



---

## Public Works & Transportation Committee

Anderson Room, City Hall  
6911 No. 3 Road

Thursday, April 24, 2014  
4:00 p.m.

Pg. #      ITEM

### MINUTES

PWT-7      *Motion to adopt the **minutes** of the meeting of the Public Works & Transportation Committee held on Wednesday, March 19, 2014.*



### NEXT COMMITTEE MEETING DATE

Thursday, May 22, 2014, (tentative date) at 4:00 p.m. in the Anderson Room

### PLANNING & DEVELOPMENT DEPARTMENT

1. **PROPOSED RAILWAY-ROADWAY GRADE CROSSINGS REGULATIONS AND STANDARDS**  
(File Ref. No. 01-0140-20-TCAN1-01) (REDMS No. 4165866 v.3)

PWT-11

**See Page PWT-11 for full report**

*Designated Speaker: Victor Wei*

### STAFF RECOMMENDATION

- (1) *That a letter be sent to the federal Minister of Transport and to Transport Canada as formal comment in response to the pre-publication of the proposed Grade Crossings Regulations in the Canada Gazette, Part I, on February 8, 2014:*

- (a) *requesting that the specification of a maximum time limit of five minutes that a moving train may block any at-grade roadway crossing be included in the proposed Grade Crossings Regulations;*
- (b) *reiterating the previous Council resolution of July 23, 2012 that the proposed Grade Crossings Standards be revised to be engineering guidelines to allow for a risk-based approach that provides flexibility to address any identified safety concerns and, if the proposed Standards are implemented, a dedicated program be established by Transport Canada to provide adequate funding support to municipalities for any upgrades required from the new Standards; and*
- (2) *That a copy of the above letter be sent to all Richmond Members of Parliament and Lower Mainland municipalities affected by the proposed Regulations and Standards for support of the above request.*



## ENGINEERING AND PUBLIC WORKS DEPARTMENT

2. **BATH SLOUGH REVITALIZATION INITIATIVE**  
(File Ref. No. 10-6125-25-017) (REDMS No. 4149768 v.9)

PWT-23

See Page PWT-23 for full report

*Designated Speaker: Lesley Douglas*

### STAFF RECOMMENDATION

*That Option 1 – Proceed with the Bath Slough Revitalization Initiative on a Pilot Basis, as presented in the staff report titled Bath Slough Revitalization Initiative dated February 6, 2014, from the Director, Engineering, be endorsed.*



3. **GATEWAY THEATRE – ENERGY RETROFIT PROJECT**  
(File Ref. No. 06-2050-20-GT) (REDMS No. 4169249 v.4)

PWT-41

See Page PWT-41 for full report

*Designated Speaker: Peter Russell*

STAFF RECOMMENDATION

*That the staff report titled Gateway Theatre – Energy Retrofit Project dated March 26, 2014, from the Director, Engineering be received for information.*



4.      **JAPANESE FISHERMAN'S BENEVOLENT SOCIETY BUILDING – INTERIOR DESIGN**

(File Ref. No. 06-2050-20-JNB) (REDMS No. 4171969 v.4)

PWT-48

See Page PWT-48 for full report

*Designated Speaker: Jim Young*

STAFF RECOMMENDATION

*That the status update report for the Japanese Fisherman's Benevolent Society Building Interior Design be received for information.*



5.      **RICHMOND ENERGY CHALLENGE AND THE CLIMATE SMART PROGRAM**

(File Ref. No.) (REDMS No. 4196803)

PWT-53

See Page PWT-53 for full report

*Designated Speaker: Brendan McEwen*

STAFF RECOMMENDATION

*That, as presented in the staff report titled Richmond Energy Challenge and the Climate Smart Program dated March 28, 2014, from the Director, Engineering:*

- (1) staff's development and implementation of a "Richmond Energy Challenge" for larger private buildings be endorsed; and*
- (2) the Chief Administrative Officer and General Manager, Engineering and Public Works be authorized to execute a funding agreement with BC Hydro, and other potential funders, to implement this Challenge.*



Pg. #      ITEM

6.    **RICHMOND'S    ECOLOGICAL    NETWORK    MANAGEMENT STRATEGY**

(File Ref. No. 10-6000-01/2014) (REDMS No. 4143643 v.3)

PWT-70

See Page PWT-70 for full report

*Designated Speaker: Lesley Douglas*

STAFF RECOMMENDATION

*That the Ecological Network Management Strategy, as described in the staff report titled Ecological Network Management Strategy – Phase 1 dated April 3, 2014, from the Director, Engineering, be endorsed for the purposes of public consultation.*



7.    **MANHOLE COVER ART CONTEST AND PROGRAM**

(File Ref. No. 11-7000-09-20-100) (REDMS No. 4184720)

GP-165

See Page PWT -165 for full report

*Designated Speaker: Lloyd Bie*

STAFF RECOMMENDATION

*That the implementation of the public art contest and program for integrating artwork on sanitary sewer and storm drainage manhole covers, as outlined in the staff report from the Director, Engineering, and Director, Arts, Culture and Heritage Services dated April 8, 2014, be endorsed.*



8.    **MULTI-MATERIAL BC PROGRAM IMPLEMENTATION**

(File Ref. No. 10-6370-03-01) (REDMS No. 4196769 v.2)

GP-174

See Page PWT -174 for full report

*Designated Speaker: Suzanne Bycraft*

STAFF RECOMMENDATION

- (1) *That the Chief Administrative Officer and General Manager, Engineering & Public Works be authorized to negotiate and execute an amendment to or replacement of Contract T.2988, Residential Solid Waste & Recycling Collection Services with Sierra Waste Services Ltd. (in accordance with the April 7, 2014 staff report titled “Multi-Material BC Program Implementation” from the Director, Public Works (the “Staff Report”)), to:*



- (a) *include acquisition, storage, assembly, labelling, delivery, and related tasks for the bags, containers and carts associated with implementation of the program changes and added recycling materials to be collected under the terms of the City's agreement with Multi-Material BC per Section 1, Item a) of the Staff Report;*
- (b) *remove the processing and marketing components from the scope of work and incorporate other changes described in Section 1, Item b) of the Staff Report, effective May 19, 2014;*
- (c) *modify the scope of work as described in Section 1, Item c) of the Staff Report to collect glass as a separate recycling stream, newsprint and mixed paper products as one combined stream, and collect an expanded scope of recycling materials as defined by Multi-Material BC as Packaging and Printed Paper for all residents serviced by the City for recycling services under Contract T.2988, effective May 19, 2014;*
- (d) *add administrative provisions to address the requirements of the contract with MMBC, as described in Section 1, Item d) of the Staff Report;*
- (e) *revise the annual contract amount to approximately \$6,391,841.26 (depending on contract variables such as required added equipment, inflationary and unit count increases), effective May 19, 2014;*
- (2) *That additional funding for the remaining portion of the 2014 Sanitation and Recycling budget be approved at the estimated amount of \$650,000 and that full program funding in the estimated amount of \$1,040,000 be included in the 2015 utility budget process for Council's consideration;*
- (3) *That a letter be sent to Allan Langdon, Managing Director of Multi-Material BC (MMBC), expressing concern regarding the negative operational and financial impacts associated with the current designated post-collection site (located in Surrey) for Richmond's recycling materials, and that MMBC be urged to establish a site within closer proximity to Richmond; and*
- (4) *That staff evaluate options, alternatives and costs associated with addressing the operational and logistical challenges associated with the current designated post-collection site for Richmond, and report back to Council.*



Pg. #      ITEM

9.    **MANAGER’S REPORT**

**ADJOURNMENT**





## Public Works & Transportation Committee

Date: Wednesday, March 19, 2014

Place: Anderson Room  
Richmond City Hall

Present: Councillor Linda Barnes, Chair  
Councillor Chak Au  
Councillor Derek Dang (entered at 4:04 p.m.)  
Councillor Linda McPhail  
Councillor Harold Steves

Call to Order: The Chair called the meeting to order at 4:00 p.m.

### MINUTES

It was moved and seconded

*That the minutes of the meeting of the Public Works & Transportation Committee held on Wednesday, February 19, 2014, be adopted as circulated.*

CARRIED

### NEXT COMMITTEE MEETING DATE

Thursday, April 24, 2014, (tentative date) at 4:00 p.m. in the Anderson Room

### ENGINEERING AND PUBLIC WORKS DEPARTMENT

1. **METRO VANCOUVER GILBERT TRUNK SEWER NO. 2 UPDATE**  
(File Ref. No. 10-6060-03-01) (REDMS No. 4164217)

In reply to queries from Committee, John Irving, Director, Engineering, advised that the first section of the Gilbert Trunk Sewer No. 2 (GTS 2) project is underway and scheduled to be completed in June 2014.

**Public Works & Transportation Committee**  
**Wednesday, March 19, 2014**

---

Discussion ensued and Mr. Irving noted that Metro Vancouver, through their contractors, implement the project's traffic management plan. He commented on the number of traffic-related complaints and advised that a significant concern from a local business has been resolved. Also, Mr. Irving advised that once the project enters its second phase, staff will liaise with Vancouver Coastal Health in an effort to ensure access to and from Richmond Hospital is not affected by works along Gilbert Road.

*Cllr. Dang entered the meeting (4:04 p.m.).*

It was moved and seconded

***That the staff report titled Metro Vancouver Gilbert Trunk Sewer No. 2 Update (dated February 25, 2014, from the Director, Engineering), be received for information.***

**CARRIED**

**2. CLOTHES WASHER REBATE PROGRAM**

(File Ref. No. 10-6650-01) (REDMS No. 4166980 v.6)

In reply to queries from Committee, Jason Ho, Project Engineer, provided background information and advised that the proposed program will be promoted on the City's web site, in a local newspaper, and at community centres. Also, Mr. Ho stated that, upon conclusion of the proposed program, staff will report back on the program's outcome.

Discussion ensued regarding the proposed program's eligibility requirements, and Mr. Ho advised that the proposed program is currently only available to residents. Also, it was suggested that air-drying clothing be encouraged as part of the proposed program's outreach message.

It was moved and seconded

***That:***

- (1) the City partner with BC Hydro for a combined rebate program in May and October 2014, which provides a minimum \$100 and maximum \$200 rebate (equally shared between BC Hydro and the City) for the replacement of an efficient clothes washer;***
- (2) the scope of the existing toilet rebate program be expanded to include clothes washer rebates; and***
- (3) the CAO and General Manager, Engineering and Public Works, be authorized to enter into an agreement with BC Hydro to execute this program.***

**CARRIED**

**Public Works & Transportation Committee**  
**Wednesday, March 19, 2014**

---

**3. AGEING FACILITY INFRASTRUCTURE - UPDATE**

(File Ref. No. 06-2050-01) (REDMS No. 3788323 v.6)

In reply to queries from Committee, Mr. Irving commented on the current facility infrastructure replacement, improvement and maintenance funding. He noted that it is estimated that such funding be increased by approximately \$1 million annually to maintain the current facility index score of 0.08.

Discussion ensued regarding the potential to utilize casino funds to bridge the estimated \$1 million annual shortfall.

In reply to a further query from Committee, Mr. Irving stated that unplanned equipment failures occur regardless of the City's robust preventative maintenance efforts.

It was moved and seconded

*That the staff report titled Ageing Facility Infrastructure – Update dated March 4, 2014 from the Director, Engineering be utilized as input in the annual capital and operating budget preparation process.*

**CARRIED**

**PLANNING & DEVELOPMENT DEPARTMENT**

**4. ICBC/CITY OF RICHMOND ROAD IMPROVEMENT PROGRAM – PROPOSED PROJECTS FOR 2014**

(File Ref. No. 01-0150-20) (REDMS No. 4158403)

In reply to a query from Committee in relation to correspondence received from a Hamilton resident regarding pedestrian safety, Victor Wei, Director, Transportation, advised that it is anticipated that this pedestrian safety concern be resolved in 2014.

It was moved and seconded

(1) *That the list of proposed road safety improvement projects, as described in the staff report titled ICBC/City of Richmond Road Improvement Program – Proposed Projects for 2014, from the Director, Transportation, be endorsed for submission to the ICBC 2014 Road Improvement Program for consideration of cost sharing funding; and*

(2) *That should the above applications be successful, the Chief Administrative Officer and General Manager, Planning and Development be authorized to negotiate and execute the cost-share agreements and that the 2014 Capital Plan and 5-Year (2014-2018) Financial Plan be amended accordingly.*

**CARRIED**

3.

**Public Works & Transportation Committee**  
**Wednesday, March 19, 2014**

---

5. **MANAGER'S REPORT**

Tom Stewart, Director, Public Works, introduced Bryan Shepherd, Manager, Water Services and spoke of Mr. Shepherd's tenure with the City.

**ADJOURNMENT**

It was moved and seconded

*That the meeting adjourn (4:33 p.m.).*

**CARRIED**

Certified a true and correct copy of the Minutes of the meeting of the Public Works & Transportation Committee of the Council of the City of Richmond held on Wednesday, March 19, 2014.

---

Councillor Linda Barnes  
Chair

---

Hanieh Berg  
Committee Clerk



**To:** Public Works and Transportation Committee

**Date:** April 3, 2014


**From:** Victor Wei, P. Eng.  
Director, Transportation

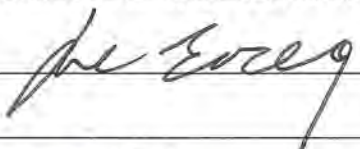


**File:** 01-0140-20-TCAN1-  
01/2014-Vol 01

**Re:** Proposed Railway-Roadway Grade Crossings Regulations and Standards

**Staff Recommendation**

1. That a letter be sent to the federal Minister of Transport and to Transport Canada as a formal comment in response to the pre-publication of the proposed Grade Crossings Regulations in the *Canada Gazette*, Part I, on February 8, 2014:
  - (a) requesting that the specification of a maximum time limit of five minutes that a moving train may block any at-grade roadway crossing be included in the proposed Grade Crossings Regulations; and
  - (b) reiterating the previous Council resolution of July 23, 2012 that the proposed Grade Crossings Standards be revised to be engineering guidelines to allow for a risk-based approach that provides flexibility to address any identified safety concerns and, if the proposed Standards are implemented, a dedicated program be established by Transport Canada to provide adequate funding support to municipalities for any upgrades required from the new Standards.
2. That a copy of the above letter be sent to all Richmond Members of Parliament and Lower Mainland municipalities affected by the proposed Regulations and Standards for support of the above request.

  
Victor Wei, P. Eng.  
Director, Transportation  
(604-276-4131)  
Att. 2

REPORT CONCURRENCE		
<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>
Engineering Roads & Construction Parks	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	
<b>REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE</b>	<b>INITIALS:</b> 	<b>APPROVED BY CAO</b> 



## Staff Report

### Origin

At the July 23, 2012 Council meeting, Council considered a report on Transport Canada's development of Canadian Railway-Roadway Grade Crossings Standards (the Standards) and associated Railway-Roadway Grade Crossings Regulations (the Regulations) that would enable enforcement of the standards. The Regulations would apply to all public and private grade crossings on federally-regulated rail lines and govern the grade crossing owners (i.e., road authorities, beneficiaries and railway companies) who share ownership of these crossings.

The report identified that compliance with the proposed standards could materially impact City resources as information from Transport Canada at that time indicated that the City is the responsible road authority for nearly 60 public grade crossings in Richmond. Hence, Council resolved to send a letter to the Minister of Transport requesting that:

- a) the proposed Standards be revised to be engineering guidelines, to allow for a risk-based approach that provides flexibility to address any identified safety concerns in light of limited financial resources and technical constraints; and
- b) a dedicated program be established to provide adequate funding support for any upgrades required to meet the new guidelines.

On February 8, 2014, Transport Canada published the proposed Regulations and Standards. The public and other stakeholders now have 90 days to submit comments (i.e., deadline is May 9, 2014). Staff recommend that the City provide formal comments to Transport Canada reiterating the above Council resolution and outlining the City's concerns with the proposed Regulations and Standards.

### Findings of Fact

#### Responsibility of Roadway Authority

The proposed Regulations and Standards can be viewed at [www.gazette.gc.ca](http://www.gazette.gc.ca) > Proposed Regulations > *scroll to* Department of Transport – Proposed Regulations: Grade Crossing Regulations. In summary, the added responsibilities for the City would comprise:

- gathering and documenting information to be shared with the railway authority, which includes roadway specifications, traffic volumes and safe stopping distance;
- conducting safety reviews that are targeted towards recurring unsafe occurrences at a grade crossing and must be conducted within a reasonable time of being made aware of the occurrence;
- funding the construction and installation of any warranted upgrades identified by a safety review that are within the road right-of-way; and
- notifying landowners of sightline requirements over the owner's land.

With respect to the elements of a public<sup>1</sup> grade crossing, a road authority is responsible for the following requirements of the Regulations:

<sup>1</sup> Railway authorities are responsible for the elements of a private grade crossing.



- (i) the design, construction and maintenance of a road approach;
- (ii) traffic control devices, except for a stop sign that is installed on the same post as a railway crossing sign;
- (iii) the design of a crossing surface; and
- (iv) sightlines within the land on which the road is situated and over land in the vicinity of the grade crossing, including the removal of trees and brush that obstruct the sightlines.

Table 1 summarizes the different timelines identified by the proposed Regulations for road authorities to meet the two levels of standards (basic and full) for all existing public grade crossings. Works that entail the upgrade of an existing crossing or the construction of a new crossing must meet the full standards at the time of construction.

**Table 1: Timelines for Proposed Standards for Existing Crossings**

Timeline	Standards to be Met	
Immediately (Upon Coming into Force)	BASIC	<ul style="list-style-type: none"> <li>• road crossing surface width (vehicular travel surface and shoulders)</li> <li>• depth and width of flangeway</li> </ul>
Within 5 Years (of Coming into Force)	FULL	<ul style="list-style-type: none"> <li>• road and pathway crossing surface dimensions</li> <li>• minimum/maximum depth/width of flangeway and field side gaps</li> <li>• minimum/maximum wear limits of top of rail and crossing surface</li> <li>• traffic control devices: stop, stop/railway crossing ahead, advisory speed tab, prepare to stop at railway crossing, traffic signal</li> <li>• information sharing</li> <li>• sightlines</li> <li>• warning system: lights, warning time, circuits</li> </ul>

### Blocked Crossings

Currently, the *Canadian Rail Operating Rules* pursuant to the *Railway Safety Act* prohibit a stopped train or switching operations from obstructing a public grade crossing for more than five minutes when vehicular or pedestrian traffic requires passage across it. However, there is no comparable existing regulation with respect to moving trains (i.e., there is no maximum time limit that a moving train can block a crossing). To address the issue of prolonged blockage at crossings by moving trains, the proposed Regulations instead first restricts the scope of grade crossings to be considered by listing several qualifying conditions that must be met, which are:

- (a) the average annual daily traffic at the grade crossing is 2,000 or more and there is no other road crossing within three kilometres of the crossing surface, measured along the line of railway, that crosses the line of railway;
- (b) the public grade crossing is located in a municipality or other organized district where:
  - (i) there are two or fewer main roads that pass through it, or provide access into or egress out of it, and that cross the line of railway at grade, and
  - (ii) there is no other road crossing within three kilometres of the crossing surface, measured along the line of railway, that crosses the line of railway; or
- (c) the public grade crossing is the primary access for emergency services.

Then, only if the crossing meets the above criteria, a municipality may declare in a resolution and issue notice to the Minister of Transport and the railway company that the obstruction of the grade crossing creates a safety concern, upon which the railway company and the road authority

must collaborate to resolve the safety concern within 90 days. If an agreement cannot be reached within the 90 day period, the road authority must notify the Minister of Transport.

### Whistling Cessation

The proposed Regulations include enforceable anti-whistling requirements such that when the Regulations come into force, authorities will be prohibited from enacting anti-whistling at grade crossings that do not meet the specified standards with respect to warning systems and signage.

### **Analysis**

Staff acknowledge the worthy goal of the proposed Regulations to improve public safety at railway-roadway grade crossings but have concerns regarding the potential costs to municipalities of complying with the proposed Standards as well as issues not fully addressed, namely:

- the prescription of standards versus guidelines plus the need to upgrade existing public crossings within the specified time frame without any financial considerations; and
- the lack of a maximum time limit that a moving train may block a roadway causing delays, frustration, and potential safety consequences of other road users, including trucks.

These concerns are shared by a number of municipalities across Canada and staff have continued to participate in discussions with Transport Canada regarding the proposed Regulations and Standards through the aegis of the Federation of Canadian Municipalities (FCM). Transport Canada also recognizes that the proposed Regulations and Standards are crafted from a legal perspective and lack clarity with respect to their practical application in the field. The agency is therefore in the process of developing a manual for road authorities that will provide interpretation and guidance.

### Standards versus Guidelines

As stated in the previous report, staff recommend that the proposed Regulations be introduced as guidelines rather than standards to allow for a risk-based approach that provides flexibility for road authorities to address any identified safety concerns. Compliance with the proposed Standards is likely to create an additional burden for the City and, given limited resources, may displace other municipal priorities as discussed in more detail in the following sections.

### Preliminary Assessment of Existing Public Grade Crossings

Based on information supplied by Transport Canada in 2012 and staff knowledge, there are 39 active public at-grade crossings in Richmond, all of which (30 roadway crossings and nine pedestrian crossings) are used by CN Rail (see Attachment 1 for their locations). Of the 30 roadway crossings, the City shares responsibility with the Ministry of Transportation & Infrastructure for one crossing (Alderbridge Way-Highway 91 just east of Shell Road) and the remaining 29 are wholly within the jurisdiction of the City. While the two pedestrian crossings at the south end of the Horseshoe Slough Trail and the pedestrian crossing for the Bath Slough Trail are all signed as private, the three crossings have been deemed public as the City has signed the trails (i.e., the path is maintained by a road authority and is designed for public use). The 11 at-grade crossings along CP Rail's former Van Horne spur in north Richmond have been



discontinued and as such are no longer within the purview of the proposed Regulations and Standards. All remaining crossings are private and thus not the responsibility of a road authority.

Staff conducted site visits to all 39 crossings to assess on a preliminary basis whether or not the existing conditions comply with both the basic Standards (to be met on Day 1 as per Table 1) and the full Standards (to be met within five years) that fall within the responsibility of road authorities. Attachment 2 details the existing conditions and deficiencies at each location, which are summarized below.

- **Road Approaches and Shoulders (Day 1):** The proposed basic Standards require a 0.5 m shoulder beyond the travelled surface of the road or trail. Site visits indicate that 10 of the 30 roadway crossings and all nine pedestrian crossings require shouldering (see Figure 1 for an example). With respect to flangeways (i.e., the gap in a road surface that allows the wheel flange of a rail vehicle to pass as shown in Figure 2), only six crossings (three road and three pedestrian) appear to be in poor condition and require maintenance (i.e., removal of accumulated debris). For all other crossings, the flangeways appear in fair to good condition.



**Figure 1: Shouldering Needed**



**Figure 2: Flangeways**

Site visits indicate that the asphalt of the road approaches for the majority of road crossings (23 of 30) is in good or fair condition. The remaining seven crossings need repaving due to cracked and broken pavement. Of the nine pedestrian crossings, the three crossings that have a paved surface require repaving and four of the six crossings with crushed limestone require additional fill.

**Table 2: Responsibilities of City and CN Rail for Repaving**

City Responsibility	CN Rail Responsibility
<ul style="list-style-type: none"> <li>• public notices</li> <li>• traffic management</li> <li>• saw cut, remove and dispose of road crossing to a typical width of 6 m</li> <li>• reinstate asphalt road to thickness of top of ties to top of rails, typically 180 mm</li> <li>• supply rail seal materials</li> </ul>	<ul style="list-style-type: none"> <li>• replace ties and/or rails as required</li> <li>• supply and install additional rail ballast as required</li> <li>• compact ballast material and grade rail</li> <li>• install rail seal materials</li> <li>• provide track protection to City crews</li> </ul>

The City has a long-standing relationship with CN Rail regarding the regular repaving of road approaches at grade crossings. The City and CN Rail share the costs based on jurisdiction and responsibility with the average unit cost for only the City portion being \$2,200 per track meter based on the costs of the last five projects completed. Table 2 identifies the breakdown of responsibilities between the two authorities.

- Sightlines (within 5 Years): Per Table 1, the basic Standards do not identify any requirements for sightlines. The full Standards do not apply to roadway crossings with warning systems (lights and bells) and gates (five crossings). For roadway crossings with warning systems but without gates (11 crossings), roadway crossings with stop signs (10 crossings) or pedestrian crossings (eight crossings), sightlines requirements must be met from the stop position of the vehicle or individual to approaching railway equipment. For roadway crossings without warning systems or stop signs (four crossings), additional sightlines are required (i.e., from the stopping sight distance to the stop position of the vehicle).

Staff's preliminary assessment indicates that 26 crossings (23 road and three pedestrian) have sightline issues, the majority of which (22 of 26) are due to overgrowth of vegetation within the sightline area. The remaining four road crossings, three on Vulcan Way and one on Bridgeport Road east of Viking Way, are all located on spur lines and have sightline issues due to buildings situated within the sightline area. More detailed assessments (i.e., sightline calculations) at these four crossings as well as discussion with CN Rail as to the actual train movements on the spur lines will be undertaken to confirm whether or not there is a sightline concern and, if so, what level of warning system is warranted.

- Warning Systems (within 5 Years): the full Standards identify a formula to determine whether or not a warning system is needed based on the speed of the train, the average annual daily railway movements and the average annual daily traffic of vehicles using the crossing. Warning systems would not be required for the pedestrian crossings in Richmond due to the combination of a low train speed and only one set of tracks at each crossing. Of the 15 roadway crossings without warning systems, the combined low volume of daily railway and vehicle traffic indicates that it would be unlikely that any crossing would need to be upgraded based on rail and vehicle movements. However, as discussed above, sightline requirements may still necessitate upgraded warning systems. More detailed assessments (i.e., traffic volume counts and train speeds) will be undertaken to confirm whether or not a warning system is warranted based on rail and traffic volumes.
- Traffic Control Devices (within 5 Years): As shown in Table 1, the basic Standards do not identify any requirements for traffic control devices. With respect to the full Standards, stop signs may be necessary at the four roadway crossings where there is no stop sign and sightline issues exist (two crossings on Vulcan Way, one on Viking Way and one on Rice Mill Road leading to BC Ferries site). All four roadway crossings are located on local or collector roads where the installation of a stop sign would not unduly impact traffic movements. Additional signage (e.g., stop/railway crossing ahead) would not be required as the railway crossing sign and/or stop sign are visible within the stopping sight distance. Although not required by the Standards, the City's practice is to also install a stop bar; 16 road crossings are lacking stop bars while six crossings have stop bars that need refreshing. Two of the 29 roadway crossings and six of the nine pedestrian crossings lack railway crossing signage, which is the responsibility of the railway authority. Stop signs are not required at pedestrian crossings.

In summary, the majority (34 of 39) of public road and pedestrian crossings in Richmond do not meet the basic and/or full Standards. However, the vast majority of the deficient crossings (30 of 34) require only remedial work (i.e., repaving, shouldering, signage, pavement markings, trimming of vegetation) to comply with the Standards. Only the four road crossings that have sightline issues due to a building located within the sightline area have potentially major deficiencies.



As shown in Table 3, the preliminary cost estimate to address the outstanding minor deficiencies is in the order of \$0.8 million, of which \$570,000 would be required to meet the Standards on Day 1 of coming-into-force. The worst-case scenario of installing a warning system with gates to address the sightline issues due to a building at four crossings is estimated at \$1.6 million, for a total estimate cost of \$2.4 million.

**Table 3: Estimated Cost to Address Deficiencies**

Timing	Cost Item	Est. Cost
Day 1	Repaving/Shouldering: road/path approach including flangeways • 12 road & 9 pedestrian crossings	\$570,000
In 5 Years	Sightlines: vegetation trimming • 19 road & 3 pedestrian crossings	\$220,000
	Signage: stop signs • 4 road crossings	\$2,000
	Pavement Markings: stop bar • 22 road crossings	\$4,000
	<b>Subtotal: Minor Deficiencies</b>	<b>\$796,000</b>
In 5 Years	Sightlines: warning system with gates • 4 road crossings	\$1,600,000
	<b>Total</b>	<b>\$2,396,000</b>

#### Potential Impact to City of Upgrades to meet Proposed Regulations and Standards

Of the proposed Standards, meeting the sightline requirements is the one area that could have significant cost implications for road authorities. The proposed Regulations and Standards are silent on the process for determining how the costs to install an advanced warning system to meet sightline requirements would be shared between rail and road authorities. Should the two authorities be unable to agree on cost apportionment, the agencies can apply to the Canadian Transportation Agency (CTA), which has the authority to resolve disputes. The CTA assesses each situation on a case-by-case basis and gives consideration to factors such as relative rail versus road movements, which agency can more easily accommodate any required changes, and what measures would have the overall least impact to society (e.g., the net impact of requiring the railway company to reduce the speed of approaching trains may be less than requiring the installation of a warning system with gates).

Transport Canada administers the Grade Crossing Improvement Program (GCIP), which is an existing fund that supports the implementation of safety improvements at crossings. Transport Canada funds up to 50 per cent of the eligible costs under the program with the remaining 50 per cent divided amongst the involved authorities (typically roadway and railway). If the involved authorities cannot agree on the percentage split of the remaining costs, they can apply to the CTA for a determination. The Agency makes its decision based on the merits of each case, following submissions from the authorities involved.

While the GCIP has been recently undersubscribed (i.e., \$1 million unallocated in 2013), FCM has advised Transport Canada that increased funding may be necessary to help municipalities meet the full Standards within the prescribed five year period. Staff recommend that Council reiterate the need for Transport Canada to establish a dedicated program to provide adequate funding support to municipalities for any upgrades required to meet the proposed Standards.

### Crossings Blocked by Moving Trains

Since the start of the consultation process on the proposed Regulations and Standards led by Transport Canada, municipalities across Canada have consistently voiced (through FCM) a preference for a maximum time limit (between five and 10 minutes) that a moving train can block a crossing for reasons of public safety (e.g., need for emergency vehicle access) and negative impacts on the local road network (e.g., congestion and delays, particularly for goods movement). That preference was rejected by railway companies plus Transport Canada deemed that there is insufficient evidence that a blanket 10-minute rule is required. Transport Canada has further advised that the clause is intended to address safety concerns only and not the impacts to other travel modes. However, blockages of long duration may encourage drivers to engage in risky manoeuvres such as U-turns on two lane roads.

As noted earlier, the proposed clause contains qualifying conditions that would in effect eliminate virtually all crossings in most urban areas from consideration, as the threshold distance of three kilometres between crossings is measured along the railway line and most crossings are spaced closer than that. The clause does not take into account the configuration of the local road network where the detour for motorists may be much greater than three kilometres.

In addition, the clause does not identify any recourse for road authorities after they have notified the Minister of Transport that a blockage concern could not be resolved with the railway company. While Transport Canada has advised that a guideline similar to the whistling cessation process will be developed, a guideline lacks certainty and authority.

Given the shared concern of roadway authorities regarding blocked crossings, Transport Canada initiated a short-term project in December 2013 to examine measures to mitigate risky behaviour by road users at blocked crossings. The study comprises a literature review of railway operational reasons for blocking crossings, road user behaviour at blocked crossings and countermeasures to avoid risk taking behaviour. Both FCM and City staff are participating on the project steering committee, which is chaired by Transport Canada's Rail Safety Directorate and also includes representatives from the Railway Association of Canada. Staff recently received a draft of the final report, which identifies the following potential countermeasures outside of grade separation of the crossing:

- use of communications technologies and/or changeable message systems to provide real-time information on expected blockages and wait times, and alternate routes;
- pre-emption of traffic signals to clear traffic through the crossing;
- linkage of emergency service providers with rail traffic control centre to display crossings either blocked or potentially blocked, and also the nearest clear crossings; and
- shorter trains, track circuit upgrades and revised train schedules.

As the City has received concerns from local businesses regarding the negative impact of blocked crossings, particularly in the East Richmond area, a notice was published in the March 5 and 19, 2014 editions of the City Page of the Richmond Review advising the public of the proposed railway-roadway grade crossing regulations and, in particular, the lack of a maximum time that a moving train can block a crossing. The public and business owners were encouraged to review the proposed regulations and provide feedback directly to Transport Canada, particularly if they have been negatively impacted by a blocked crossing.



Based on discussions with staff of other Greater Vancouver municipalities, there is consensus that a maximum time limit for blocked crossings is preferred that would, for consistency, match the existing maximum time limit of five minutes for stopped/switching trains. From the perspective of a road authority, a crossing is occupied whether the train is moving or stopped, and thus the maximum time limit should be the same for both types of operations.

**Financial Impact**

None.

Should the proposed Standards as written come into force, staff estimate the potential costs could range from an average of \$40,000 per crossing to address minor deficiencies (i.e., shouldering, repaving, trimming of vegetation, signage, and pavement markings) and up to \$400,000 per crossing to address sightline deficiencies due to buildings, or a total cost of approximately \$2.4 million over the five years (approximately \$480,000 per year) allowed to meet the proposed Standards. Any such funding needs would be submitted to Council via the capital and operating budget process and compete with other City priorities.

**Conclusion**

Transport Canada is currently seeking feedback from stakeholders and the public regarding its proposed Canadian Railway-Roadway Grade Crossings Regulations and Standards. Staff support the intent of the Regulations to increase public safety at grade crossings but advise that compliance with the Standards may carry considerable financial impacts. In addition, the proposed Regulations do not satisfactorily address the issue of blocked crossings by moving trains. Both concerns are shared by municipalities across Canada as FCM has continued to facilitate discussions with Transport Canada on these issues. Staff recommend that the City provide formal comments to the Minister of Transport and Transport Canada regarding these key concerns.

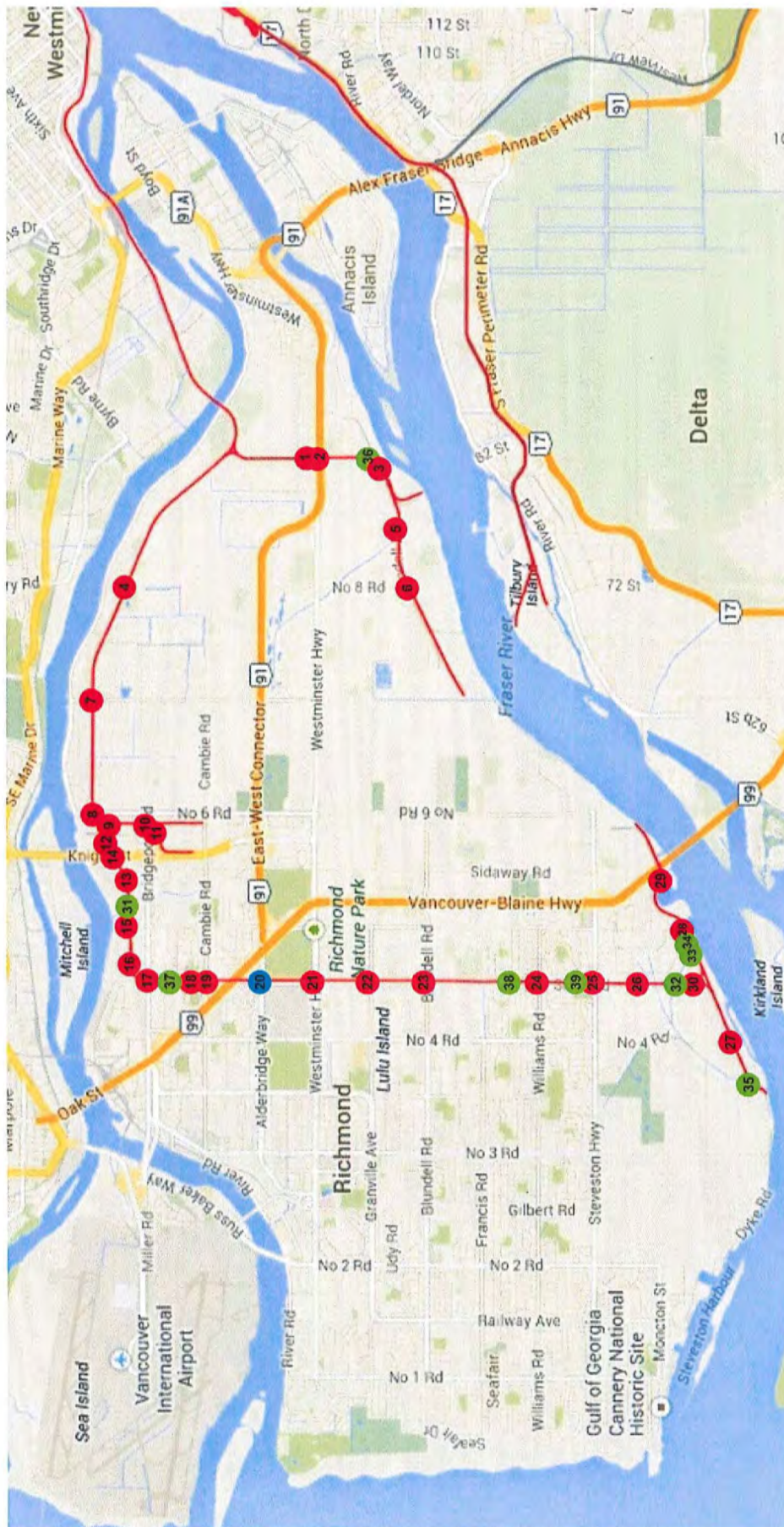


Joan Caravan  
Transportation Planner  
(604-276-4035)

JC:jc

Att. 1: CN Rail Public At-Grade Crossings in Richmond  
Att. 2: Condition of Existing 39 Public At-Grade Crossings

# CN Rail Public At-Grade Crossings in Richmond





## Condition of Existing 39 Public At-Grade Crossings

Location	Road or Trail?	Warning System	Sightlines		Traffic Control Devices			Road/Trail Approach			Meets Standards?	Level of Deficiency
			Issue?	Due To	Railway Xing Sign	Stop Sign	Stop Bar	Surface Condition	Width (m)	Shoulder Needed?		
1	WESTMINSTER HWY - N of Hwy 91	Lights & Bells	No	N/A	Yes	N/A	No	Poor	9.0	Yes	✗	Minor
2	WESTMINSTER HWY - S of Hwy 91	Lights & Bells	Yes	Vegetation	Yes	N/A	No	Good	9.0	Yes	✗	Minor
3	NO 9 ROAD	Stop	Yes	Vegetation	Yes	Yes	Yes	Good	7.3	Yes	✗	Minor
4	NO. 8 ROAD - N	Stop	Yes	Vegetation	Yes	Yes	Yes but faded	Good	5.0	Yes	✗	Minor
5	NELSON RD - S	Stop	Yes	Vegetation	Yes	Yes	Yes but faded	Fair	11.3	No - C&G	✗	Minor
6	NO 8 ROAD - S	Lights, Bells & Gates	N/A	N/A	Yes	N/A	Yes but faded	Good	15.0	No - C&G	✓	N/A
7	NO 7 ROAD	Stop	Yes	Vegetation	Yes	Yes	No	Fair	7.5	Yes	✗	Minor
8	NO 6 ROAD	Lights & Bells	Yes	Vegetation	Yes	N/A	Yes but faded	Poor	14.5	No - C&G	✗	Minor
9	VULCAN WAY - W of No. 6 Rd	None	Yes	Building	Yes	No	No	Good	25.2	No - C&G	✗	Major
10	BRIDGEPORT ROAD	Lights & Bells	Yes	Building	Yes	N/A	No	Good	14.5	No - C&G	✗	Major
11	VIKING WAY	None	Yes	Vegetation	No	No	No	Good	11.4	No - C&G	✗	Minor
12	VULCAN WAY - E of Knight St Bridge	Stop	Yes	Building	Yes	Yes	No	Poor	8.3	Yes	✗	Major
13	VULCAN WAY - W of Knight St Bridge	None	Yes	Building & Vegetation	No	No	No	Good	14.8	Yes	✗	Major
14	FRONTAGE RD btwn Vulcan Way	Lights & Bells	No	N/A	Yes	N/A	No	Poor	6.7	Yes	✗	N/A
15	NO 5 ROAD - N	Stop	Yes	Vegetation	Yes	Yes	Yes	Poor	19.6	Yes	✗	Minor
16	SIMPSON RD	Stop	Yes	Vegetation	Yes	Yes	Yes	Fair	14.0	Yes	✗	Minor
17	BRIDGEPORT ROAD	Lights, Bells & Gates	N/A	N/A	Yes	N/A	Yes	Good	15.0	No	✓	N/A
18	BAMFIELD GATE ROAD	Lights & Bells	Yes	Vegetation	Yes	N/A	Yes	Poor	10.8	No - C&G	✗	Minor
19	CAMBIE RD	Lights, Bells & Gates	N/A	N/A	Yes	N/A	Yes	Good	18.0	No - C&G	✓	N/A
20	ALDERBRIDGE WAY	Lights, Bells & Gates	N/A	N/A	Yes	N/A	Yes	Good	35.0	No - C&G	✓	N/A

PWT - 21

## Condition of Existing 39 Public At-Grade Crossings

Location	Road or Trail?	Warning System	Sightlines		Traffic Control Devices			Road/Trail Approach				Meets Standards?	Level of Deficiency
			Issue?	Due To	Railway Xing Sign	Stop Sign	Stop Bar	Surface Condition	Width (m)	Shoulder Needed?	Flangeway Condition		
21	WESTMINSTER HWY	Lights, Bells & Gates	N/A	N/A	Yes	N/A	Yes	Good	20.0	No - C&G	Fair	✓	N/A
22	GRANVILLE AVE	Lights & Bells	Yes	Vegetation	Yes	N/A	No	Good	7.6	No	Good	✗	Minor
23	BLUNDELL ROAD	Lights & Bells	Yes	Vegetation	Yes	N/A	No	Poor	9.2	Yes	Poor	✗	Minor
24	WILLIAMS ROAD	Lights & Bells	Yes	Vegetation	Yes	N/A	No	Good	13.5	No - C&G	Good	✗	Minor
25	STEVESTON HWY	Lights & Bells	Yes	Vegetation	Yes	N/A	Yes	Good	13.5	No - C&G	Poor	✗	Minor
26	HAMMERSMITH GATE	Lights & Bells	Yes	Vegetation	Yes	N/A	Yes but faded	Good	14.4	No - C&G	Good	✗	Minor
27	NO 4 ROAD	Stop	Yes	Vegetation	Yes	Yes	No	Good	5.0	No	Poor	✗	Minor
28	NO 5 ROAD - S	Stop	Yes	Vegetation	Yes	Yes	No	Good	12.0	No	Poor	✗	Minor
29	RICE MILL RD to BC Ferries	None	Yes	Vegetation	Yes	No	No	Good	15.5	No	Good	✗	Minor
30	SHELL RD (north of Dyke Road)	Stop	Yes	Vegetation	Yes	Yes	Yes but faded	Good	12.0	No	Good	✗	Minor
31	BATH SLOUGH TRAIL	None	No	N/A	No	N/A	N/A	Poor	2.0	Yes	Fair	✗	Minor
32	HORSESHOE SLOUGH TRAIL - N	None	No	N/A	No	N/A	N/A	Fair	2.0	Yes	Fair	✗	Minor
33	HORSESHOE SLOUGH TRAIL - W	None	No	N/A	No	N/A	N/A	Poor	2.0	Yes	Fair	✗	Minor
34	HORSESHOE SLOUGH TRAIL - E	None	No	N/A	No	N/A	N/A	Poor	2.0	Yes	Fair	✗	Minor
35	SOUTH DYKE TRAIL - Crown Packaging	None	Yes	Vegetation	No	N/A	N/A	Poor	2.0	Yes	Poor	✗	Minor
36	MC MILLAN WAY - South End	None	Yes	Vegetation	No	N/A	N/A	Fair	4.5	Yes	Poor	✗	Minor
37	BIRD RD	None	Yes	Vegetation	Yes	N/A	N/A	Poor	2.0	Yes	Poor	✗	Minor
38	ATHABASCA Drive	None	No	N/A	Yes	N/A	N/A	Poor	3.0	Yes	Fair	✗	Minor
39	SEALORD RD	None	No	N/A	Yes	N/A	N/A	Poor	3.0	Yes	Good	✗	Minor





# City of Richmond

## Report to Committee

**To:** Public Works and Transportation Committee

**Date:** February 6, 2014

**From:** John Irving, P.Eng. MPA  
Director, Engineering

**File:** 10-6125-25-017/Vol 01

**Re:** Bath Slough Revitalization Initiative

### Staff Recommendation

That Option 1– Proceed with the Bath Slough Revitalization Initiative on a Pilot Basis, as presented in the report titled “Bath Slough Revitalization Initiative”, dated February 6, 2014, from the Director, Engineering, be endorsed.

John Irving, P.Eng. MPA  
Director, Engineering  
(604-276-4140)

Att: 2

REPORT CONCURRENCE		
<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>
Communications	<input checked="" type="checkbox"/>	
Community Social Development	<input checked="" type="checkbox"/>	
Community Recreation Services	<input checked="" type="checkbox"/>	
Parks Services	<input checked="" type="checkbox"/>	
Public Works	<input checked="" type="checkbox"/>	
<b>REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE</b>	<b>INITIALS:</b> 	<b>APPROVED BY CAO</b> 

## Staff Report

### Origin

The purpose of this report is to present a strategy for environmental enhancement and community stewardship, focused on the Bath Slough catchment in the Bridgeport neighbourhood. Several factors converge in this area that makes the location ideal for a focused stewardship initiative. The proposed initiative directly supports the Ecological Network (EN) endorsed by Council as part of the 2041 OCP (Chapter 9) and the more detailed Ecological Network Management Strategy under consideration by Council for public consultation.

