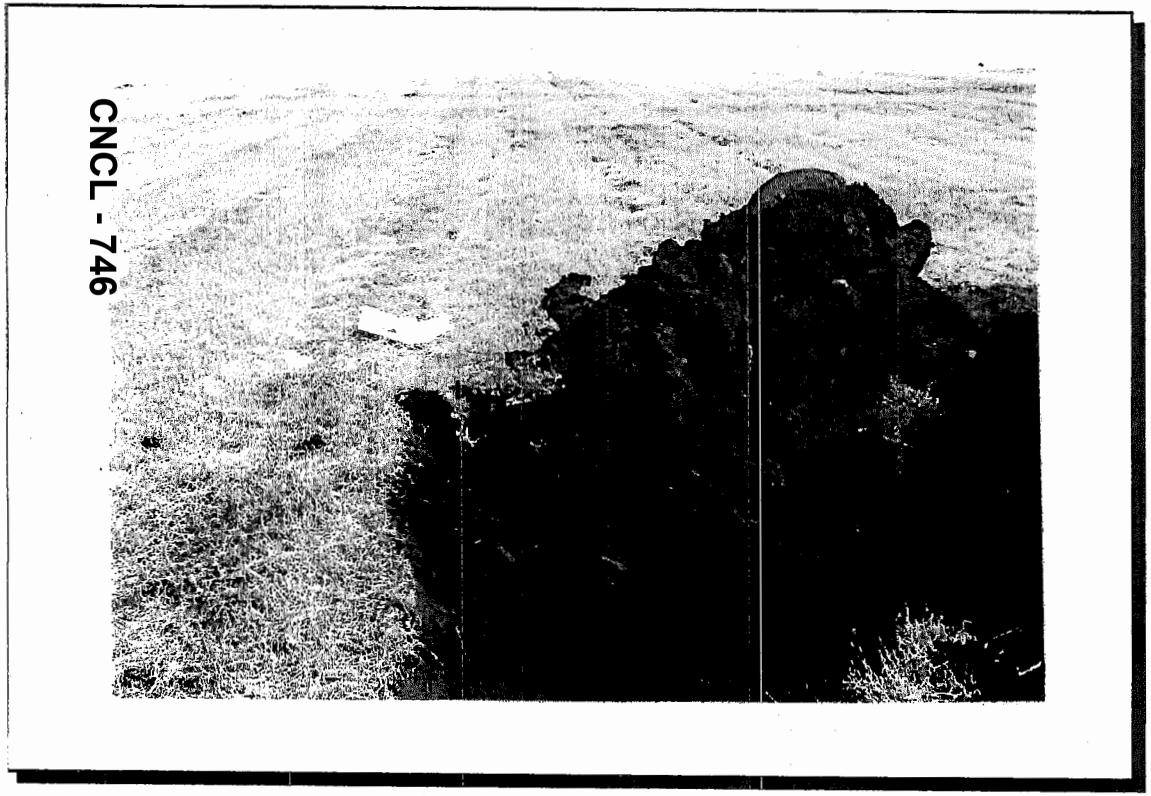
Delivery Method: H.

Waybill:

