



City of Richmond

Report to Committee

TO WAT-MEM. 20, 2013

To: Public Works and Transportation Committee

Date: February 26, 2013

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

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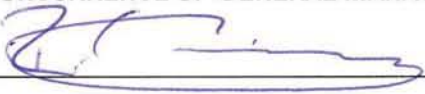

Re: 2013 Liquid Waste Management Plan Biennial Report

Staff Recommendation

That the City's 2013 Liquid Waste Management Plan Biennial Report, provided as Attachment 1 to the staff report of the same name from the Director of Engineering, dated February 26, 2013, be submitted to Metro Vancouver.

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

Att. 1

REPORT CONCURRENCE			
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER	
Sewerage & Drainage	<input checked="" type="checkbox"/>		
REVIEWED BY DIRECTORS	INITIALS: <i>DW</i>	REVIEWED BY CAO	INITIALS: 

Staff Report

Origin

The Greater Vancouver Sewerage and Drainage District Board considered and adopted the 2010 Integrated Liquid Waste and Resource Management Plan (ILWRMP) at their meeting on May 21, 2010. Richmond City Council endorsed the municipal commitments in the ILWRMP at their regular Council Meeting on September 27, 2010. The provincial Minister of Environment approved the ILWRMP subject to conditions identified in his letter dated May 30, 2011.

The ILWRMP requires member municipalities to report progress on 27 municipal commitments on a biennial basis. Metro Vancouver provides a template that is used as a basis for Municipal reporting to maintain a consistent approach to ILWRMP reporting across the Metro Vancouver member municipalities. Richmond's 2013 Liquid Waste Management Plan Biennial Report (2013 Biennial Report) (**Attachment 1**) is due to Metro Vancouver on April 2, 2013. This staff report reviews the City's progress on the ILWRMP municipal actions and presents the 2013 Biennial Report to Council for their information and consideration.

Analysis

The ILWRMP includes a municipal commitment to report progress on a biennial basis. The 2013 Biennial Report covers a three year reporting period that includes 2010 through 2012. Richmond has previously submitted 4 biennial reports over the last 10 years based on reporting requirements in previous Liquid Waste Management Plans.

The 2013 Biennial Report includes 26 narratives, 12 tables and 13 graphics attachments that report on the 27 municipal commitments included in the ILWRMP. The City of Richmond is meeting or exceeding all of the requirements of the ILWRMP. The following are the highlights of Richmond's 2013 Biennial Report.

Inflow and Infiltration

ILWRMP action 1.1.18 requires municipalities to develop and implement inflow and infiltration (I&I) management plans that ensure I&I levels are within Metro Vancouver allowances as measured at Metro Vancouver's flow metering stations. The City of Richmond's measured I&I rate is 7,600 l/ha/d as measured at the Lulu Island Wastewater Treatment Plant. This level of I&I is 32% below the Metro Vancouver allowance of 11,200 l/ha/d. Staff continue to monitor I&I levels at the City's sanitary pump stations, identifying any catchments that may have higher I&I rates for subsequent study and remediation if required.

On Site Rainwater Management

ILWRMP action 1.1.20 requires municipalities to update municipal bylaws to require on-site rainwater management sufficient to meet criteria established in municipal stormwater plans or baseline region-wide criteria by 2014. Richmond already incorporates a number of on-site rainwater management features in its bylaws and standards including green roofs and boulevard swales. Richmond's Integrated Rainwater Resource Management Strategy is in development and

will be completed by the end of 2013. On-site rainwater management criteria for Richmond will be determined as part of that process.

Condition Assessment

ILWRMP action 3.1.6 is carried forward from previous Liquid Waste Management Plans (LWMP) and requires inspection and condition assessment of the municipal sanitary sewer system on a 20 year cycle. Richmond has inspected and assessed 90% of its sanitary sewers over the last 12 years and is ahead of schedule on this action. During the reporting period Richmond inspected and assessed 52 km of sanitary mains in the Terra Nova Sanitary Area and found the pipelines to be in good condition, with defects or leaks addressed via the utility rate. Additional projects to repair identified defects have been included and approved by Council in the 2013 Capital Plan.

Asset Management Plan

ILWRMP action 3.1.8 requires municipalities to develop and implement asset management plans and to provide copies of those plans to Metro Vancouver by 2014. Richmond has both an Ageing Infrastructure Management Plan and a Growth Related Infrastructure Management Plan. Both of these have been in place for a number of years and are ahead of Metro Vancouver's target date.

Sanitary Sewer Overflows

ILWRMP action 3.3.7 requires Municipalities to report on the frequency and location of sewerage overflows from municipal sanitary sewers. The City does not have chronic sanitary sewer overflow issues and there were zero overflows for the reporting period. This is largely due to Richmond's successful capital and maintenance programs, separated sewer systems and low I&I rates.

Storm Water Management Plan

ILWRMP action 3.4.7 requires municipalities to develop and implement stormwater management plans that integrate with land use by 2014. The Minister of the Environment has indicated that this deadline may be deferred till 2016. Richmond is currently developing its Integrated Rainwater and Resources Management Strategy, which will be complete in the fall of 2013, ahead of Metro Vancouver's schedule.

Water Metering

Ministerial Condition 2 for approval of the ILWRMP strongly encourages municipalities to business case and/or implement residential water metering programs and consider municipal rebate programs for water efficient fixtures and appliances to reduce water use. Richmond has one of the most successful volunteer water metering programs in the region that, along with its mandatory water metering programs, has metered 70% of single family dwellings and 23% of multi-family dwellings as of the end of the Biennial Report reporting period. The City has a successful toilet rebate program that has replaced 3,150 older toilets with new, water efficient toilets. Richmond also provides metered customers with low flow shower heads, faucet aerators and a number of other water conservation tools. Council has asked staff to review mandatory

February 26, 2013

- 4 -

water metering for single family residential dwellings. The findings of this review will be presented to Council in a subsequent report.

Financial Impact

None.

Conclusion

The 2010 ILWRMP includes a municipal commitment to report progress on ILWRMP actions on a biennial basis. The attached 2013 Biennial Report summarizes Richmond's progress on municipal actions for the January 2010 to December 2012 reporting period. The City of Richmond is meeting or exceeding all of the requirements of the ILWRMP and staff will continue work on municipal actions identified in the ILWRMP.



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LB:lb

2013 Liquid Waste Management Plan Biennial Report

Reporting Period: Jan 2010 – Dec 2012

Municipal Submission Section

February 26, 2013

Municipal Contact Information			
Name	Email	Phone	Responsible For ILWMP Actions
Lloyd Bie	lbie@richmond.ca	604.762.4417	Actions 1.1.14; 1.1.17; 1.1.18; 1.1.19; 1.1.20; 1.1.21; 1.2.5; 1.2.6; 1.3.11; 1.3.12; 1.3.13; 1.3.14; 1.3.15; 3.1.6; 3.1.8; 3.2.4; 3.3.7; 3.3.8; 3.4.4; 3.4.5; 3.4.6; 3.5.8; 3.5.9;
Lesley Douglas	LDouglas@richmond.ca	604-247-4672	Action 1.1.16
Alen Postolka	APostolka@richmond.ca	604-276-4283	Action 1.3.17; 3.3.6

List of Content

- 1. Submission Checklist:
 - a. Narrativesi
 - b. Tables.....iv
 - c. Attachments.....v

- 2. Municipal Reporting Submission1

Submission Checklist

Narratives:

- ☒ Narrative 1: *Summarize ongoing permitting & inspection programs*
- ☒ Narrative 2: *Summarize approach to regulating pesticides and lawn care products*
- ☒ Narrative 3: *Summarize updates to outreach plans for supporting liquid waste source control programs (e.g. stormwater, sewer use, sewer maintenance, I&I management, cross connections etc.) during the reporting period*
- ☒ Narrative 4: *Summarize I&I management plans & list key actions resulting from plans*
- ☒ Narrative 5: *Summarize enforcement enhancements and process efforts during reporting period*
- ☒ Narrative 6: *Highlight and summarize bylaw changes relating to stormwater management*
- ☒ Narrative 7: *Highlight and summarize changes to utility design standards and neighbourhood design guidelines in relation to on-site rainwater management*
- ☒ Narrative 8: *Summarize development of municipal sanitary overflow management plans. Highlight specific examples.*
- ☒ Narrative 9: *Highlight & summarize progress on the prevention of CSOs and the separation of combined sewers*
- ☒ Narrative 10: *List approaches and strategies that address risks (ie: regular maintenance, SCADA, monitoring, protocols, identified redundancies/contingencies)*
- ☒ Narrative 11: *Describe regulations and status of applications*
- ☒ Narrative 12: *Summarize existing municipal odour control programs and the implementation of new programs for targeted municipal sewer facilities*
- ☒ Narrative 13: *Summarize air emissions management programs for standby power generators at municipal sewer pump stations*
- ☒ Narrative 14: *Identify any programs or initiatives for wastewater and drainage services that help achieve municipal greenhouse gas targets.*
- ☒ Narrative 15: *Summarize key progress on the assessment and condition of municipal sewerage system*
- ☒ Narrative 16: *Summarize key progress or accomplishments on the development of asset management plans for municipal sewerage infrastructure*

- ☒ Narrative 17: *Summarize key findings from the tri-annual internal audit (first due in 2013)*
- ☒ Narrative 18: *Summarize the estimate of greenhouse gas emissions and odours associated with the operation of municipal and regional liquid waste management systems*
- ☒ Narrative 19: *Summarize and highlight any important details and action plans relating to wet weather SSOs & probable causes of CSOs*
- ☒ Narrative 20: *Summarize and highlight any changes to the existing municipal sewer flow & sewer level monitoring network*
- ☒ Narrative 21: *Summarize progress on the development of emergency management strategies and response plans for municipal & regional wastewater collection and treatment systems*
- ☒ Narrative 22: *Summarize key initiatives that support the adaptation of infrastructure & operations to address risks and long term needs*
- ☒ Narrative 23: *Summarize and highlight key initiatives relating to the development and implementation of the integrated stormwater management plans*
- ☒ Narrative 24: *Discuss water metering & rebate programs relating to water fixtures and appliances*
- ☒ Narrative 25: *To be determined once the Adaptive Management Framework for ISMPs has been developed (see page 12)*
- ☒ Narrative 26: *Quote relevant OCP sections addressing stormwater, stream health and their consideration of ISMPs*

Tables:

- ☒ Front Cover: *Municipal Contacts*
- ☒ Table 1: *List core sewer use bylaws and summarize any changes*
- ☒ Table 2: *Identify type & number of permits issued during reporting period*
- ☒ Table 3: *Identify regulated products & any additional information*
- ☒ Table 4: *Identify location regulations and enforcement*
- ☒ Table 5: *List relevant bylaws and key stormwater components and list on-site rainwater management target (s)/objective (s)*
- ☒ Table 6: *List standards and guidelines and where applied*
- ☒ Table 7: *List references*
- ☒ Table 8: *List procedures & protocols*
- ☒ Table 9: *List local regulation process or bylaw*
- ☒ Table 10: *List ISMPs, their current status and the implementation of any major initiatives*
- ☒ Table 11: *List budget estimates for the LWMP implementation programs and subsequent two years beyond biennial report (from 5 yr plan)*
- ☒ Table 12: *Biennial Report Information*

Graphics:

☒ Attachment 1:

- Map showing I&I management rates for neighbourhoods where studies have been completed with before and after I&I (L/h/d)
- Coded map & % histogram showing age of service connections

☒ Attachment 2:

- Map showing CSO locations, volumes & number of occurrences (N/A)

☒ Attachment 3:

- Map showing location of emergency municipal overflows

☒ Attachment 4:

- Map showing location of marinas within municipal boundaries
- Map showing location of pleasure craft pump-out facilities within municipal boundaries (N/A)

☒ Attachment 5:

- Map showing odour control facilities & locations of complaints

☒ Attachment 6:

- Map highlighting a) sewerage system CCTV inspection, b) replacement/rehabilitation locations (last 20 yrs)

☒ Attachment 7:

- Colour coded map showing age of the sewerage system (ie: <25 yr, 25-50,50-75,75-100,>100)

☒ Attachment 8:

- Map showing wet weather SSO locations, volumes & number of occurrences

☒ Attachment 9:

- Map showing location & number of active sewer flow and level monitors for the reporting period

☒ Attachment 10:

- Colour coded map of municipal service area: within Urban Containment Boundary, Outside under special exemption, Outside without exemption.

☒ Attachment 11:

- Map showing ISMPs completed

☒ Attachment 12:

- Map showing locations of stormwater monitoring – *Not provided - Richmond does not currently have a stormwater monitoring program. Through the ISMP process, the City will consider future monitoring needs.*

☒ Attachment 13:

- Map of protected riparian areas & possible stream classifications

City of Richmond

Action 1.1.14 – Review and enhance sewer use bylaws to reduce liquid waste at source, including contaminants identified by the Canadian Environmental Protection Act (2012).

Table 1: List core sewer use bylaws and summarize any changes

Sewer Use Bylaws	Summary of Changes
DRAINAGE, DYKE AND SANITARY SEWER SYSTEM BYLAW NO. 7551	<p>PART THREE: GREASE MANAGEMENT 3.1 No person responsible for a food sector establishment or a building, including an operator, property owner, agent or contractor, shall discharge or suffer, allow, cause or permit fat, oil or grease to be discharged into a sanitary sewer or drainage system within the City.</p> <p>PART FIVE: INTERPRETATION BEST MANAGEMENT PRACTICES: means schedules of activities, prohibitions of practices, maintenance procedures and other management practices to prevent or reduce the discharge of fat, oil or grease into a sanitary sewer or drainage system, as outlined in Schedule C attached to and forming part of this bylaw.</p> <p>FAT, OIL OR GREASE: means any solvent or extractable material of animal, vegetable or mineral origin, including but not limited to hydrocarbons, esters, fats, oils, waxes and high molecular weight carboxylic acids.</p> <p>FOOD SECTOR ESTABLISHMENT: means: (a) a business establishment or institutional facility where food is prepared or made ready for eating or packaged and shipped to any establishment described in (b) or (c) below; (b) a retail establishment or institutional facility where food is prepared and made ready for retail sale or sold to the public and includes grocery stores, fresh produce stores, bakeries, butcher shops and similar establishments; or (c) a business or institutional eating or drinking establishment or facility where food is prepared or made ready for eating and is sold or served to the public or to persons employed at, served by or attending the establishment, whether or not consumed on the premises, and includes restaurants, delicatessens, fast-food outlets, cafeterias, hospitals, pubs, bars, lounges, or other similar establishments.</p> <p>GREASE TRAP OR GREASE INTERCEPTOR: means a device designed and installed to separate and retain fat, oil or grease from wastewater, while permitting wastewater to discharge into a sanitary sewer or drainage system.</p>
Public Health Protection Bylaw No. 6989	No changes for reporting period related to sewer
Pollution Prevention and Clean-up Bylaw No.8475	No changes for reporting period

Table 1b: Summarize status of sewer use bylaws related to preventing sediment from the land clearing and construction phases, from entering storm water systems and receiving environments.

