City of Richmond

Report to Committee

Planning and Development Division

To:	Planning Committee	**Date:**	May 5, 2016
From:	Wayne Craig Director, Development	**File:**	AG 13-646237

Re: **Agricultural Land Reserve Application by Dagneault Planning Consultants Ltd. for Non-Farm Use and Subdivision at 9500 No. 5 Road**

Staff Recommendation

1. That the Agricultural Land Reserve Application by Dagneault Planning Consultants Ltd. at 9500 No. 5 Road to allow subdivision of the existing lot into five 0.8 ha (2 acre) lots fronting No. 5 Road and one 8.2 ha (20.3 acre) backland lot and non-farm uses for the development of community institutional facilities and supporting uses on the five 0.8 ha (2 acre) lots on the westerly 110 m (361 ft.) of the site, as outlined in the report dated May 5, 2016 from the Director of Development, be endorsed and forwarded to the Agricultural Land Commission

2. That the Agricultural Land Reserve Transportation Application to dedicate a 20 m (66 ft.) wide portion of land from No. 5 Road to Highway 99 as road (Williams Road – Unopened Allowance), as outlined in the report dated May 5, 2016 from the Director of Development, be endorsed and forwarded to the Agricultural Land Commission.

Wayne Craig
Director, Development

WC:ke
Att.

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Real Estate Services	☑	
Parks Services	☑	
Policy Planning	☑	

Staff Report

Origin

Brian Dagneault Planning Consultants Ltd. has applied to the City of Richmond for permission to apply to the Agricultural Land Commission (ALC) to:

- Subdivide the subject site (12.5 ha or 31 acres) into five 0.8 ha (2 acre) lots fronting No. 5 Road and one 8.2 ha acre (20.3) lot on the backlands.
- Allow for community institutional non-farm uses on the proposed five 0.8 ha (2 acre) lots along No. 5 Road.

Through the staff review of this application and examination of the status of Williams Road (presently unopened), it has been determined that through a historical survey error, Williams Road was not legally dedicated as road. In order to move forward with the City's desire to dedicate Williams Road, approval from the ALC is required for the purposes of dedicating land in the Agricultural Land Reserve (ALR) for this purpose. The City's objective is to resolve this historical error and has no implications to the status of Williams Road, which will remain an unopened, undeveloped road dedication in the ALR.

Refer to Attachment 1 for a location map, Attachment 2 for a preliminary proposed subdivision plan and Attachment 3 for a map of the proposed Williams Road dedication.

Project Description

The subject site is located in the Agricultural Land Reserve (ALR) and is zoned "Golf Course (GC)". The site previously was operated as the former Mylora Golf Course facility, which ceased operation in 2012.

The applicant's proposal contains two (2) components:

1. Subdivision to create five 0.8 ha (2 acre) lots along No. 5 Road (generally the westerly 110 m or 361 ft. of the site) and allow community institutional uses on these smaller lots to enable separate congregations to develop assembly facilities and supporting uses (i.e., parking). Currently, no specific congregations or assembly development plans have been submitted with this application.
2. An agricultural remediation plan to convert the backlands portion of the site (8.2 ha or 20.3 acres) back to agriculture. The owner/developer of the site would be responsible for undertaking all the works identified in the ARP at their cost and once completed, the backland lot would be transferred (as a fee simple lot) at no cost to the City.

Findings of Fact

ALR Subdivision and Non-Farm Use Application Process

This ALR land use application requires consideration and endorsement by Richmond City Council prior to the application being forwarded to the ALC for consideration. If Council passes a resolution in support of the proposal, the application will be forwarded to the ALC; should

Council not grant approval for the application, it will not proceed further. Once an application is endorsed and forwarded to the ALC, they are the sole decision making authority.

Surrounding Development

The existing 12.5 ha (31 acre) parcel is the site of the former Mylora Golf Course, and contains typical facilities (club house, parking area and maintenance buildings) and land improvements (fairways, mature trees, berms, sand/water hazards) for a golf course.

To the North: An unopened road allowance (King Road) that currently has a 15 m (49 ft.) Riparian Management Area designation for an existing open watercourse running the length of the site from No. 5 Road to Highway 99. North of the unopened road allowance a vacant field zoned "Assembly (ASY)".

To the South: An "Assembly (ASY)" zoned lot generally on the westerly 180 m containing a temple (Lingyen Mountain Temple), religious gardens and "Agriculture (AG1)" zoning on the remainder containing a fruit orchard. This site is currently under a rezoning application (RZ 13-641554).

To the East: Highway 99 corridor.

To the West: West of No. 5 Road, single-family homes zoned "Single-Detached (RS1/E)".

Related Policies & Studies

Official Community Plan

The Official Community Plan (OCP) designates the westerly 110 m (361 ft.) of the subject site for 'Community Institutional' and the remaining portion of the site as 'Agriculture'. The proposed ALR application proposing assembly uses on the westerly 110 m (361 ft.) while undertaking remediation works on the remainder of the site to allow for active farming complies with the OCP.

OCP No. 5 Road Backlands Policy

The OCP No. 5 Road Backlands Policy is applicable to land east of No. 5 Road generally north of Steveston Highway and south of Blundell Road. The policy achieves the following:

- Outlines general objectives for development on the frontlands and farming on the backlands.
- Includes information about required development application processes.
- Recommends specific measures to remove constraints and facilitate farming of the backlands.

This ALR application and proposal meets the objectives of the No. 5 Road Backlands Policy by:

- Undertaking agricultural remediation plan works, at the applicant's sole cost to return the backlands to a condition capable of supporting a wide-range of soil-based crops.
- Transferring the ownership of the backlands area to the City (at no cost to the City) to facilitate future farming on the backlands.

- An access road to the backlands will be provided by a farm road within a portion of the Williams Road allowance (120 m or 394 ft. total length from No. 5 Road) at the sole cost to the applicant.
- The retention of the 8.2 ha (20.3 acre) contiguous lot results in bringing the land into agricultural production.

Public Consultation

Agricultural Advisory Committee

The Agricultural Advisory Committee reviewed the application at its March 12, 2015 meeting and passed the following motion (See Attachment 4 for an excerpt of AAC meeting minutes:

That the non-farm use application for the purposes of utilizing the front 110 m for community institutional uses and subdivision of the site (five 2 acres lots and one 20 acre lot) at 9500 No.5 Road be supported subject to the following conditions and resolution of issues:

1. *The large berm (entitled Berm #1 in the agrologist's report) to be removed at developer's cost as part of the agricultural remediation works for the 20 acre portion of land to be dedicated to the City;*
2. *The developer undertake further investigation on the potential to retain any existing on-site trees, specifically those located on the perimeter of the site and submit the necessary supporting arborist report;*
3. *Investigate salvaging native agricultural quality soil from the front 110 m portion of the site and if feasible, include these soil salvaging activities in the agricultural remediation plan to be prepared by the agricultural consultant.;*
4. *Examine the implementation of appropriate drainage control structures to prevent any backflow that would negatively impact any agricultural drainage infrastructure provided on the 20 acre agricultural site;*
5. *Appropriate mechanism be secured to ensure completion of the agricultural remediation works associated with the required land use approvals for this development proposal;*
6. *Securing of a legal agreement on the proposed assembly portion of the site to identify that the site is subject to the typical nuisance activities (noise, odour and dust) which will be mitigated through the implementation of an on-site landscaped buffer.*
7. *All efforts to be made by the City to support farming use on the back portion in perpetuity.*

Carried Unanimously

In response to the AAC's support and related conditions, the applicant has addressed all of these comments in the submitted agricultural remediation plan.

Analysis

Agricultural Remediation Plan

The owner engaged a consultant to develop a plan to convert the golf course lands back to agriculture. The Agricultural Remediation Plan (ARP) report prepared by a professional agrologist (Bruce McTavish – McTavish Resource and Management Consultants Ltd) is contained in Attachment 5, which provides a summary report of the agricultural conversion plan and consolidates all previous reports and investigations undertaken into one (1) document. The general highlights of the ARP are:

- Removal of all golf course related buildings, infrastructure and land modifications (i.e., water/sand traps, greens and tee boxes).
- Land levelling and grading to achieve a generally flat elevation. These works also involve removal of a significant east-west curvilinear berm that runs through the golf course.
- Tree removal and land clearing on the site to facilitate ARP works (refer to later sections on trees in this report for additional information about the approach to trees).
- Soil salvaging over the entire site for the purposes stockpiling and potential use in the backlands portion to achieve the proposed finished grades for the farmlands.
- Implement an agricultural drainage plan by gradual slopes to crown the land to channel water to the main drainage conveyance adjacent to Highway 99 and new proposed drainage canal at the south east corner of the future backlands site, which has been reviewed and approved by Ministry of Transportation and Infrastructure staff.
- To address soil compaction and wetness limitations, undertake sub-soiling (deep ploughing), add organic materials and additional disking and ploughing to incorporate materials and further break up the root restricting layer.
- Implement a forage/cover crop after ARP works completed, which will improve soil structure. The forage/cover crop can also be harvested as hay as required.
- Construction farm access road within the future Williams Road allowance for access to the backlands. The general farm access road standard proposed is for a 6 m (20 ft.) wide durable and permeable driving surface (crushed gravel), appropriate drainage and road shoulder transitions and a water line for agricultural irrigation purposes. The approximate length of the farm access road would be 120 m (393 ft.). Use of crushed or ground asphalt and/or concrete for the farm road construction would be prohibited. The ultimate design and construction of the farm access road will be at the developers sole cost and will be completed through a City Servicing Agreement.
- A north-south farm road connecting the City owned Gardens Park site and Lingyen Mountain Temple (LMT) agricultural backlands and subject site at 9500 No. 5 Road is proposed to be secured through the LMT rezoning application (RZ 13-641554).

- The estimated cost to complete all works associated with the ARP is approximately $750,000. A bond will be required to be submitted at future rezoning by the developer based on a cost estimate (plus contingency) provided by the argologist that takes into account all proposed works in the ARP. All ARP works will be undertaken by the developer at their sole cost with the submitted bond referenced above to ensure completion of the agricultural remediation plan to the City's and ALC's satisfaction.

Proposed Subdivision and Land Transfer to the City

The owner of the site has confirmed that they will undertake all ARP related works at their sole cost. They have also agreed that they will transfer the ownership of the remaining backlands (approximately 0.8 ha or20.3 acres) to the City at no cost. The transfer of land to the City, as an unencumbered fee simple lot, would be secured as a rezoning consideration through the future rezoning process if this ALR application is supported by Council and the ALC. Transfer of ownership of the remaining backlands to the City would be contingent on agrologist confirmation of completion of all ARP works or the submission of an appropriate bond for these works to be confirmed through the processing of the rezoning application. All ARP works are to be done by the developer at their sole cost. The developer would retain ownership of the proposed five 0.8 ha (2 acre) lots along No. 5 Road for the purposes of developing assembly type facilities.

City ownership of the backland portion of the site in conjunction with the completed ARP works allows for the City to pursue a potential range of agricultural opportunities:

- Lease the entire site or portions of the site to a commercial farmer.
- Lease portions of the site to agricultural user groups to farm the backlands in partnership with the City.
- Undertake agricultural programming and education, in partnership with local agricultural stakeholders.
- Other uses as determined and approved by Council.

Parks staff have confirmed that they would be able to maintain the land during periods where there is no agricultural user operating on the lands. Any use of the agricultural backlands, including any potential lease arrangements would be subject to City Council approval.

Williams Road Dedication

Through the application review it was determined that a historical error was made where legal plans were not submitted to dedicate and/or create title for the Williams Road area following the approval of the bylaw to create the road by the local government at the time. In order to resolve this, road dedications involving a 20 m (66 ft.) wide portion of land from No. 5 Road to Highway 99 is required. However, as this area is contained in the ALR and subject to the legislation, approval from the ALC to allow for the dedication is required as it technically constitutes a new road dedication through the ALR.

Staff note that the requested approval to formerly dedicate Williams Road will not result in additional residential development on the farmland, and construction of a City standard road is not proposed. The proposed road is only intended to be used by farmers.

Pending the outcome of the ALC decision on the request to dedicate land in the ALR for road purposes, staff will bring forward the appropriate report to Council to formerly dedicate the land as road.

George Massey Tunnel Replacement Project – Potential Land Requirements

The exact area of land dedication requirements will be confirmed through the future rezoning application. Any land dedications required by either MOTI or secured through the GMTRP will result in a decrease in the overall land area for the backlands lot proposed to be owned by the City. Under the current proposal, the backlands portion to be transferred to the City is 8.2 ha (20.3 acres), which does not take into account the above referenced land takings from the Province.

Agricultural Buffer Area

A suitable agricultural landscape buffer to be implemented on the proposed five (5) lots fronting No. 5 Road to be developed for institutional uses will be secured through the future rezoning application. The general approach to this buffer will allow for the establishment of an appropriate width buffer, typically between 4.5 m (15 ft.) to 6.0 m (20 ft.) wide, to be located on the development site to address noise, visual, odour and trespass related issues between the assembly and farm uses. Locating the buffer on the assembly sites ensures that a maximum amount of land on the farm is available for agricultural use. Details, design parameters and bonding to secure the buffer will be addressed through the future rezoning application.

On-Site Trees

Being a former golf course with surrounding agricultural land uses, the subject site contains a large number of mature evergreen and deciduous trees and hedges dispersed throughout the 30 acre site. Perimeter trees are also prevalent on the site, especially along the edges where there are existing open canals along the north side (King Road allowance), Highway 99 corridor and portion of the Williams Road allowance.

Approach to Trees on the Proposed Assembly Area

An initial tree inventory and assessment has been conducted for bylaw sized trees located on the proposed assembly area of the lot. This tree survey has identified approximately 285 trees and includes trees along road allowances to the south, west and north of the site (Williams Road allowance – future, No. 5 Road and King Road allowance). Through the rezoning application, a detailed review of these trees will be conducted to determine opportunities for tree retention and removals required as a result of institutional related development.

The applicant has identified that due to demolition of existing golf course related buildings and soil salvaging activities related to the ARP works, some trees (35 total) located on the assembly area of the site may need to be removed in order to allow these activities to occur. For proposed tree removals under this situation, City staff will review these on a case-by-case basis through the tree removal permitting process. Those trees that are not impacted by these activities will be protected by tree protection zones installed to City specifications. See Attachment 6 that

contains a location map and accompanying report that marks all trees proposed for removal due to demolition and soil salvaging related to the agricultural conversion of the backlands.

Approach to Trees on the Agricultural Backlands

To accommodate the ARP works that generally involves land clearing, levelling and regrading of the agricultural backlands site, a majority of these trees will need to be removed. Tree removals on the agricultural backlands for farm purposes will be reviewed in accordance with the City's Tree Protection Bylaw 8057, which provides an exemption for tree removals necessary for farm operations.

Approach to Trees in Proximity to a Watercourse/Riparian Management Area

The subject site has designated 15 m wide Riparian Management Areas (RMAs) along the north (King Road allowance) and east (Highway 99) associated with existing watercourses running along these areas. Based on survey information and investigation by the consulting agrologist, there also appears to be an existing canal at the south east corner of the site that also has the potential for aquatic habitat.

The general approach for trees within or close to designated RMAs (north and east edge of the site) is to allow for an appropriate setback distance from these areas where no land clearing or tree removals would be undertaken related to the ARP works to convert the backland portion to farming. No tree removals would also be undertaken for trees along the portion of Williams Road, where there is an existing canal. This approach to retain trees along the perimeter of the site associated with the RMAs will result in a slight decrease in area available for farming on the backlands; however, the approach is recommended based on the potential benefits in and around the watercourses.