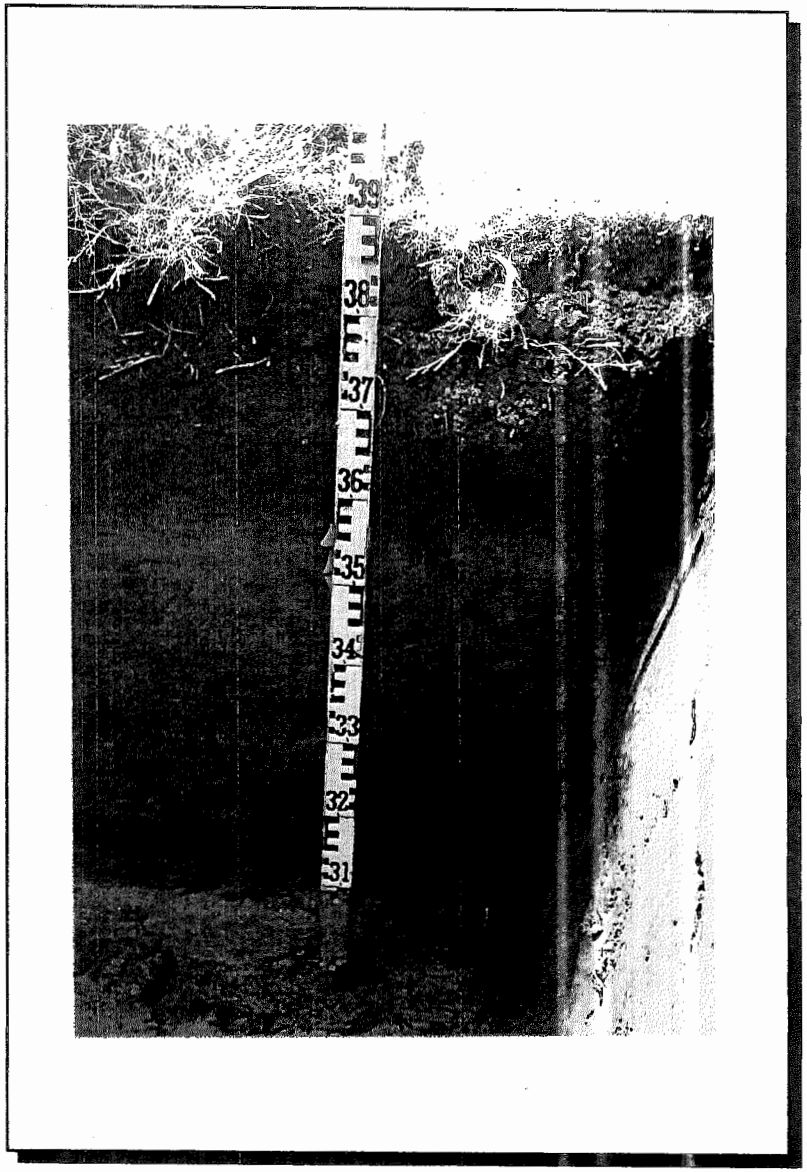
Received by: LC

Appendix D: Photographs

PLATE 1: 14671 WILLIAMS ROAD, RICHMOND, B.C.: July 9, 2015



1(a): Landscape at Soil Pit #1



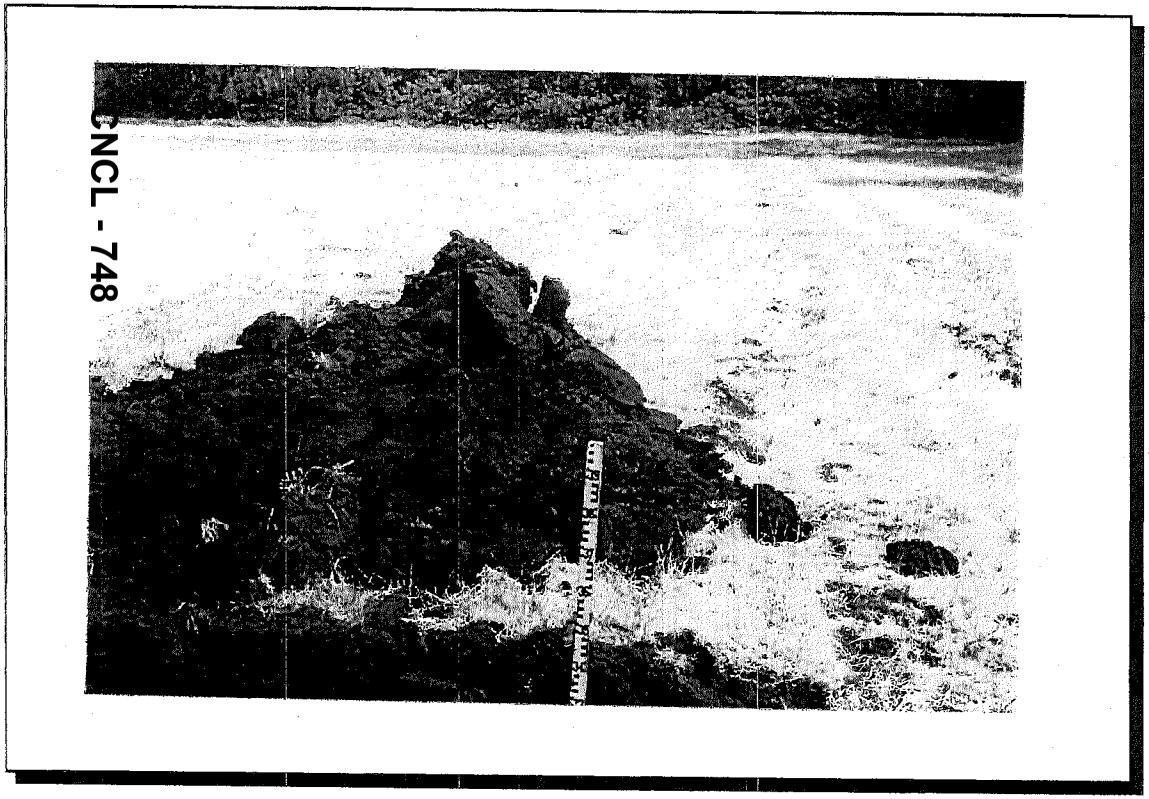
1b):Soil Pit #1, 100cm organic peat over silty clay loam

