



City of Richmond


Report to Committee

To: Public Works and Transportation Committee *to Public Works & Transportation - Jun 21, 2006* **Date:** June 5, 2006
From: Robert Gonzalez, P.Eng. **File:** 10-60450-01
 Director, Engineering **Xref:** 10-6045-08-01
Re: **East Richmond Agricultural Water Supply Study**

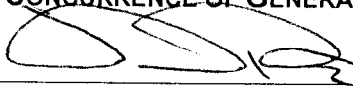
Staff Recommendations

That:

1. Staff develops an implementation strategy based on the study recommendations and submit capital projects into the 2007 – 2011 Capital Program for Council consideration.;
2. Staff pursue available grants for the capital projects through Provincial and Federal Agencies and;
3. Council provide the General Manager of Engineering and Public Works the authority to sign grant agreements on behalf of Council.


 Robert Gonzalez, P.Eng.
 Director, Engineering
 (4150)

Att. Appendix – Table 5.2.1
 Executive Summary
 Letters of Support/Comments

FOR ORIGINATING DIVISION USE ONLY					
ROUTED TO:	CONCURRENCE		CONCURRENCE OF GENERAL MANAGER		
Operations	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>			
REVIEWED BY TAG	YES <input checked="" type="checkbox"/> <i>DW</i>	NO <input type="checkbox"/>	REVIEWED BY CAO	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>

Staff Report

Origin

In 2005, the City initiated the East Richmond Agricultural Study in partnership with the Ministry of Agriculture and the Richmond Farmer's Institute (RFI) to address the drainage and irrigation needs of the agricultural lands in East Richmond, shown in Appendix 1 - Map 6.1, as per Council's directive. The study was completed by UMA Engineering Ltd. and consisted of the following major tasks:

- interviewing the farmers to understand their needs and current procedures.
- completing the hydraulic analysis of the existing drainage/irrigation system and identifying the current constraints.
- recommending improvement strategies.
- preparing a cost benefit analysis of the proposed improvements.

The purpose of this report is generally to obtain Council's endorsement of the Implementation Strategy and for staff to take the next steps.

Analysis

Discussed below is a summary of the findings from the East Richmond Agricultural Study.

Interviews and Consultation

At the outset of the project, staff met with the Agricultural Advisory Committee (AAC) as well as the RFI. The AAC recommended that two Committee members serve as ongoing liaisons to the project in order to ensure proper consultation and adequate dialogue. As a result the ongoing consultation included both the RFI and the designated members from the AAC.

Drainage and irrigation needs, crop type, and irrigation water consumption information was gathered from meetings with the designated AAC members, Richmond Farmer's Institute (RFI), tours, informal meetings with farmers and their representatives, and personal interviews with farmers.

The following is a brief summary of key findings:

- Total area for this study is 3084 ha of which 2235 ha (72%) is available for agricultural production (excluding golf courses). Of the available agricultural land, 1,784 ha (80%) is in production and the remaining 450 ha is currently unused.
- Drainage issues were identified by approx. 65% of farmers south of Hwy 91 and approx. 19% of farmers in the north.
- In the north area, farmers found the ditch system to provide sufficient irrigation water for their needs. In the south, the ditch system was reported to be inadequate. Many farmers in the south use metered city water for blueberry and nursery operations.

Hydraulic Analysis

The hydraulic analysis was completed using modelling software. Based on the Agricultural Regional Development Subsidiary Agreement (ARDSA) criteria, the analysis indicated that there are some areas that may experience flooding within the agricultural lands and poor irrigation for the area south of Highway 91. Given that the City's drainage system was not designed for irrigation purposes south of Highway 91, the comments regarding poor irrigation were expected.

Drainage issues were identified for the following areas:

- southwestern sector (Sidaway/No. 6 Rd. area, south of Blundell Rd)
- Granville Ave in the vicinity of No. 8 Rd
- Westminster Hwy between No. 6 and No. 7 Rd
- in the north along Cambie Rd in the vicinity of No. 7 Rd

Irrigation issues were identified for the following areas:

- Sidaway Rd from Westminster Hwy to Williams Rd
- No. 6 Rd, south of Highway 91
- Westminster Hwy
- Granville Ave
- Nelson Rd from Hwy 91 to Westminster Hwy
- No. 9 Rd toward Ewen Pump Station

Improvement Strategy

The improvement strategy was developed to achieve the ARDSA drainage criteria as regulated by the BC Ministry of Agriculture and Lands. The study results indicated that various conveyance improvements are needed to alleviate the drainage issues and provide irrigation.