The Bath Slough Revitalization Initiative is broad based and supports a range of Council Term Goals across several sectors that include:

- **Community Social Services** Goal #2.9  
*Encourage the development of community volunteer programs and strategies;*
- **Sustainability** Goal #8.1  
*Continued implementation and significant progress towards achieving the City's Sustainability Framework;*
- **Community Wellness** Goals #10.3 and #10.4  
*Create urban environments that support wellness, Continued emphasis on the development of the City's parks and trails system), and;*
- **Waterfront Enhancement** Goal #12.3  
*Consider day-lighting more sloughs in the City.*

### Background

Waterways form an integral part of Richmond's history, in a unique way among lower mainland municipalities. Before the European settlement, Lulu Island was crisscrossed with watercourses, wetlands and sloughs. Sloughs provided the earliest avenues of travel into the heart of the island and were also important habitats for a myriad of organisms, including the juveniles of all five species of Pacific Salmon. Bath Slough forms part of a historical watercourse complex that stretched across Lulu Island. Today, its catchment area spans over 750 hectares of industrial, agricultural and residential land in the Bridgeport area (Figure 1).

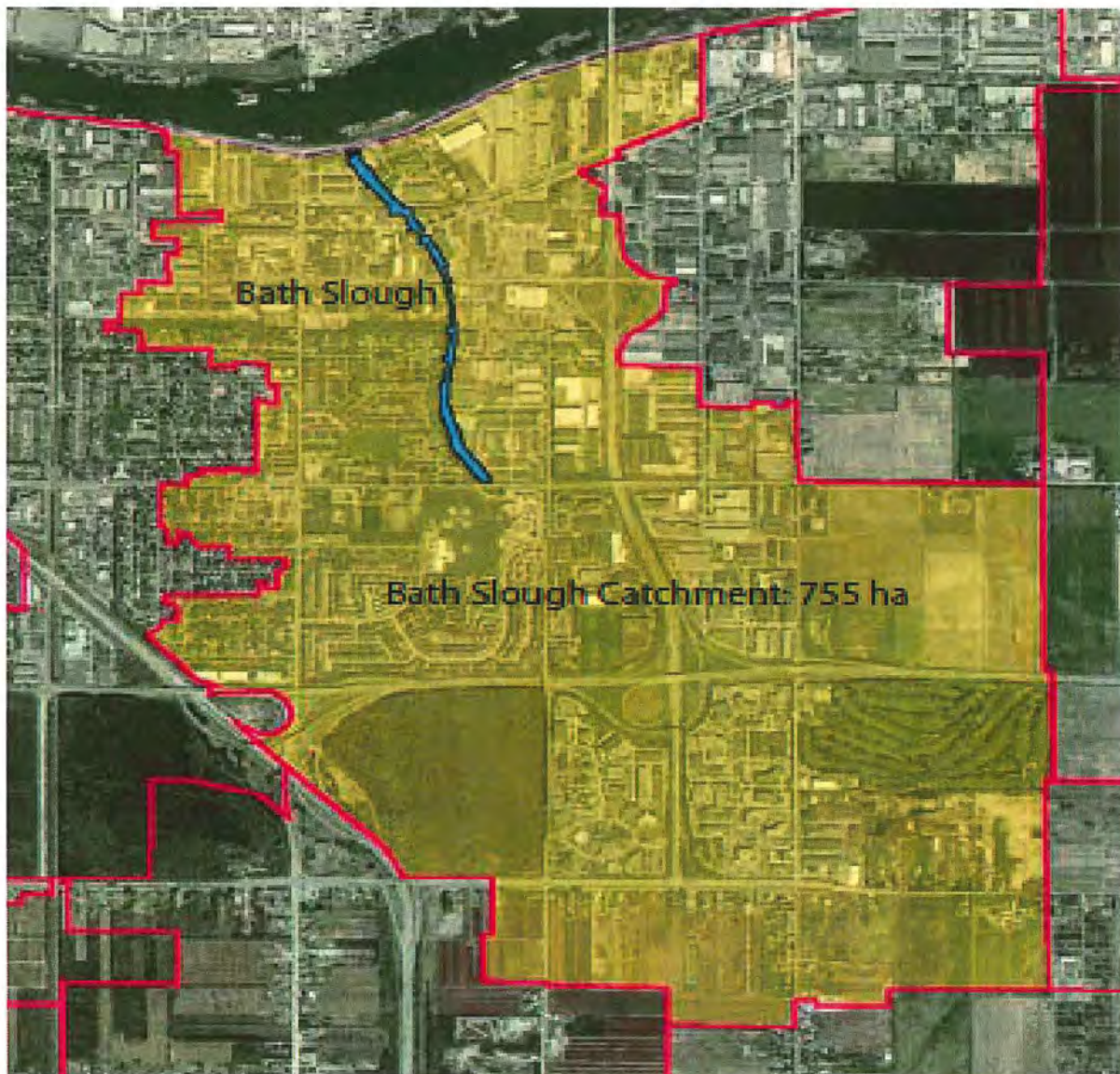


Figure 1: Bath Slough Catchment Area, 2014

With development accelerating in Richmond, a significant decision was made in 1973 to not enclose Bath Slough and to retain some of the natural form and character of the waterway. The form of the remaining watercourse today is similar to before industrial development, and it retains a character distinct from adjacent agricultural watercourses. Enhancement and restoration activities started as early as 1980 with the objective to preserve natural features while “preserving the slough’s function as a drainage canal and providing both a recreation corridor and an aesthetic buffer between land uses”. Volunteer planting efforts in the late 1980s were the earliest community driven enhancement projects and were successful, if modest in scope.

Since the completion of trail construction along the slough in the early 1990s marking the beginning of full community access, little stewardship of the area has taken place. Surrounding



properties have enhanced the trail network somewhat through redevelopment but this has been done in a discontinuous fashion. The combination of infrastructure issues and limited community engagement has led to degradation of the corridor through illegal dumping, poor water quality, vandalism and infestations of invasive plant species.

The drainage pump station for Bath Slough is due to be replaced in 2014 as part of ongoing capital projects. As with other upgraded pump stations, the new pump station will be both an attractive central feature and community amenity, focusing interest in the area. Combined with ongoing dike trail upgrades and new residential development in adjacent areas, the pump station redevelopment sets the stage for revitalization in the neighbourhood. Bath Slough is well-situated as a greenway for public recreation and transportation, connecting the Cambie Community Centre and surrounding neighbourhoods with the Bridgeport retail and industrial operations and the Fraser River Shoreline.

The City has recently experienced great success in promoting community stewardship and engagement of the public on environmental topics. The annual REaDY Summit has grown to be a significant event in the City, driven by an enthusiastic and informed core of High School youth volunteers. The City's Earth Day Events are diverse, well supported and are expanded by year-round events engaging community and corporate participants.

Earth Day 2012 was held adjacent to Bath Slough at King George Park, which provided an excellent opportunity to reintroduce enhancement and stewardship activities in the Bath Slough area. In the summer of 2012, Environmental Sustainability staff built on this momentum by implementing a program of industrial stewardship, targeted at the major industrial operators in the area. Outreach materials were created and staff conducted 96 individual business visits, with the specific goal of increasing awareness of the City's Pollution Prevention Bylaw (Attachment 1).

Finally, students from the Richmond Green Ambassadors program volunteered in the summer of 2012 and spring of 2013 to conduct a storm drain marking program on hundreds of catch basins throughout the neighbourhood. Under the guidance of the City's Environmental Sustainability team, they successfully marked the entire Bath Slough catchment area.

To provide context for the revitalization of the Bath Slough corridor, staff commissioned the preparation of the Bath Slough Restoration Plan in 2012. The Plan outlines several priority strategies for enhancement of the slough, including:

1. Increasing riparian tree cover,
2. Selectively controlling invasive plant species,
3. Strengthening the identity of Bath Slough,
4. Improving the use of Bath Slough as a greenway,
5. Addressing riparian encroachment issues, and;
6. Assessing bank stability.

Recent outreach activities that have been undertaken by staff to industrial tenants in the area, combined with discussions with businesses and new stewardship activities engaging the

Richmond Green Ambassadors has indicated a groundswell of community interest in Bath Slough. Ideal outcomes include community groups and volunteers taking ownership of the area and participating in hands-on work to improve it, and industrial and commercial tenants taking pride in their setting and encouraging their employees and clients to be engaged.

Following the adoption of the EN strategy as part of the 2041 OCP, Sustainability staff have been developing the Ecological Network Management Strategy to guide the preservation and enhancement of the City's natural assets. The EN was adopted as part of the 2041 OCP Update. A central component of the EN is the concept of improved or restored connectivity between ecologically significant areas. In the case of Bath Slough, the corridor has the potential to link the important habitats of the Fraser River foreshore to the interior of the island, including the King George park area and nearby Richmond Nature Park. The revitalization of Bath Slough presents a rare opportunity to further the goals of the EN in an area already largely under City jurisdiction. The initiative also directly supports Council goals for active transportation and GHG reduction.

### **Analysis**

Initiatives promoting the restoration of natural systems in the urban context have proven to have wide-ranging community benefits beyond enhancing habitats. Concepts such as watercourse day-lighting and adopt-a-stream programs capture public imagination and draw residents into stewardship activities. In Richmond, natural enhancements at Terra Nova Park and the Nature Park provide popular engagement and education opportunities. Place-based environmental enhancement and stewardship initiatives have the potential to draw in sponsorship and corporate support and provide for leveraged funding. Richmond is endowed with many natural areas and has an opportunity in Bath Slough to create a unique urban enhancement and stewardship program that will revitalize a community amenity and further the goals of the Ecological Network. Increased ownership by the community and industrial tenants provides an opportunity to recreate a sense of place and long term stewardship.

A draft Vision / Concept Plan graphic for the Initiative is provided in Attachment 2. The Bath Slough Revitalization Initiative is envisioned to consist of several inter-related elements designed to target different user groups and constituents, such as;

- ***Community Mapping:*** A critical element to developing a robust long-term stewardship program is to understand clearly the community's views on the Bath Slough corridor, including how they use it and their priorities for enhancement in the area. Community mapping workshops are an important method to gauge the opinion of local residents and engage them in dialogue. These workshops would consist of drop-in sessions held in partnership with the Cambie Community Centre and Secondary School and facilitated by staff. Participants would identify areas that are significant to them with the assistance of maps and graphics. Staff propose that this be a first step to launching the Initiative as it provides important supporting information to define the program.
- ***Ongoing Capital and Operational Projects:*** This initiative would provide more specific context for the direction of engineering upgrades and maintenance in the corridor. Currently, the Bath Slough Pump Station Upgrade design includes opportunities to

stabilize the slough banks and improve water quality within the lower reaches of the slough. Preliminary investigations are also underway through the Parks Department for the lower reach of the slough to: seek formal permission to establish a public right of way; apply for a railway crossing permit for the slough trail; and determine options for a bridge repair or replacement.

- **Public Stewardship Events:** Staff will seek to implement an ongoing program of volunteer engagement in the slough catchment consisting of public stewardship and education events. These events would be targeted projects taking place under the “Partners in Parks” umbrella. The Bath Slough Restoration Plan outlines methods for restoration; these consist broadly of invasive plant removal and native species plantings.
- **Industrial Stewardship & Outreach:** The Bath Slough catchment is highly industrialized area, with over 70% of land zoned for industrial uses. The Industrial Stewardship program involves direct onsite outreach to clients by staff, supported by educational resources targeting the most common industrial operations found in the area. This program would ideally expand to include all industrial tenants in the catchment.
- **Special Events:** The Bath Slough initiative presents an ideal opportunity to host dedicated events such as future Earth Day related celebrations. As yet the City does not have a significant event celebrating World Rivers Day, held on the last Sunday in September. Situated as it is at the mouth of British Columbia’s largest river, Richmond is in an excellent position to host a Rivers Day event centred on a revitalized Bath Slough.

The above projects represent focus areas for the Bath Slough Revitalization Initiative but should not be considered a comprehensive list; projects will be scoped and prioritized by a coordinated team of staff members.

#### Consideration of Other Sloughs

Staff also considered other major sloughs in the City and evaluated their relative suitability for stewardship initiatives as compared to Bath Slough.

- **Agricultural context:** Other significant sloughs in the City such as Woodward, Horseshoe and Hartnell are more closely associated with agricultural areas and function as both drainage and irrigation features. The immediate adjacency of agricultural properties means that enhancement options for these sloughs are more limited.
- **Adjacent communities:** Adjacency to residential areas and ideally a community centre is considered significant to the development of stewardship as these provide an existing constituency from which community volunteers can be drawn. Other sloughs in the City are in agricultural areas with significantly less population density, making it more challenging to recruit volunteers.
- **Access considerations:** Pedestrian and public access are important to developing a community stewardship initiative as these provide for easy and safe implementation for enhancement projects and public events. Other sloughs have less public access overall



compared to Bath Slough. Some areas of Bath Slough are currently closed to the public due to infrastructure considerations; this will be considered in planning the Initiative and proposed activities will be limited to areas open to the public. Increased engagement in the slough can provide assistance and support in resolving these issues.

- **Supporting Context:** Synergies with the launch of this initiative at the same time as the capital project for the Bath Slough pump station replacement provides significant opportunities for potential water quality improvements and bank stabilization. As described above a restoration plan that is already in place for Bath Slough includes these types of actions as priority strategies.

All of the above factors support the launch of a revitalization program at Bath Slough as a starting point for future stewardship. The success of the pilot initiative will produce important knowledge applicable to other sloughs in the City.

#### *Staff Steering Group*

Multiple City divisions will be involved in a successful Bath Slough Revitalization Initiative. An internal steering group is proposed including but not limited to:

- Parks
- Engineering Operations
- Sustainability
- Community Recreation
- Corporate Communications
- Sewerage & Drainage

#### Options for consideration

##### **Option 1 (Recommended) – Proceed with the Bath Slough Revitalization Initiative on a Pilot Basis:**

Under this option, staff would convene the proposed staff steering group, who would further develop the work plan and timeline and outline priority projects for the launch of the initiative. The launch period would extend through October 2014. Staff would report back to Council on the Initiative's progress once initial meetings have been held in spring 2014, both internally and with the community.

This approach is considered to provide a strong foundation to community environmental enhancement and stewardship that builds upon current opportunities with existing Capital and Operations projects and their integration with community based initiatives.

##### **Option 2 (Not Recommended) – Alternative slough initiative:**

The general concepts presented in this report are applicable to other sloughs in the City. Should Council decide on this option staff would consider the specific environment of the selected area and report back with options for implementation.

Option 2 is not recommended. The synergistic opportunities for the remaining sloughs do not provide the breadth of opportunities already existing in the Bath Slough community.

**Option 3 (Not Recommended) – Do not proceed with the initiative at this time.**

This option does not capitalize upon existing opportunities for slough revitalization, community engagement and community stewardship and is therefore not recommended.

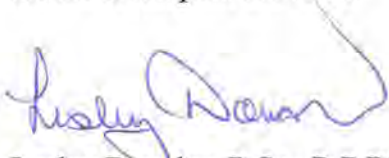
**Financial Impact**

None at this time. All activities highlighted above would occur within existing Capital and Operating budgets. Over time, it is envisioned that increased focus on the slough's health will highlight opportunities for new capital projects, which will be identified in future budgets for Council consideration. In addition, there are many opportunities to leverage external funds from private businesses and other levels of government. To date, staff have successfully secured \$6,400 from the TD Friends of the Environment Foundation to support environmental enhancement and stewardship activities in 2014.

**Conclusion**

Staff are seeking Council's endorsement for the proposed Bath Slough Revitalization Initiative and the raising of awareness of the City's Ecological Network Management Strategy through the Initiative. Constituent components of the Initiative will include coordination of community stewardship events/collaborations, Capital and Operations Projects, environmental enhancement opportunities and the establishment of an internal Bath Slough Steering Group. The intent of this Initiative is to build upon existing environmental enhancement and stewardship projects and opportunities in the Bath Slough that collectively instill a sense of place within the community.

Should Council approve the report and Option 1 for implementation, staff will report back on the results of the pilot initiative.



Lesley Douglas, B.Sc., R.P.Bio.  
Manager, Environmental Sustainability  
(604-247-4672)



Andrew Appleton  
Environmental Coordinator  
(604-276-4216)

LD:aa

Att. 1: Industrial Stewardship Outreach Materials

Att. 2: Draft Bath Slough Restoration Initiative Vision Graphic





# Prevent storm drain pollution

Storm drains in this area connect directly  
to **Bath Slough** and the **Fraser River**.

Only clean rain water may enter the storm  
drain system. It's a good idea, and it's the law.

For more information visit:

[www.richmond.ca/envirostewardship](http://www.richmond.ca/envirostewardship)



PWT - 31





## Legislation

Any person or business responsible for contamination of the City stormwater drainage system will be charged for the cost of cleanup, and could be held liable under the following environmental legislation:

- Federal Fisheries Act
- Meat Inspection Act
- Fish Inspection Act
- BC Hazardous Waste Regulation
- BC Environmental Management Act
- Richmond By-laws No. 8441 and No. 8475

PWT - 32



## More Information

**Environment Canada**  
[www.ec.gc.ca/pollution/](http://www.ec.gc.ca/pollution/)

**Canadian Food Inspection Agency:**  
[www.inspection.gc.ca](http://www.inspection.gc.ca)

**BC Ministry of Environment**  
 604-582-5200

**City of Richmond Environmental Sustainability Services**  
 Tel: 604-276-4694  
[www.richmond.ca/services/Sustainable/environment/about.htm](http://www.richmond.ca/services/Sustainable/environment/about.htm)

**Metro Vancouver Wastewater Regulations**  
[www.metrovancouver.org/services/wastewater/sources/Pages/default.aspx](http://www.metrovancouver.org/services/wastewater/sources/Pages/default.aspx)

**RCBC Recycle Hotline**  
 Tel: 604-276-4345

In the event of an accidental spill to the environment immediately contact the Provincial Emergency Program (PEP) at 1-800-663-3456, in the event that the chemical is flammable, toxic, corrosive or has other hazardous properties, also call the Richmond Fire Department immediately at 911.

If you witness a spill, or anything being washed down the stormdrain, please contact the City of Richmond By-laws Inquiries and Complaints:  
 Tel: 604-276-4345



**City of Richmond**  
 6911 No. 3 Road, Richmond, BC V6Y 2C1  
[www.richmond.ca](http://www.richmond.ca)



# Meat and Seafood Processing

Protect our Aquatic Environment by  
 Preventing Stormwater Contamination



Environmental Services  
[www.richmond.ca](http://www.richmond.ca)



## Protect our Environment

Richmond's spectacular estuarine location—at the point where the Fraser River meets the Pacific Ocean—means that the island city is located within one of the most productive ecosystems in the world. Our community relies on a healthy and diverse landscape to maintain biological diversity and a resilient natural environment. Richmond's inland and foreshore provide a host of ecosystem services – fundamental life supports for humans and a wide variety of plants and animals.

Bath Slough is a semi-natural waterway that flows directly to the Fraser River. The slough is an ecologically important natural area and a community asset in the Cambie neighbourhood. The slough and its riparian areas provide important biodiversity values and ecosystem services. These values are recognized through City-designated Riparian Management Areas (RMA) and Environmentally Sensitive Areas (ESA), protecting the slough's unique ecological values for future generations.

Protecting the ecological and recreational value of the slough depends on actions on both private and public land. Storm drains in your area connect directly to Bath Slough and the Fraser River, and have historically been a significant source of water pollutants.

The City of Richmond is raising local awareness of impacts on Bath Slough in order to increase protection of the slough: for the fish, birds, and invertebrates that inhabit it, and for the people of Richmond to enjoy. Our goal is to assure Bath Slough is a prominent, healthy watercourse for future generations.

## Remember

Storm drains on the street and in your parking lot flow directly to streams bearing fish. Nothing but clean rain water should go down those drains.

## Best Management Practices

If not managed properly, waste and wastewater from industrial fish and meat processing operations pose a serious risk to Richmond's aquatic environment. The detergent and organic components of the waste have a high "biological oxygen demand" that suffocate aquatic life in the area.

In order to protect Richmond's storm drainage system, aquatic environment and the Fraser River Estuary, industries should observe best management practices, including the following:

- Know where your storm drains are and whether they connect to the sanitary sewer or storm system.
- Ensure all wastewater is screened and disposed of in the sanitary sewer, as permitted.
- Undertake any rinsing/washing in a wash bay connected to a sanitary sewer with approval from Metro Vancouver, if required.
- Do not let wastewater or any other substance other than clean rain water enter the storm drains.
- Sweep outdoor areas instead of hosing down. Hosing off pavement carries harmful pollutants directly to the stormdrain system and fish bearing streams.
- Keep all outdoor waste and equipment storage areas clean, secure and out of the rain. Secondary containment may be required for storage of some pollutants.

## Spill Prevention

- All Spills must be cleaned up or contained to prevent them from entering the stormwater drainage system

### To help prevent spills:

- Waste containers should be kept secure, tidy and out of the rain. Secondary containment may be required for storage of polluting substances
- Use "dry" cleanup methods, such as a rag, damp mop or broom.
- Never hose a spill into the street, gutter or storm drain.
- Develop a spill response plan: Have a spill response kit equipped with absorbent materials that are appropriate for offal and other waste produced by your facility.
- Ensure all employees and maintenance workers are aware of their important role in preventing stormwater contamination.





## Spill Prevention

Discharge of wastewater containing concrete, stone and tile fines, or chemicals used to wash or finish these materials, must be contained to prevent them from draining to streets, lanes or other areas where it may reach the stormwater drainage system.

Any person or business responsible for contamination of the City stormwater drainage system will be charged for the cost of cleanup, and could be held liable under the following environmental legislation:

- Federal Fisheries Act
- BC Hazardous Waste Regulation
- BC Environmental Management Act
- Richmond By-laws No. 8441 and No. 8475

**PWT - 34**



## More Information

**Environment Canada**  
[www.ec.gc.ca/pollution/](http://www.ec.gc.ca/pollution/)

**BC Ready-Mix Concrete Association**  
 Tel: 604-881-2522

**BC Ministry of Environment**  
 Tel: 604-582-5200

**City of Richmond Environmental Sustainability Services**  
 Tel: 604-276-4694

[www.richmond.ca/services/Sustainable/environment/about.htm](http://www.richmond.ca/services/Sustainable/environment/about.htm)

**Metro Vancouver Wastewater Regulations**  
[www.metrovancouver.org/services/wastewater/sources/Pages/default.aspx](http://www.metrovancouver.org/services/wastewater/sources/Pages/default.aspx)

**RCBC Recycle Hotline**  
 Tel: 604-276-4345

In the event of an accidental spill to the environment immediately contact the Provincial Emergency Program (PEP) at 1-800-663-3456, in the event that the chemical is flammable, toxic, corrosive or has other hazardous properties, also call the Richmond Fire Department immediately at 911.

If you witness a spill, or anything being washed down the stormdrain, please contact the City of Richmond By-laws Inquiries and Complaints:

Tel: 604-276-4345



**City of Richmond**

6911 No. 3 Road, Richmond, BC V6Y 2C1  
[www.richmond.ca](http://www.richmond.ca)



# Concrete, Stone and Tile

Protect our Aquatic Environment by Preventing Stormwater Contamination



Environmental Services  
[www.richmond.ca](http://www.richmond.ca)



## Protect our Environment

Richmond's spectacular estuarine location—at the point where the Fraser River meets the Pacific Ocean—means that the island city is located within one of the most productive ecosystems in the world. Our community relies on a healthy and diverse landscape to maintain biological diversity and a resilient natural environment. Richmond's inland and foreshore provide a host of ecosystem services – fundamental life supports for humans and a wide variety of plants and animals.

Bath Slough is a semi-natural waterway that flows directly to the Fraser River. The slough is an ecologically important natural area and a community asset in the Cambie neighbourhood. The slough and its riparian areas provide important biodiversity values and ecosystem services. These values are recognized through City-designated Riparian Management Areas (RMA) and Environmentally Sensitive Areas (ESA), protecting the slough's unique ecological values for future generations.

Protecting the ecological and recreational value of the slough depends on actions on both private and public land. Storm drains in your area connect directly to Bath Slough and the Fraser River, and have historically been a significant source of water pollutants.

The City of Richmond is raising local awareness of impacts on Bath Slough in order to increase protection of the slough: for the fish, birds, and invertebrates that inhabit it, and for the people of Richmond to enjoy. Our goal is to assure Bath Slough is a prominent, healthy watercourse for future generations.

## Remember

Storm drains on the street and in your parking lot flow directly to streams bearing fish. Nothing but clean rain water should go down those drains.

## Best Management Practices

Wastes produced from concrete, stone and tile operations pose a serious risk to Richmond's aquatic environment. Concrete slurry and saw cut fines have been contaminating stormdrains and suffocating sea life in the area.

In order to protect Richmond's storm drainage system, valued aquatic environment and the Fraser River Estuary, industries must observe best management practices, including the following:

### At the Construction Site

*\*Be aware of drainage catch basin locations prior to commencing work.*

- Provide catch basin covers, inlet protection or similarly effective containment devices over all nearby catch basins such that runoff from the construction activity does not enter the stormwater drainage system.
- Use drip pans, ground cloths, heavy cardboard or plywood wherever concrete, asphalt, or asphalt emulsion chunks and drips are likely to fall unintentionally, such as beneath extraction points from mixing equipment.
- Concrete delivery and pumping vehicles must not discharge any concrete, slurry, or rinse water into street gutters, stormwater drainages, drainage ditches or onto the paved surface of a roadway or driveway that may lead to the stormwater drainage system.
- Direct aggregate wash water to areas on the construction site where the sediments can filter through the soil, not the stormwater drainage system.
- If wastewater cannot be directed to suitable areas on the construction site, it should be contained, collected and disposed of in an approved manner. Absorbents may be required to contain and collect wastewater.
- During rain events, portable asphalt mixing equipment should be covered by an awning or other similar structures to avoid contact with rainfall.

## Clean-Up

- Designate a wash out area away from stormdrains onsite where application and mixing equipment cleaning should be conducted. This washout area can also be used to contain excess material and slurry.
  - Trucks and equipment should be returned to your facility for washing in a wash bay connected to the sanitary sewer
  - Sweep the pouring area to collect loose aggregate chunks and dust. Do not hose down the area to stormwater drains.
- ### Saw Cutting
- Slurry and sediment from saw cutting operations should be confined to the immediate work area by using berms or diversion structures. Cover or barricade all nearby stormwater drains to prevent any materials from entering the stormwater drainage system.
  - Collect saw-cut slurry in a well contained area and allow it to dry. Dispose of dry slurry in the garbage. Residue from cutting or grinding operations may also be picked up by means of a wet vac or vacuum attachment to the cutting machine.
  - Residue must not be allowed to flow across the pavement, or be left on the surface of the pavement where it may wash to stormdrains. It may be necessary to use a street sweeper or wash down the area and collect the water.
  - Avoid saw cutting operations during rainfall events unless you can contain, capture and dispose of cuttings, sediment and wash water.
  - Consult Metro Vancouver regarding waste water treatment and discharge options to the sanitary sewer system





## Legislation

Any person or business responsible for contamination of the City stormwater drainage system will be charged for the cost of cleanup, and could be held liable under the following environmental legislation:

- Federal Fisheries Act
- Meat Inspection Act
- Fish Inspection Act
- BC Hazardous Waste Regulation
- BC Environmental Management Act
- Richmond By-laws No. 8441 and No. 8475

PWT - 36



## More Information

**Environment Canada**  
[www.ec.gc.ca/pollution/](http://www.ec.gc.ca/pollution/)

**Canadian Food Inspection Agency:**  
[www.inspection.gc.ca](http://www.inspection.gc.ca)

**BC Ministry of Environment**  
 604-582-5200

**City of Richmond Environmental Sustainability Services**

Tel: 604-276-4694  
[www.richmond.ca/services/Sustainable/environment/about.htm](http://www.richmond.ca/services/Sustainable/environment/about.htm)

**Metro Vancouver Wastewater Regulations**

[www.metrovancouver.org/services/wastewater/sources/Pages/default.aspx](http://www.metrovancouver.org/services/wastewater/sources/Pages/default.aspx)

**RCBC Recycle Hotline**

Tel: 604-276-4345

In the event of an accidental spill to the environment immediately contact the Provincial Emergency Program (PEP) at 1-800-663-3456, in the event that the chemical is flammable, toxic, corrosive or has other hazardous properties, also call the Richmond Fire Department immediately at 911.

If you witness a spill, or anything being washed down the stormdrain, please contact the City of Richmond By-laws Inquiries and Complaints:

Tel: 604-276-4345



**City of Richmond**

6911 No. 3 Road, Richmond, BC V6Y 2C1  
[www.richmond.ca](http://www.richmond.ca)



## Food Services

Protect our Aquatic Environment by  
 Preventing Stormwater Contamination



Environmental Services  
[www.richmond.ca](http://www.richmond.ca)



## Protect our Environment

Richmond's spectacular estuarine location—at the point where the Fraser River meets the Pacific Ocean—means that the island city is located within one of the most productive ecosystems in the world. Our community relies on a healthy and diverse landscape to maintain biological diversity and a resilient natural environment. Richmond's inland and foreshore provide a host of ecosystem services – fundamental life supports for humans and a wide variety of plants and animals.

Bath Slough is a semi-natural waterway that flows directly to the Fraser River. The slough is an ecologically important natural area and a community asset in the Cambie neighbourhood. The slough and its riparian areas provide important biodiversity values and ecosystem services. These values are recognized through City-designated Riparian Management Areas (RMA) and Environmentally Sensitive Areas (ESA), protecting the slough's unique ecological values for future generations.

Protecting the ecological and recreational value of the slough depends on actions on both private and public land. Storm drains in your area connect directly to Bath Slough and the Fraser River, and have historically been a significant source of water pollutants.

The City of Richmond is raising local awareness of impacts on Bath Slough in order to increase protection of the slough: for the fish, birds, and invertebrates that inhabit it, and for the people of Richmond to enjoy. Our goal is to assure Bath Slough is a prominent, healthy watercourse for future generations.

## Remember

Storm drains on the street and in your parking lot flow directly to streams bearing fish. Nothing but clean rain water should go down those drains.

## Best Management Practices

It is important to prevent fats, oils, grease and other food service waste from entering stormwater drains as they discharge directly into Bath Slough and then to the Fraser River. Any contaminants, including food waste and “environmentally friendly” cleaning products, may be toxic to aquatic life in this environment.

In order to protect Richmond's storm drainage system, aquatic environment and the Fraser River Estuary, industries must observe best management practices, including the following:

- Know where your storm drains are and whether they connect to the sanitary sewer or storm system.
- Wash water from cooking vent filters, cleaning solutions, waste greases and all other sources must be disposed of through an approved connection to the sanitary sewer system or trucked to an approved disposal facility.
- Do not let any substance other than clean rain water enter stormdrains.
- Undertake rinsing in a wash bay connected to a sanitary sewer.
- Sweep outdoor areas instead of hosing them down. Hosing off of pavement introduces harmful pollutants into the stormdrains.
- Keep all outdoor waste and storage areas clean, secure and out of the rain.
- Waste grease storage may require secondary containment to prevent spills and rain from carrying pollutants down the stormdrain.
- Even “environmentally friendly” cleaning products and organic food wastes cause harm to natural watercourses – rinse them in the sanitary sewer, not the stormdrain.

## Spill Prevention

- All Spills must be cleaned up or contained to prevent them from entering the stormwater drainage system

### To help prevent spills:

- Waste containers should be kept secure, tidy and out of the rain. Secondary containment may be required for storage of polluting substances
- Use “dry” cleanup methods, such as a rag, damp mop or broom.
- Never hose a spill into the street, gutter or storm drain.
- Develop a spill response plan: Have a spill response kit equipped with absorbent materials that are appropriate for offal and other waste produced by your facility.
- Ensure all employees and maintenance workers are aware of their important role in preventing stormwater contamination.





## Spill Prevention

Keep your business clean and organized to prevent spills:

- Develop a spill response plan that includes a spill response kit equipped with absorbent materials appropriate for wastes produced by your facility. Train employees how to use the spill response kit, and proper vehicle washing, chemical usage and waste handling techniques.
- Train employees about best management practices, storm water discharge prohibitions, and wastewater discharge requirements. Ensure all employees are aware of their important role in preventing stormwater contamination.
- Spills of automotive fluids or other hazardous materials must be cleaned up or contained immediately to prevent them from entering the stormwater drainage system
- Any person or business responsible for contamination of the City's stormwater drainage system will be charged for the cost of cleanup, and could be held liable under the following environmental legislation:
  - Federal Fisheries Act
  - BC Hazardous Waste Regulation
  - BC Environmental Management Act
  - Richmond By-laws No. 8441 and No. 8475

## More Information

**Environment Canada**  
[www.ec.gc.ca/pollution/](http://www.ec.gc.ca/pollution/)

**BC Ministry of Environment**  
604-582-5200

**City of Richmond Environmental Sustainability Services**  
Tel: 604-276-4694

[www.richmond.ca/services/Sustainable/environment/about.htm](http://www.richmond.ca/services/Sustainable/environment/about.htm)

**Metro Vancouver Wastewater Regulations**  
[www.metrovancouver.org/services/wastewater/sources/Pages/default.aspx](http://www.metrovancouver.org/services/wastewater/sources/Pages/default.aspx)

**RCBC Recycle Hotline**  
Tel: 604-276-4345

In the event of an accidental spill to the environment immediately contact the Provincial Emergency Program (PEP) at 1-800-663-3456, in the event that the chemical is flammable, toxic, corrosive or has other hazardous properties, also call the Richmond Fire Department immediately at 911.

If you witness a spill, or anything being washed down the stormdrain, please contact the City of Richmond By-laws Inquiries and Complaints:  
Tel: 604-276-4345



**City of Richmond**

6911 No. 3 Road, Richmond, BC V6Y 2C1  
[www.richmond.ca](http://www.richmond.ca)



# Auto Service and Repair

Protect our Aquatic Environment by Preventing Stormwater Contamination



Environmental Services  
[www.richmond.ca](http://www.richmond.ca)



## Protect our Environment

Richmond's spectacular estuarine location—at the point where the Fraser River meets the Pacific Ocean—means that the island city is located within one of the most productive ecosystems in the world. Our community relies on a healthy and diverse landscape to maintain biological diversity and a resilient natural environment. Richmond's inland and foreshore provide a host of ecosystem services – fundamental life supports for humans and a wide variety of plants and animals.

Bath Slough is a semi-natural waterway that flows directly to the Fraser River. The slough is an ecologically important natural area and a community asset in the Cambie neighbourhood. The slough and its riparian areas provide important biodiversity values and ecosystem services. These values are recognized through City-designated Riparian Management Areas (RMA) and Environmentally Sensitive Areas (ESA), protecting the slough's unique ecological values for future generations.

Protecting the ecological and recreational value of the slough depends on actions on both private and public land. Storm drains in your area connect directly to Bath Slough and the Fraser River, and have historically been a significant source of water pollutants.

The City of Richmond is raising local awareness of impacts on Bath Slough in order to increase protection of the slough: for the fish, birds, and invertebrates that inhabit it, and for the people of Richmond to enjoy. Our goal is to assure Bath Slough is a prominent, healthy watercourse for future generations.

## Remember

Storm drains on the street and in your parking lot flow directly to streams bearing fish. Nothing but clean rain water should go down those drains.



## Best Management Practices

Automotive service and repair facilities are often where significant amounts of hydrocarbons, metals, coolants, and other pollutants can mix with stormwater runoff.

Wastewater from auto washing, cleaning and detailing operations also contain sediments, chemicals, detergents, oils, and other contaminants, all of which can be harmful to the environment.

In order to protect Richmond's storm drainage system, aquatic environment and the Fraser River Estuary, industries should observe best management practices, including the following:

- Establish a designated, bermed wash area where wash water is directed to an isolated sump connected to the sanitary sewer system or a holding tank for collection by a disposal company.
- Have your oil-water separator and sediment trap inspected and maintained regularly. Remember: separators provide a buffer in the event of spills, but do not "clean" water or make it suitable for discharge to storm drainage systems.
- Wastewater from radiator flushing, steam cleaning, engine shampooing, parts washing, and caustic cleaning operations must be directed to an approved sanitary sewer connection, or where there is proper containment and no risk of spills to the stormwater drainage system.



- Biodegradable, phosphate-free detergents and cleaners are a good option but they still must not be allowed to enter the stormwater drainage system.
- All waste automotive fluids, paints and solvents must be properly recycled and/or disposed of by an approved disposal or recycling company. All containers of new or waste automotive fluids, solvents, paints, cleaners, deodorizers, acids and caustics should be stored in a secure area. Secondary containment may be required.
- Oil filters should be drained and stored separately for recycling.
- Interior and floor drains must have an approved connection to the sanitary sewer system.
- Drip pans should be placed under any leaking vehicle stored or parked on your site to capture fluids. Captured fluids should be disposed of in appropriate waste containers for proper disposal or recycling. Contact the RCBC Recycling Hotline.
- Vehicles, tools and equipment must not be washed in areas where the wastewater flows to stormdrains.
- Sweep parking lots and work areas rather than using water to flush dirt and debris into stormdrains.





## Bath Slough Revitalization Initiative Vision / Concept Plan

**Vision: Revitalized and activated slough corridors, where communities experience the qualities that make Richmond unique.**

### Goal: Engage the Community and Foster Stewardship

- Reduce dumping and vandalism
- Engage residents in special events
- Foster ownership of Sloughs
- Create a culture of Stewardship
- Interpret history

*Walk, cycle and explore  
Amenity features  
Cool and shady*

**"From the Heart of the City  
to the Fraser"**

*Birds and animals  
Flowers and colour  
Hands in the dirt  
Berries and fruits*

### Goal: Strengthen City Infrastructure

- Decrease maintenance costs
- Reduce spills / pollution events
- Decrease sedimentation
- Improve channel stability

*Experiencing water  
Engaging  
infrastructure*

### Goal: Create Diverse and Healthy Habitats

- Reduce invasive species
- Plant trees and create special habitats
- Enhance biodiversity

## Why restore Sloughs?

Sloughs, along with Bogs are the backbone of the natural history of Richmond. Before European settlement sloughs defined the landscape and brought people to the heart of the island. Few sloughs remain following their original course; Bath Slough is a rare opportunity to take the journey in reverse – from the heart of the island to the River. In the incipient years of the City Richmond was to become, Bath Slough was retained in its historical location to preserve its natural values. Now is the time to revitalize and activate this community amenity.



**To:** Public Works and Transportation Committee  
**From:** John Irving, P.Eng, MPA  
Director, Engineering  
**Re:** Gateway Theatre – Energy Retrofit Project

**Date:** March 26, 2014  
**File:** 06-2050-20-GT/Vol 01

**Staff Recommendation**

That the report entitled “Gateway Theatre – Energy Retrofit Project”, dated March 26, 2014, from the Director, Engineering be received for information.

John Irving, P.Eng, MPA  
Director, Engineering  
(604-276-4140)

Att. 1

REPORT CONCURRENCE	
CONCURRENCE OF GENERAL MANAGER 	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: 
APPROVED BY CAO 	

## Staff Report

### Origin

In September 2008, Council signed the BC Climate Action Charter, voluntarily committing the City of Richmond to carbon neutral operations. In addition to this, Council adopted on April 26, 2010, the provincial greenhouse gas (GHG) reduction targets and approved an amendment to the Richmond Official Community Plan Bylaw 7100, which sets Richmond's community-wide GHG reduction targets at 33% below 2007 levels by 2020, and 80% below 2007 levels by 2050. In connection with these community targets, Council also adopted on July 14, 2010, the Energy Sustainability Strategic Program with the target to reduce energy consumption in the Richmond community by at least 10% by 2020, from 2007 levels.

Through these commitments, the City of Richmond has a mandate to reduce GHG emissions and integrate renewable technologies into its existing corporate energy systems.

### Background

Council endorsed staff's recommendation to implement a pilot project to install a sewage wastewater heat recovery system at Gateway Theatre on September 24, 2012. The heat recovery system was designed to provide a renewable heating source to the facility and displace natural gas use. A summary of the project and images of the technology are included in **Attachment 1**. In addition to the installation of the heat recovery system, other mechanical heating system components at Gateway Theatre that were at the end of their service life were upgraded.

It was estimated that the integration of the heat recovery system would reduce natural gas use annually by 900 gigajoules (GJ) or 35%, operating costs by an estimated \$8,100, and GHG emissions by 50 tonnes. Other measures, including boiler and coupling replacements were expected to further reduce annual natural gas use by approximately 300 GJ and operating costs by an estimated \$2,700.

A similar and larger scale sewer waste heat recovery system is currently the preferred technology for supporting the purposed River Green District Energy Utility.

### Analysis

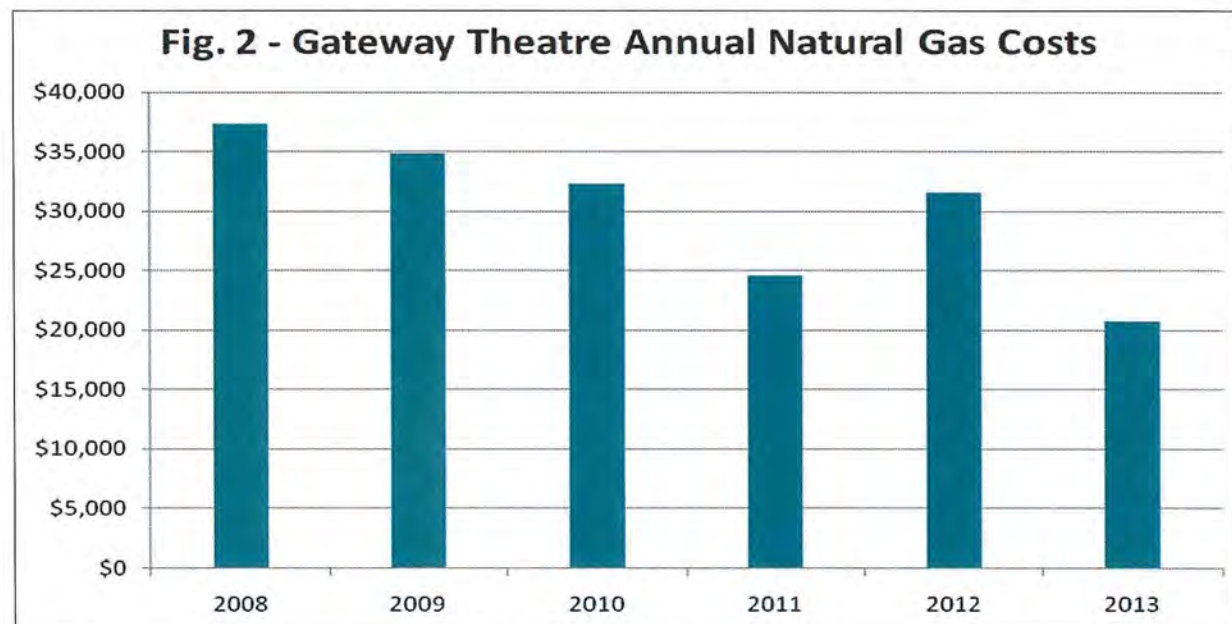
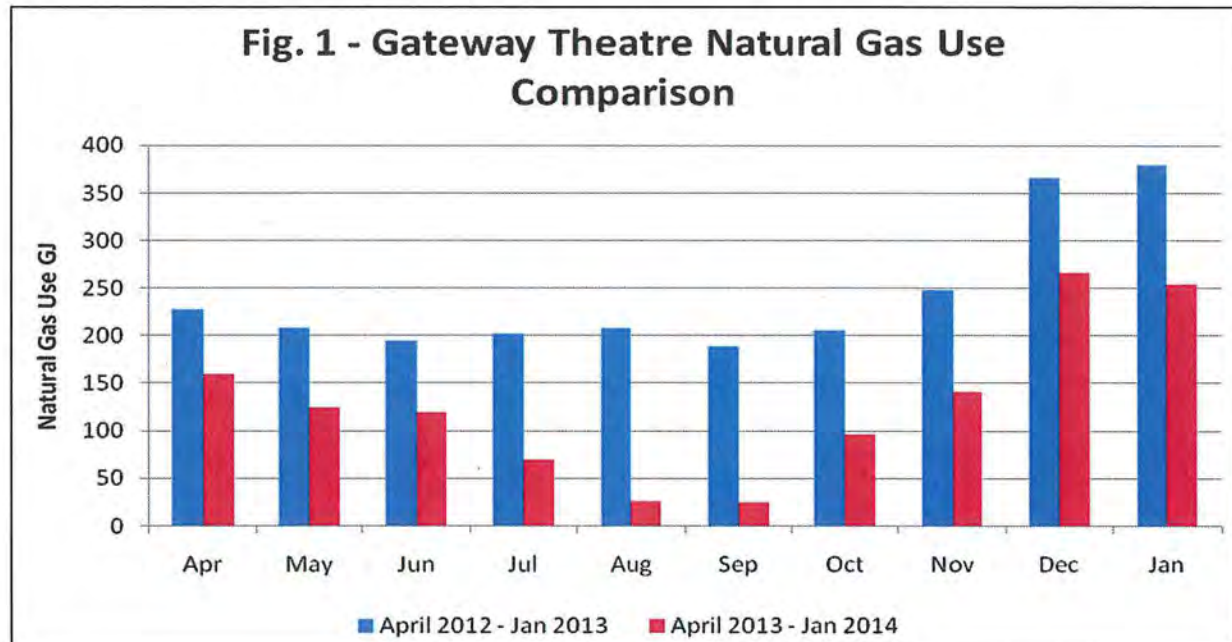
The installation of the Gateway Theatre sewage heat recovery system was completed in April 2013. Mechanical system upgrades, including a boiler replacement, coupling replacements, and a building envelop improvement were completed by September 2013.