PLATE 2: 14671 WILLIAMS ROAD, RICHMOND, B.C.: July 9, 2015

2(a): Landscape at Soil Pit #2

2b):Soil Pit #2, 60cm organic peat over silty clay loam

PLATE 3: 14671 WILLIAMS ROAD, RICHMOND, B.C.: July 9, 2015



3(a): Landscape at Soil Pit #3

3b):Soil Pit #3, 45cm organic peat over silty clay loam

PLATE 4: 14671 WILLIAMS ROAD, RICHMOND, B.C.: July 9, 2015

4(a): Landscape at Soil Pit #4

4b):Soil Pit #4, 20cm organic peat over silty clay loam

PLATE 5: 14671 WILLIAMS ROAD, RICHMOND, B.C.: July 9, 2015

5(a): Landscape at Soil Pit #5

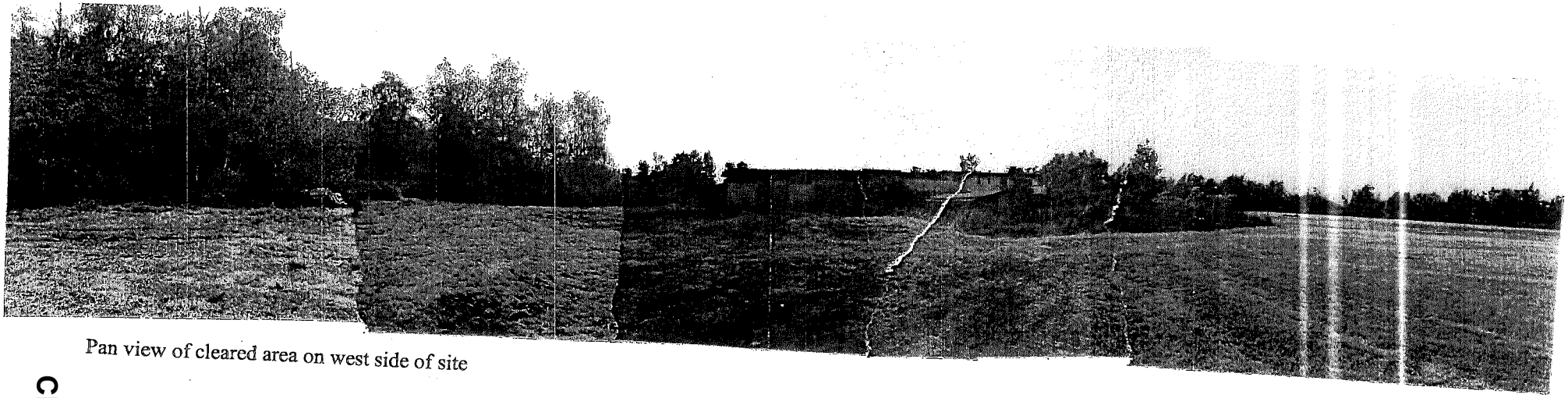
5b):Soil Pit #5, 40cm organic peat over silty clay loam

PLATE 6: 14671 WILLIAMS ROAD, RICHMOND, B.C.: July 9, 2015

6(a): Landscape at Soil Pit #6

6b):Soil Pit #6, 35cm organic peat over silty clay loam

PLATE 7: 14671 WILLIAMS ROAD, RICHMOND, B.C.: July 9, 2015



Pan view of cleared area on west side of site

Appendix E: Excerpts from MOE Manual 1

LAND CAPABILITY CLASSIFICATION FOR AGRICULTURE IN BRITISH COLUMBIA

MOE MANUAL 1

Ministry of Environment
Surveys and Resource Mapping Branch
and
Ministry of Agriculture and Food
Soils Branch

Kelowna, British Columbia
April, 1983

CNCL - 754

4. LAND CAPABILITY CLASSES FOR MINERAL SOILS

The capability class, the broadest category in the classification, is a grouping of lands that have the same relative degree of limitation or hazard for agricultural use. The intensity of the limitation or hazard becomes progressively greater from Class 1 to Class 7. The seven land capability classes for mineral soils are defined and described as follows.

CLASS 1 LAND IN THIS CLASS EITHER HAS NO OR ONLY VERY SLIGHT LIMITATIONS THAT RESTRICT ITS USE FOR THE PRODUCTION OF COMMON AGRICULTURAL CROPS.

Land in Class 1 is level or nearly level. The soils are deep, well to imperfectly drained under natural conditions, or have good artificial water table control, and hold moisture well. They can be managed and cropped without difficulty. Productivity is easily maintained for a wide range of field crops.

CLASS 2 LAND IN THIS CLASS HAS MINOR LIMITATIONS THAT REQUIRE GOOD ONGOING MANAGEMENT PRACTICES OR SLIGHTLY RESTRICT THE RANGE OF CROPS, OR BOTH.

Land in Class 2 has limitations which constitute a continuous minor management problem or may cause lower crop yields or slightly smaller range of crops compared to Class 1 land but which do not pose a threat of crop loss under good management. The soils are deep, hold moisture well and can be managed and cropped with little difficulty.

CLASS 3 LAND IN THIS CLASS HAS LIMITATIONS THAT REQUIRE MODERATELY INTENSIVE MANAGEMENT PRACTICES OR MODERATELY RESTRICT THE RANGE OF CROPS, OR BOTH.

The limitations are more severe than for Class 2 land and management practices are more difficult to apply and maintain. The limitations may restrict the choice of suitable crops or affect one or more of the following practices: timing and ease of tillage, planting and harvesting; and methods of soil conservation.

