JACOBS

CSO Master Plan

Metcalfe District Plan

August 2019

City of Winnipeg

CSO Master Plan

Project No: 470010CH
Document Title: Metcalfe District Plan
Revision: 03
Date: August 18, 2019
Client Name: City of Winnipeg
Project Manager: John Berry
Author: Stephen Godon
File Name: Metcalfe_Plan_Final_CO1MP_08182019_Tracked

Jacobs Engineering Group Inc.

1301 Kenaston Boulevard
Winnipeg, MB R3P 2P2
Canada
www.jacobs.com

Document History and Status

Revision	Date	Description	By	Review	Approved
0	08/2018	Version 1 DRAFT	DT	SG	
1	02/15/2019	DRAFT 2 for City Review	DT	MF	SG
2	05/2019	Final Draft Submission	DT	MF	MF
3	08/18/2019	Final Submission For CSO Master Plan	MF	MF	SG

Contents

Tables

Figure

1. Metcalfe District

1.1 District Description

Metcalfe district is located towards the eastern limit of the Combined Sewer (CS) area. Regional Roadways bordering the district include Coniston Street and Niverville Street to the north, Carriere Avenue to the south, Des Meurons Street to the east, and Chandos Avenue to the west. Figure 26 provides an overview of the sewer district and the location of the proposed Combined Sewer Overflow (CSO) Master Plan control options.

St. Mary's Road is the only regional transportation route that passes through the district. Lyndale Drive Park located along the Red River is the only greenspace.

Metcalfe district land use is classified primarily as residential with a small commercial area present along St. Mary's Road. Significant buildings and areas in the district include the Aria Medical Centre located on the west side of St. Mary's Road.

1.2 Development

A portion of St. Mary's Road is located within the Metcalfe District. St. Mary's Road is identified as Regional Mixed-Use Corridor as part of the OurWinnipeg future development plans. As such, focused intensification along St. Mary's Road is to be promoted in the future.

1.3 Existing Sewer System

Metcalfe district encompasses an area of 41 ha[1] based on the district boundary and consists of a CS system with one outfall. There is approximately 0.5 percent (0.2 ha) separated and no separation-ready areas.

The CS system includes a flood pump station (FPS), CS lift station (LS), and one combined CS / flood pump station (FPS) outfall. All domestic wastewater and combined sewage collected throughout the district flows to the main 1050 mm by 1600 mm sewer that connects to the Metcalfe FPS and CS outfall.

During dry weather flows (DWF), sewage is diverted past the Metcalfe outfall weir into the 300 mm off-take pipe and north to the Metcalfe sewage LS. Sewage is pumped through a 200 mm force main south down St. Mary's Road, and then ties into Mager district CS system at St Mary's Road and Fifth Avenue. From here, sewage is conveyed via gravity through the Mager District, where it is pumped to the South Interceptor sewer and ultimately transported to the South End Sewage Treatment Plant (SEWPCC). Note that prior to 1990 the intercepted CS flows from the Metcalfe district were pumped the Metcalfe LS north into the Marion district, and eventually was transported to the North End Sewage Treatment Plant (NEWPCC). The interceptor connection for the Metcalfe district into the Marion district was relocated to tie into the Mager district in 1990 to reduce the risk of failure of the interceptor pipe from riverbank stability issues experienced in the area.

During wet weather flow (WWF), any flow that exceeds the diversion capacity of the primary weir is discharged into the Metcalfe CS outfall, where it flows to the Red River by gravity. Sluice and flap gates are installed on the CS outfall to prevent back-up of the Red River into the CS system under high river level conditions. Under these high river level conditions gravity discharge through the Metcalfe CS outfall is not possible due to the flap gate in place on the outfall. In this situation the excess flow is pumped by the

[1] City of Winnipeg GIS information relied upon for area statistics. The GIS records may vary slightly from the city representation in the InfoWorks sewer model. Therefore, minor discrepancies in the area values reported in Section 1.3 Existing Sewer System, and in Section 1.8 Performance Estimate may occur.