A map has been submitted by the applicant to summarize the approach to trees along the perimeter of the subject site (Attachment 7) and is colour coded as follows:

- Purple – Trees along a portion of No. 5 Road to be dedicated to the City to accommodate frontage upgrades. Tree retention and removal will be reviewed through the Servicing Agreement for any off-site works through the redevelopment process.
- Blue – Trees within the assembly area contained in a RMA designation. Development of a no disturbance area associated with the RMA and related compensation plan through the forthcoming rezoning application.
- Green/Orange – Respect the existing 15 m (49 ft.) RMA and retain trees within these areas.

Transportation and Site Access

Access to the proposed five (5) assembly lots will be from individual driveway crossings along No. 5 Road to service each development site. In addition, Transportation staff has identified a 4.5 m (15 ft.) wide dedication required along the subject site's entire No. 5 Road frontage. Generally, this dedication would allow for frontage works to improve pedestrian and cycling related infrastructure in the area. The confirmed road dedications and applicable frontage upgrade details will be determined through the processing of the rezoning application.

Site access to the agricultural backlands to be transferred to the City will be provided through the design and construction of a farm road within the future Williams Road allowance to a distance of approximately 120 m (393 ft.) measured from No. 5 Road. Design and construction of this farm road would be through a Servicing Agreement, secured through the future rezoning application and based on the farm road design parameters outlined in this report.

Forthcoming Rezoning Application Process

Pending the outcome of the ALR non-farm use and subdivision application, a rezoning application will be required to rezone the site from "Golf Course (GC)" zoning to zoning districts that would allow assembly type uses on the five 0.8 ha (2 acre) lots fronting No. 5 Road and agricultural activities on the remainder. The following is a summary of potential items to follow-up through rezoning:

- Follow-up applicable items identified through the Agricultural Land Commission review and approval of the application.
- Liaise with the Agricultural Advisory Committee to update the group on the proposal.
- Development of a satisfactory agricultural buffer and general on-site landscaping that takes into account opportunities for tree retention and required tree removals.
- Update the ARP and related works as necessary and secure a bond amount to ensure implementation of the works.
- Develop zoning to accommodate the assembly/institutional facilities on the five 2 acre (0.8 ha) lots and agricultural supporting zoning on the backlands.
- Develop an approach for the RMA located on the northern assembly lot.
- Secure the necessary legal agreement to address ALR landscape buffering for the purposes of limiting typical nuisance activities between farm and assembly uses.
- Confirm and secure any City road dedication requirements, including required off-site improvements and infrastructure works.
- Confirm and secure required land/highway dedications required by MOTI and/or GMTRP.

Conclusion

The purpose of ALR subdivision and non-farm use application at 9500 No. 5 Road is to allow:

- Subdivision of the existing lot into five 2 acre (0.8 ha) lots fronting No. 5 Road and one 20.3 acre (8.2 ha) backland lot;
- Non-farm uses for the development of community institutional facilities and supporting uses on the five lots on the westerly 110 m (361 ft.) of the site; and

This application is supported for the following reasons:

- The application supports the overall mandate of the ALC by encouraging and accommodating farm uses for land contained in the ALR.
- The community institutional/assembly land uses and agricultural conversion of the golf course back to farming is consistent with the No. 5 Road Backlands Policy contained in the OCP.
- Facilitates significant capital investment by the owner to undertake ARP works to convert the golf course back to agricultural uses

- Achieves City ownership of agricultural land so that it can be made available to a number of agricultural users for the purposes of farming.

The purpose of the ALR Transportation Application to dedicate a 20 m (66 ft.) wide portion of land from No. 5 Road to Highway 99 as road (Williams Road – Unopened Allowance) is supported by staff for the following reasons:

- Corrects a historical survey error, which would allow for the dedication of Williams Road in the ALR.
- Does not result in any new road development in the ALR or additional development potential, as Williams Road would remain an unopened road allowance.
- Formerly dedicating the Williams Road allowance allows for the development of a farm access to the backland portion of the site.

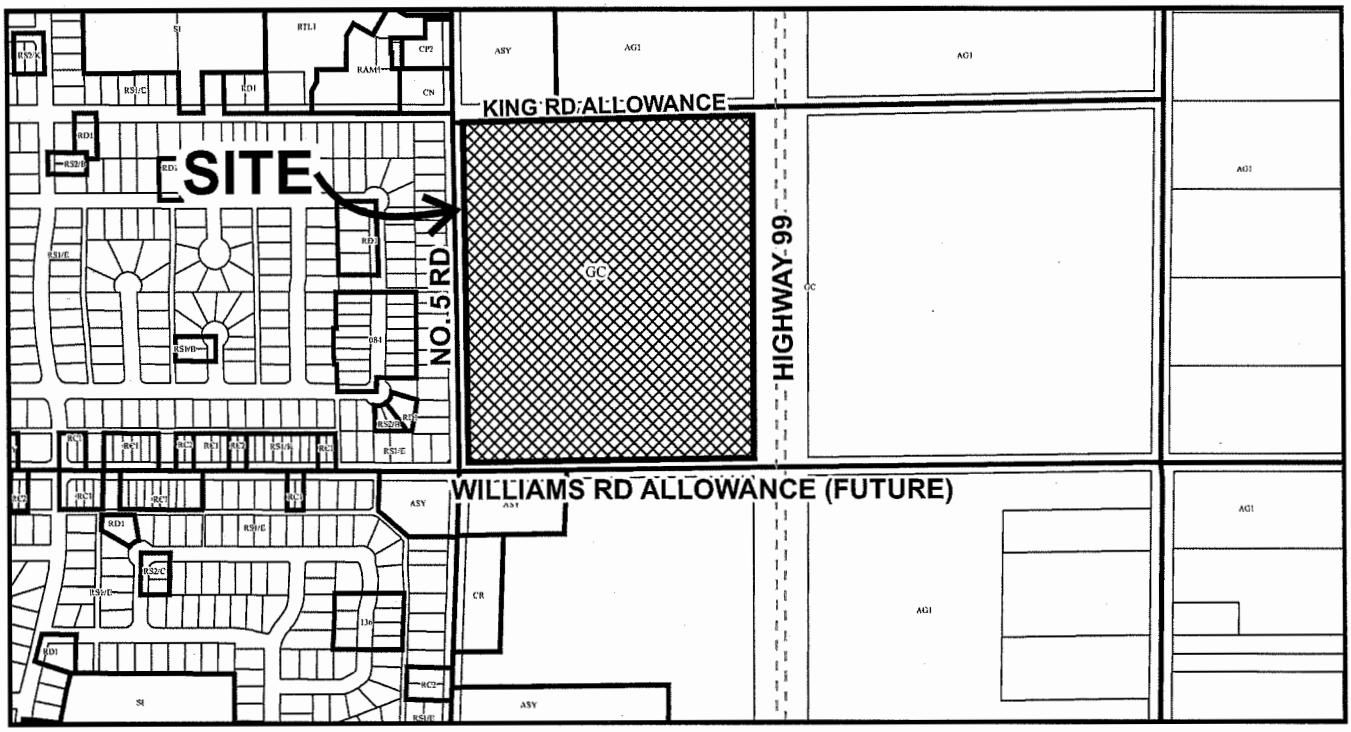
Staff recommend that the above ALR applications for subdivision, non-farm use and road dedication in the ALR (Williams Road allowance) be endorsed and forwarded to the ALC.

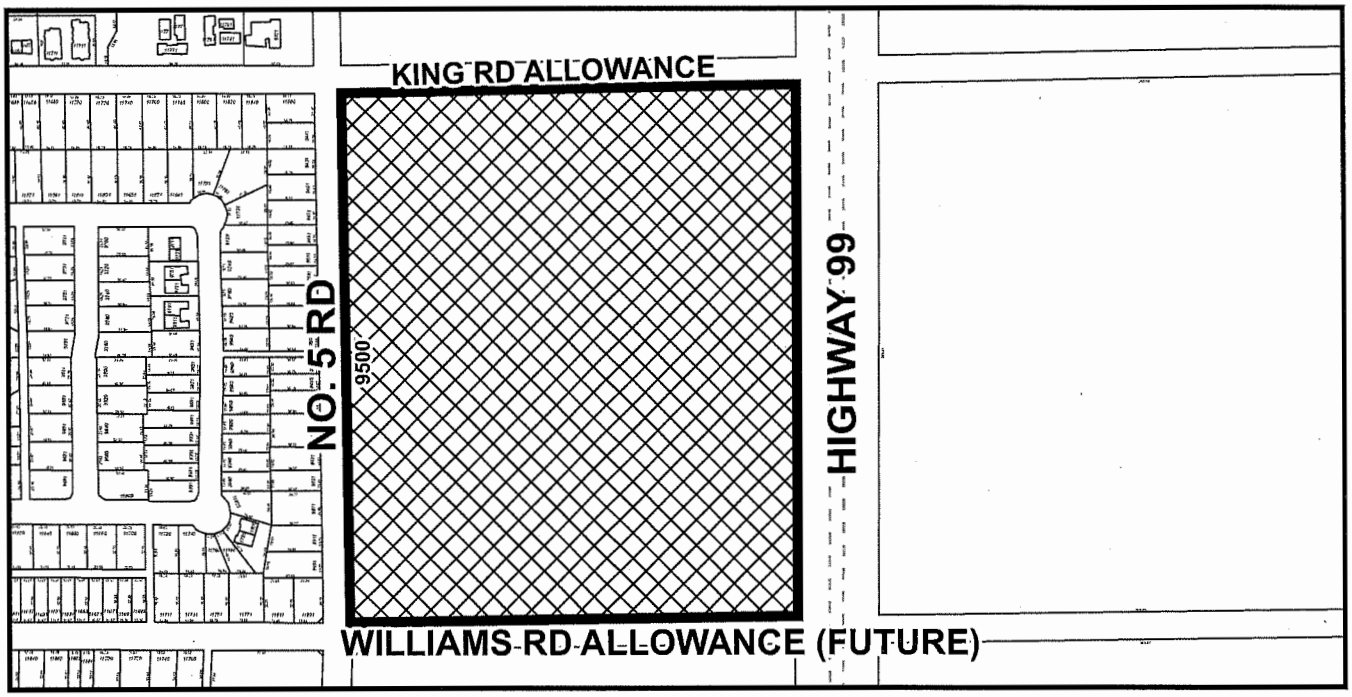
Kevin Eng
Planner 2

KE:rg

Attachment 1: Location Map
Attachment 2: Preliminary Subdivision Plan
Attachment 3: Preliminary Plan Outlining Williams Road Dedicated Allowance
Attachment 4: Excerpt of Agricultural Advisory Committee Minutes (March 12, 2015)
Attachment 5: Agricultural Remediation Plan for 9500 No. 5 Road – Summary Report
Attachment 6: Proposed Tree Removals Due to Demolition or Soil Excavation Activities.
Attachment 7: Map of Trees in Relation to RMA

City of Richmond





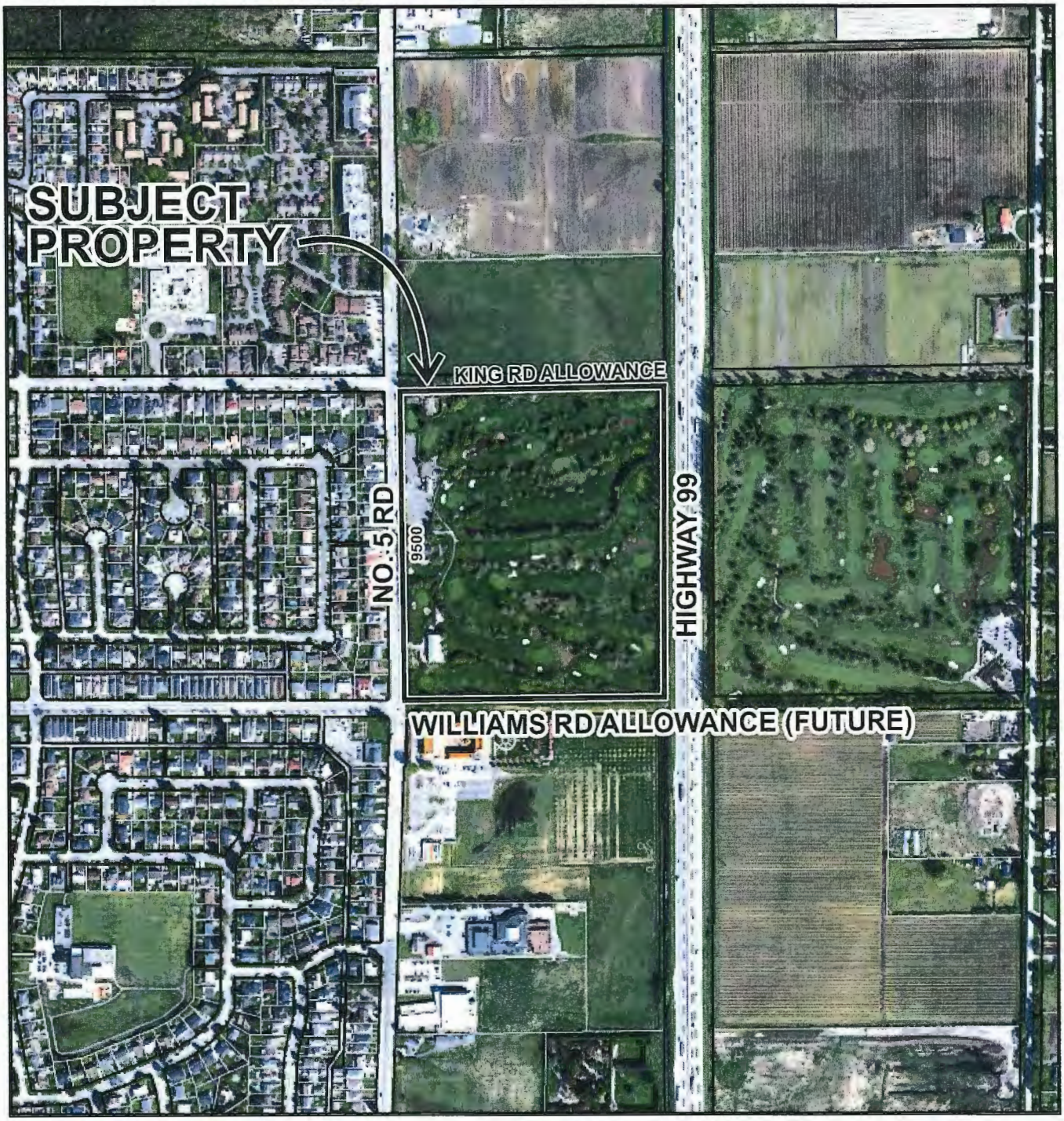
AG 13-646237

Original Date: 04/29/16

Revision Date: 05/09/16

Note: Dimensions are in METRES

City of Richmond



AG 13-646237

Original Date: 10/03/13

Revision Date: 05/0916

Note: Dimensions are in METRES

PROPOSED SUBDIVISION PLAN OF PARCEL "A", (REFERENCE PLAN 775) SECTION 30, BLOCK 4 NORTH, RANGE 5 WEST, N.W.D. EXCEPT: FIRSTLY: PART SUBDIVIDED BY PLAN 2627, SECONDLY: PART SUBDIVIDED BY PLAN 51360, THIRDLY: PART ON STATUTORY RIGHT OF WAY PLAN 21305

PLAN EPP _____

B.C.G.S. 92G.015

SCALE 1:1500

20 0 20 40 60

ALL DISTANCES ARE IN METRES.