The total capital cost of the heat recovery system was \$55,000. Including design costs, other associated building improvement measures included a boiler replacement and installation; the total cost of the combined energy retrofit and upgrade project was approximately \$192,000. Prior to project implementation, grant and incentive funding agreements were arranged with the Federal Government through the Western Economic Diversification Canada and with Fortis BC. Fortis BC has contributed \$15,000 and Western Economic Diversification Canada has committed to contribute \$85,000 for this combined project. This incentive funding of \$100,000 will help reduce the net capital cost of this project allowing for a shorter payback period.



## Results

Initial results indicate that energy reduction estimates for this project were accurate. In the first four months of operation, natural gas use was reduced by approximately 30% when compared to the previous year. Once the couplings and the main boiler were replaced, additional natural gas reductions were realized. Over the latter part of 2013 and following the completion of other retrofit projects, the facility realized an overall gas use reduction of approximately 45% as detailed in Figures 1 and 2.





Natural gas reductions since April 2013 have resulted in an annual savings of approximately \$15,000, surpassing the project's conservative estimates. In addition, the facility has reduced its GHG emissions by approximately 70 tonnes annually, which is equal to removing 20 cars from Richmond roads.

Initial returns on the City's investment indicate that the project is successful and meeting expectations. Based on the first year cost avoidance savings and including the incentive funding, the project is estimated to have just over a 6 year payback period. It is estimated that the system's usable life is approximately 25 years.

### **Conclusion**

The installation of an innovative sewage heat recovery system was a key component of this overall project, which will help displace and reduce natural gas use over the long term. It is through innovative and effective solutions that the City of Richmond can demonstrate how the community as a whole can transition to a more sustainable and low carbon community.



Levi Higgs, B.Sc, EMIT  
Energy Manager  
(604-276-1239)

Attachment 1	Community Energy Association Award Submission - 2013	REDMS# 3917596
--------------	--	----------------



# Heat Recovery System Integration

Gateway Theatre in Richmond, BC

**A first in North America!**

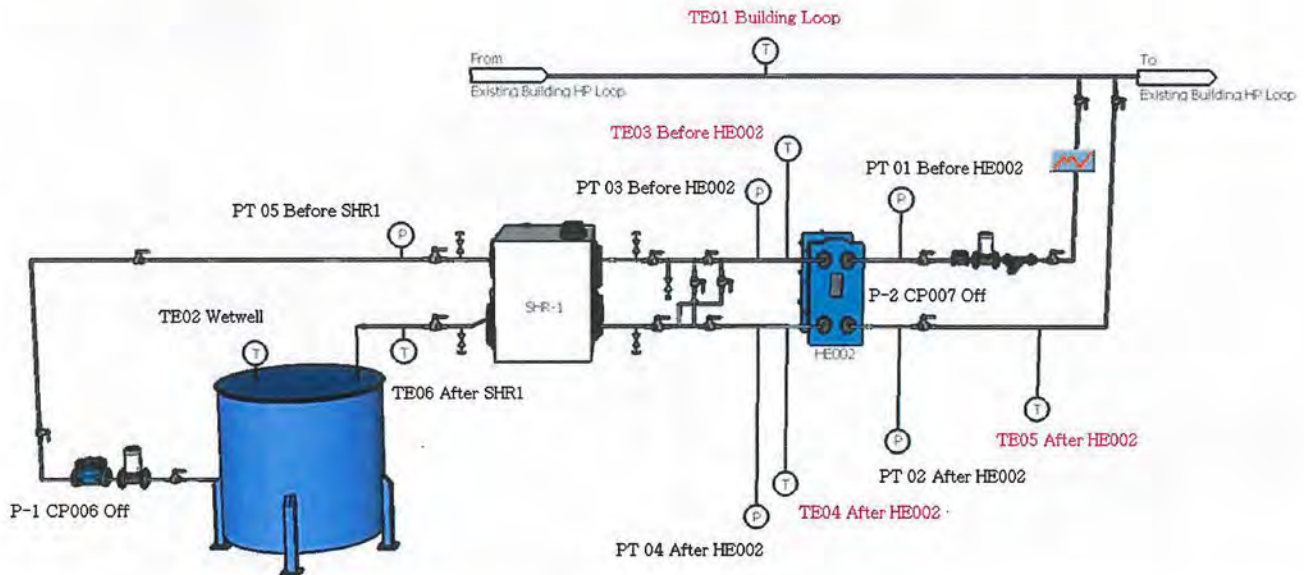




- With the successful integration of a sewage heat recovery system into the building's heating system at Gateway Theatre, the City of Richmond, BC and its partners have achieved a North American first at a publically owned facility.
- The recently installed sewage heat recovery system is estimated to displace over 900 GJ of natural gas annually = 35% reduction, and reduce GHG emissions by over 45 tonnes annually = 35% reduction
- Gateway Theatre is a dynamic 50,000 ft<sup>2</sup> community facility that supports emerging and established artists in the region, and fosters growth in the theatrical arts. Its continued operational success is very important for the cultural viability of the City of Richmond.
- The theatre is owned by the City of Richmond and operated by a charity association. The City is responsible for energy utility costs, and to maintain and upgrade the facility as needed.
- The theatre was constructed in 1984, and was identified as a good candidate facility for some significant energy retrofit projects, due to its life expectancy, its existing water source heat pump heating system with a natural gas boiler, and the proximity to a large sanitary pump station situated beneath the Theatre.







- The US EPA estimates that 385 billion kwh of energy in the form of waste heat is sent down the drain every year in North America.
- To extract heat for use, the sewage SHARC® system processes incoming raw sewage pumped from a sanitary wet well, which typically averages between 15 and 20 Celsius throughout the year.
- The processed sewage is then pumped through a heat exchanger where heat is extracted from the sewage water to process fluid, which is then supplied directly to the building's low temperature heat loop.
- Up to 250 gallons per minute of raw sewage can be pumped through the SHARC® system to supply heat to the building.
- The system uses a unique clog-free filter and heat exchange combination made specifically to perform with raw sewage, which allows it to achieve heating COP of over 5.3 and an EER of over 20. The system has an anticipated life in excess of 25 years.
- The City of Richmond is proud of the work that was done to integrate this new technology, and is looking forward to the potential of using this system in other existing or new buildings.
- The City is committed to reducing our corporate carbon footprint, and it is through new and innovative technology, such as this heat recovery system, that the City will be able to make great progress.







# City of Richmond

## Report to Committee

**To:** Public Works and Transportation Committee

**Date:** March 7, 2014

**From:** John Irving, P.Eng. MPA  
Director, Engineering

**File:** 06-2050-20-JNB/Vol  
01

**Re:** Japanese Fisherman's Benevolent Society Building – Interior Design

### Staff Recommendation

That the status update report for the Japanese Fisherman's Benevolent Society Building Interior Design be received for information.

John Irving, P.Eng. MPA  
Director, Engineering  
(604-276-4140)

REPORT CONCURRENCE		
<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>
Finance Division	<input checked="" type="checkbox"/>	
Arts, Culture & Heritage	<input checked="" type="checkbox"/>	
Parks Services	<input checked="" type="checkbox"/>	
<b>REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE</b>	<b>INITIALS:</b> 	<b>APPROVED BY CAO</b> 

## **Staff Report**

### **Origin**

The Japanese Fishermen's Benevolent Society Building Rehabilitation Project (Japanese Building) interior/exterior renovations were approved by Council as part of the 2010 and 2014 capital programs. Exterior renovations were completed in 2013.

The purpose of this report is to update Council regarding the status of interior renovations.

### **Background**

On November 13, 2012, Council adopted additional terms of reference for Site Building Committees for heritage projects as follows:

- a) Review the tender package prior to the tender process;
- b) Review any subsequent changes that affect heritage conservation outside of the Council approved project scope; and
- c) Include appropriate heritage documents in the orientation package.

The Japanese Building interior design has been completed and was endorsed by the Council appointed Building Committee on March 6, 2014. The floor plan design has been included as Attachment 1.

### **Analysis**

The City values Richmond's historically and culturally significant buildings, monuments, and other sites. There are currently 27 buildings in Richmond's heritage inventory. The Japanese Building is valued for its historical and social significance, for its cultural significance as a rare remnant of a once-extensive infrastructure built by Steveston's Japanese Canadian community, and for its surviving original and early material and design elements.

Photographs of the completed Japanese Building exterior renovation are included as Attachment 2.

The project site is within a small park located on 3811 Moncton Street in the Steveston Village. The building was relocated in 2010 from Chatham Street to its current location and exterior rehabilitation was completed in Spring 2013.

### **Interior Design**

The interior design captures the historical nature of the original building through re-use of existing materials, application of similar paint colours and general design features reflective of this period in Steveston's history. Some of the design highlights include:

- A fire protection system which will enable full public occupancy
- A kitchenette area which can be used for public events

- Secure space for storage of exhibit and programming support materials.
- Upgraded electrical and HVAC system
- Upgraded interior lighting system
- Use of original interior wood panel as interior finishes for walls and ceiling
- Exhibit development is in progress working with the Steveston Historical Society and the Nikkei National Museum and Archives.

Landscaping design is in progress and will expand the park functional space as well as create synergies between the town square and the building structure.

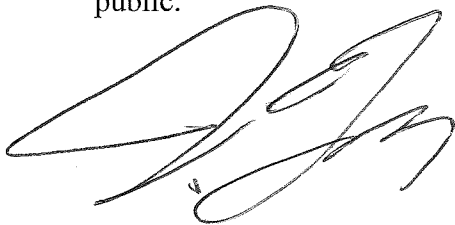
It is anticipated that interior construction will commence in the July/August 2014 timeframe and be completed by early 2015.

### **Financial Impact**

No financial impact. Funding is available for the Japanese Fisherman's Benevolent Society Building, as previously approved by Council. The Steveston Museum upgrades will be funded through the Building Improvement Operating Budget

### **Conclusion**

The Japanese Building located in Steveston represents one of the City's important heritage buildings. Exterior restoration was completed in 2013. The building interior renovation design was endorsed by the Building Committee on March 6, 2014 and construction is anticipated to be completed by early 2015. Once complete, the Japanese Building will be fully accessible to the public.

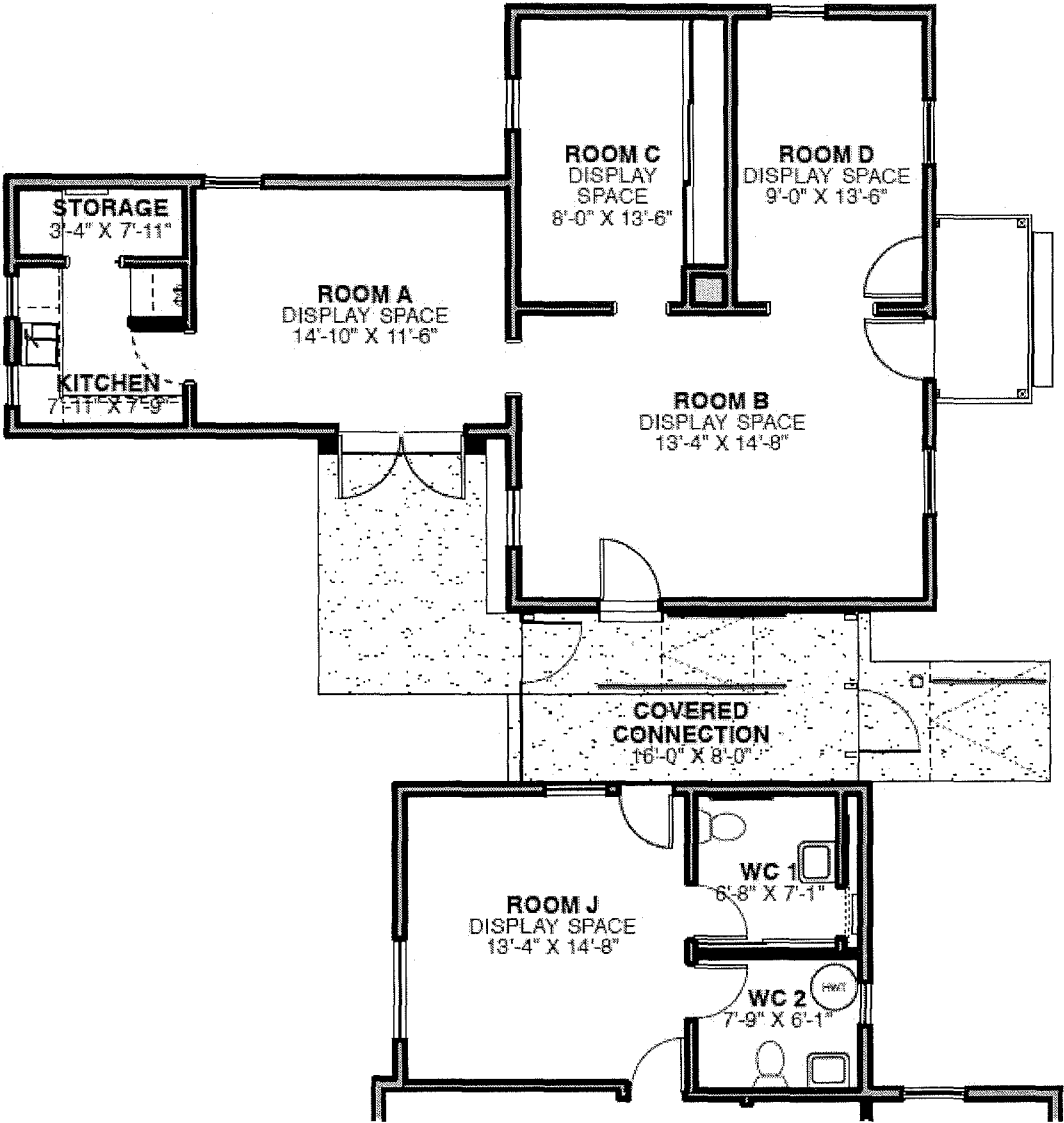


Jim Young, P Eng  
Senior Manager, Project Development  
(604-247-4610)

Attachment 1 – Floor Plan

Attachment 2 – Exterior Renovation Photographs

Attachment 1



Building Floor Plan



Attachment 2



Building – East Elevation View



Building – South Elevation View



# City of Richmond

## Report to Committee

**To:** Public Works and Transportation Committee **Date:** March 28, 2014  
**From:** John Irving, P.Eng. MPA **File:**  
Director, Engineering  
**Re:** **Richmond Energy Challenge and the Climate Smart Program**

### Staff Recommendation

That, as presented in the attached report titled "Richmond Energy Challenge and the Climate Smart Program", dated March 28, 2014, from the Director, Engineering:

1. Staff's development and implementation of a "Richmond Energy Challenge" for larger private buildings be endorsed, and
2. That the Chief Administrative Officer and the General Manager, Engineering and Public Works be authorized to execute a funding agreement with BC Hydro, and other potential funders, to implement this Challenge.

John Irving, P.Eng. MPA  
Director, Engineering  
(604-276-4140)

REPORT CONCURRENCE		
<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>
Economic Development	<input checked="" type="checkbox"/>	
<b>REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE</b>	<b>INITIALS:</b> 	<b>APPROVED BY CAO</b> 



## **Staff Report**

### **Origin**

In November 2012, the City piloted the Climate Smart program to help businesses reduce their energy use and emissions. The City provided \$5000 to leverage funding from the Pacific Carbon Trust, Fortis BC, and participating businesses. This report reviews outcomes of the program.

Building on the success of the Climate Smart pilot, staff propose that Richmond implement an “Energy Challenge” for local businesses and multifamily properties over 2014-2015; the Richmond Energy Challenge will help building owners, managers and operators reduce energy use in their facilities, by providing training, services, tools, and a community of peers. The Challenge is part of the implementation of the City’s 2014 Community Energy and Emissions Plan (CEEP); Action #7 in the CEEP is “promoting building efficiency through outreach and education”. The Challenge supports Council Term Goal #8.1 on Sustainability: “Continued implementation and significant progress towards achieving the City’s Sustainability Framework.”

### **Analysis**

#### Climate Smart Program - 2013 Pilot Results

The Climate Smart Program is offered in British Columbia by a social enterprise with the purpose of enabling small- and medium-sized enterprises (SMEs) to reduce their greenhouse gas (GHG) emissions while cutting costs and fulfilling their corporate social responsibility objectives.

In 2013, the City of Richmond partnered with Climate Smart, the Pacific Carbon Trust (\$5,000 contribution), and Fortis BC (\$3,000 contribution) to deliver a Program specifically for 10-12 Richmond-based businesses on a 1-year pilot basis. The City of Richmond also contributed \$5,000, and businesses each paid between \$250 and \$1,000 depending on their size.

The City’s Economic Development Office worked with Climate Smart to develop an appropriate communication and recruitment strategy that would engage the local business community. Eleven Richmond-based businesses registered for the Program, representing a cross-section of sectors including manufacturing, logistics, retail, food processing, agriculture, information technology and construction. These businesses collectively represent 1,830 employees, nearly 700,000 square feet of commercial space, and total revenue reported of over \$1.5 billion. The Richmond participant profile represents larger businesses than typical for Climate Smart members region-wide.

As of November 2013, the participation of Richmond businesses had resulted in over 13,000 tonnes of CO<sub>2</sub>e (carbon dioxide equivalent) being inventoried. As part of ongoing engagement with the program, participating businesses are continuing to identify strategies to reduce these emissions. Emissions reduction strategies employed by participants range from behavioral changes (such as encouraging employees to take public transportation and turn off energy consuming devices when not in use) to capital projects (such as warehouse lighting retrofits and gradually replacing fleet vehicles to more fuel efficient models). Other reduction strategies



implemented include increasing the amount of green space at the company's facilities, reducing corporate flights taken, buying carbon offsets, and installing fleet tracking devices to increase efficiencies and reduce fuel consumption. Program-wide, Climate Smart businesses average 4% emission reductions in the first-year and \$397 in projected cost savings per tonne CO<sub>2</sub>e reduced.

Through a post-Program survey conducted by the City, Richmond businesses reported being very satisfied with the Climate Smart Program and the majority indicated they had one or more staff members dedicated to ongoing monitoring of GHG emissions. Eighty-three percent of respondents indicated they would continue using the Climate Smart tool to monitor GHG emissions. The respondents commended the City's involvement in this initiative, and encouraged ongoing participation in local businesses' sustainability efforts.

Businesses report that they value participation in Climate Smart, and participants continue to identify a wide array of GHG emissions reduction opportunities. Unfortunately, the Pacific Carbon Trust and Fortis BC have not renewed support for Climate Smart, and at this time no new funding partners have been identified for the Program. Moving forward, staff propose to support businesses' energy and emissions management through a "Richmond Energy Challenge". Leveraging funding from BC Hydro, and potentially other sources, the Challenge will provide training and resources to help local businesses and multifamily buildings pursue energy upgrades, building on the success of Climate Smart. The Richmond Energy Challenge is described below.

#### Richmond Energy Challenge

Expanding from the City's success with the Climate Smart program and businesses' feedback that City energy programs are valued, staff propose to develop a "Richmond Energy Challenge". The Richmond Energy Challenge supports the Community Energy and Emissions Plan Action #7 (CEEP p. 49) to "promote building efficiency through outreach and education". The Challenge will scale up the City's efforts to engage businesses and multifamily buildings in energy improvements, offering deeper engagement and opportunities for a larger number of buildings to participate.

The Challenge will respond to key barriers and opportunities that impede building owners and businesses from implementing energy improvements to their buildings. Attachment # 1 summarizes the barriers and opportunities to improving building energy performance for pertinent building sectors.

To address key barriers and capitalize on opportunities, the Challenge will provide a range of services to help commercial and multifamily building owners, managers, and operators reduce energy spending and emissions in their facilities, and pursue other green building management practices. The City will recruit building owners and managers into the Challenge, asking that they simply track their energy performance and commit to pursuing strategies to save money and help protect the environment.

The Challenge will be anchored by a "Peer Learning Group", which will convene participating property managers and building operators. The City will work with utilities and industry experts to deliver training and tools for this group, including:

- Training in building energy benchmarking, to track buildings' performance.
- Training in how to access utility energy efficiency programs, and building the business case for upgrades.
- Specialized seminars on energy upgrade opportunities.
- Connection to free/low-cost energy assessments provided by BC Hydro and Fortis BC.
- Ongoing peer support to share good practices in implementing upgrade projects, and provide the social "nudge" to follow through with upgrades.
- Opportunities for bulk procurement.
- Regular networking and mentorship.
- A forum to inform the ongoing development of City policy and programs to reduce energy and emissions in existing buildings.

As part of the Richmond Energy Challenge, the City will recognize participating buildings, and provide "Energy Awards" for high performing buildings.

BC Hydro has offered to provide \$47,875 in funding for the Richmond Energy Challenge and broader efforts to promote upgrades, and has provided funding agreements for the City. Staff have applied to Fortis BC (\$40,500 funding request) for additional support, and are exploring other sources to support the Challenge.

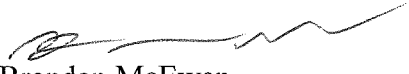
The Richmond Energy Challenge is anticipated to run from September 2014 to September 2015, with recruitment over summer 2014. Staff will provide an interim update on the Challenge to Council during its implementation, and a final report when completed.

### **Financial Impact**

None. Staff estimate that implementing the Challenge will require a total budget of \$88,375. BC Hydro has offered to provide funding for the Richmond Energy Challenge and efforts to promote upgrades, totaling \$47,875. The remaining \$40,500 to implement the Richmond Energy Challenge and associated promotions are pre-existing in the City's 2014 capital budget. Additional funding from Fortis BC and/or other sources may reduce City spending.

### **Conclusion**

Increasing the scale of energy upgrades in Richmond's residential and commercial buildings is critical if Richmond is to achieve the energy and emissions goals articulated in the Official Community Plan and CEEP. The Energy Upgrade Strategy presents a range of actions to catalyze deeper energy improvements in the community. Richmond can build upon and enhance previous efforts, such as its support of Climate Smart, by implementing these actions. The Richmond Energy Challenge represents an important early action in the Energy Upgrade Strategy, and a means of building on the success of the Climate Smart program.



Brendan McEwen  
Manager, Sustainability  
(604-247-4676)  
BM:bm



## Market Analysis of Larger Private Building Segments

This Market Analysis profiles the barriers and opportunities to implementing energy improvements (or “upgrades”) to larger private buildings that will be eligible to participate in the proposed Richmond Energy Challenge. The Market Analysis is based on multiple interviews with utility program administrators, energy service providers, representatives of the building owners and managers industry, and energy service providers, as well as a literature review. It identifies five building segments which might participate in the Richmond Energy Challenge, noting the particular barriers and opportunities to proceeding through energy upgrades for each. Key barriers are summarized in the table below.

The proposed Richmond Energy Challenge is intended to address many of these barriers. Notably, the program will:

- Improve knowledge of existing energy improvement programs and incentives provided by utilities.
- Increase building operators’ and managers’ understanding of energy issues, and ability to implement energy saving projects.
- Reduce the hassles and transaction costs associated with implementing energy upgrades.
- Provide a forum to liaise with members of the building ownership and management industries, to identify how to overcome persistent barriers to energy improvements, including “Hold Barriers” (owners are hesitant to invest in energy improvements when they may sell, or tenants may leave the property); “Split-incentives” (owners pay the cost of energy improvements, while tenants save on energy costs); and a lack of appropriate financing tools.

Barriers	Commercial, Industrial & Institutional			Residential	
	Small & Medium Business	Large, professionally managed buildings	Large Institutions	Condo	Rental Apt.
Knowledge of energy programs	✓			✓	✓
Building operator energy literacy	✓	✓	✓	✓	✓
Hassle / transaction cost	✓	✓	✓	✓	✓
“Hold Barrier” – owner/tenant may leave property	✓	✓		✓	✓
“Split-Incentives” <sup>1</sup>	✓	✓		✓	✓
Lack of appropriate financing tools	✓	✓		?	?

<sup>1</sup> A “split-incentive” refers to conditions where owners must cover capital cost of upgrades, while tenants reaps lower utility bills; in this case, the owner has limited incentive to invest in upgrades. Alternatively, it may refer to a case where an owner/strata pays energy costs, and the occupant has limited incentive to control energy spending.



## Commercial Buildings

This analysis differentiates between smaller businesses with less energy upgrade capacity, and larger businesses with greater capacity. In reality, businesses fall along a spectrum of energy management capacity; the “smaller” and “larger” subsectors are used to highlight conditions at different ends of this spectrum. Across these different segments, there are commonalities, including:

### **A wide variety of building sectors, with individual upgrade needs**

The commercial sector encompasses a wide variety of building types and industries, each with its own energy upgrade opportunities and barriers. Important sectors to address in Richmond include offices; retail; warehousing and logistics; manufacturing; and food services.

### **“Base-building” versus tenanted space upgrades**

Some buildings are owner-occupied, while others include spaces leased to tenants. Energy consumption in buildings with leased space can be divided into two broad sources: “Base-building” and tenanted spaces. The base-building includes common areas, and also often includes common HVAC services that are provided to all building spaces. Owners are billed for base-building costs; however, under the structure of many real estate leases, they will pass some or all of these utility bills through to tenants. Owners and their building management firms are typically responsible for making upgrades that reduce base building energy use costs.

Tenants’ energy costs often include electricity consumption billed for their leased spaces, include lighting and plug-loads; they may also pay for some or all HVAC services for these spaces. It is also important to note that in many leased commercial buildings, tenants occupy an entire building and pay for all costs.

## Smaller Businesses with Less Energy Upgrade Capacity

### **Market description**

Roughly, this segment covers buildings less than 50,000 square feet in size, occupied by small and medium businesses. Smaller businesses will often not have full-time, dedicated property management or buildings operations staff. Where management and operations staff are present, they are typically responsible for a wide range of duties, and frequently have limited experience nor time to devote to upgrade projects.

### **Utility/Provincial Programs**

**LiveSmart BC Small Business Program (expired March 31, 2014)** – Historically, the Province administered the LiveSmart BC Small Business Program. It provided free energy assessments. Utilities provided incentives for energy upgrade measures completed as part of the program. The LiveSmart program expired March 31, 2014.

**Future utility-administered home energy upgrade program** – In late April, BC Hydro and Fortis BC are expected to announce energy efficiency program(s) that will effectively replace the LiveSmart BC Small Business Program. The program(s) will likely feature an energy assessment, and access to utility incentives. Whether multi-fuel assessments will be available, and the depth of assessments required, remains uncertain.





## Key Barriers

**“Hold barriers” due to potentially short-term building tenure** – Many owners anticipate they might sell their property within a few years. Likewise, tenants may leave leased spaces. The potential that owners/tenants may leave the property limits their interest in investing in energy improvements.

**Limited knowledge** – Many small and medium business owners are unaware that energy efficiency incentive programs are available to help reduce emissions.

**Transaction costs & limited staff capacity** – Smaller business owners and managers face multiple demands on their time. They often cannot expend significant time navigating utility programs.

**Split-incentives** – Energy upgrades are hindered in many commercial properties where owners are responsible for upgrades, but tenants pay utility bills. Conversely, in properties where owners pay utility bills, tenants have no incentive to save. “Green lease” terms that align responsibility for energy upgrades with utility payments are required, and/or financing mechanisms that can pass through repayments for capital spent on upgrades under the structure of existing leases.

**Lack of appropriate financing mechanisms** – While various loans and lease financing mechanisms are offered by financial institutions and vendors for commercial upgrades, these products do not address some of the commercial sectors’ key requirements. Notably, existing financing mechanisms:

- **Cannot be readily passed to future building owners** – Many commercial real estate owners anticipate potentially selling their property within a few years. They are often hesitant to finance upgrades whose repayment cannot be readily passed to future owners.
- **Do not address split-incentives** – Financing repayments are not readily passed through to tenants under the structure of many existing leases. Thus, owners hesitate to invest in upgrades that reduce tenants’ utility bill payments, a “split-incentive”.
- **Reduce borrowers’ debt service capacity** – When a business takes on debt it typically reduces their debt service capacity, limiting what they may borrow in the future. Businesses have multiple demands on their limited cash reserves and debt capacity. Thus, they hesitate to finance upgrades.
- **Are not available for smaller projects** – Many upgrade financiers note that they will not finance upgrades of less than \$100,000-\$500,000 in value. Smaller businesses thus may not be able to access financing for upgrades. While some emerging equipment lease services are financing projects for lower values, there remains the need to aggregate projects and serve smaller customer sizes.

For these reasons, few commercial property owners will invest in upgrades with greater than a 2 year simple payback. Financing mechanisms that address these barriers have the potential to significantly increase these investment thresholds, and enable deeper energy upgrades to be realized.

## Key Drivers & Opportunities


**Recognition and awards** – Many commercial building owners and businesses are keen to differentiate their practices, and be recognized for green building achievement. Facilitating existing building rating systems and providing recognition for green building performance can drive better building upgrade practices.

**Tenant improvements** – Tenant improvements at the time of re-leasing spaces present an opportunity to implement more efficient lighting and equipment in tenant spaces.

**Norms and peers’ actions** – Building owners are influenced by peers actions and market norms.



## Small Business Upgrade Process

	Current Process	Existing Barriers	Potential Solutions
	Recruitment - Business schedules assessment	Low knowledge of programs' existence  Low motivation to participate	Increase direct marketing (letters, etc.)  Provide informative indirect marketing  Leverage social norms through "Community based social marketing"
	Business Energy Advisor (BEA) conducts assessment  Report provided to business owner  BEA may provide further assistance to business	Time & hassle of assessment  Difficulty interpreting assessment  Contractor is not involved in assessment, missing a sales opportunity	Simplify assessment  Involve the contractor; use assessment as a sales opportunity
	Business accepts bids from contractors  Contractors visit business to inform quotes  Business chooses best bid	Hassle and uncertainty of procuring contractor  Additional time for contractor visits	Provide pre-approved contractor to reduce hassles  Facilitate bulk procurement of contractors by community organizations, to reduce transaction costs (the "Solarize" model).  Provide technical assistance during procurement
	Businesses may finance upgrades through cash reserves, debt	Many business do not have cash, available debt capacity, or cannot secure financing at good terms  Short (2 year) investment thresholds  Businesses may anticipate selling/moving before term of financing  Split-incentives – owner responsible for upgrade, tenant pays bill	Provide financing tools that: <ol style="list-style-type: none"><li>1. Are available in small amounts</li><li>2. Pass with property/utility meter</li><li>3. May be readily passed through to utility bill paying tenants</li><li>4. Are considered "off balance sheet"</li></ol> "Property Assessed Payment for Energy Retrofits" are a promising model
	Contractor implements upgrades	Hassle of coordinating contractors	Provide streamlined, rapid upgrade

**Note:** This process is based on experience with LiveSmart BC program. Future programs may differ.



## Larger Businesses with More Energy Upgrade Capacity

### Market description

Roughly, this segment encompasses buildings greater than roughly 50,000 square feet, which often have more sophisticated ownership, property management and buildings operations. Some of the more energy intensive and/or most valuable properties are served by dedicated energy managers, with sponsorship from utilities. This sector also encompasses building spaces occupied by some large chains that have some energy management expertise serving their various locales.

Energy Service Companies (ESCOs), engineering design firms, contractors, and equipment vendors have established markets providing upgrade services for larger commercial and industrial buildings. These service providers frequently drive upgrade projects and participation in upgrade programs.



### Utility/Provincial Programs

A wide range of utility programs provide incentives and services for upgrades to commercial and industrial buildings. BC Hydro offers the Power Smart Partners program, geared towards larger commercial clients that spend \$50,000 or more per year on electricity. Participants have access to a range of incentives, key account managers that provide advice on appropriate programs, sponsored energy managers, continuous optimization and other programs. Likewise, Fortis BC offers a Custom Design program for upgrade assessments, a range of incentives, and sponsored Energy Specialist positions for qualifying customers.

In recent years, both BC Hydro and Fortis BC have expanded their Energy Manager and Specialist programs across networks of buildings; for example, the Building Owners and Managers Association (BOMA) has an Energy Manager on staff who can support upgrade work for BOMA members.

### Key Barriers

Many of the barriers to upgrades in larger commercial buildings are similar to those facing smaller properties (see subsection above). However, larger properties face relatively less transaction costs, and will have greater capacity to implement upgrades if the barriers listed below are ameliorated.

**“Hold barriers” due to potentially short-term building tenure** – Owners/tenants may sell/leave the property in a few years, limiting their interest in investing in energy improvements.

**Split-incentives** – Energy upgrades are hindered in commercial properties where owners are responsible for upgrades, but tenants pay utility bills.

**Lack of appropriate project financing** – Commercial properties will rarely pursue upgrades with longer than a 2-year simple payback. This is because owners will typically seek to keep cash and debt service capacity available for other uses, and due to “hold barriers” and “split-incentives”. Financing mechanisms are needed that do not reduce debt service capacity and that can pass with the property in future years.



**Need for skill-building and continuous energy optimization** – Larger buildings are complex; significant amounts of energy can be saved through operational improvements. Implementing and maintaining these operational improvements is a challenge for building operators, who need access to training and services.

### Key Drivers & Opportunities

**Established service providers** – Energy service firms and contractors currently serving the commercial market are crucial allies in providing innovative services and driving deeper energy upgrades.

**Higher capacity operations staff** – Management and operations staff in larger buildings typically have more experience and resources to implement upgrade projects. Training and further capacity building can enable further upgrade projects.

**Recognition and awards** – Many commercial building owners and businesses are keen to differentiate their practices, and be recognized for green building achievement.

**Tenant improvements** – Tenant improvements and times of re-leasing spaces present the opportunity to implement upgrades to tenant spaces.

**Norms and peers' actions** – Building owners are influenced by peers' actions and market norms.





## Larger Business & Institutions Upgrade Process

	Current Process	Existing Barriers	Potential Solutions
Ongoing Energy Management	Buildings may benchmark energy performance Ongoing monitoring and optimization of energy use	Lack of building manager/operator training & capacity Limited mandate from ownership	Facilitate training Encourage owners to direct staff to focus on energy savings
Energy Assessment	Owner/manager opts to undertake comprehensive assessment Internal management staff or external consultant provide assessment	Operations staff can be hesitant to facilitate assessments that find range of opportunities for improvement, as this may reflect poorly on their performance	Involve operations and management staff; have them "own" the project
Project Development & Approval	Assessment & business case provided to building owners/managers and/or tenants	Management and operations staff often lack business case development experience and skills Split-incentives – owners & tenants hesitant to negotiate payment of upgrades mid-lease	Provide business case training Green lease education Target assessments & upgrades at re-tenanting
Finance Upgrades	Owners and/or tenants secure financing for upgrades	Many business do not have cash, available debt capacity Short (2 year) investment thresholds Businesses may anticipate selling/moving before term of financing Split-incentives – owner responsible for upgrade, tenant pays bill	Provide financing tools that: 5. Are available in small amounts 6. Pass with property / utility meter 7. May be readily passed through to utility bill paying tenants 8. Are considered "off balance sheet" "Property Assessed Payment for Energy Retrofits" are a promising model
Complete Upgrades, Commissioning	Contractors install upgrades, commission systems	Construction practices may be subpar. Systems commissioning requires skilled practitioners	Facilitate improved commissioning and ongoing energy management & monitoring services



## Institutions – Government, Hospitals, Schools, Higher Education

### Market description

Many public and non-profit institutions own substantial portfolios of buildings in Richmond, with owners including government, hospitals, schools and higher education. Institutions typically own and occupy their properties, and expect have a long tenure on most of these properties.

### Utility / Provincial Programs

Institutions are generally eligible for the same array of programs as larger commercial properties.

### Key Barriers

**Need for skill-building and continuous energy optimization** – Larger buildings are complex; significant amounts of energy can be saved through operational improvements. Implementing and maintaining these operational improvements is a challenge for building operators, who need access to training and services.

### Key Drivers & Opportunities

**Availability of financing tools** – Financing tools, such loans for performance guaranteed energy savings contracts, are relatively well established for large institutions.

**Carbon neutral commitments and environmental responsibility** – Institutions typically lead in commitments to climate action. This includes the public sectors' commitments to achieve carbon neutrality.

**Norms and peers' actions** – Institutions are influenced by peers' actions.



# Multifamily Condominiums

## Market description

BC assessment and census data suggest that as of 2011, there were about 34,000 housing units in stratas (about 50 per cent of Richmond's housing units) of which about 23,000 were apartments with common corridors.<sup>1</sup> Condominiums thus comprise an important market for energy upgrades.

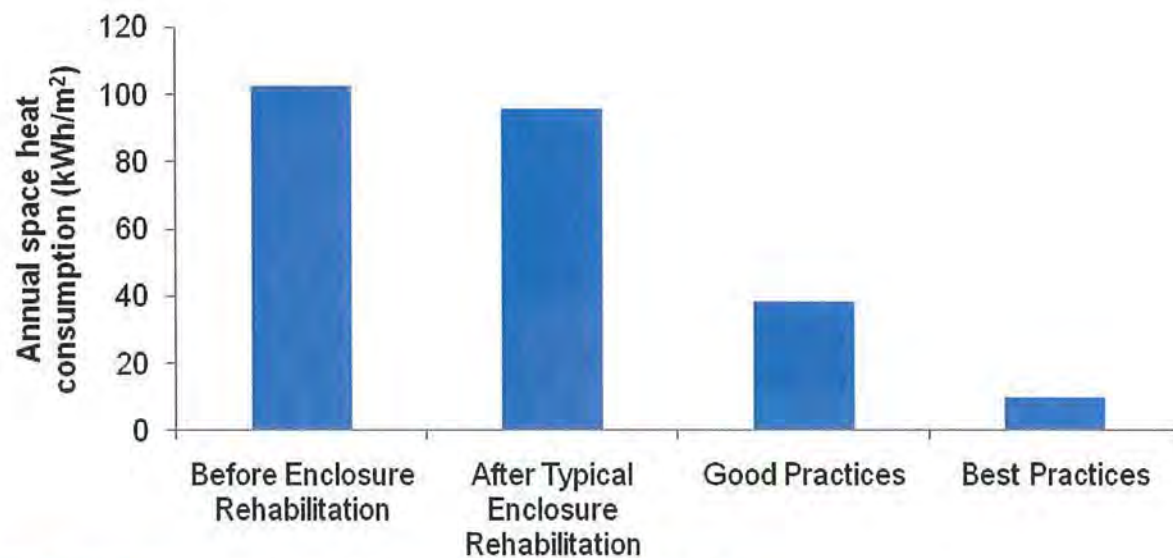
## Base building versus in-suite upgrades

Condominium's energy consumption can be divided into two broad sources: Common energy costs, which are paid via strata fees; and in-suite energy costs, paid by unit owners. Common costs include common area lighting and conditioning, as well as much in-suite heating—many stratas have only one gas account, and do not individually meter unit heating costs such as fireplaces, heated ventilation air, or hotwater. These common sources account for about 70% of unit heating, and represent the greatest opportunities for efficiency improvements.<sup>2</sup> In-suite costs include electric equipment such as baseboard heating, lighting, appliances and plug-load. In-suite upgrades generally require action only by suite owners.



## Rented condominium units

About 23% of condominium units in suburban Metro Vancouver are rentals. Like owner-occupants, owners of rented units have an interest in reducing common strata fees through energy upgrades, but have less interest in reducing energy costs for in-suite energy loads. Coordinating upgrade projects with investor owners can add to transaction barriers.



Multifamily heating consumption, pre and post rehabilitation. Source: RDH 2012.

<sup>1</sup> Of the remaining units, some would be strata townhomes and duplexes with individual heating systems and better served through "home energy upgrade" services described above.

<sup>2</sup> RDH Building Engineering. 2012. *Energy Consumption and Conservation in Mid- and High-Rise Residential Buildings in British Columbia*. Prepared for: CMHC; Province of BC, Homeowner Protection Office; City of Vancouver; BC Hydro; & Fortis BC.



## **Opportunities for deep energy upgrades during building enclosure rehabilitation**

Many multi-unit residential buildings may undergo comprehensive building enclosure rehabilitation to address moisture issues. To date, few buildings in British Columbia have sought to improve the thermal performance of the building enclosure during these renovations. However, they present the potential to achieve deep energy savings. One study found that advanced building remediation efforts could reduce heating and ventilation requirements 60 to 90 per cent.<sup>3</sup>

### **Utility/Provincial Programs**

There is currently no utility sponsored program that provides assessments for multiple fuels (both electricity and natural gas) for condominiums; rather, current programs provide upgrade services for just one fuel type. BC Hydro's residential program offers incentives for electrical equipment upgrades for residential account holders, which can cover activities in units. BC Hydro's Power Smart Partner's Express Program will launch on April 30, 2014; it will facilitate upgrades for common areas of condominium buildings. Fortis BC's Energy Assessment Program facilitates subsidizes audits for condominiums.

### **Key Barriers**

**Difficulty coordinating upgrades amongst stratas** – Convincing a strata to undertake energy upgrades to common spaces presents transaction costs and organizational challenges.

**Hesitancy to invest reserves in upgrades when unit owners may move** – Unit owners face a “hold barrier”—they may resist supporting investing cash reserves in energy upgrades when they may sell the unit. To overcome this challenge, greater buyer recognition of the energy performance of buildings is required or financing provided that is repaid by the strata corporation over time.

**Property managers have limited incentive to develop projects** – Many condominiums are managed by property management firms. While these property managers will typically conduct simple energy upgrades, they have generally do not have direction to develop deep energy upgrade plans.

**Limited financial incentives for unit occupants to conserve energy** – Unit owners frequently do not pay for many sources of heating in their units, including gas fireplaces, heated ventilation air, and hotwater; these are paid via strata councils. Thus incentives for individual units to change behaviour to conserve energy are limited.

### **Key Drivers & Opportunities**

**Opportunities to integrate deeper energy measures into depreciation reports and building enclosure rehabilitation** – A depreciation report help strata corporations plan for the repair, maintenance and replacement of common property. Strata corporations in British Columbia need to obtain depreciation reports every three years, unless a 75% vote of their strata council opts out of the report. Integrating energy considerations in depreciation reports, and in condominiums' subsequent capital plans, has potential to facilitate deeper energy upgrades.

**Peer examples** – Stratas can be influenced by examples of similar buildings that have improved energy performance, reduced net maintenance fees, and increased value of building.

**Use simple in-suite upgrades to drive deeper upgrade activities** – In-suite upgrade opportunities include low-flow water fixtures, appliances, lighting, and other measures. In-suite programs can serve as a gateway for upgrades to base building systems.

---

<sup>3</sup> Ibid.

## Condominium Upgrade Process

	Current Process	Existing Barriers	Potential Solutions
Opt to Pursue Upgrades	Strata decides to pursue upgrades to address common energy costs	Limited understanding & motivation to pursue energy improvements	Market directly to condos; document & present benefits at strata meetings
	Service provider promotes upgrade opportunities	Little condo-focused programming	Include energy considerations in depreciation reports
	Strata or property manager makes assessment application (Fortis BC)	Low motivation for property manager to organize project	Provide simple in-suite upgrades to jump-start conversations at strata council about deeper upgrades
Energy Assessment	Strata opts to undertake assessments for gas and/or electricity	No multi-fuel assessment provided by existing programs	Provide multi-fuel assessment
Project Development & Approval	Strata/property manager evaluate assessment and decide on appropriate upgrade scope	Limited understanding of upgrade measures Difficulty organizing strata	Provide assistance & capacity building to help interpret assessment & define project scope
Procure Contractor	Strata/property manager procure upgrade contractor	Limited knowledge of upgrade process; limited trust in contractors	Provide assistance & capacity building to help procure contractors
Finance Upgrades	Strata may fund upgrades through reserves, and/or debt/levies	Strata members wary of additional assessments	Document cash-flow implications of decreasing common utility bills, increased upgrade assessments. Connect with potential financiers
Complete Upgrades, Test Out & Commissioning	Upgrades completed Rebate incentives submitted to utilities		Improved commissioning process could strengthen upgrade performance



# Multifamily Rental Housing

## Market description

Richmond has a relatively small stock of multifamily rental housing. According to an inventory of rental housing developed for Metro Vancouver in 2012, there are about 2,259 rental units at 27 purpose-built rental housing properties in the City of Richmond, and approximately half of these properties may be redeveloped in the near term.<sup>4</sup>

## Utility/Provincial Programs

Currently, no multiple fuel assessment program is available in Richmond. Owners and managers of multifamily rental housing may apply to the BC Hydro Power Smart Partner Express and/or various programs offered by Fortis BC.

BC Hydro, Fortis BC and the industry organization Landlord BC recently introduced a pilot Apartment Energy Incentive Pilot (also called the Multi-Unit Residential Buildings Pilot), which is being offered in various local governments. The program offers multiple fuel assessments, and also compensates owners for upgrades made in tenants' suites. Richmond is not currently participating because of its limited stock of rental apartments relative to other municipalities in the region. The program covers both common area and in-suite upgrades. The program may be available in the future.

## Key Barriers

**Split-incentives** – Currently, owners have limited financial incentive to make upgrades for systems where tenants pay the utility bill. Conversely, tenants have limited incentive to conserve energy from sources provided via common areas.

**Limited knowledge of upgrade opportunities** – Owners and managers have limited knowledge of upgrade opportunities.

**Limited access to capital** – Owners may have limited cash on hand for upgrades.

**Hold barriers** – Owners may anticipate selling the property before energy savings pay off efficiency investments. This is especially a barrier in buildings on parcels that may be redeveloped in the near term.