Metcalfe FPS, and redirected to tie into the CS outfall downstream of the flap gate, allowing gravity discharge to the Red River once more.

Metcalfe contains a section of storm relief sewer (SRS) pipe along the eastern boundary on Des Meurons Street. The SRS connects Marion district CS flow into Metcalfe's CS system. There is no dedicated SRS outfall in the Metcalfe district.

The one CS outfall to the Red River is as follows:

- ID06 (S-MA70011115) – Metcalfe CS Outfall

1.3.1 District-to-District Interconnections

There are several district-to-district interconnections between Metcalfe and the surrounding districts. Each interconnection is shown on Figure 26 and shows locations where gravity and pumped flow can cross from one district to another. Each interconnection is listed in the following subsections.

1.3.1.1 Interceptor Connections

No interceptor connections are found in this district.

1.3.1.2 District Interconnections

Marion

CS to CS

- High Point Manholes (flow is directed into both districts from these manholes):
  - Lyndale Drive and Tache Avenue – 229.00 m (S-MH50003338)
  - Niverville Avenue and Braemar Avenue invert at district boundary – 227.28 m (S-MH50006462)
- A 300 mm CS sewer acts as an overflow pipe from the Metcalfe district to the Marion district:
  - Coniston Street and Crawford overflow pipe invert – 228.37 m (S-MH50003505)
- A 300 mm CS sewer acts as an overflow pipe from the Metcalfe district to the Marion district:
  - Coniston Street and Chandos Avenue overflow pipe invert – 228.08 m (S-MH50003573)
- A 450 mm CS sewer acts as an overflow pipe from the Marion district to the Metcalfe district:
  - Dubuc Street and Hill Street overflow pipe invert – 225.67 m (S-MH50006379)
- A 450 mm CS sewer acts as an overflow pipe from the Metcalfe district to the Marion district:
  - Dubuc Street and Des Meurons Street overflow pipe invert – 225.83 m (S-MH50006377)

SRS to SRS

- The SRS from Marion's CS system flows by gravity into Metcalfe's SRS system at the intersection of Des Meurons Street and Yardley Street, and the intersection of Des Muerons Street and Bristol Avenue. The Metcalfe SRS system then connects to the CS system in Metcalfe near the intersection of Carriere Avenue and Des Meurons:
  - 450 mm on Yardley Street, invert at Marion district boundary – 226.07 m (S-MA70026907)
  - 375 mm on St Luc Street, invert at Marion district boundary - 226 m (S-MA70026912)

Mager

CS to CS

- The Metcalfe CS LS discharges into the Mager Interceptor, a gravity sewer beginning at St Mary's Road and Fifth Avenue that flows through the Mager district to the Mager CS LS.

    - St Mary's Road and Fifth Avenue – 227.52 m (S-MH50008551)

A district interconnection schematic is included as Figure 1-1. The drawing illustrates the collection areas, interconnections, pumping systems, and discharge points for the existing district.