THE INTENDED PLOT SIZE OF THIS PLAN IS 432mm IN WIDTH BY 559mm IN HEIGHT (C SIZE) WHEN PLOTTED AT A SCALE OF 1:1500

INTEGRATED SURVEY AREA No. 18
(RICHMOND) NAD 83
(CSRS) 4.0.0.BC.1.GVRD
UTM ZONE 10

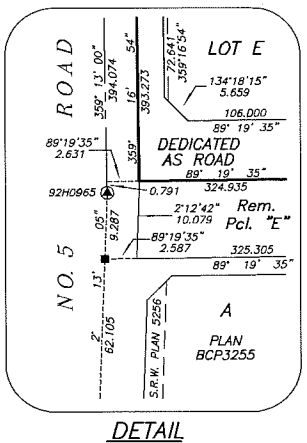
THIS PLAN SHOWS HORIZONTAL GROUND-LEVEL DISTANCES UNLESS OTHERWISE SPECIFIED. TO COMPUTE GRID DISTANCES, MULTIPLY GROUND-LEVEL DISTANCES BY THE AVERAGE COMBINED FACTOR OF 0.9996034 WHICH HAS BEEN DERIVED FROM GEODETIC CONTROL MONUMENTS 92H0965 AND 92H0966.

LEGEND

GRID BEARINGS ARE DERIVED FROM OBSERVATIONS BETWEEN GEODETIC CONTROL MONUMENTS 92H0965 AND 92H0966

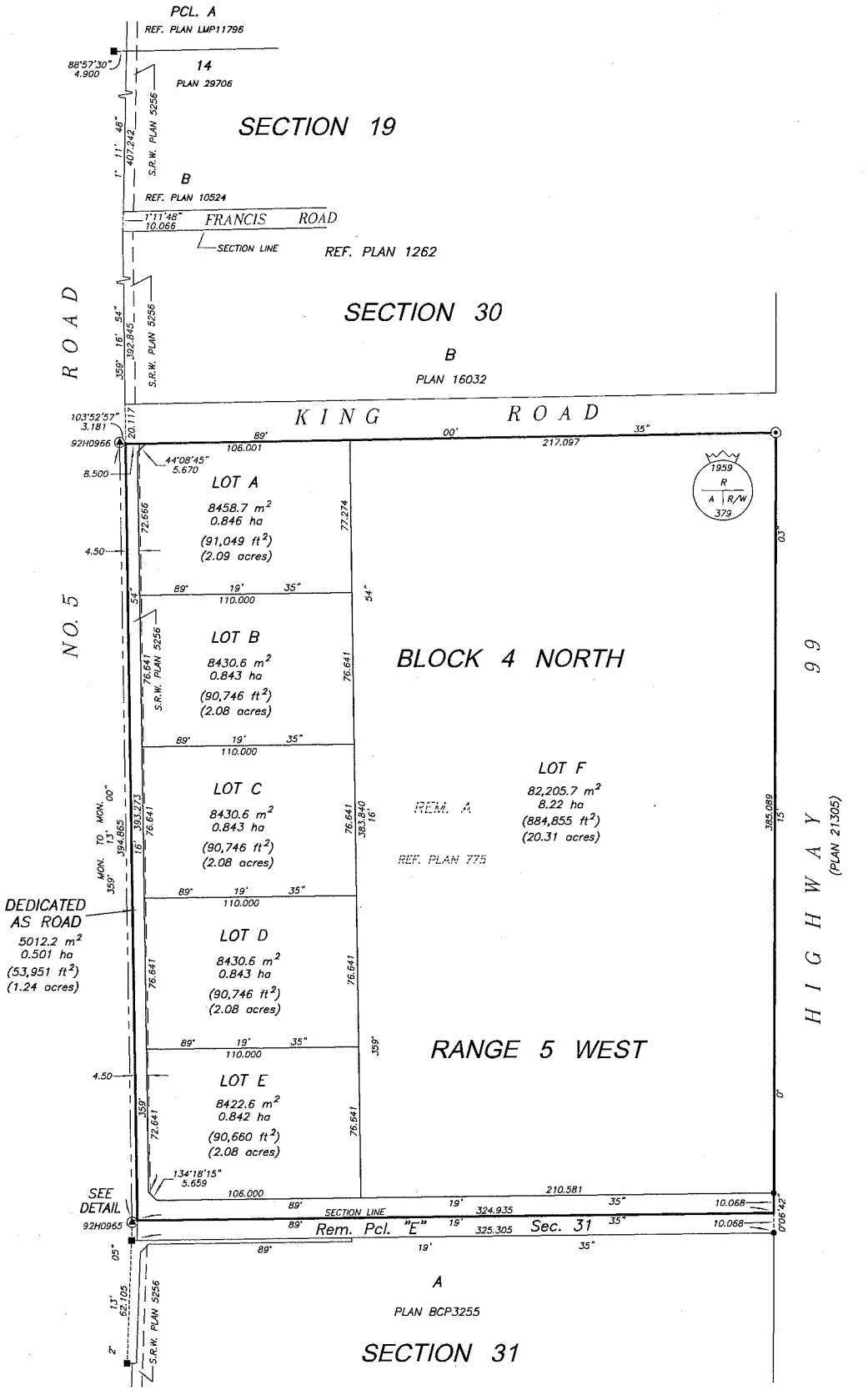
- ▲ – DENOTES CONTROL MONUMENT FOUND
- ● – DENOTES STANDARD IRON POST FOUND
- ■ – DENOTES LEAD PLUG FOUND
- ○ – DENOTES STANDARD IRON POST PLACED
- □ – DENOTES LEAD PLUG PLACED
- NR – DENOTES NO RECORD

THIS PLAN SHOWS ONE OR MORE WITNESS POSTS WHICH ARE NOT SET ON THE TRUE CORNER(S) AND ARE SET ALONG THE PRODUCTION OF THE PROPERTY BOUNDARY UNLESS OTHERWISE NOTED.



DETAIL

NOT TO SCALE



BENNETT LAND SURVEYING LTD.
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DRAWING # 30911-4 Revision #1
FILE # 30911-4_R4
DATE : MAY 3, 2016.

THIS PLAN LIES WITHIN THE GREATER VANCOUVER REGIONAL DISTRICT

City of Richmond

Reference Map: Proposed Williams Road Allowance

Original Date: 04/29/16

Revision Date: 05/02/16

Note: Dimensions are in METRES

Agricultural Advisory Committee
Excerpt of Meeting Minutes
March 12, 2015

Development Proposal - ALR Non-Farm Use Application – 9500 No.5 Road

Staff (Kevin Eng) outlined the non-farm use application to develop the westerly 110 m of the subject site for community institutional/assembly uses, and subdivide the existing 30 acres lot into five 2-acre lots along No.5 Road and one 20-acre lot on the backlands. The proposal includes remediation work to reinstate the back portion of the site to an agricultural capability to support a wide variety of soil-based farm activities, and dedicate the backlands to the City.

The consulting agrologist, Bruce McTavish, and Dr. Hubert Timmenga were invited to the table and provided further details about the proposal. Mr. McTavish noted that the agrologist report contains methodology for conversion of the former golf course site to agricultural production and associated budgets to undertake this work.

Committee had the following questions and comments:

- In response to Committee's query about the farm road access, it was noted that a farm road access is proposed along a portion of the existing unopened Williams Road allowance for access to the 20 acre back portion of the site. The farm road will be constructed to a suitable standard and capable of supporting heavy farm vehicles and machinery. Committee asked if the road will be connected to Highway 99 and staff clarified the road will not connect to Highway 99 and only be extended approximately 120m east of No. 5 Road.

- Committee asked if any barriers are proposed to ensure access is restricted to farm vehicles only. The proponent noted that an appropriate mechanism such as installation of bollards can be considered.

- In response to Committee's query about the drainage plan, Mr. McTavish indicated that there are existing ditches along the north and east property lines and new ditches are proposed along the south property line and through the middle of the site. He clarified that drainage from the farm portion will be discharged to Highway 99 and drainage from the institutional portion will be discharged to No.5 Road.

- Committee asked who will be responsible for removing the large berm running through the site if it has to be removed for agricultural production. Staff noted that the agricultural consultant has identified berm removal in the proposed agricultural remediation plan. Staff also noted that all costs to undertake the agricultural remediation plan, including berm removal, will be the responsibility of the owner/developer.

- Committee expressed concerns regarding the large berm, and noted that it should be removed to maximize the site's agricultural viability and to remove any future barriers to farming the 20 acre back portion once remediated.

- A suggestion was made to properly assess the environmental value of the berm to see if it can enhance bio-diversity of the farm.

- Committee asked about the small size of the proposed lots. The proponent noted that most of the existing institutional properties available for development along No. 5 Road are for larger organizations, and there are demands from small organizations requiring smaller parcels.

- Committee asked if additional soil would need to be brought to remediate the site, and noted any agricultural quality soil should be salvaged from the front portion and applied to the back portion. In response to questions about agricultural remediation works, staff identified that completion of these works will be required as a condition of the land being dedicated to the City. The agricultural consultant identified that minimal additional soil would be needed based on the agricultural remediation plan.

- Committee members asked if an Arborist Report was submitted as part of the application, and if any of the trees can be relocated. No arborist report was submitted as a majority of the existing on-site trees would need to be removed as if left would be an impediment to farming. The proponent also noted that many of the trees are too big to be relocated. Committee noted that it may not be necessary to remove all the existing trees, especially those around the perimeter of the site, and requested the health and condition of the trees to be evaluated and retention opportunities to be reviewed.

- Committee requested details of the proposed road material. The proponent confirmed that it will be compact and permeable surface.

- A suggestion was made to consider using the landscape buffer between the farm and non-farm uses as a plot to expand the farm use on the site.

- Committee noted that removal of the large berm located in the middle of the site is a critical component and it should be removed at the developer's cost.

That the non-farm use application for the purposes of utilizing the front 110 m for community institutional uses and subdivision of the site (five 2 acres lots and one 20 acre lot) at 9500 No.5 Road be supported subject to the following conditions and resolution of issues:

1. *The large berm (entitled Berm #1 in the agrologist's report) to be removed at developer's cost as part of the agricultural remediation works for the 20 acre portion of land to be dedicated to the City;*

2. *The developer undertake further investigation on the potential to retain any existing on-site trees, specifically those located on the perimeter of the site and submit the necessary supporting arborist report;*

3. *Investigate salvaging native agricultural quality soil from the front 110 m portion of the site and if feasible, include these soil salvaging activities in the agricultural remediation plan to be prepared by the agricultural consultant.;*

4. *Examine the implementation of appropriate drainage control structures to prevent any backflow that would negatively impact any agricultural drainage infrastructure provided on the 20 acre agricultural site;*

5. *Appropriate mechanism be secured to ensure completion of the agricultural remediation works associated with the required land use approvals for this development proposal;*

6. *Securing of a legal agreement on the proposed assembly portion of the site to identify that the site is subject to the typical nuisance activities (noise, odour and dust) which will be mitigated through the implementation of an on-site landscaped buffer.*

7. *All efforts to be made by the City to support farming use on the back portion in perpetuity.*

Carried Unanimously

Agricultural Conversion Plan

Mylora Golf Course

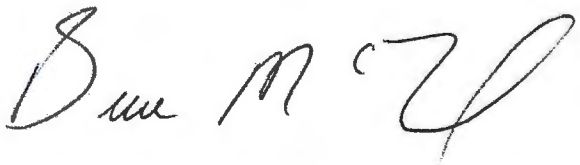
9500 No. 5 Road Richmond BC

Prepared for:

Dagneault Planning Consultants Ltd.

220 – 8171 Cook Road, Richmond BC

Prepared by:



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Executive Summary

The following report is a summary of eight previous reports submitted to the City of Richmond with respect to converting the eastern 18 acres of the Mylora Golf Course located at 9500 No. 5 Road, Richmond BC, to a commercial farm.

The previous reports reviewed agricultural options for the site including:

- Removal of all golf course infrastructure including all trees and berms, and developing a single 18 acres farm.
- Development of up to 7 small 2-3 acre plots for small-scale commercial agriculture, while maintaining some of the existing berms and trees.
- Conversion of the site into community gardens, maintaining most of the berms and some of the trees.
- Develop a combination of community gardens and small lot (urban) agriculture plots.

These options were presented to the City of Richmond Agriculture Advisory Committee (AAC) and to City staff. The AAC requested that the site be converted into a single contiguous farm and that all golf infrastructure be removed including all berms and trees that would interfere with farm operations. Based on this recommendation an agricultural reclamation/conversion plan has been developed and is described in this report.

The present land capability for agriculture on the site is 4W, and based on the site assessment this can be improved to 3WD with some areas 2WD. The improvements will include removing all golf course features, installing additional surface drainage, spreading of salvaged topsoil, subsoiling and cultivation, incorporation of organic matter and a construction of a drainage ditch along the southern property boundary. Subsurface drains have been excluded as they will be ineffective due to the lack of adequate free board (ditch depth) in the Highway 99 ditch.

Since the soils are compacted from years of golf course use they will be remediated by using typical cultivation methods such as subsoiling, ploughing and disking. These actions will remove the existing root restriction and allow rooting to approximately 50 cm depth compared to the present 20 cm depth. These action will allow a wide variety of annual and perennial crops to be grown on the property.

Soil samples were taken and soil pits installed on all fairways and greens, and analyzed for agricultural chemical criteria as well as for heavy metals because golf courses have historically used fungicides that incorporate mercury and cadmium. The soil analysis indicated that metals were well below limits for agricultural soils and that there are no soil chemical issues that would preclude farming on this site or necessitate any soil removal.

Extensive excavations took place on all constructed berms to determine if there was debris in the berms that is not compatible with agriculture. Only a small amount of concrete and asphalt was found in a single location. The amount found is not significant with respect to using the berm material for filling in the water hazards on the property.

A 2 inch water line will be connected to the City water system and run to the property to provide a source of irrigation water, and an all-weather farm road constructed to provide access to the farm.

1.0 Introduction

The following report has been prepared for the City of Richmond and the Agricultural Land Commission (ALC). This report summarizes the findings of 8 documents prepared by McTavish Resource & Management Consultants Ltd. which were previously submitted to the City of Richmond. This summary report provides the City of Richmond and the ALC with final recommendations for the conversion of the eastern 18 acres of the Mylora Golf Course located at 9500 No. 5 Road, Richmond BC, to a commercial agricultural operation. Figure 1 shows the site location and the approximate area that will be converted from a golf course to agriculture.

Figure 1 Site location and agriculture conversion area

1.1 Proposed development

The conversion of the eastern portion of the Mylora Golf Course to a commercial farm is part of an overall development plan to subdivide the western 10 acres along No. 5 Road into five 2-acre lots that will be developed for assembly use (church and temple, see Figure 2). The remaining land will be converted to agricultural land. Since the initiation of this project in 2013 the George Massey Tunnel Project (GMT) has been announced and the Ministry of Transportation and Infrastructure (MOTI) will purchase 2 acres of the property that is adjacent to Highway 99. The land taken by MOTI will vary in width from 18 metres at the north end to 28 metres at the south end. The total amount of land to be acquired is 0.81 ha or 87,292 square feet (2 acres). This will leave approximately 18 acres for commercial farming. This remaining portion of the subject property will be given to the City of Richmond to operate as a commercial agricultural enterprise.