<p>List bylaw or bylaws that relate to controlling sediment release from land clearing and construction phase of development.</p>	<p>Section 3.1 of the City's Engineering Design Specifications requires that catch basins and inspection chambers are installed on all drainage service pipes to prevent sediment discharging into the City's drainage system (open watercourses and enclosed conduits). For mainline storm sewers sump manholes are required at every second manhole on a straight run, every change in pipe direction and all intersecting mainline sewers. It also requires that a Sediment Control Plan is submitted to the City to identify the type and location of sediment control best management practices that will be used during construction.</p> <p>Drainage, Dike and Sanitary Sewer System Bylaw No. 7551 requires that during demolition all unnecessary connections to the drainage system are disconnected and capped to prevent sediment entering the drainage system.</p> <p>The Pollution Protection and Cleanup Bylaw No 8475 requires that no discharge from dewatering may enter the drainage system or watercourse without an agreement with the City. The agreement requires a Qualified Environmental Professional (QEP) to design a treatment system to satisfy British Columbia and/or Canadian Water Quality Guidelines for the Protection of Aquatic Life, or approval to discharge from a Provincial or Federal Authority.</p> <p>Boulevard and Roadway Protection and Regulation Bylaw 6399 requires that anyone using a boulevard for construction or (other similarly disruptive activities) shall ensure that the roadway is cleared of sediment producing materials during the activity.</p> <p>Boulevard Maintenance Regulation Bylaw No. 7174 states that a property owner must not discard any materials in front of their property.</p>
<p>Identify monitoring requirements related to this bylaw.</p>	<p>The Pollution Protection and Cleanup Bylaw 8475 requires a developer's QEP to monitor output from groundwater dewatering treatment systems to ensure discharge quality compliance and provide monitoring records to the City, upon request, as per a written</p>

	agreement signed between the Developer and the City.
Identify how monitoring data is assessed and used to initiate corrective actions.	The Pollution Protection and Cleanup Bylaw 8475 requires a QEP to discontinue dewatering activities if they do not comply with the associated written agreement.
Identify approaches used to maintain compliance with the bylaw (e.g. annual resources dedicated to maintaining compliance).	The City maintains a significant inspection and environmental staff resources that perform regular field inspections. Compliance is maintained through written notification and stop work notices. The City requires developers to provide damage deposits and letters of credit which can also be drawn upon for remediation in extreme cases.
Discuss effectiveness of bylaw/bylaws and current approach to prevent inputs of sediment to the storm system and receiving environment.	Most development and construction sites are cooperative in this regard and maintain compliance with the City's sediment control measures.

Action 1.1.15* – Continue existing programs of permitting and inspection to support and enforce sewer use bylaws (*Ongoing, *City of Vancouver Only*).

N/A

Action 1.1.16 – Identify and regulate pesticides and lawn care products which negatively affect rainwater runoff quality and urban stream health (2014).

Narrative 2: Summarize approach to regulating pesticides & lawn care products

Adopted in 2009, under the Enhance Pesticide Management Program, the Pesticide Use Control Bylaw No.8514 restricts the cosmetic use of pesticides on residential and municipally owned lands allowing only low-toxicity products listed under BC's IPM Regulations Schedule 2: Excluded Pesticides and bio-controls for lawn care and ornamental plant health. In addition to bylaw enforcement, the City provides a comprehensive educational program, including free workshops, to support and empower Richmond residents and practitioners with environmentally sound lawn care, gardening and pest control practices.

Table 3: Identify regulated products & any additional information

Regulated Products	Type of Regulation (eg. Ban, Permit, Limited Users etc.)	Additional Information (Bylaw & Policy Numbers)
Pesticide	Limited Users	Pesticide Use Control Bylaw No.8514

Action 1.1.17 – Continue outreach plans to support liquid waste source control programs (Ongoing).

Narrative 3: Summarize updates to outreach plans for supporting liquid waste source control programs (e.g. stormwater, sewer use, sewer maintenance, I&I management, cross connections etc.) during the reporting period

Green Can Program

Through the Green Can program, over 9,900 tonnes of food scraps and yard trimmings were collected in 2011. This program reduced the amount of waste that would otherwise have been discharged to the sanitary sewer through garburators. To facilitate grease reduction in the sanitary system, Richmond conducts the following activities:

- Green can program literature includes information on the impact of grease on the sewer system and proper grease disposal techniques.
- Richmond accepts cooking oil and animal fat at the City's Recycling Depot.
- The City promotes proper disposal of cooking oil and grease on Facebook, annual collection calendar, ads in local newspaper (see attached) and annual report.
- Richmond discourages the use of garburators as part of the Green Can program.
- Residents can recycle food scraps and solid grease through the Green Can programs.

Metro Vancouver Waste Water Discharge Permit Process

The City is continuing to participate in the Metro Vancouver sanitary sewer source control program by supporting the Metro Vancouver Waste Water Discharge Permit process.

Fat, Oil and Grease Reduction Programs

Richmond Community Bylaws staff continue to work with representatives from the GVRD, stakeholder groups, industry associations, pumping operators and grease trap vendors to mitigate the impact of fats, oils and grease (FOG) on the region's sanitary sewer system. Some of the program initiatives for the time period Jan 2010 to Dec 2012 are identified below.

Phase 1 in 2010 was centred around education and building a database foundation of over 660 food establishments. Staff efforts were focused on promoting 'best management practices' for the proper management of fats, oils and grease (FOG)

Council's adoption of the new Grease Management regulations and fines in October 2010 provided additional enforcement tools and incentives to promote compliance in difficult situations and enhance the ability of enforcement personnel to inspect food sector establishments

and gain access to the grease trap or interceptor systems under section 16 of the *Community Charter*.

On January 18 2011, Community Bylaws commenced, as Phase 2 of the City's Grease Management program, active inspection and enforcement of food sector establishments in Richmond. As part of the grease reduction strategy, enforcement is focused on high impact areas 'hot spots' where there is reported evidence of the most grease accumulation in the sewer system.

During the time period 2011 to 2012 Community Bylaws in concert with City Engineering staff broadened program efforts to include food sector operator/owner engagement in order to promote a high and sustainable quality of enforcement and compliance. For the year 2012, assertive enforcement efforts on the part of staff resulted in 99 tickets issued and revenue of \$24,875.

Rainwater Best Management Practices

The City's OCP Bylaw No. 9000 section 14.2.10 Development Permits' intention is to provide general direction in regards to the voluntary undertaking, where feasible, of green building and sustainable infrastructure to support City of Richmond sustainability objectives and help reduce the demand for energy and resources. Developers are encouraged to incorporate green roofs, bio-swales, infiltration and other best management practices throughout the building site to store rainwater, mitigate urban heat island effect, reduce heating and cooling loads and reduce the impact on City drainage systems.

Low-flow Toilet Rebate Program

The City offers a \$100 rebate to residents for replacing old toilets with new low-flush toilets to reduce waste volume through water conservation.

Action 1.1.18 – Develop and implement inflow and infiltration management plans, using the Metro Vancouver template as a guide, to ensure wet weather inflow and infiltration volumes are within Metro Vancouver's allowances as measured at Metro Vancouver's flow metering stations (2012).

Narrative 4: Summarize I&I management plans & list key actions resulting from plans

Richmond's overall I&I rate for a 5 year return period storm is 7,600 l/ha/d based on flows recorded at the Lulu Island Wastewater Treatment Plant. This rate is of I&I is 32% below the regional allocation of 11,200 l/ha/d.

Richmond monitors I&I at the catchment level through pump run times at sanitary pump stations. Detailed pump run times are captured in data loggers that are manually downloaded to spreadsheets

and subsequently converted to sanitary flow rates. The results of this monitoring program are included graphically Attachment 1.

Richmond is improving the accuracy of the pump run time analysis through installation of pressure sensors at sanitary pump stations. Utilizing pressure information and pump curves will improve the accuracy of the flow information generated by the City's monitoring program. Richmond is also installing Mag-meters on all new sanitary pump stations to further improve the accuracy of its sanitary flow information.

Richmond is also moving toward automated pump run time data collection and analysis through its SCADA network and the Flow Works data storage and analysis system.

Catchment level data is being utilized to identify catchments with excessive I&I for further study. This study will include a review of sanitary system response to rainfall events to determine the relative levels of inflow and infiltration. This information will be subsequently utilized to identify appropriate inspection techniques for further catchment review.

Richmond has completed CCTV inspection and sanitary sewer condition assessment for 90% of its gravity sewer system. The sewers inspected to date were found to be in excellent condition. There are very few significant structural defects (0.2 structural defects per km of pipe inspected) as well as low rates of I&I defects, consisting mainly of infiltration at joints (0.7 I&I defects per km of pipe inspected).

During the reporting period, Richmond completed 52 km of CCTV inspection and sanitary sewer condition assessment in the Terra Nova Sanitary Sewer Study Area. This work identified four pipeline segments that require structural point repair and 52 points of infiltration. Identified defects in the Terra Nova Sanitary Sewer Study Area will be repaired as part of the City's 2013 Capital Program.

Attachment 1:

- a) I&I Mapping showing I&I rates for neighbourhoods where studies have been completed with before and after I&I (L/h/d). Objective to illustrate catchment areas covered by I&I studies.*

Action 1.1.19 – Enhance enforcement of sewer use bylaw prohibition against the unauthorized discharge of rainwater and groundwater to sanitary sewers (2010).

Narrative 5: Summarize enforcement enhancements and process efforts during reporting period

Drainage, Dyke and Sanitary Sewer System Bylaw No. 7551 requires “that where the property owner does not connect the property owner’s property to the City sanitary sewer system and the City drainage system, as required in subsection 1.1.1, the General Manager, Engineering & Public Works may direct that the City undertake such connections at the expense of the property owner.”

Richmond has an on-going sanitary and storm preventative maintenance program that identifies sanitary and storm cross-connections. During reporting period, seven (7) identified cross-connections were identified and corrected by City crews.

Table 4: Identify location regulations and enforcement

Local Regulation & Bylaw No.	Date	Objectives
Bylaw 7551	Effective Date-January 1, 2003	To connect to City Sanitary Sewer and Drainage Systems

Action 1.1.20 – Update municipal bylaws to require on-site rainwater management sufficient to meet criteria established in municipal integrated stormwater plans or baseline region-wide criteria (2014).

Narrative 6: Highlight and summarize bylaw changes relating to stormwater management

The City is developing an ISMP that will establish on-site rainwater management criteria. This process will recommend possible bylaw improvements to meet ISMP objectives. The plan is scheduled to be completed by the end of 2013 - in advance of the required 2014 ISMP completion schedule. Table 5 includes existing bylaws that already relate to on-site rainwater management.

The City’s OCP Bylaw No. 9000 was updated in 2012. The bylaw emphasizes the importance of managing rainwater in many situations, including private land use. Specifically included in section 14.2.10, Development Permits require that developers must manage as much rainwater on site as possible by:

- incorporating Green Roofs (as per Bylaw 8385), bio-swales, infiltration and other best management practices throughout the site to store rainwater;
- using pervious surfaces to promote rainwater infiltration;
- using rainwater harvesting systems for irrigation and toilet flushing.

The Richmond Olympic Oval and the IKEA development on Bridgeport Road are examples of buildings that capture rainwater for use as toilet flushing water. The Townline development on the Fantasy

Gardens site diverts roof and other rainwater run-off into a City pond that will be used to irrigate City Park and community garden space.

Table 5: List related bylaws and key stormwater components and list on-site rainwater management target (s)/objective(s).

Stormwater Management Bylaws	On-Site Rainwater Management Target/Objectives
Green Roof Bylaw No. 8385 (Oct. 2008)	To reduce the total annual site stormwater run-off volume by 20% of the volume that would otherwise enter the City's stormwater system by means of conventionally designed roof drains conveying storm water runoff from a totally impermeable roof of equal area, directly to the storm sewer or drainage system. Location area restrictions apply. Only applicable to buildings where industrial or office uses will occupy a gross floor area of 2,000s.m. or more.
2041 Official Community Plan Bylaw No. 9000 (Nov, 2012)	This bylaw contains non-specific water quantity and quality objectives. Objectives are determined on a site specific basis.
Pollution Prevention and Clean-up Bylaw No. 8475 (Oct. 2009)	This bylaw may be applied to stormwater management if a stormwater discharge is considered to be polluting. Its objective is that no person shall release or allow to be released a polluting substance into any drainage system, watercourse or onto or into the soil, other than as authorized by all applicable environmental laws.

Action 1.1.21 – Update municipal utility design standards and neighbourhood design guidelines to enable and encourage on-site rainwater management (2014).

Narrative 7: Highlight and summarize changes to utility design standards and neighbourhood design guidelines in relation to on-site rainwater management

To manage known drainage system issues, the City's Engineering Design Standards require that developers upgrade existing drainage infrastructure to increase system storage and capture sediment. The City's minimum specified drainage pipe diameter is 600 mm, and all storm connections must incorporate inspection chambers or sump manholes.

Roof leaders from single family homes are typically tied into perimeter, perforated drainage pipes. Although this practice primarily directs roof water into the City's drainage system it also allows water to infiltrate into the ground, when capacity exists. As per new design standards for boulevard drainage, where no road curb and gutter exist, single family homes are also required to create shallow swales on their fronting boulevards that direct rainwater over grassed areas before entering the City's drainage system.

The Richmond Olympic Oval and the IKEA development on Bridgeport Road are examples of buildings that capture rainwater to flush toilets. These designs help to set a precedent for requiring similar on-site rainwater management infrastructure, although no formal design standards exist to guide their installation.

As per Table 5, the City's Green Roof Bylaw No. 8385 requires on-site rainwater management although no formal design standards exist to guide their installation.

Table 6: List standards and guidelines and where applied

Utility Design Standards & Guidelines	Application Location
City of Richmond Engineering Design Specifications	<p>Section 3.1.1 – 3.1.3: Stormwater Management Plans and sediment Control Plans</p> <p>Section 3.7: Minimum pipe size</p> <p>Section 3.14: Manholes</p> <p>Section 3.16: Stormwater Connections</p> <p>Section 3.19:</p> <p>Drg No. D-3-DS: Typical Boulevard Landscaping for Single Family Development without Curb & Gutter</p> <p>Drg No. D-1-DS: Watercourse Crossing Design Standard</p> <p>Drg No. P105-2: SF Perimeter Drain Design Standard</p>

Action 1.2.5 – Work with Metro Vancouver to develop and implement municipal-regional sanitary overflow management plans as set out in 1.2.4 (2013).

Narrative 8: Summarize development of municipal sanitary overflow management plans. Highlight specific examples. Indicate if this includes formalized protocols or procedures for emergency sanitary sewer overflows.

Richmond's municipal sanitary system did not experience any sanitary sewer overflows during the reporting period. Richmond does not have any combined sewer systems, and maintains an overall I&I rate below the regional design allowance. As such, Richmond does not have chronic sanitary sewer overflow issues due to weather or rainfall. The City's emergency protocols related to preventing sanitary sewer overflow are largely based on mechanical failures and power interruption.

Due to the Richmond's flat topography and high water table, the City has a large number of small sanitary catchments. Each catchment is serviced by a gravity collection system that feeds a pump station dedicated to that catchment. In the event of a pump station failure, the flat nature of catchment topography facilitates utilization of the entire gravity collection system as short term storage. For longer failures, the relatively small size of each gravity catchment maintains sanitary flows at a rate that can be serviced by vactor trucks. An example of this is the Lansdowne forcemain failure event where 5 pump stations served by the forcemain were maintained through vactor truck service for a number of days while a temporary pipeline was installed.