## Key Drivers & Opportunities

**Peer examples** – Owners may have limited cash on hand for upgrades.

---

<sup>4</sup> Coriolis Consulting Corp. 2012. *Metro Vancouver Purpose-Built Rental Housing: Inventory and Risk Analysis*. Prepared for Metro Vancouver.

## Multifamily Rental Upgrade Process

	Current Process	Existing Barriers	Potential Solutions
Opt to Pursue Upgrades	Owner decides to pursue upgrades to address common area & unit energy costs	Limited understanding & motivation to pursue energy improvements Limited marketing to multifamily building owners Owners face split-incentives Low motivation for property manager to organize project	Market directly to owners Include energy considerations in capital planning Provide simple in-suite upgrades to jump-start deeper upgrades
Energy Assessment	Owner opts to undertake assessments for gas and/or electricity	No multi-fuel assessment	Provide multi-fuel assessment
Project Development & Approval	Owner/manager must interpret report Submissions & approval to utilities	Limited understanding of upgrade measures	Provide assistance & capacity building to help interpret assessment & define project scope
Procure Contractor	Owner selects contractor	Limited trust in contractors	Provide assistance & capacity building to help procure contractors
Finance Upgrades	Owner may fund upgrades through reserves, and/or new debt	Owner may face hold barriers, split-incentives	Sponsor in-suite upgrades Consider individual unit metering, with financial protection for tenants Consider financing repayment pass through mechanisms, with financial protection for tenants
Complete Upgrades, Test Out & Commissioning	Upgrades completed Rebate incentives submitted to utilities		Improved commissioning process could strengthen upgrade performance





# City of Richmond

## Report to Committee

**To:** Public Works and Transportation Committee  
**From:** John Irving, P. Eng.  
Director, Engineering  
**Date:** April 3, 2014  
**File:** 10-6000-01/2014-Vol  
01  
**Re:** Richmond's Ecological Network Management Strategy

### Staff Recommendation

That the Ecological Network Management Strategy, as described in the report from the Director, Engineering, titled "Ecological Network Management Strategy – Phase 1" dated April, 2014, be endorsed for the purposes of public consultation.

John Irving, P. Eng.  
Director, Engineering  
(604-276-4140)

Att. 1

REPORT CONCURRENCE		
<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>
Community Social Development	<input checked="" type="checkbox"/>	
Parks Services	<input checked="" type="checkbox"/>	
Policy Planning	<input checked="" type="checkbox"/>	
Development Applications	<input checked="" type="checkbox"/>	
<b>REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE</b>	<b>INITIALS:</b>	<b>APPROVED BY CAO</b>

## Staff Report

### Origin

On November 19, 2012 Council adopted the *Richmond 2041 Official Community Plan (OCP)*. Chapter 9 of the OCP entitled “Island Natural Environment (an Ecological Network Approach)” provides direct support for the development of an Ecological Network in Richmond through Objective 1: “Protect, enhance and expand a diverse, connected and functioning Ecological Network.”

Several policies provide direction to meet this objective including the identification of a framework to better manage the City’s ecological resources and prioritize possible acquisition, enhancement and protection strategies.

The purpose of this report is to present the *Ecological Network Management Strategy (ENMS)* – Phase 1 (Attachment 1) and a recommended public and stakeholder consultation process. In addition, this report directly relates to the achievement of the following Council 2011-2014 Term Goal #8 Sustainability: 8.1 (*Continued implementation of the City’s Sustainability Framework*).

### Analysis

The ENMS – Phase 1 provides a framework for managing and guiding decisions regarding the City-wide system of natural areas in Richmond and the ecosystem services they provide on City, public and private lands. This Strategy, intended to be opportunistic and collaborative, will set out priority areas, initiatives and projects for the on-going and long-term implementation of the Ecological Network (EN). There are many City actions, initiatives and projects currently underway that are supported by a range of regional and City policies, regulations and plans. The Strategy, when completed, will seek to complement, align and, where appropriate, inform the current planning and regulatory context in order to strengthen and enhance Richmond’s natural spaces.

The Phase 1 Strategy was informed by several consultation sessions with staff across City departments. Through these sessions, the following vision for the EN was developed:

*The Ecological Network is the long-term ecological blueprint for the collaborative management and enhancement of the natural and built environments throughout the City, within neighbourhoods, and across land-uses and development types in order to achieve ecologically connected, livable and healthy places in which residents thrive. (Part 3 of the ENMS)*

Four goals for improving and strengthening the EN overtime guide actions identified in the Strategy:

1. Manage and Enhance our Ecological Assets
2. Strengthen City Green Infrastructure (e.g. drainage, flood mitigation, water filtration, erosion and public amenity)
3. Create, Connect and Protect Diverse and Healthy Spaces
4. Engage through Stewardship and Collaboration



The ENMS is presented in three parts:

- Part 1: What is Richmond's Ecological Network;
- Part 2: Mapping Richmond's Ecological Network; and
- Part 3: Vision, Goals and Strategy Areas

#### Part 1: What is Richmond's Ecological Network?

An Ecological Network is an inter-connected system of natural areas across a landscape that is composed of terrestrial, marine shoreline and marine intertidal areas. In Richmond, areas such as the Richmond Nature Park, Terra Nova, Sturgeon Bank, South Arm Islands are all part of an EN. In addition, an EN encompasses Green Infrastructure, the components of the natural and built environment that provide the essential ecosystem services on which the City depends. These ecosystem services include:

- drainage
- erosion protection
- flood mitigation
- water filtration
- habitat
- cultural values
- recreation
- aesthetics

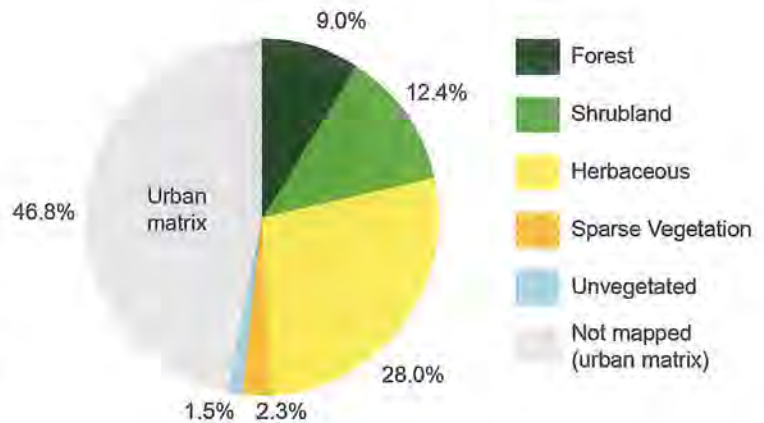
In this manner, an EN consists of all green natural and built features across the City that play a role in delivering ecosystem services.

The Strategy identifies six (6) components that form Richmond's EN:

- **Hubs:** the large natural areas in Richmond (> 10 hectares) that make up the core of the EN
- **Sites:** discrete areas of 0.25 to 10 hectares of natural ecosystems, that provide "stepping stone" connections between hubs
- **Corridors and Connectivity Zones:** linkages between hubs that facilitate the movement of species, water, nutrients, and energy
- **Shoreline and Riparian Areas:** buffers to sensitive watercourses and the edge of the Fraser River. Many also function as wildlife corridors and greenways
- **Parks and Greenways:** most developed parks lack sufficient natural vegetation to be considered hubs or sites, but they still provide ecosystem services and are recognized as high priority sites for various degrees of restoration, especially given that the majority are under City control
- **Matrix:** land lying between the other components of the EN outlined above, encompassing most of the City's land-base, many opportunities exist to restore ecological features and functions through the creation of green infrastructure on this land

## Part 2: Mapping Richmond's Ecological Network

The Strategy includes mapped vegetation distribution, structure, composition and condition from 2009 air photos. A total of 6,841 ha of the City of Richmond's terrestrial land area (inside the high water mark) and another 13,861 ha of its marine and intertidal areas (outside the high water mark) were mapped. Figure 1 identifies vegetation classes and sub-classes.



**Figure 1: Vegetation classes as a percentage of total land area in the City of Richmond (2012)**

Connectivity (the connections between hubs and sites) is key for a robust EN as it ensures that, as in nature, the natural systems within the City remain resilient through movement of biodiversity across the landscape. Two types of connectivity analysis were undertaken to better understand connectivity in Richmond:

1. Corridor Analysis: combined vegetation mapping with existing land use to map how the landscape fosters or impedes the movement of biodiversity, as well to identify potential corridors that could be restored or created through enhancement
2. Circuitscape Analysis: computer modeling based on electrical circuit theory to find the "path of least resistance" between different habitat areas; areas of good habitat represent less resistance to species movement, while those habitats of lower quality represented a higher resistance

These various analyses informed the strategic areas and guided mapping product described in the final part of the EN Management Strategy.

## Part 3: Vision, Goals and Strategy Areas

The vision and goals, described above, informed the EN implementation framework. In order to prioritize and guide future actions, the Implementation Framework includes ten (10) EN strategy areas that were identified based upon vegetation distribution data, land-use, and current and future stewardship and development opportunities. Strategy Areas include:

1. Traditional Neighbourhoods
2. City Centre
3. Agriculture
4. Central Wetlands
5. Industrial
6. West Dike
7. Sea Island YVR
8. Iona + Sea Island Conservation Area (SICA)
9. Wildlife Management Areas (WMA) + Marine
10. Fraser River



The purpose of the Strategy Areas is four-fold:

- To provide an overview of Richmond's current ecological assets;
- To identify and group the key areas of the City in order to focus future specific actions where most appropriate;
- To provide tailored guidance on how the EN can be strengthened by different vegetation and land-use types within the City; and
- To identify the critical issues, key opportunities and stakeholder considerations that pertain to the enhancement and enrichment of the EN in specific areas.

The strategy areas are identified and included on the new map "Ecological Network Strategy Areas Map" (Figure 2).



Figure 2: Ecological Network Strategy Areas. 2014.

### *Focus Areas*

To organize future actions and consultation, six areas of focus are identified for each strategy area. These areas of focus were selected as they represent opportunities for EN application within the City's planning, development, and operational context:

- Rainwater Management/Infrastructure
- Vegetation/Habitat
- Wildlife
- Parks, Open Space, Public Lands
- Private Development
- Stewardship

### *How does the proposed Strategy affect City lands, Private lands and other Public lands?*

- ***City owned lands:*** The ENMS will approach ecological management on City lands through the lens of collaboration and integration. Rather than creating a series of new policy directives and projects, the Strategy will be selectively integrated with those City structures and frameworks that already exist in order to strengthen and inform them according to the Goals of the Strategy. The Strategy will provide a menu of ecological management tools for a variety of City capital and operation projects and processes such as landscape plantings, stormwater management, dike upgrades, park maintenance, ditch maintenance and community stewardship (e.g. Bath Slough Revitalization Initiative).
- ***Private lands:*** The ENMS will approach ecological management on Private lands by assessing and informing existing policies and regulations that speak to ecological management and land-use, yet could be enhanced in terms of evolving green infrastructure technologies and understandings of the natural environment. Exploring the enhancement of existing tools such as the green roof bylaw, the watercourse protection and crossing bylaw and the ecological aspects of the City's various development permit areas could yield City-wide benefits in terms of ecological connectivity, livability, ecological health and more resilient infrastructure.
- ***Other Public lands:*** Though under the jurisdiction of other agencies, collaborative opportunities exist to establish connectivity between City, Private and Public EN lands. The City currently participates as a member of several multi-jurisdictional agencies such as the YVR Environmental Advisory Committee and Metro Vancouver's Regional Planning Advisory Committee. The ENMS provides for the continuation of this type of participation under the lens of ecological connectivity across jurisdictions. Within this approach, the City can collaborate on projects of regional, provincial and federal natures that would not only enhance the ecological management of Public lands in Richmond, but further connected them with those outside of the City. One significant example of this is the City's role in Metro Vancouver's Regional Green Infrastructure Network.



*How does the proposed Strategy affect Environmentally Sensitive Areas?*

The Ecological Network Management Strategy does not change the current administration of the City's designated Environmentally Sensitive Areas (ESAs) as identified in the recently adopted 2041 OCP. This strategy provides opportunities to explore innovative approaches to protection, enhancement and connectivity of ESAs on public and private lands. Examples include: opportunities to establish connectivity with private ESA lands that are contiguous with the Shell Road corridor; establishment of an urban buffer using native vegetation; and invasive species removal projects on public lands, contiguous with ecologically significant City owned lands.

**Public and Stakeholder Consultation**

In order to develop actions that benefit from wide support, a public and stakeholder consultation program is recommended. The proposed program that provides both educational opportunities (e.g. *What is an Ecological Network?*) and seeks input regarding priority actions, initiatives and projects. The program would include the following three engagement techniques:

- **Digital Engagement:** *Let's Talk Richmond* interactive discussion forum and survey (May-August, 2014).
- **Stakeholder Engagement:** Staff will conduct multi-stakeholder focus groups for Strategy Areas, as identified in Part 3 of the Ecological Network Management Strategy – Phase 1. This engagement will include presentations to formal City Liaison and Advisory Committees as well as applicable agency and organization representatives. Suggested stakeholder questions are listed below. (May-September, 2014).
- **Public Engagement:** The public engagement will focus on building community awareness and education for the EN. The events below represent a suite of potential education opportunities. These could occur in concurrence with larger-scale themed events including:
  - Richmond Pecha Kucha Night “Secrets of the Fraser”- May 2, 2014
  - Public Works Open House – May 24, 2014
  - International Biological Diversity Day - May 22, 2014
  - Rivers to Oceans Week – June 8-14, 2014
  - Culture Days – September 26-28, 2014
  - BC Rivers Day- September 28, 2014

In addition, staff will conduct some public engagement as discrete events, or in conjunction with engagement events associated with the Bath Slough Revitalization Initiative, as appropriate. Public and stakeholder engagement is anticipated to take place between May and October 2014, with a report back to Council in the fall of 2014 on the outcomes of these engagement activities and proposed action plan.

The following questions will guide the stakeholder consultation program:

1. What aspects/features of Richmond's natural landscape/environment/wildlife do you like the most?
2. How would you improve Richmond's natural environment? Are there specific changes you would like to see in the environments where you live/work/play?
3. Have you been involved in any stewardship initiatives in the past (e.g. tree planting, river front clean-up)?
  - How can the City help facilitate increased participation in stewardship and/or education from your sector?
  - How would you like to participate?
4. Which would be the most feasible and/or desirable ecological enhancements in your sector and why? (rain gardens/ stormwater management features, green roofs and walls, natural parks, greenways/ shared streets/ trails for cyclists and pedestrians, native plantings, increase in trees, habitat for birds and pollinators, daylighting of sloughs and riparian areas, riverfront naturalization).
5. What are the greatest environmental challenges in your sector? Can natural areas and ecological enhancements serve to remedy some of these?

The following questions will guide the public consultation program:

1. What are your favourite natural places or environmental features (e.g. plants, wildlife, open spaces, etc) in your neighbourhood? In Richmond?
2. Would you be interested in participating in any stewardship projects/ initiatives (e.g. tree planting, riverfront clean-up, invasive species removal)?
  - If so, what types of projects would you be interested in?
  - If not, what would it take to get you involved?
3. What improvements to the natural areas of Richmond have you seen in the past few years? What would you like to see?
4. Is nature in the city important to you? What aspects of nature in the city do you value the most? (habitat, clean water/ air/ soil, trees, natural areas, recreation/ trails, health benefits, beauty/ aesthetics)
5. What is the biggest challenge to natural areas in your neighbourhood? In Richmond? How can the City help address these?



## Financial Impact

None at this time. Potential costs to implement Ecological Network Management Strategy actions would be addressed through staff time (e.g. stewardship outreach and engagement), while other actions (e.g. acquisitions, infrastructure) would be submitted for Council consideration in future budget processes.

## Conclusion

Richmond's 2041 Official Community Plan has provided strong direction to pursue an EN approach for the management of Richmond's ecological resources. While several policies and plans are currently serving to guide this ecological management, the proposed EN Management Strategy – Phase 1 seeks to provide more clarity for how the broad network can be managed for maximum community benefit. The Ecological Network Management Strategy- Phase 1 sets the stage for the development of an action plan in order to fulfill the goals outlined in the Strategy. A key piece of developing this action plan is the consultation with the stakeholders and members of the public associated with each of the 10 strategy areas. Upon review and finalization of the public and stakeholder consultation results a revised Strategy will be forwarded to Council for adoption.



Lesley Douglas, B.Sc. R.P.Bio,  
Manager, Environmental Sustainability  
(604-247-4672)



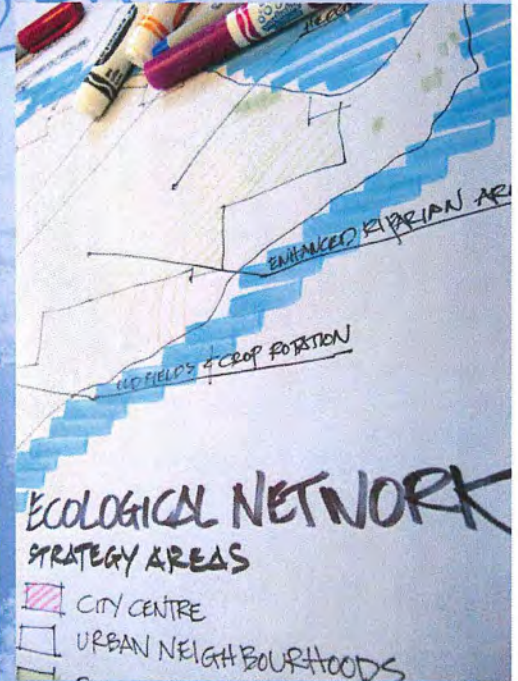
Kaitlin Kazmierowski, M.Sc., MCIP, RPP  
Environmental Coordinator  
(604-247-4661)

KK: ld

Attachment 1 – Richmond's Ecological Network Management Strategy - Phase 1



# Richmond's Ecological Network Management Strategy – Phase 1



April 2014



## Acknowledgements

This document was prepared by the City of Richmond Engineering and Public Works Department - Environmental Sustainability. We would like to acknowledge the contribution of Raincoast Applied Ecology in the development of this report. We would also like to thank the many staff across the City who have provided their insight and expertise into this strategy over the past months.

## Executive Summary

The Ecological Network Management Strategy – Phase 1 provides a framework for managing and guiding decisions regarding the city-wide system of natural areas and the ecosystem services they provide. The Ecological Network (EN) was incorporated into Richmond's Official Community Plan (OCP) in 2012 and is consistent with the draft Metro Vancouver Regional Green Infrastructure Network. The EN is supported by a range of regional and City policies, regulations and plans. It does not aim to create a series of new regulations and policies, but complement and where appropriate, inform the current planning and regulatory context in order to strengthen and enhance the City's natural spaces.

The EN is the inter-connected system of natural areas across Richmond's landscape and is composed of both terrestrial and marine (shoreline and intertidal) areas. In addition, the EN encompasses green infrastructure: the components of the natural and built environment that provide the essential ecosystem services on which the City depends such as drainage, erosion protection, flood mitigation, water filtration, as well as cultural value, recreation and aesthetic beauty. All components of the EN are interconnected components of the same system, linking ecological values and services across the City while creating a unique Richmond identity that links ecology with livability, health, recreation, social and cultural values.

### Vision:

*The Ecological Network is the long-term ecological blueprint for the collaborative management and enhancement of the natural and built environments throughout the City, within neighbourhoods, and across land-uses and development types in order to achieve ecologically connected, livable and healthy places in which residents thrive.*

The EN is composed of five main components: hubs (>10 ha), sites, corridors and connectivity zones, shorelines and riparian areas, and parks and greenways. A quarter of the City's total area, including intertidal and marine areas, is within the EN. Almost two-thirds are large hubs, over half of which are marine and intertidal areas. Most of Richmond's large natural areas (hubs) are either outside of the dike, or within Richmond's Agricultural Land Reserve (approx. 30%). This highlights the importance of collaborative actions with other levels of government to manage the EN.

Four goals were identified for improving and strengthening the EN over time:

- Goal 1: **Manage and Enhance** our Ecological Assets
- Goal 2: **Strengthen** City Infrastructure
- Goal 3: **Create, Connect and Protect** Diverse and Healthy Spaces
- Goal 4: **Engage** through Stewardship and Collaboration

This management strategy and its subsequent phases will be implemented through an opportunistic, integrated and collaborative approach that will maximize current and future land-use and development policies, guidelines, partnerships, City-wide initiatives, and area-specific projects. Plans, projects and processes which collectively implement the EN will demonstrate how this framework for on-the-ground action will be incorporated within the City's planning and development context. Phase 1 of the strategy identifies the key issues, opportunities and stakeholder considerations necessary for a robust consultation process that will ensure a collaborative approach to future implementation.



In consultation with various City departments, ten (10) EN strategy areas were identified based upon vegetation distribution data, land-use, and current and future stewardship and development opportunities:

1. Traditional neighbourhoods
2. City Centre
3. Agriculture
4. Central Wetlands
5. Industrial
6. West Dike
7. Sea Island YVR
8. Iona + Sea Island Conservation Area (SICA)
9. Wildlife Management Areas + Marine
10. Fraser River

The purpose of the strategy areas is four-fold:

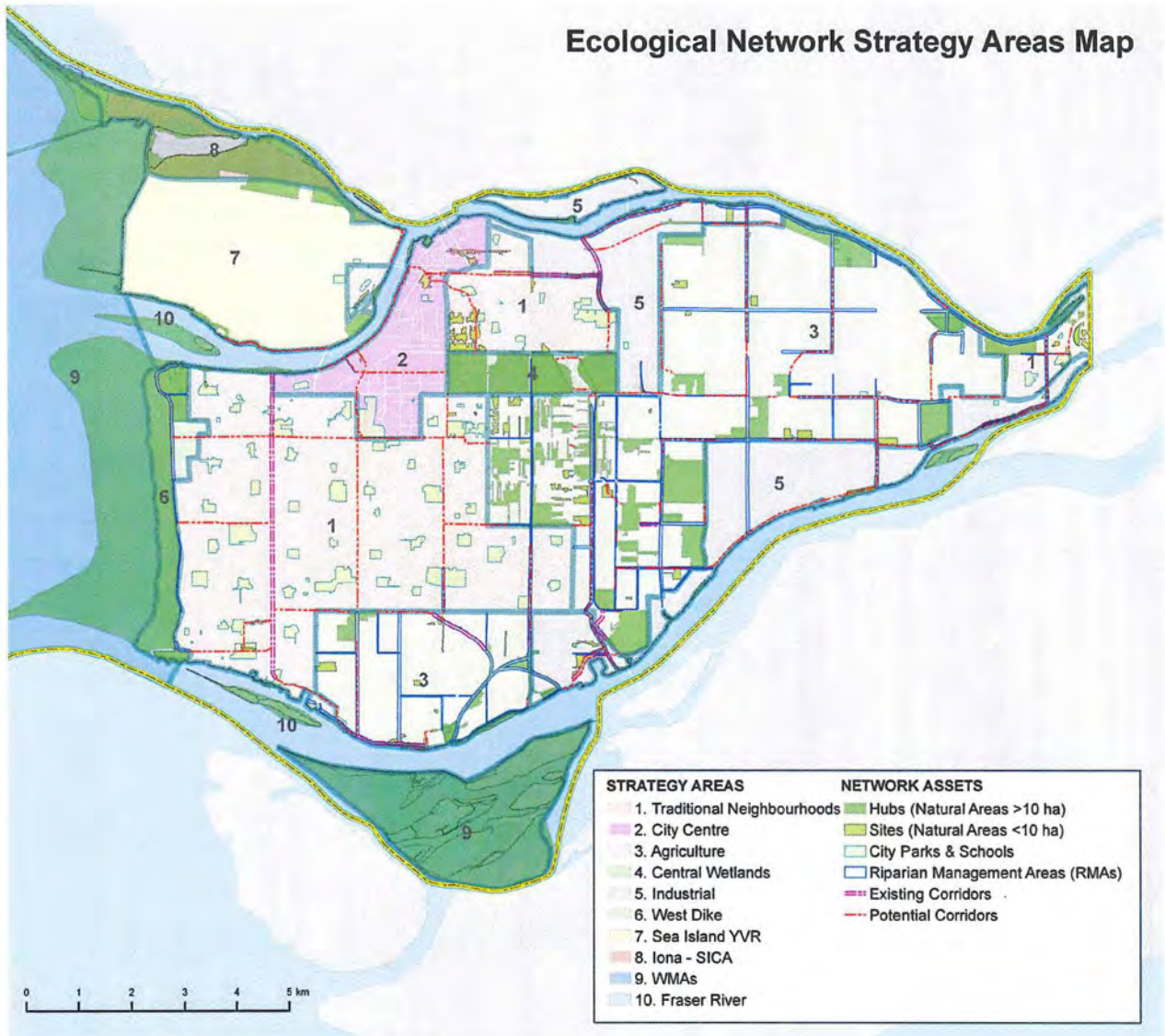
- To provide an overview of Richmond's current ecological assets;
- To identify and group the key areas of the City in order to focus future specific actions where most appropriate;
- To provide tailored guidance on how the EN can be strengthened by different vegetation/ land-use types within the City; and
- To identify the critical issues, key opportunities and stakeholder considerations that pertain to the enhancement and enrichment of the EN in specific areas.

An overview of each area's critical issues, key opportunities and specific stakeholder considerations is included in order to guide the stakeholder and public consultation process that will lead to the development of the second phase of the EN management Strategy; the action plan. To organize future actions and consultation, six areas of focus are identified for each strategy area:

- Rainwater Management/ Infrastructure
- Vegetation/Habitat
- Wildlife
- Parks, Open Space, Public Lands
- Private Development
- Stewardship

These areas of focus were selected as they represent the EN's various areas of application within the City's planning, development, and operational context. These are also the various themes under which future actions can be applied to fulfill the Goals outlined above. Under a framework of Strategy Areas and focus areas, it is clear that the EN has a role to play on public and private lands, in the natural and built environments and as a catalyst for stewardship and community action.

A new map has been developed to guide and support the development of the EN: an Ecological Network Strategies Area Map. This is an on-the-ground guide that not only reflects the current condition of the EN, but identifies priorities in the direction of its long-term evolution via delineation of the 10 strategy areas.



Ecological Network Strategy Areas Map. 2014.

Effective management of Richmond's EN involves protecting and connecting the existing natural areas whenever possible, with incorporating more green infrastructure into developing and redeveloping neighbourhoods. Actions at both the local and City-wide scales are needed to support the EN. This first phase of the Ecological Network Management Strategy provides the context for Richmond's EN, identifies key areas, issues and opportunities within the network and provides guidance on the stakeholder consultation necessary to guide future actions.



# Table of Contents

Executive Summary .....	i
<b>PART 1 – What is Richmond's Ecological Network? .....</b>	<b>1</b>
Introduction .....	1
Purpose and Origin .....	1
Report Structure .....	1
What is an Ecological Network? .....	2
Why an Ecological Network Management Strategy (ENMS) in Richmond? .....	2
What are Ecosystem Services? .....	3
What is Green Infrastructure? .....	4
Components of the Ecological Network.....	6
Planning Context .....	8
Roles and Responsibilities .....	12
Foreshore Jurisdictions .....	13
Importance of Agriculture Lands for the Ecological Network.....	15
<b>PART 2 – Mapping Richmond's Ecological Network .....</b>	<b>19</b>
Overview .....	19
Mapping of Natural and Semi-Natural Vegetation.....	19
Assessing Naturalness .....	22
Identifying the Ecological Network.....	23
Assessing Connectivity within the Ecological Network.....	25
Summary of Richmond's Ecological Network.....	29
<b>PART 3 – Vision, Goals and Strategy Areas .....</b>	<b>35</b>
EN Vision .....	35
Goals .....	35
Implementation Framework .....	36
Ecological Network Strategy Areas .....	37
Strategy Area 1: <b>Traditional Neighbourhood</b> .....	39
Strategy Area 2: <b>City Centre</b> .....	41
Strategy Area 3: <b>Agriculture</b> .....	43
Strategy Area 4: <b>Central Wetlands</b> .....	45
Strategic Area 5: <b>Industrial</b> .....	47
Strategy Area 6: <b>West Dike</b> .....	49
Strategy Area 7: <b>Sea Island – YVR</b> .....	51
Strategy Area 8: <b>Iona – SICA (Sea Island Conservation Area)</b> .....	53
Strategy Area 9: <b>Wildlife Management Areas (WMAs)</b> .....	55
Strategy Area 10: <b>Fraser River</b> .....	57
Next Steps .....	59
Glossary .....	60
References and Resources.....	62
Appendix 1: Ecological Network – Regulatory Context .....	A1-1
Appendix 2: Ecological Network Foundation Maps from the 2041 Official Community Plan .....	A2-1
Appendix 3: Circuitscape Mapping Methodology.....	A3-1



An aerial photograph of a landscape. In the upper half, a river flows through a wooded area. In the lower half, there are large, flat, open fields, possibly agricultural, with some trees and a small body of water or pond visible on the right side.

# PART 1

What is Richmond's  
Ecological Network?





## PART 1 – What is Richmond's Ecological Network?

### Introduction

Richmond's neighbourhoods, parks, schools, and roads are interwoven with our natural landscape. Natural areas like Bath Slough, Terra Nova Rural Park, Iona Beach, and Richmond Nature Park are unique and essential parts of the city's landscape. Richmond's residents have a particularly strong connection to the dike trails, foreshore marshes, cottonwood forests, and sloughs which reflect the city's unique location at the mouth of the Fraser River. This system of natural areas—wetlands, forests, shorelines, and old fields - is the basis of the Ecological Network.

### Purpose and Origin

This report identifies and describes Richmond's Ecological Network (EN), and recommends a vision and goals for ensuring that it is connected, protected and enhanced for the long-term. The EN is a tool for managing the system of natural areas and the ecosystem services they provide. It was incorporated into Richmond's Official Community Plan (OCP) in 2012 via Chapter 9: "Island Natural Environment (an Ecological Network approach)". The OCP directly informs and lays the groundwork for this report via a series of objectives and policies that call for the protection, enhancement and expansion of a diverse, connected and functioning EN. It calls for the identification of an EN to provide an innovative framework for the management of Richmond's ecological resources, and provides direction for the establishment of a meaningful and robust EN through: the prioritization of lands; the establishment of clear goals and objectives for EN expansion; the development of new design objectives, policies, principles and operations; the strategic acquisition of lands within the EN; the updating of Riparian Management Area policy and the continued establishment of partnerships, incentives and programs to improve the EN. Chapter 9 of the OCP also speaks to the promotion of Green Infrastructure and ecosystems services as well as the improvement of water, air and soil quality, the protection of Environmentally Sensitive Areas (ESAs) and the development of partnerships for ecological gain.

The principle underlying the use of the EN is that effective management of ecological systems must occur at the city-wide scale. Richmond's EN encompasses the whole city but emphasizes the importance of large natural areas such as provincial Wildlife Management Areas, regional parks, and private lands with significant natural areas such as large wetlands or old fields.

Effective management of Richmond's EN must also balance the goal of protecting the existing natural areas, while incorporating Green Infrastructure into developing and redeveloping neighbourhoods in order to strengthen the City's infrastructure over time.

As stated in the OCP, there are a variety of ways in which a meaningful and robust EN is established and strengthened over time. This report, a direct result of policies set out in the OCP, provides a starting point for identifying and prioritizing areas and actions to establish and expand the EN as a long-term ecological management strategy for the City of Richmond.

### Report Structure

This report is divided into three parts. Part 1 provides an introduction to Richmond's ecological landscape, provides definitions, and summarizes jurisdictions of land management. It provides the context for the development of Richmond's EN. Part 2 describes and assesses the current state of the EN, providing a picture of what we've got and associated mapping and analysis. Part 3 presents a vision for the future of the EN. It provides a vision and a series of goals for the long-term development and implementation of the EN. In this section a Strategic Areas map is presented as well as the strategic areas of focus and their key issues, opportunities and stakeholder considerations. The appendix in the report provides a detailed description of analysis methods for the Circuitscape Mapping.



## What is an Ecological Network?

The EN is the inter-connected system of natural areas across Richmond's landscape. It is composed of both terrestrial and marine (shoreline and intertidal) areas. It includes prominent natural areas such as Richmond Nature Park, Sturgeon Banks and the South Arm Islands WMAs, as well as larger urban parks, the Fraser River foreshore, watercourses, and riparian areas. It also includes old fields, bog forests, and wetlands found in agricultural areas and other private lands with significant natural areas.

Richmond's EN was identified using a science-based approach to mapping and assessment that recognizes the importance of a system of natural areas for protecting ecological features and functions across landscapes. Identification of the EN is a mapping exercise using Geographic Information Systems (GIS) and the principles of landscape ecology, conservation biology and ecosystem services to identify lands and features most critical to an area's long-term ecological health. The EN approach has been used successfully to identify priorities for environmental management in other jurisdictions at both large (e.g., State of Maryland) and small scales (e.g., City of Edmonton, City of Surrey).

## Why an Ecological Network Management Strategy (ENMS) in Richmond?

The EN is a strategic approach to managing Richmond's natural areas. As in nature, no component of the Network exists in isolation, every piece is connected and exerts impacts and influences on surrounding environments. By managing Richmond's natural areas as components of the same Network, synergies between natural and built environments, policies, regulation, and community vision can be identified and addressed in manners that strengthen the Network and ultimately, the ecological health and livability of City. These synergies extend to reflect community values and support a vision of ecology, health, recreation and resilience thus shaping a unique opportunity for a "made in Richmond" holistic approach to land use and liveability. This approach identifies tools and common goals that are mutually supportive, and builds on and connects existing strategies with emerging priorities.

## What Is The Ecological Network Management Strategy?

The ENMS (Phase 1) is a framework that will lead to the development of an action plan for establishing an inter-connected system of natural areas across the Richmond landscape. It is founded upon a suite of EN fundamentals that prioritize integration with existing City initiatives, processes, policies and projects rather than the initiation of anything new.

- Opportunistic pursuits and results. Building upon what is already happening in the City.
- Consistency, alignment and connectivity with existing City initiatives, processes, policies and projects
- Clarity of context and content. The EN builds upon City initiatives, processes, policies and projects that are already in place. Through the alignment, collaboration and integration of City action, the EN represents an opportunistic pathway forward to establish a pragmatic foundation for the preservation, enhancement and connectivity of ecological lands in Richmond.



Figure 1-1



An important part of Richmond's Ecological Network, intertidal wetlands are critical habitat for juvenile fish migrating from the Fraser River system, provide important waterfowl habitat, protect shorelines from erosion by dissipating wave energy, and capture and store carbon in accumulating sediments.

## What are Ecosystem Services?

Woven into the EN is the emerging concept of ecosystem services. Simply put, ecosystem services are the benefits people obtain from ecosystems<sup>1</sup>. In Richmond, examples of ecosystem services include the storage of rainfall in the pond in Garden City Park during storms, foraging habitat for migrating sandpipers in the intertidal mudflats outside the West Dike, the storage of carbon in thousands of years of accumulating plant material in the bog soils of Richmond Nature Park, and the North-East Bog Forest and the pollination of hundreds of hectares of blueberries by native bees and honeybees. Even the recreational value of parks and greenways is a service provided to the residents of Richmond that helps maintain healthy neighbourhoods and increases the livability and land value of the city. Ecosystem services are enhanced through green infrastructure, the physical components of the natural and built environment that provide these services. Green infrastructure is discussed below.



### Building Ecosystem Services into Parks

The City is incorporating the idea of ecosystem services into the design of Richmond's new municipal parks. The large pond in Garden City Community Park is more than a beautiful part of the park landscape; it also stores and filters runoff from the adjacent neighbourhood. The new park in the Cambie West neighbourhood will also incorporate stormwater wetlands, but also hedgerows to provide habitat for songbirds and pollinators like native bees, and trees for filtering air, intercepting rain, and cooling the surrounding neighbourhood.

<sup>1</sup> "Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth" from Millenium Ecosystem Assessment. Ecosystems and Human Well-being: A Framework for Assessment (2003).



## What is Green Infrastructure?

Like other components of the City's infrastructure such as the network of roads and sewers (often referred to as "grey" infrastructure), green infrastructure also provides essential services on which the city depends. Green infrastructure encompasses the components of the natural and built environment that provide the ecosystem services discussed above. Green infrastructure is complimentary to conventional grey infrastructure and is used to advance the resilience and sustainability of Richmond's infrastructure by employing features inherent to the natural world. Watercourses and wetlands are examples of green infrastructure because they can include both natural and constructed features, provide ecosystem services for drainage, erosion protection, flood storage, and water filtration, but also provide cultural values such as recreation and aesthetic value. Some watercourses in Richmond such as Bath Slough are also important as recreation trails and greenways. Other examples of green infrastructure are the constructed wetland at the Richmond Oval that captures and stores roof runoff, bioengineered shorelines along the Sea Island dike, the Railway Greenway which incorporates stormwater wetlands, hedgerows and trees for wildlife habitat, and the large stormwater wetland in Garden City Community Park. Figure 1-2 provides photos of different GI features in Richmond's landscape. Richmond's Green Roof Bylaw and the developing Integrated Rainwater Resource Management Strategy support the development of green infrastructure.



Figure 1-2



Large stormwater pond in Garden City Community Park stores runoff from the surrounding neighbourhood



Diverse hedgerow habitat for birds



Bath Slough Trail and riparian corridor



Community garden for pollinators



Watercourse through agricultural lands

Examples of green infrastructure in the City of Richmond



## Components of the Ecological Network

The EN is composed of five main components that vary in size, condition, and ecological value. Each component is defined below.

**Hubs** include the largest natural areas in Richmond and are generally >10 ha. They are the core of the EN. Hubs are capable of supporting entire and diverse populations of animals and plants and associated ecological functions.

**Sites** are smaller (e.g., 0.25–10 ha), more discrete non-linear areas of natural ecosystems which support smaller or less diverse populations of animals and plants. These lands play an important role in increasing the structural or functional connectivity of the network by providing “stepping stones” as connections between hubs.

**Corridors and Connectivity Zones** provide linkages between hubs that facilitate movement of species, water, nutrients, and energy. Some may be linear corridors that are largely natural and functioning. Others may be zones of connectivity where there is not a single defined route.

**Shoreline and Riparian Areas** provide important buffers to sensitive watercourses and the edge of the Fraser River. These ecosystems are included as part of the EN in recognition of their important role in protecting the function of adjacent aquatic ecosystems. Many shoreline and riparian areas are linear in form and also function as wildlife corridors or greenways.

**Parks and Greenways** often range widely in their naturalness and ecological function. However, as most are under City control, these public lands represent some of the best opportunities for future City-led ecological restoration or enhancement projects. Most developed parks lack sufficient natural vegetation to be considered hubs or sites, but they still provide ecosystem services and are recognized as high priority sites for various degrees of restoration.

**Matrix** is the remainder of the land between the hubs, corridors, and other components of the EN. The Matrix is important because it encompasses most of the land base in the City. It includes many smaller ecological features (see Figure 1-3) and also provides many opportunities to restore ecological features and functions through restoration measures and the creation of green infrastructure. The matrix can contribute to the overall function and health of the EN.



### Greenways for People and Wildlife: Railway Avenue Greenway

By 2016, the Railway Greenway will provide an ecological connection from the Middle Arm of the Fraser River to Steveston, through the heart of Richmond's residential neighbourhoods. Commuters, dog walkers, recreational cyclists, and visitors to Richmond will have a safe, fast, and interesting route through the city. It is anticipated that as the greenway develops, a number of Green Infrastructure components will be implemented, making this an ecologically functional link between the Middle and South Arms of the Fraser River.



Figure 1-3



This semi-natural area in the Bridgeport area is characteristic of many remnant natural areas in the developed part of Richmond's urban Matrix. It is ecologically valuable for songbirds and other urban wildlife species, and contains a small ditched watercourse. There are a variety of opportunities for improving ecological values in the area using green infrastructure approaches: watercourse or wetland creation, tree planting, and invasive species control. Many of these opportunities could be incorporated into the development process.

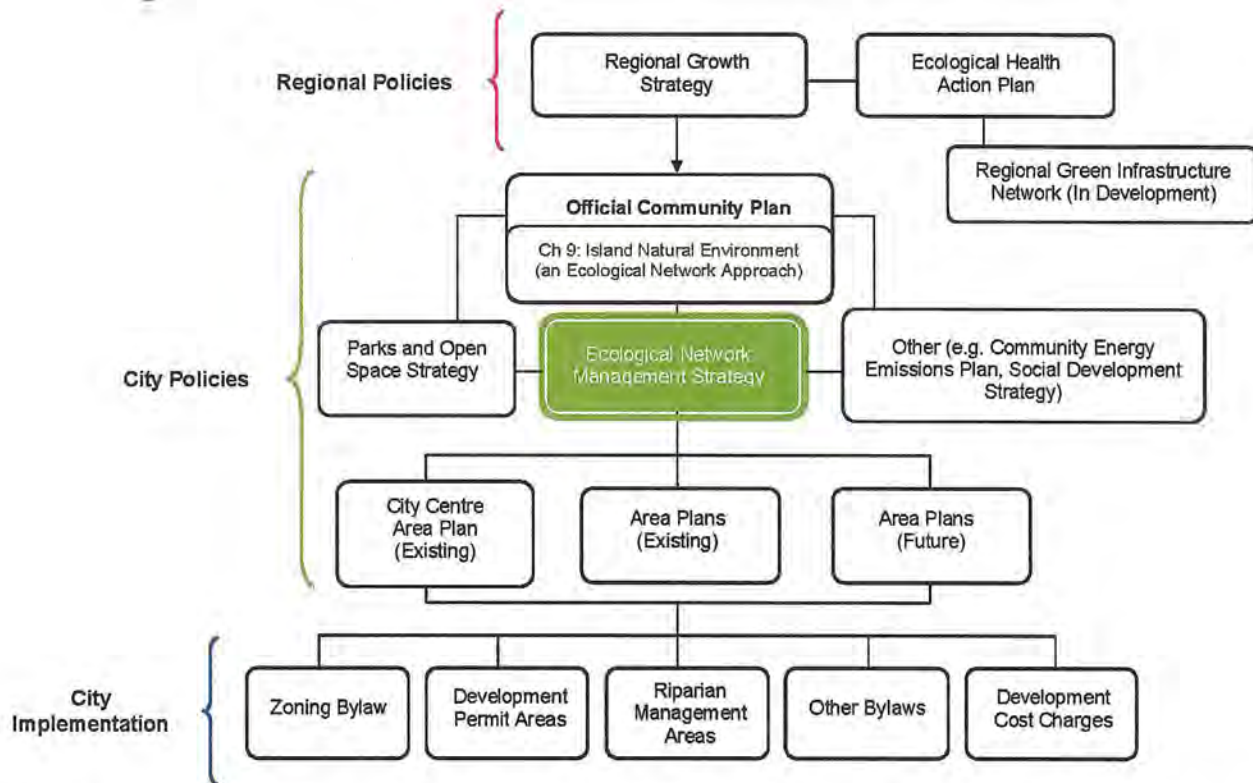


#### **Lansdowne Road Transformation Strategy: High Street Urban Ecology**

A portion of Lansdowne Road was identified in the City Center Area Plan as a key location for a future linear park. The subject area, linking Lansdowne Skytrain station with the Richmond Oval and the Fraser River beyond, is rapidly re-developing from a predominantly industrial area to mixed-use residential neighbourhood with an "art walk" theme. The transformation strategy, currently being developed, has established that the street will be an ecological corridor and seeks to infuse this emerging active transportation corridor with green infrastructure, reflecting its urban context. The use of native plants, constructed wetlands, water features and the capture of rainwater from the roofs and walls of buildings will be used to create a connected urban oasis for residents, a pollinator pathway for insects, and habitat for local wildlife. The fusion of ecology and public art will also be reflected in the construction of these elements in order to broaden the public's understanding of how Green Infrastructure can be used to create community and reflect neighbourhood character.



## Planning Context



The EN approach is currently supported by a range of regional and City policies, regulations and plans outlined briefly below and in more detail in Appendix 1. The EN does not aim to create a series of new regulations and policies, but compliment and where appropriate, inform the current planning and regulatory context in order to strengthen and enhance the City's natural spaces; a goal identified and endorsed by the City in a variety of contexts.

### The Planning Context and Regulatory Framework

#### 2040 Regional Growth Strategy (RGS) (Metro Vancouver)

Guiding sustainable growth in the region, the goals of the RGS must be included in each municipality's Official Community Plan. Goal 3 of the RGS ("Protect the Environment and Respond to Climate Change") contains several strategies that support the EN including the protection and enhancement of natural features and their connectivity.

#### Ecological Health Action Plan (Metro Vancouver)

Metro Vancouver's Ecological Health Action Plan describes how ecological health is incorporated into Metro Vancouver's plans and operations, and proposes 12 projects with associated action items that can be implemented in the next two to five years. Advancing a Regional Green Infrastructure Network in collaboration with regional stakeholders is one of the Action Plan's main projects and is currently in development (see Figure 1-4). This directly supports the EN and provides a unique opportunity for Richmond to serve a role as a key stakeholder in shaping the Regional Network.

### Richmond Council Term Goals (2011-2014)

In addition to the Richmond Council Term Goals associated directly with sustainability, several other goals support component and objectives of the EN including the encouragement of volunteer programs, the creation of urban environments that support wellness and physical activity, and the continuing development of the City's parks and trails system.

### Official Community Plan (OCP)

The OCP guides the City's growth and development through land use designation, policies, guidelines and targets. Chapter 9: Island Natural Environment, establishes guiding policies for the EN and the Green Infrastructure Network. In addition, policies supporting the EN or components thereof can be found in the Open Space and Public Realm section, the Sustainable Infrastructure and Resources section, the Agriculture and Food section and the Climate Change Response section.