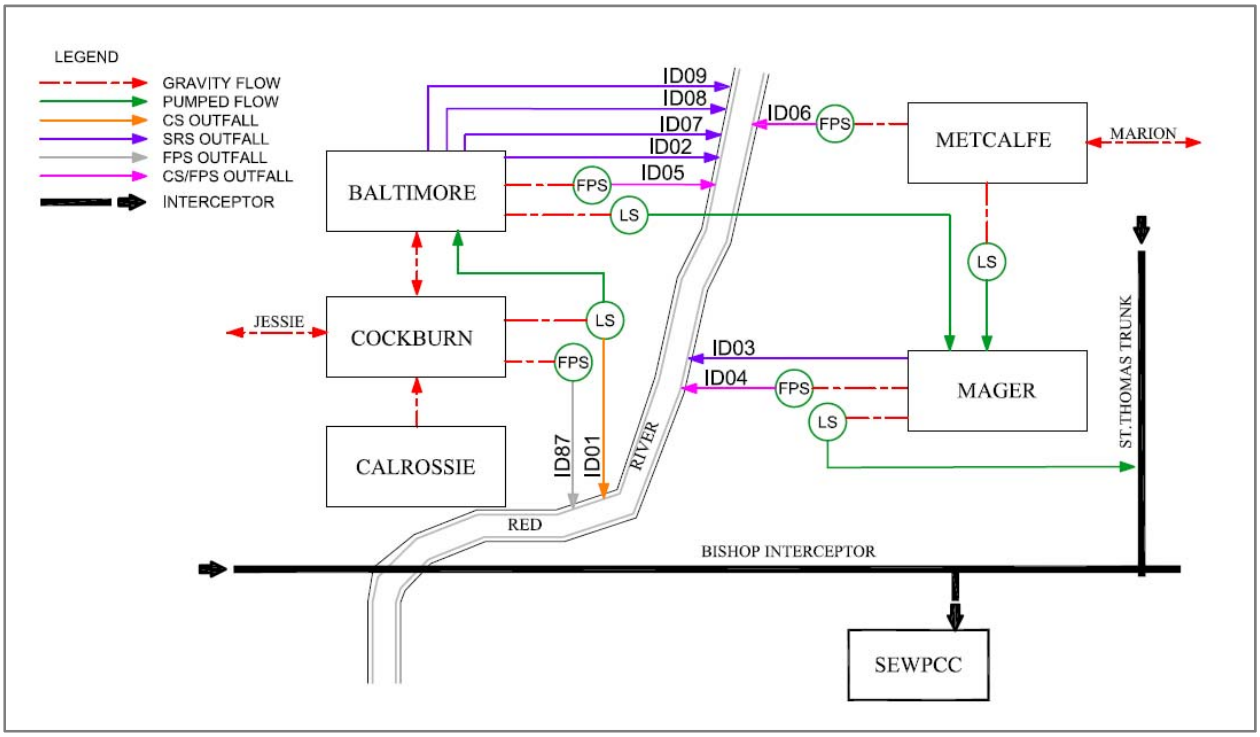


Figure 1-1. District Interconnection Schematic

1.3.2 Asset Information

The main sewer system features for the district are shown on Figure 26 and are listed in Table 1-1.

Table 1-1. Sewer District Existing Asset Information

Asset	Asset ID (Model)	Asset ID (GIS)	Characteristics	Comments
Combined Sewer Outfall (ID06)	S-CO70004641.1	S-MA70011115	2100 mm	Circular Invert: 222.23 m
Flood Pumping Outfall (ID06)	S-CO70004641.1	S-MA70011115	2100 mm	Circular Invert: 222.23 m
Other Overflows	N/A	N/A	N/A	
Main Trunk	N/A	S-MA50004337	1050 x 1600 mm	Egg-shaped Invert: 222.56 m
SRS Outfalls	N/A	N/A	N/A	No dedicated SRS outfall in this district.

Table 1-1. Sewer District Existing Asset Information

Asset	Asset ID (Model)	Asset ID (GIS)	Characteristics	Comments
SRS Interconnections	N/A	S-MA70026870 S-MA70026890 S-MA70026891 S-MA70026900 S-MA70026905	225.97 m 225.39 m 225.01 m 224.63 m 224,17 m	Flowing into CS system
Main Trunk Flap Gate	S-RE70004673.1	S-CG00000845	1375 mm	Invert: 223.14 m
Main Trunk Sluice Gate	S-CG00000846.1	S-CG00000846	1200 mm	Invert: 223.00 m
Off-Take	S-MH50003713.1	S-MA50004317	300 mm	Circular Invert: 222.99 m
Dry Well	N/A	N/A	N/A	
Lift Station Total Capacity	N/A	N/A	0.039 m^3/s	1 x 0.020 m^3/s 1 x 0.019 m^3/s
Lift Station ADWF	N/A	N/A	0.0027 m^3/s	
Lift Station Force Main	N/A	S-MA70017062	200 mm	Invert: 229.30 m
Flood Pump Station Total Capacity	N/A	N/A	1.32 m^3/s	1 x 0.67 m^3/s 1 x 0.65 m^3/s
Pass Forward Flow – First Overflow	N/A	N/A	0.032 m^3/s	

Notes:ADWF = average dry-weather flow
GIS = geographic information system
ID = identification
N/A = not applicable

The critical system elevations for the existing system relevant to the development of the CSO control options are listed in Table 1-2. Critical elevation reference points are identified on the district overview and detailed maps.