The primary strategy to alleviate the drainage issues and to provide irrigation water was to improve the existing ditch conveyance, storage capacities, and water circulation. Irrigation water will be routed from the North Arm of the Fraser River where the water quality is good to the South Arm of the Fraser River where the water quality is poor. Furthermore, the continuous flow of water from north to south will reduce stagnation and improve water quality. These objectives detailed in Appendix 3 – Executive Summary are achieved through the following improvements:

- re-grade various ditches to remove local irregularities
- construct various new ditches to provide alternative flow paths
- install screw-type pump station at No. 6 Rd and Granville Ave to improve flows to the Sidaway and No. 6 Rd area north of Blundell
- install automated and manually operated control structures at strategic locations to direct flows
- deepen the ditch on Westminster Hwy from Nelson Rd to No. 9 Rd to increase flows to the No. 9 Rd area
- increase irrigation pump capacities at the No. 7 Rd north pump station

These improvement recommendations are shown in Appendix 1 - Map 6.1 and itemized in Appendix 2 - Table 5.2.1.

In addition, there are several operational improvements recommended which include a review of service levels regarding pump operations and our ditch cleaning program.

Cost Benefit Analysis

The study area, shown in Appendix 1 - Map 6.1, was divided into three sub-areas:

- (1) area south of Hwy 91 and generally east of No. 6 Rd
- (2) area north of Hwy 91
- (3) area in the south western portion east of No. 6 Rd and south of Blundell

The potential average annual revenue of each area was estimated based on the total unused agricultural land and average revenue per unit of land. This provided a benefit to cost comparison for each area. Summarized below is the estimated potential average annual revenue:

Area	Potential Average Annual Revenue	Cost of Infrastructure (2006 Dollars)
1	\$3,300,000	\$ 3,970,000
2	N/A	\$ 660,000
3	\$6,150,000	\$ 6,480,000
TOTAL	\$9,450,000	\$11,110,000

As Area 2 is quite well served by the existing infrastructure, it was determined that the unused land in the area is likely a result of a business decision rather than inadequate infrastructure. Therefore, potential average annual revenues were not estimated for Area 2. The significant cost of improvements and composition (small lots) of Area 3 may warrant a long-term agricultural viability study specific to Area 3 prior to implementation of the improvements.

Financial Impact

There is no financial impact at this time. Staff propose to prioritize and insert respective capital projects into the 2007 – 2011 capital program for Council consideration. Furthermore, staff will pursue grant funding partnership opportunities.

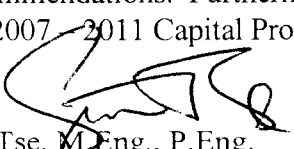
Conclusion

The study identified deficiencies in the existing conveyance system and recommended improvements to alleviate the drainage and irrigation issues in the area. These recommended improvements are shown on Appendix 1 - Map 6.1 and itemized in Appendix 2 - Table 5.2.1. Also included in the Appendix is a copy of the Executive Summary of the report. The findings and recommendations of the report were well received by the farming community. Attached in the Appendix are letters of support/comments from RFI and non-RFI member farmers.

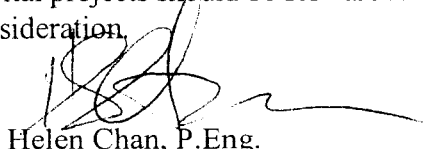
June 5, 2006

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Staff recommends that an implementation strategy be developed based on the study recommendations. Furthermore, the resulting capital projects should be forwarded scheduled into the 2007-2011 Capital Program for Council consideration.



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(4075)