2.0 Site Investigations Soil

To determine the site's suitability for agriculture and the steps necessary to convert the existing golf course back to agriculturally productive land, detailed investigation of soils, drainage, existing golf course features, and potential soil contamination took place between 2013 and 2015.

Existing soil mapping indicates that the soils on the property are in the Delta soil series (Figure 3).

2.1 Existing soil mapping

The existing soil mapping indicates that the soils on the subject property are in the Delta soil series which are common in central and western Delta and central Richmond. The parent material is medium to moderately fine-textured Fraser River deltaic deposits, with the surface texture varying from silt loam to silty clay loam that is usually 100 cm or more deep.

"Delta soils have a very dark gray or black, friable to firm, cultivated surface that is about 20 cm thick and usually contains 10 to 20 percent organic matter. The plowed surface layer (Ap horizon) is underlain by a gleyed Bg horizon (Figure 3) which is typically grayish-brown, firm to very firm, silty/clayey zone, about 30 cm thick which breaks to prismatic or blocky clods and contains some reddish-brown mottles. Underlying this is a Cg horizon about 30 cm thick of dark gray or grayish-brown, massive silty material containing common mottling. Below 100 cm is typically saline, sandy or silty material. The lower part is also often saline and high in sulphur compounds. The soil series is classified as an Orthic humic Gleysol: saline phase, and typically has an extremely to very strongly acid reaction throughout the soil profile."[1]

[1] Luttmerding, H. A., 1981. Soils of the Langley Vancouver Map Area. RAB Bulletin 18. Province of BC Ministry of Environment.

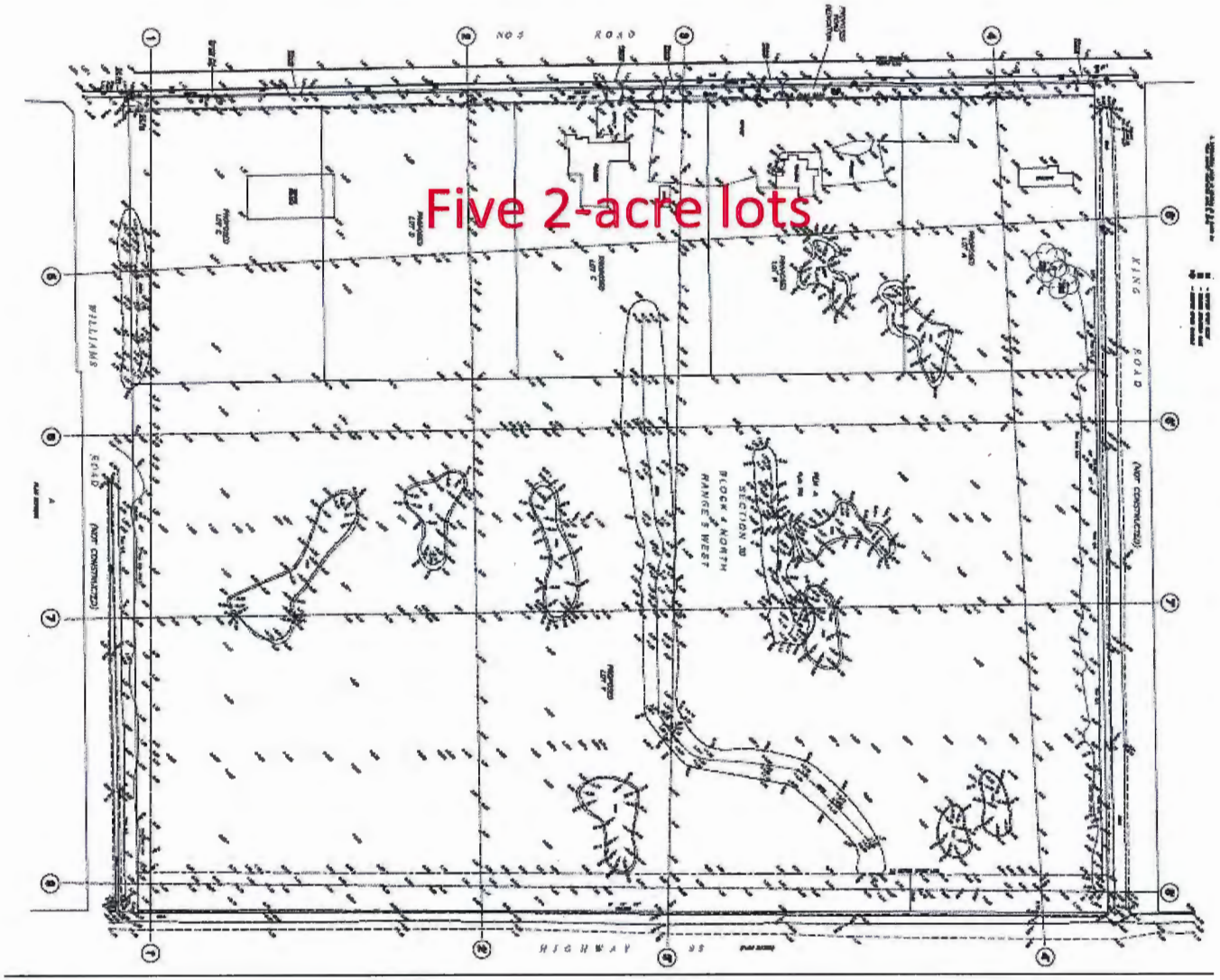

Figure 2 Proposed subdivision 9500 No. 5 Road

Figure 3 Soil sample showing mottled Bg horizon

2.2 On-site soil observations

On -site soil observations were made by sampling all fairways, greens and berm areas on the golf course.

The soil of each fairway was sampled to a depth of 60cm with a Dutch auger. All sample locations were tagged with GPS points and these are shown in Figure 4. Aggregate samples were taken from both the A and B horizon from each soil pit and tested for macro/micro nutrients as well as organic matter, electrical conductivity (EC) and acid reaction (pH). Soil texture was determined by hand texturing at each sample location (see soil logs Appendix I).

2.2.1 Physical properties of soil on fairways

The hand textures of the Ap horizon indicate that soils ranged from sandy clay; silty clay; to silt loam. Since texturing was done by hand it is possible that some of the sandy textured soils are sandy clay loams or clay loams (Figure 5). It was assumed that the soils of the fairways represented the natural soil because there was a clear Ap horizon. However the samples are lower in organic matter and higher than normal in sand for Delta soils. This is probably due to sand topping of the fairways in an attempt to improve drainage.

Figure 4 Soil sample locations

Figure 5 Typical soil profile of fairways

2.2.2 Soil compaction on fairways

Heavy foot traffic on golf courses, particularly around tee boxes, is considered a potential issue in the management inputs needed to convert the property back into agricultural production. Compaction reduces the amount of large non-capillary pores in the soil (reducing hydraulic conductivity) and increases capillary pore spaces. This leads to an increase in water-holding capacity (not good on naturally wet soils) and decreases water infiltration. Compaction typically leads to an increase in standing water and increases the probability of fungal and other diseases. Compaction will also reduce air movement in the soil (oxygen diffusion rates) that in turn inhibits plant growth. It also leads to reduced root growth because roots cannot penetrate the compacted soil.

To determine the degree of compaction on this site a cone penetrometer was used to measure the density of the Ap soil horizon. Penetrometer readings were taken at 25 meter intervals from the tee box down the middle of the fairway towards the green.

"Soil strength is measured in units of pressure: 1 Mega Pascal (MPa) = 145 lb per square in (psi). Root growth is reduced by about half at a penetration resistance of 2.0 MPa (290psi) and severely limited at 3.0 MPa (435 psi). The 2.0 MPa threshold is equivalent to a force of about 26 kg (57lb) to push the 0.5 inch diameter probe into the soil; penetration resistance in compacted soils can be two to four times this value. Higher soil water content typically results in lower penetrometer values so assessments should be carried out at consistent soil water contents." [2]

The readings were taken in the Ap horizon to a maximum depth of 15cm or 6 inches. The readings ranged from 200 to 500 psi with an average of 296 psi (Detailed penetrometer readings are provided in Appendix II). A t-test was run on the data at the 95% confidence interval which indicates that the penetrometer average is 296 psi plus or minus 19.6 psi. This means this reading can be expected 95 times out of 100 tests.

The levels of compaction found on the site are very high (above 300 psi) which will severely restrict roots. At 500 psi root penetration is impossible. In order to convert this property back to agriculture, measures will have to be taken to reduce the compaction by using typical cultivation methods such as subsoiling, ploughing and disking. These will be discussed in more detail in the site remediation section of the report.

2.2.2 Chemical properties of soil on fairways

Nitrogen levels for all soil pits are classified as deficient, which is common for soils on the west coast. Soils can be amended by the addition of organic or inorganic amendments. Soil test results for phosphorus and sulphur indicate marginal levels in samples taken from holes 1-18; however, these levels can be raised through the use of soil amendments. Soil micronutrients are all in the optimum range with the exceptions of boron and chlorine for holes 1-18. Soil sodium is low (< 30 ppm) so there will be no saline issues. The TEC (total nutrient exchange capacity of the soil) indicates that the soil will

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[2] Mclaughlan, N.B., Lapen, D.R., Kroetsch, D., Wang, X., Gregorich, E.G., Ma B.L. & Y.X. Li 'Soil Compaction and Corn Roots' in Advanced Silage Corn Management 2004, Chapter 4. *Agriculture and Agri-Food Canada, Ottawa, Ontario. Available online:* http://www.farmwest.com/node/961 (Accessed 2013).

hold nutrients in reserve and gradually release them to the crop. The organic matter for fairways 1-9 is 6.6%, which is at the high end of normal. This reflects in the relatively high nutrient exchange capacity (TEC of 16.1 meq/100g). The organic matter for fairways 10 to 18 is slightly lower at 5.5% but still within the normal range.

Soil test results are summarized in Tables 1 and 2 below.

Table 1 Soil chemistry fairways 1 to 9

Analysis	**Results (ppm unless indicated otherwise)**	**Comments**
N (nitrogen)	4	Deficient
P (Phosphorus)	20	Marginal
K (Potassium)	217	Low optimum
S (Sulphur)	5	Marginal
Ca (Calcium)	1670	Optimum
Mg (Magnesium	200	Optimum
Fe (Iron)	421	Optimum
Cu (Copper)	2.4	Optimum
Zn (Zinc)	2.2	Low optimum
B (Boron)	0.2	Deficient
Mn (Manganese)	11.8	Low optimum
Cl (Chlorine)	5.0	Marginal
pH	6.4	Neutral
EC ((dS/m)	0.20	Good
OM (organic matter %)	6.6	High normal
BS (Base saturation)	65.3 %	
TEC (Exchange capacity)	16.1 (meq/100g)	Good
Na (Sodium)	<30 ppm	Good

Table 2 Soil chemistry fairways 10 to 18

Analysis	**Results (ppm unless indicated otherwise)**	**Comments**
N (nitrogen)	4	Deficient
P (Phosphorus)	12	Deficient
K (Potassium)	177	Low optimum
S (Sulphur)	4	Deficient
Ca (Calcium)	1170	Optimum
Mg (Magnesium	198	Optimum
Fe (Iron)	385	Optimum
Cu (Copper)	3.0	Optimum
Zn (Zinc)	2.4	Low optimum
B (Boron)	0.3	Deficient
Mn (Manganese)	13.1	Low optimum
Cl (Chlorine)	5	Marginal
pH	6.2	Neutral
EC ((dS/m)	0.12	Good

OM (organic matter %)	5.5	Normal
BS (Base saturation)	60.9	
TEC (Exchange capacity)	13.0 (meq/100g)	Good
Na (Sodium)	<30 ppm	Good

Since the greens are built with a deep layer of medium to coarse-textured sand they are considered highly modified and will be removed as part of the agricultural conversion. Soil sampling on the greens therefore focused on the potential for soil contaminants as described in Section 2.3.

2.3 Golf greens and potential for contaminants

All greens were impacted by fungal infections (see reddish-brown spots, Figure 6). A number of fungal diseases are common on bent grass golf greens these include dollar spot, pink snow mold (Microdochium patch and Fusarium patch), Anthracnose, and Pythium diseases (including Pythium blight and Pythium root rot or dysfunction). The obvious presence of fungal disease indicates that the golf course would have had a fungal control program that would have included extensive use of fungicides to control these diseases when the course was in operation. The major concern in terms of agricultural conversion of the golf course is not the actual presence of fungal diseases, but the types of fungicides that may have historically been used for control.

From the 1960s until the 1990s golf courses used fungicides whose active ingredients were either mercury or cadmium. Mercury was present in the inorganic formulation of mercurous and mercuric chlorides and organic forms with phenyl mercuric acetate and hydro-xymercurichlorophenol. Cadmium was incorporated into fungicides in both organic and inorganic forms including cadmium chloride (inorganic) and cadmium succinate (organic).

Figure 6 Reddish-brown spots indicating fungal disease on greens

With respect to the development of agriculture on the subject property, it was important to assess potential heavy metal contamination that may be present due to fungicide use on golf course greens. Prior to 1995 there was widespread use of mercurial fungicides to control snow mold (Brytus, 1997). These mercury compounds have a high affinity to absorb into soil complexes, leading to residual contamination long after the fungicides were used. Based on this information the testing for heavy metal contamination is imperative to ensure mercury levels do not exceed agriculture standards.[3]

Mercury and cadmium are the main concerns. To test for heavy metals for each green, samples were taken at the depths of 0-7.6 cm (0-3 inch), 7.62 cm-15.2 cm (3-6 inch), 15.2 cm-22.8 cm (6-9 inch) and 22.8 cm-30.4 cm (9-12 inch). Samples were taken using an Oakfield probe. The probe was cleaned between each set of samples taken. In total two sets of samples were submitted to the laboratory (composites of fairways 1-9 and 10-18). Each sample set consisted of an aggregate sample representing the 0-7.6 cm depth (Sample 1), and the 7.62 to 15.2 cm depth (Sample 2). The deeper samples were stored in a freezer pending analysis in case any metals above allowable limits were found in the shallower samples. The logic for testing the surface 15 cm (6 inches) is that heavy metals are not mobile in the soil since they bind to soil cations. Thus if they were present they would be found in the upper 15 cm of the soil.

Samples representing all 18 greens on the subject property were tested for heavy metals and compared to the agriculture regulation standard for allowable heavy metals for agriculture use. All samples were well below the maximum limit allowed for agriculture (see Table 3 and Appendix III). The allowable limit for Cadmium is 1.5 ppm, and concentrations were found at 0.11 in the 0-7.6cm (0 to 3 inch) depth (less than 10% of the allowable limit). The allowable limit for mercury is 0.6 ppm and this heavy metal was found at 0.039 in the 0-7.6 cm (0-3 inch) depth and 0.021 ppm in the 7.6-15 cm (3 to 6 inch) depth (about 5% of the allowable limit). Based on these results there are no concerns about mercury or cadmium contamination on this site.