### Development Permit Areas (DPA)

Chapter 14 of the OCP contains DP guidelines for five types of environmentally sensitive areas, thus contributing to the quality of ecosystems in the EN. In addition to these, general DP guidelines and those pertaining to various forms of multi-family development often contain provisions relating to vegetation/ tree retention, rainwater collection, stormwater management and forms of green infrastructure.

### Zoning

Bylaw 8500 defines watercourses, parks and landscaping. Watercourse setbacks are not included in the zoning bylaw, however, City parks are permitted in all zones.

### Area Plans

Most area plans refer to the OCP provisions regarding the natural environment. Some plans for neighbourhoods which contain major EN hubs (e.g., the East Cambie plan) contain specific policies regarding natural open space or DP guidelines that incorporate planting configurations and vegetation species that would increase biodiversity (e.g., Blundell Area East Livingston).

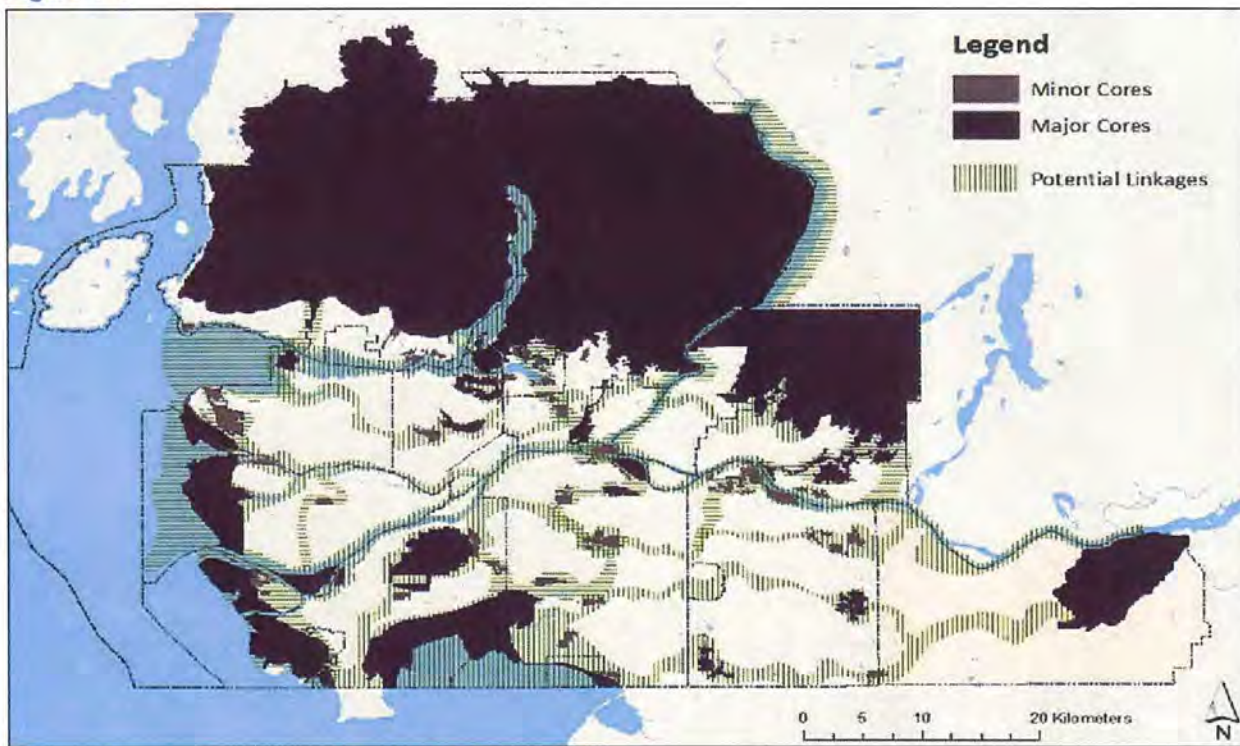


### Hamilton Area Plan: Integrating Ecological Connections into a Neighbourhood Plan

The update of the Hamilton Area Plan was approved in February of 2014. The update provides an opportunity to improve the Queen Canal Greenway via future development. A concept strongly supported through the public consultation process, improvements to the canal would not only contribute to rainwater management and an important trail and natural amenity space, but would serve as an ecological connection between the North and South arms of the Fraser River. The Area Plan update also seeks to create a high street that will integrate creative storm water management systems with pedestrian-friendly mixed-use development. This concept proposes the use of bioswales, rain gardens and engineered wetlands; a true example of green infrastructure improvements being planned for early within a redeveloping neighbourhood.



Figure 1-4



Draft Regional Green Infrastructure Map (Source: Metro Vancouver Draft Strategy Guide for a Regional Green Infrastructure Network, 2013).

### City Centre Area Plan (CCAP)

The CCAP contains a section for Ecology and Adaptability that contains policies supporting interconnected ecological services, green infrastructure opportunities and public education. The Parks and Open Space section of the CCAP speaks to the EN through policies supportive of the integration of ecological zones and greenways into the City Centre.

### Bylaws

While there is no bylaw that specifically addresses the EN, there are several bylaws that support the maintenance and protection of various EN components including the Tree Protection Bylaw, the Pesticide Use Control Bylaw, the Pollution Prevention Bylaw and the Watercourse Protection and Crossing Bylaw (see Appendix for a full list).

### Environmentally Sensitive Area (ESA) Management Strategy

Completed in June 2012 the ESA management strategy introduced the EN concept and served as a guiding document to update the ESA Development Permit guidelines for the recent Richmond 2041 OCP update.

### Riparian Management Areas (RMAs)

In response to Provincial legislation, the City has delineated 5 or 15 metre setbacks from the top of bank of certain watercourses throughout Richmond. No buildings, structures or surface treatments are permitted within the setback, however planting of native species is encouraged. The RMA is currently not supported through Bylaws or Development Permits.

## **2022 Parks and Open Space Strategy (POSS) & Garden City Lands**

The recently adopted 2022 Parks and Open Space Strategy is comprised of seven focus areas, each containing several outcome statements. Each focus area speaks to and supports various facets and components of the EN, with the "Green Network" focus area speaking specifically to the parks and open spaces system contributing significantly to the conservation and enhancement of the EN. This focus area contains three Outcomes, each with associated priority actions, programs and initiatives that support the EN:

1. Nature and natural areas are recognized as fundamental building blocks of a livable and healthy city.
2. The parks and open spaces system includes a range of green spaces that support recreation, social interaction and psychological and spiritual renewal.
3. The parks and open spaces system contributes significantly to the health of the EN.

This final outcome also includes an action to develop park natural areas protection and management guidelines to direct the protection and maintenance of the City's natural areas based on the recommendations of the 2012 ESA Management Strategy. This would ensure that sensitive ecological areas in parks remain protected and managed.

The status of the Garden City Lands will be governed by Council direction of the upcoming Garden City Lands Legacy Landscape Plan. This plan, once approved, will direct the intent for these lands for the future, including EN considerations for the site.

## **Sustainability Framework (In Development)**

The Sustainability Framework is the City of Richmond's high level strategic plan to guide development into a more socially, economically and environmentally sustainable community over the coming decades. The Sustainability Framework defines the characteristics of a more sustainable Richmond; articulates how the City and other partners will pursue a sustainable community; and establishes how we will track our progress towards sustainability. The EN is a key strategy within Richmond's Sustainability Framework.

## **Integrated Rainwater Resources Management Strategy (IRRMS—In Development)**

As a member of the Greater Vancouver Sewerage and Drainage District, Richmond has committed to the stormwater management requirements of the 2010 Metro Vancouver Integrated Liquid Waste Resource Management Plan. The IRRMS will fulfil these commitments and focuses on strategies for utilizing the resources contained in traditional waste streams such as the efficient use of energy, drinking water, nutrients in sewage and the re-use of rainwater after it falls on buildings and the ground. The strategy directly references the EN in its third objective, "Maintain the ecological health of existing habitat areas and provide enhancement opportunities to improve the City's ecological network". It provides recommendations for green infrastructure and habitat enhancements for a variety of land-use types across the City. Moreover, these recommendations focus on many of the challenges the EN seeks to address including decreasing water quality and habitat quality, increase in impervious coverage of new developments, bank erosion and slumping and strengthening infrastructure through the enhancement of green infrastructure measures that increase ecosystem services.

## **Social Development Strategy (2013-2022)**

Richmond's Social Development Strategy was adopted by Council in 2013 and guides decisions and resource allocations on social development matters over the next 10 years. While the strategy does not directly reference the EN, it speaks to the synergies between social development, sustainability, health and creating community partnerships; many of these themes are reflected in the EN and play an important role in creating the healthy ecological communities that increased livability.

## **Dike Master Plan (DMP)**

In response to rising sea levels, the Dike Master Plan (DMP) identifies future dike alignments and flood protection concepts for a 100 year planning horizon. Phase one of the DMP considered the Southern West Dike and the Steveston area, and its recommendations were endorsed by Council in April of 2013. Five strategic directions inform this plan:



1. Working Together
2. Amenities and Legacy
3. Thriving Ecosystems
4. Economic Vitality
5. Responding to Climate Change and Natural Hazards

The plan identifies the creation of a new primary dike alignment using Steveston Island and identifies the potential to create offshore wave mitigating barrier islands along Sturgeon Bank. Both of the concepts have the potential to create large areas of new intertidal and marsh habitat.

### Partners for Beautification

The Partners for Beautification (PFB) program provides opportunities for local residents or groups to “adopt” various components of the City (street, garden, park, tree, trail, portion of the dike, or an Environmentally Sensitive Area) in order to enhance its ecological, recreational and social function as well as build a sense of stewardship and awareness within the community. The Partners for Beautification is facilitated through the Parks Department. Its framework can synergistically support increasing community stewardship, awareness and sense of ownership over the protection and management of the EN.

## Roles and Responsibilities

Responsibility for managing Richmond's EN is shared by several levels of government, First Nations, private citizens, landowners, and stewardship groups. Table 1-1 on the following page summarizes the different roles government, stewardship groups, and others play in the management of the EN.

**Table 1-1: Organizations and Other Groups Involved in the Management of Richmond's Ecological Network**

Component	Roles and Responsibilities
City of Richmond	City of Richmond is responsible for planning and regulating land use including enacting an Official Community Plan (OCP), zoning, regulating land use and buildings, and designating parks and other amenities. Richmond uses Development Permit Areas to protect the natural environment, as well as a Tree Protection Bylaw, a Riparian Management Areas Strategy, and the Parks and Open Spaces Strategy (see Planning Context in Part 3 of this report).
Federal Government	Federal Government has a diverse role in environmental management including fish, species at risk, and migratory birds. Fisheries and Oceans Canada manages fish and fish habitat, including the foreshore of the Fraser River and some inland watercourses. Species at risk are protected by the Species at Risk Act (SARA).
Provincial Government	Provincial Government is responsible for the management of water, wildlife, contaminated sites, and other issues related to maintaining a healthy environment. The BC Ministry of Environment is responsible for the regulation of watercourses and riparian areas through the Water Act and Fish Protection Act (Riparian Areas Regulation). The Ministry of Environment manages the Sturgeon Bank and South Arm Islands Wildlife Management Areas. The Provincial Inspector of Dikes oversees dike maintenance and construction.
First Nations	First Nations have been using Richmond for over 5000 years. The Musqueam First Nation has a small undeveloped reserve on Sea Island, and is resolving land claims within an area that encompasses Richmond.



Component	Roles and Responsibilities
Metro Vancouver Regional District	MV Regional District plays a supporting role in the management of the EN. Its recent "Ecological Health Action Plan" describes a green infrastructure approach and it recently completed a Sensitive Ecosystem Inventory. The Integrated Liquid Waste and Resource Management Plan guides stormwater management. Metro Vancouver Parks manages Iona Beach Regional Park and Don and Lion islands in the Fraser River.
Port Metro Vancouver	Port Metro Vancouver, a corporation established by the Government of Canada in January 2008, owns and manages land and water-based transportation and industrial lands throughout the region, including areas south of No. 8 Road in south Richmond. It has a variety of environmental management policies and programs including the management of some of the roles associated with the now disbanded Fraser River Estuary Management Program (FREMP).
Vancouver International Airport	The Vancouver International Airport (YVR) is owned by Transport Canada. Most of its land base is developed and YVR has environmental management initiatives and policies to manage lands with ecological values.
Private Landowners	Most lands in Richmond are privately owned and include residential areas, commercial and industrial lands, and agricultural lands. Private landowners have a critical role in protecting ecological values in the EN avoiding development in sensitive areas and managing stormwater runoff and water and soil quality.
Farmers	Farmers play an essential role in the management of the EN, and given that roughly 38% of Richmond's land area is within the Agricultural Land Reserve, farming practices influence ecosystem performance and resilience.
Land Stewards	Groups and individuals involved in volunteer-based stewardship of parks and other natural areas play a critical part of the management of the EN. They support restoration and management projects, monitor ecological health, and raise the profile of natural areas conservation.



#### Grauer Lands: Land Acquisition and Partnerships for Stewardship

In 2012, the City of Richmond, in partnership with Ducks Unlimited Canada purchased the largest remaining privately owned land along the Sturgeon Banks. The 51 hectare area is comprised of tidal wetlands, significant for millions of migrating birds, and habitat that plays a crucial role in the life cycle of all five Pacific salmon species as well as Sturgeon, flounder and numerous estuarine species. This partnership represents an important opportunity for Richmond's Ecological Network as it not only secures privately-owned intertidal lands for ecological conservation, but also supports the connection to nearby trails, ensuring that the public will continue to experience the benefits of Richmond's foreshore natural ecology first-hand and inspire further stewardship actions and initiatives.

## Foreshore Jurisdictions

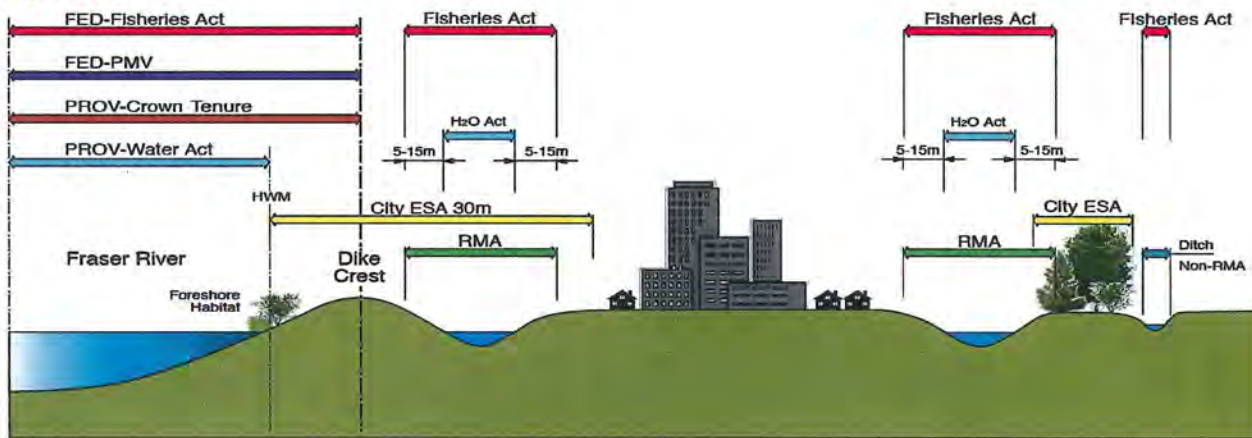
The foreshore for the Fraser River and the West Dike is jurisdictionally complex. Key components that influence the management of the EN are summarized below:

- The foreshore and sea- or river-bed outside Richmond's perimeter dike and below the high water mark (under the Land Act referred to as "natural boundary") is owned by the Province of BC (Crown).



- The public is able to use the foreshore; however, this only includes limited rights including navigation, anchoring, mooring, and fishing.
- The Province of BC grants leases for shellfish aquaculture, log storage, moorage, and other activities. It is also responsible for dike management.
- BC's Provincial Inspector of Dikes is responsible for the general supervision of dike maintenance and construction to protect public safety. However, local dikeing authorities, such as the City of Richmond, are responsible for dike operation and maintenance activities that include inspection and emergency response.
- The federal government owns and manages the water column and is responsible for the management of fish habitat (through Fisheries and Oceans Canada) and navigation (through Transport Canada).
- Port Metro Vancouver regulates marine traffic, owns and manages industrial and port-related lands, and coordinates environmental assessments of foreshore development within its jurisdiction.

Figure 1-5



Foreshore Jurisdiction in Richmond

## Importance of Agriculture Lands for the Ecological Network

Richmond's agricultural lands play a critical role in maintaining the City's environmental values and ecosystem services. Not only are they essential for food production and provide most of the City's green space, but over 30% of EN lands identified by this study are within the Agricultural Land Reserve. These areas include cultivated and natural wetlands, bog forest, remnant forest patches, and old fields. While some of these ecosystems are predominantly natural, most are the result of previous or current agricultural practices. Figure 1-6 depicts the significant role that old field sites play within a mosaic of land-uses in Richmond.



The City of Richmond recognizes the importance of farming. Farmers need to cultivate their lands to be successful, and they face many obstacles to be economically viable, often with few options to avoid farming in ecologically important areas. Examples of farming operations that protect and respect ecological areas and their beneficial services include maintaining headlands and hedgerows to protect habitat, apiculture (bee hives for honey and pollination purposes), the preservation of riparian setbacks around watercourses, and controlling runoff. Farmers often understand the ecological benefits of sound farming practices as they too benefit from clean water, unpolluted soils, and clean air. The Environmental Farm Plan Program (managed by the BC Agriculture Research & Development Corporation) is one way in which farmers can be supported in improving the ecological sustainability of their farming operations.

### Delta Farmland and Wildlife Trust

The Delta Farmland and Wildlife Trust (DF&WT) is a non-profit organization that promotes the preservation of farmland and wildlife habitat through co-operative land stewardship with local farmers in the lower Fraser River delta. Each year the Trust provides local farmers with \$325,000 of cost-sharing funding through stewardship programs including the Grass-land Set-aside Program, the Winter Cover Crop Stewardship Program and the Hedgerow & Grass Margin Stewardship Programs. These programs provide farmers with tools and finances to enhance and sustain the natural areas on their properties that serve as habitat for beneficial insects, birds and wildlife, as windbreaks, as shade for livestock and for erosion control. Fostering these relationships with local farmers is key to ensuring a connected and thriving ecological network where the natural and working landscapes co-exist and support each other.

Complimenting the ecological role of agricultural lands but at a much smaller and often more urban scale, community gardens provide opportunities to integrate food growing into a variety of areas. Community gardens have a range of benefits beyond food production, including recreation and pollinator and songbird habitat. They can also be used to restore green space in brownfield sites.



Figure 1-6



Example of land use mosaic in south Richmond near Highway 1 and the Deas Island Tunnel. Industrial port development is visible along the river and two areas of agricultural old fields (shown as hubs in red) are located in the centre of the photo. Light industry is found on the western (left) flank and a small amount of single family residential occurs on the upper left.





# PART 2

## Mapping Richmond's Ecological Network





## PART 2 – Mapping Richmond's Ecological Network

### Overview

Richmond's EN was identified using a science-based approach to mapping natural and semi-natural vegetation, assessing the size, distribution, and relative value of natural habitats, and examining the potential connections between them. Vegetation was used as the primary indicator of ecological value and function because it is easily mapped from air photos, and its structure, composition, and condition can be used as a surrogate for a broad range of ecological values including biodiversity. A summary of analysis methods are provided in this section. The resultant maps for this Strategy build upon the mapping developed for the EN in the 2041 Official Community Plan (both found in Appendix 2 of this report). These include the EN Management Map (page 9-3 in OCP) and the ESA Development Permit Type Map (page 14-81 in the OCP). Note: The EN mapping undertaken for this Strategy includes the Garden City Lands. All future initiatives for the CGL will ensue in accordance with the *Garden City Lands Landscape Legacy Plan*.

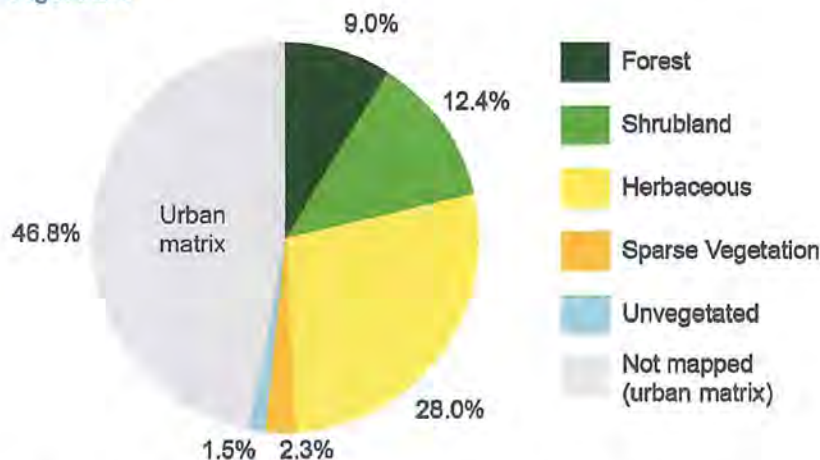
### Mapping of Natural and Semi-Natural Vegetation

Natural and semi-natural vegetation in the City of Richmond was mapped using spring 2009 air photos. Vegetation was divided into five structural classes, and more detailed attributes based on vegetation structure and composition were assigned to each vegetation unit (see Table 2-1 for classification details and Figure 2-3 for examples). Larger wetlands, agricultural fields, and developed vegetation types such as lawns and gardens were also mapped. A limited field review was conducted to verify the accuracy of vegetation mapping.

Key results of the vegetation assessment are summarized in Figure 2-1 and the points below.

- A total of 6,841 ha of the City of Richmond's terrestrial land area (inside the high water mark) and another 13,861 ha of its marine and intertidal areas (outside the high water mark) were mapped as part of the study. Figure 2-2 summarizes the extent of different vegetation classes in Richmond.
- About 9% of Richmond is forested. Forested plant communities include bog forests composed primarily of shore pine and birch, mature black cottonwood stands along ditches and the banks of the Fraser River, and red alder stands which have regenerated in areas that were previously cleared. Some areas identified as forest are made up of planted ornamental trees and have low naturalness value.

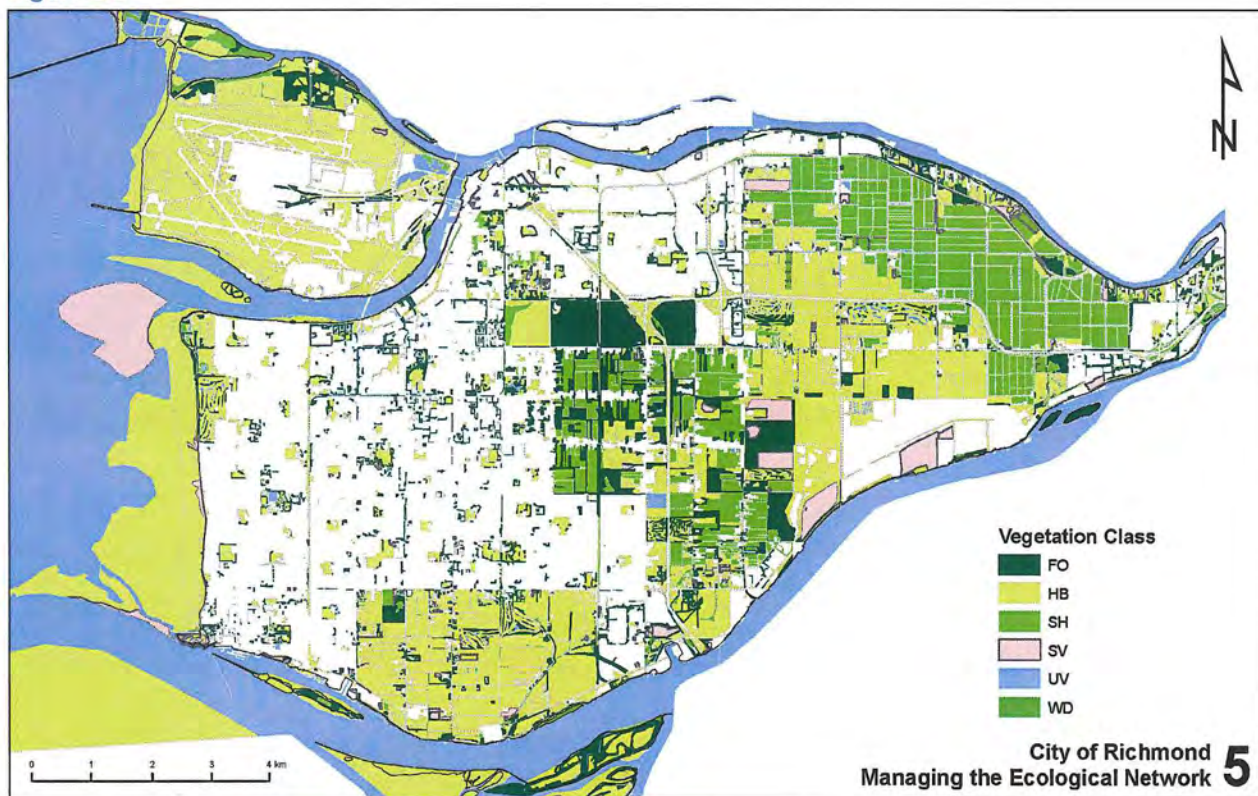
Figure 2-1



Vegetation classes as a percentage of total land area within the City of Richmond.



Figure 2-2



Vegetation mapping for City of Richmond showing the distribution of natural and semi-natural vegetation by class. 2012.

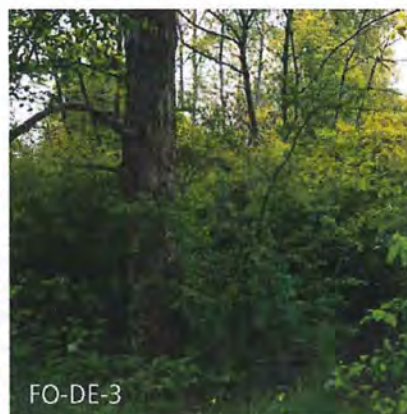
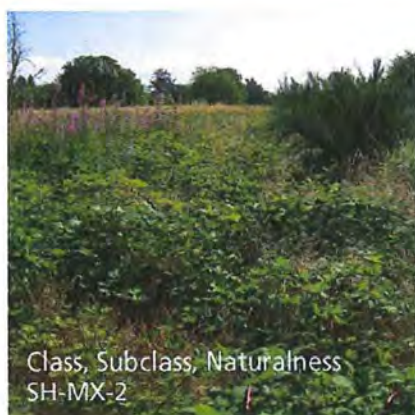
Table 2-1: Vegetation Classes and Subclasses

Class	Subclass
Forest (FO)	Evergreen Forest (FO-EV) Deciduous Forest (FO-DE) Mixed Evergreen-Deciduous Forest (FO-MX)
Shrubland (SH)	Evergreen Shrubland (SH-EV) Deciduous Shrubland (SH-DE) Mixed Evergreen-Deciduous Shrubland (SH-MX)
Herbaceous (HB)	Perennial Graminoid Vegetation (HB-GR) Hydromorphic Rooted Vegetation (HB-HY) Annual Graminoid or Forb Vegetation (HB-AN)
Sparse Vegetation (SV)	Boulder, Cobble, Gravel, Sparse Vegetation (SV-BO) Unconsolidated Material Sparse Vegetation (SV-UC)
Unvegetated (UV)	Unvegetated Unconsolidated Material (UV-UC) Unvegetated Water (UV-WA)



**Table 2-2: Naturalness Values for Richmond's Vegetation**

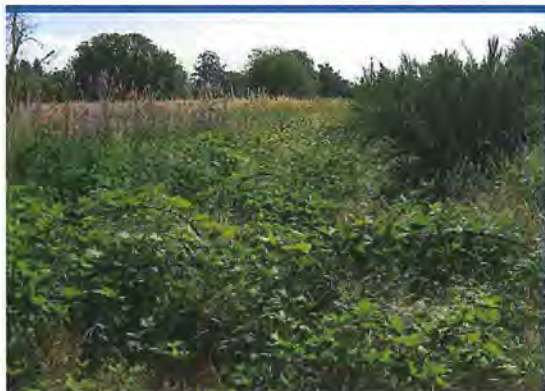
Naturalness	Definition
5. Natural	Undisturbed by direct human activity.
4. Mainly Natural	Disturbed historically (logged) by sufficient time to restore native species and structure.
3. Semi-natural	Disturbed vegetation; predominantly native species but lacking some species and structures associated with natural vegetation.
2. Altered	Heavily disturbed vegetation that is often a mix of native and non-native species; may be recovering or rapidly changing.
1. Cultural	Vegetation that is regularly maintained.



- Herbaceous vegetation is the dominant vegetation class in Richmond, covering 28% of Richmond's land area. Most of the herbaceous cover is comprised of agricultural fields, rough grass areas that are not actively cultivated, and playing fields and lawn areas in parks. Old fields (abandoned or fallow agricultural lands with a mix of grass and shrub vegetation) are also present.
- Shrub cover accounts for another 12% of Richmond's vegetation. This includes shrub communities in bogs (composed of Labrador tea, bog blueberry, and salal), agricultural fields in cranberry or blueberry production, hardhack and willow thickets in moist sites (such as along watercourses), and areas of Himalayan blackberry and other predominantly non-native shrubs along ditches, railway rights-of-way, roadsides, fence lines, and field margins.



- Only a small area of Richmond's land area (approximately 4%), is covered by sparse vegetation or is unvegetated. Sparse vegetation includes habitats like the sand dunes at Iona Beach. In contrast, 90% of intertidal and marine areas are either sparsely vegetated (e.g., mudflats) or unvegetated (mostly river channel). More natural sparsely vegetated sites include beaches and mudflats while less natural sites include dyke faces and recently cleared development sites.



#### **Old Fields: An Important Part of Richmond's Ecological Network**

The South Coast Conservation Program identified "old fields" as an important ecosystem for biodiversity in the Lower Fraser Valley. Old fields are abandoned or long-term fallow agricultural lands dominated by grasses and shrub species (often forming hedgerows and thickets). They are similar to historic natural prairie, grassland and estuarine salt marsh communities which once had a wider distribution on the South Coast. Richmond's old fields provide habitat for small mammals such as voles on which barn owls and other owls and hawks depend.

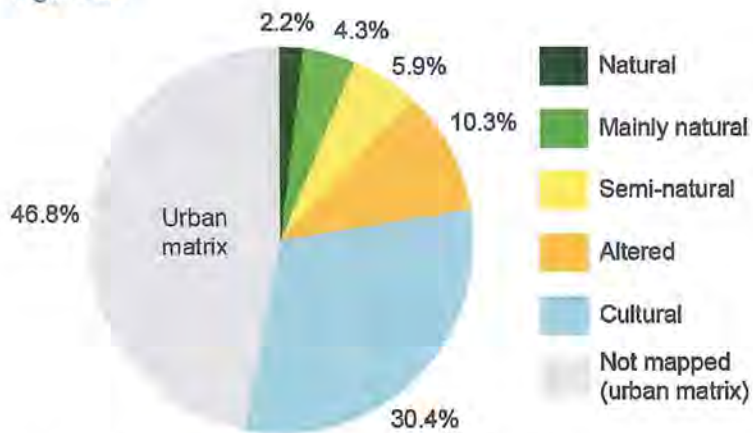
## **Assessing Naturalness**

Vegetation naturalness is an important attribute for assessing ecological function and value, particularly for biodiversity. Naturalness describes how altered a landscape or area is from its natural state. This attribute was assessed on a scale from 1 (least natural) to 5 (most natural) for each unit (see Table 2-2 and Figure 2-3 for examples). For example, maintained non-native shrubs in a landscaped bed in an urban park generally have lower value for biodiversity than native shrub vegetation. Similarly, natural wetland vegetation is indicative of functioning hydrology and water quality relative to constructed landscape ponds without aquatic vegetation.

Key results are shown in Figure 2-4 and described in the following points.

- Of the 20,702 ha of area mapped in Richmond's boundary (land and water), 58% was classified as having some natural characteristics (Naturalness 3, 4, and 5). Only 12% of Richmond's land area has natural or mainly natural characteristics (Naturalness 4 and 5). Most is intertidal wetland, designated as ESA within the OCP.
- Within Richmond's terrestrial land area, approximately:
  - 560 ha (6%) is classified as semi-natural (Naturalness 3);
  - 558 ha (4%) of vegetation is classified as mainly natural (Naturalness 4); and
  - 283 ha (2%) was classified as natural (Naturalness 5).
- Terrestrial areas mapped as mainly natural (Naturalness 4) were predominantly remnant bog forest such as Richmond Nature Park.

Figure 2-4



Naturalness of mapped vegetation as a percentage of total land area within the City of Richmond

- The average naturalness value of Richmond's municipal parks was 1.8 which indicates a general lack of ecological features. Comparatively speaking, this is similar to the park network in the City of Vancouver but lower than City of Surrey.
- Because of Richmond's natural and cultural history (most of Richmond was originally part of the Fraser River delta, and most land was diked to allow for settlement and farming), the only vegetation classified as natural (Naturalness 5) are the foreshore marshes and mudflats on Sturgeon Banks and the western perimeter of Sea Island. Figure 2-4 shows the naturalness values as a proportion of Richmond's land area (including areas not mapped).

## Identifying the Ecological Network

Several analyses using the vegetation mapping, watercourse, shoreline, and park system information were undertaken to identify the components of the EN. The main analysis focused on identifying the largest areas of natural vegetation. These were termed "hubs" because of their essential role in sustaining the EN. Hubs are essential for sustaining urban biodiversity, as well as providing other ecosystem services such as capturing, storing and infiltrating rainfall. Smaller natural areas were called "sites" and connections between EN were called either "corridors" or "connectivity zones" depending on their size and configuration. Shoreline and riparian areas, as well as parks and greenways were added to the EN because of their importance as green space for both biodiversity and people.

### Hubs and Sites

Hubs are areas of vegetation comprised of semi-natural or natural vegetation (naturalness  $\geq 3$ ) and 10 ha in size or greater (see Figure 2-5 for example). Areas that were 10 ha were selected as the size threshold for hubs because they can support populations of many native wildlife species, particularly if there are other natural areas nearby. Sites are areas of semi-natural to natural vegetation (naturalness  $\geq 3$ ) between 0.25 ha and 10 ha in size (see Figure 2-4 for examples).

### Shoreline and Riparian Zones

Shoreline areas (lands within 30 m (landward) of the high water mark) were added to the EN regardless of their land use, vegetation, or naturalness. These areas contribute to the health of the adjacent intertidal zone and provide important habitat for wildlife. Stable shoreline zones help maintain the ecological health of adjacent intertidal marshes and mudflats. They are also important sites to manage during development and redevelopment when ecological features such as riparian vegetation can be protected or restored.

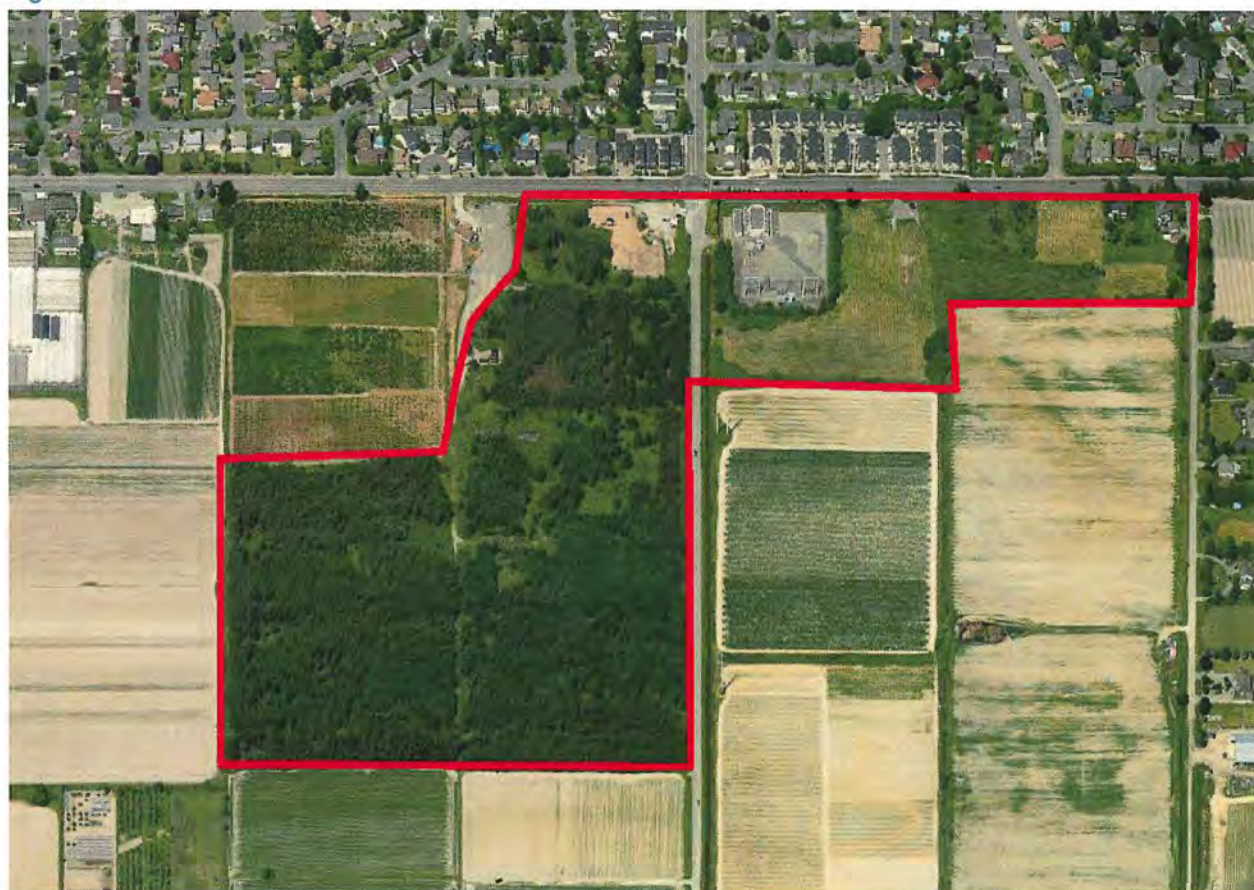


Watercourses and their associated Riparian Management Areas (RMAs; 15 m and 5 m setbacks around selected watercourses in Richmond) are also an important part of Richmond's EN. Riparian areas are recognized as transitional areas between aquatic and terrestrial zones and have a broad range of ecological functions including shading watercourses, filtering runoff, providing nesting and feeding areas for birds and mammals, and acting as wildlife corridors in urban landscapes.

### Parks and Greenways

Public parks and greenways were added to the EN for two reasons. First, they are publically-owned lands which offer opportunities for City-led restoration and enhancement focusing on green infrastructure. The stormwater pond in Garden City Community Park is an example of stormwater-related green infrastructure in an urban park. Second, most of Richmond's public parks and greenways contain only small amounts of natural ecosystems. The City can play a leadership role in EN protection and improvement by further managing some of them for ecological enhancement. Public parks and greenways cover 668 ha, just over 5% of the land area of Richmond. This represents significant opportunity for further hub and site acquisitions and ecological corridor linkages.

**Figure 2-5**



Large Ecological Network Hub (Gilmore-Northwest) in the agricultural area north of Steveston. The 22.9 ha unit encompasses regenerating forest, shrublands, and old fields. While the hub encompasses cultural vegetation, roads, and houses, its large size make it ecologically important.



## Assessing Connectivity within the Ecological Network

Connections between different parts of the EN are essential for creating an inter-connected system. Two complimentary methods were used to assess connectivity within the terrestrial components of the EN: (1) corridor analysis using a landscape impedance model; and (2) landscape permeability using Circuitscape analysis. Both methods assess *potential* areas that allow for the movement of biodiversity through the complex ecological landscape that characterizes Richmond. The main differences are that corridor identification delineates specific routes between each hub in the EN, while the Circuitscape analysis identifies a broader range of routes or movement zones (see Figures 2-7 and 2-8). They are complimentary analyses that assist in understanding how biodiversity may move through the landscape and identifying potential corridors and connectivity zones. It should be noted that both these methods served as tools to aid in understanding the highly complex nature of species movement across a complex landscape; a difficult thing to quantify and display. These connectivity analyses represent one set of tools among several used to develop the EN Assets and Opportunities maps presented in Part 3 of this report; the maps that will serve as guides for future work and enhancements within the EN.



Ecological and recreational connections between east and west components of Richmond Nature Park are reduced by the Highway 99 Corridor (red dashed line).

### What is Connectivity?

"Connectivity" is a way of understanding how wildlife and other parts of the ecosystem are able to move through the landscape. We know that many species—birds, fish, amphibians, and mammals, use different habitats for different parts of their lifecycle. We also know that urban landscapes often have poor connectivity because roads, residential areas, and developed parks create fragmented habitats. Building a functioning Ecological Network means strengthening connections using corridors like streams or greenways.

**Corridor Analysis.** An analysis incorporating the permeability (or, conversely, impedance) of Richmond's landscape for the movement of biodiversity was used to identify potential corridors. Vegetation mapping was combined with existing land use, roads, and other data layers to map how the landscape affects biodiversity movement. The analysis delineated paths offering the least resistance (e.g., preferred land cover types for wildlife species, lowest number of barriers) to wildlife movement between hubs. This initial corridor network was then modified and supplemented by removing corridors that were unlikely to function because of length or habitat quality, adjusting corridors to follow existing greenways and riparian corridors where they were in proximity, and adding new corridors where greenways or riparian corridors have been designated. Potential corridors were classified qualitatively according to their function where:

A **functioning corridor** is a linear area of habitat with continuous or near-continuous natural vegetation cover along its length. This type of corridor offers an existing pathway for wildlife movement between hubs.

An **impaired corridor** has some natural vegetation cover along its length but contains significant gaps that are currently compromising its function as a pathway for wildlife movement between hubs. As a result, actual use of the corridor in its current state may be limited. This type of corridor has a high potential for restoration.



A **non-functioning corridor** has little to no natural vegetation along its length and does not function as pathway for wildlife movement between hubs in its current state. Non-functioning corridors were identified based the corridor analysis and are shown where connectivity would significantly benefit the integrity of the EN but is currently lacking. Larger-scale restoration efforts would be required to restore connectivity in these areas.

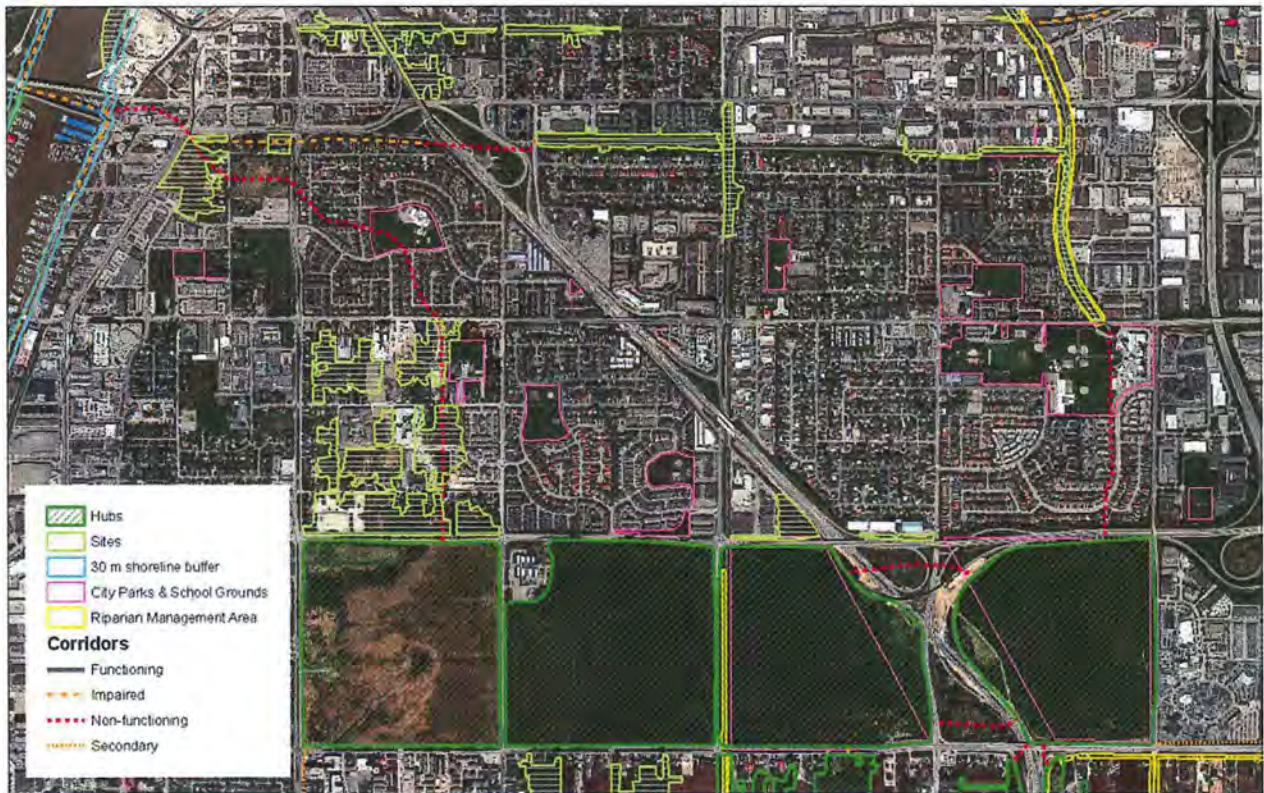
**Figure 2-6**



Examples of corridors and connectivity zones: Bath Slough (left) connects King George Park with the Fraser River through a linear corridor composed of watercourse, shrub and grass areas, and mixed forest. The fairways of Quilchena Golf and Country Club provide a connectivity zone (in orange) which maintains wildlife movement along the West Dike south of Terra Nova Park.