CLASS 4 LAND IN THIS CLASS HAS LIMITATIONS THAT REQUIRE SPECIAL MANAGEMENT PRACTICES OR SEVERELY RESTRICT THE RANGE OF CROPS, OR BOTH.

Land in Class 4 has limitations which make it suitable for only a few crops, or the yield for a wide range of crops is low, or the risk of crop failure is high, or soil conditions are such that special development and management practices are required. The limitations may seriously affect one or more of the following practices: timing and ease of tillage, planting and harvesting; and methods of soil conservation. Note that in areas which are climatically suitable for growing tree fruits and grapes the limitations of stoniness and/or topography on some Class 4 lands are not significant limitations to these crops. (Refer to Chapter 10).

CLASS 5 LAND IN THIS CLASS HAS LIMITATIONS THAT RESTRICT ITS CAPABILITY TO PRODUCING PERENNIAL FORAGE CROPS OR OTHER SPECIALLY ADAPTED CROPS.

Land in Class 5 is generally limited to the production of perennial forage crops and specially adapted crops (crops such as cranberries suited to unique soil conditions not amenable to a wide range of common crops). Productivity of these suited crops may be high. Class 5 lands can be cultivated and some can be used for cultivated field crops provided unusually intensive management is employed and/or the crop is particularly adapted to the conditions peculiar to these lands. Cultivated field crops may be grown on some Class 5 land where adverse climate is the main limitation, but crop failure can be expected under average conditions. Note that in areas which are climatically suitable for growing tree fruits and grapes the limitations of stoniness and/or topography on some Class 5 lands are not significant limitations to these crops. (Refer to Chapter 10).

CLASS 6 LAND IN THIS CLASS IS NONARABLE BUT IS CAPABLE OF PRODUCING NATIVE AND/OR UNCULTIVATED PERENNIAL FORAGE CROPS.

Land in Class 6 provides sustained natural grazing for domestic livestock (i.e. cattle and sheep) and is not arable in its present condition. Land is

placed in this class because of severe climate, or the terrain is unsuitable for cultivation or use of farm machinery, or the soils do not respond to intensive improvement practices. Some unimproved Class 6 lands can be improved by draining, diking and/or irrigation.

CLASS 7 LAND IN THIS CLASS HAS NO CAPABILITY FOR ARABLE CULTURE OR SUSTAINED NATURAL GRAZING.

All classified areas not included in Classes 1 to 6 are placed in this class. Class 7 land may have limitations equivalent to Class 6 land but they do not provide natural forage for sustained grazing by domestic livestock due to climate and resulting unsuited natural vegetation. Also included are rockland, other nonsoil areas, and small water-bodies not shown on the maps. Some unimproved Class 7 lands can be improved by draining, diking and/or irrigation.

AWSC (upper 50 cm)	Definitive Soil Texture	Best Improved Rating
>60 mm	sandy loam or finer	1
45-60 mm	loamy sand to coarse sandy loam	2A
25-44 mm	sand to coarse loamy sand	3A
10-24 mm	very gravelly sand	5A
<10 mm	gravel	no improvement

Adverse climate (C): This subclass is used on a subregional or local basis and is derived from 1:100 000 scale "Climatic Capability for Agriculture" maps (see "Thermal Limitations" pg. 43). It indicates thermal limitations to agricultural capability including the adverse affect on plant growth during the growing season by minimum temperatures near freezing and/or insufficient heat units, and/or, extreme minimum winter temperatures which injure or kill dormant or near dormant fruit trees.

Improvement of adverse climate due to thermal limitations is not considered practical. The Improved Rating is equivalent to the Unimproved Rating.

Undesirable soil structure and/or low perviousness (D): This subclass is used for soils difficult to till, requiring special management for seedbed preparation and soils with trafficability problems for common farm implements. Also included are soils which have insufficient aeration, absorb and distribute water slowly, or have the depth of rooting zone restricted by conditions other than wetness (high water table) or consolidated bedrock or permafrost.

The guidelines suggested for class designations are based on texture, structure, consistence, permeability (hydraulic conductivity of disturbed samples in the laboratory) and depth to root restricting layer. These restricting layers may include clay enriched horizons, compact soil parent materials, cemented horizons, horizons with massive structure, or horizons with weak structure and firm to very firm consistency. Soils with good tilth in the upper 25 cm may be rated one class better than the guidelines indicate. Tilth

is the physical condition of soil as related to its ease of tillage, fitness as a seedbed, and impedance to seedling emergence and root penetration.

CLASS 1 : A root restricting layer does not occur within 75 cm of the mineral soil surface, and the upper 25 cm has a non-sticky wet consistence and a texture usually coarser than silty clay loam, and permeability is usually greater than 1.0 cm/hr in the upper 100 cm.

CLASS 2D: A root restricting layer occurs within 50 to 75 cm of the mineral soil surface, or the upper 25 cm has a slightly sticky wet consistence and usually has a texture of silty clay loam, clay loam or sandy clay, or the slowest permeability is usually 0.5 to 1.0 cm/hr in the upper 100 cm.