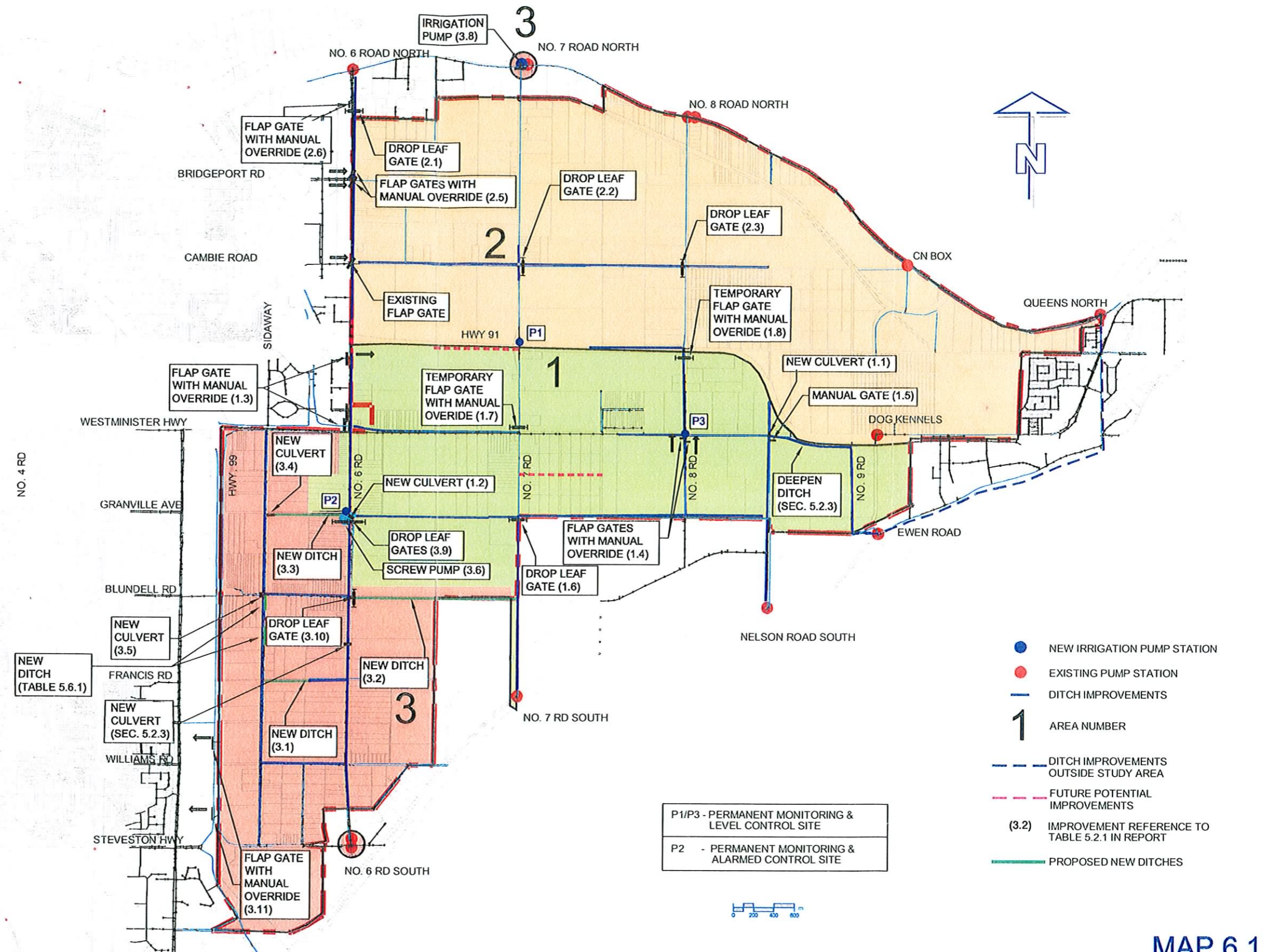
Helen Chan, P.Eng.
Project Engineer
(4656)

ST:hc

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PLOT: 10/05/2011 10:18 AM

UMA FILE NAME: D:\proj\100_00-CW1001_RK.dwg Saved By: rdalton



MAP 6.1

PROFESSIONAL SEALS

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C	06/05/18	Issued For Final Report							
B	06/04/26	Issued For Public Open House	RD	HG	HG	KC	-	-	
A	06/03/14	Issued For Review	RD	KC	KC	KC	KC	KC	
IR	YYMMDD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	ENG	IDR	APP	



City of Richmond
 East Richmond Agricultural Water Supply Study
 East Richmond
 PHASING PLAN

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
0947-041-00	00-CW1001	C

Table 5.2.1: Proposed Irrigation Structures (7 pages)
Refer also to Map 6.1 for location of Item Nos.