Figure 2-7



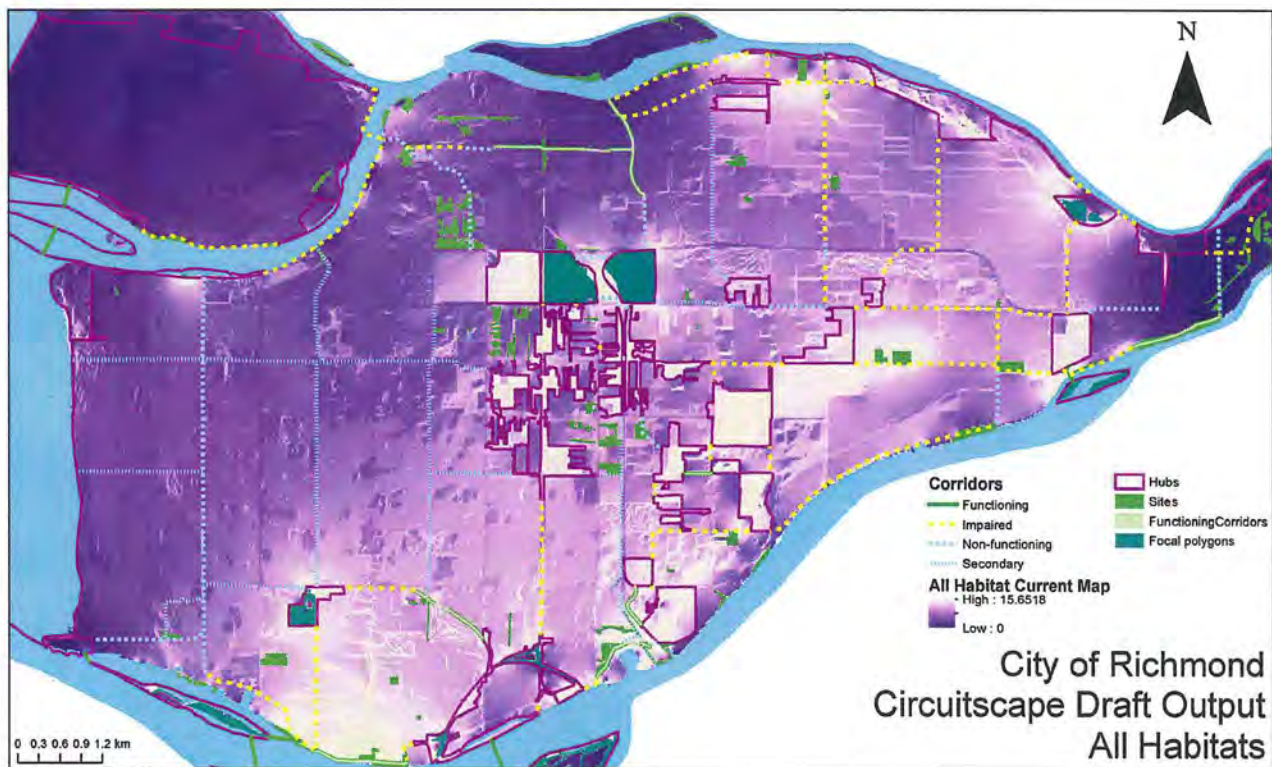
Example of Ecological Network connectivity in north central Richmond including the downtown area. Most of the identified corridors are considered "non-functioning" because of the intensity of urban land use.

**Circuitscape Analysis:** Circuitscape is a computer model that applies the concepts of electrical circuit theory to ecological landscapes. Simulated electrical current, representing the movement of biodiversity, finds the path of least resistance between different habitat areas. Areas of good habitat will have low resistance to the current's movement and areas of poor habitat will have higher resistance which will slow the flow of current, and in extreme cases will block the current all together. Circuitscape analysis was used to model four different habitat types (forest, wetland, shrubland, and old fields), and compared for species with high (e.g., birds) and low (e.g., amphibians) mobility.

Circuitscape has two advantages. Firstly it does not constrain connectivity to a single path or corridor. Current is free to flow anywhere and multiple pathways will often be identified as well as dead ends where a pathway meets resistance and cannot continue. This is more realistic of how biodiversity uses the landscape; mobile wildlife often use a range of possible routes or corridors rather than the single path identified (as in the corridor analysis described previously). Second, the flow of current in Circuitscape is based on the resistance a species encounters as it randomly moves across the landscape. Again, this is more realistic than corridor analysis because side routes or splits in the path are possible. An example of a Circuitscape output map is presented in Figure 2-8. Circuitscape mapping methodology is included in Appendix 3.



Figure 2-8



Example of output from of Circuitscape connectivity analysis. The lighter coloured areas indicate areas of higher connectivity, with darker purple areas indicating low connectivity.2012.

#### Key results of the connectivity analysis:

- The corridor analysis identified 74 km of corridors that were delineated within Richmond's EN. 29 km (39%) of these corridors are located along foreshore areas within the Agricultural Land Reserve. 17 km (23%) of these corridors are located along foreshore areas. Figure 2-8 shows the range of corridors (functioning or non-functioning) in heavily urbanized north-central Richmond.
- 12 km of corridors (17%) mapped in Richmond were identified as functioning and currently provide connectivity between adjacent hubs within the network. 45 km of corridors (60%) were classified as impaired and, while providing some connectivity currently, could be improved with minor restoration and enhancement. 17 km of corridors (23 %) were identified as non-functioning. Non-functioning corridors currently do not provide connectivity but represent opportunities to improve connectivity during large-scale City planning.
- The Circuitscape analysis provided complimentary results but was more difficult to interpret. Figure 2-9 shows an example of the city-wide results for the generalized model (all habitats + high and low dispersers).
- Circuitscape highlighted three important results. First, distance is important for connectivity. Habitat patches that are close together, such as the bog forests, old fields, and forests of central Richmond, are better connected than patches that are more isolated. Second, where there is a well-defined route like Horseshoe Slough, adjacent areas become less important for maintaining connectivity. Three, the residential areas of west and central Richmond have very little in the way of functioning ecological connections which emphasizes the value of the Railway Avenue Greenway and other constructed corridors.

## Summary of Richmond's Ecological Network

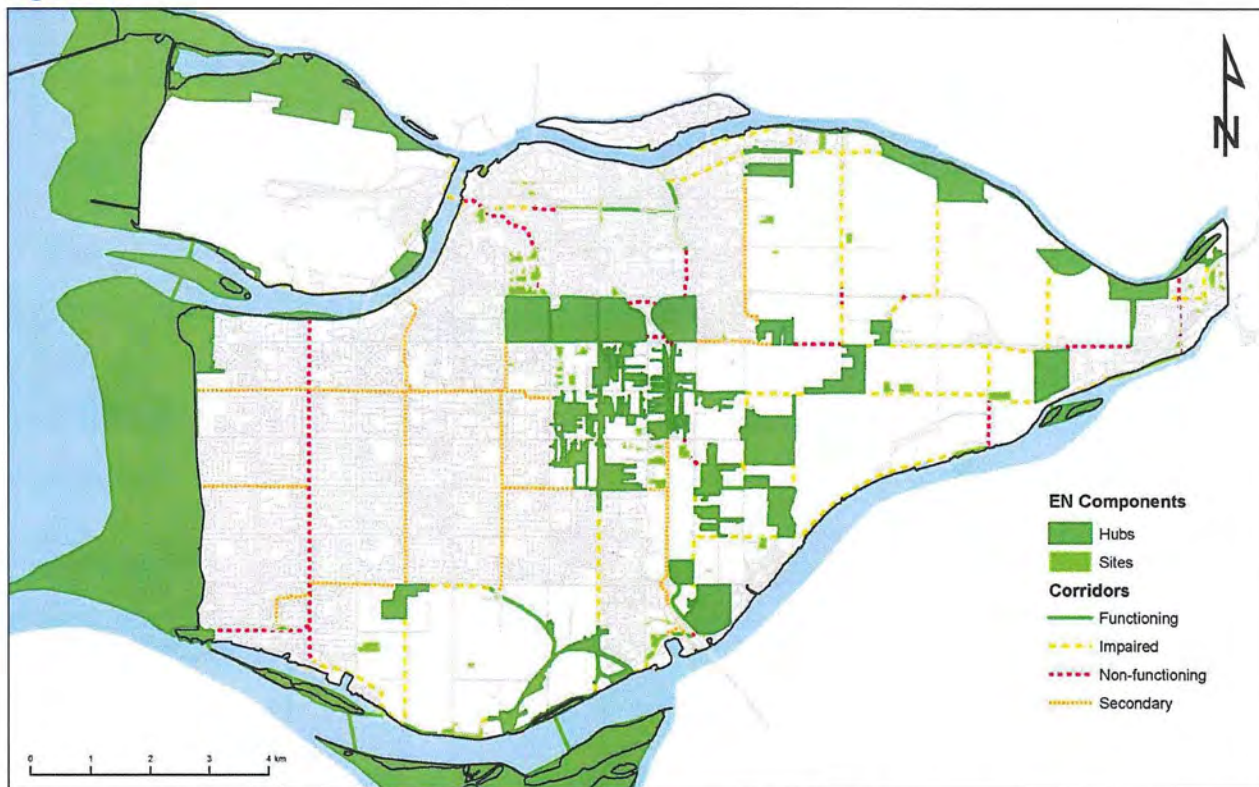
Richmond's EN is shown in Figure 2-9 and summarized in Table 2-3.

### Key points:

- About 23% of the City's total area, including intertidal and marine areas, is within the EN. Almost 2/3rds of the EN is comprised of large hubs, of which over half are marine and intertidal areas. Sites account for <1% of the network, while shoreline and riparian zones make up about 5%.
- A total of 38 hubs and 103 sites were identified in Richmond's EN.
- Hubs range from well-known natural areas such as Richmond Nature Park, Sturgeon Banks and South Arm Islands Wildlife Management Areas, Terra Nova Rural Park, and the Sea Island Conservation Area (SICA), to lesser known areas such as Horseshoe Slough, Northeast Bog Forest, cottonwood forests along River Road, and bog forest areas on either side of Shell Road.
- The five largest hubs within the City of Richmond are Sturgeon Banks (1,025 ha), South Arm Islands (807 ha), Sea Island Southwest (501 ha; predominantly the mudflats west of airport and south of Iona Jetty), Iona Island (269 ha), and Sea Island North (252 ha).
- Most of Richmond's hubs are either outside of the dike (approx. 70%) or within Richmond's Agricultural Land Reserve (approx. 30%). Less than 1% of Richmond's hubs are inside the dike and not in ALR lands. This highlights the importance of Richmond's agricultural areas in contributing to ecological values, especially those which have remained uncultivated and/ or representative of native bog forest environments. It is also an indicator of how few natural areas have been protected within the urban (non-agricultural) areas of Richmond.
- The largest hubs on Lulu Island are along River Road (82 ha; River Road between Kartner Road and Nelson Road), Fraser Lands West (72 ha; west of South Shore port between No. 6 Road and No. 7 Road), Terra Nova (66 ha), and Horseshoe and Finn sloughs (63 ha). With the exception of Terra Nova, all of these hubs are located within the Agricultural Land Reserve.
- Sites are frequently located adjacent to foreshore areas, along watercourses, in agricultural areas, or along transitions between different land use types. Sites include an area in the Cambie West neighbourhood, small foreshore parks such as the off-leash Dog Park (along South Arm of the Fraser River), and Hamilton Highway Park (along Highway 91).
- Concentrations of sites also exist within the Bridgeport, West Cambie, Broadmoor, and Hamilton neighbourhoods of Richmond.
- Connectivity is generally poor because of the intensity of urban or agricultural land use throughout Richmond. Many corridors were classified as non-functioning or impaired. However, the Circuitscape analysis highlighted some areas of better than anticipated connectivity (e.g., central Richmond), as well as areas where connectivity can be improved through the creation of greenways and linear parks.



Figure 2-9



Current state of Richmond's Ecological Network including hubs, sites, parks, shoreline and riparian zones, and corridors.2012.

Table 2-3: Summary of Richmond's Ecological Network Components

Component	Hubs	Sites	Connections <sup>1</sup>	Shoreline and Riparian Zones	Parks and Greenways	Matrix
Definition	Large areas of natural and semi-natural vegetation	Small areas of natural, semi-natural, and semi-modified vegetation	Linear connections or zones of connectivity between hubs, variable width when finally established	Linear strips along dyke areas and watercourses to protect aquatic habitats and other values	City-owned and managed recreation lands, as well as non-City owned schools sites; opportunities for restoration and enhancement	Areas surrounding hubs, sites, and corridors including urban and other modified areas and open water
Size	> 10 ha	0.25–10 ha	30 m wide corridor	30 m buffer inside dyke; 30 m outside dyke; 15 m and 5 m Riparian Management Area buffer	various	n/a
Total Land Area <sup>2</sup>	1,597 ha	178 ha	181 ha	755 ha	667 ha	9,353 ha

Component	Hubs	Sites	Connections <sup>1</sup>	Shoreline and Riparian Zones	Parks and Greenways	Matrix
% of Land Area <sup>2</sup>	13%	1%	1%	6%	5%	74%
Total Intertidal and Marine Area <sup>3</sup>	2,421 ha	31 ha	6 ha	470 ha	47 ha	11,158 ha
% of Intertidal and Marine Area <sup>3</sup>	17%	0.2%	0.0%	3%	0.3%	79%
Total Area of City <sup>4</sup>	4,017 ha	209 ha	187 ha	1224 ha	636 ha	20,510 ha
% of Area of City <sup>4</sup>	15%	0.8%	0.7%	5%	2%	77%
Number	37 hubs	102 sites	84 corridors	-	-	-

<sup>1</sup> Includes functioning, impaired, and non-functioning corridors, and zones of connectivity.

<sup>2</sup> Includes all areas above the high water mark.

<sup>3</sup> Includes all areas below the high water mark.

<sup>4</sup> Includes all areas within the City boundary, including intertidal and marine areas.







A hand-drawn map on a light-colored background, possibly a piece of paper or a digital canvas. The map features several irregular shapes representing different areas. A large, dark blue, hand-drawn shape is labeled 'ECOLOGICAL NETWORK'. Below it, the words 'STRATEGY AREAS' are written in a similar style. To the left of the map, there is a legend with three items: a square with a diagonal line, a square with a horizontal line, and a square with a vertical line. These are labeled 'CITY CENTRE', 'URBAN NEIGHBOURHOODS', and 'RURAL' respectively. The map itself has several handwritten notes in blue ink. One note says 'OLD FIELDS & CROP ROTATION' and another says 'EXTENDED CROP ROTATION ARE'. There are also some other faint, illegible handwritten notes. In the top left corner, there are some markers and a pen.

# PART 3

Vision, Goals and  
Strategy Areas

ECOLOGICAL NETWORK  
STRATEGY AREAS

- ☒ CITY CENTRE
- ☐ URBAN NEIGHBOURHOODS
- ☐ RURAL





## PART 3 – Vision, Goals and Strategy Areas

The Official Community Plan (OCP) states that Richmond's population is expected to increase by 80,000 people by 2041. While the City is preparing to accommodate this growth through infrastructure expansion (e.g., approximately 42,000 new housing units will be needed by 2041) and the updating of Area Plans, the City will also accommodate this growth by enhancing and expanding the natural spaces and green infrastructure that currently make Richmond a healthy, livable City.

The EN has thus far been defined, spatially delineated and assessed in terms of its current components and its current quality. In order for the EN to serve as a relevant and evolving tool for managing Richmond's natural areas, the EN must be future-thinking and set the course for implementation at various scales and through a diverse and flexible set of means. Chapter 9 of the OCP supports this course of action, and the following sections provide the vision, goals and identify the key issues and opportunities that will ensure the EN's continued relevance and strategic implementation.

### EN Vision

*The Ecological Network is the long-term ecological blueprint for the collaborative management and enhancement of the natural and built environments throughout the City, within neighbourhoods, and across land-uses and development types in order to achieve ecologically connected, livable and healthy places in which residents thrive.*

The EN is built upon four primary goals, each one contributing to the achievement of the vision, and each one lending itself to the opportunistic and collaborative approach outlined below.

### Goals

1. **Manage and Enhance our Ecological Assets** – Richmond is home to a unique mix of diverse ecological places; many of which are managed through a range of municipal, provincial and federal levels of jurisdiction. The EN seeks to ensure that these protected areas remain so and are actively monitored and enhanced over time so they continue to provide the ecological services vital to community health.
2. **Strengthen City Infrastructure** – There is vast opportunity to expand the traditional approach to infrastructure in the City through the inclusion of green infrastructure. The EN seeks to not only identify priority areas where the incorporation of green infrastructure into the built environment will enhance building and street performance and efficiency, but also where it will positively contribute to the public realm in terms of ecosystem service provision, education and amenity. Green infrastructure ensures resilience of the built environment while strengthening its connection with the community.
3. **Create, Connect and Protect Diverse and Healthy Spaces** – Complimenting the management and enhancement of our current protected ecological assets (Goal #1), is the need to strategically identify unprotected ecological assets under threat and create a variety of new protected spaces that will be connected to and enrich the existing Network. The EN seeks to identify these areas in a manner that is opportunistic; working with the current and potential function of present ecology, the needs of the community, and future development processes.
4. **Engage through Stewardship and Collaboration** – Central to the continued success of the EN is the community's sense of stewardship over the Network at different scales and levels of participation. The EN seeks to ignite collaboration and stewardship through community involvement and engagement at all levels of EN delivery.



## Implementation Framework

The plan will be implemented through an opportunistic and collaborative approach that will maximize current and future land-use and development policies, guidelines, partnerships, City-wide initiatives, and area-specific projects. Plans, projects and processes which collectively implement the EN demonstrate how this framework for on-the-ground action is incorporated within the City's planning and development context.

In consultation with various City departments, ten (10) EN strategy areas were identified. The strategy areas are based upon vegetation distribution data, land-use, and current and future stewardship and development opportunities. The purpose of the strategy areas is four-fold:

- To provide an overview of Richmond's current ecological assets;
- To identify and group the key areas of the City in order to focus future specific actions where most appropriate;
- To provide tailored guidance on how the EN can be strengthened by different vegetation/ land-use types within the City; and
- To identify the critical issues, key opportunities and stakeholder considerations that pertain to the enhancement and enrichment of the EN in specific areas.

The ten strategy areas are outlined in the following pages. A general description of each area and a statement about the desired outcomes for that strategy area within the context of the EN are provided. In addition, an overview of each area's critical issues, key opportunities and specific stakeholder considerations included in order to guide the stakeholder and public consultation process that will lead to the development of the second phase of the EN management Strategy; the action plan. To organize future actions and consultation, six areas of focus are identified for each strategy area:

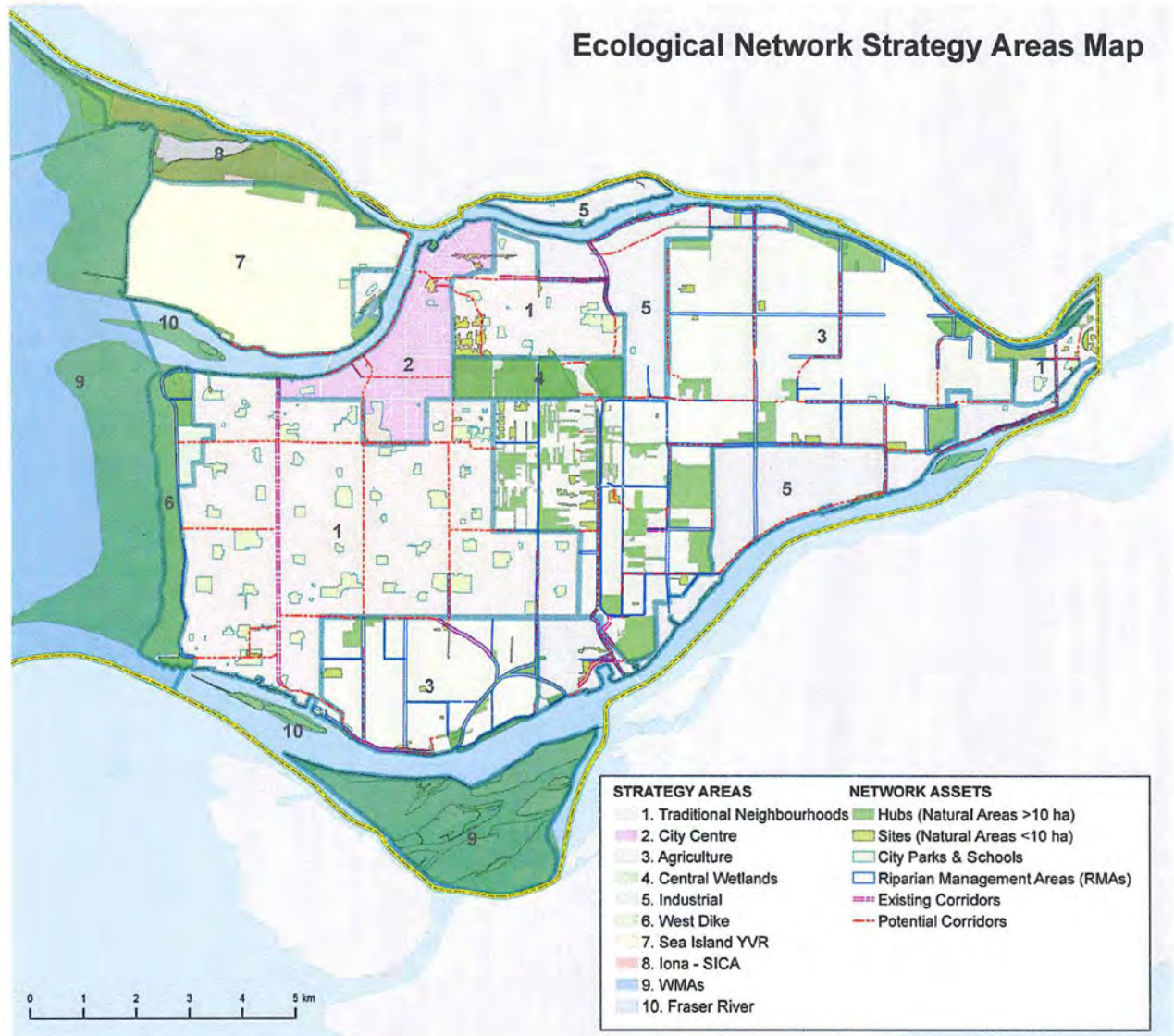
- Rainwater Management/ Infrastructure
- Vegetation/Habitat
- Wildlife
- Parks, Open Space, Public Lands
- Private Development
- Stewardship

These areas of focus were selected as they represent the EN's various areas of application within the City's planning, development, and operational context. These are also the various themes under which future actions can be applied to fulfill the Goals outlined above. While the application of these areas of focus within each strategy area will vary by land-use, vegetation, City jurisdiction and community, the key message in identifying the components of each of the strategy areas, is that the EN has a role to play on public and private lands, in the natural and built environments and as a catalyst for stewardship and community action.

## Ecological Network Strategy Areas

In direct response to general desire expressed by various City departments for the future management of the EN to be supported by a visual tool, a new mapping product was developed. Figure 3-1 presents an Ecological Network Strategy Areas Map as an on-the-ground guide that not only reflects the current condition of the EN, but identifies priorities in the direction of its long-term evolution via delineation of the 10 strategy areas. The intent is that as the EN is enhanced and expanded, this will be amended to reflect that detail and identify new opportunities.

Figure 3-1



Ecological Network Strategy Areas Map.2014.



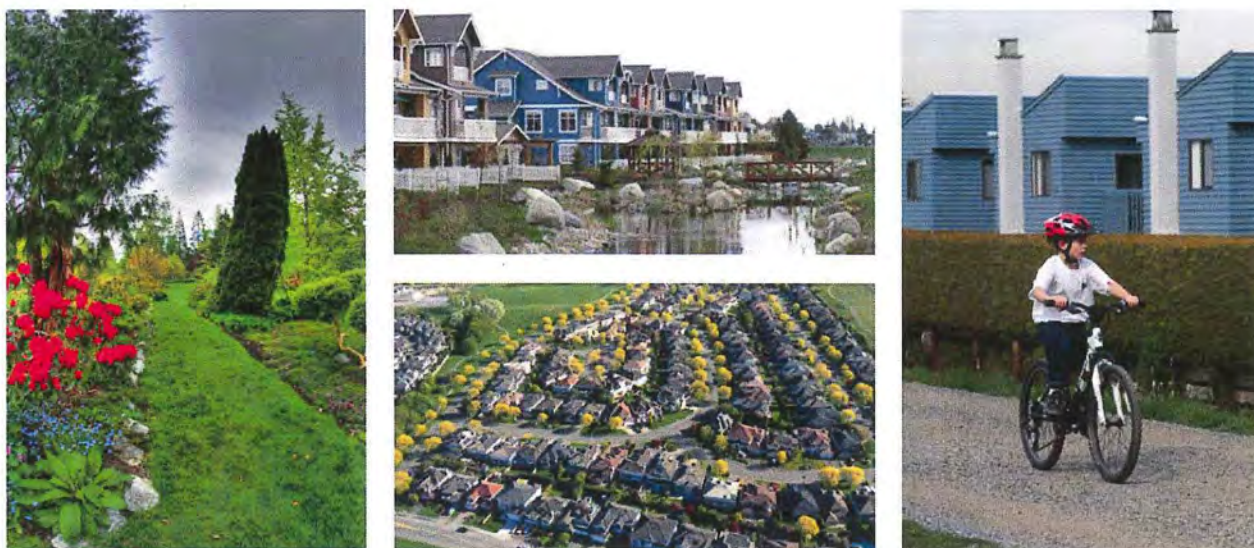


## STRATEGY AREA 1: TRADITIONAL NEIGHBOURHOOD

Richmond's traditional neighbourhoods are comprised primarily of West Richmond, Burkeville, Hamilton, Steveston and portions of the East Cambie, West Cambie and Bridgeport neighbourhoods. West Richmond and Burkeville are primarily single-family residential neighbourhoods, while East and West Cambie and Steveston offer a range of housing types including single-family, townhouses and low-rise building. Over time, under the Hamilton Area Plan, this neighbourhood will become more dense, offering a range of housing types and services. **Ecologically, Richmond's traditional neighbourhoods offer the most opportunity for enhancement as they contain the majority of the City's neighbourhood parks, schools, community centres and backyards; areas ripe for stewardship activities and community engagement.** In addition to these assets, Richmond's traditional neighbourhoods contain key features such as the Railway corridor (West Richmond), the Queen Canal (Hamilton), and Alexandra Greenway (West Cambie). Finally the West Richmond neighbourhood borders on the highly diverse and ecologically valuable West Dike and Sturgeon Bank Wildlife Management Area beyond.







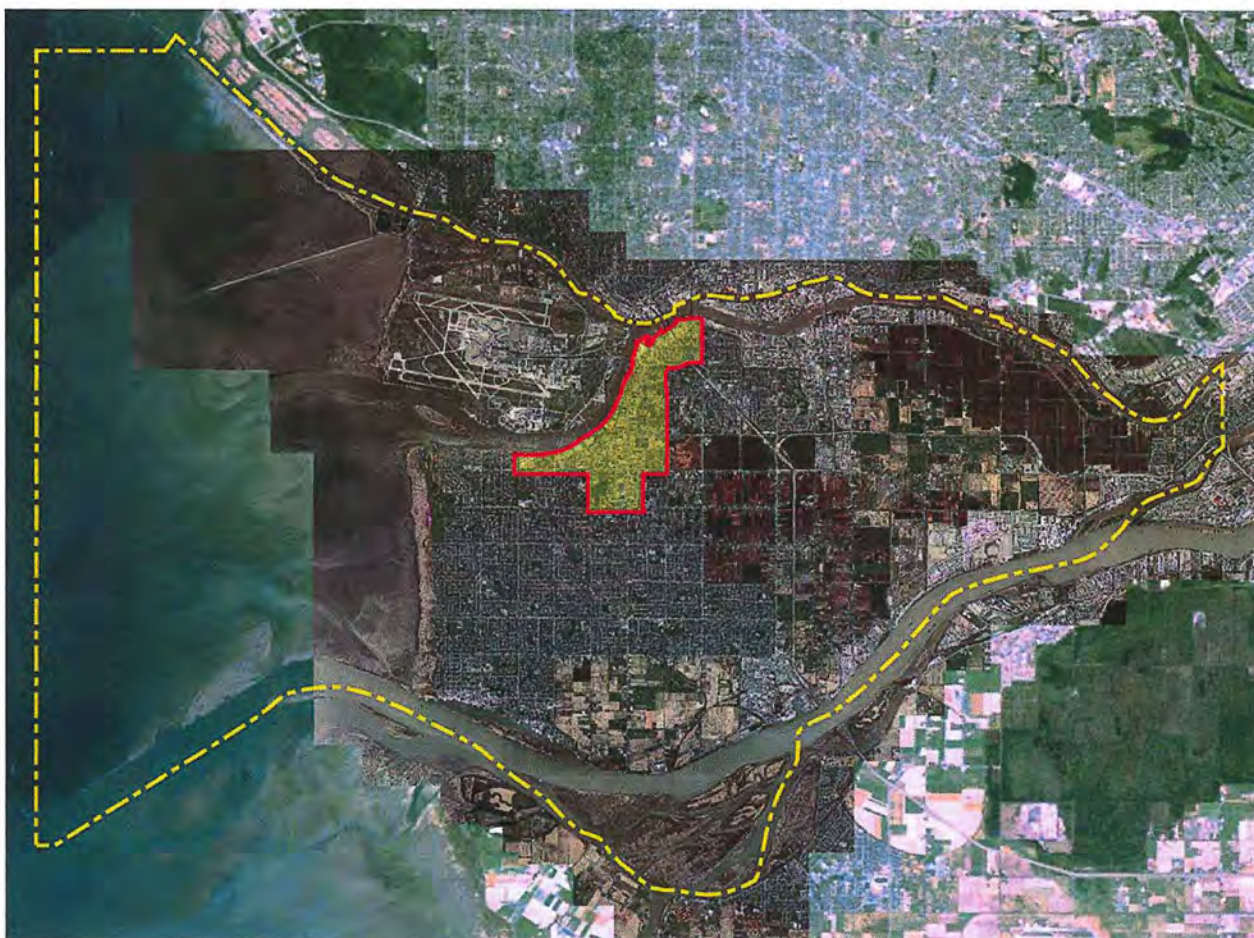
**Desired Outcomes:** Healthy traditional neighbourhoods where neighbourhood parks, school yards and community centres provide spaces for recreation, natural habitat, ecological stewardship and education. These local ecological nodes are connected via an evolving system of trails, greenways, developed urban tree canopies, and ecologically rich back-yard environments that serve as unique areas of rainwater filtration and management. Local residents are well connected to each other via a range of stewardship and education opportunities and feel empowered to be stewards of the natural environment that surrounds their homes, schools and places of work.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• Loss of native and non-native vegetation through ongoing development</li> <li>• Increase in impermeable surfaces (paved lots, driveways)</li> <li>• Riparian Management Area process (awareness raising)</li> <li>• Automobile-centric neighbourhoods and patterns of development (landscape fragmentation, increased impermeable surfaces, decreased walkability)</li> <li>• Invasive species proliferation and loss of native vegetation/ habitat</li> <li>• Inadvertent Encroachment on City-owned lands</li> <li>• Unpermitted tree removal</li> </ul>
<b>Key Opportunities</b>	Naturalization and green infrastructure initiatives in: <ul style="list-style-type: none"> <li>• Backyards</li> <li>• School Sites</li> <li>• Neighbourhood parks &amp; Community Centres</li> <li>• Greenways and pedestrian/ cycling infrastructure &amp; trails</li> <li>• Core stewardship community located here</li> <li>• Large portion borders on the West Dike and Terra Nova</li> <li>• Watercourses</li> <li>• Stormwater management</li> <li>• Maintenance of trees</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• Residents</li> <li>• Residential developers/ small builders</li> <li>• School District (Green Ambassadors and beyond)</li> <li>• Terra Nova outdoor pre-school</li> <li>• PFB participants</li> <li>• Walk Richmond</li> <li>• Community gardeners</li> <li>• Community Services Advisory Committee</li> </ul>



## STRATEGY AREA 2: CITY CENTRE

Richmond's City Centre is rapidly developing into a high-density mixed-use urban environment characterized by the commercial corridor along No. 3 Road. The area is undergoing a period of rapid development, with significant opportunity for green infrastructure interventions as development takes place. Areas such as the Lansdowne corridor future linear park, and current and future park and habitat enhancement opportunities along the middle arm of the Fraser River, the Lansdowne Mall site, and potentially at Minoru present unique opportunities for green infrastructure integration into the landscape. **Progressive rainwater management strategies, the re-introduction of native vegetation, the provision of appropriate habitat, reduction of the urban heat island effect, and trail and greenway links between pedestrians, cyclists and amenities, are all examples of green infrastructure opportunities.** There is also ample opportunity to engage private developers in the incorporation of various green infrastructure features through the re-development process. The City Centre Area Plan (CCAP) provides additional detail on future parks, greenways and green links, as well as information about connectivity in an urban environment. It serves as an example of how an Area Plan successfully incorporates EN language and concepts.







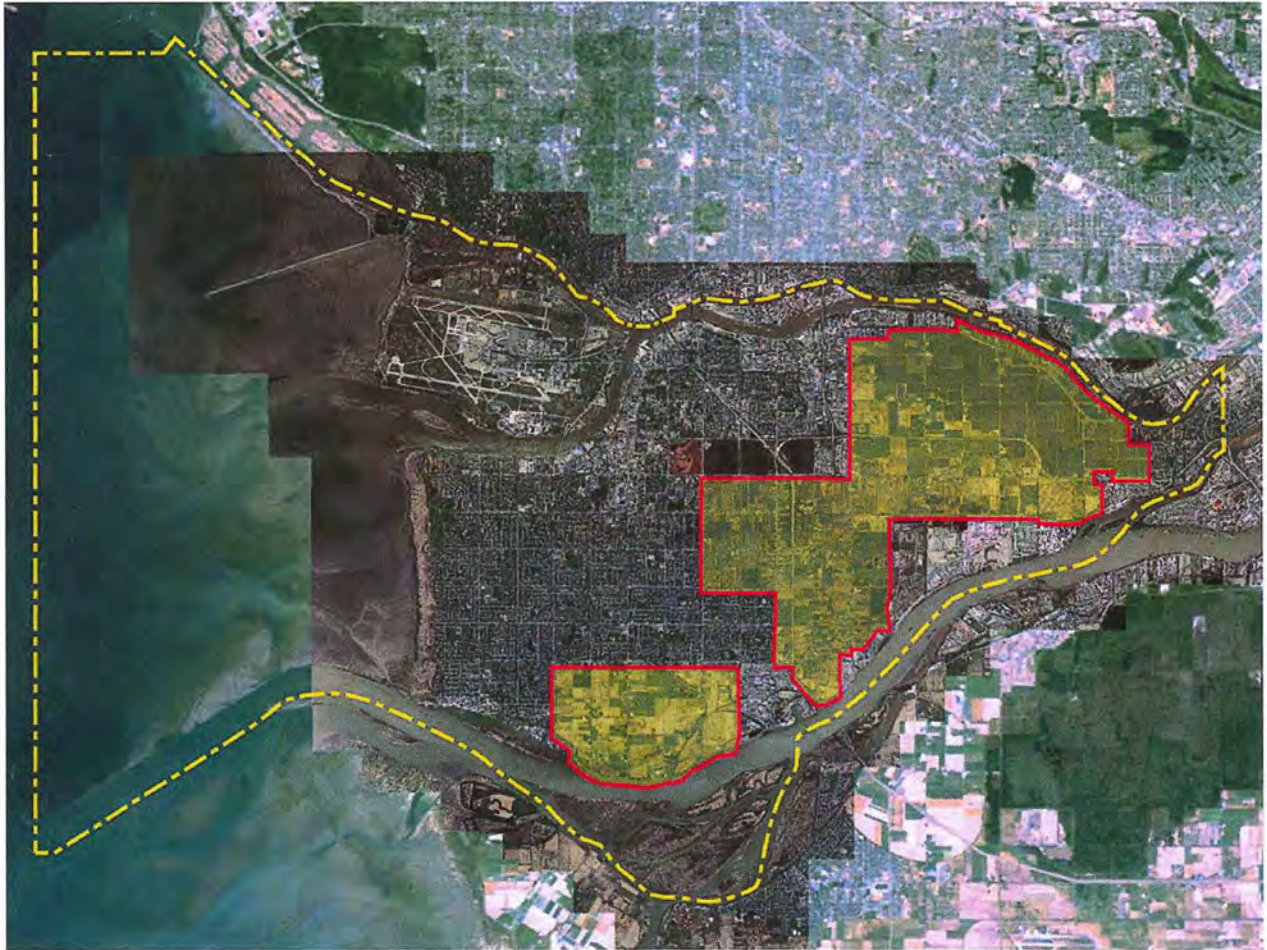
**Desired Outcomes:** The dynamism of a highly urban environment is heightened through the incorporation of ecological function into the urban hardscape with innovative and educational stormwater management features such as swales, rain gardens and engineered wetlands. A continuous tree canopy provides shade, respite and habitat, while continuous landscape elements are composed of native and drought tolerant species. Urban shoreline areas balance recreation with the ecological requirements needed to sustain highly sensitive habitats. Linear parks, urban parks and greenways not only connect pedestrians and cyclists with various amenities, but inherently provide ecological services such as water filtration, air purification, habitat, opportunities for education and natural beauty. Development and EN principles work in tandem to result in the creation of resilient infrastructure and healthy urban environments.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• Loss of native and non-native vegetation through ongoing development</li> <li>• Increase in impermeable surfaces (paved lots, roads, driveways)</li> <li>• Major transit and commercial corridor</li> <li>• Increase in residential development, especially transit oriented development and waterfront development—20,000 new dwellings needed by 2021 (CCAP)</li> <li>• Pre-existing site contamination</li> <li>• Water quality and run-off (including sediment and erosion control for construction projects)</li> </ul>
<b>Key Opportunities</b>	<ul style="list-style-type: none"> <li>• Green infrastructure interventions included at the planning stage</li> <li>• Opportunities for innovative green design requirements</li> <li>• Stormwater Management (IRRMS)</li> <li>• Gradual re-development of large areas with significant civic and public park uses (e.g. Lansdowne)</li> <li>• Increased shoreline ecosystem protection and integration through development</li> <li>• City as a "Living Lab" for green infrastructure trials (e.g. stormwater management innovation)</li> <li>• Partnerships with planning/ architecture/ design programs</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• First Nations</li> <li>• Residents</li> <li>• Urban Development Institute/ Developers</li> <li>• Local business and organizations (e.g. Chamber of Commerce, Tourism Richmond, Steveston Merchants' Association)</li> <li>• Kwantlen &amp; other academic institutions</li> <li>• Translink</li> </ul>



## STRATEGY AREA 3: AGRICULTURE

Agriculture is a significant land-use within the City of Richmond, yet it does not result in homogeneous vegetation cover or land-use patterns. The Northeastern portion of this area sits atop very moist peat soils and thus comprises of the majority of Richmond's peat-based agriculture (cranberries and blueberries), whereas the central and south western agricultural areas contain field crops, fallow areas, and permitted residential and commercial development. **Key ecological features in the Agriculture Strategy Area include the North-East Bog, a large portion of Richmond's Environmentally Sensitive Areas (ESAs), a significant portion of the City's Riparian Management Areas (RMAs), the majority of Horseshoe Slough and significant shoreline areas along the North and South arms of the Fraser River.** As the majority of the area is privately held and within the Agriculture Land Reserve (ALR), there are limited ecological requirements that the City can place upon such lands, however key initiatives such as Environmental Farm Plans (administered by the BC Agricultural Research & Development Corporation), the exploration of conservation leases, and the encouragement of hedgerow and Riparian Management Areas stewardship will ensure that the ecosystem services inherent to agricultural lands (water filtration and retention, habitat provision, healthy soils) are enhanced and connected to adjacent EN features over time.







**Desired Outcomes:** Agricultural lands play a significant socio-ecological role within the City of Richmond. Farming livelihoods are supported through EN initiatives and contribute to healthy environments while remaining viable. Significant natural habitats are identified and protected via a range of mechanisms including conservation leases, incentives programs and strategic land acquisitions.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• Development that erodes useable farmland and farming livelihoods—(increase in impervious development and/or loss of productive soil)</li> <li>• Loss of Environmentally Sensitive Areas (ESAs)</li> <li>• Impacts to Riparian management Areas (RMAs)</li> <li>• Maintenance of ecologically beneficial habitat areas and ecosystem services that contribute to soil and water health</li> <li>• Inadvertent encroachment onto City land</li> <li>• Management of invasive species</li> <li>• Urban/ industrial/ agricultural interface</li> </ul>
<b>Key Opportunities</b>	<ul style="list-style-type: none"> <li>• Majority of City's ESA sites and hubs are located here and significant number of RMAs</li> <li>• Finding synergies between conventional farming and environmental health (hedgerows, wind throws, clean water/soil)</li> <li>• Several voluntary programs: setback program, hedgerow development, riparian area protection, biodiversity farm plans)</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• Farmers and farmers associations/institutes</li> <li>• Non-farming residents</li> <li>• User groups (recreational, bird watching, etc.)</li> <li>• Local business</li> <li>• Religious community</li> <li>• Non-profits (e.g. Richmond Food Security Society, Delta Farmland and Wildlife Trust)</li> <li>• Agricultural Advisory Committee</li> <li>• Agriculture Land Commission</li> </ul>



## STRATEGY AREA 4: CENTRAL WETLANDS

Forming the largest in-land contiguous system of EN Hubs in Richmond, the Central Wetlands are comprised of the Richmond Nature Park, the Department of National Defence (DND) lands and the Garden City Lands. These wetlands represent the remaining pieces of what was once the Greater Lulu Island Bog and are characterized by peat soils, bog forest (most prevalent in the Richmond Nature Park) and species such as blueberry, heather, birch, pine, Labrador tea, willow and hemlock as well as a rich communities of mosses, lichens and fungi. The central Wetlands also provide critical habitat to a host of wildlife including the Garter snake, the Pacific Chorus Frog, coyotes, Mule Deer, voles, shrews and a variety of birds of special interest such as Great Blue Heron, Barn Owl and Pileated Woodpecker. **The central wetlands are fragmented, and are threatened by adjacent development, road expansion and invasive species; however, they continue to play a key role in maintaining residual wildlife populations in Richmond.** In addition, the peat soils of these wetlands could serve as significant areas for carbon sequestration if managed and enhanced over time.







**Desired Outcomes:** The Central Wetlands continue to play a significant role in habitat provision, hydrological function and ecosystem services for the City of Richmond. Ecological enhancements, including the removal of invasive species and the management of wildlife ensure that these remnant wetlands remain ecologically productive, serve as reminders of our natural history, and provide areas for on-going education, stewardship and local identity.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• Largest remaining area of the original Greater Lulu Island Bog</li> <li>• Invasive species proliferation</li> <li>• Lack of baseline data for hydrological regime</li> <li>• Fragmentation (road expansion, development, invasive species)</li> <li>• Future status of Department of National Defence lands</li> <li>• Ecological connectivity between the four Central Wetland parcels</li> <li>• Garden City Lands Legacy Landscape Plan</li> </ul>
<b>Key Opportunities</b>	<ul style="list-style-type: none"> <li>• High-profile and unique natural area within the City</li> <li>• City ownership and control of 3 out of 4 parcels</li> <li>• Representative of Richmond's cultural and natural heritage</li> <li>• Stewardship community already active</li> <li>• Largest in-land hubs in the City</li> <li>• Consultation and concept development around the Garden City Lands</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• Richmond Nature Park Society</li> <li>• Richmond Food Security Society</li> <li>• User groups (bird watchers, passive recreation)</li> <li>• School district</li> <li>• Kwantlen</li> <li>• Residents (target those in adjacent neighbourhoods especially in rapidly developing Cambie/Alexandra neighbourhoods)</li> <li>• Residents (of Richmond)</li> <li>• Department of National Defence</li> </ul>



## STRATEGIC AREA 5: INDUSTRIAL

Industrial areas in the City comprise of a variety of land uses including Industrial/ Office Business Park, Industrial only, and Industrial/ Office/ Limited Retail. In general, impervious paving and coverage tend to dominate these areas with very few pockets of natural or pervious space. Ecologically, Richmond's industrial strategic areas abut extensive portions of the Fraser River, thus creating significant opportunities for ecological management and restoration in addition to those outlined in the ESA DPA for Shoreline and Intertidal areas. **The Industrial strategic area presents an important opportunity for stewardship, restoration and enhancement through the Bath Slough Revitalization Initiative. The initiative builds on the upgrade of the Bath Slough pump-station in 2014 and will revitalize one of Richmond's last remaining sloughs through a series of actions and programs including; invasive species removal, native vegetation planting, and bank stabilization.** In addition, the area provides ample opportunity for the development of green infrastructure interventions such as green roofs, innovative stormwater management measures (especially in managing areas with significant impervious paving), pervious paving, rainwater collection and on-site re-use.