The City also maintains a fleet of standby generators to maintain pump station operation during power failure. Larger stations include dedicated generator facilities and all new pump stations in high-density development areas include dedicated emergency generators.

Metro Vancouver has an overflow management plan for Lulu Island Waste Water Treatment Plant that includes backup power to the plant, extra pumps, high level alarms and overflow discharge arrangement. For other Metro Vancouver facilities, including Bridgeport sanitary pump station and East Richmond sanitary pump station, the overflow management plan includes backup power, extra pumps, high level alarms and vactor trucks arrangements.

Action 1.2.6 – Burnaby, New Westminister and Vancouver will work with Metro Vancouver to give effect to 1.2.2 and, specifically, implement plans to prevent combined sewer overflows by 2050 for the Vancouver Sewerage Area and 2075 for the Fraser Sewerage Area and separate combined sewers at an average rate of 1% and 1.5% of the system per year in the Vancouver Sewerage Area and Fraser Sewerage Area respectively (Ongoing).

Narrative 9: Highlight and summarize progress on the prevention of CSOs and the separation of combined sewers

N/A. There are no combined sewers in the City of Richmond.

Attachment 2:

a) *Map showing CSO locations, volumes & number of occurrences (N/A)*

Action 1.3.11 – Develop and implement operational plans for municipal sewerage facilities to ensure infrastructure reliability and optimal performance (Ongoing).

Narrative 10: Discuss approaches and strategies that address risks (i.e. regular maintenance, SCADA, monitoring, protocols, identified redundancies/contingencies)

Richmond has an ongoing Ageing Infrastructure replacement program with dedicated funding from the Sanitary Sewer Utility that maintains the sanitary system in an appropriate operating condition.

The City has a SCADA monitoring system for its 152 sanitary pump stations that identifies and records various alarm states and operational data. Pressure sensors are being installed at sanitary pump stations to provide additional pump and forcemain performance information. New pump stations include a duplex pump configuration to provide system redundancy.

Richmond has a gradual sanitary pump station start up procedure to minimize stress on the sanitary pressure system after BC Hydro power failure events. High volume and critical sanitary pump stations have standby generator provisions in place to minimize the impact of power failure.

Pump stations are inspected and cleaned bi-weekly basis.

Richmond has completed CCTV inspection of 90% of its gravity collection system and has an ongoing CCTV inspection and remediation program for pipelines with chronic issues.

Richmond maintains a spare equipment and materials inventory (including pumps, pipes, valves and etc.) for unplanned maintenance and emergency events.

Richmond has an on-going grease monitoring and cleaning program to maintain gravity sanitary sewers and pump stations in good operating conditions. Richmond has a number of source control programs and initiatives to reduce the amount of grease that gets introduced to the sanitary system.

Richmond's fleet includes vactor trucks and Richmond has a standing agreement with McRae's Environmental Services Ltd. for additional vactor resources to supplement the City's fleet when required.

Action 1.3.12 – Work with Metro Vancouver to develop and implement emergency sanitary sewer overflow plans including contingency plans to minimize impacts of unavoidable sanitary sewer overflows resulting from extreme weather, system failures or unusual events (Ongoing).

Richmond's municipal sanitary system did not experience any sanitary sewer overflows during the reporting period. Richmond does not have any combined sewer systems, and maintains an overall I&I rate below the regional design allowance. As such, Richmond does not have chronic sanitary sewer overflow issues due to weather or rainfall. The City's emergency protocols related to preventing sanitary sewer overflow are largely based on mechanical failures and power interruption.

Richmond has developed an Emergency Management Plan (REDMS#2874803) that provides the authority and guidance to the City of Richmond's staff to ensure a well-managed response to major emergencies within the jurisdiction. It is based on the standards established for the "British Columbia Emergency Response Management System". The plan identifies key priorities and actions to be undertaken in preparing for and responding to a major emergency or disaster. Those disasters include but not limited to critical infrastructure failure, earthquake, flooding and severe weather. All these disasters may involve failures of municipal & regional wastewater collection and treatment systems. A detailed emergency management strategies and response plan will be developed in the future in collaboration with Metro Vancouver and IPREM for municipal and regional wastewater collection and treatment systems.

Richmond is a participant in IPREM (The Integrated Partnership for Regional Emergency Management in Metro Vancouver), which is currently working on the potential impacts to critical infrastructure and regional response within Metro Vancouver for regional disaster scenarios. This work includes Investigation of "Guiding Principles, Rational and Process" proposed for the Regional Concept of Operations and their applicability to restoration priorities. It is a proposed a framework to help address how this Region will:

- Collectively share information and collaborate on decisions;
- Identify roles and authority of elected and appointed officials and other agencies;
- Agree on the consultation and approval process.

Metro Vancouver has an overflow management plan for Lulu Island Waste Water Treatment Plant that includes backup power to the plant, extra pumps, high level alarms and overflow discharge arrangement. For other Metro Vancouver facilities, including Bridgeport sanitary pump station and East Richmond sanitary pump station, the overflow management plan includes backup power, extra pumps, high level alarms and vactor trucks arrangements.

Attachment 3:

- a) *Map showing location of emergency municipal overflows*

Action 1.3.13 – Work with private marina operators, Ministry of Environment and Environment Canada to develop and implement regulations to ensure all new marinas and marinas where planned renovations exceed 50% of the assessed existing improvements value have pleasure craft pump-out facilities (*Ongoing*).

Table 9: List local regulation process or bylaw

Regulation Process or Bylaw	Date
Bylaw No.6989 Public Health Protection Subdivision two: Marina Health and Safety Regulation	Effective Date-March 13, 2000

Action 1.3.14 – Require all pleasure craft pump-out facilities to connect to a municipal sanitary sewerage system or a provincially permitted on-site treatment and disposal system or have established enforceable protocols for transporting liquid waste for disposal at a permitted liquid waste management facility (*Ongoing*).

Narrative 11: Describe any additional regulations and the number of on-site treatment systems required/installed during the reporting period

Bylaw No.6989 Public Health Protection Subdivision two: Marina Health and Safety Regulation Part 2.4 Liquid Waste Disposal Item 2.4.1.1 states that "Every marina operator must ensure that all sewage from a marina is discharged into a municipal sanitary sewer system, or where not available, into an approved sewage disposal system."

Action 1.3.15 – Continue existing municipal odour control programs and implement new programs for targeted municipal sewer facilities (*Ongoing, see Action 3.3.4*).

Narrative 12: Summarize existing municipal odour control programs and the implementation of new programs for targeted municipal sewer facilities

The City controls odour for sanitary pump stations primarily through low sewage residency time and pump station cleanliness. Richmond's small catchments result in a system that has short residency time for sanitary sewage in the Richmond collection system. By-weekly flushing facilitates removal of build up and solids in pump stations further reducing odour generation. Richmond had no odour complaints regarding the City collection system during the reporting period.

Attachment 5:

a) Map showing odour control facilities & locations of complaints

Action 1.3.16 – Develop and implement air emissions management programs for standby power generators at municipal sewer pump stations (*2016*).

Narrative 13: Summarize air emissions management programs for standby power generators at municipal sewer pump stations

Canada currently does not have a universally defined emissions standards. The City is using MTU Onsite Energy generator sets that are manufactured in the U.S., and they are in compliance with U.S. EPA standards. The City has annual test program for standby generators that includes load test, fuel quality check, filter replacement, etc.

Action 1.3.17 – Develop and implement programs to reduce greenhouse gas emissions from municipal liquid waste management systems to help achieve federal, provincial and municipal greenhouse gas targets (*Ongoing, see Action 3.1.5*).

Narrative 14: Identify any programs or initiatives for wastewater and drainage services that help achieve municipal greenhouse gas targets.

On July 26, 2010, Richmond City Council endorsed the Corporate Sustainability Framework, Energy Strategic Program, which included a target "to reduce energy consumption in the Richmond community by at least 10% from 2007 levels by 2020". Together with Council's adopted green house gas reduction targets of 33% below 2007 levels by 2020 and 80% by 2050, these targets provide direction on energy management to the City as a corporation and for the community.

Bylaw 9000 - 2041 Official Community Plan (OCP) Schedule 1 Energy Policy 2(e) states: "continue to pursue locally supplied renewable energy systems and technologies for space heating and cooling,

domestic hot water supply as well as electricity production (e.g., renewable energy, district energy systems, solar thermal, geothermal, **sewer heat recovery**, river heat recovery and wind power systems)".

During the reporting period, Richmond completed installation of the Gateway Theatre Sewer Heat Recovery System to recover heat from a municipal wastewater pump station. The system reduces the amount of natural gas and associated greenhouse gas emissions required to heat the adjacent Gateway Theatre. This project is estimated to have a 52 tonnes CO₂ green house gas reduction. The Gateway Theatre is intended as a pilot project to prove the concept in advance of more ambitious sewer heat recovery projects.

Richmond is working with Metro Vancouver and the River Green Development to implement a sewer heat recovery system on the Gilbert Trunk Sewer at cated at Hollybridge Way. A feasibility study has been completed and the project is moving forward with a business case analysis in preparation for City Council consideration. The project has a target construction date in 2018. There will be an estimated 2600 tonnes CO₂e green house gas emissions reduction at full build out for this project from heat recovery. Additionally, renewable Natural Gas (RNG) use from the Lulu Island WWTP will reduce green house gas emissions by up to 2044 tonnes CO₂.

Richmond is partnering with Metro Vancouver to explore sewer heat recovery at Lulu Island Waste Water Treatment Plant (LIWWTP), and is supporting the Metro Vancouver and FortisBC Biomethane Pilot Program at LIWWTP. This project will reduce green house gas emission by an estimated 186 tonnes CO₂.

Richmond is developing a District Energy Utility Ready policy for the City Centre Area as part of a medium to long term strategy to develop district energy utilities in the City Centre.

Trenchless technologies are employed where appropriate to repair or install sanitary sewer infrastructure, which reduces greenhouse gas emissions. A recent example is 2010/2011 sanitary gravity sewer and forcemain installation in the Hamilton area where directional drilling was used extensively to install the pipe network. The City has included Appendix 6 Sustainable Practices in the Form of Tender for municipal capital infrastructure projects to further encourage responsible use of resources. Sustainable practices are defined as those materials, equipment and construction methodologies that reduce greenhouse gas emissions as compared to standard practices.

Richmond has a pump replacement program that systematically upgrades sanitary and drainage pumps with more energy efficient models.

Action 3.1.6 – Assess the performance and condition of municipal sewerage systems by: (a) inspecting municipal sanitary sewers on a twenty year cycle, (b) maintaining current maps of sewerage inspection, condition and repairs, and (c) using the Metro Vancouver “Sewer Condition Report, November 2002” as a guide to ensure a consistent approach to sewer system evaluation and reporting (*Ongoing*).

Narrative 15: Summarize key progress on the assessment and condition of municipal sewerage system

Between 2001 and until 2011, Richmond has completed CCTV inspection and assessment for 90% of its gravity sanitary sewer system. During the reporting period, Richmond completed 52 km of CCTV inspection and condition assessment for the Terra Nova Sanitary Sewer Area. The study identified four sections of gravity pipeline that require point repair for structural defect and 52 points of infiltration, mainly at pipe joints. The City will remedy these defects as part of the 2013 Capital Program.

Attachment 6:

Map highlighting:

- a) sewerage system CCTV inspection*
- b) replacement /rehabilitation locations (last 20 yrs)*

Action 3.1.8 – Develop and implement asset management plans targeting a 100 year replacement of rehabilitation cycle for municipal sewerage infrastructure and provide copies of such plans to Metro Vancouver (*2014*).

Narrative 16: Summarize key progress or accomplishments on the development of asset management plans for municipal sewerage infrastructure.

Richmond has an ongoing Ageing Infrastructure Replacement Program with dedicated funding from the Sanitary Sewer Utility that maintains the sanitary system in an appropriate operating condition. Staff report to City Council annually on the status of the program which includes current infrastructure status, long term funding requirements and funding gaps if they exist. The 2011 program update is available as RDMS# 3170477 and identified a long term, sustainable capital requirement of \$6.2M and a budget of \$4.3M. City Council and staff have made significant progress in closing the funding gap and will continue to close the gap in subsequent utility rate setting cycles. The sanitary system is relatively young and the bulk of replacement funding is predicted to be required between 2041 and 2061. As such, the incremental approach to closing the funding gap is appropriate for the City of Richmond.

Richmond has completed CCTV inspection and sanitary sewer condition assessment for 90% of its gravity sewer. Richmond has found that the sewers inspected to date are in excellent condition. The 52 km CCTV program completed in the reporting period identified a low occurrence of structural (0.2 structural defects per km of pipe inspected) or I&I defects (0.7 I&I defects per km of pipe inspected).

Identified defects will be remedied as part of the 2013 Capital Program as documented in the City's 5-year capital program (REDMS#3247757 2013-2017 Capital Sanitary Projects Recommendations).

Development of the City's 2041 Official Community Plan included hydraulic modeling of the sanitary sewer system and identification of capacity based improvements to support growth identified in the plan. Identified pipelines will be improved as growth occurs through the Developer Cost Charges program or through developer funded improvements.

Attachment 7:

- a) *List copies of completed asset replacement plans that are available on request: REDMS#3249431 Eng. D&C Construction Program Update 2012 and 2011; REDMS#2056950 Eng. D&C Construction Program Update 2010. REDMS#3247757 2013-2017 Capital Sanitary Projects Recommendations. Additional documentation for previous years is available upon request.*
- b) *Reference or append completed annual PSAP 3150 reporting on asset values: City of Richmond 2011 Annual Report includes audited financial statement and note 13 tangible capital assets schedule attached (REDMS#3486562 TSA Continuity Schedule Details)*

2011 Annual Report could be found at:

<http://www.richmond.ca/shared/assets/2011annualreport33023.pdf>

More detailed information for our non-financial assets that we report to the Province could be found at: http://www.cscd.gov.bc.ca/lgd/infra/municipal_stats/municipal_stats2011.htm

- c) *Colour coded map showing age of the sewerage system (i.e.: <1900, 1901-1925, 1926-1950, 1951-1975, 1976-2000, >2000)*

Action 3.2.4 – Undertake a tri-annual internal audit of best practices of one municipal liquid waste management sub-program in each municipality to identify opportunities for innovation and improvements (*Triennially*).

Narrative 17: Summarize key findings from the tri-annual internal audit (first due in 2013)

The implementation is not required for the current reporting period.

Action 3.3.6 – In collaboration with Metro Vancouver, estimate and document the greenhouse gas emissions and odours associated with the operation of the municipal and regional liquid waste management systems (2014).

Narrative 18: Summarize the estimate of greenhouse gas emissions and odours associated with the operation of municipal and regional liquid waste management systems.

Not required for the current reporting period.

Action 3.3.7 – Estimate and report on the frequency, location and volume of sewerage overflows from municipal combined and sanitary sewers, and where feasible identify and address the probable causes (Ongoing).

Narrative 19: Summarize and highlight any important details and action plans relating to wet weather SSOs & probable causes of CSOs

Richmond did not have any wet weather sanitary sewer overflows during reporting period. There are no combined sewers in the City.