1.1	Culvert connecting Nelson to Ewen	From STND3784 To STND3393	<p>Drainage mode: would send a part of drainage water to Ewen pump station and give relief to Nelson Road.</p> <p>Irrigation mode: To send irrigation water to No. 9 Road</p>	17m± long with 900 mm diameter
1.2	Culvert connecting ditches on the west side of No. 6 Road to the Granville	From STND9411 To STND4497	<p>Drainage mode: Water flowing south in smoothed ditches along No. 6 Road would be redirected east at Granville and No. 7 Road</p> <p>Irrigation mode: Would send flows from No. 7 Road to the proposed pump station at STND9411</p>	<ul style="list-style-type: none"> • 21 m± long with 900 mm diameter • Currently, the links (i.e., ditches and pipes) from both north and south sides at No. 6 Road are flowing toward Westminster at No. 6 Road. Reversing and smoothing the links in this area plus adding the proposed culvert at this location would give some relief to flooding at Westminster and would also send less flow to pump station #6-South.
1.3	Flap gates with manual override at No. 6 Road and north of Westminster	a- From STND10383 To STMH7529 b- From STMH6701 To STND3888	<p>Drainage mode: Would allow drainage water from industrial areas on the west side of the project to enter the ditches.</p> <p>Irrigation mode: To prevent irrigation water from flowing from agricultural areas to industrial areas</p>	Keeps the irrigation water in the project area

1.4	Flap gates with manual override at No. 8 Road and Westminster HWY	a- From STND3938 To STND3890 b- From STND3862 To STND4022	<p>Drainage mode: Would allow drainage water from ditches between Westminister and Granville, along No. 8 Road to drain themselves to Westminister ditches.</p> <p>Irrigation mode: would prevent irrigation water from flowing from No. 8 Road to these ditches</p>	<p>That would let these ditches to function as drainage-only ditches and improve drainage condition in that area. Interview with local farmers indicated that they do not withdraw irrigation water out of those ditches.</p>
1.5	Manually operated gate at Nelson-east and Westminister HWY	From STND3393 To STND3797	<p>Drainage mode: inactive (fully or partly open).</p> <p>irrigation mode: The gate should be closed to redirect irrigation water to No.9 Road, when the local farmers at Ewen area take their turn to irrigate.</p> <p>Drainage mode: inactive</p>	<p>IRG model result is suggesting that providing irrigation water to Ewen area is possible when the flow from Nelson-east is redirected.</p>
1.6	Drop-leaf gate at No. 7 Road and Granville intersection	From STND6064 To STND 6066	<p>Irrigation mode: Located at No. 7 RD to block the irrigation water going toward Pump Station #7-South</p> <p>Harvest mode: will be closed to prevent harvest flows entering south, and send flows to P.S. # 7 North</p>	<p>If the water depth at the upstream ditch exceeds 0.9 m, the gate will open to send flows to pump station #7-South</p>
1.7	Temporary manually operated gate at No. 7 Road, north of Westminister Highway	North of STND4674	<p>Same as for 1.7, except flows are directed to P.S. # 8 North</p>	<p>This is a temporary structure until full implementation of improvements can be executed. See section 5.5.</p>
1.8	Temporary manually operated gate at No. 8 Road, south of Highway 91	North of STND1424	<p>Same as for 1.7, except flows are directed to P.S. # 8 North</p>	<p>Same remarks as 1.7</p>

	Description	Location	Drainage mode: Inactive	Irrigation mode: Inactive
2.1	Drop-leaf gate at No. 6 Road, north of Bridgeport Road	From STND2393 To STMH3861	<p>Drainage mode: Inactive- would allow drainage water from Cambie on both sides to drain to No. 7 Road ditches.</p> <p>Irrigation mode: Would control the rate of irrigation water from flowing into Cambie Road</p>	<p>The proposed drop-leaf gates will block the irrigation water from flowing toward #6-North pump station. In order to avoid possible flooding, the introduced gates would allow water to flow through, if the water depth in the ditch goes beyond a predefined level of 0.9 m.</p> <ul style="list-style-type: none"> • During drainage mode, the gate should stay open to let drainage water leave the area and discharge to No. 7 Road • If the water depth at Cambia Road exceeds 0.7 m, the gate will close to stop sending flows. This measure would control flooding along Cambie.
2.2	Drop-leaf gates at No. 7 Road and Cambie (on both sides of No. 7 Road). However, the effectiveness of the gate on the west side needs re-evaluation with further modeling	<p>a- From STND2318 To STND2319</p> <p>b- From STND2318 To STND2343</p>	<p>Drainage mode: Inactive- would allow drainage water from Cambie to drain to No. 8 Road ditches.</p> <p>Irrigation mode: Would control the rate of irrigation water from flowing into Cambie Road</p>	<ul style="list-style-type: none"> • During drainage mode, the gate should stay open to let drainage water leave the area and discharge to No. 8 Road • If the water depth at cambia: Road exceeds 0.7 m, the gate will close to stop sending flows. This measure would control flooding along Cambie.
2.3	Drop-leaf gate at No. 8 Road and Cambie (on the west sides of No. 8 Road)	From STND2337 To STND2336	<p>Drainage mode: Inactive- would allow drainage water from Cambie to drain to No. 8 Road ditches.</p> <p>Irrigation mode: Would control the rate of irrigation water from flowing into Cambie Road</p>	<ul style="list-style-type: none"> • During drainage mode, the gate should stay open to let drainage water leave the area and discharge to No. 8 Road • If the water depth at cambia: Road exceeds 0.7 m, the gate will close to stop sending flows. This measure would control flooding along Cambie.
2.5	Flap gates with manual override at No. 6 Road and Bridgeport Road	<p>a- From STMH3738 To STMH4005</p> <p>b- From STMH3735 To STMH3730</p>	<p>Drainage mode: Would allow drainage water from industrial areas to enter the ditches.</p> <p>Irrigation mode: To prevent irrigation water from flowing from agricultural areas to industrial areas</p>	<p>Keeps the irrigation water in the project area</p>