[3] Brytus, G. (1997). *An assessment of mercurial fungicide residues in golf course soils and clippings*. Informally published manuscript, Olds College, Alberta, Retrieved from http://www.oldscollege.ca/ptrc/1997_ar/9708.html

Table 3 Heavy metal test results from golf greens

		Sample 1	Sample 2
Substance	**Allowable limits for agriculture (ppm)**	**0 - 3 inches (ppm)**	**3 - 6 inches (ppm)**
Inorganic Substances			
antimony	20	1.7	1.8
arsenic	15	<0.20	<0.20
barium	400	35	42.3
beryllium	4	0.16	0.19
boron (hot water soluble)	2	0.15	0.08
cadmium	1.5	0.11	0.14
chloride ion (Cl-)	35		
chromium (+3)	50		
chromium (+6)	60		
chromium (total)	50	29	32.5
cobalt	40	5.56	6.56
copper	90	12.6	12.2
fluoride	200		
lead	100	1.7	3.2
mercury	0.6	0.039	0.021
molybdenum	5	0.21	0.09
nickel	150	35.9	29.4
selenium	2	<0.3	<0.3
silver	20	<0.2	<0.2
sodium ion (Na+)	200		
sulphur (elemental)	500		
thallium	2	<0.3	<0.3
tin	5	<0.2	<0.2
vanadium	200	41.3	43.4
zinc	150	37.8	42.9

2.4 Constructed berms and potential for contamination

Several constructed berms form part of the golf course infrastructure. It is the intention to use the soil material in the berms to fill in the existing water features on the golf course. Therefore it is critical to ensure there are no contaminants in the berms.

Observations took place in 2013 and 2015 by excavating trenches in the berms and making visual observations for foreign material such as asphalt and concrete.

Twenty trenches were excavated in 2015 as shown in Figure 7. In 2015 a small amount of asphalt was observed at GPS location 655 and 677. All other trenches were free of any foreign material.

Figure 7 Sample locations 2015

Figure 8 Sample locations 2013

The 2013 sampling indicated that the large berm running east to west along fairway 14 (GPS locations 419 to 421) contained occasional pieces of concrete and asphalt (consistent with 2015 findings). The soil in this berm also contains some gravel and is of a texture more consistent with glacial till. This berm turns north at sample location 421 (Figure 8) and 660 (Figure 7). The section of the berm running north is constructed with soil material from the subject property.

The small amount of concrete and asphalt found in the berms are of no concern with respect to using the soil in the berms as fill material for the golf course water hazards. Even if there are small amounts of concrete or asphalt in this material, research has shown that aged asphalt and concrete do not leach significant quantities of deleterious material into the environment. This is supported by the fact that the BC Ministry of Agriculture recommends the use of broken concrete in cranberry berm construction.[4]

2.2 Drainage

Delta soils are generally poorly drained. Internal and surface drainage are both slow, resulting in high water tables over the winter months. During the growing season the water table gradually retreats and droughty conditions sometimes develop during dry summers. The soil compaction that is found on the site will also reduce water infiltration and result in poorly-drained soils.

During the site investigation in April, 2013 surface water ponding occurred in some areas, along with soggy soil and generally poor drainage. Surface drains and shallow subsurface drain lines were encountered during the site investigation and one outlet was observed into the Highway 99 ditch approximately 0.30 m below the soil surface. Due to heavy brush along the ditch it was not possible to find other drain outlets.

Drainage needs to be improved in order to convert the property to agriculture. More details on drainage improvement are provided in the agricultural conversion plan (Section 4).

2.4 Agricultural capability

Agricultural areas in the Lower Mainland have been mapped and the land rated for its agricultural capability. The capability is presented as unimproved (land without additional management inputs such as drainage or irrigation) and improved which is the highest capability the land can reach if all constraints are removed.

2.4.1 Agricultural capability based on existing mapping

The land capability class 4W. This means that based on the published mapping without improvement, 100% is of the site has an unimproved classification of 4 with the most significant limitation being W (excess wetness).

[4] Guidelines for Farm Practices Involving Fill. (2006) Strengthening Farming Fact Sheet. December 2006.

2.4.2 Agricultural capability based on site investigations

Site observations on the subject properties show soils to be consistent with the current land capability rating of 4W. Evidence of prolonged wetness was observed on the majority of the fairways. Mottling was present in many of the soil pits, indicating prolonged water saturation in the soil profile. This is common for Delta soils, which are classified as Orthic Humic Gleysol.

Figure 9 Land capability for agriculture

The site has been managed as a golf course for many years, and shallow subsurface drainage has been installed, however this is offset by very compacted soils and lack of freeboard for adequate drainage outlet depth at the Highway 99 ditch. Based on the saturated condition of the site observed during soil sampling in April 2013 and results of soil compaction testing in May 2013, it is the author's opinion that the site is presently a 4W classification.

Agricultural capability ratings are described below[5]:

Class 4

Land in Class 4 has limitations which make it suitable for only a few crops, or the yield for a wide range crops is low, or the risk of crop failure is high. The limitations may seriously affect one or more of the following practices: timing and ease of tillage, planting, harvesting and methods of soil conservation.

[5] Henk, E & I. Cutic. 1983. Land Capability Classification for Agriculture in BC. BC Ministry of Environment.

Class 4W

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

With site remediation the land capability can be improved to 7:2WD 3:3WD. This means that 70% of the property can be improved to Class 2 with excess water restrictions, as well as a root-restricting layer within 50-75 cm of the soil surface. 30% of the property can be improved to Class 3 with excess water restrictions and a root-restricting layer within 25-50 cm of the soil surface. Class 3 capability is described below:

Class 3

Limitations are more severe than for Class 2, and management practices are more difficult to apply and maintain. 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 3W

Occasional occurrence of excess water during the growing period causes minor crop damage but no crop loss, or the occurrence of excess water during the winter months adversely affects 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.

Present land capability classifications have the potential to be improved by remediating current limitations. Such improvements typically include:

- Water control (ditching or tilling)
- Deep ploughing
- Amelioration of soil texture
- Cultivating to break up root-restricting layers

The options for improvement of the property will be discussed in Section 4.

2.5 Existing golf course features

Various features need to be addressed when returning golf courses to commercial agriculture use. These include ponds, sand traps, tees and greens, various undulations in the terrain and berms, and landscaping. This section describes the various golf course features found on the property, and Section 4 describes the remediation strategy to remove these features to allow for commercial agriculture.

Bennett Surveying prepared a survey plan of the site that included the area and volume of all water hazards and the volume of the berms. This section of the report uses the Bennett survey plan to describe the various golf course features and to develop a reclamation plan and budget.

2.5.1 Golf course water hazards

Various water hazards located throughout the site can be seen in Figure 1. Based on the survey plan approximately 4000 m^2 (volume of 4600 m^3) of water hazards exist on the property and will need to be filled.

2.5.2 Sand traps

Various sand traps are located throughout the site as can be seen in Figure 1. Based on the survey plan approximately 850 m^2 of sand traps will need to be filled or the sand removed and topsoil applied.

2.5.3 Tees and greens

Tees and greens are built above the natural soil surface with native soil and fine sand. Greens are highly compacted sand and tees are also compacted. The layer of sand is about 25 cm deep (9-10 inches). The sand can either be spread and incorporated into the soil or used as fill for the water hazards.

2.5.4 Undulations

The fairways include various undulations and minor landscaping. Some are planted with ornamentals or single trees. Most undulations are covered with grass. The minor undulations consist of contoured natural soil, and after potential removal of vegetation and trees, can be easily levelled.

2.5.5 Berms

The Mylora course includes one major berm running east-west alongside Fairway 14, with a north-south section near Highway 99. The east-west berm has numerous coniferous trees and ornamental plants. It is constructed with mostly clean fill (subsoil). The north-south part of the berm is constructed with native soil. Another berm runs across the north side of the property, and is planted with conifers and poplars.

Based on the survey plan the total soil volume of the berms is 2418 m^3.

2.5 Summary of site investigations

Based on site investigations carried out between 2013 and 2015 there are no contaminants that will inhibit the conversion of the existing golf course to a commercial agriculture property. The soil chemical and physical properties are all within normal parameters for agricultural land in Richmond, and the low macro nutrient levels are consistent with areas that were not fertilized on a regular basis.

Existing golf course features such as berms, sand traps, tees, and greens have been identified and quantified. These numbers are used in the conversion/reclamation plan (Section 4) and in the budget presented in Section 8 of this report.

3.0 Agricultural site options

A number of agricultural options were developed and presented to the City of Richmond Agricultural Advisory Committee (AAC) for the conversion of the golf course into a farm operation. These included:

1. Developing a single 18 acre commercial farm site:
   - Commercial agriculture requires the removal of all trees and berms, all greens and tee boxes, as well as the filling of all water hazards presently on the golf course.

2. Developing small lot urban agriculture plots of 2 acres each:
   - This scenario would need less site reclamation because a single contiguous unit of land would not be required (as is the case for a larger scale commercial operation). The proposed small agricultural lots would closely follow the existing fairways, with some removal of trees and filling of ponds and sand traps.

3. Use of the site as a community garden with multiple small gardens that could be leased/rented to residents of the local community:
   - Under this option it is feasible to leave the ponds and berms as aesthetic features, but fill in the sand traps with topsoil to make them available for garden plots.
   - This option would require that a significant area be developed for parking.

4. Develop a combination of community garden and 2-acre urban agriculture plots.

For more detailed information on each option refer to 'Agricultural Site Assessment of Land Located at 9500 Number 5 Road for Inclusion in the Agricultural Land Reserve and Conversion of Golf Course to Agriculture' prepared by McTavish Resource & Management Consultants and submitted to the City of Richmond in June of 2013. Also refer to the 'Proposed Business Plan for Mylora Golf Course Agriculture Conversion Addendum II' prepared by McTavish Resource & Management Consultants and submitted to the City of Richmond in September, 2014.

The AAC and staff at the City of Richmond carried out a detailed review of all proposals. They have requested the option of conversion to an 18-acre commercial farm. Since all other options have been removed from consideration, the following site reclamation plan is based on converting 18 acres of golf course into a contiguous farmable area.

By converting the entire area into a single contiguous field the City of Richmond will have the option to operate the area as a single farm entity or to potentially rent or lease out smaller acreages within the 18-acre block.

4.0 Agriculture conversion plan

The objective of the agricultural conversion plan is to maximize the area of farmable land and to improve the agricultural capability of the site to at least Class 3W. This will be achieved by improving the drainage and carrying out the following activities:

- Tree and stump removal;
- Grass and weed removal;
- Berm removal;
- Filling of water hazards;
- Removal of sand traps;
- Removal of existing irrigation and drain lines;
- Leveling and crowning the land;
- Break the existing sod by ploughing and disking;
- Spreading salvaged topsoil over berm removal areas, sand traps and water hazards;
- Preparing the land for planting;
- Seeding a grass forage crop;
- Constructing a farm access road; and
- Installing a 2 inch water from the city main to a stand pipe inside the property line.

4.1 Agriculture capability improvement through drainage enhancements

A detailed analysis of site elevations, depth of the Highway 99 ditch and water table depth indicates that it is not possible to install a functioning gravity subsurface drainage system (see analysis by Dr. Hubert Timmenga PAg, provided in Appendix V).

Based on site investigations the current land capability classifications can be improved to Class 3W without subsurface drainage by:

- Grading and ditching to remove excess surface water;
- Deep ploughing/subsoiling to break up the root-restricting and water infiltration-restricting layers;
- Improving soil texture through the addition of organic matter;
- Disking and ploughing to incorporate organic matter and further break up the root-restricting layer; and
- Adding salvaged topsoil to increase the rooting layer depth and improve drainage.

4.1.1 Open ditches and grassed waterways

New ditch north of Williams Road right of way

Drainage will be improved by installing a new ditch along the south property boundary between the subject property and Lingyen Mountain Temple north of the Williams Road right of way. Details on the ditch design are provided in Appendix VI.

Detailed engineering for the open ditch is provided in Appendix VI

Based on the analysis provided in Appendix VI a trapezoidal ditch with the following dimensions will be installed:

- Z = side slopes of 1:5 to 1
- B = bottom width of 1m
- D = channel depth of 0.5m
- S = Slope of 0.1%

Using the rational method for determining required flow, the ditch must have a peak runoff capacity of 0.1 m^3/s. The soil texture on the site dictates a maximum velocity of 1.2 m/s. Based on the ditch size criteria shown above, the design ditch capacity will be 0.33 m^3/s at a maximum velocity of 1.2 m/s. The ditch is therefore oversized, however installing a ditch smaller than recommended size becomes difficult to maintain. The additional capacity also provides storage capacity during high rainfall events.

A central grassed waterway was considered, however the low peak runoff, shallow slope and resulting high Manning's coefficient of roughness preclude using a grassed waterway to convey surface water (see Appendix VII).

4.1.2 Use of salvaged topsoil

Six (6) acres of land in the assembly area (western section of the property) are unencumbered with buildings or parking lots. In addition, MOTI has indicated that topsoil can be salvaged from the 2 acres they are purchasing adjacent to Highway 99. This results in a total of 8 acres available for topsoil salvage. The average topsoil depth of Delta soils is 20 cm (7.87 inches) therefore [8 acres (340,480 ft^2) x 0.67 foot depth = 228,126 ft^3 = 8448 yd^3] or approximately 6460 m^3 of topsoil that will be available to assist in crowning the land to improve surface drainage.

The topsoil will be used to improve the grades from west to east, with a deeper application along the western section of the agricultural area to produce a greater slope from the west to the Highway 99 ditch.

4.1.3 Direction of drainage

The sloping and crowning of the agricultural area will ensure that all drainage from the site flows to the Highway 99 drainage ditch. Water will be transmitted by the existing ditch on the north of the property, by the newly installed ditch on the south of the property and by overland flow directly to the highway 99 ditch.

Figure 10 Location of surface drainage features

4.2 Agricultural capability improvement using cultivation

The wetness (W) and root restricting (D) limitations can be mitigated by the application of cultivation techniques including:

- Subsoiling (deep ploughing) the soil to break up the root-restricting and water infiltration restricting layer;
- Amelioration of soil texture by the addition of organic matter; and
- Disking and ploughing to incorporate organic matter and further break up the root-restricting layer.

4.2.1 Subsoiling

Deep compaction which restricts water infiltration and root development can be improved by subsoiling with a wing-tined subsoiler to depths of 0.75 m (Figures 11 and 12). Criteria for effective subsoiling include:

- Tine spacing must be at least 1 x the working depth of the subsoiler; and
- Subsoiling must be done when the soil is relatively dry.

Figure 11 Example of a winged tine subsoiler

Figure 12 Example of deep subsoiler

Correct use of subsoiling equipment includes pulling the subsoiler at the correct speed. Soil moisture must be low and shanks must be the correct depth and spacing (Figure 13)[6].