Table 1-2. Critical Elevations

Reference Point	Item	Elevation (m)[a]
1	Normal Summer River Level	223.74
2	Trunk Invert at Off-Take	222.99
3	Top of Weir	223.33
4	Relief Outfall Invert at Flap Gate	N/A
5	Low Relief Interconnection (S-MA70026905)	224.17
6	Sewer District Interconnection (Marion)	225.67
7	Low Basement (Despins, Marion, Metcalfe)	224.33
8	Flood Protection Level (Despins, Marion, Metcalfe)	229.95

[a] City of Winnipeg Data, 2013

1.4 Previous Investment Work

Table 1-3 provides a summary of the district status in terms of data capture and study. The most recent study completed in Metcalfe was in 1996 with the *Metcalfe Combined Sewer District Sewer Relief Study*

(Reid Crowther & Partners Ltd., 1996). This study discussed the possible relief work available for Metcalfe CS. No other sewer work has been completed since that time.

Between 2009 and 2015, the City invested $12 million in the CSO Outfall Monitoring Program. The program was initiated to permanently install instruments in the primary CSO outfalls. The outfall from the Metcalfe Combined Sewer District was included as part of this program. Instruments installed at each of the 39 primary CSO outfall locations have a combination of inflow and overflow level meters and flap gate inclinometers if available.

Table 1-3. District Status

District	Most Recent Study	Flow Monitoring	Hydraulic Model	Status	Planned Completion
26 - Metcalfe	1996	Future Work	2013	Study Complete	N/A

1.5 Ongoing Investment Work

The City has proposed to rebuild the Metcalfe CS LS within the next 6 years. This construction will allow for an optimized pumping rate of combined sewage from Metcalfe district into Mager district. It is noted that this upgrade should be assessed in conjunction the proposed solutions to meet control option 1, detailed below.

There is ongoing maintenance and calibration of the permanent instruments installed within the primary outfall within the Metcalfe district. This consists of monthly site visits in confined entry spaces to verify that physical readings concur with displayed transmitted readings and replacing desiccants where necessary.

1.6 Control Option 1 Projects

1.6.1 Project Selection

The proposed projects selected to meet Control Option 1 – 85 Percent Capture in a Representative Year for the Metcalfe district are listed in Table 1-4. The proposed CSO control solution is primarily complete sewer separation. Program opportunities including green infrastructure (GI) and real time control (RTC) will also be included as applicable.

Table 1-4. District Control Option

Control Limit	Latent Storage	Flap Gate Control	Gravity Flow Control	Control Gate	In-line Storage	Off-line Storage Tank	Off-line Storage Tunnel	Sewer Separation	Green Infrastructure	Real Time Control	Floatable Management
85 Percent Capture in a Representative Year	-	-	-	-	-	-	-	✓	✓	✓	-

Notes:

- = not included
✓ = included

The existing CS system is not fully suitable for use an in-line storage as the relative low level of the CS LS and associated CS outfall results in the NSWL level being at a similar level to the recommended control gate level (within 100mm) during the 1992 representative year assessment.

The marginal evaluation on the performance of the district for the future 98% percent capture target indicated that complete sewer separation has an advantage over any off-line storage facilities for the Metcalfe district. The initial capital costs to separate a district were found to be higher than implementing the equivalent off-line storage. However, with the implementation of a off-line storage arrangement, flotable control would also be needed as overflows would still occur under the 1992 representative year. Floatables are typically captured via a screening facility, however, the hydraulic constraints within the Metcalfe district do not allow sufficient positive head to be achieved and an alternative floatables management approach will be necessary. In addition, the implementation of complete separation would reduce the reliance on the Metcalfe FPS, further reducing long term operating costs. It is for these reasons that complete sewer separation was found to be most feasible and cost-effective solutions over a long term perspective, and was recommended over any in-line storage or off-line storage control solutions.