2.6	Flap gate with manual override at No. 6 Road, north of Bridgeport Road	From STMH3838 To STMH3861	<p>Drainage mode: Would allow drainage water from industrial areas to enter the ditches.</p> <p>Irrigation mode: To prevent irrigation water from flowing from agricultural areas to industrial areas</p> <p>Drainage mode: To redirect flows from going to west Williams</p> <p>Irrigation mode: To circulate water by redirecting a part of flows toward No. 6 Road</p> <p>Keeps the irrigation water in the project area</p>
3.1	Ditch on Francis connecting Sideway to No. 6 Road	From STND100309 To STND9297	<ul style="list-style-type: none"> • A 484 m± trapezoidal ditch with 2:1 side slope, 1-m width and 1.5-m depth • In drainage mode, flow redirection would reduce flooding at Williams area. During irrigation mode, a part of flow would be sent to No. 6 Road that could flow toward south and north along No. 6 Road
3.2	Ditch on Blundell connecting No. 6 Road to No. 7 Road	From STND9494 To STND6075	<p>Drainage mode: To redirect drained water from pump station # 6 to discharge to No. 7 Road</p> <p>Irrigation mode: To send the redirected flows from No. 7 road to Southwest (from Westminster in the north to Williams in south).</p> <p>Drainage mode: To drain southwest to No. 6 & No. 7 Roads</p> <p>Irrigation mode: To pump flows to Sideway</p> <p>Drainage mode: To drain southwest to No. 7 Road</p> <p>Irrigation mode: To pump flows to Sideway</p> <p>A 1,625 m± trapezoidal ditch with 2:1 side slope, 1.5 m width and 1.5 m depth</p>
3.3	Ditch along Granville, connecting No. 6 Road to ditches on the east side of Sideway	From STND9411 To STND100390	<ul style="list-style-type: none"> • A 803 m± trapezoidal ditch with 2:1 side slope, 1.5 m width and 1.5 m depth • This culvert will connect east sideway to No.6 and No.7 Roads
3.4	Culvert along Granville, connecting east side to west side ditches of Sideway	From STND100390 To STND100217	<ul style="list-style-type: none"> • 16 m± long with 900 mm diameter • This culvert will connect west sideway to No.6 and 7 Roads, via the proposed Granville ditch

3.5	Culvert crossing Blundell to connect North Sidaway ditch to the south side	From STMH100159 To STMH100160	<p>Drainage mode: to send a part of drainage water from South Sidaway to No. 7-south pump station via the proposed pipe along Blundell</p> <p>Irrigation mode: To send flows from North Sidaway to South Sidaway, Francis, and Williams</p>	<ul style="list-style-type: none"> • 15m± long with 900 mm diameter • In Irrigation mode, a drop-leaf gate along Blundell would prevent the irrigation water from leaving southwest area to go back to No. 7 Road.
3.6	Screw pump at No. 6 Road and Granville intersection	From STND9411 To STND 9411A	<p>Drainage mode: Inactive</p> <p>Irrigation mode: the lifted flow will be carried to Sidaway via the proposed Blundell pipe</p> <p>Drainage mode: Inactive</p> <p>Irrigation mode: Will pump in water from Fraser River</p>	<p>Using screw pump is perceived to be fish friendly and well suits the project's objectives.</p>
3.8	New irrigation pump at pump station No. 7 Road - North with a flap gate	From #7-North outlet To STND 3998	<ul style="list-style-type: none"> • This is to provide enough water for irrigation during low tide at this side of the project area. • This pump is assumed to be similar, but slightly smaller than the irrigation pump at No. 8-North pump station • The pump operation will be controlled in real time by a water level sensor in the downstream ditch to make sure the newly introduced water to the system will not flood the ditches at downstream. • The flap gate is to prevent the irrigation water taken from Fraser River to go back to it through the link connecting outlet to the proposed irrigation pump station. 	