**Desired Outcomes:** Richmond's industrial areas serve as important sources of employment while also serving as important examples of successful and functional green infrastructure integration within industrial, highly altered environments. The shoreline areas abutting the industrial strategic area are enhanced habitat environments, and Bath Slough serves as a premier example of successful habitat and trail amenity enhancement and restoration in the heart of industrial lands. The City's industrial partners feel engaged and have a strong understanding of the role of industrial stewardship in contributing to ecological and community health.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• Habitat loss (i.e. terrestrial and foreshore including RMA and ESA)</li> <li>• Increase in highly impervious areas</li> <li>• Encroachment of materials (storage) onto City Lands</li> <li>• Invasive species</li> <li>• Challenges with contamination, dumping, use of storm drains/storage of hazardous materials</li> <li>• Significant area owned by Port Metro Vancouver</li> </ul>
<b>Key Opportunities</b>	<ul style="list-style-type: none"> <li>• Bath Slough Revitalization Initiative</li> <li>• Extensive opportunity for restoration and green infrastructure interventions</li> <li>• Build upon existing industrial business outreach and engagement work to increase industrial stewardship</li> <li>• Eco-industrial opportunities</li> <li>• Build on Green Ambassadors work (storm drain "fish painting")</li> <li>• Explore partnerships with Port Metro Vancouver (e.g., their Land Use Plan and Sustainability Strategy)</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• Local business owners</li> <li>• Local residents</li> <li>• DFO (Fisheries and Oceans Canada)</li> <li>• Port Metro Vancouver</li> <li>• Local Economic development groups (e.g. Chamber of Commerce)</li> <li>• Economic Advisory Committee</li> <li>• School District</li> <li>• Railway</li> </ul>



## STRATEGY AREA 6: WEST DIKE

The West Dike is a key location for leisure activities in Richmond and is regularly identified as one of the City's most significant waterfront destinations. As the beauty and aesthetic value of the area derives from its natural values, careful management of the area is required. This unique north-south dike provides an important public amenity while providing community protection at the same time. **The West Dike acts as a transition zone between the extensive foreshore marsh habitats and adjacent inland residential neighbourhoods and park lands.** The area is defined by the adjacent Sturgeon Banks Wildlife Management Area (WMA) and the adjacent Grauer Lands that were recently purchased by the City and Ducks Unlimited. A riparian management area runs along much of the inner flank of the West Dike providing drainage and refuge for waterfowl and other fresh water aquatic species. As research on climate change and sea level rise evolve over time, the City will continue to investigate strategies and solutions that address the needs for dike upgrades and the associated tidal marsh habitats along Sturgeon Banks. Residential developments adjoin much of the west dike and have a direct role to play in its health and connection with the rest of the City.







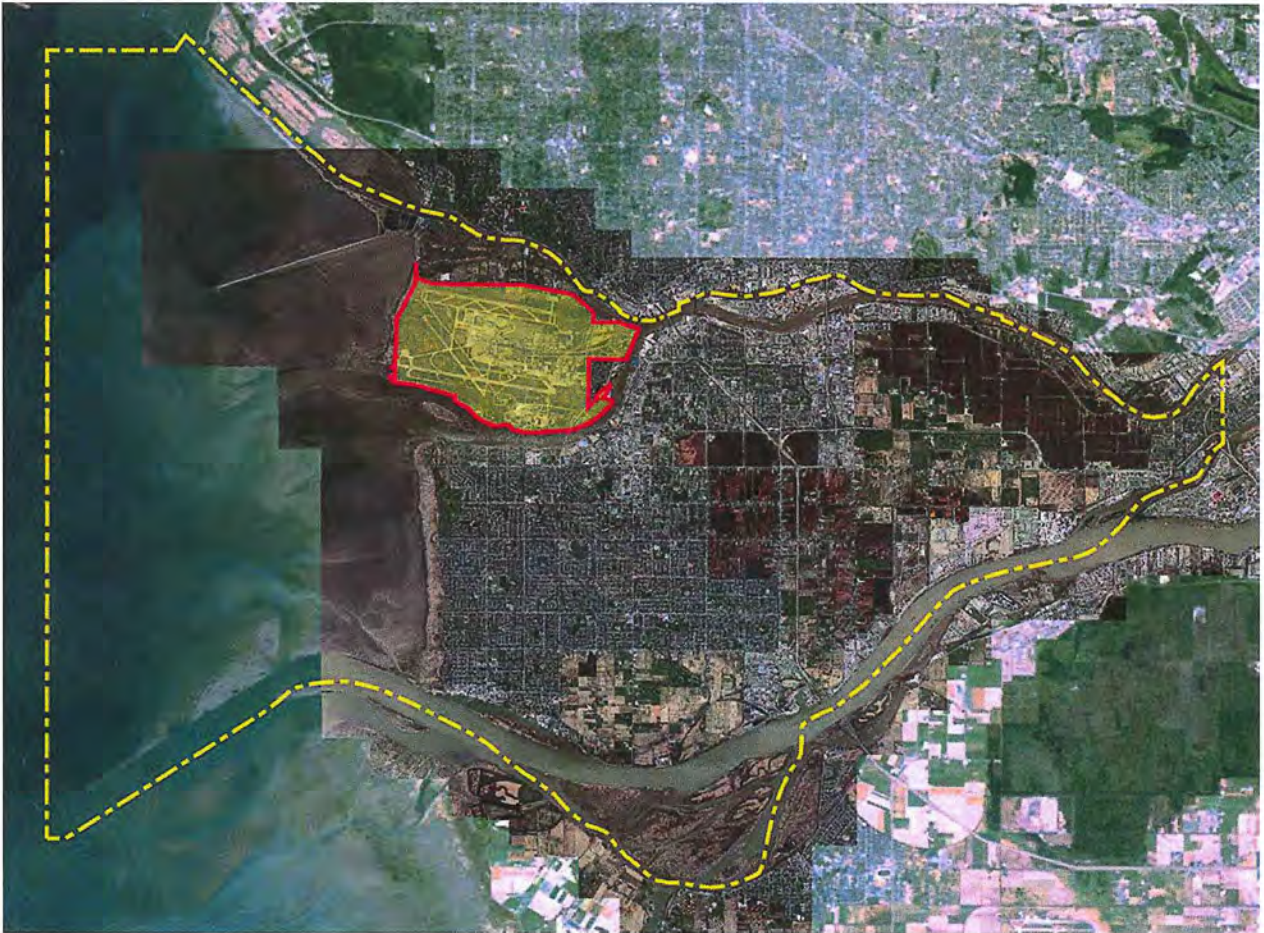
**Desired Outcomes:** Maximizing the foreshore and riparian habitats and ecosystem services of Sturgeon Bank; maintaining the protection of City infrastructure through ongoing research and innovation; and continued improvement to the dike public amenity. The West Dike is a critical amenity corridor a significant recreational venue. The corridor is managed to accommodate anticipated population increases while implementing management strategies specific to the west dike. The health of the area depends not only on the habitat outside the dike but also the dike itself and the community bordering it. The ecological health of the West Dike is supported through the on-going improvement of upland watercourses and through innovative Best Management Practices such as vegetation and drainage management. On-going engagement with the adjacent community instils a sense of ownership and pride in the community's continued stewardship of the area.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• Important transition zone between foreshore marsh habitat and adjacent residential neighbourhoods</li> <li>• Area of focus for Dike Master Plan</li> <li>• Significant ecological and recreation amenity for the City of Richmond</li> <li>• Climate change and sea level rise</li> <li>• Invasive species (e.g. Japanese Knotweed)</li> <li>• Critical habitat</li> <li>• Riparian Management Areas and Environmentally Sensitive Areas protection</li> </ul>
<b>Key Opportunities</b>	<ul style="list-style-type: none"> <li>• Significant to Richmond's "Island City" identity</li> <li>• High-profile/ high-usage amenity area</li> <li>• Grauer Lands</li> <li>• Large number of community groups/non-profits exist in relation to this area—core stewardship groups</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• Ducks Unlimited</li> <li>• Terra Nova non-profits (Sharing Farm, Richmond Food Security Society)</li> <li>• Terra Nova Outdoor pre-school</li> <li>• Recreationalists (cycling and walking community)</li> <li>• Partners for Beautification participants</li> <li>• Local residents</li> <li>• Provincial Diking Authority</li> </ul>



## STRATEGY AREA 7: SEA ISLAND – YVR

Situated on Sea Island, Vancouver International Airport (YVR) is the second busiest airport in Canada. Located at the mouth of the Fraser River estuary, the airport is surrounded by large tracts of ecological lands included within the Iona/SICA and Sturgeon Banks WMA strategy area. Vancouver International Airport is owned by Transport Canada and managed by Vancouver Airport Authority.







**Desired Outcomes:** Existing partnerships between the City, YVR and other agencies are built upon and strengthened to address burgeoning ecological challenges and opportunities.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• YVR lands are Federally held</li> <li>• Significant bird habitat</li> </ul>
<b>Key Opportunities</b>	<p>Joint Partnerships:</p> <ul style="list-style-type: none"> <li>• Sea Island Slough revitalization</li> <li>• Collaborate with YVR regarding environmental enhancement initiatives to improve the ecological resiliency of the City's and YVR's lands</li> <li>• Invasive Species Management</li> <li>• Explore partnerships with private land owners</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• YVR</li> <li>• Canadian Wildlife Service</li> <li>• Local businesses</li> <li>• Vancouver International Airport (YVR) Environmental Advisory Committee</li> </ul>

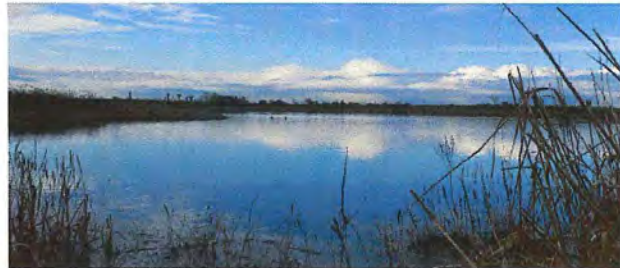


## STRATEGY AREA 8: IONA – SICA (SEA ISLAND CONSERVATION AREA)

The Iona/SICA Strategy Area occupies lands within the jurisdiction of the Canadian Wildlife Service (Sea Island Conservation Area), Metro Vancouver (Greater Vancouver Sewerage & Drainage District and Metro Vancouver Park lands), YVR and the City of Richmond (Macdonald Beach Park). **Bounded by the Fraser River and Macdonald Slough and the foreshore, these estuarine lands, including the Iona Spit, provide a contiguous network of protected habitat that include remnant dune habitat, foreshore and slough marshes, remnant forest patches, upland open fields, saline marshes and open water ponds.** The Metro Vancouver Sewage Treatment Plant lands, the jetty and other leased businesses including log booming and other non conservation activities occur in this area.







**Desired Outcomes:** Ecological resiliency, ecosystem services and green infrastructure functions are enhanced when large, contiguous tracts of land can be assembled and managed with a common ecological goal. The Iona/SICA Strategy Area represents a unique assemblage and Hub of Fraser River riparian, dune, slough and foreshore habitats within different ownership, yet are managed for their overall ecological connectivity. These lands continue to contribute significantly to the community as a public amenity for wildlife viewing and by walkers, dog walkers, horse-back riding, cyclists, bird watchers, botanists and many others due to the unique estuary setting.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• Multiple jurisdictions.</li> <li>• Invasive Species Management</li> </ul>
<b>Key Opportunities</b>	<ul style="list-style-type: none"> <li>• Collaborative environmental enhancement initiatives to establish resiliency of lands within the Ecological Network that have a diversity of tenure</li> <li>• Collaborative initiative to develop connectivity between sites and hubs in this Strategy Area</li> <li>• Collaborative approach to community stewardship and education initiatives</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• First Nations</li> <li>• YVR</li> <li>• Greater Vancouver District Sanitary Sewer facility</li> <li>• Metro Vancouver Parks</li> <li>• Canadian Wildlife Service</li> <li>• Port Metro Vancouver</li> </ul>



## STRATEGY AREA 9: WILDLIFE MANAGEMENT AREAS (WMAS)

As an estuarine municipality, Richmond is home to two provincially designated Wildlife Management Areas (WMAs), Sturgeon Bank and the South Arm Marshes. These large hub areas provide critical foreshore marshes and island habitat that support a diversity of ecological habitats that are integral to our estuarine island City. **These WMAs are also part of a recently expanded and renamed Ramsar site called the *Fraser River Delta*. This international designation recognizes critical migratory habitat for shorebirds, migrating and wintering waterfowl and critical feeding and rearing for anadromous salmon during their transition between river and marine stages of their life cycle.**







**Desired Outcomes:** The long term ecological resiliency of the WMAs is maintained over time. Retention of the ecological resiliency assures that the WMAs continue to provide the essential wildlife/conservation values and ecosystem services that are critical for the estuary. Expanded linkages with adjacent ecological lands (e.g., Grauer Lands), habitat restoration, enhancement projects and ongoing research within the WMAs continue to support their long term ecological resiliency.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• Sturgeon Banks and South Arm Islands WMAs comprise the largest area of aquatic hub areas in the Ecological Network</li> <li>• Provide critical habitat to a diversity of waterfowl, shorebirds and salmon</li> <li>• Provide valuable ecosystem services for sea level rise and wave dissipation</li> </ul>
<b>Key Opportunities</b>	<ul style="list-style-type: none"> <li>• Wildlife viewing</li> <li>• Nature interpretation</li> <li>• Dike Master Planning</li> <li>• Habitat enhancement</li> <li>• Invasive Species Management</li> <li>• Review of original WMA Management Plans (MFLNRO)</li> <li>• RAMSAR designated – Fraser River Wetland Complex</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• First Nations</li> <li>• MFLNRO (Ministry of Forests, Lands and Natural Resource Operations)</li> <li>• DFO (Fisheries and Oceans Canada)</li> <li>• Advisory Committee on the Environment</li> <li>• Ducks Unlimited</li> <li>• Port Metro Vancouver</li> <li>• Canadian Wildlife Service</li> </ul>

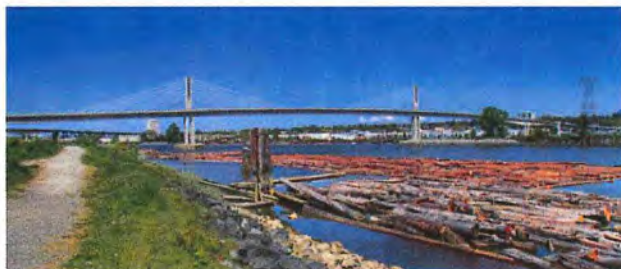
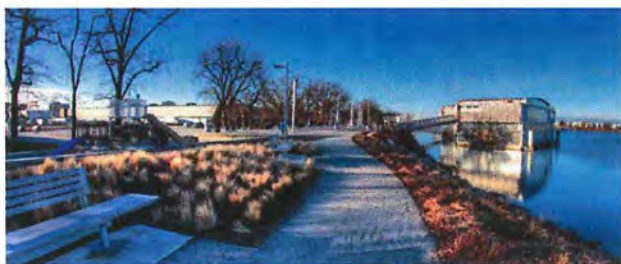


## STRATEGY AREA 10: FRASER RIVER

The Fraser River created the islands that are now Richmond and continues to define the City and its setting. Richmond lacks conventional watersheds; instead it is located at the estuary of the largest river in western Canada. Surrounded by the Fraser and its exceptional natural values, Richmond's EN is inextricably linked to the river. **The Fraser River Strategy Area is defined by extensive wetlands critical for many species, particularly migratory birds. The Fraser River estuary serves as critical habitat for all five species of Pacific Salmon, and the Fraser River itself is one of the largest salmon-bearing rivers in the world.** The 2041 Richmond Official Community Plan (OCP) contains several policies that speak to the need to protect the Fraser River. Some of these are contained in Chapter 9 and pertain to prioritization of the protection and enhancement of the Fraser and West Dike foreshore habitat via assured compliance with established Environmentally Sensitive Area (ESA) setbacks of 30 metres seaward and 30 metres inland of the high water mark, as well as setbacks of 5 or 15 metres from all Riparian Management Areas (RMAs). In addition, Chapter 10 of the OCP, "Open Space and Public Realm", provides guidance in show-casing Richmond's waterfront by linking the river with the community through recreational opportunities as well as by protecting, enhancing and connecting ecological values and public amenities, and providing educational and interpretive programming.







**Desired Outcomes:** The north, south and middle arms of the Fraser are places of high-functioning ecological health, increased water quality, and are valued as Richmond's most important assets with development enhancing the environment and exerting a light-footprint upon the City's most significant ecological asset. The City will use the EN structure to be a responsible steward of the Fraser River. The EN will function to protect and enhance the foreshore and riverine environment while accommodating anticipated development. The EN directions are intended to provide tactical and site-level actions that will guide development on the foreshore.

<b>Critical Issues</b>	<ul style="list-style-type: none"> <li>• The Fraser River is a "Living Working River"</li> <li>• Significant portion of the Ecological Network's hubs and sites within City jurisdiction occur on the Fraser River</li> <li>• Balancing the needs of waterfront activities (development, Port Metro Vancouver lands, industrial uses, the perimeter dike, public amenities, etc.) with high value estuarine habitat</li> </ul>
<b>Key Opportunities</b>	<p>Integration of guideline documents and process related to habitat protection and development of the Fraser River foreshore:</p> <ul style="list-style-type: none"> <li>• Dikes</li> <li>• Stormwater management</li> <li>• Pump station upgrades</li> <li>• ESA Development Permit</li> <li>• RMA process</li> <li>• Tree Bylaw</li> <li>• Perimeter trail network,</li> <li>• Waterfront Strategy: <i>Art on the Edge</i> program</li> </ul>
<b>Stakeholder Considerations</b>	<ul style="list-style-type: none"> <li>• First Nations</li> <li>• Advisory Committee on the Environment</li> <li>• Port Metro Vancouver</li> <li>• DFO (Fisheries and Oceans Canada)</li> <li>• MFLNRO (Ministry of Forests, Lands and Natural Resource Operations)</li> <li>• Fraser Basin Council</li> <li>• Canadian Wildlife Service</li> <li>• Ducks Unlimited</li> <li>• Harbour Commission</li> </ul>

## Next Steps

In order to ensure that the Ecological Network Management Strategy remains a pragmatic and evolving strategic document, the next phase in this work will seek input from a range of stakeholders and the public. This consultation process will inform a forthcoming action plan that will identify and provide strategies for integrating key actions, initiatives and priorities for EN enhancement into City process, and serve as a catalyst for community stewardship.



## Glossary

**Connectivity Zone:** a non-linear area that provides connectivity for biodiversity and other ecological components between habitat patches; for example a large old field may be a connectivity zone between adjacent wetlands but the movement route does not follow a linear feature such as watercourse.

**Corridor:** is a linear feature such a watercourse and adjacent riparian zone that allows the movement of wildlife or other biodiversity components between habitat patches.

**Ecological Network:** is the inter-connected system of natural areas across Richmond's landscape. It is composed of both terrestrial and marine (shoreline and intertidal) areas.

**Ecosystem Services:** "Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth". From Millenium Ecosystem Assessment. Ecosystems and Human Well-being: A Framework for Assessment (2005).

**Environmentally Sensitive Area:** an ecologically important area identified and mapped by the City of Richmond within the Official Community Plan; most are protected as development permit areas.

**Functioning Corridor:** a linear area of habitat with continuous or near-continuous natural vegetation cover along its length. This type of corridor offers an existing pathway for biodiversity to move between habitat patches.

**GIS (Geographic Information System):** a system of organizing, analyzing, and displaying spatial (map) data; it can be thought of as digital map with many layers including features that are points, lines, or shapes.

**Green Infrastructure:** encompasses the components of the natural and built environment that provide ecosystem services such as drainage, water filtration, green space, and wildlife habitat; they are often smaller than components of the EN.

**Green Infrastructure Network (GIN):** a network of natural and built features that are introduced or enhanced across the Richmond landscape over time; the Green infrastructure Network contributes to the connectivity and resiliency of the EN.)

**Greenway:** is a linear corridor for improving environmental quality and outdoor recreation or transportation; the Railway Avenue Greenway is an example in Richmond.

**Highwater Mark:** a line defining the highest elevation of inundation from water under normal tides or floods; it is often the lowest point for rooted woody vegetation; it defines the boundary between the terrestrial and intertidal or marine realms.

**Hub:** a component of the EN that is >10 ha in size and naturalness >3; it may be forest, wetland, or other type of ecosystem; hubs are the most important part of the EN.

**Impaired Corridor:** a linear corridor with some natural vegetation cover along its length but contains significant gaps that are currently compromising its function as a pathway for wildlife movement between hubs. As a result, actual use of the corridor in its current state may be limited. This type of corridor has a high potential for restoration.

**Matrix:** in an EN, the matrix is the developed portion of the landscape (e.g., houses, farms, developed parks) that surrounds the main components of the EN; it also provides some ecological values and ecosystems services and influences the function of the network.

**Non-functioning Corridor:** a linear corridor that has little to no natural vegetation along its length and does not function as pathway for wildlife movement between hubs in its current state. Non-functioning corridors were identified based the least-cost path analysis and are shown where connectivity would significantly benefit the integrity of the EN but is currently lacking. Larger-scale restoration efforts would be required to restore connectivity in these areas.

**Riparian Management Area (RMA):** a 5 or 15 m wide zone (depending on watercourse size and fish habitat value) on both sides of a watercourse (measured from the highwater mark) which is used to maintain watercourse health; RMAs were implemented in response to provincial requirements under the BC Fish Protection Act.

**Riparian Zone:** the land area bordering watercourses or shorelines with distinctive vegetation, topography, and soils related to its proximity to watercourses; riparian zones are important for biodiversity, watercourse health, and other values (shading, bank stabilization, etc.).

**Shoreline Zone:** areas within 30 m of the highwater mark of the Fraser River or the Strait of Georgia; it includes developed and natural areas.

**Site:** a component of the EN between 0.1 and <10 ha in size and naturalness >3; it may be forest, wetland, or other type of ecosystem; sites are important for maintaining connectivity within development landscapes.

**Watercourse:** a water feature with a defined channel formed by the regular movement of water; in Richmond, watercourses are mainly man-made or modified features such as ditches and canals.



## References and Resources

- Axys Environmental Consulting. 2006. Assessment of Regional Biodiversity and Development of a Spatial Framework for Biodiversity Conservation in the Greater Vancouver Region. Biodiversity Conservation Strategy Partnership, Burnaby, BC.
- Benedict, M. and E.T. McMahon. 2006. Green Infrastructure: Linking Landscapes and Communities. Island Press, Washington. 299 pp.
- Boitani, L. A. Falcucci, L. Maiorano, and C. Rondinini. 2007. Ecological Networks as Conceptual Frameworks or Operational Tools in Conservation. *Conservation Biology* 21 (6):1414-1422.
- City of Edmonton. Natural Connections Strategic Plan. 48 pp.
- Grossman D.H., Faber-Langendoen, D., Weakley, A.S., Anderson, M., Bourgeron, P., Crawford, R., Goodin, K., Landa, I.S., Metzler, K., Patterson, K.D., Pyne, M., Reid, M., and L. Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume I, The National Vegetation Classification System: development, status, and applications. The Nature Conservancy: Arlington, VA.
- HB Lanarc and Raincoast Applied Ecology. 2011. City of Surrey Ecosystem Management Study: Books 1 and 2. 79 pp.
- Jongman, R.H.G., M. Külvik, I. Kristiansen, I. 2004. European ecological networks and greenways. *Landscape and Urban Planning* 68: 305–31.
- Maybury, K. P., editor. 1999. Seeing the Forest and the Trees: Ecological Classification for Conservation. The Nature Conservancy, Arlington, Virginia.
- McRae, B.H., B.G. Dickson, T.H. Keitt, and V.B. Shah. 2008. Using circuit theory to model connectivity in ecology and conservation. *Ecology* 10: 2712–2724.
- Millennium Ecosystem Assessment. 2005. Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC.
- Weber, T. Maryland's Green Infrastructure Assessment: A Comprehensive Strategy for Land Conservation and Restoration. Maryland Department of Natural Resources. 246 pp + appendices.





# Appendix 1

Ecological Network—  
Regulatory Context





## Ecological Network – Regulatory Context

Regional Growth Strategy (Metro Vancouver)	<p>Goals 3: Protect the Environment and Respond to Climate Change Impacts</p> <ul style="list-style-type: none"> <li>• Strategy 3.1: Protect Conservation and Recreation lands</li> <li>• Strategy 3.2: Protect and enhance natural features and their connectivity</li> <li>• Strategy 3.3: Encourage land use and transportation infrastructure that reduce energy consumption and greenhouse gas emissions, and improve air quality</li> <li>• Strategy 3.4: Encourage land use and transportation infrastructure that improve the ability to withstand climate change impacts and natural hazard risks.</li> </ul>
Ecological Health Action Plan (Metro Vancouver)	<p>Project 1: Advancing a Regional Green Infrastructure Network</p> <ul style="list-style-type: none"> <li>• Objective: Enhance and expand a Regional Green Infrastructure Network in collaboration with regional stakeholders.</li> </ul> <p>Project 9: Relandscaping Wastewater Treatment Plants</p> <ul style="list-style-type: none"> <li>• Objective: Revegetate industrial sites to enhance biodiversity by focusing on flowering shrubs for pollinators and trees for rainwater detention.</li> <li>• Objective: Show leadership by investing in green infrastructure in industrial areas.</li> </ul>
Council Term Goals (2011-2014)	<p>Priorities:</p> <p>2.9 Encourage the development of community volunteer programs and strategies that build a broad, knowledgeable and keen volunteer base, and that provide positive and meaningful opportunities for volunteers to utilize their talents while helping to provide important services to the community. (Community Social Services).</p> <p>3.6 Develop and integrated strategy for the Steveston Waterfront that blends business and public interest in a manner that allows for continued sustainable development in this area.</p> <p>3.8 Develop a “stay-cation” appeal for the City and region.</p> <p>8.1 Continued implementation and significant progress towards achieving the City's Sustainability Framework and associated targets. (Sustainability)</p> <p>8.2 Continue to advocate for a coordinated regional approach to enhance local food security in Richmond and the region through policy development and initiatives such as community farms. (Sustainability)</p> <p>8.3 Communicate to the public the City's Sustainability goals with detail on how the City is meeting (or exceeding) these goals and how they support Provincial goals.</p> <p>8.4 Review opportunities for increasing sustainable development requirements for all new developments, including consideration of increasing requirements for sustainable roof treatments (e.g., rooftop gardens, solar panels, etc.) and energy security (e.g., use of local renewable energy sources, use of district energy systems, etc.).</p> <p>10.3 Create urban environments that support wellness and encourage physical activity. (Community Wellness)</p> <p>10.4 Continued emphasis on the development of the City's parks and trails system. (Community Wellness)</p>
OCP	<p>Ch 2: Climate Change Response</p> <ul style="list-style-type: none"> <li>• Section 2.3, Objective 1, policy a) protect and enhance Richmond's natural environments to support carbon retention as well as other important ecosystem services (pollution reduction, nutrient generation, habitat).</li> <li>• Section 2.3, Objective 1, policy b) integrate carbon retention objectives into key policies, plans and programs, including but not limited to Parks and open Spaces Strategy, Environmentally Sensitive Areas Management Strategy and land use and development policies.</li> <li>• Section 2.4, Objective 1, policy b) Sustainability staff to lead the integration of climate change adaptation considerations into key policies, plans, programs and services, including land-use and development decision-making, city infrastructure design and management; floodplain management, emergency preparedness, natural ecosystem health, agricultural viability, social development planning and economic development.</li> </ul>



#### Ch 7: Agriculture and Food

- Ensure that land uses adjacent to, but outside of, the ALR are compatible with farming by establishing effective buffers on the non-agricultural lands.
- Designate all parcels abutting, but outside of, the ALR boundary as DPAs with Guidelines for the purpose of protecting farming.
- Minimize conflicts among agricultural, recreation, conservation and urban activities.
- Environment policies explore ways to protect the EN values of agricultural land: encourage the Environmental Farm Program, explore the leasing of lands that have important agricultural values, explore compensation to farmers for the loss of cultivation to maintain key ecological objectives.
- Urban food production policies speak to increasing the number of community gardens, edible landscapes and food bearing trees in open space, and in new and existing residential development.

#### Ch 9: Island Natural Environment (an Ecological Network Approach)

- Objective 1: Protect, enhance and expand a diverse, connected and functioning EN
- Objective 2: Promote green infrastructure and the Green Infrastructure Network (GIN) and their underlying ecosystem services on all lands.
- Objective 3: Proactively implement practices to protect and improve water, air and soil quality
- Objective 4: Develop partnerships for "Ecological Gain".
- Objective 5: Foster Environmental Stewardship.
- Objective 6: Achieve long-term protection for Environmentally Sensitive Areas (ESAs) through the implementation of the 2012 ESA Management Strategy.

#### Ch 10: Open Space and Public Realm

- Objective 5: Strategically expand the range of ecosystem services (e.g., biodiversity and habitat, rain water management, carbon sequestration) integrated within the open space and public realm to strengthen and contribute to the Ecological Network.
- Objective 6: Showcase Richmond's world-class waterfront and enhance the Blue Network (the Fraser River shoreline and estuary, and the internal waterways, the sloughs, canals, and wetlands) for their ecological value, recreational opportunities, and enjoyment.

#### Ch 12: Sustainable Infrastructure and Resources

Objective 1, policy e) encourage the use of collection and drainage systems that harvest rainwater for non-potable water uses, temporarily store rainwater during major storm events and reduce surface contaminants from entering drainage systems.

- Objective 1, policy h) wherever practical, retain open watercourses to provide drainage, and ensure that the watercourse permitting process is followed.
- Objective 1, policy i) integrate drainage with the Ecological Network.
- Section 12.10 Street Trees – speaks to urban forest strategy, coordinated planting, healthy diversity of trees, tree health and retention.

#### DPs

Ch 14 of the OCP provides Development Permit Guidelines from Environmentally Sensitive Areas:

- Intertidal
- Shoreline
- Upland Forest
- Old Fields and Shrublands
- Freshwater Wetlands

The following general guidelines speak to the retention and/or enhancement of the natural environment as part of DP requirements:

- Heritage Preservation (14.2.4, c))
- Site Landscaping (14.2.5, 14.2.5b-c)
- Green Buildings and Sustainable Infrastructure (14.2.10 d)
- Agriculture Land Reserve Landscape Buffers (14.2.14)

The following guidelines contain Sustainability Initiatives that speak directly to tree/ vegetation retention, rainwater collection/retention, naturesscaping and green technology:

- Intensive Residential Guidelines – Granny Flats and Coach Houses (14.3).



	<ul style="list-style-type: none"> <li>• Multiple Family Guidelines (14.4: 14.4.1.F Preservation of Existing Natural Features, 14.4.5 Landscaping and Open Space Design, 14.4.8 Edge Conditions (ESAs and Public Open Space).</li> <li>• Commercial and Commercial/ Mixed Use Guidelines (14.4.1.H Surface Parking Landscaping, 14.5.3 Green Building and Sustainable Infrastructure, 14.5.9 Landscaping and Street Furniture)</li> <li>• Industrial Guidelines (14.6.1.d Adjacent Uses (edge Conditions), 14.6.4 Site Planning and Landscaping)</li> <li>• Marina Guidelines (14.8.1 Environment, 14.8.2 Public Access, 14.8.3 Landscaping).</li> <li>• Broadmoor Neighbourhood Centre Guidelines (14.9.5 Key Pedestrian Corridors, 14.9.8 Green Buildings and Sustainable Infrastructure)</li> </ul>
Zoning	<p>Bylaw 8500 (City of Richmond Zoning Bylaw) defines watercourses but does not delineate setbacks from watercourses. It also defines Parks and Landscaping. Specific park zoning regulations pertain to the location of City parks (permitted in all zones).</p> <p>Specific Landscaping and Screening regulations are found in part 6 of the Bylaw. These speak to the provision and maintenance of vegetation during the development process as well as alternatives to landscaping. Landscaping is most commonly referred to as a screening/ fencing tool.</p>
NPs	<p>Most area plans refer to the OCP for provisions pertaining to the natural environment, while some contain their own specific policies (e.g., Bridgeport Area Plan). For plans that do contain specific policies for the natural environment, these often refer to the provision of parks and recreation. In addition, most plans also contain specific Development Permit guidelines for landscape elements, often referring to tree and ground cover plantings along boulevards, as screening elements and as enhancements in common open space. Some plans provide examples of planting configurations and vegetation species that would enhance biodiversity (e.g., Blundell Area East Livingstone). The East Cambie Plan contains more specific policies regarding natural open space as it includes the Richmond Nature Park.</p>
CCAP	<p>Section 2.5 of the City Center Area Plan provides policies for ecology and adaptability. Specifically, it contains policies to ensure the long-term supply of interconnected ecological service areas, the encouragement of ecological-based amenities, green infrastructure and opportunities for public education and out-reach.</p> <p>Section 2.6 speaks to integrating ecological zones and a system of greenways into the City Centre. It also outlines a Base Level Open Space Standard for parks acquisition and speaks to securing public access on private property for park or greenway purposes. Additional studies recommended include an Urban Forest Strategy update and an Urban Ecology Study. According to the CCAP, 160.3 hectares of open space will be acquired by the City in the City Centre in the period ending in 2031.</p>
Bylaws	<p>Bylaw 6366 – Boulevard &amp; Roadway Protection</p> <p>Bylaw 7174 – Boulevard Maintenance</p> <p>Bylaw 7310 – Public Parks &amp; School Grounds Regulation</p> <p>Bylaw 8057 – Tree Protection</p> <p>Bylaw 8204 – Flood Plain Designation and Protection</p> <p>Bylaw 8441 – Watercourse Protection and Crossing</p> <p>Bylaw 8475 – Pollution Prevention and Clean-up</p> <p>Bylaw 8385 – Green Roofs &amp; Other Options Involving Industrial &amp; Office Buildings Outside the City Centre</p> <p>Bylaw 8514 – Pesticide Use Control</p>
ESA Management Strategy	<p>Completed in June of 2012, the ESA Management Strategy introduced the Ecological Network concept, but focused primarily on the development of Development Permit guidelines for Environmentally Sensitive Areas. These served to update the ESA DP guidelines for the 2041 OCP update.</p>



RMA	The Riparian Areas Regulation Response Strategy was developed in response to the provincial <i>Riparian Areas Regulation</i> (RAR) enacted under Section 12 of the <i>Provincial Fish Protection Act</i> . Riparian management Areas (RMAs) are setback of either 5 or 15 metres from the top of bank of inland watercourses in the City. No building, structure or surface construction is permitted in the RMA, and the RMA cannot be landscaped, however planting of native species within the RMA is encouraged. The RMA is currently not supported by a bylaw or a DP.
POSS	The recently adopted 2022 Parks and Open Spaces Strategy is comprised of seven focus areas, each containing several outcome statements. Each focus area speaks to and supports various facets and components of the Ecological Network, with the "Green Network" focus area speaking specifically to the parks and open spaces system contributing significantly to the conservation and enhancement of the EN. Other focus areas include Health and Wellness, Great Spaces and Experiences, Connectivity, Blue Network, Diversity and Multi-functionality, and Resource Management.





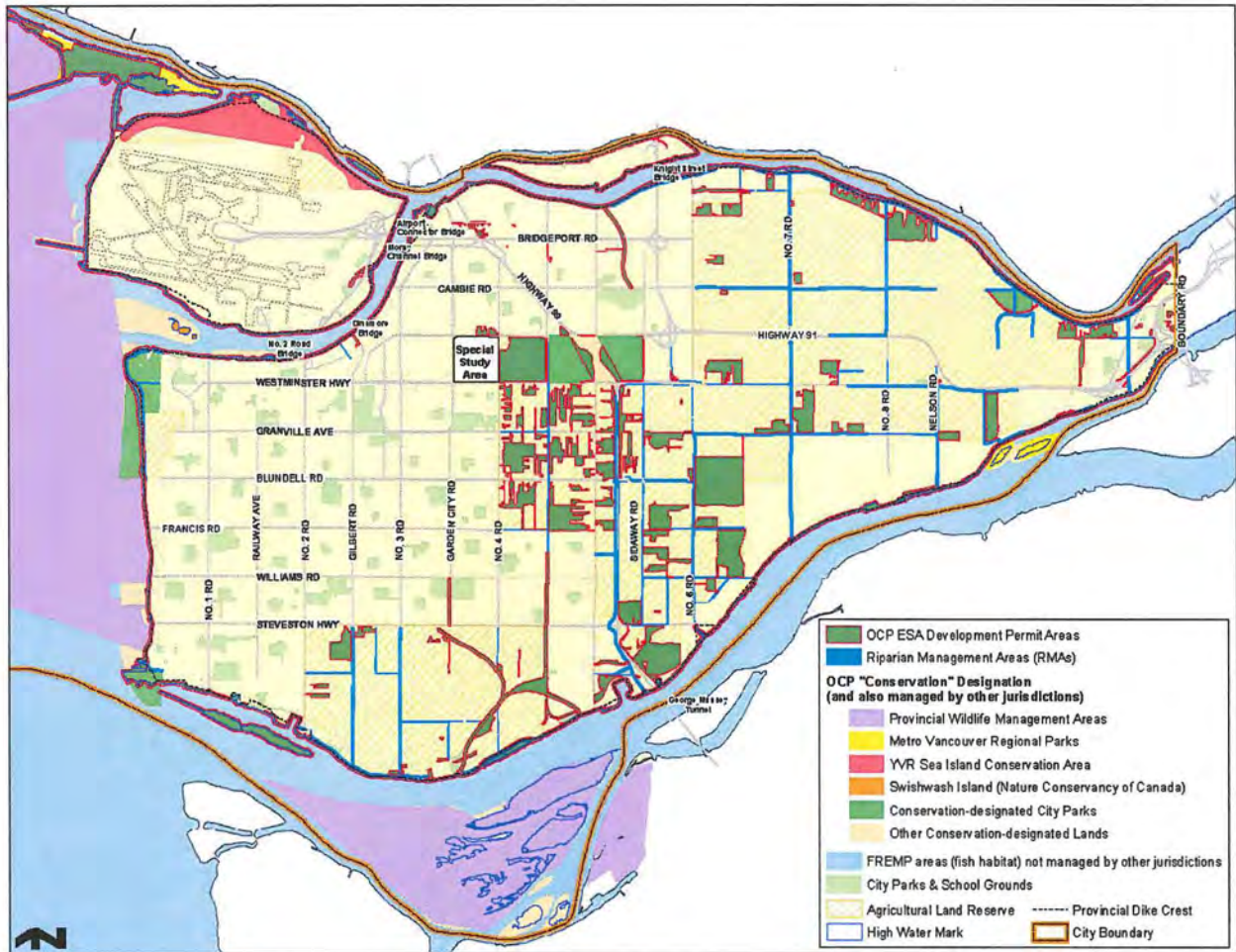
# Appendix 2

Ecological Network Foundation Maps  
from the 2041 Official Community Plan



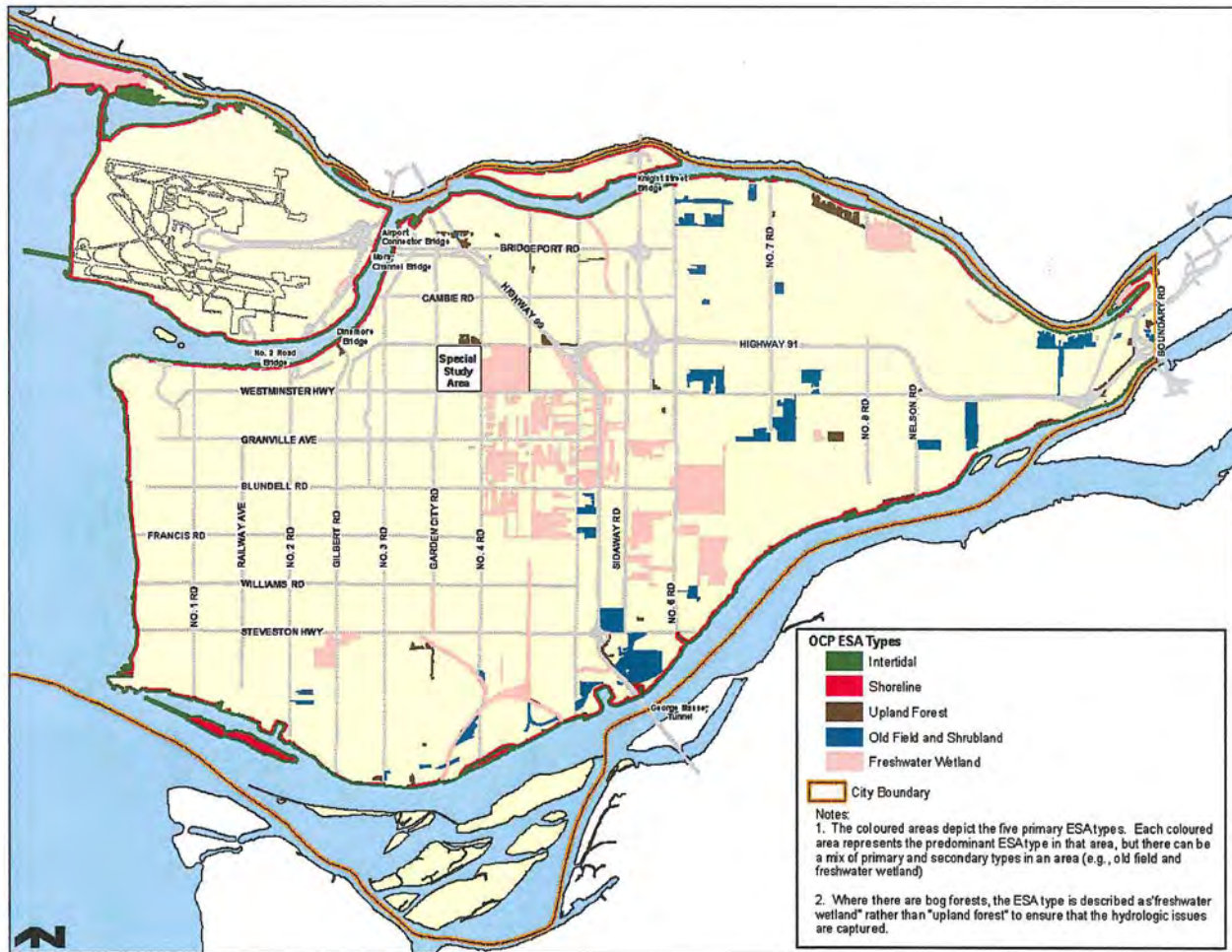






The Ecological Network Management Map. 2012.





ESA Development Permit Type Map. 2012





# Appendix 3

Circuitscape Mapping  
Methodology







## Understanding Habitat Connectivity in Richmond: Circuitscape-based Models

Draft Feb. 13, 2013

### 1. Introduction

This report summarises the methods used by Raincoast Applied Ecology to create habitat connectivity maps for the City of Richmond. Modelling was done in the connectivity software Circuitscape using habitat and landuse maps to identify important areas for species movement.

### 2. Circuitscape

Circuitscape is a connectivity model used to find pathways across a landscape (1). It can be used to model gene flow, habitat quality and for conservation planning. In this application we use it to evaluate habitat connectivity in an urban setting for a variety of habitat types.

Circuitscape is based on electrical circuit theory but applies these concepts to ecological landscapes. The model uses 'focal nodes' to introduce simulated electrical current. Focal nodes are areas identified as having high quality habitat that provides zero resistance to species movement. The rest of the landscape is assigned resistance based on the quality of habitat for the species being modelled. Current is supplied to each focal node while all other focal nodes are grounded. In this way the flow of current across the landscape is modelled between all pairs of focal nodes. The path of current is determined by the resistance it encounters at each point on the landscape. Areas of good habitat will have low resistance and will allow current to flow relatively freely. Areas of poor habitat will have higher resistance which will slow the flow of current and in extreme cases will block the current all together.

Circuitscape has two advantages over the widely use least-cost path methods. Firstly it does not constrain connectivity to a single best pathway. Current is free to flow anywhere and multiple pathways will often be identified as well as dead ends where a pathway meets resistance and cannot continue. Secondly, the flow of current in Circuitscape is based on a 'random-walk' where the species encounters resistance as it randomly moves across the landscape. This is more realistic than in least-cost methods where the species has complete knowledge of the entire landscape and can choose the best route accordingly. Detailed descriptions of the methods and theory underlying Circuitscape can be found in (2) and (3).

### 3. Methods

#### 3.1 Data

Three datasets were used for the analysis:

- i) *Richmond Ecologically Sensitive Areas (ESA)*  
This dataset contains information on the habitat types across much of the vegetated areas of the city. It also identifies areas of high naturalness, defined as hubs of high quality habitat. This was the primary dataset used to create habitat maps for the analysis. Examples of ESA habitat designations include forested wetlands, agricultural row crops, and old fields vegetated with shrubs and grasses.
- ii) *2006 Landuse*  
Areas not included in the ESA layer were added using the 2006 Landuse data. These areas were typically un-vegetated and of low habitat quality. Examples of landuse include commercial developments, industrial areas, and housing.
- iii) *Roads*  
Roads were used as barriers to species movement and were assigned resistances based on road class. Highways and connectors had the highest resistances whereas small lanes and local roads had lower resistances.



### 3.2 Habitat Models

Four different habitat types were modelled. The designation of habitat quality varied between the models depending on the usability of the habitat for the group of species being modelled. A forested wetland for example may provide high quality habitat for one group of species but lower quality habitat for others. By producing multiple habitat models we aimed to identify all areas of importance. Multiple models also allow identification of areas that are important for different groups of species. For each habitat type, two models were created, one for species with high dispersal potentials and one for species with low dispersal potentials. Species with high dispersal potentials are those that can travel most easily across the landscape, large birds for example. Species less able to disperse include smaller birds and small mammals. Poor dispersers would require more intact habitats and could not leapfrog as well between areas of high quality habitat.