Attachment 8:

a) Map showing wet weather SSO locations, volumes & number of occurrences

Action 3.3.8 – Maintain and, if necessary, expand the existing municipal sewer flow and sewer level monitoring network (Ongoing).

Narrative 20: Summarize and highlight any changes to the existing municipal sewer flow & sewer level monitoring network

Richmond has wet well level monitoring sensors installed at all (152) sanitary pump stations. Currently, the City is monitoring flows through the utilization of pump run times at sanitary pump stations using data loggers. To improve the accuracy of pump flow calculations, the City is installing pressure sensors at sanitary pump stations. The pump discharge pressures will be utilized with pump curves to determine sanitary discharge flow. Richmond is moving toward automating the data collection and data download processes through SCADA and Flow Works technologies. The City requires flow meters at all new pump stations.

Attachment 9:

a) Map showing location & number of active sewer flow and level monitors for the reporting period

Action 3.4.4 – In collaboration with Metro Vancouver and the Integrated Partnership for Regional Emergency Management (IPREM), develop emergency management strategies and response plans for municipal and regional wastewater collection and treatment systems (2015).

Narrative 21: Summarize progress on the development of emergency management strategies and response plans for municipal & regional wastewater collection and treatment systems

Richmond has developed an Emergency Management Plan (REDMS#2874803) that provides the authority and guidance to the City of Richmond's staff to ensure a well-managed response to major emergencies within the jurisdiction. It is based on the standards established for the "British Columbia Emergency Response Management System". The plan identifies key priorities and actions to be undertaken in preparing for and responding to a major emergency or disaster. Those disasters include but not limited to critical infrastructure failure, earthquake, flooding and severe weather. All these disasters may involve failures of municipal & regional wastewater collection and treatment systems. A detailed emergency management strategies and response plan will be developed in the future in collaboration with Metro Vancouver and IPREM for municipal and regional wastewater collection and treatment systems.

IPREM has identified next steps for Critical Infrastructure (CI) Assurance Planning as follows:

- 1) Examine the potential impacts to CI within Metro Vancouver for each of the priority hazards that were identified during the Regional Hazard/Risk Assessment workshops. The first to be discussed is the 7.3M Strait of Georgia earthquake, followed by the recent Haida Gwaii Earthquake/ Tsunami, including indirect impacts to Metro Vancouver;
- 2) Investigate the "Guiding Principles, Rational and Process" proposed for the Regional Concept of Operations and their applicability to restoration priorities. It proposed a framework to help address how this Region will:
 - Collectively share information and collaborate on decisions;
 - Identify roles and authority of elected and appointed officials and other agencies;
 - Agree on the consultation and approval process.

Action 3.4.5 – Adapt infrastructure and operations to address risks and long-term needs (Ongoing).

Narrative 22: Summarize key initiatives that support the adaptation of infrastructure & operations to address risks and long term needs

Long term financial management strategy to replace ageing infrastructure

Richmond has an ongoing Ageing Infrastructure Replacement Program with dedicated funding from the Sanitary Sewer Utility that maintains the sanitary system in an appropriate operating condition. Staff report to City Council annually on the status of the program which includes current infrastructure status, long term funding requirements and funding gaps if they exist. The 2011 program update is available as RDMS# 3170477 and identified a long term, sustainable capital requirement of \$6.2M and a budget of \$4.3M. City Council and staff have made significant progress in closing the funding gap and will continue to close the gap in subsequent utility rate setting cycles. The sanitary system is relatively young and the bulk of replacement funding is predicted to be required between 2041 and 2061. As such, the incremental approach to closing the funding gap is appropriate for the City of Richmond.

Richmond has an on-going 5-year sanitary replacement capital program (REDMS# 3247757) that includes gravity sewers, forcemains and pump stations replacements.

Bylaw 9000 – 2041 Official Community Plan (OCP)

Bylaw 9000 – 2041 Official Community Plan (OCP) Schedule 1 addresses risks and long term needs of sanitary sewer system through the following objectives and policies:

OBJECTIVE 1:

Maintain an efficient sewage system to protect public health and safety.

POLICIES:

- a) maintain and improve the existing sanitary sewer system through a proactive maintenance program, the use of quality materials and applying best-management practices that minimize life cycle costs;
- b) improve the efficiency of the sewer system by:
 - maintaining low inflow and infiltration levels;
 - reducing waste volume through water conservation;
 - continuing to participate in the Metro Vancouver sanitary sewer source control program by supporting the Metro Vancouver Waste Water Discharge Permit process;
- c) focus on detecting and reducing fat, oil and grease (FOG) in the sewer system;
- d) develop public education programs to:
 - reduce FOG discharges into the sewer system;
 - reduce per capita water use which will, in turn, reduce sanitary sewer flows;

e) continue to work with Metro Vancouver on sanitary trunk and treatment plant capacity improvement projects;

f) participate in the on-going implementation of the May 2010 Metro Vancouver Integrated Liquid Waste Resource Management Plan.

OBJECTIVE 2:

Proactive planning of infrastructure upgrades and replacements due to age and growth.

POLICIES:

a) budget and plan to replace aging infrastructure in alignment with the City's Aging Infrastructure Replacement Plan;

b) coordinate the replacement of aging sewer infrastructure with other City infrastructure replacement projects;

c) ensure that sewered areas of the City maintain service levels in alignment with the needs of present and future land uses;

d) ensure that development related sanitary system upgrades are funded through Servicing Agreements sewer DCC's, and senior government funding;

e) require all new developments to be connected to sanitary sewer where sanitary system is available;

f) discourage the development of private on-site sewage disposal systems, except in those areas where sanitary sewer is not available.

Action 3.4.6 – Ensure liquid waste infrastructure and services are provided in accordance with the Regional Growth Strategy and coordinated with municipal Official Community Plans (Ongoing).

Attachment 10:

a) Map showing colour coded municipal serviced area: within the Urban Containment Boundary, Outside under special exemption, Outside without exemption.

Action 3.4.7 – Develop and implement integrated stormwater management plans at the watershed scale that integrate with land use to manage rainwater runoff (2014).

Narrative 23: Summarize and highlight key initiatives relating to the development and implementation of the integrated stormwater management plans

The City is developing an ISMP that will be completed in 2013, ahead of the 2014 deadline. Due to Richmond's topography, diking and historic agricultural land use, the City has few natural wetlands and no natural creeks or streams. However, many watercourses are recognised as Riparian Management Areas (RMAs) that are important wildlife habitats and contribute to surface water health. City drainage systems typically use enclosed, interlinked conduits and manmade open channel/watercourses to convey surface rainwater to gravity outfalls and drainage pump stations that discharge into the Fraser River. Due to the drainage systems interlinked nature, water can move in many directions throughout the system making Lulu Island one big watershed. As such, the City is producing one ISMP for the Lulu Island watershed. To date, the City's consultant has completed stage one of the proposed IRRMS work program which included a review of the City's drainage system, environmental habitats, land use, policies, bylaws and similar key pieces of information that affect surface water management and health. From this information, study areas with diverse land use and drainage system characteristics have been developed. These areas will be used to identify rainwater management best practices and recommendations that may update or extend current policies, bylaws and other standards to protect and enhance watercourse health.

Table 10: List ISMPs, their current status and the implementation of any major initiatives

ISMPs	Current Status (In Development, Developed, Implemented)	Major Initiatives
Lulu Island	In Development	Not yet identified

Attachment 11:

- a) Map showing ISMPs & status (using the following colour code: In Development = Yellow, Developed = Light Green, Implemented = Dark Green)

Action 3.5.8 – Biennially produce a progress report on plan implementation for distribution to the Ministry of the Environment that: (a) summarizes progress from the previous two years on plan implementation for all municipal actions, including the status of the performance measures, (b) includes summaries and budget estimates for proposed LWMP implementation programs for the subsequent two calendar years (July 1st biennially).

Table 11: List budget estimates for the LWMP implementation programs and subsequent two years beyond biennial report (from 5 yr plan)

LWMP Implementation Action	Details/Notes	Budget					
		2010	2011	2012	2013	2014*	2015*
Sanitary Sewer Capital Program	Includes pump stations	8.7M	3.2M	6.9M	4.6M	5.9M	4.7M

	<i>replacement, gravity sewer and forcemain replacement and sanitary sewer rehabilitation works.</i>						
<i>Development Projects (Sub-division Agreements)</i>		<i>2.3M</i>	<i>2.9M</i>	<i>2.5M</i>			
<i>ISMP Implementation</i>				<i>0.15M</i>			

* Subject to council approval

Action 3.5.9 – this reporting is an annual requirement. In the year of the biennial report, this action is covered off by municipal reporting on 3.4.7 & 3.3.7. This municipal reporting is to be summarized regionally under 3.5.6 of the MV reporting template.

Ministerial Condition 2 – Member municipalities are strongly encouraged to business case and/or implement residential water metering programs and to consider municipal rebate programs for water efficient fixtures and appliances to reduce potable water use.

Narrative 24: Discuss initiatives that evaluate/support water metering and rebate programs to water fixtures and appliances

The City of Richmond has comprehensive water meter programs for both residential and commercial properties. 100% of industrial and commercial properties in Richmond are metered. Richmond also has mandatory and voluntary programs for residential water metering. Water meters are mandatory for new construction, major renovations, and for dwellings in areas of watermain upgrades. Richmond has voluntary water meter programs for single-family dwellings, with free water meter and installation, and multi-family dwellings, with a minimum subsidy of \$60,000 per complex. As of January 1, 2013, 70% of single-family dwellings and 23% of multi-family dwellings are metered in Richmond.

To complement these water meter programs, Richmond provides metered customers with free water conservation kits, which include low flow showerheads, faucet aerators, toilet fill cycle diverters, toilet leak detection tablets, and educational water conservation tools. In addition, Richmond offers a \$100 rebate to residents for replacing old toilets with new low-flush toilets, and subsidized rain barrels to collect and store water for outdoor use. As of January 1, 2013, 3,150 toilet rebates and 825 rain barrels have been issued to Richmond residents.

Ministerial Condition 3 –

MV, in partnership with member municipalities, is encouraged to pursue a region-wide water conservation program targeting the industrial, commercial, institutional and agricultural sectors as part of its new Drinking

Water Management Plan. Remaining municipalities in the region that have not implemented metering for these sectors are encouraged to do so.

The City's water conservation programs include water metering, toilet rebates, lawn irrigation restrictions, river and rainwater for irrigation, and demonstration projects that use rainwater for toilet flushing.

Ministerial Condition 7 – Member municipalities will, with MV planning and coordination, and to the satisfaction of the Regional Manager, develop a coordinated program to monitor stormwater and assess and report the implementation and effectiveness of Integrated Storm Water Management Plans (ISMPs). The program will use a weight-of-evidence performance measurement approach and will report out in the Biennial Report. The Regional Manager may extend the deadline for completion of ISMP by municipalities from 2014 to 2016 if satisfied that the assessment program could result in improvement of ISMP and protect stream health.

Narrative 25: To be determined once the Adaptive Management Framework for ISMPs has been developed

A draft Adaptive Management Framework for ISMPs was developed in 2012 with input from the Stormwater Interagency Liaison Group and Environmental Monitoring Committee. This framework is being tested and refined in 2013 prior to its use by member municipalities.

Attachment 12:

- a) Results per ISMP Adaptive Management Framework watershed (as available) Not Available*
- b) Map showing location of monitoring*
- c) Do you have required ISMP's that will not be completed by 2014?*

Ministerial Condition 9 – The ILWRMP has a goal of protecting public health and the environment. In keeping with this goal and to ensure alignment with other national, provincial and regional initiatives, Metro Vancouver and member municipalities are encouraged to: (a) Have local land use planning consider the direction provided by the ISMPs, (b) Consider how the degree, type and location of development within a drainage can affect the long-term health of the watershed, (c) Consider how to protect the stream, including the riparian

areas that exert an influence on the stream, from long-term cumulative impacts and (d) Use scenarios and forecasting to systematically consider environmental consequences/benefits of different land use approaches prior to build-out (for example, Alternative Future type approaches).

Narrative 26: Please describe how you have used proactive planning processes as listed in Ministerial Condition 9 and provide examples.

Quote relevant OCP sections addressing stormwater, stream health and their consideration of ISMPs (may not be required based on MOE comments).

As a flat lowland municipality with few Greenfield sites, most development within the City has marginal negative impact on public health and the environment. However, the City undertakes many initiatives, supported by OCP policies (updated in 2012), that protect public Health and the environment. Examples include:

The City is undertaking a City wide ISMP with implementation plan, to be completed and endorsed by Council in 2013.

The City controls development related sediment and dewatering activities as described in Table 1b.

The City reviews development applications to limit the amount of vegetation that can be disturbed or removed from a site and sets compensation requirements. Environmental best management practices are determined for sediment control and preservation of vegetation within 5m and 15m Riparian Management Areas (RMAs), in accordance with the Department of Fisheries and Oceans (DFO) Land Development Guidelines (one additional staff member hired to manage RMAs). Permitted tree removal or replacement is determined as per Tree Protection Bylaw No. 8057.

The infilling of watercourses with RMAs is restricted by Bylaw 8441 and requires DFO approval.

The City is exploring programs detailed in the Richmond's 2012 Environmentally Sensitive Area Management Strategy to protect environmentally sensitive areas and their connectivity (jointly referred to as Richmond's Ecological Networks).

The City has a policy to maintain Agriculture land Reserve Boundaries and discourage the addition of new roads, residential and other development within them.

The City has a Dangerous Goods Spill Response Plan that identifies the risk assessment, prevention initiatives, and the preparedness, response and recovery measures to manage dangerous goods and pollution incidents in the City of Richmond, which vary with land use.

The City proactively identifies areas where existing developments cause environmental concerns (for example Bath Slough) and implements strategies to improve ecological and community values. The Bath Slough area is negatively impacted from invasive vegetation and adjacent land use issues. Strategies to improve watercourse health include tree planting to create riparian forest, the control of invasive species

(e.g. blackberry, reed canary grass and parrot feather), and working cooperatively with local business and landowners to achieve these goals and prevent point source pollution.

The City is actively trying to manage invasive plant species that threaten watercourse health and drainage functionality. The City has provided input to the Provinces Early detection rapid response

Very little Greenfield Development occurs in the City. Richmond is redeveloping within the urban containment boundaries and is moving towards densification. The following is a selection of OCP objectives and policies that ultimately support ISMP objectives:

Bylaw 9000 – 2041 Official Community Plan (OCP)

OCP Section 7.0 Agriculture and Food

7.1 Protect Farmland and Enhance Its Viability

OBJECTIVE 1: Continue to protect the City's agricultural land base in the Agricultural Land Reserve (ALR).

POLICIES:

Farmland Protection

a) maintain the existing ALR boundary and do not support a loss of ALR land unless there is a substantial net benefit to agriculture and the agricultural community is consulted;

OBJECTIVE 2: Enhance all aspects of the agricultural sector including long-term viability, opportunities for innovation (agri-industry), infrastructure and environmental impacts.