			<p>Drop-leaf gates at Granville and No. 6 Road intersection</p>	<p>3.9</p>
<p>The proposed drop-leaf gates will block the irrigation water from going directly toward No. 6-South pump station and redirect it to areas at southwest sector. In order to avoid possible flooding, the introduced gates would allow water to flow through, if the water depth in the ditch goes beyond a predefined level of 0.9 m.</p> <ul style="list-style-type: none"> • During drainage mode, the gate should stay open to let drainage water leave the area and discharge to No. 7 Road • If the water depth at STND9494 exceeds 0.9 m, the gate will open to send flows to No. 7 Road and pump station No. 7-South 	<p>Drainage mode: Inactive</p> <p>Irrigation mode: That would ensure that the carried flow from No. 7 Road would not bypass the screw pump at that location by flowing toward No.6-South pump station</p>	<p>a- From STND 9411 To STND 9410</p> <p>b- From STND 4497 To STND 9405</p>		
<p>Drop-leaf gate at the proposed ditch along Blundell</p>	<p>Drainage mode: Inactive</p> <p>Irrigation mode: to prevent water leaving southwest area.</p>	<p>From STND9494 To STND6075</p>		<p>3.10</p>
<p>Flap gates with manual override located at west boundaries (i.e., west of Highway 99)</p>	<p>Drainage mode: Inactive, open all the time</p> <p>Irrigation mode: Would prevent irrigation water from flowing from agricultural areas to residential areas</p>	<p>a- From STND9592 To STND9696</p> <p>f. From STND9606 To STND9673</p>		<p>3.11</p>

Executive Summary

This report deals with the agricultural irrigation and drainage of East Richmond within the Agricultural Land Reserve (ALR) area east of Highway 99. The total study area is approximately 3084 ha of which 2235 ha (72%) is available for agricultural purposes. The area of land currently in agricultural production is approximately 1785 ha (80 % of available land), with 450 ha (20 % of available land) being “unused”.

The study area is divided in two by Highway 91. The area north of Highway 91 is dominated by cranberry production, while the southern area includes a variety of crops such as blueberry, vegetables, and forage. Nurseries and greenhouses are also an important component here. The south-western sector west of No. 6 Road has a distinct urban character with a tendency toward small parcels and the area has the highest proportion of unused farmland and non-agricultural land uses (68% of the land in this area is unused or non-agricultural).

The figure on the right graphically illustrates the extent of the various crops grown in the study area. Cranberries make up 42 % of available land, followed by forage (crops used by livestock – 14 %) and blueberries (11 %).

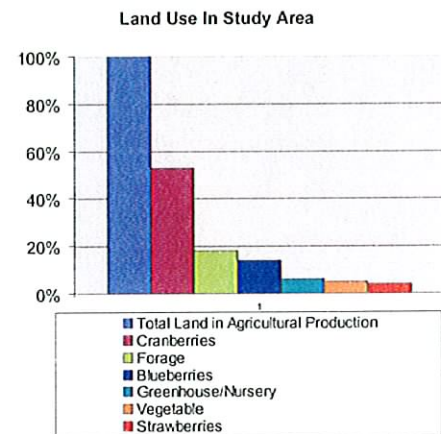
In terms of irrigation and drainage, the area north of Highway 91 is generally well served, however south of the Highway is generally poorly served. Poor drainage reduces the growing season and crop production, and limits the type of crop. Poor irrigation not only limits the quantity of water, but reduces quality through stagnation.

Consultation on this project included an advisory letter of introduction to all land-owners, a presentation to members of the Richmond Farmers’ Institute (RFI), and a comprehensive one-on-one interview survey with farmers representing approximately 67% of the land in production in the study area. Forty one interviews were conducted from a population list of 59 farming operations. In addition, the project team reported to a steering committee made up of a representative from each of the RFI, the Agricultural Advisory Committee, Ministry of Agriculture and Lands, Fisheries and Oceans, and the City of Richmond. A public open house was also hosted to take public input and comment.