CLASS 3D: A root restricting layer occurs within 25 to 50 cm of the mineral soil surface, or the upper 25 cm has a sticky wet consistence and usually has a texture of silty clay or clay, or the slowest permeability is usually 0.15 to 0.5 cm/hr in the upper 100 cm.

CLASS 4D: A root restricting layer occurs within 25 cm of the mineral soil surface, or the upper 25 cm has a very sticky wet consistence and usually has a texture of heavy clay, or the slowest permeability is usually less than 0.15 cm/hr in the upper 100 cm.

Some features of undesirable soil structure and/or low perviousness are improvable to varying degrees (amelioration of soil texture, deep ploughing or blading to break-up root restricting layers); others, such as strongly cemented horizons, are not. The Improved Rating for this subclass, if indicated, should be determined on the basis of past experience with improving comparable soils. If such experience is not available no improvement is assumed and the Improved Rating is equivalent to the Unimproved Rating.

sheet, rill or wind erosion, and/or the area is dissected by moderately deep to deep gullies with small areas of intact soil between the gullies. Improvements are not feasible and farm machinery cannot be reasonably or safely operated. Class 6 land in its present condition provides sustained natural grazing for domestic livestock but Class 7 land does not.

Erosion is usually a continuing limitation. It is often practical to reduce the affect of present erosion but improvement of the effects of past erosion is not considered. The Improved Rating is equivalent to the Unimproved Rating.

Fertility (F): Soils with this subclass are those limited by fertility characteristics that are either correctable with constant and careful use of fertilizers and/or other soil amendments, or are difficult to correct in a feasible way. The limitations may be due to lack of available nutrients, inadequate (low) cation exchange capacity or nutrient holding ability, high acidity or alkalinity, high levels of carbonates, the presence of toxic elements or compounds, or high fixation of plant nutrients. The limitations are assessed on the rooting zone depth (upper 50 cm of mineral soil) unless otherwise stated. Limitations due to salinity are not considered in this subclass.

CLASS 1 : Soils are well supplied with nutrients easily and continuously available to plants. Fertility status neither restricts the range or productivity of a wide range of crops.

CLASS 2F: Includes both, soils with minor fertility limitations in the upper 50 cm, such as minor nutrient imbalances, inadequate exchange capacity or nutrient holding ability, or moderate acidity or alkalinity, and/or soils with moderate to severe fertility problems below the 50 cm depth. Fertility status does not restrict the range of crops, but routine additions of fertilizer and/or other soil

amendments are required to maintain productivity for a wide range of crops (Improved Rating is Class 1).

CLASS 3F: Includes soils with moderate nutrient imbalances, low cation exchange capacity or nutrient holding ability, high acidity or alkalinity and/or high levels of carbonates. Fertility status does not restrict the range of crops, but moderate, ongoing additions of fertilizer and/or other soil amendments are required to maintain productivity for a wide range of crops (Improved Rating is Class 1).

CLASS 4F: Includes soils with severe nutrient imbalances, very low cation exchange capacity or nutrient holding ability, very high acidity or alkalinity, very high levels of carbonates and/or high fixation of plant nutrients. Fertility status significantly restricts the range of crops, but with intensive and judicious applications of fertilizers and/or other soil amendments, productivity for a wide range of crops is attainable. (Improved Rating is Class 1, or Class 2F if improvement results in lower crop yields than common for Class 1 lands).

CLASS 5F: Includes soils with very severe nutrient imbalances, extreme acidity or alkalinity and/or extremely high levels of carbonates. Fertility status restricts the range of crops to perennial forages or other specially adapted crops such as cranberries. With very intensive, closely controlled and carefully monitored applications of fertilizers and/or other soil amendments, these soils are improvable in crop range, climate permitting. If expected crop range upon improvement is wide the Improved Rating is 2F, otherwise 3F.

CLASS 6F: Soils in which the very poor fertility status is unsuited for agricultural crops and is impractical to improve with feasible management practices. Specially adapted native plant species are present which are suitable for grazing by domestic livestock.

CLASS 7F: Soils which contain elements or compounds toxic to vegetation, or support plants poisonous to animals which cannot be removed with feasible management practices.

Inundation (I): This subclass includes soils where overflow by streams, lakes or marine tides causes crop damage or restricts agricultural use. The following criteria based on relative hazard or increasing limitation to plant growth are suggested for class designation.

CLASS 1 : Soils are not subject to damaging overflow.

CLASS 2I: Soils are subject to occasional, very brief (1 day) inundation during the growing period causing slight crop damage, or the occurrence of winter inundation causing high water tables affecting only deep-rooted perennial crops.

CLASS 3I: Soils are subject to frequent, brief (2 days) overflow during the growing period causing minor crop damage but no crop loss, and/or are flooded until mid-spring forcing late seeding and adversely affecting perennial crops during the winter months.

CLASS 4I: Soils are subject to either frequent or extended overflow during the growing period causing moderate crop damage and occasional crop loss, or are flooded until late spring preventing seeding in some years.