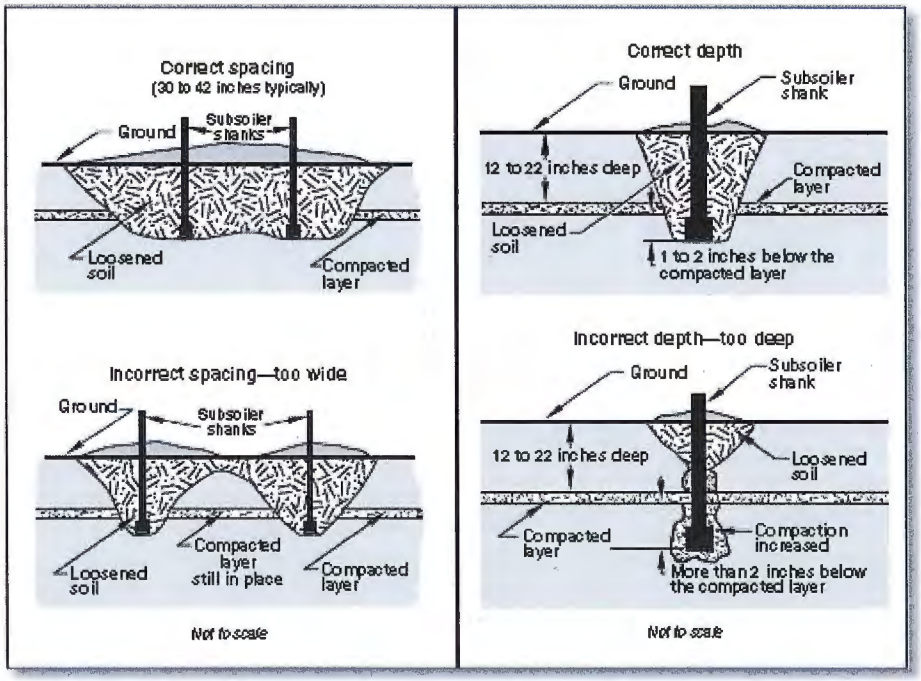


Figure 13 Correct use of a subsoiler

[6] US Department of Agriculture (2008) Using a Subsoiler to Reduce Soil Compaction. Web site: http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf08342828/pdf08342828dpi72.pdf Accessed January 2016.

Horsepower requirements for subsoiling depend on soil moisture, the depth and thickness of the compacted layer, and (to a lesser extent) the soil type. Each shank may require from 30 to 75 horsepower. Equipment speed can affect subsoiling. Travel speed that is too high can cause excessive surface disturbance, bring subsoil materials to the surface, create furrows, and bury surface residues. Travel speed that is too slow may not lift and fracture the soil adequately.

To ensure subsoiling is carried out correctly and effectively, McTavish Resource & Management Consultants Ltd. will direct the contractor to proceed when soil conditions are ideal, and McTavish personnel will be present on site to ensure correct depth and speed.

4.2.2 Ploughing

The site will be ploughed using a moldboard plough which slices, lifts, fractures and inverts the soil. Ploughing the site after subsoiling will have two positive impacts:

- Burying the existing sod and weeds; and
- Restoring tilth to the top layer of the soil.

Ploughing should be done using a large mouldboard plough (see Figure 14) with a plough depth of at least 30 cm (12 inches).

Figure 14 Moldboard plough

4.2.3 Summary of agricultural capability improvements

The combination of management practices outlined in Section 4.2 will result in a significant improvement in the agricultural capability of this site. The cultivation practices and addition of organic matter as described will remove the root-restricting limitations. At the present time the root-restricting layer ranges between 12 and 20 cm below the surface. Implementation of the recommendations will result in a root-restricting layer located between 40 and 50 cm below the surface. The new classification will therefore be 3D with respect to root restriction, and possibly 2D in some areas where there will be significant topsoil additions.

Constructing an open ditch along the southern side of the property, adding salvaged topsoil and subsoiling the entire site will significantly improve drainage and infiltration rates. The resulting agricultural capability classification will be 3W with respect to the wetness limitation.

The existing agricultural capability mapping shows that under best management practices the site would be 70% 2WDN and 30% 3WDN. The management inputs described will result in a rating for the property of 90% 3WD and 10% 2WD. This will allow a wide range of crops to be grown on the site; these are described in Section 6.

It should be noted that with the present regional ditching system and lack of freeboard for subsurface drain outlets it is not possible to improve the capability rating to 2W. A rating of 2W requires that excess water in the soil occurs only within the upper 50 cm of the soil for less than 2 weeks at any time of the year. This can only be accomplished if the ditch water levels are low enough to allow drains to be placed at least 1m below the surface.

4.2.3 Improving soil texture

Soil texture will be improved through the addition of organic matter. This will improve water infiltration and nutrient-holding capacity. All trees and branches will be chipped and composted on site and incorporated into the soil. Incorporation will be done by spreading the organic material with a manure spreader and using a tine cultivator to incorporate the material into the existing soil.

4.3 Tree and stump removal

All trees and stumps will be removed.

- Trees of commercial value will be sold. All others will be chipped on site, composted and cultivated into the soil.
- Chips will be small enough to quickly decompose, or a breaking disc must be used to cultivate chips into the soil after application.

A list of trees to be removed is provided in Appendix VIII

4.4 Grass and weed removal

Weed removal will be done by mechanical means. This will include:

- Mowing in the spring of 2016

- Ploughing as soon as soil moisture conditions allow
- Disking as soon as soil moisture condition allow.

By using only mechanical means for weed control the site will be suitable for organic agriculture.

4.5 Berm removal

All berms will be removed and the berm material used for filling the water hazards. Any asphalt or concrete encountered will be removed from the site.

4.6 Fill in water hazards

All water hazards will be filled using on-site material from sand traps, berms and tee boxes.

4.7 Remove sand traps

All sand will be removed from sand traps and used as fill in water hazards. Sand in excess of that required for filling of water hazards will be spread evenly over the site.

4.8 Break existing sod by ploughing and disking

The entire golf course area will be ploughed and disked to break the sod prior to land levelling.

4.9 Level and crown land

The site will be levelled with a grade of 0.25% from west to east toward the Highway 99 Road ditch and crowned in the middle with a grade of 0.25% toward the north and south. Elevation drawings and cross sections are provided in the topographic/grading plan that accompanies this report.

4.10 Prepare the land for planting

Once land levelling is completed the site will be disked and prepared for seeding by harrowing the entire area.

4.11 Seed forage crop

The site will be seeded with a fall cover crop of either winter wheat or fall rye depending on the weather conditions and time of year when seeding takes place. The cover crop will need to be harvested and the site seeded in the spring with Richardson Seed (Terralink) General Pasture with Clover Mix or equivalent. Seed at 35 lbs. per acre.

To improve soil structure and infiltration it is important to seed a deep-rooting forage crop and maintain it for a minimum of 1 year after all reclamation activities are complete. This crop can then be harvested as hay or silage and therefore has commercial value.

4.12 Timeline for site reclamation activities

It is critical that the work begin in the spring (May at the latest) to ensure that soil movement activities take place during the summer months when the soil is not saturated. It is also important to seed a cover crop by the end of the first week of October to ensure establishment before winter. Table 4 outlines the activities that need to take place and their appropriate timing.

Table 4 Site reclamation schedule

Item	Activity	Month
1	Tree and stump removal; chipping and composting	March to May
2	Spray with herbicide (if allowed); otherwise wait and remove existing vegetation in June	May (June)
3	Remove berms - place all material in water hazards	June to July
4	Fill water hazards	June to July
6	Topsoil - salvage topsoil from west lots and use on water hazards	June to July
5	Topsoil water hazards (minimum 20 cm of topsoil)	June to July
7	Remove sand traps and spread sand evenly over fairway	June to July
8	Apply topsoil to sand traps	June to July
9	Break sod, plough and disk the entire site	June
10	Spread topsoil over all berm areas (20 cm deep)	July to August
11	Remove irrigation and drain lines as encountered	As encountered
12	Subsoil, plough, disk, land level and crown (use remaining topsoil to improve grades)	August to September
13	Install drainage ditch at south side of property	August
14	Prepare for planting (harrow)	September
15	Sample soil, prepare nutrient management plan and add nutrients as needed	September
15	Seed with winter cover crop	Mid-September to first week of October
16	Construct farm access road	July to August
17	Install 2 inch water line	August to September

5.0 Environmental farm plan initiatives included in conversion

The agricultural conversion/reclamation will encompass initiatives that have been developed under the Environmental Farm Planning program (EFP) in BC. Areas within the EFP program that are relevant to the site conversion are:

- Crops
- Pest Management
- Soil amendments
- Biodiversity
- Soil
- Water
- Stewardship areas

5.1 Crops

The EFP program encourages farmers to plant cover crops to assist with the management of pests, nutrients and soil tilth. Cover crop practices also benefit wildlife and provide additional forage yield for the farm operator.[7]

The agricultural reclamation plan recommends that a cover crop be seeded on sites in late September or early October to improve the soil and infiltration capacity of the soil.

If the City of Richmond has not taken ownership by Spring, 2017 the present owner will incorporate the cover crop prior to seeding a forage crop.

5.2 Pest management

The EFP program encourages the use of integrated pest management, control of noxious weeds, and reduced use of pesticides and herbicides.

Part of the planned activities is the control of all weeds on the property either by a combination of herbicide use and cultivation; or, if directed by the City of Richmond, using cultivation only. There is no intention to use any pesticides on the site.

5.3 Soil amendments

The EFP program encourages the use of compost, animal manures and the management of soil fertility to match crop needs. This is done by developing nutrient management plans for individual farms.

The agricultural reclamation plan includes the composting of all wood material on the site and incorporating this into the soil. Prior to the seeding of the fall cover crop, soil sampling will take place. A nutrient management plan will be developed and appropriate nutrients will be added to meet crop needs.

[7] EFP Reference Guide The Canada – British Columbia Environmental Farm Plan Program. 5th edition. Pub. ARDCORP

5.4 Biodiversity

The EFP program encourages the maintenance and expansion of biodiversity on farms. Biodiversity as defined by the EFP program as:

"The variety of all life forms plus the habitats and natural processes that support them. It includes all forms of life from bacteria, viruses and fungi to grasses, forbs, shrubs, trees, worms, insects, amphibians, reptiles, fish, birds, mammals, agricultural crops and livestock, and humans. Natural processes including, pollination, predator-prey relationships, and natural disturbances such as floods and wildfires."[8]

The agricultural reclamation plan intends to leave all the trees that are presently growing along the northern property boundary and the existing ditch. This will maintain bird habitat and continue to provide habitat for small mammals.

Incorporation of the composted wood material will increase soil biodiversity by providing organic matter including fungi, bacteria, and worms. These form the basis of a healthy and biodiverse soil ecosystem.

It should be noted that, based on the recommendations of the City of Richmond AAC, all trees are being removed from the farmed portion of the site. This will reduce biodiversity on the site but is necessary to develop a large farm without impediments to conventional farm activities.

5.5 Soil

The EFP program encourage farmers to use management practices that improve or maintain a high level of soil quality. Soil quality factors include carbon to nitrogen ratios; compaction, soil contaminants; macronutrients (especially nitrogen); organic matter; cultivation and erosion control.

5.5.1 Carbon to nitrogen ratio

A nutrient management plan will be developed which will ensure that there is adequate nitrogen to balance the carbon added via the composted wood chips.

5.5.2 Compaction

The agricultural reclamation plan includes significant work to reduce the compaction of soil on the site and improve soil tilth.

5.5.3 Soil contaminants

The entire site has been tested for contaminants and none are present.

5.5.4 Macronutrients

A nutrient management plan will be developed which will ensure that all nutrients are balanced with crop needs, and that nitrogen does not leach from the soil.

5.5.5 Organic matter

Organic matter will be increased through the addition of the decomposed wood chips and the incorporation of crop residue.

[8] EFP Reference Guide IBIC

5.5.6 Cultivation

Cultivation techniques will be used as described in the report. Subsoiling will improve drainage; ploughing and disking will be only used to the degree necessary to break up compaction and improve rooting depth. These are all cultivation practices that will improve the soil, including soil biodiversity and tilth.

5.5.7 Erosion control

A cover crop will be seeded in the fall to ensure that there is soil cover to reduce water and wind erosion.

6.0 Crop Potential

The anticipated agricultural capability of the site after the conversion from the existing golf course to a commercial farm is 3WD. This capability based on the attributes of Delta series soils is slightly limiting compared to class 2, however a wide range of crops can be grown including:

- Annual legumes
- Blueberries
- Cereals
- Cole crops
- Corn
- Perennial forage crops (though first cut may be late due to wet conditions)
- Root vegetables (except carrots)
- Shallow rooted annual vegetables (except celery)
- Strawberries

An example of specific crops are provided in Table 5[9] which are the top ten crops presently grown in Richmond and on similar soil and drainage conditions.

Table 5 Top 10 crops grown in Richmond

Crop	Hectares	% of crops	% of census farms	% of ALR
Cranberries	858	38.9%	11.4%	21.5%
Blueberries	556	25.2%	33.2%	13.9%
Other Hay	320	14.5%	8.1%	8.0%
Potatoes	88	4.0%	2.8%	2.2%
Cabbage	64	2.9%	4.7%	1.6%
Strawberries	57	2.6%	2.4%	1.4%
Sweet Corn	52	2.4%	4.7%	1.3%
Chinese Cabbage	51	2.3%	10.0%	1.3%
Pumpkins	25	1.1%	5.2%	0.6%
Squash and Zucchini	21	1.0%	7.1%	0.5%

[9] http://www.richmond.ca/plandev/planning2/agriculture/about.htm

Total	2,092	94.7%	89.6%	52.4%

7.0 Farm road access

A farm access road will be constructed along the Williams Road easement. This is a farm access road and not a public road and is therefore designed to meet farm standards as outlined in the BC Environmental Farm Plan Program Reference Guide[10].

- The road width will be 6m wide allowing ample room for farm vehicles and trucks to enter and leave the farm site.
- Road base will be compacted well drained gravel
- Road surface will be clean, non-contaminated permeable materials.
- A drawing of the farm road is provided in Appendix IX.

8.0 Cost estimate

A number of quotations have been obtained to carry out the work listed below:

Item	Activity
1	Tree and stump removal; chipping and composting
2	Spray with herbicide (if allowed); otherwise wait and remove existing vegetation in June
3	Remove berms - place all material in water hazards
4	Fill water hazards
6	Topsoil - salvage topsoil from west lots and use on water hazards
5	Topsoil water hazards (minimum 20 cm of topsoil)
7	Remove sand traps and spread sand evenly over fairway
8	Apply topsoil to sand traps
9	Break sod, plough and disk the entire site
10	Spread topsoil over all berm areas (20 cm deep)
11	Remove irrigation and drain lines as encountered

[10] Reference Guide: The Canada BC Environmental Farm Planning Program 5th Edition (2013)

12	Subsoil, plough, disk, land level and crown (use remaining topsoil to improve grades)
13	Install drainage ditch at south side of property
14	Prepare for planting (harrow)
15	Seed with winter cover crop
16	Construct farm access road
17	Install 2 inch water line

The cost to carry out the work as described is $718,400.00

9.0 Monitoring plan

The conversion of the golf course to land appropriate for commercial agriculture will be managed and monitored by McTavish Resource & Management Consultants Ltd.

McTavish has extensive experience in large reclamation projects and specifically on remediation/reclamation work on agriculture land in BC.

McTavish is presently the lead agricultural consultant for Kinder Morgan Canada (KMC) on the Trans Mountain Expansion Project. They are also the lead agricultural/soil consultant for KMC operations and responsible for ensuring all work on agricultural land is reclaimed to equal or greater productivity than prior to construction activities.

McTavish is also a consultant for Spectra Gas, and has carried out numerous large projects to remediate agricultural land that has been disturbed by pipeline activities.

McTavish is also ISNet World certified as medium risk contractor. This certification is a global health, safety and environmental certification based on health, safety and environmental performance.

McTavish
Resource & Management
Consultants Ltd.

April 20, 2016

Dagneault Planning Consultants Ltd.
220 – 8171 Cook Road
Richmond, B.C.
V6Y 3T8

Re: Response to City of Richmond for additional information on the Mylora budget estimate

The following budget provides details on the various activites taking place to convert the Mylora Golf Course to agricultural production.