POLICIES:

Land Use Considerations

a) support farm activities which follow normal farm practices and do not create health hazards;

b) consider agricultural projects which achieve viable farming while avoiding residential development as a principal use;

c) discourage, wherever possible, roads in the ALR, except as noted on the Existing Status of Road improvements in the ALR Map;

j) continue to encourage the use of the ALR land for farming and discourage non-farm uses (e.g., residential);

k) limit the subdivision of agricultural land into smaller parcels, except where possible benefits to agriculture can be demonstrated;

Environment

a) explore with farmers ways to protect the Ecological Network values of their lands such as:

- explore programs contained in the 2012 Environmentally Sensitive Area Management Strategy;
- encourage environmentally sound agricultural practices by promoting the BC Environmental Farm Program;
- explore the viability of leasing agricultural lands that have important environmental values from farmers to manage these lands for both agricultural and environmental goals;
- explore mechanisms that compensate farmers for the loss of cultivation to maintain key ecological objectives.

OCP Section 9.0 Island Natural Environment (an Ecological Network approach)

OBJECTIVE 1: Protect, enhance and expand a diverse, connected and functioning Ecological Network (EN).

POLICIES:

a) identify an EN to provide an innovative framework to better protect the city's ecological resources;

b) include the EN as a foundational tool within the Green Built and Natural Environment program of the City's Sustainability Framework. Implementation within the program will include the establishment of targets and adoption of the Ecological Network concept;

c) establish a meaningful and robust EN by:

- considering the prioritization of EN lands, including City, private and other jurisdictions, for future planning, land acquisition, protection and enhancement (e.g., Riparian Management Areas, Park and Open Space policies, Environmentally Sensitive Areas, school yards, agricultural lands, Wildlife Management Areas, etc.). The EN data set includes information for the relative "naturalness" of given areas and also assesses their suitability for restoration and enhancement of lands including functioning, impaired and non-functioning corridors. Prioritization and recommendations can be made to identify possible acquisition, enhancement and protection strategies. Note: Currently the EN map does not include any corridors. Amendments to the OCP will be made, as appropriate, prior to the next OCP update;
- establish clear goals and objectives to strengthen and expand the existing EN. This will include a review and recommendation of potential targets and metrics to assure successful implementation of the EN;
- over time, establishing new design objectives (e.g., ecological landscape design guidelines), policies and principles for city lands, operations, environmental stewardship initiatives and private developments to ensure integration with the EN; implementing the 2012 Environmentally Sensitive Areas (ESA) Management Strategy and updating it every five years (Policy Planning);

- over time, updating the City's Riparian Management Areas (RMA) Response Strategy, Parks and Open Space Strategy and related policies to reinforce the value of connectivity;
- all private development and City works will comply with the City's Environmentally Sensitive Areas policies, the City's RMA setbacks (5 m or 16.4 ft. and 15 m or 49.2 ft.), the City's Tree Protection Bylaw, the Fraser River Estuary Management Program (FREMP) project review process and will respond to the EN policies and all other applicable environmental legislation;
- as city resources enable, strategically acquiring portions of the EN that become available and are considered important properties to be owned by the City;
- continuing to establish partnerships, incentives, policies, programs and measures, as appropriate, to improve the EN;

OBJECTIVE 2: Promote green infrastructure and the Green Infrastructure Network (GIN) and their underlying ecosystem services (e.g., clean air, water, soils), on all lands.

POLICIES:

- a) expand the EN with a complementary Green Infrastructure Network (GIN) as the key management tool;
- b) develop a Richmond specific approach to promote and track GIN opportunities to support the Ecological Network through the City's capital and operation projects, policies and development application requirements;
- c) establish an Invasive Species Management Program which includes community and institutional partners, to reduce the spread of invasive species and consequent loss of biodiversity;
- d) create educational and outreach materials that interpret the direct value of the green infrastructure and the GIN, their underlying ecosystem services and significant natural features in the City;
- e) develop a toolbox of planning and environmental policies to support site and neighbourhood level planning processes to integrate the GIN tool within the EN. This will include the identification of opportunities to acquire, enhance

OBJECTIVE 3: Proactively implement practices to protect and improve water, air and soil quality.

POLICIES:

- a) incorporate ecological values, Ecological Network, and Green Infrastructure Network opportunities and consideration of targets into the **City's Integrated Stormwater Management Plan** being developed under Regional and Provincial process. Targets will be considered for inclusion within the City's Sustainability Framework programs. As part of plan implementation, encourage innovative measures to improve storm water quality and manage impervious areas where appropriate to reduce run-off volumes, sedimentation and erosion, and thus improve water quality;

- b) continue to partner with other government agencies in the Fraser River Estuary Management Program (FREMP) in regulating and assessing shoreline development along the Fraser River;*
- c) prioritize the protection and enhancement of the Fraser River and West Dike foreshore habitat (e.g., RMA requirements, 30 m or 98.4 ft. foreshore and 30 m or 98.4 ft. inland setback buffer in accordance with the City's ESA development permit process and the Parks and Open Space Strategy);*
- d) assure compliance for all capital, operations, development applications and other projects for the City's 5 m or 16.4 ft. and 15 m or 49.2 ft. setback requirements for Riparian Management Areas (RMAs) and for Environmentally Sensitive Development Permit Areas (ESAs);*
- e) enhance the City's RMA network through the implementation of strengthened policy and/or bylaw approaches;*
- f) overtime, review and update design guidelines to ensure that public access to natural areas is provided in a manner that best balances habitat protection with public access and ecological connectivity opportunities;*
- g) establish and encourage Best Management Practices related to Air Quality and reduction of greenhouse gases, including education both internally and externally to the industrial, construction and agricultural sectors;*
- h) cease the use of traditional pesticides through the ongoing implementation of the city's Enhanced Pesticide Management Program which includes the Pesticide Use Control Bylaw and educational initiatives which promote the use of new generation, low toxicity pesticides, organic gardening, natural lawn care, etc.;*
- i) continue to expand City Operations practices to innovate best practices for landscape maintenance in the absence of traditional pesticides;*
- j) continue to establish collaborative approaches with partner agencies to reduce the environmental (i.e. biodiversity loss), infrastructure and economic impact of invasive species expansion;*
- k) continue to partner with senior governments and businesses to promote initiatives aimed at best practices for storm water management and spill response management;*
- l) continue participation in the Site Profile system to assist the Provincial Ministry of Environment with screening and managing contaminated sites through the Development process;*
- m) continue to work with senior government and other agencies to raise awareness of environmental and health impacts of discharges of polluting substances into the air, soil and water;*
- n) over time, establish Adaptive Management Principles to better manage foreshore areas in light of the potential impacts of climate change (e.g., sea level rise);*

o) continue to partner with all levels of government and others to encourage more adaptable, resilient policies to better manage climate change.

OBJECTIVE 4:

Develop Partnerships for "Ecological Gain".

POLICIES:

a) incorporate Ecological Gain principles into all City and development approval projects to maximize environmental values and benefits to the Ecological Network;

b) consider the review and establishment of a target or metric to use for tracking the implementation and success of the Ecological Gain concept.

OBJECTIVE 5: Fostering Environmental Stewardship.

POLICIES:

a) identify and establish opportunities to support the Ecological Network through volunteer driven stewardship initiatives;

b) continue to work with partner organizations, other levels of government, multicultural organizations and First Nations to develop and deliver environmental stewardship initiatives and collaborations that embrace the City's Ecological Network principles;

c) ensure outreach and educational programs in environmental stewardship are relevant to a multicultural audience;

d) seek out sponsorship and private sector support for environmental stewardship and place-making initiatives;

e) encourage the formation of community based volunteer environmental stewardship organizations.

OBJECTIVE 6: Achieve long-term protection for Environmentally Sensitive Areas (ESAs) through the implementation of the 2012 ESA Management Strategy.

POLICIES:

b) continue to provide protection for ESAs by requiring ESA Development Permits for proposed development activity in ESAs to ensure that development proposals meet ESA policies and guidelines;

c) ensure that the ESA DPs review and minimize the impacts of the proposed development in the ESA;

d) continue to require environmental impact assessments in cases where development applications are likely to negatively impact the ESA;

e) strive to achieve additional protection for ESAs, by facilitating the environmentally sensitive development on lands adjacent to identified ESAs through particular attention to the subdivision of land, siting of buildings and structures, the provision of parking, storage and landscaping areas, and allow stormwater retention during rain events;

f) encourage the restoration and re-creation of natural habitats to enhance ESAs, particularly those which are under City ownership;

OCP Section 10.0 Open Space and Public Realm

OBJECTIVE 5: *Strategically expand the range of ecosystem services (e.g., biodiversity and habitat, rain water management, carbon sequestering) integrated within the open space and public realm to strengthen and contribute to the Ecological Network.*

POLICIES:

a) protect, enhance and sustain ecosystem services in parks and other public open spaces as these are significant parts of a robust Ecological Network (see Chapter 9.0);

b) as practical, connect significant Ecological Network assets via existing or enhanced corridors (linear connections between ecosystems that facilitate the movement of species, water, nutrients and energy increasing the viability of those ecosystems);

c) provide more opportunities for people to experience nature (e.g., bird watching, nature walks);

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.*

POLICIES:

a) protect, enhance and connect the ecological values and public amenities in the Blue Network (e.g., trails, piers, fl oats, beaches, riparian areas and the foreshore);

b) continue to acquire land for the waterfront park on the Middle Arm in City Centre;

c) continue to support the City's signature maritime events (e.g., Ships to Shore, Maritime Festival, Dragon Boat Festival);

d) develop recreational opportunities on and around sloughs and canals;

e) deliver educational and interpretive programs that increase the community's connection to the Blue Network;

f) include water as an element in the urban environment (e.g., Garden City Park stormwater detention pond, Water Sky Garden at the Oval).

OCP Section 12.0 Sustainable Infrastructure and Resources

12.1 Sanitary Sewers

OBJECTIVE 1: *Maintain an efficient sewage system to protect public health and safety.*

POLICIES:

- a) maintain and improve the existing sanitary sewer system through a proactive maintenance program, the use of quality materials and applying best-management practices that minimize life cycle costs;*
- b) improve the efficiency of the sewer system by:*
 - maintaining low inflow and infiltration levels;*
 - reducing waste volume through water conservation;*
 - continuing to participate in the Metro Vancouver sanitary sewer source control program by supporting the Metro Vancouver Waste Water Discharge Permit process;*
- c) focus on detecting and reducing fat, oil and grease (FOG) in the sewer system;*
- d) develop public education programs to:*
 - reduce FOG discharges into the sewer system;*
 - reduce per capita water use which will, in turn, reduce sanitary sewer flows;*
- e) continue to work with Metro Vancouver on sanitary trunk and treatment plant capacity improvement projects;*
- f) participate in the on-going implementation of the May 2010 Metro Vancouver **Integrated Liquid Waste Resource Management Plan**.*

OBJECTIVE 2: *Proactive planning of infrastructure upgrades and replacements due to age and growth.*

POLICIES:

- a) budget and plan to replace aging infrastructure in alignment with the City's Aging Infrastructure Replacement Plan;*
- e) require all new developments to be connected to sanitary sewer where sanitary system is available;*
- f) discourage the development of private on-site sewage disposal systems, except in those areas where sanitary sewer is not available.*

12.2 Irrigation and Drainage

OBJECTIVE 1: *Maintain and improve urban drainage systems to meet the public's needs and regional requirements.*

d) prepare for the effects that climate change may bring to the region, such as increased rainfall intensities which may require higher drainage capacity (for example by participating in regional climate change initiatives, researching issues and options and implementing City Climate Change policies as practical and funding becomes available);

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 water contaminants from entering drainage systems;

*f) **integrate rainwater management master planning with other city initiatives**, such as shopping centre and arterial road densification, to meet drainage needs while minimizing pollution and soil erosion;*

g) upgrade drainage systems in established neighbourhoods via redevelopment requirements and Local Area Service Plans;

h) wherever practical, retain open watercourses to provide drainage, and ensure that the watercourse permitting process is followed;

i) integrate drainage with the Ecological Network;

12.5 Recycling and Waste Management

OBJECTIVE 3: *Support regional requirements for banned and restricted materials including hazardous waste management, through improved City bylaws, enforcement, community awareness and drop-off programs, and partnerships with product stewardship/take back programs.*

POLICIES:

a) support regional initiatives to develop alternative programs to reduce waste and pollution, such as waste audits on construction sites, processes for tracking construction waste, and alternatives to traditional building material, recycling programs and improved commercial building design guidelines;

b) encourage additional opportunities for the safe and convenient disposal of household hazardous waste through drop-off collection at the Richmond Recycling Depot, partnerships with community product stewardship/take back programs, and coordination with responsible disposal services in the community;

12.10 Street Trees

OBJECTIVE 3: *Protect and retain the City's existing street trees, particularly in areas of new development within the City.*

POLICIES:

- a) ensure that existing street trees are only removed in accordance with the criteria established by the City's Urban Forest Strategy;*
- b) ensure that planning of new developments takes into account the location and condition of existing street trees, and where necessary their replacement;*
- c) ensure that street trees are protected from disturbance during installation or maintenance activities of other public or private utilities.*

OCP Section 14.0 Development Permit Guidelines

14.2.10.D Rainwater Management

- a) Manage as much rainwater on site as possible by:*
 - *incorporating intensive and accessible extensive Green Roofs, bio-swales, infiltration and other best management practices throughout the site to store rainwater, mitigate urban heat island effect, reduce heating and cooling loads and reduce the impact on City drainage systems;*
 - *using pervious surfaces to promote rainwater infiltration;*
 - *using rainwater harvesting systems for irrigation and toilet flushing.*
- b) Newly or re-developing areas should manage rainwater runoff by using boulevard swales, rainwater gardens and other best practice techniques that slow surface runoff.*

Attachment 13:

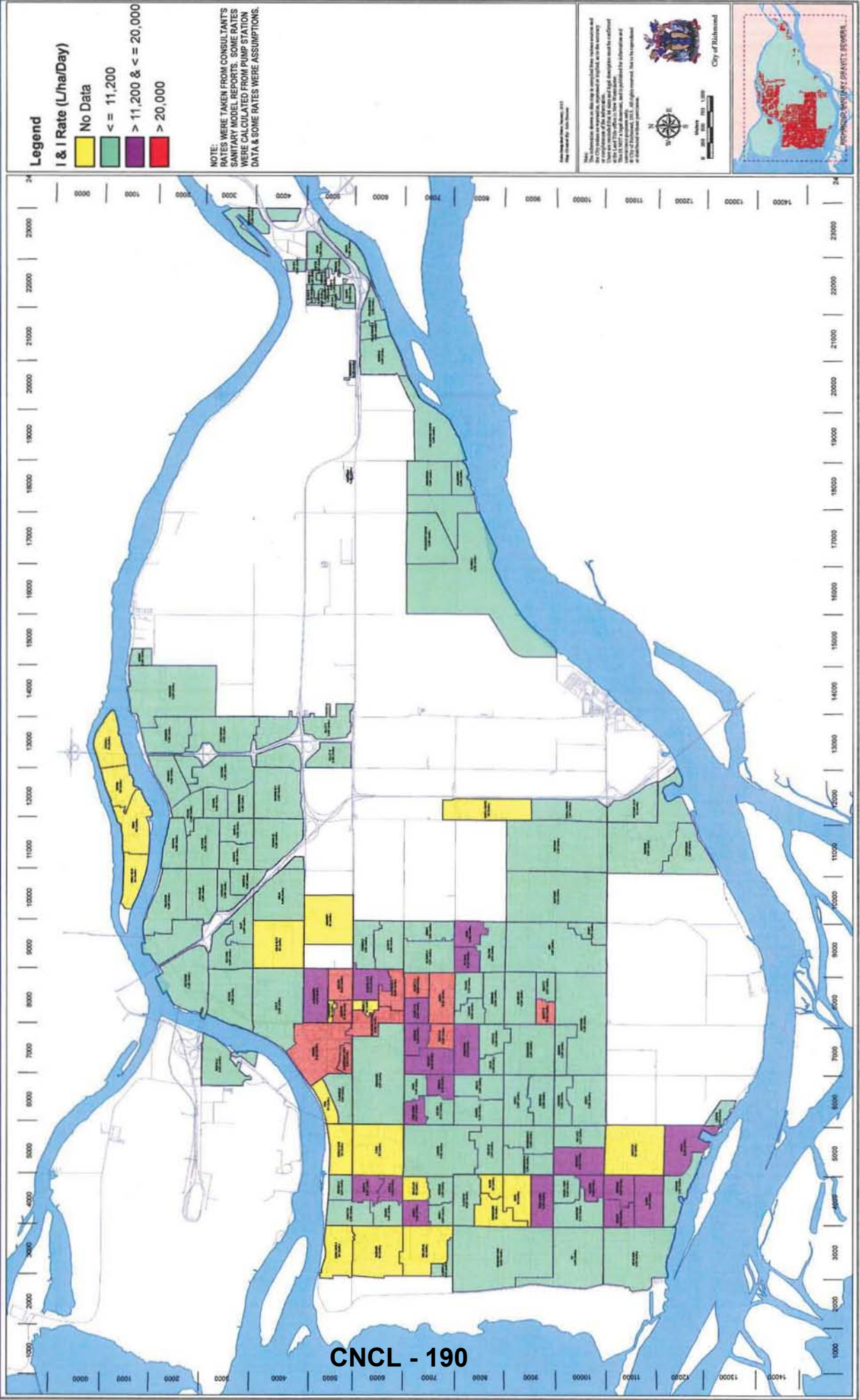
- a) Map showing protected riparian areas & possible stream classifications*

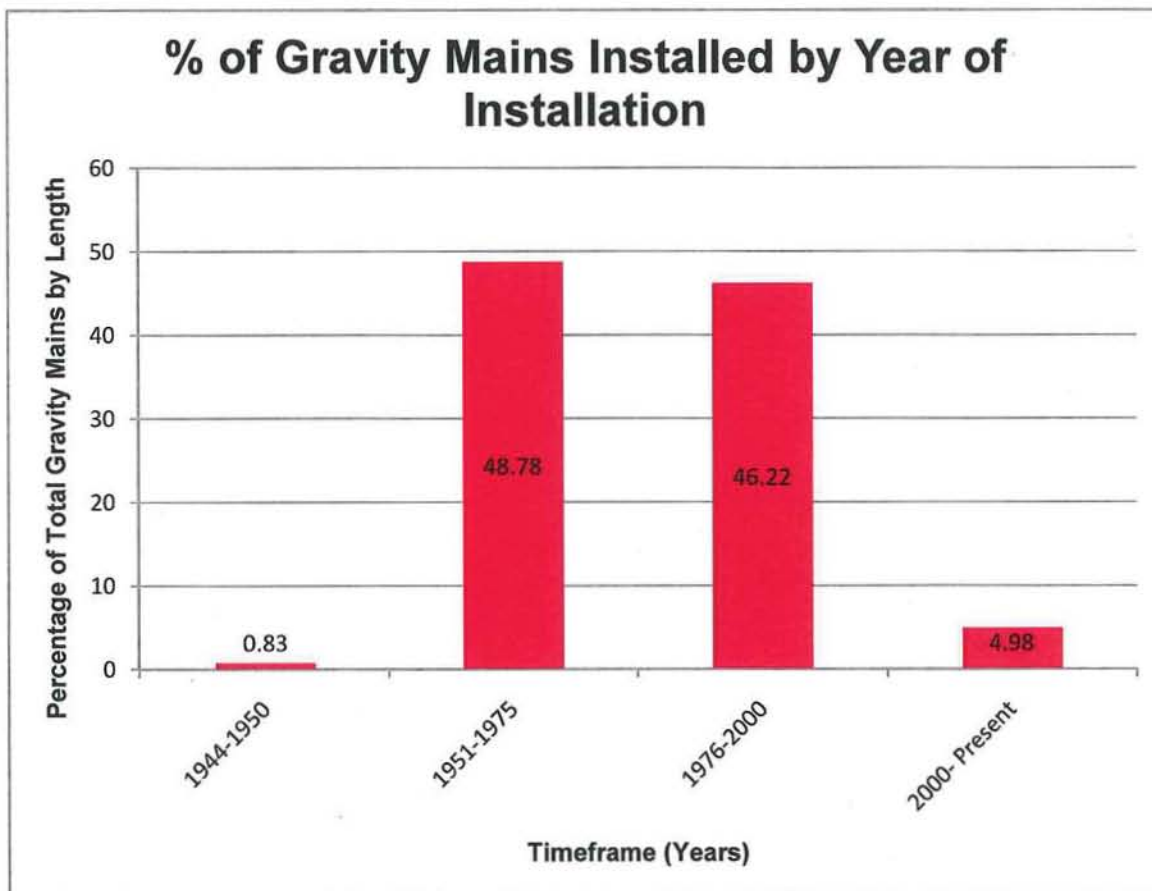
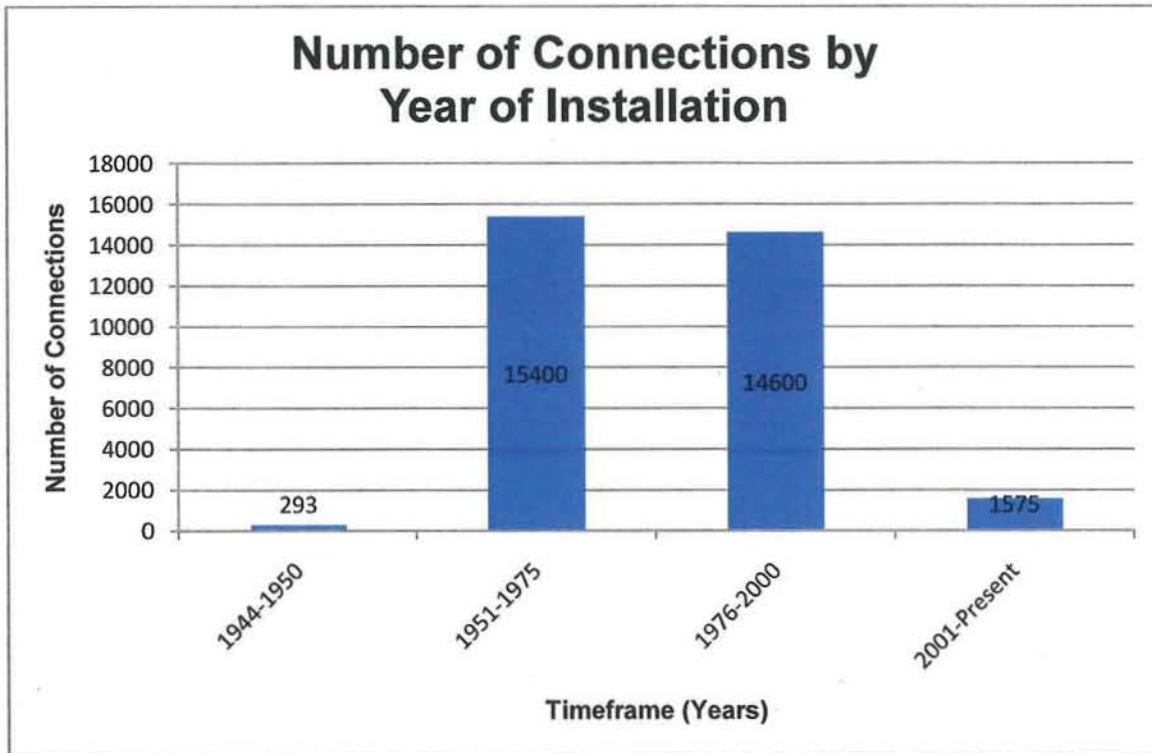
Table 12: Summary of System

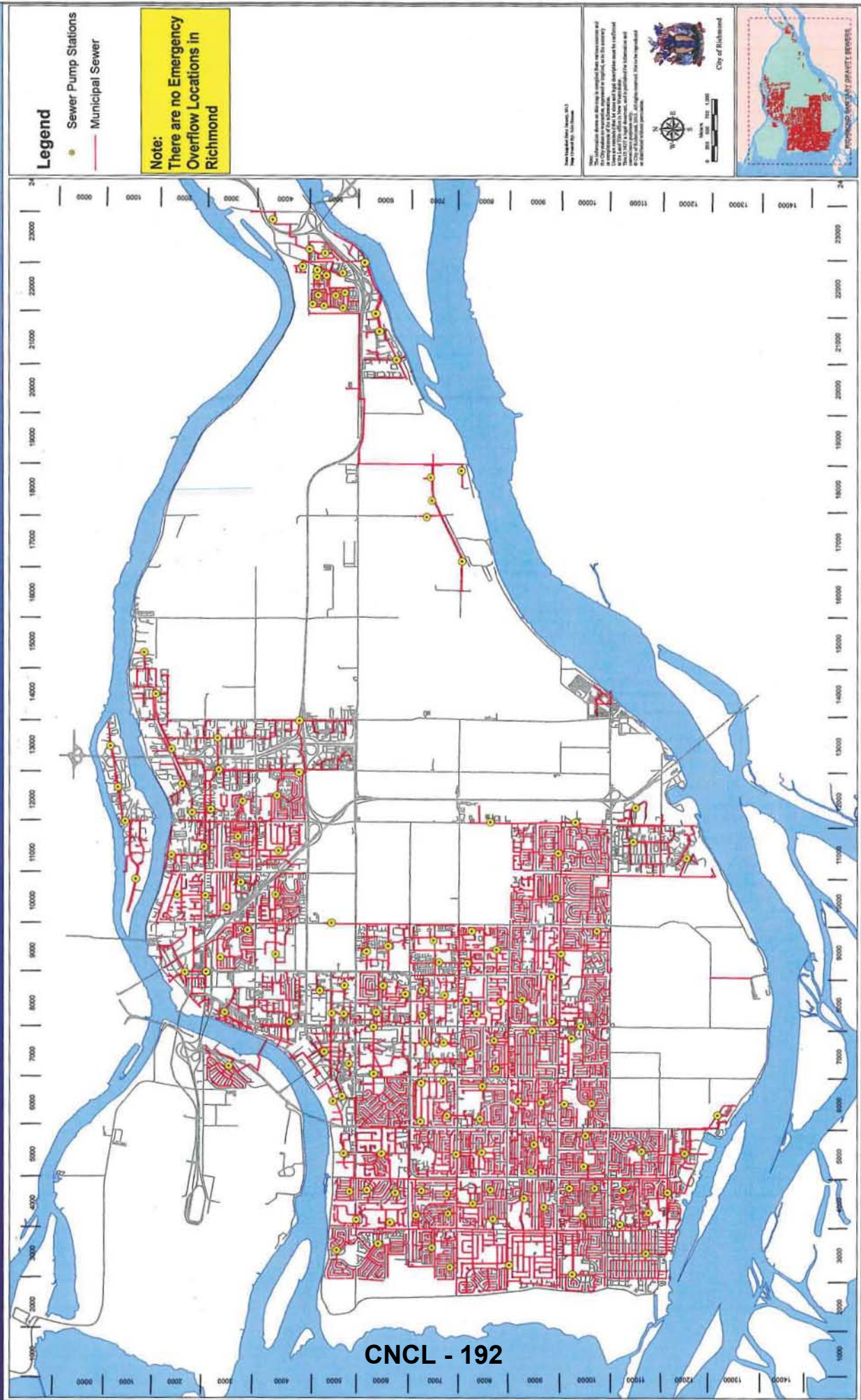
City of Richmond Biennial Report Information				
Description	Unit	Total as of Dec. 31, 2009	Changes	Total as of Dec. 31, 2012
1. Municipal Sewer System Inventory				
a. Sanitary Gravity Sewers	m	466,343	981	467,324
b. Sanitary Services (Connections)	ea.	31,289	302	31,591
c. Sanitary Force mains	m	103,531	1,023	104,553
2. Combined Sewer System Inventory				
a. Total Combined Sewers	m	0	0	0
b. Combined Services (Connections)	ea.	0	0	0
c. Combined Sewers Separated	m	0	0	0
d. Percentage of total system separated	%	0	0	0
3. Sanitary Sewer System Evaluation Program				
a. Sanitary Sewers Video Inspected	m	366,100	51,200	417,300
b. Percentage of Entire Municipal Sewer System Dye & Smoke Tested	%	0%	0.7%	0.7%
c. Percentage of Entire Municipal Sewer System Video Inspected	%	80.2%	9.5%	89.7%
d. Percentage of Entire Municipal Sewer System Structurally Rated	%	80.2%	9.5%	89.7%
4. Sewer System Rehabilitation				
a. Total Length of Sewers Rehabilitated	m	2,584	0	2,584
b. Total Length of Sewers Replaced/Capacity Upgraded Gravity/Force mains	m	4,017/2,252	2,234/1,887	6,251/4,139
c. Total Number of Service Laterals Rehabilitated	ea.	21	11	32
d. Number of Structurally Repaired Manholes/Cleanouts	ea.	2086	245	2331
e. Number of Cross-Connections Corrected	ea.	0	7	7
5. Sanitary Sewer Overflows				
a. Total Number of Reported Dry Weather SSOs	ea.	0	0	0
b. Total Number of Reported Wet Weather SSOs	ea.	0	0	0
c. Number of Breakdowns from Failures	ea.	85	32	117

6. Greenhouse Gas Emissions		Period 2010 -2011 -2012		
a.	CO ₂ emission reduction from sewer system	kg CO ₂	n/a	n/a
7. Summary of Budget/Cost		Period 2010 -2011 -2012		
a.	Sanitary Sewer Condition Evaluation Program	\$0.4M	0	0
b.	Combined Sewer Separation Program	0	0	0
c.	Sewer System Rehabilitation/Replacement Program	\$10.6M	\$6.1M	\$9.4M
d.	CO ₂ Reduction Program	0	0	0
e.	ISMP Implementation	0	0	\$0.15
f.	Total Budget/Cost	11.0M	\$6.1M	\$9.55M