CLASS 5I: Soils are subject to frequent overflow of extended duration (7 days or more) during the growing period or are flooded until early summer making the land suitable only for perennial forage crops and/or improved pasture. Effective grazing period is longer than 10 weeks.

CLASS 6I: Extended flooding (>6 weeks) and/or very frequent overflow during

the growing season with effective natural grazing period of 5 to 10 weeks.

CLASS 7I: Flooded for most of the growing season; not useable for agriculture.

Inundation can be prevented by diking and no further hazard is assumed to exist. The Improved Rating for this subclass in such a case is CLASS 1. Any hazard or limitation expected to continue after diking due to high water tables is indicated by the Subclass W (excess water). Note that lands with Unimproved Ratings of 6I or 7I are improvable by diking.

Salinity (N): This subclass includes soils adversely affected by soluble salts which reduce crop growth or restrict the range of crops that may be grown. The following guidelines for class designation are suggested. The salt content is expressed as the electrical conductivity of the extract from a water-saturated paste.

CLASS 1 : No limitations to crop growth or range of crops. Soils have low (<2 mS/cm) salt content from 0 to 100 cm.

CLASS 2N: Only salt sensitive crops are adversely affected. Soils have low (<2 mS/cm) salt content from 0 to 50 cm and have moderate (2 to 4 mS/cm) salt content from 50 to 100 cm.

CLASS 3N: Most crops are adversely affected. Soils have moderate (2 to 4 mS/cm) salt content from 0 to 50 cm and/or have high to very high (>4 mS/cm) salt content from 50 to 100 cm.

CLASS 4N: Moderate limitation to most crops. Soils have high (4 to 8 mS/cm) salt content from 0 to 50 cm.

CLASS 5N: Salt content is sufficiently severe to preclude most crops, but salt-tolerant forage crops can be established and maintained. Soils have very high (>8 mS/cm) salt content in the 0 to 50 cm depth.

CLASS 6N: Soils are too salty for cultivated crops but support specially adapted, native salt-tolerant plant species, some of which are suitable for grazing by domestic livestock.

CLASS 7N: Soils are too salty for cultivated crops and do not support native plants suitable for grazing or soils which support poisonous plants which cannot be removed with feasible management practices.

There are different reasons for, and types of, salinity problems. Improvement practices and their success in alleviating limitations due to salinity vary depending on site and soil conditions. The Improved Rating for this subclass, if indicated, should be determined on the basis of past experience with improving comparable soils. If such experience is not available no improvement is assumed and the Improved Rating is equivalent to the Unimproved Rating.

Stoniness (P): This subclass applies to soils with sufficient coarse fragments* to significantly hinder tillage, planting, and/or harvesting operations. The suggested guidelines for class designation are based on the sieved proportion of "coarse gravels" (2.5 to 7.5 cm diameter), cobbles (7.5 to 25 cm diameter) and stones (>25 cm diameter) of the total soil in the upper 25 cm of mineral soil.

CLASS 1 : Total coarse fragment content (2.5 cm diameter or larger) offers no or very slight hindrance to cultivation. Total coarse fragment content is 5% or less with cobbles and stones occupying 0.01% or less of the sieved soil.

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* In this case coarse fragments refer to "coarse gravels" plus cobbles plus stones, i.e. fragments 2.5 cm diameter or larger.

CLASS 4T: Simple slopes varying from 16 to 20% or complex slopes varying from 11 to 15%. Note that in areas which are climatically suitable for growing tree fruits and grapes, a CLASS 4 level Topograghy limitation may not be considered a significant limitation to these crops. (Refer to Chapter 10).

CLASS 5T: Simple slopes varying from 21 to 30% or complex slopes varying from 16 to 30%. Note that in areas which are climatically suitable for growing tree fruits and grapes, a CLASS 5 level Topography limitation may not be considered a significant limiation to these crops. (Refer to Chapter 10).

CLASS 6T: Slopes, either simple or complex, varying from 31 to 60% and the land in its present condition provides sustained natural grazing for domestic livestock.

CLASS 7T: Slopes, either simple or complex, greater than 30%. The land in its present condition is not useable for either arable agriculture or sustained natural grazing by domestic livestock.

Improvement of topographic limitations is considered impractical. The Improved Rating is equivalent to the Unimproved Rating.

Excess water (W): This subclass applies to soils for which excess free water, other than from inundation (flooding), limits their use for agriculture. The excess water occurs because of imperfect to very poor drainage due to high water tables, seepage, or runoff from surrounding areas. The following guidelines for class designation are suggested.

CLASS 1 : Crop damage due to excess water is not a factor.

CLASS 2W: Occasional occurrence of excess water during the growing period causing slight crop damage, or the occurrence of excess water during

the winter months adversely affecting deep rooted perennial crops. Water level is rarely, if ever, at the surface and excess water is within the upper 50 cm for only short periods (less than 2 weeks) during the year.

CLASS 3W: Occasional occurrence of excess water during the growing period causing minor crop damage, but no crop loss, or the occurrence of excess water during the winter months adversely affecting perennial crops. Water level is near the soil surface until mid-spring forcing late seeding, or the soil is poorly and in some cases imperfectly drained, or the water level is less than 20 cm below the soil surface for a continuous maximum period of 7 days during the growing period.