Regards,

Bruce McTavish MSc, MBA, PAg, RPBio

Item	Activity	Month	Cost Estimate
1	Tree and stump removal; chipping and composting	March to May	137,150.00
2	Spray with herbicide (if allowed); otherwise wait and remove existing vegetation in June	May (June)	6,500.00
3	Remove berms - place all material in water hazards	June to July	143,650.00
4	Fill water hazards	June to July	32,500.00
6	Topsoil - salvage topsoil from west lots and use on water hazards	June to July	31,800.00
5	Topsoil water hazards (minimum 20 cm of topsoil)	June to July	13,000.00
7	Remove sand traps and spread sand evenly over fairway	June to July	44,200.00
8	Apply topsoil to sand traps	June to July	13,000.00
9	Break sod, plough and disk the entire site	June	13,000.00
10	Spread topsoil over all berm areas (20 cm deep)	July to August	13,000.00
11	Remove irrigation and drain lines as encountered	As encountered	34,000.00
12	Subsoil, plough, disk, land level and crown (use remaining topsoil to improve grades)	August to September	28,400.00
13	Install drainage ditch at south side of property	August	19,100.00
14	Prepare for planting (harrow)	September	6,500.00
15	Sample soil, prepare nutrient management plan and add nutrients as needed	September	3,900.00
15	Seed with winter cover crop	Mid-September to first week of October	10,000.00
16	Construct farm access road	July to August	99,200.00
17	Install 2-inch water line	August to September	44,500.00
	Subtotal		693,400.00
	Contingency		25,000.00
	Total estimated cost for proposed work		718,400.00
	Additional cost for composting		30,000.00
	Total		748,400.00

Appendix V Subsurface drainage analysis

Timmenga & Associates Inc.
Strategies for a sustainable future

292 East 56 Ave
Vancouver BC. V5X 1R3
Phone: 604-321-1242
Fax: 604-321-1260
Email: ttimmenga@telus.net

McTavish Resource & Management Consultants Ltd.
2858 Bayview St.
Surrey BC
V4A 3Z4

Attention: Bruce McTavish

Re: Review of Site drainage potential – Mylora Golf Course Project

Timmenga & Associates Inc. is pleased to provide you with our assessment of whether subsurface drainage would be feasible for the Mylora Golf Course Project. It is our understanding that the for this project the west 120m will be developed for congregational use, while the east 210m is designated for farming purposes after all golf course related elements have been removed. The east 210m of the property is the subject property.

Timmenga & Associates Inc. in an agricultural and environmental consulting company based in Vancouver B C. Its Prinical, Dr. Hubert Timmenga, P. Ag, CMC, has been an agricultural consultant working in BC and across North America for over 30 years. His training included soil science, soil physics and environmental soil issues, and he has worked on organic waste management and agricultural issues in BC since 1987. Dr. Timmenga is familiar with the soils and drainage issues of the subject property and those in the Lower Mainland of BC.

This assessment does not provide you with a drainage plan for the subject property. However, it evaluates key components that will affect the installation and operation of such a system, and how it will affect general agricultural practices such as soil cultivation and deep plowing. Deep plowing is a technique commonly used in Lower Mainland agriculture to break up restricting layers that impede drainage of fields under intensive management.

Dr. Timmenga has utilized the following resources:

- His knowledge of the site
- City of Richmond Interactive Map
- Surveying diagrams as provided by you
- B.C. Agricultural Drainage Manual: V. Lalonde and G Hughes-Games, 1997 Issue, BC Ministry of Agriculture.

Site Description

The Mylora Golf Course is located on virtually flat land. The land includes the features that make-up the challenges of the course such as berms, greens and tees, and minor undulations. These features are all above the average (original) land height. Survey data presented below show that there is no difference in water level in the ditches surrounding the property. All three ditches are slow flowing and are connected. The survey shows no fall in the land in any direction.

The site elevations were measured above the ditch water table are about 67 cm in the west of the original property, and 52 cm near the east border and similar elevations for north and south borders. Some large portions of several fairways are as low as 43cm above the water table. The survey plots are included below (Transects 1-4 are east - west, with transect 1 at the south side of the property, transects 5-8 are north-south).

There are berms along the north border (81cm – 110cm, with the middle sloping towards the ditch), east border (148cm to 98cm) and south border (179cm to 148cm). The central berm has a maximum height of about 210cm. Greens and tees are at about 100cm above the water table (and have an elevation in the landscape of up to 55 cm). Any undulations show elevations of between the fairway (45cm) and the greens and tees (~100cm). These features are mostly elongated and narrow.

The project anticipates soil from the development site to be placed on the subject site. As the soil depth of the development site is very similar to the subject site, but the size is about half, the recovered topsoil would raise the overall soil level with 10-15 cm.

All berms and elevated greens and tees consist of sand or fill. This material will be used to fill-in the existing "water hazards". It is expected that the "clean", not crowned surface of the subject property will be around 53 cm above the water table of the surrounding ditches. With the added 15cm of topsoil, the average elevation above the water level will be 68cm. This estimated total soil depth will be used in the calculations below.

The north-south dimension of the subject property is 385m and the east-west dimension is 210m. The bridge expansion project and widening of Highway 99 will likely require 15m, and the ditch may be relocated inwards, resulting in a property width of 200m or less. The distance of 200m is used as the maximum length of the drain lines.

Characteristics of a drainage plan

Free flowing subsurface drainage must have the following characteristics:

- Bottom of outlet to be 300mm above the receiving water table (BC Agricultural Drainage Manual 10.5.1);
- Grade for a 100mm drain line to be a minimum of 0.1% (BC Agricultural Drainage Manual Table 10.4);
- Use of 100mm (4inch) perforated drain lines;

- Receiving ditch is located alongside Highway 99 and is connected to the Richmond Municipal drainage system; and
- Drain lines to run west to east for a length of 200m.

Soil depth requirements

The required soil depth above the water table at the receiving ditch will be:

- 300mm freeboard (30cm);
- 100mm diameter of pipe (10cm);
- 300mm plough layer without capability for deep plowing (30cm);
- A minimum of 450mm to allow deep plowing (45cm); and
- 200mm to allow for the minimum grade of the drain line (20cm).

This means that with a laser leveled property, the minimum elevation of the soil surface at the east ditch should be 300 + 200+ 100 + 300 = 900mm (90cm) above the water table in case of farming where no deep plowing will be possible, and 1050mm (105cm) in case deep plowing would be required.

Conclusion

When the golf course related elements of the subject property have been removed or filled in, and with the top soil originating from the west development site placed on the property, it is expected that the soil surface will be laser leveled at an elevation of 68cm above the water table of the receiving ditch.

The depth of soil required above the water table to accommodate sub-surface drainage using 100mm drain lines, but without the potential for deep plowing is at least 90cm. Should the potential for deep plowing be desired, a soil depth is required of at least 105cm.

We conclude that the depth of soil on the subject property will not not be sufficient to accommodate a subsurface drainage system.

Respectfully submitted,

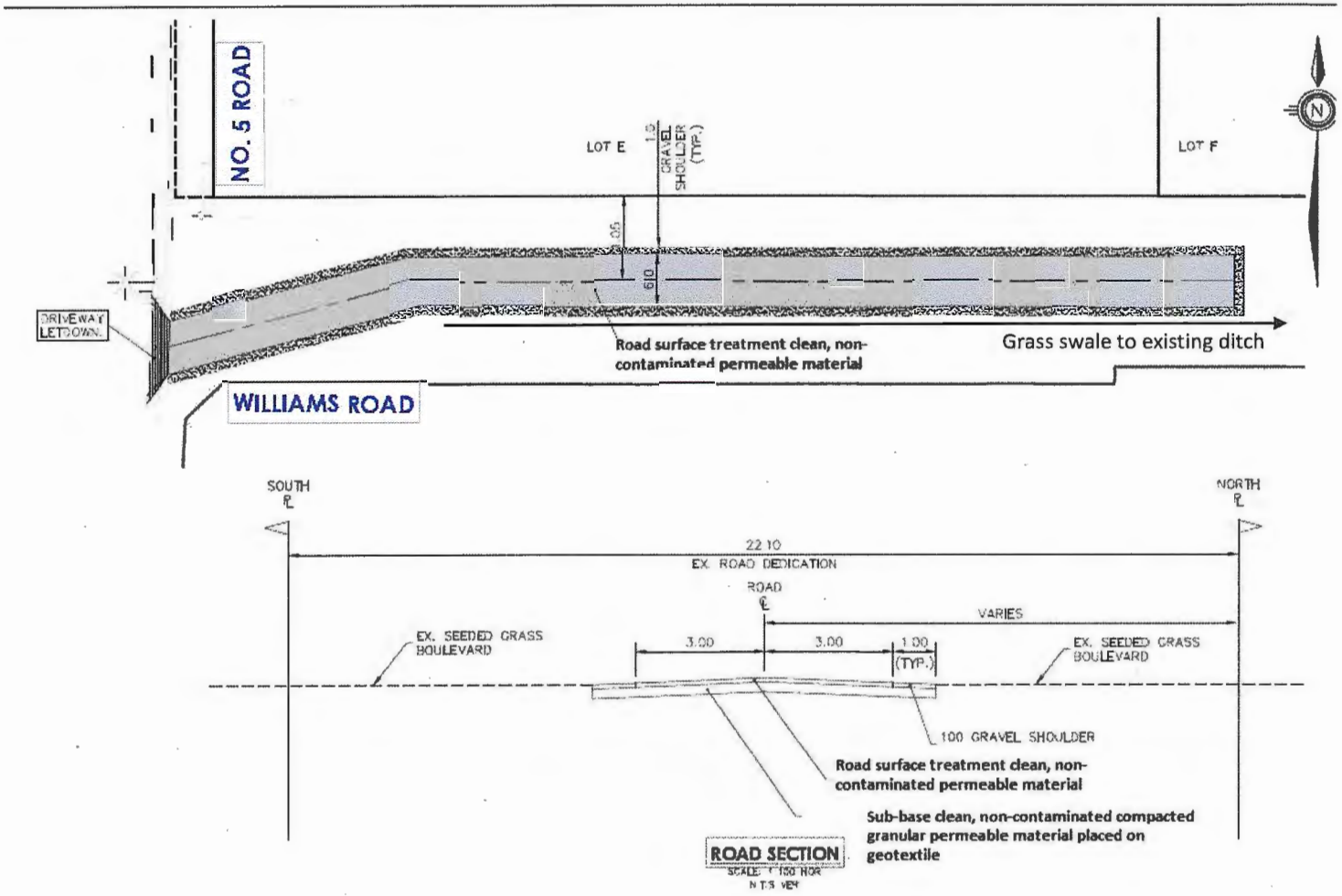
Timmenga & Associates Inc.

Per

Hubert Timmenga, PhD., P.Ag., CMC

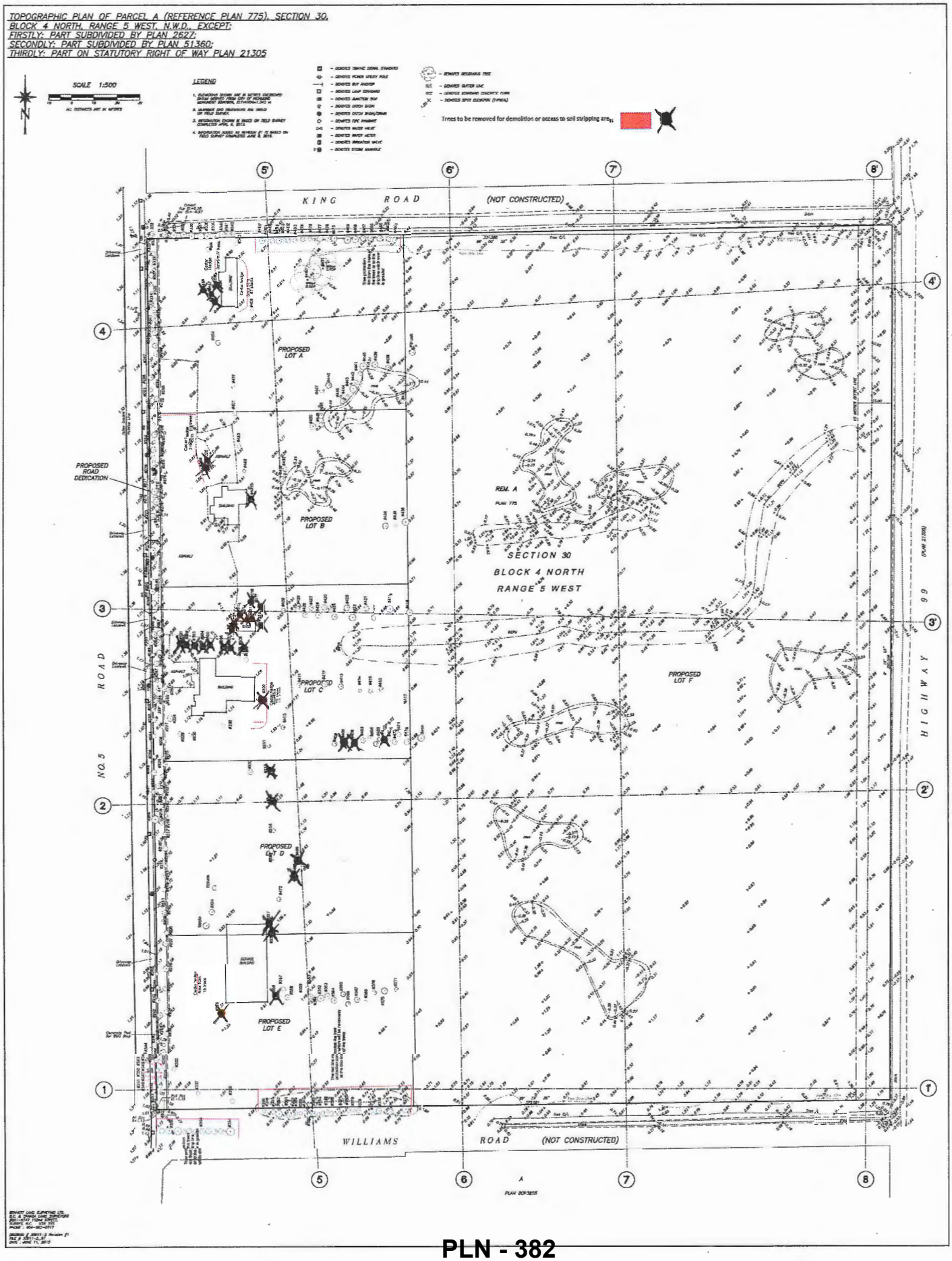
Principal

Appendix IX Road design



PLN - 381

TOPOGRAPHIC PLAN OF PARCEL A (REFERENCE PLAN 775), SECTION 30, BLOCK 4 NORTH, RANGE 5 WEST, N.W.D., EXCEPT:
FIRSTLY: PART SUBDIVIDED BY PLAN 2627;
SECONDLY: PART SUBDIVIDED BY PLAN 51360;
THIRDLY: PART ON STATUTORY RIGHT OF WAY PLAN 21305



Tree inventory and assessment for trees to be removed at 9500 No. 5 Road, Richmond, BC

Prepared for:
Dagneault Planning Consultants Ltd.

Prepared by:

Matt McTavish, CQ Horticulture, CQ Arborist Technician,
ISA Certified Arborist #PN-8194A
mattm.mrmc@gmail.com

&

Bruce McTavish MSc, MBA, PAg, RPBio
McTavish Resource & Management Consultants Ltd.
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bmct@intergate.ca

April 18, 2016

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List of Figures

1.0 Introduction

This report is prepared at the request of the City of Richmond with respect to trees that need to be removed from the western 10 acres of 9500 No. 5 Road to allow for the stripping of topsoil and demolition of buildings.