GI and RTC will be applied within each district on a system-wide basis with consideration of the entire CS area. The level of implementation for each district will be determined through evaluations completed through district level preliminary design.

1.6.2 Sewer Separation

Sewer separation is proposed for the Metcalfe district and will provide immediate benefits to the CSO program. The work includes installation of an independent LDS system to collect road drainage. Collected stormwater runoff will be routed through the new LDS to an outfall discharging to the Red River. The approximate area of sewer separation is shown on Figure 26. The flows to be collected after separation will be as follows:

- DWF will remain the same – pumped through the Metcalfe CS LS to Mager district.
- WWF will consist of sanitary sewage combined with foundation drainage.

This will result in a reduction in combined sewage flow received at Mager CS LS after the separation project is complete. The separation project will also reduce the requirements for the future upgrades to the existing LS.

In addition to added basement flood relief (BRF) and reducing the CSO volume, the benefits of separation include increasing the storage volume available in the CS system. With the implementation of separation, consideration should be given to the possibility of reducing the use of or elimination of the Metcalfe FPS. The implementation of separation at Metcalfe will also eliminate the overflows from the district, and will no longer require screening at the primary outfall for the district.

It is proposed that future monitoring of the district is completed to verify that the sewer separation is fully compliant with the modelled simulated elimination of all CSO overflows. A static weir elevation increase may be necessary at the CS primary weir to eliminate the occurrence of all CSOs. Any weir elevation raise will also be evaluated in terms of existing basement flood protection to ensure the existing level of basement flood protection remains.

1.6.3 Green Infrastructure

The approach to GI is described in Section 5.2.1 of Part 2 of the CSO Master Plan. Opportunities for the application of GI will be evaluated and applied with any projects completed in the district. Opportunistic GI will be evaluated for the entire district during any preliminary design completed. The land use, topography and soil classification for the district will be reviewed to identify the most applicable GI controls.

Metcalfe has been classified as a high GI potential district. Metcalfe district land use is classified primarily as residential with a small commercial area present along St. Mary’s Road. This means the district would

be an ideal location for bioswales, permeable paved roadways, cisterns/rain barrels, rain gardens, and green roofs. The greenspace areas in the district would be ideal for bioretention garden projects.

1.6.4 Real Time Control

The approach to RTC is described in Section 5.2.2 of Part 2 of the CSO Master Plan. The application of RTC will be evaluated and applied on a district by district basis through the CSO Master Plan projects with long term consideration for implementation on a system wide basis.

1.7 System Operations and Maintenance

System operations and maintenance (O&M) changes will be required to address the proposed control options. This section identifies general O&M requirements for each control option proposed for the district. More specific details on the assumptions used for quantifying the O&M requirements are described in Part 3C of the CSO Master Plan.

Sewer separation will include the installation of additional sewers that will require inspection, cleaning and rehabilitation. This will result in additional maintenance costs over the long term, but operational costs will be minimal. The existing larger CS pipes within the district may also receive insufficient flow with the separation work for proper scouring velocities in the sewer pipes. This could result in solids settling within the sewers and requiring more frequent cleaning operations. The impacts of the reduced flows in larger CS pipes will be evaluated as part of the sewer separation design for the district.

The reduction in storm flows entering the downstream Metcalfe FPS will reduce the requirement for operation of the station. It is recommended to continue to maintain and operate the flow monitoring instrumentation and assess the results after district separation work has been completed. This will allow the full understanding of the non-separated storm elements (foundation drain connections to the CS system) extent within the Metcalfe district.

1.8 Performance Estimate

An InfoWorks CS hydraulic model was created as part of the CSO Master Plan development. An individual model was created to represent the sewer system baseline as represented in the year 2013 and a model for the CSO Master Plan with the control options implemented in the year 2037. A summary of relevant model data is summarized in Table 1-5.