CLASS 4W: Frequent or continuous occurrence of excess water during the growing period causing moderate crop damage and occasional crop loss. Water level is near the soil surface during most of the winter and/or until late spring preventing seeding in some years, or the soil is very poorly drained.

CLASS 5W: Frequent or continuous occurrence of excess water during the growing period making the land suitable for only perennial forage crops, and/or improved pasture. Water level is near the soil surface until early summer, or the maximum period the water level is less than 20 cm below the soil surface is 6 weeks during the growing period, or the soil is very poorly drained, commonly with shallow organic surface layers. Effective grazing period is longer than 10 weeks.

CLASS 6W: Continuous occurrence of excess water during the growing season with an effective natural grazing period of 5 to 10 weeks. The water level is at or above the soil surface except for a short period in mid-summer.

CLASS 7W: Under water most of the growing season; not useable for agriculture.

Water control (ditching or tiling) will generally improve this limitation by at least one class depending on landscape position, and source and type of excess water. The Improved Rating should be assessed on a site specific basis, using regional experience from comparable soils in the area which have been improved. Note that lands with Unimproved Ratings of 6W or 7W can sometimes be improved by draining.

Permafrost (Z): The presence of a cryic (permanently frozen) layer is a severe limitation to agricultural production. In addition to maintaining undesirable cold soil temperatures, drainage problems are complicated when permafrost is present in the upper 150 cm. If permafrost occurs below 150 cm depth from the soil surface, and its depth is unaffected by cultivation, it poses a less severe limitation to agricultural production than it would if it occurred above 150 cm. Because of limited experience regarding the effect of this limitation on agricultural use, partial guidelines for permafrost conditions are suggested as follows.

CLASS 4Z: Permafrost occurs below 150 cm from the soil surface during the growing season and does not interfere with crop production.

CLASS 6Z: Permafrost occurs within 150 cm of the soil surface during the growing season. The land in its present condition provides sustained natural grazing for domestic livestock.

CLASS 7Z: Permafrost occurs within 150 cm of the soil surface during the growing season. The land in its present condition is not useable for either arable agriculture or sustained natural grazing by domestic livestock.

Improvement of permafrost conditions is assumed impractical. The Improved Rating is equivalent to the Unimproved Rating.

Appendix F: Letters of Support

MAYLAND FARMS LTD.
2611 No. 7 Road
Richmond, B.C. V6V 1R3

August 27, 2015

TO WHOM IT MAY CONCERN:

We, Mayland Farms Ltd., are Cranberry producers in Richmond and sand topdressing is a critical part of our cranberry bog management. We require approximately 3,000 yards of clean, salt-free sand every year.

We have purchased this sand from E. Mathers Bulldozing Co. Ltd. for many years. The sand supplied by Mathers is excellent quality in terms of its particle size, consistency and it is free of salt. The cost of Mathers sand is very reasonable, an important consideration for agricultural producers. We know that there are very limited suppliers of high quality topdressing sand in the Delta - Richmond area and worry that if Mathers is forced out of the area, we will have to import sand from suppliers in Abbotsford at significantly higher cost.

As agricultural producers, we support the application by Mathers to relocate on the property at 14671 Williams Road in Richmond. We believe Mathers provides an important agricultural input to our cranberry operation.

Yours truly,

MAYLAND FARMS LTD.

David May.
(Pres)

MAYFAIR LAKES GOLF & COUNTRY CLUB
5460 No. 7 Road
Richmond, B.C. V6V 1R7

August 27, 2015

TO WHOM IT MAY CONCERN:

We, Mayfair Lakes Golf & Country Club, require topdressing sand and sand for green and tee maintenance on a regular basis. We require approximately 3,000 yards of clean, salt-free sand every year.

We have purchased this sand from E. Mathers Bulldozing Co. Ltd. for many years. The sand supplied by Mathers is excellent quality in terms of its particle size, consistency and it is free of salt. The cost of Mathers sand is very reasonable. We know that there are very limited suppliers of high quality topdressing sand in the Delta-Richmond area and worry that if Mathers is forced out of the area, we will have to import sand from suppliers in Abbotsford at significantly higher cost.

We support the application by Mathers to relocate on the property at 14671 Williams Road in Richmond. We believe Mathers provides an important service to golf course operators and agricultural producers in Richmond.

Yours truly,

MAYFAIR LAKES GOLF & COUNTRY CLUB

COLUMBIA CRANBERRY CO. LTD.
4291 No. 7 Road
Richmond, B.C. V6V 1R6

August 27, 2015

TO WHOM IT MAY CONCERN:

We, Columbia Cranberry Co. Ltd., are Cranberry producers in Richmond and Delta and sand topdressing is a critical part of our cranberry bog management. We require approximately 5,000 yards of clean, salt-free sand every year.