The main issues identified by farmers included:

- Poor drainage south of Highway 91 (only 35% of farmers in the south indicated adequate drainage compared to 71% in the north). Particular note was made of (1) the detrimental effect of the replacement of the ditch along Westminster Highway with buried culvert, and (2) farmers’ perception that the poor ditch maintenance contributes to the poor drainage.
- Irrigation concerns included competition amongst farmers for water (mainly the north) and the high cost of city water in the south. The use of metered City water is driven by the lack of quality irrigation water.
- Stagnation and water quality issues were most often identified in the south-western - in the Sidaway / No. 6 Road area.

Other issues pertinent to this study include:



- The flat topography, soil types, ground water conditions, property restraints, and traffic safety considerations all limit the options for increasing ditch capacity through deeper and wider ditches.
- The dual purpose of the ditches providing both irrigation and drainage can be contradictory and require some trade-off to achieve a satisfactory solution.
- The cost of upgrading existing infrastructure can be significant, and our approach has been to work with the existing system and limiting improvements as far as practical to those that can be applied incrementally to allow for evaluation of their effectiveness.

The drainage/irrigation conveyance system was analysed using hydro-dynamic modelling software. Two distinct models were created for analyses: one modeled drainage conditions during cranberry harvest discharges; and the other modeled irrigation requirements, including during cranberry harvest demand periods. The study used the Ministry's Agricultural Design Criteria (previously known as ARDSA criteria) as a basis.

Under existing drainage conditions, our analyses showed significant flooding in the southwestern sector (in the Sidaway / No. 6 Road area, south of Blundell Road); along the Granville ditch alignment in the vicinity of No. 8 Road; along Westminster Highway between No 6 and No. 7 Roads; and in the north along the Cambie ditch in the vicinity of No. 7 Road. Similar analyses carried out under irrigation conditions showed the current system cannot provide sufficient water to many areas south of Highway 91. In particular, these included the Sidaway area from Westminster Highway to Williams Road, No. 6 Road south of Highway 91, along the Granville alignment, and the area east of Nelson Road.

Listed below and shown in Map 6.1 are the recommended improvements to address the identified drainage and irrigation issues:

Recommended Improvement	
1	Install temporary flow control structures on No. 7 and No. 8 Roads to contain potential cranberry harvest water.
2	Eliminate major variations in ditch bottom to improve hydraulics in the following ditches: Granville Avenue alignment from No. 6 Road to Nelson Road; No 7 Road from Granville alignment to the south; No. 8 Road, south of Highway 91; Nelson Road; Westminster Avenue on the north side from No. 6 Road to No. 8 Road; Westminster Avenue on the south side from Kartner Road to Nelson Road; No. 6 Road on both sides of Highway 91; Sidaway Road; Blundell and Williams Roads between Sidaway and No. 6 Road.
3	Construct new ditches at the following locations: On Blundell, from No. 6 Road to No. 7 Road; On Francis Road connecting Sidaway to the existing ditch west of No. 6 Road; and on Granville between Sidaway and No 6 Road.
4	Install various flow control structures on the boundary between east and west Richmond on Highway 99 to prevent flooding of west Richmond from the study area.
5	Install screw-type pumpstation located at No. 6 Road and Granville to improve irrigation flows to the Sidaway / No. 6 Road area north of Blundell. This area is slightly higher in elevation.
6	Install drop-leaf automated flow control structures as indicated to direct flows to areas where current irrigation is poor.

7	Deepened ditch on Westminster Highway from Nelson Road to No. 9 Road to allow flows to the No. 9 Road area.
8	Install manually operated control structures at identified locations to direct flows to area east of Nelson Road. These will require the co-ordination of farmers and City operations.
9	Install an additional irrigation pump station at the No. 7 Road North pumping facility, similar to the No. 8 Road station. This will even out the flows along No. 7 Road ditch, but will only be required if the screw pump station in (4) is provided.