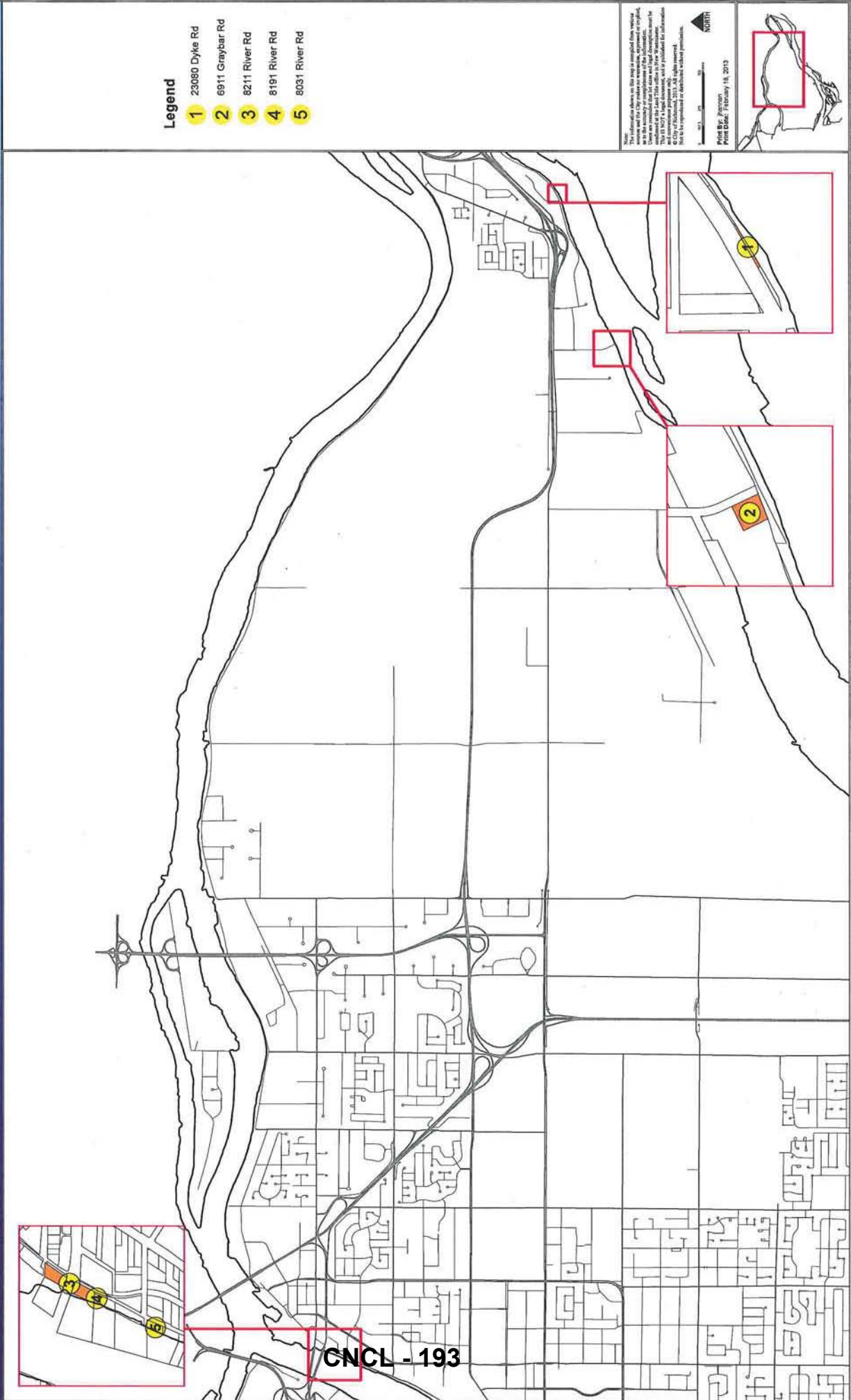
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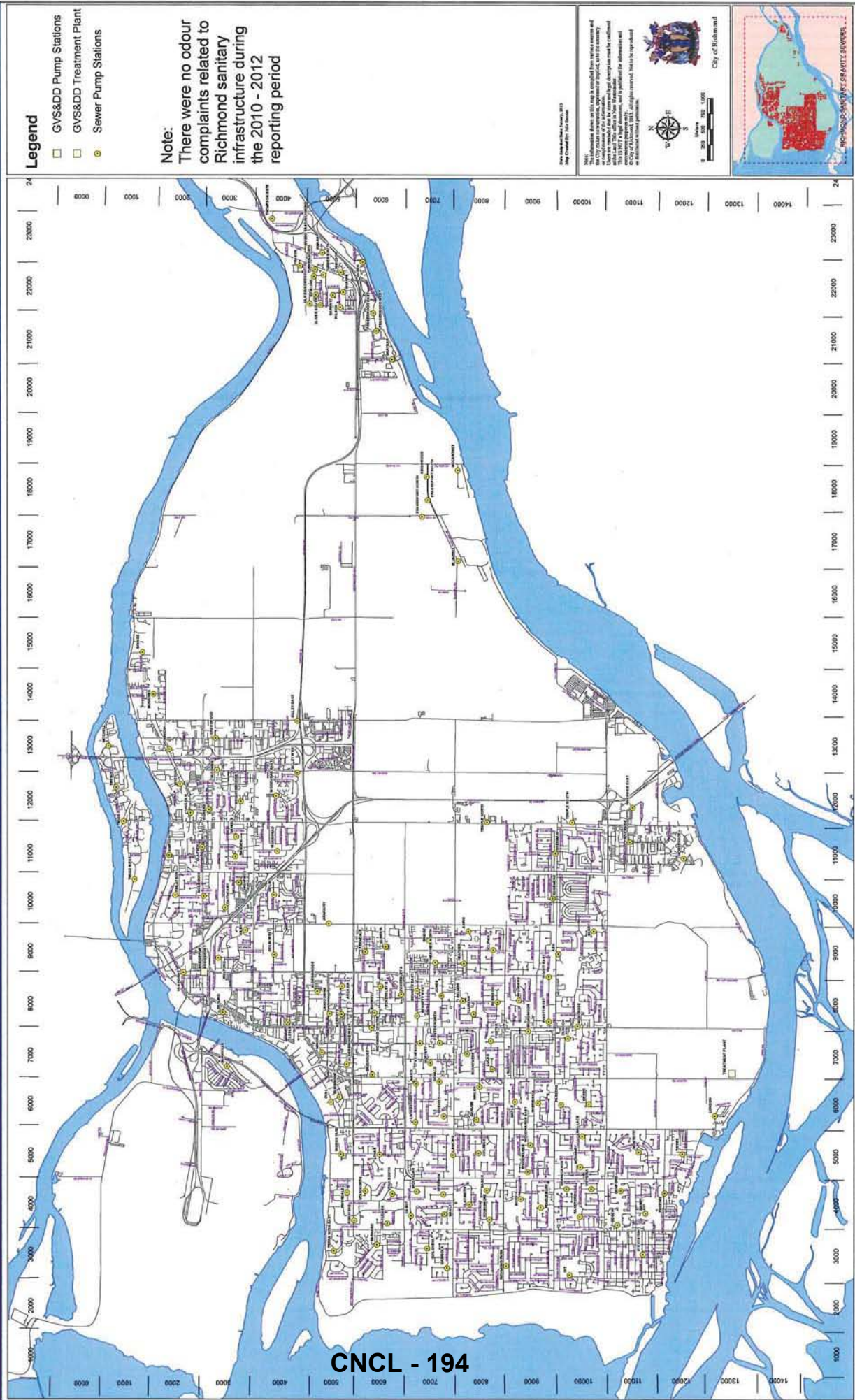




Richmond Location of Marinas within City Boundaries



CNCL - 193

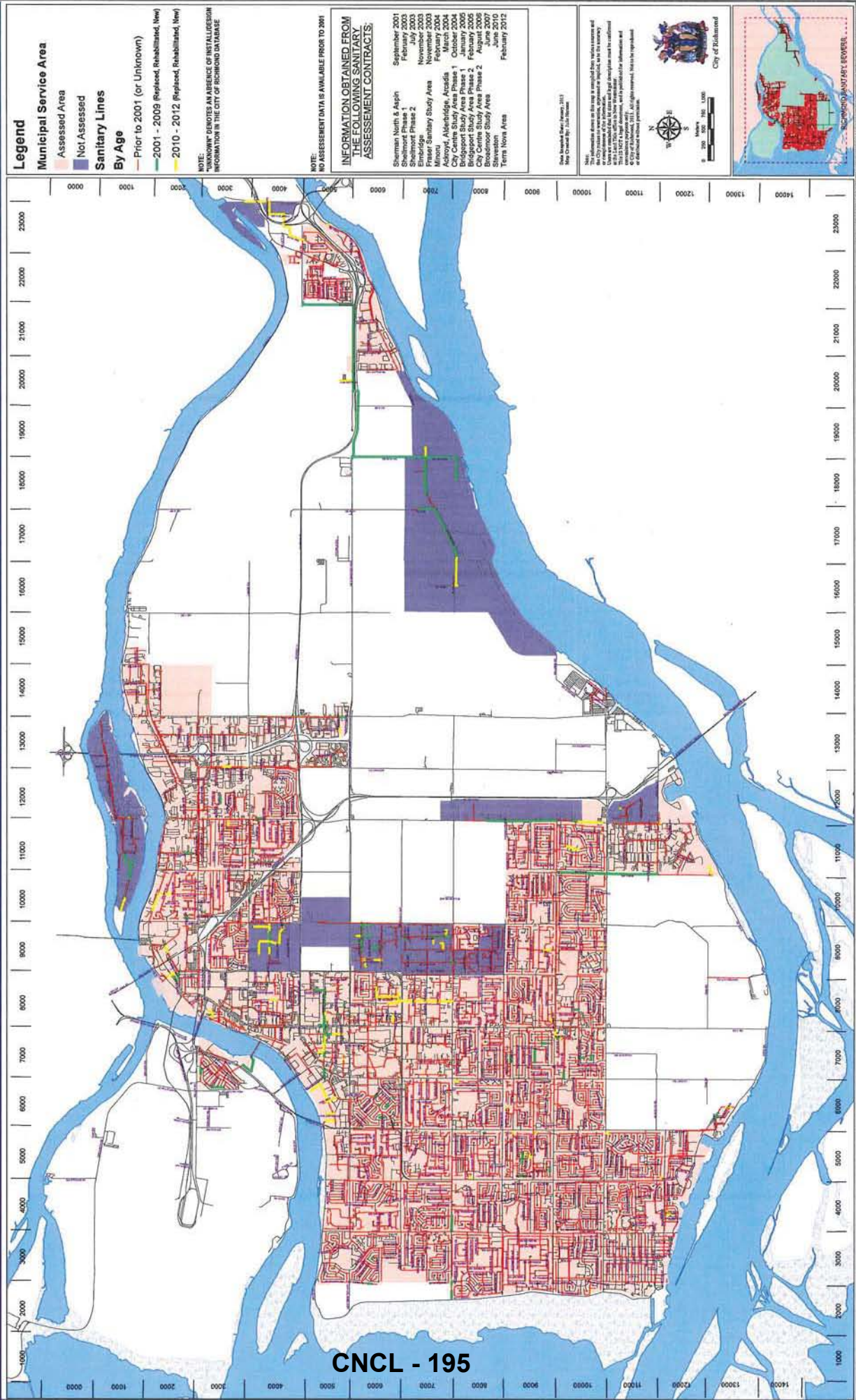




Richmond

City of Richmond Sanitary Sewer Assessment, Replacement & Rehabilitation January 2013

ATTACHMENT 6



ATTACHMENT 7(B)

CITY OF RICHMOND

Notes to Consolidated Financial Statements (continued)
 (Tabular amounts expressed in thousands of dollars)

Year ended December 31, 2011

13. Tangible capital assets:

Cost	Balance at December 31, 2010 (recast - note 3)	Additions and transfers	Disposals	Balance at December 31, 2011
Land	\$ 570,939	\$ 37,582	\$ 10	\$ 608,511
Buildings and building improvements	313,067	27,705	600	340,172
Infrastructure	1,455,639	47,349	3,394	1,499,594
Vehicles, machinery and equipment	81,498	4,864	1,099	85,263
Library's collections, furniture and equipment	8,203	2,788	1,329	9,662
Assets under construction	34,379	(8,522)	-	25,857
	\$ 2,463,725	\$ 111,766	\$ 6,432	\$ 2,569,059

Accumulated amortization	Balance at December 31, 2010 (recast - note 3)	Disposals	Amortization expense	Balance at December 31, 2011
Buildings and building improvements	\$ 80,489	\$ 508	\$ 10,950	\$ 90,931
Infrastructure	591,261	2,069	29,868	619,060
Vehicles, machinery and equipment	47,819	1,067	5,514	52,266
Library's collections, furniture and equipment	5,137	1,329	1,364	5,172
	\$ 724,706	\$ 4,973	\$ 47,696	\$ 767,429

CITY OF RICHMOND

Notes to Consolidated Financial Statements (continued)
(Tabular amounts expressed in thousands of dollars)

Year ended December 31, 2011

13. Tangible capital assets (continued):

	Net book value December 31, 2010 (recast - note 3)	Net book value December 31, 2011
Land	\$ 570,939	\$ 608,511
Buildings and building improvements	232,578	249,241
Infrastructure	864,378	880,534
Vehicles, machinery and equipment	33,679	32,997
Library's collection, furniture and equipment	3,066	4,490
Assets under construction	34,379	25,857
Balance, end of year	\$ 1,739,019	\$ 1,801,630

(a) Assets under construction:

Assets under construction having a value of approximately \$25,857,000 (2010 - \$34,379,000) have not been amortized. Amortization of these assets will commence when the asset is put into service.

(b) Contributed tangible capital assets:

Contributed capital assets have been recognized at fair market value at the date of contribution. The value of contributed assets received during the year is approximately \$35,740,000 (2010 - \$31,454,000) comprised of infrastructure in the amount of approximately \$11,978,000 (2010 - \$10,061,000), land in the amount of approximately \$22,483,000 (2010 - \$21,393,000) and library collections in the amount of approximately \$1,279,000 (2010 - nil)

(c) Tangible capital assets disclosed at nominal values:

Where an estimate of fair value could not be made, the tangible capital asset was recognized at a nominal value.

(d) Works of Art and Historical Treasures:

The City manages and controls various works of art and non-operational historical cultural assets including building, artifacts, paintings, and sculptures located at City sites and public display areas. The assets are not recorded as tangible capital assets and are not amortized.

(e) Write-down of tangible capital assets:

There were no writedowns of tangible capital assets during the year (2010-\$nil).