We have purchased this sand from E. Mathers Bulldozing Co. Ltd. for many years. The sand supplied by Mathers is excellent quality in terms of its particle size, consistency and it is free of salt. The cost of Mathers sand is very reasonable, an important consideration for agricultural producers. We know that there are very limited suppliers of high quality topdressing sand in the Delta - Richmond area and worry that if Mathers is forced out of the area, we will have to import sand from suppliers in Abbotsford at significantly higher cost.

As agricultural producers, we support the application by Mathers to relocate on the property at 14671 Williams Road in Richmond. We believe Mathers provides an important agricultural input to our cranberry operation.

Yours truly,

COLUMBIA CRANBERRY CO. LTD.

Arthur W. Gaugh

COUNTRY MEADOWS GOLF CLUB
SAVAGE CREEK GOLF CLUB
8400 No. 6 Road
Richmond, B.C. V6W 1E3

August 27, 2015

TO WHOM IT MAY CONCERN:

We, Country Meadows Golf Club and Savage Creek Golf Club, require topdressing sand and sand for green and tee maintenance on a regular basis. We require approximately 4,000 yards of clean, salt-free sand every year.

We have purchased this sand from E. Mathers Bulldozing Co. Ltd. for many years. The sand supplied by Mathers is excellent quality in terms of its particle size, consistency and it is free of salt. The cost of Mathers sand is very reasonable. We know that there are very limited suppliers of high quality topdressing sand in the Delta-Richmond area and worry that if Mathers is forced out of the area, we will have to import sand from suppliers in Abbotsford at significantly higher cost.

We support the application by Mathers to relocate on the property at 14671 Williams Road in Richmond. We believe Mathers provides an important service to golf course operators and agricultural producers in Richmond.

Yours truly,

COUNTRY MEADOWS GOLF CLUB

and SAVAGE CREEK GOLF CLUB

Westcoast Farms LTD.
Willow Bay Farms LTD.
Willow Bay Helicopters LTD.
Willow Bay Aviation LTD.
C-GDJG Mustang Holdings

westcoast INSTANT LAWNS

Enviro-smart Organics Ltd.
a full cycle company

August 31, 2015

TO WHOM IT MAY CONCERN:

West Coast Instant Lawns has been using E. Mathers Bulldozing Company Ltd. for all our sand requirements since 1996. Over the last 19 years we have made free draining sand turf fields by applying 6 to 12 inches of sand on our soil based fields which allows us to harvest turf during the wet months. Westcoast has been topping up these sand fields approximately every two years.

The reason we use sand from E. Mathers is because we have tested sand from all the other sand suppliers within our logistical area and we have found that Mathers sand is consistent in quality in terms of its particle size and it is free of salts as compared to other suppliers.

Our composting operation consistently uses approximately 100,000 cubic yards of clean, salt free sand from Mathers, This sand helps us meet the strict B.C. Nursery Trades Association specification as required by the landscape industry.

E. Mathers has always given a preferred price to agricultural producers and this is important for farmers to remain competitive.

There is no real alternative for supply of clean, salt free sand in the Delta area and if E. Mathers were to shut down we would be forced to source sand from suppliers in Abbotsford at significantly higher cost.

We at Westcoast Instant Lawns support the application by E. Mathers Bulldozing Company Ltd. to relocate on the property at 14671 Williams Road in Richmond, B.C. Over the years I have talked with other farmers that have benefitted from being able to have a reliable, consistent source of sand for their farm operations in Delta and Richmond.

Yours truly,

West Coast Instant Lawns

D. Goodwin

Daryl Goodwin, President

4295 - 72nd St. Delta, BC V4K 3N2
Phone: 604.946.0201 Fax: 604.946.0221

COMMERCIAL REAL ESTATE SERVICES

CBRE

Bruce Richardson
Vice President/Nominee

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To Whom it May Concern

I have worked at CBRE for 31 years which is the largest real estate network in the world, with over 300 offices in North America. I have a Bachelor of Commerce form the Urban Land program at UBC and throughout my career I have specialized in Richmond industrial real estate. During my career I have been involved in several significant deals..... relocating IKEA's store within the City of Richmond... moving the Canada Post 700,000 square foot Processing Plant from Georgia Street in Vancouver onto the Airport. Five years ago, during the relocation for Canada Post, I spent 6 months looking for a site for Canada Post. We could not find a site as there was virtually no supply of land available for them, this the reason they ended up leasing land from the Airport Authority. Their requirement in terms of land size was similar to yours so I have an excellent understanding of the supply of industrial land in the City of Richmond.

For the last 5 years, I have been searching for a suitable site that is near the south arm of the Fraser River for your soil storage operation. There is no sites that have come available in the last 5 years that would suit your needs. As you need a site near the Fraser River I can say it is almost impossible to find what you are looking for.

Richmond is surrounded by water on 3 sides making the supply of industrial sites very limited. Further the demand from companies who need to be near the Airport puts even more demand on the industrial land. The supply is limited as it is a rare situation that the City of Richmond can only grow eastward.

I confirm that it will be near impossible to find a site in the City of Richmond for your soil storage operation.

Please call me if you any questions or concerns.

Yours truly,

CBRE LIMITED

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