East Richmond can be subdivided into three subareas: (1) area south of Highway 91 and generally east of No. 6 Road; (2) area north of Highway 91; and (3) the south western portion east of No. 6 Road and south of Blundell. These are indicated on Map 6.1. The cost-benefit of improvements in the three areas are listed below:

Area	Total Land Area (acres)	Area of Non-Agricultural Land Use	Area of Unused Land (acres)	Annual Average Potential Revenue on Un-used Land			Cost of Infrastructure for this Phase
				Low \$4,673/acre	Median \$9,600/acre	High \$17,500/acre	
1	2,300	500 (22%)	345	\$1,600,000	\$3,300,000	\$6,050,000	\$ 3,970,000
2	3,500	630 (18%)	130	N/A	N/A	N/A	\$ 660,000
3	1800	590 (33%)	640	\$3,000,000	\$6,150,000	\$ 11,200,000	\$ 6,480,000

In addition to the conveyance improvements, we also recommend the following actions and strategies:

- (1) Develop long term communication plan and procedures between City operations and farmers;
- (2) Develop rural agricultural engineering design guidelines;
- (3) Implement a long term flow monitoring program to refine calibration of model;
- (4) Confirm pump operational data as per this report;
- (5) Review ditch cleaning strategy;
- (6) Implement more-formal record-keeping procedures at pump stations
- (7) All drainage and irrigation structures within City right-of-ways should only be operated by City personnel, including the CN Rail Floodbox. This will require improved communications between farmers and City Operations.
- (8) Install alarm system and implement regular inspections at CN Rail floodbox.
- (9) Review cost-benefit of improvements to the area 3 (see table above). The area tends to have much smaller lots, and it has a distinct urban character to it. The cost of improvements here are significantly higher than elsewhere, and prior to proceeding with major capital improvements, we suggest the long-term agricultural viability of the area be confirmed.

Richmond Farmers Institute
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June 1, 2006

Helen Chan, P.Eng.,
Project Engineer
Engineer Planning Section
Engineering Division
City of Richmond
6911 No. 3 Road
Richmond B.C.

Dear Helen

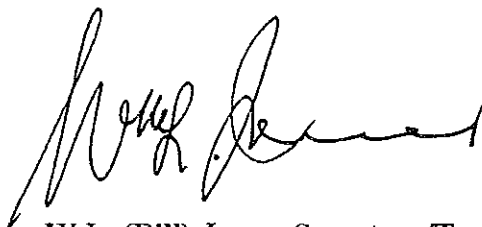
East Richmond Agricultural Water Supply Study

Please refer to your email of May 18, 2006, and the project presentation by Kelvin Carey of UMA yesterday evening.

By unanimous vote, RFI is pleased to support in principle the findings of the Study, and applaud the work of Kelvin Carey, understanding that it is a planning level project. We are assuming the Agricultural Advisory Committee will continue to be routinely consulted as the project moves forward.

A significant by-product of the Study process is the degree to which a high level of communication between City Engineering, AAC, RFI and individual affected farmers, has evolved. Thank you making possible this crucial step forward.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'W.L. Jones', written in a cursive style.

W.L. (Bill) Jones, Secretary/Treasurer.

Date May 2006

To Kelvin Carey +

U/MH Engineering Ltd

3030 Selkirk Mission

Burnaby B.C. V5C 3R4

FX 604 438 5587

Re Hitching and East Richmond Age Study

Mr. Carey

Reason for study water control.

1. Water that is allowed to come from river on North
Branch of Fraser for use by cranberry growers and the
use and release after use:

2. Use by houses in Area 3 of map

3. Flooding of farm land and crop damage in
Area 1 of Map.

2004 and 2005 water flooded and damaged
crops near property, when allowed into the
ditches and from the river, also damage
after release from cranberry use for harvesting

Suggested cure

1. Containment of water in area 2 before
and after use, not allowed to flow into
Area 1 and 3.

2. Use of #7 Road ditch to flow water to Area 1
water will flow down (East of #7) to Westbound
Highway ditch. to flood land in our area
as no control is shown to stop this flow.

3. Ditch clearing should be improved and new
ditches dug.

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Jsc			
Richard Hall			
Fax 604 276 4197			

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4) Other improvements

- 1 new pump. at # 7 Rd and like.
- 2 some control on flap gate at # 7 Rd and Brevelle to allow water out of east of # 7 Rd.
3. Legal (Who is legally responsible??)
From Lim Belmie for
HC Belmie + Sons Farms
6220 # 8 Rd.

Copy to Sue Joe
Richmond Hall
Fax 604 276 4197.

East Richmond Agricultural Study

Name: *Clark Mitchell*
Address: *14540 Westminster Hwy*

Organization:
Contact number:

Your Comments:

looks ~~at~~ Great... lot. best... being

Please hand in your comment sheet at the end of this session