At a meeting with the City of Richmond on April 14, 2016 it was agreed to only remove trees that conflict with the stripping of topsoil (that will be used on the agricultural conversion area) or trees that interfere with the demolition of buildings and parking lots.

This report identifies trees by using existing tags and reference to the previously submitted arborist report.[1]

2.0 Observations

On April 16, 2016, Matt McTavish and Bruce McTavish visited the site to determine which trees conflict with soil stripping and demolition work. At the same time the trees to be removed were examined for their current state of health. The species of trees observed and identified for removal consist of; *Betula pendula* (Birch), *Picea abies* (Norway Spruce), *Picea pungens* (Blue Spruce), *Pinus nigra* (Austrian Pine), *Acer spp.*(Maple), *Pinus radiata* (Monterey Pine), *Thuja plicata* (Western Red Cedar) and *Pseudotsuga menziesii* (Douglas Fir), *Quercus palustris* (Pin Oak), *Aesculus hippocastanum* (Horse Chestnut). There is also a Laurel hedge and a cedar hedge that will conflict with demolition, these hedges are in poor condition due to last years' drought and a lack of pruning.

The majority of trees observed exhibited poor health and structure. Observations indicate that a number of trees have sustained poor or excessive pruning, exhibit co-dominant stems and have multiple sites of inclusion. Some trees have fencing material girdled into the trunk creating a weak structure and a possibility of future failure. There are a few conifers that are in good health and exhibiting adequate vigour, this was evident by a healthy live crown ratio, good annual shoot growth and sound wood. The majority of birch trees on the subject property have signs and symptoms of bronze birch borer as well as fungal fruiting bodies present on the main stems.

Details on each tree that will be removed are provided in Appendix I and representative photographs are provided in Appendix II.

3.0 Recommendations

It is recommended that the trees that do not conflict with demolition or the stripping of topsoil be protected while work is being performed on the subject property. Protection shall be implemented using tree protection procedures specified by the City of Richmond (Appendix III.[2]) Tree protection will also be implemented in the topsoil stripping area by creating tree islands where groups of trees are located. A detailed plan showing the tree islands and the trees to be removed is provided as a map sheet accompanying this report.

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[1] McTavish (2015) Tree Assessment for Trees Located at Mylora Golf Course. September 3, 2015.
[2] City of Richmond Bulletin Tree Bylaw Section. TREE-03 Revised 2015-11-12. Web site: http://www.richmond.ca/__shared/assets/Tree_0315142.pdf

Appendix I Details of trees to be removed

TAG #	SPECIES	DBH (cm)	CROWN SPREAD (m)	CONDITION (POOR-VERY GOOD)	COMMENTS/RECCOMENDATIONS
238	Birch	37	7	Poor	LCR 50%. The tree has been repeatedly utility pruned and is declining in health; within 2 meters of barn to be demolished
237	Birch	37	7	Poor	LCR 60%. Co-dominant stems, Bronze birch borer present. Proximity to building indicates significant root damage; within 2 meters of barn to be demolished
401	Maple	34	9	Good	LCR 70% This tree shows adequate vigour, no structural abnormalities; removal needed to allow stripping of topsoil
400	Maple			Dead	Remove to allow topsoil stripping and mitigate hazard
233	Birch	25	8	Poor	LCR 50%. Bronze birch borer present, co-dominant stems, poor structure, dead tops; remove to allow topsoil stripping and mitigate hazard
234	Birch			Dead	Remove to allow topsoil stripping and mitigate hazard
402	Birch	41	13	Poor	LCR 50%. Bronze birch borer present, dead top; removal necessary for topsoil stripping and to mitigate hazard
408	Birch	34	9	Poor	LCR 25%. Bronze birch borer present, dead top; removal necessary for topsoil stripping and to mitigate hazard
406	Birch	22/24	6	Poor	LCR 40%. Bronze birch borer present, co-dominant stems, dead top; removal necessary for topsoil stripping and to mitigate hazard
315	Birch	31	9	Poor	LCR 50%. Tree previously topped, bronze birch borer present; remove, conflict with demolition
314	Birch	33	6	Poor	LCR 60%. Bronze birch borer is present, dead top; remove, conflict with demolition
311	Austrian Pine	42	9	Good	LCR 70% Tree exhibits good vigour and uniform canopy; removal is needed to allow demolition
312	Austrian Pine	39	9	Fair	LCR 70%. Co-dominance at 8 meters, included bark at codominant union; removal is needed for demolition

313	Birch	36/33	7	Poor	LCR 40%. Bronze birch borer present, dead top; remove, conflicts with demolition and poses a hazard
301	Monterey Pine	44	6	Good	LCR 70%. Co-dominant stems with included bark, tree exhibits average vigour; removal necessary for demolition
302	Norway Spruce	22	6	Good	LCR 70%. Co-dominant stems, tree exhibits normal vigour; removal necessary for demolition
303	Monterey Pine	52	14	Good	LCR 75%. Co-dominant stems, tree exhibits normal vigour; removal necessary for demolition
304	Blue Spruce	24	7	Good	LCR 75%. Co-dominant stems, tree exhibits normal vigour; removal necessary for demolition
305	Blue Spruce	21	5	Good	LCR 75%. Co-dominant stems, tree exhibits normal vigour; removal necessary for demolition
306	Monterey Pine	37	11	Good	LCR 75%. Co-dominant stems, tree exhibits normal vigour; removal necessary for demolition
307	Norway Spruce	27	9	Good	LCR 75%. Co-dominant stems, tree exhibits normal vigour; removal necessary for demolition
308	Austrian Pine	37	9	Good	LCR 70%. Co-dominant stems with included bark, tree exhibits average vigour; removal necessary for demolition
455	Austrian Pine	40	7	Fair	LCR 80%. Asymmetrical canopy with co-dominant tops, good vigour; removal is necessary for demolition
456	Austrian Pine	54/51	9	Fair	LCR 80%. Co-dominant stems at 2 meters with included bark, 8-degree lean to the south; removal necessary for demolition
457	Douglas Fir	63	12	Fair	LCR 60%. Co-dominant stems at 2 meters with included bark, average vigour; removal necessary for demolition
458	Austrian Pine	33	8	Good	LCR 75%. Uniform canopy, generally healthy with good annual shoot growth; removal necessary for demolition
319	Blue Spruce	38	10	Fair	LCR 80%. Previously topped, exhibits average vigour; removal necessary for demolition
320	Norway Spruce	71	16	Good	LCR 75%. Exhibits good vigour and form; removal necessary for demolition

431	Maple	23	8	Fair	LCR 60%. Poor pruning resulting in poor branch structure, included bark, average vigour: removal necessary for stripping of topsoil
317	Western Red Cedar	31/22	9	Fair	LCR 80%. Co-dominant from base, average vigour; removal necessary for demolition
318	Western Red Cedar	50	8	Good	LCR 75%. Normal vigour for an open grown tree; removal necessary for demolition
316	Birch	26	8	Poor	LCR 50%. Co-dominant from base, butt rot in one stem; removal is necessary for demolition and to mitigate hazard
355	Pin Oak	44	11	Good	LCR 75%. Exhibiting good health & vigour, co-dominant tops, symmetrical canopy; removal is necessary for demolition
356	Western Red Cedar	37	10	Good	LCR 75%. Normal health & vigour, no defects noted; removal necessary for demolition
399	Horse Chestnut	100	17	Good	LCR 80%. Good health & vigour, showing some structural defects and dead wood; removal necessary for demolition

Appendix II Representative photographs of trees to be removed

Figure 1 Birch to be removed to allow building demolition

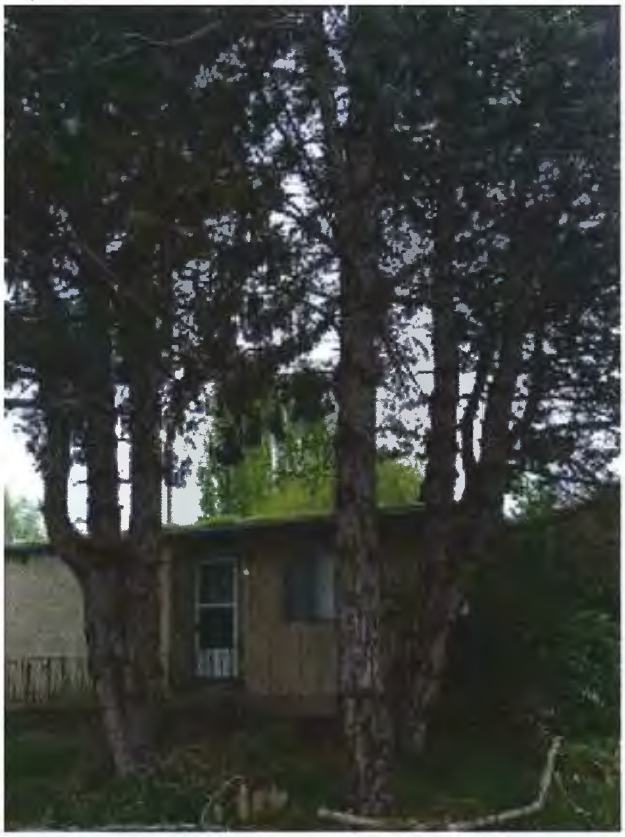


Figure 2 Pines to be removed for house demolition

Figure 3 Dead cedar hedge to be removed for parking lot demolition

Figure 4 Two birch to be removed for shed demolition

Figure 5 Birch to be removed for topsoil salvage

Figure 6 Two maples and cedar to be removed for topsoil salvage

Figure 7 Birch to be removed for safety reasons

Figure 8 Birch to be removed for safety reasons

Figure 9 Row of pines to be removed for demolition

Appendix III Richmond Tree Protection Guidelines

City of Richmond

Bulletin
Tree Bylaw Section
6911 No. 3 Road, Richmond, BC V6Y 2C1

www.richmond.ca Tel: 604-276-4000 Fax: 604-276-4177

Protection of Existing Trees During Demolition and Construction

No.: TREE-03
Date: 2006-06-29
Revised Date: 2015-11-12

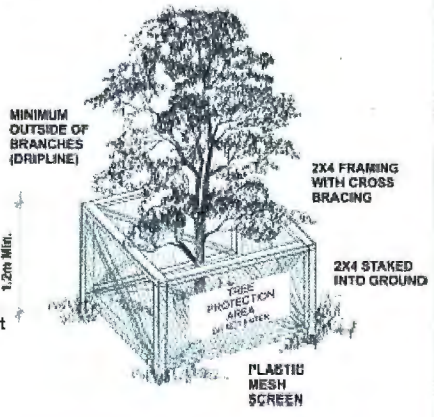
Purpose:

To ensure tree protection barrier(s) are placed around any tree(s) which are not to be cut or removed, in such a manner as to ensure that the trunk, branches and root structure are not damaged by **any** construction operations.

Background:

Applicants shall not remove or cut any trees with a dbh of 20 cm or 7⅞ inches (see Bulletin TREE-1) on the site until a Tree Permit or Development Permit and/or Rezoning has been approved which addresses the removal of trees.

1. A fence must be placed at the drip line of all trees to be retained prior to issuance of any permits (demolition, rezoning, development, building). The fence(s) shall be 2x4 wood frame with cross brace construction with snow-fence and staked into the ground (see reverse). The tree protection fence shall be clearly signed **"Tree Protection Zone – Do Not Enter"** (see reverse) and remain intact for any construction or demolition site throughout the entire period of demolition and/or construction.
2. Appropriate information regarding existing tree preservation shall be provided to Tree Preservation and/or Planning staff. This is to include:
   - The location of all protective tree fencing;
   - Any excavation locations for foundations, utilities, driveways, perimeter drainage, etc.;
   - A grading plan or cross-section showing finished grade; and
   - A drainage plan for the site.
3. Any Arborist recommended pruning and root pruning shall be supervised by an ISA Certified Arborist.
4. No entry of any kind shall occur within the trees' drip line/tree protection zone. This includes people, equipment and/or materials.
5. Fill material, compacted soil and continuous concrete walls with footings cannot be located within the drip line of retained trees.



Tree Protection Zone

The Tree Protection Zone (TPZ) encompasses the drip line of the tree as illustrated in Fig. 1a and 1b.

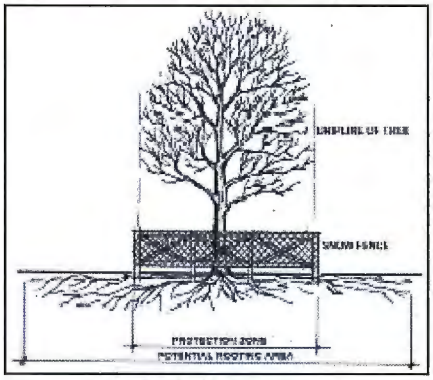


Fig. 1a - Example of a drip line on a tree

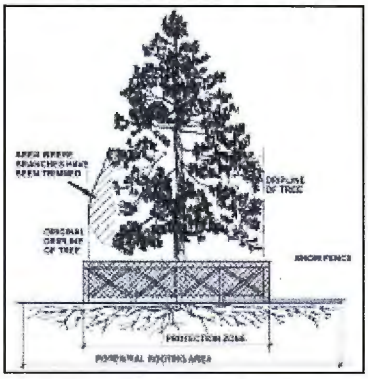


Fig. 1b - Example of a drip line on a tree with one side pruned

Note: If the tree is on an adjacent property, the drip line must still be protected on your side of the property line. If the branches have been cut or pruned, the TPZ must protect the original drip line of the tree (Fig. 1b).

Tree Protection Distance Table

*Minimum Protection Required Around Tree

Tree Trunk Diameter			Distance from Trunk		Total Diameter	
cm	inches	feet	m	feet	m	feet
20	8	0.6	1.2	3.9	2.60	8.5
25	10	0.8	1.5	4.9	3.25	10.7
30	12	1.0	1.8	5.9	3.90	12.8
35	14	1.2	2.1	6.9	4.55	14.9
40	16	1.3	2.4	7.9	5.20	17.1
45	18	1.5	2.7	8.9	5.85	19.2
50	20	1.7	3.0	9.8	6.50	21.3
55	22	1.8	3.3	10.8	7.15	23.5
60	24	2.0	3.6	11.8	7.80	29.6
75	30	2.5	4.5	14.8	9.75	32.0
90	36	3.0	5.0	16.4	10.90	35.8
100	40	3.3	6.0	19.7	13.00	42.7

Tree Protection Zone Signage

All TPZ are required to have signage as shown in Fig. 2. The signage must be a minimum of 11"x14" in size on *at least* 2 sides. A sign is now available for download from the City of Richmond's Tree Bylaw webpage at www.richmond.ca/sustainability/environment/treeremoval.htm

For Tree Protection Barrier inspection requests and enquiries call 604-247-4684.

NOTE: Failure to maintain tree protection barriers may result in fines of up to $10,000.00 per offence.

Fig. 2 – Tree Protection Zone Sign

TOPOGRAPHIC PLAN OF PARCEL A (REFERENCE PLAN 775), SECTION 30, BLOCK 4 NORTH, RANGE 5 WEST, N.W.D., EXCEPT:
FIRSTLY: PART SUBDIVIDED BY PLAN 2627;
SECONDLY: PART SUBDIVIDED BY PLAN 51360;
THIRDLY: PART ON STATUTORY RIGHT OF WAY PLAN 21305