COST

Account	Asset Category	Beginning Balance		Additions	Transfers	Disposals	Ending Balance
		December 31,	2010				December 31, 2011
1521	Drainage	452,617,538.01		10,217,365.30	(383,748.65)		462,451,154.66
	Sewer	210,754,097.29		9,186,052.91	(467,487.41)		219,472,662.79

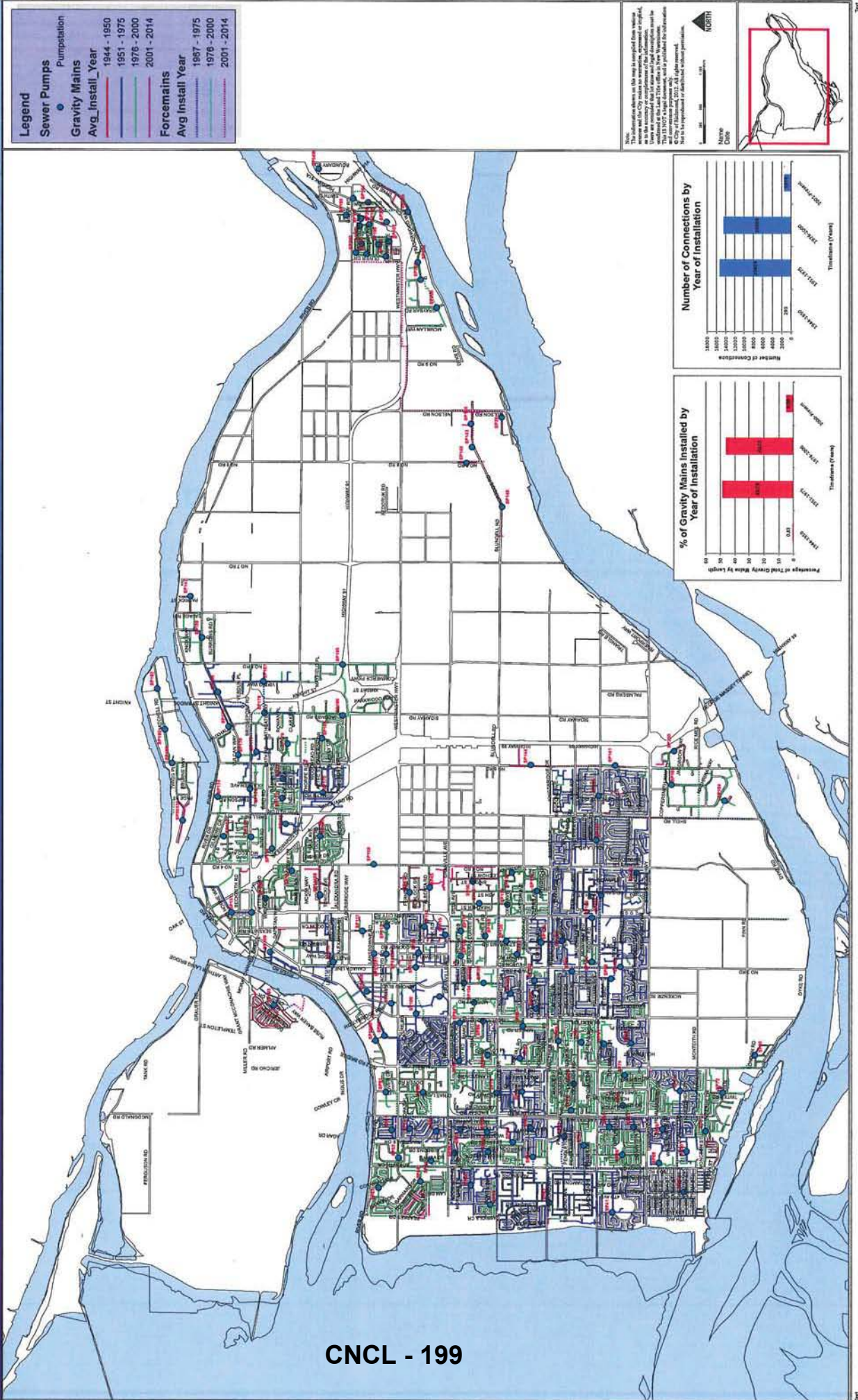
ACCUMULATED AMORTIZATION

Account		Balance at		Amortization	Disposals	Balance at
		December 31,	2010			December 31, 2011
1531	Drainage	(155,637,168.96)		(6,466,179.00)	135,134.29	(161,968,213.67)
	Sewer	(82,646,661.75)		(3,337,116.17)	259,536.09	(85,724,241.83)

NET BOOK VALUE

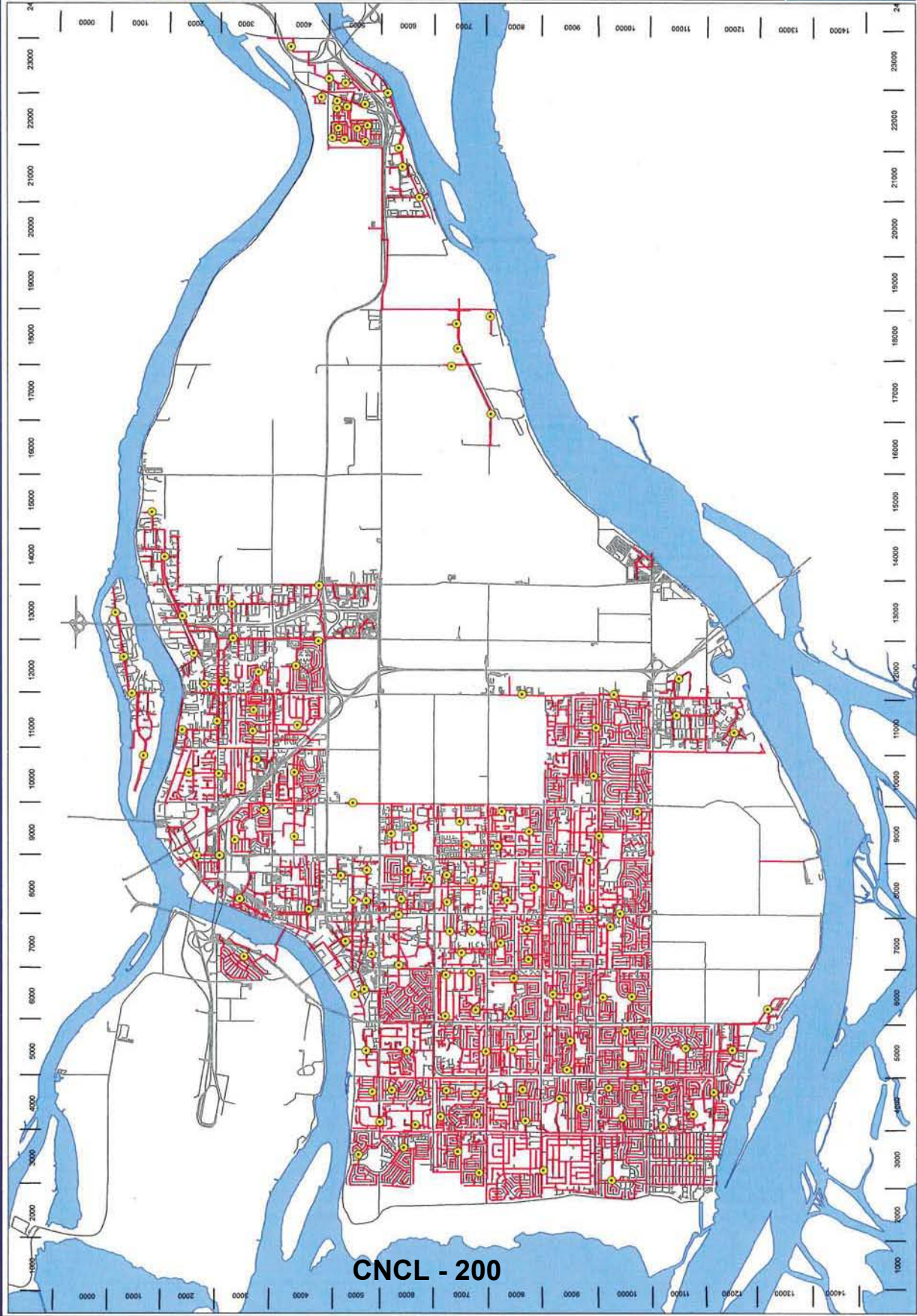
Asset Category	Opening Net Book		Ending Net Book
	Value December	31, 2010	Value December
Drainage	296,980,369.05		300,482,940.99
Sewer	128,107,435.54		133,748,420.96

REDMS# 3486562
TSA Continuity Schedule



City of Richmond Wet Weather SSO Locations - January 2013

ATTACHMENT 8



Legend

- Sewer Pump Stations
- Municipal Sewer

Note: There are no Wet Weather SSO Locations in Richmond

Richmond, Virginia, 2013

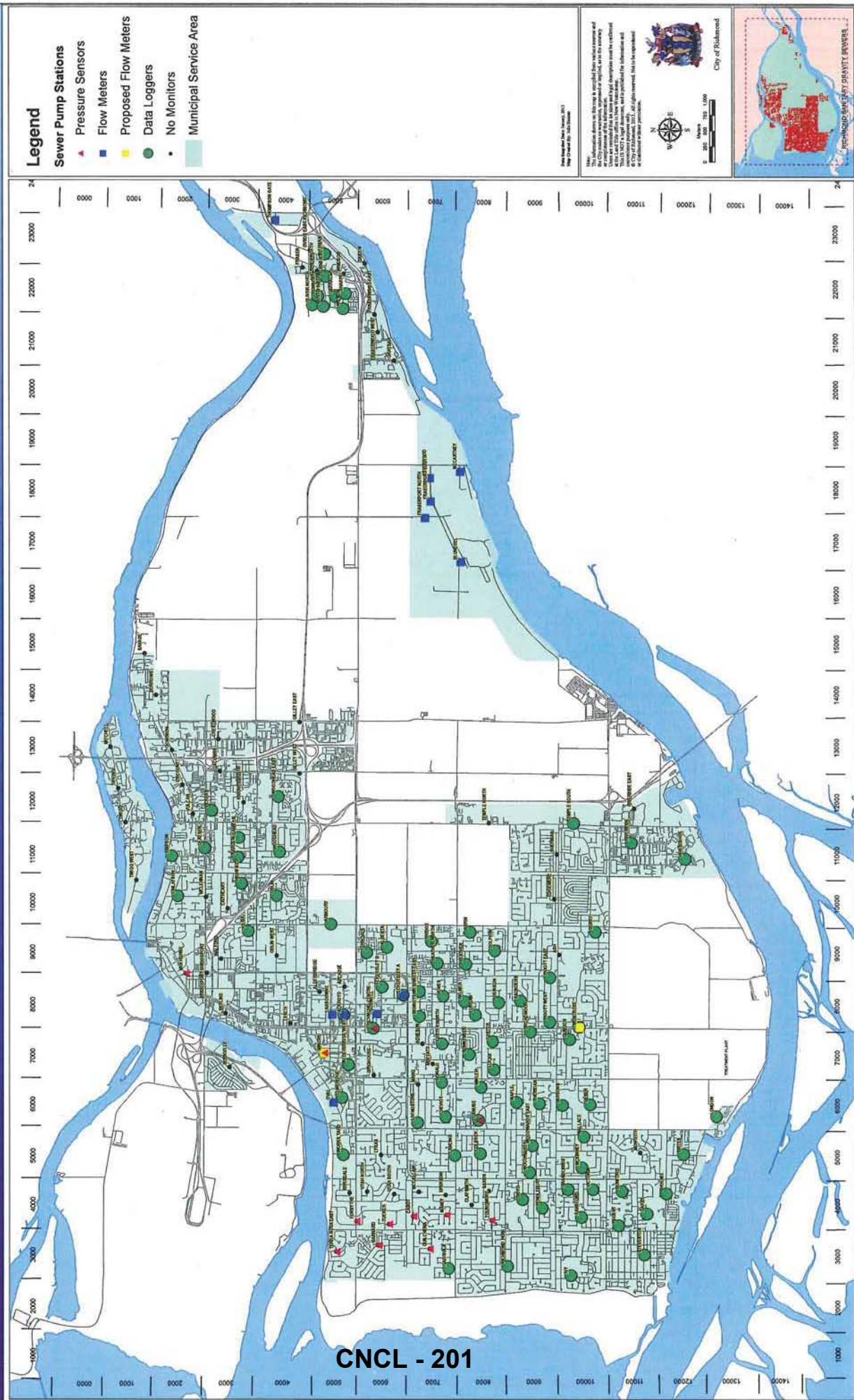
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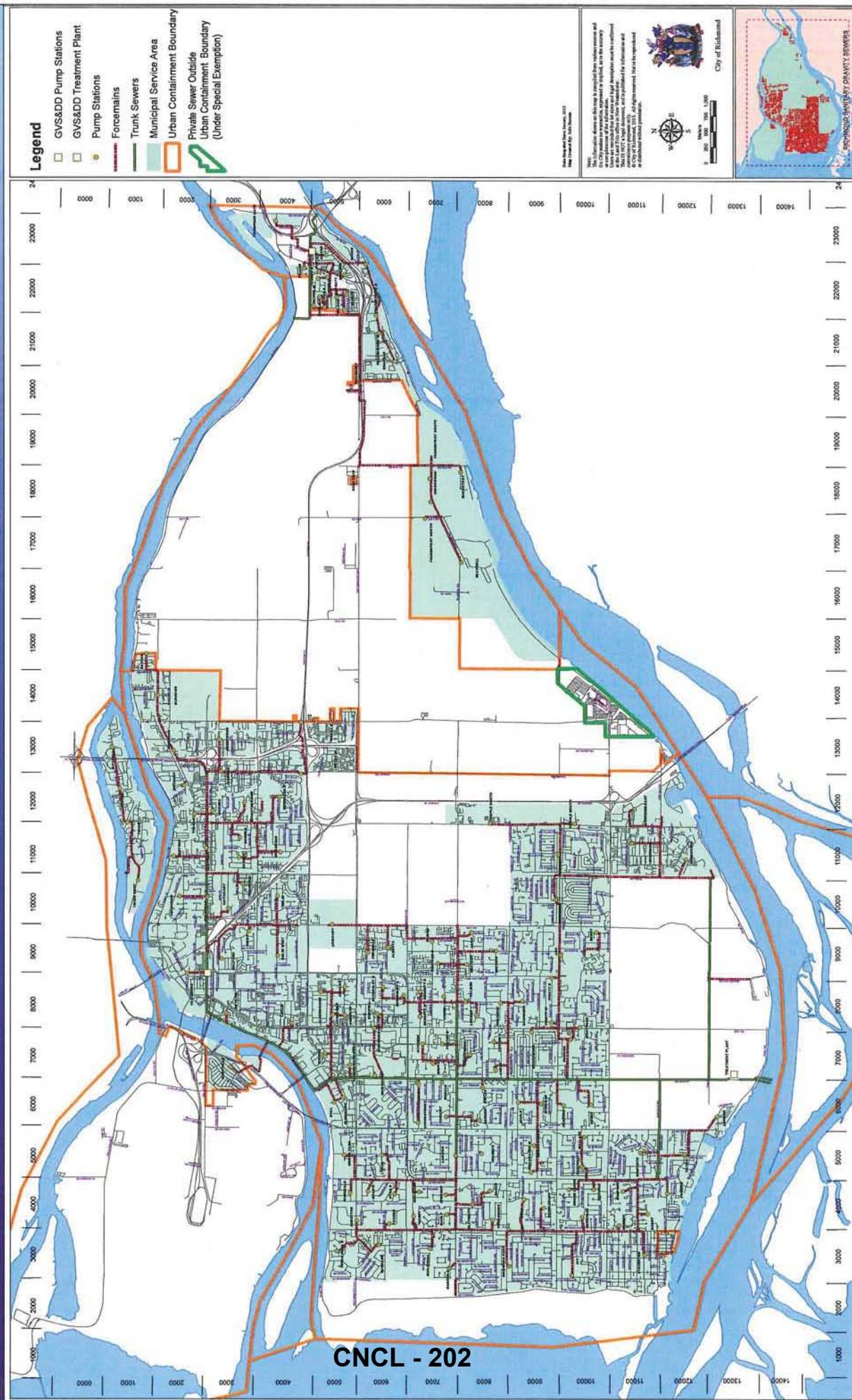


City of Richmond



CNCL - 200







Richmond Integrated Stormwater Management Plan (ISMP) Status Map

ATTACHMENT 11



CNCL - 203

City of Richmond Protected Riparian Areas - January 2013