The four habitat models were:

- i) *All species*  
This model attempts to give a general representation of habitat quality across all groups of species.
- ii) *Forest*  
This model targets species that rely on forested habitats. Areas of old coniferous, mixed and deciduous forest are prioritized, followed by younger forests, woody areas, and shrub habitats. Example species are cavity nesting birds such as woodpeckers and secondary cavity nesting birds and small mammals.
- iii) *Shrub*  
This model targets species that utilize smaller trees and shrubs as primary habitat. It gives high priority to deciduous and evergreen shrubs, followed by forested areas and areas with graminoid/herbaceous cover. Example species include passerines and small mammals that use shrubs for feeding and nesting.
- iv) *Old Field*  
This model is similar to the shrub model but places increased emphasis on the use of old field sites as productive habitat. Examples of species that could benefit from these areas are small mammals that prefer lower vegetation.
- v) *Wetland*  
This model targets species that require wetland habitat such as bogs, lakes and marshland. Example species are wetland birds and small mammals.

### 3.3 Resistance Maps

In order to model the movement of species across the landscape, Circuitscape requires a resistance map that represents the quality of habitat in every pixel. Pixels with higher resistances represent lower quality habitat. The model will therefore seek paths between pixels with lower resistance since these are the areas that are easiest for species to move through. For each habitat model, resistances were assigned to every habitat type, landuse type, and road category in Richmond to create a single resistance map for each habitat model. The resistances assigned varied depending on the habitat type and dispersal ability being modelled.

### 3.4 Focal Nodes

Focal nodes are the areas of highest quality habitats that are used to start the modelling process. The modelled pathways of species movement radiate out from these nodes and if a suitable path of low resistance is found the nodes will be connected by pathways of suitable habitat. For each model a set of approximately 15 focal nodes were identified. This was done by selecting the polygons with the lowest resistances that also had ESA naturalness values of 4 or 5 (High or Very High naturalness). Geographical distribution was also considered because a spread of focal nodes across the landscape is required to identify all potential pathways. Since the

modelling is done in a pairwise fashion between all pairs of focal nodes, increasing the number of nodes greatly increases the processing time. A balance therefore had to be struck between the distribution and number of nodes. Rules for focal node inclusion were relaxed for the wetland model to include a number of lakes and to ensure geographic spread of focal nodes. All resistance maps were created in Arc GIS 10.1.

### **3.5 Circuitscape Modelling**

All models were run in Circuitscape 3.5.8. Data inputs required for modelling are a map of focal nodes and a map of resistances, both in ASCII format. Circuitscape output was taken into ArcGis 10.1 for display.

## **4. References**

(1) [www.circuitscape.org](http://www.circuitscape.org)

(2) McRae, B.H., B.G. Dickson, T.H. Keitt, and V.B. Shah. 2008. Using circuit theory to model connectivity in ecology and conservation. *Ecology* 10: 2712-2724.

(3) McRae, B.H. and P. Beier. 2007. Circuit theory predicts Gene flow in plant and animal populations. *Proceedings of the National Academy of Sciences of the USA* 104:19885-19890.





## City of Richmond

6911 No. 3 Road, Richmond, BC V6Y 2C1  
Telephone: 604-276-4000  
[www.richmond.ca](http://www.richmond.ca)



# City of Richmond

## Report to Committee

**To:** Public Works and Transportation Committee

**Date:** April 8, 2014

**From:** John Irving, P.Eng. MPA  
Director, Engineering

**File:** 11-7000-09-20-100/Vol  
01

Jane Fernyhough  
Director, Arts, Culture and Heritage Services

**Re:** Manhole Cover Art Contest and Program

### Staff Recommendation

That the implementation of the public art contest and program for integrating artwork on sanitary sewer and storm drainage manhole covers, as outlined in the report from the Director, Engineering, and Director, Arts, Culture and Heritage Services dated April 8, 2014, be endorsed.

John Irving, P.Eng. MPA  
Director, Engineering  
(604-276-4140)

Jane Fernyhough  
Director, Arts, Culture and Heritage Services  
(604-276-4288)

Att. 1

REPORT CONCURRENCE	
CONCURRENCE OF GENERAL MANAGER 	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE 	INITIALS: 
APPROVED BY CAO 	



## **Staff Report**

### **Origin**

On July 27, 2010, Council endorsed the Public Art Program Policy 8703, which identifies strategies to fully integrate artwork into the planning, design and construction of civic works.

On October 11, 2011, Council endorsed the City Centre Public Art Plan identifying and prioritizing public art opportunities in the City Centre. Integrating public art into infrastructure design, including manhole covers, was identified as an immediate priority.

The purpose of this report is to provide Council with information regarding the Manhole Cover Art Contest and the community outreach opportunities to engage a large cross section of the community of all ages and local artists with a wide range of expertise.

This initiative is in line with Council Term Goal 9.1 Arts and Culture:

*Build culturally rich public spaces across Richmond through a commitment to strong urban design, investment in public art and place making.*

### **Analysis**

#### **Background**

There are over 50,000 storm water and sanitary sewer manhole covers throughout the City, many in highly visible public locations on sidewalks and pedestrian street crossings. The current manhole covers are utilitarian in design, however, manhole covers with a custom design can be purchased at the same price as the standard covers. The City purchases approximately 150 replacement manhole covers each year, which is an opportunity to place decorative manhole covers in strategic locations. By incorporating art into the design of manhole covers there is an opportunity to make these cast iron lids beautiful, informative and unique.

#### **Terms of Reference – Integrated Art on Manhole Covers Art Contest**

The public art Terms of Reference for the Manhole Cover Art Contest (Attachment 1) describes the project description, art opportunity, entry requirements, and selection process.

#### **Artist Selection Process**

Following the administrative procedures for artist selection for civic public art projects, a five person selection panel will convene to review the artist submissions. It is intended for two artist designs to be recommended for the new manhole covers (one storm water and one sanitary), plus honourable mentions for short listed artists. In addition to the two designs recommended for incorporation into the covers, a second category for children aged 12 years and under will be reviewed by the selection panel with two contest winners (not for fabrication) and honourable mentions to be identified.

### Community Engagement

City staff working across departmental sections, including Engineering, Public Works, Environmental Programs, Arts, Culture & Heritage Services, Production, and Corporate Communications, will be instrumental in developing a successful community engagement process for the art contest. City staff have also identified points of contact with arts education programs, including the Richmond School Board and Kwantlen Polytechnic University, to engage school children, emerging artists and designers.

Proposed themes for the artwork contest will reference Richmond's cultural heritage, community identity, and ecological history. The educational messaging of the contest will be to highlight and raise awareness of the importance of keeping our waters clean and the environmental concerns in safely disposing of liquids.

Key civic, arts and cultural events in the spring and summer of 2014 will provide platforms to engage artists of all ages and to educate the public about the important role our storm water and sanitary sewer infrastructure play:

- Project WET, Water Education Team Program, Public Works – May 20 - 22, 2014
- Public Works Open House – May 24, 2014
- Doors Open – June 7-8, 2014
- Culture Days – September 27-28, 2014

The competition will close in early October 2014, followed by a display of all entries online for public feedback and voting for the People's Choice selection. Following the selection panel review of the submissions in Fall 2014, the two recommended artworks will be presented for Council endorsement in early 2015 followed by a public unveiling of all the winners and honourable mentions, including the children's category.

The communications plan to promote the program will include posters, local newspapers, social media, and the City of Richmond website. Additionally, City staff will work with a contract communications designer to create a contest website that will be linked to the City's website. This will allow the public to conveniently submit their designs and application forms and will assist City staff in building audiences.

Social media vehicles will be a focus for the Manhole Cover Art Contest to build community engagement and raise awareness of both public art and the sewerage systems in the City. A public vote using social media will recognize the People's Choice artists to receive honourable mentions.

### Implementation

Staff and the selected artists will work with the current fabricator and supplier of sanitary and storm water manhole covers, Westview Sales Limited, to translate the two winning artist designs into production molds for fabrication. Westview Sales Limited will sponsor the additional costs for creating two unique molds, coordination and labour. There will be no additional costs for the decorative manhole covers above existing purchasing programs.



The focus of the initial program will be to place manhole covers in high visibility locations in the pedestrian oriented Neighbourhood Service Centres and the developing City Centre, either in new locations or replacing existing covers. In the event that existing covers are replaced, they will be recycled and used in other less visible locations around the City.

Staff are currently developing a Steveston Village Public Art Plan, and while the manhole covers to be selected through this contest may be suitable for Steveston, it would be more appropriate to develop a specific manhole cover project unique to Steveston in the future, based on the strategic directions developed in consultation with the Steveston community. Staff will report back to Council in early 2015 on the Steveston Village Public Art Plan.


### Financial Impact

The total project budget is \$16,000. This will include selection panel honorariums, website management services, promotional campaign and coordination, artist fees, and material expenses for civic community engagement events. Engineering has allocated \$11,000 for this project from existing funds. The Public Art Program will provide the remaining \$5,000 from the approved 2014 Capital Budget for public art programs

### Conclusion

The Manhole Cover Art Contest represents an opportunity to engage a large cross section of artists of all ages and creative practices. Incorporating art into functional objects is an affordable, high-impact method of integrating the arts into everyday life and making art accessible to the public.

The manhole cover project builds on other programs for successfully integrating art with civic infrastructure, such as drainage pumps stations and the district energy utility, and is a low cost opportunity to continue this practice. Integration of public art with manhole covers is consistent with the vision and strategic direction of the Richmond Arts Strategy, to broaden the diversity of arts experiences and opportunities, and supports the Council Term Goal to build culturally rich public spaces across Richmond through a commitment to strong urban design, investment in public art and place making.



Lloyd Bie  
Manager, Engineering Planning  
(604-276-4075)



per Eric Fiss  
Public Art Planner  
(604-247-4612)

LB:ey

Att. 1: Outline Terms of Reference Document



**City of  
Richmond**

**Public Art**  
Community Services Department  
Arts Services

**Terms of Reference – Manhole Cover Art Contest**  
(Text Copy Version for Production Services to produce public artist call brochure)

**Introduction (front page) – “Cover Stories”**

Thousands of manhole covers are located throughout the city but they tend to get lost in the urban landscape mix. This is your chance to help turn these ordinary cast-iron lids into works of art. Put your pencil to paper and create a design that could be showcased on Richmond's streets for a lifetime.



Figure 1. - Existing Richmond Sanitary and Storm Manhole Covers



Figure 2. Susan Point, Vancouver. (2004)



Figure 3. Artist: Anne Knight, Seattle (1975)

**[Insert relevant organization branding logos, including City of Richmond and Richmond Public Art]**



## **Facts about Richmond's Sewer Systems**

In Richmond, there are two separate sewer systems: sanitary and storm. Sanitary sewers direct waste water from sinks and washrooms to a treatment plant. Storm sewers prevent flooding by directing water from streets, sidewalks and outdoor spaces to drainage systems that go directly to the Fraser River or the ocean. As storm water is not treated, it is important that only clean rain water enter storm drains. Harmful chemicals found in soapy water from car washing and pesticides from lawns can harm the ecosystems connected to the storm drainage system.

## **Context and Themes for the Artwork**

The artwork should reference our cultural heritage in Richmond. You might think about all the pivotal moments in Richmond's history that have shaped our cultural, social and political identities. These may include important historical figures or a key historical event. The artwork may tell a story or have an educational message. Think about how your design can help to establish a sense of place, remembrance and pride for years to come.

**[Insert Richmond archive images of Musqueam First Nations, Chinese and Japanese historical figures, Samuel Brighthouse, Lulu Sweet, fishing industry, farming industry, horse racing, transportation heritage, ecological heritage, Fraser River] Reference Richmond City Archives for further information.]**

## **Eligibility**

The manhole cover art contest is open to anyone who lives in Metro Vancouver. You don't have to be a professional artist to participate in the contest, just have a great imagination.

## **How to Apply**

- Submission deadline is Friday October 3, 2014
- All designs must use the provided templates and be submitted on-line by following the step by step application process at **[Insert website link]**.
- Please do not submit more than two designs per person.
- All submissions must be submitted through the on-line process.

## **Design Considerations**

Designs should be clear and easily transferable to create the mould for the casting process. The selected artists will be required to work with the fabricator to finalize the design before fabrication. The design should have textural elements to prevent pedestrians and bicycles from slipping on the covers. Your design may include some text. Designs should be in black and white and be contained within the dedicated circle area of the attached templates.

### **Selection Process and Artwork Exhibition**

Artist submissions will be uploaded to the City of Richmond Facebook page and will be eligible for selection by the community at large for the on-line People's Choice voting and award.

A five-person jury made up of artists, community representatives and art professionals will review all submissions anonymously. Two designs will be selected to be integrated onto our manhole covers. The two selected artists will each receive \$2,000. People's Choice and Short-Listed honorable mentions will also be given.

\*Special honorable mentions will be presented to school children under the age of 12 years old.

- Short-listed Artists will be announced in November 2014
- Winners and honourable mentions will be announced in January 2015
- Exhibition of Finalists in February 2015
- Installation in July 2015

**Questions? Contact: [publicart@richmond.ca](mailto:publicart@richmond.ca)**

### **Legal Terms and Conditions**

**Consequences of submission and the acceptance of designs:** The City and the selection panel is not obliged to accept any submissions and it may reject all submissions. By submitting a design, each artist will be deemed to: (1) agree with the City that the City will not be responsible for any costs, losses, damages or liabilities incurred by him or her as a result of or arising out of this call for designs; and (2) consent to the display of his or her design at the public exhibition referred to in this call for designs. Employees of the City of Richmond and family members are not eligible to submit designs and; (3) artwork must be original and made by the artist submitting the contest entry. Absolutely no mechanical reproductions of original works are permitted; and (4) artist retains sole copyright to his/her artwork. The City of Richmond will have unlimited reproduction rights to all contest submissions; and (5) Submissions will not be returned to the artist.



22.25" diameter cover  
1" cored hole  
1" type  
18.75" diameter artwork  
area (inside circle)



Figure 4. Artist Template

22.25" diameter cover  
1" cored hole  
1" type  
18.75" diameter artwork  
area (inside circle)



Figure 5. Artist Template





**To:** Public Works and Transportation Committee  
**From:** Tom Stewart, ASCT,  
Director, Public Works  
**Re:** **Multi-Material BC Program Implementation**

**Date:** April 15, 2014  
**File:** 10-6370-03-01/2014-  
Vol 01




### Staff Recommendation

1. That the Chief Administrative Officer and General Manager, Engineering & Public Works be authorized to negotiate and execute an amendment to or replacement of Contract T.2988, Residential Solid Waste & Recycling Collection Services with Sierra Waste Services Ltd. (in accordance with the April 7, 2014 Staff Report entitled "Multi-Material BC Program Implementation" from the Director, Public Works (the "Staff Report")), to:
  - a) include acquisition, storage, assembly, labelling, delivery, and related tasks for the bags, containers and carts associated with implementation of the program changes and added recycling materials to be collected under the terms of the City's agreement with Multi-Material BC per Section 1, Item a) of the Staff Report;
  - b) remove the processing and marketing components from the scope of work and incorporate other changes described in Section 1, Item b) of the Staff Report, effective May 19, 2014;
  - c) modify the scope of work as described in Section 1, Item c) of the Staff Report to collect glass as a separate recycling stream, newsprint and mixed paper products as one combined stream, and collect an expanded scope of recycling materials as defined by Multi-Material BC as Packaging and Printed Paper for all residents serviced by the City for recycling services under Contract T.2988, effective May 19, 2014;
  - d) add administrative provisions to address the requirements of the contract with MMBC, as described in Section 1, Item d) of the Staff Report;
  - e) revise the annual contract amount to approximately \$6,391,841.26 (depending on contract variables such as required added equipment, inflationary and unit count increases), effective May 19, 2014.
2. That additional funding for the remaining portion of the 2014 Sanitation and Recycling budget be approved at the estimated amount of \$650,000 and that full program funding in the estimated amount of \$1,040,000 be included in the 2015 utility budget process for Council's consideration.

3. That a letter be sent to Allan Langdon, Managing Director of Multi-Material BC (MMBC), expressing concern regarding the negative operational and financial impacts associated with the current designated post-collection site (located in Surrey) for Richmond's recycling materials, and that MMBC be urged to establish a site within closer proximity to Richmond.
4. That staff evaluate options, alternatives and costs associated with addressing the operational and logistical challenges associated with the current designated post-collection site for Richmond, and report back to Council.



Tom Stewart, AScT.  
Director, Public Works  
(604-233-3301)  
Att. 2

REPORT CONCURRENCE		
<b>ROUTED TO:</b>  Law	<b>CONCURRENCE</b>  <input checked="checked" type="checkbox"/>	<b>CONCURRENCE OF GENERAL MANAGER</b>  
<b>REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE</b>	<b>INITIALS:</b>  	<b>APPROVED BY CAO</b>  



## Staff Report

### Origin

In November, 2013, Council agreed to join the Multi-Material BC (MMBC) program in order to provide enhanced recycling of paper and packaging materials for single family and multi-family residents, commencing May 19, 2014. This arrangement requires contractual amendments to the City's existing service contract T.2988 with Sierra Waste Services Ltd.

This report provides details on the required contractual amendments and provides a progress update on implementation activities.

### Analysis

As background, the City has engaged Sierra Waste Services Ltd. under Contract T.2988 – Residential Solid Waste and Recycling Collection Services until December 31, 2017. In accepting the incentive offer from MMBC, the City is assuming the role of contractor to MMBC for the collection of recycling materials. However, Sierra Waste Services Ltd. will remain the City's contractor who provides the services on the City's behalf. From the public's perspective, the only apparent service related changes are the separate collection of glass, a change in sorting requirements for newspaper and mixed paper items, and an increase in the range of materials which will be accepted for recycling in both the blue box and blue cart (multi-family) recycling programs.

Contract T.2988 is a multi-service contract for curbside garbage, organics and large item collection services, as well as curbside/blue box and multi-family/blue cart recycling services. It is the curbside and multi-family recycling services components of this contract that are impacted as a result of the City entering into an agreement with MMBC.

#### *1. Summary of Contractual Amendments Required to Contract T.2988*

Changes impacting the City's agreement with Sierra Waste Services Ltd. are in the areas of start up costs, processing and marketing, expansion to the scope of work, and items of a general administrative nature.

- a) Start Up Costs: To meet MMBC's requirements for the separate collection of glass, new receptacles are required for residents with blue box service and new carts are required for multi-family residents. To meet the May 19, 2014 launch date, it is recommended that Sierra Waste Services Ltd. acquire, store, assemble, label and deliver these items on behalf of the City. Delivery will also include related items developed and provided by the City (educational materials, re-usable recycling bags, etc.).

The change in sorting requirements and expanded scope of recycling materials to be added also necessitates that all multi-family recycling carts be re-labelled as part of educating and communicating new program information to residents. It is proposed that Sierra Waste Services also undertake the required cart re-labelling work on the City's behalf. The estimated cost of the start up cost items and associated activities by Sierra Waste Services is up to \$520,000. Funding for these start up costs was previously approved by Council.

- b) Processing & Marketing: Under existing Contract T.2988, the City pays Sierra Waste for processing all recycling materials collected and the City is, in turn, paid commodity revenues for the sale of recycling materials based on commodity market pricing. Under the City's agreement with MMBC, MMBC now assumes all rights, revenues, etc. associated with processing and marketing all recycling materials (and have contracted Green By Nature to process and market these materials on their behalf).

As a result of this change:

- i. The processing and marketing aspects of the City's agreement with Sierra Waste Ltd. must be removed and the contractor be compensated for any resulting lost revenue;
- ii. Provisions must be included to address changes by MMBC in the location of the designated processing facility;
- iii. Mechanisms to ensure a transparent and equitable process for the contractor to work with the City to identify alternative processing and marketing arrangements in the event of dissolution of the agreement with MMBC (i.e. MMBC contract stipulates a 180 day termination for convenience clause).

The noted changes result in increased costs to the City for contract compensation and lost opportunity for revenues from the sale of recycling commodities. This is outlined in the Financial Impact section of this report.

- c) Expanded Scope of Work: There are a number of requirements under the MMBC agreement which will result in changes to the scope of work under Contract T.2988:
- i. Newspaper and mixed paper products will be combined into one "Paper Products" stream. This will necessitate that a separate, larger bag be provided to residents for placing all their paper items (replacing the current Blue and Yellow Bags). Existing collection vehicles must be modified to accommodate this combined paper products stream.
  - ii. Glass must now be collected separately. This will require that a new receptacle be provided to residents for separating their glass jars and bottles, and the contractor to modify the collection vehicles and collection process to collect the glass as a separate stream.
  - iii. Additional materials are being added to the program, which requires that additional equipment be added to accommodate the increased volume. A sample list of materials to be added to the program includes the following. A full list per the City's agreement with MMBC is contained in *Attachment 1*:
    - Paper and plastic drink cups
    - Milk cartons (including soy, rice milk and cream cartons)
    - Aseptic containers (soup, broth, sauce, etc. containers)
    - Plastic bakery trays and packaging (plastic egg cartons, deli trays, muffin and sandwich containers, etc.)



- Plastic pill bottles, including vitamins, personal care products, cosmetic containers, etc.
- Plastic pails, such as laundry detergent and ice cream buckets.
- Plastic lids and garden pots, plastic hinged containers (e.g. diaper wipes)
- Food and solvent spray cans, hairspray, deodorant, wax and polish spray cans
- Spiral wound cans (e.g. frozen juice, cookie dough, coffee, nuts)

At this early stage, it is difficult to predict the additional volume which will result from the significantly expanded range of items residents will be able to recycle. It is recommended that flexible and transparent language be incorporated into Contract T.2988 to be conservative but allow for additional equipment if required to meet volume demands.

The noted changes result in increased costs to the City for contract compensation associated with additional equipment requirements. A minimum of two trucks will need to be added, with the ability to add additional equipment or trucks at a rate to be negotiated with Sierra Waste Services Ltd. if required to meet volume demands in order to maintain service levels.

Associated costs are outlined in the Financial Impact section of this report.

- d. Administrative Requirements: The MMBC agreement contains a number of items where it would be prudent for the City to incorporate language in Contract T.2988 to identify avenues to address:
- i. Changes requested by MMBC (which cannot be refused unless technically not feasible to carry out).
  - ii. Compliance with MMBC policies and standards.
  - iii. Contingency planning.
  - iv. Record keeping and reporting requirements.
  - v. Confidentiality requirements.
  - vi. Intellectual property - proprietary rights owned by MMBC.
  - vii. Indemnity and insurance provisions.
  - viii. Service level failure credits.

The language will be structured in a manner that provides for transparency in addressing any potential items impacting cost, without transferring financial risk to the contractor. Any issues which arise that result in increased costs would be reported to Council for consideration.

## 2. *Update on Implementation Activities*

The MMBC program will be launched on May 19, 2014. A key factor that the City was only recently informally notified of (on April 7, 2014) by Green By Nature (the organization selected by MMBC to manage their post-collection system) is that the designated processing site for delivery of Richmond's recycling materials will be the Cascades Recovery Inc. site at 12345 – 104 Avenue in Surrey. This has operational and financial impacts beyond those projected in this report due to longer travel distances and delivery wait times than that currently required since the City's recycling materials are now delivered to Urban Impact on Knox Way in Richmond. This will also have further impacts to the terms and costs of the City's contract with Sierra Waste Services Ltd. beyond that identified in this report. Other impacts include increases emissions associated with longer travelling distances and idling/wait times.

With this information only recently being made available, staff will begin identifying potential alternatives and options for how to most efficiently and cost-effectively manage delivery of the City's recycling materials to the Cascades site. This information will be reported back to Council separately. In the interim, staff recommend that Council express the City's concern to MMBC about the distant location of the designated processing site for Richmond, and urge that MMBC establish a location in closer proximity to the City.

In terms of the May 19, 2014 launch date, a number of measures are underway in an effort to launch the City's program to coincide with the MMBC program implementation timeframe. This will mean three key changes for residents with both blue box and multi-family (blue cart) collection services as outlined below.

### Residents with Blue Box Service

- a) *Newsprint and Paper Products Now Combined:* To accommodate the requirements of MMBC for a single paper stream, residents will be provided with a separate, larger yellow bag in which to place all their newsprint and paper products into a new "Mixed Paper" re-usable plastic bag. Residents may continue to use up any existing supply of blue and yellow bags or may bring these bags to the Recycling Depot to be recycled.
- b) *Separate Collection of Glass Jars and Bottles:* A separate, smaller grey box will be provided for residents to separate glass jars and bottles for recycling. Residents will be asked to place the grey box at curbside, along with their blue box and new yellow "Mixed Paper" bag on their recycling collection day. These receptacles will be emptied into a separate compartment on the recycling truck and returned to be re-used by residents.
- c) *Expanded Materials Accepted for Recycling:* Residents will be asked to place their remaining recycling materials PLUS the additional materials being added by MMBC in their existing blue box. Residents may use a second blue box, if required. Alternatively, taller/larger blue boxes (22 gallons vs. the 16 gallon capacity standard blue box) will be stocked and available at the Recycling Depot, should residents require or wish to use a larger capacity blue box to hold sufficient volumes of their recycling materials.



These items, along with program educational material, are targeted for delivery to residents during the first two weeks of May. Collection of the new items will commence on residents' first collection day during the week of May 19<sup>th</sup>.

*Attachment 2* contains an overview of the program changes for residents with blue box service.

### Residents with Blue Cart Service

The program changes for residents with central recycling services in blue carts (multi-family) will principally mirror that of the blue box program:

- a) *Newsprint and Paper Products Now Combined:* Existing recycling carts currently for "Newsprint" and "Paper Products" will be re-labelled to combine both into "Mixed Paper" cart/s.
- b) *Separate Collection of Glass Jars and Bottles:* A separate (generally smaller) cart will be provided for the separate collection of glass. Consideration of the cart size provided will be based on estimated volumes, available space, etc.
- c) *Expanded Materials Accepted for Container Recycling:* The remaining carts will be re-labelled for all remaining containers PLUS the new items being added through the MMBC program.

These changes will be undertaken commencing the first two weeks in May, with collection of the new materials commencing the week of May 19<sup>th</sup>.

The costs for the receptacles/one-time costs associated with MMBC program launch requirements are addressed in the Financial Impact section of this report.

### **Financial Impact**

**One-Time:** The one-time costs for activities to be undertaken by Sierra Waste Services on the City's behalf (i.e. acquisition and delivery of boxes and carts associated with this implementation) are estimated at \$520,000. Council previously approved these funds from the Sanitation & Recycling provision (Project 41597).

**Operating:** As noted in this report, there are increased annual operating costs impacting the 2014 and future budgets for contracted as well as City costs. Total annual costs (based on 2014 rates and unit count data) are provided in the following table. These amounts will be pro-rated in 2014 to correspond with the planned May 19<sup>th</sup> commencement date of this program. These amounts are exclusive of applicable taxes. As previously noted, these costs do not include the impacts associated with the longer travel distances that will be required for delivery of Richmond's recycling materials to the designated processing site in Surrey. These costs could range anywhere between \$250,000 - \$750,000 annually, depending on whether a consolidation/transfer facility can be arranged, or if multiple additional trucks will need to be added.

**MMBC Revenue:** Under the agreement with MMBC, the City is paid a market clearing price for providing services on behalf of MMBC (\$38.50/unit for blue box service, and \$23.75/unit for multi-family blue cart/central collection service). MMBC may deduct any service level failure

credits and other amounts from their payment, however, none are assumed in the financial analysis which follows.

Recycling Cost Under MMBC Agreement		
Description	Estimated Total Annual	2014 Projected Costs (Start Date May 19, 2014)
<b>Financial Incentive</b>		
MMBC Incentive	(\$2,316,242)	(\$1,440,512)*
<b>Costs</b>		
Additional Cost Items - MMBC		
Net Additional Contract Costs	\$454,409	\$282,605*
City Costs	\$285,000	\$177,247*
Loss of Commodity Revenue	\$300,520	\$186,899*
Total additional Costs – MMBC	\$1,039,929	\$646,751*
<b>Current Recycling Net Fixed Costs</b>	<b>\$2,018,208</b>	<b>\$2,018,208</b>
<b>Total Costs under MMBC Agreement</b> (Total Additional Costs - MMBC plus Current Recycling Net Fixed Costs)	<b>\$3,058,137</b>	<b>\$2,664,959</b>
<b>Net City Costs</b> (MMBC Financial Incentive less Total Costs under MMBC agreement)	<b>\$741,895</b>	<b>\$1,224,447</b>

\* These costs are prorated based on the MMBC program start date of May 19, 2014

Recycling Cost Comparison Under MMBC Agreement vs Existing Next Fixed Cost		
Description	Estimated Total Annual	2014 Projected Costs (Start Date May 19, 2014)
Net City Costs	\$741,895	\$1,224,447
<b>Total Existing Net Fixed Costs</b>	<b>\$2,018,208</b>	<b>\$2,018,208</b>
<b>Variance</b>	<b>(\$1,276,313)<sup>1</sup></b>	<b>(\$793,761)</b>
One Time costs		\$520,000
<b>Net Cost Savings in 2014</b>		<b>(\$273,761)</b>

<sup>1</sup>Based upon estimated volumes of recyclables collected and a local processor identified by MMBC.

As described in the table, by entering into agreement with MMBC, the City incurs additional expenses for contractual change requirements and loss of recycling material revenues. The City in turn receives a financial incentive from MMBC for providing the service on their behalf. The net result is that the City's costs, after the MMBC financial incentive, are expected to be approximately \$740,000 per year, which represents a savings of approximately \$1.27 million annually. Net cost savings in 2014 are modest due to the May 19<sup>th</sup> launch date and one-time implementation costs, or approximately \$273,000. These amounts are consistent with previous staff calculations.



The costs identified above are reflective of program-specific costs for the blue box and multi-family recycling programs. They do not include other recycling programs and services provided by the City or existing staffing/administration costs.

## Conclusion

This report highlights the operational, financial and contractual changes required to implement the City's agreement with MMBC effective May 19, 2014. Under this new program, residents will be asked to sort and prepare their recycling materials in a different manner, and will be able to recycle a significantly greater volume of materials. While there are cost increases associated with this new program, the City will receive incentive funding from MMBC through which the City's overall annual costs will be reduced by approximately \$1.27 million over existing costs. Savings in 2014 are not as significant due to the incentive not being received until launch (May 19, 2014) and as a result of start up costs associated with this program. These savings are exclusive of additional costs the City will incur associated with delivery of recycling program materials to the designated post-collection facility in Surrey. This matter will be further reviewed and reported back to Council.

Overall, the packaging and printed paper stewardship program (administered on behalf of industry by MMBC) is a progressive step to enhance producer responsibility programs for a greater range of materials. The City, by entering into agreement with MMBC for this program, will receive incentive funding from industry through MMBC to apply to the cost of operating these and other recycling programs in general. It is also an important step toward advancing waste diversion objectives, as the City and region work to achieve 70% waste diversion by 2015.



Suzanne Bycraft  
Mgr, Fleet & Environmental Programs  
(604-233-3338)

SJB:

- Att. 1: List of Packaging and Printed Paper Items from MMBC Agreement  
2: "To/From" Changes for Residents with Blue Box Service

**Attachment 1****List of Packaging and Printed Paper Items from MMBC Agreement**

<b>Material Type</b>	<b>Examples of PPP Accepted</b>	<b>Examples of PPP Not Accepted</b>
<b>Category 1 – Printed Papers</b>		
Newspapers	Daily and community newspapers	
Newspaper Inserts	Newsprint advertising inserts and flyers	
Magazines	Daily, weekly, monthly magazines; travel or promotional magazines	
Catalogues	Retailer product catalogues; automotive and real estate guides/catalogues	
Telephone Directories	Phone books; newsprint directories	
Other Printed Media	Notepads; loose leaf paper; non-foil gift wrap	
Residential Printed Paper	White or coloured paper for general use, printers and copiers	
Miscellaneous Printed Papers	Blank and printed envelopes; greeting cards	
<b>Category 2 – Old Corrugated Cardboard (OCC)</b>		
Old Corrugated Cardboard	Grocery store/liquor store boxes; pizza boxes	
<b>Category 3 (a) – Other Packaging (containing liquids when sold)</b>		
Paper Cup (hot) (polycoated liner)	Non-foam paper cups	
Paper Cup (hot) (biodegradable liner)	Non-foam paper cups	
Paper Cup (cold) (waxed)	Non-foam paper cups	
Paper Cup (cold) (2-sided polycoated)	Non-foam paper cups	
Polycoated Milk Cartons	Milk, soy, rice milk and cream cartons	
Aseptic Containers	Milk, soy, rice milk, cream, soup, broth and sauce containers, typically about 1 litre in size	
Multi-laminated Paper Packaging	Microwavable paper containers; paper bowls/cups for soup	
<b>Category 3 (b) Other Paper Packaging (not containing liquids when sold)</b>		
Old Boxboard (OBB)	Cereal boxes; shoe boxes; tissue boxes; paper towel and toilet paper tubes; detergent boxes	
Wet Strength Boxboard	Carrier boxes for soft drink containers; some frozen food paper packaging	
Moulded Pulp	Egg cartons; formed coffee take out trays; paper based flower pots	
Kraft Papers	Paper bags	
Polycoated Boxboard	Some frozen food packaging	



## Attachment 1 (Cont'd)

<b>Category 6 – Other Plastic Packaging</b>		
PETE Bottles (non-beverage)	Salad dressing bottles; edible oil bottles; dish soap or mouthwash bottles; window cleaners	
PETE Jars	Peanut butter containers; wide-mouth jars for nuts	
PETE Clamshells	Bakery trays; pre-made fruit and salad packaging; egg cartons	
PETE Trays	Single serve meals; deli and bakery items; housewares and hardware products	
PETE Tubs & Lids	Plastic lids for some containers	
PETE Cold Drink Cups	Take-out drink cups	
HDPE Bottles (non-beverage)	Shampoo bottles; milk jugs; spring water containers; bleach containers; vinegar containers; windshield washer fluid containers; pill bottles	
HDPE Jars	Personal care products; pharmaceuticals, vitamins and supplements containers	
HDPE Pails	Laundry detergent, ice cream pails	Pails for lubricants
HDPE Trays	Single serve meals; deli and bakery items; housewares and hardware products	
HDPE Tubs & Lids	Plastic lids for spreads and dairy containers	
HDPE Planter Pots	Plastic garden pots	
PVC Bottles	Water bottles; travel sized personal and hair care product bottles; household and automotive liquids containers	
PVC Jars	Peanut butter containers	
PVC Trays	Housewares and hardware products	
PVC Tubs & Lids	Plastic lids for some containers	
LDPE Bottles (non-beverage)	Hygienic, cosmetics and hair care	
LDPE Jars	Cosmetic containers	
LDPE Tubs & Jars	Plastic lids for spreads and dairy containers	
PP Bottles (non-beverage)	Butter and margarine containers; translucent squeeze bottles; travel sized personal and hair care product bottles	
PP Jars	Cosmetic containers	
PP Clamshells	Hinged containers e.g. sanitary wipes	
PP Trays	Single serve meals; deli and bakery items; housewares and hardware products	
PP Tubs & Lids	Large yogurt tubs; kitty litter containers; ice cream containers	
PP Cold Drink Cups	Some cold drink cups	

## Attachment 1 (Cont'd)

Material Type	Examples of PPP Accepted	Examples of PPP Not Accepted
PP Planter Pots	Garden planter pots	
PS Bottles (non-beverage)	Pharmaceuticals, vitamin and supplements containers	
PS Clamshells (rigid)	Clear clamshell containers such as berry, muffin and sandwich containers	
PS Trays (rigid)	Clear rigid trays used for deli foods	
PS Tubs & Lids (rigid)	Dairy products tubs and lids	
PS Tubs & Lids (high impact)	Single serve yogurt containers	
PS Cold Drink Cups (rigid)	Clear rigid plastic drink cups	
PS Planter Pots	Some garden pots and trays	
Other <sup>1</sup> Plastic Bottles (non-beverage)	Bottles without a resin code or with resin code #7	
Other Plastic Jars	Jars without a resin code or with resin code #7	
Other Plastic Clamshells	Clamshells without a resin code or with resin code #7	
Other Plastic Trays	Trays without a resin code or with resin code #7	
Other Plastic Tubs & Lids	Tubs & lids without a resin code or with resin code #7	
<b>Category 7 – Metal Packaging</b>		
Steel Cans (non-beverage)	Steel dog food and vegetable cans; metal lids and closures	
Steel Aerosol Cans	Food spray cans	
Spiral Wound Cans (steel ends)	Spiral wound containers for frozen juice, chips, cookie dough, coffee, nuts	
Aluminium Cans (non-beverage)	Cat food and other food cans	
Aluminium Aerosol Cans	Air freshener, deodorant and hairspray containers; food spray cans; wax and polish spray cans	
Aluminium Foil and Foil Containers	Foil wrap; pie plates; aluminium food trays	
<b>Category 8 – Glass Packaging</b>		
Clear Glass Bottles and Jars (non-beverage)	Food containers; ketchup bottles; pickle jars; jam and jelly containers; cosmetic jars	
Coloured Glass Bottles and Jars (non-beverage)	Cooking oils, vinegar bottles, cosmetic containers	

<sup>1</sup> 'Other' plastic packaging is typically: manufactured from a combination of recycled resins; manufactured with a barrier layer; or, lacking a resin code mark



Current Blue Box Program



Blue Bag for newsprint



Yellow Bag for paper products



Blue Box for mixed containers code 1, 2, 4 or 5 including glass bottles and jars

Blue Box Program With MMBC Effective May 19, 2014

981 - LWP



**MIXED PAPER**  
 SET OUT BY 7:30 A.M. ON COLLECTION DAY

Yes! Include:

- ✓ Newspapers & Flyers
- ✓ Magazines & Catalogues
- ✓ Flattened Cereal Boxes
- ✓ Clean Pizza Boxes
- ✓ Paper Egg Cartons
- ✓ Regular & Glossy Paper
- ✓ Flattened Cardboard & Corrugated Boxes
- ✓ Envelopes & Junk Mail
- ✓ Paper Bags
- ✓ Airplane Books

For a full list, visit [www.richmond.ca/recycle](http://www.richmond.ca/recycle)  
 604-276-4010

Let's Give Our Waste!

Richmond  
 Recycling & Reuse

NEW & LARGER!

Larger Yellow Bag for mixed paper products including newsprint materials



NEW!

Glass bottles and jars to be separated into mini grey box

Existing Remaining Blue Box Items



Plus New Items



OR



Existing Blue Box

Larger Blue Box

Example of New Items:

- NEW Aerosol cans & caps (food; air fresheners; shaving cream; deodorant; hairspray)
- NEW Paper food containers & cartons
- NEW Paper cold drink cups with lids
- NEW Plastic containers, trays and caps (bakery & deli products)
- NEW Plastic garden pots & trays
- NEW Spiral wound paper cans & lids (frozen juice concentrate; potato chips; cookie dough; coffee; nuts; baby formula)





## YOUR EXPANDED BLUE BOX PROGRAM LET'S RECYCLE EVEN MORE!

Let's  
trim  
our  
waste!

Starting the week of May 19th, 2014, residents can recycle more household items using Richmond's Blue Box program. The newly expanded program includes multiple types of plastic containers, paper and plastic drink cups, milk cartons and flower pots, along with many more items.

We've made a few changes for easy recycling:

- Your **NEW** yellow Mixed Paper Recycling Bag is now for all paper products, including newspaper, cardboard and other paper
- Your **NEW** grey Glass Recycling Bin is for glass jars and bottles only
- Your Blue Box is for containers made from plastic, paper, tin and aluminium

**Extra recycling?** A larger Blue Box for containers is available at the Recycling Depot. Additional Mixed Paper Recycling Bags and Glass Recycling Bins are also available.

Please call 604-276-4010 to order additional supplies, or pick them up at the following locations:

**City Hall:** 6911 No. 3 Road, open Monday to Friday from 8:15 a.m. to 5:00 p.m.

**Richmond Recycling Depot:** 5555 Lynas Lane, open Wednesday to Sunday from 9:00 a.m. to 6:15 p.m.

All newsprint and paper items are combined into a new yellow Mixed Paper Recycling Bag



Glass jars & bottles are now separated into a new grey Glass Recycling Bin



Plastic bottles, tin & aluminium cans plus many new items go in your Blue Box



Environmental Programs Information Line: 604-276-4010  
[www.richmond.ca/recycle](http://www.richmond.ca/recycle)







## USING YOUR EXPANDED RECYCLING SERVICE

The following guide highlights the many items accepted in recycling, how to sort them using the Blue Box, yellow Mixed Paper Recycling Bag and grey Glass Recycling Bin.


### MIXED PAPER RECYCLING BAG – COMBINE ALL NEWSPRINT & PAPER PRODUCTS TOGETHER

ACCEPTED	HOW TO RECYCLE	NOT ACCEPTED
 <ul style="list-style-type: none"> <li>✓ Newspapers, inserts &amp; flyers</li> <li>✓ Flattened cardboard boxes</li> <li>✓ Catalogues &amp; magazines</li> <li>✓ Cereal boxes</li> <li>✓ Clean pizza boxes</li> <li>✓ Corrugated cardboard (small pieces)</li> <li>✓ Envelopes</li> <li>✓ Junk mail</li> <li>✓ Paper bags</li> <li>✓ Paper egg cartons</li> <li>✓ Paper gift wrap &amp; greeting cards</li> <li>✓ Telephone books</li> <li>✓ Writing paper (Note pads, loose leaf paper, white or coloured paper, printed paper, plain &amp; window envelopes, shredded paper.)</li> </ul>	<ul style="list-style-type: none"> <li>• Remove plastic liners/covers</li> <li>• Remove any food residue</li> <li>• Flatten boxes</li> <li>• <b>Place in Mixed Paper Recycling Bag</b></li> <li>• Cardboard is limited to one bundle per week. Bundle size: 3ft x 2ft x 4 in (90cm x 60cm x 10cm)</li> </ul> <p><i>Note: Oversized/excessive amounts of cardboard can be dropped off at the City's Recycling Depot at 5555 Lynas Lane</i></p>	<ul style="list-style-type: none"> <li>✗ Cardboard boxes with wax coating</li> <li>✗ Plastic bags used to cover newspapers/flyers</li> <li>✗ Metallic wrapping paper</li> <li>✗ Ribbons or bows</li> <li>✗ Musical greeting cards with batteries</li> <li>✗ Padded envelopes</li> <li>✗ Plastic or foil candy wrappers</li> </ul>

### BLUE BOX FOR CONTAINERS – INCLUDES EXPANDED MATERIALS FOR RECYCLING

ACCEPTED	HOW TO RECYCLE	NOT ACCEPTED
 <ul style="list-style-type: none"> <li>✓ <b>New!</b> Aerosol cans &amp; caps (food items, air fresheners, shaving cream, deodorant, hairspray)</li> <li>✓ <b>New!</b> Microwavable bowls, cups &amp; lids</li> <li>✓ <b>New!</b> Paper food containers &amp; cartons (ice-cream, milk, liquid whipping cream)</li> <li>✓ <b>New!</b> Plastic cold drink cups with lids</li> <li>✓ <b>New!</b> Plastic containers, trays &amp; caps (bakery containers &amp; deli trays)</li> <li>✓ <b>New!</b> Plastic and paper garden pots &amp; trays</li> <li>✓ <b>New!</b> Spiral wound paper cans &amp; lids (frozen juice, potato chips, cookie dough, coffee, nuts, baby formula)</li> <li>✓ Aluminium cans &amp; lids</li> <li>✓ Aluminium foil &amp; foil containers (foil wrap, pie plates, food trays, etc.)</li> <li>✓ Plastic bottles &amp; caps (food items, condiments such ketchup, mustard &amp; relish, dish soap, mouthwash, shampoos, conditioners, etc.)</li> <li>✓ Plastic jars &amp; lids (margarine, spreads, dairy products such as yogurt, cottage cheese, sour cream, ice cream, etc.)</li> <li>✓ Plastic tubs &amp; lids</li> <li>✓ Tin cans &amp; lids</li> </ul>	<ul style="list-style-type: none"> <li>• Remove labels</li> <li>• Remove food residue</li> <li>• Empty &amp; rinse</li> <li>• <b>Place in Blue Box</b></li> </ul>	<ul style="list-style-type: none"> <li>✗ Aerosol cans that carry a hazardous waste symbol for corrosive, poison or flammable products</li> <li>✗ Aerosol cans that contained waxes, polishes, lubricating oils, solvents, insulating foam, pesticides</li> <li>✗ Ceramic plant pots</li> <li>✗ Containers for motor oil, or vehicle lubricant or wax products</li> <li>✗ Foil-lined cardboard lids from take-out containers</li> <li>✗ Garden hoses</li> <li>✗ Plastic bags &amp; wrap</li> <li>✗ Plastic string or rope</li> <li>✗ Spray paint cans</li> <li>✗ Styrofoam materials</li> </ul>

### GLASS RECYCLING BIN – SEPARATE GLASS JARS & BOTTLES FROM OTHER CONTAINERS

ACCEPTED	HOW TO RECYCLE	NOT ACCEPTED
 <ul style="list-style-type: none"> <li>✓ <b>New!</b> Clear or coloured glass bottles &amp; jars</li> </ul>	<ul style="list-style-type: none"> <li>• Remove labels where possible</li> <li>• Remove food residue</li> <li>• Empty &amp; rinse</li> <li>• <b>Place in Glass Recycling Bin</b></li> </ul>	<ul style="list-style-type: none"> <li>✗ Glasses, dishes, cookware, window glass or mirrors</li> <li>✗ Ceramic products</li> <li>• Lids (place lids in Blue Box)</li> </ul>

For more information on Blue Box program recycling, and tips on how to reduce waste, visit [www.richmond.ca/recycle](http://www.richmond.ca/recycle).