Table 1-5. InfoWorks CS District Model Data

Model Version	Total Area (ha)	Contributing Area (ha)	Population	% Impervious	Control Options Included in Model
2013 Baseline	35	35	865	50	N/A
2037 Master Plan – Control Option 1	35	35	865	5	SEP

Notes:

SEP = Separation

No change to the future population was completed as from a wastewater generation perspective from the update to the 2013 Baseline Model to the 2037 Master Plan Model. The population generating all future wastewater will be the same due to Clause 8 of Environment Act Licence 3042 being in effect for the CS district. While this district is to be separated and as a result Clause 8 of Licence No. 3042 will not be in effect, the wet weather response of the district overall will still need to be assessed.

City of Winnipeg hydraulic model relied upon for area statistics. The hydraulic model representation may vary slightly from the City of Winnipeg GIS Records. Therefore. minor discrepancies in the area values reported in Section 1.3 Existing Sewer System, and in Section 1.8 Performance Estimate may occur.

The performance results listed in Table 1-6 are for the hydraulic model simulations using the year-round 1992 representative year. This table lists the results for the Baseline, for each individual control option and for the proposed CSO Master Plan - Control Option 1. The Baseline and Control Option 1 performance numbers represent the comparison between the existing system and the proposed control

options, Table 1-6 also includes overflow volumes specific to each individual control option; these are listed to provide an indication of benefit gained only and are independent volume reductions.

Table 1-6. Performance Summary – Control Option 1

Control Option	Preliminary Proposal Annual Overflow Volume (m^3)	Master Plan Annual Overflow Volume (m^3)	Overflow Reduction (m^3)	Number of Overflows	Pass Forward Flow at First Overflow
Baseline (2013)	10,335	12,191	-	15	0.032 m^3/s [c]
In-line Storage	12,931	N/A [b]	N/A	N/A	N/A
Separation	N/A [a]	0	12,191	0	0.038 m^3/s [d]
Control Option 1	**12,931**	**0**	**12,191**	**0**	**0.038 m^3/s [d]**

[a] Separation was not simulated during the Preliminary Proposal assessment.

[b] In-line storage not part of Master Plan Control Options

[c] Pass forward flows assessed with the 1-year design rainfall event

[d] Pass flow flows assessed with the 5-year design rainfall event

The percent capture performance measure is not included in Table 1-6, as it is applicable to the entire CS system and not for each district individually. However, the full capture of overflows volumes for the Metcalfe district would represent a 100 percent capture rate on a district level.

1.9 Cost Estimates

Cost estimates were prepared during the development of the Preliminary Proposal and have been updated for the CSO Master Plan. The CSO Master Plan cost estimates have been prepared for each control option, with overall program costs summarized and described in Section 3.4 of Part 3A. The cost estimate for each control option relevant to the district as determined in the Preliminary Proposal and updated for the CSO Master Plan are identified in Table 1-7. The cost estimates are a Class 5 planning level estimates with a level of accuracy of minus 50 percent to plus 100 percent.

Table 1-7. Cost Estimates – Control Option 1

Control Option	2014 Preliminary Proposal Capital Cost	2019 CSO Master Plan Capital Cost	2019 Annual Operations and Maintenance Cost	2019 Total Operations and Maintenance Cost (Over 35-year period)
Sewer Separation	N/A [a]	$17,430,000	$16,000	$350,000
In-line Storage	$- [b]	N/A	N/A	N/A
Screening		N/A	N/A	N/A
Subtotal	**$0**	**$17,430,000**	**$16,000**	**$350,000**
Opportunities	N/A	$1,740,000	$2,000	$40,000
District Total	**$0**	**$19,170,000**	**$18,000**	**$390,000**

[a] Separation not included in the Preliminary Proposal

[b] Solution developed as refinement to Preliminary Proposal work following submission of Preliminary Proposal costs. Costs for these items of work found to be $1,130,000 in 2014 dollars.

The estimates include changes to the control option selection since the Preliminary Proposal, updated construction costs, and the addition of GI opportunities. The impacts of extending the implementation schedule to 2045 are included in the program development and program summary in Section 5 of Part 3A. The calculations for the CSO Master Plan cost estimate includes the following:

- Capital costs and O&M costs are reported in terms of present value.
- A fixed allowance of 10 percent has been included for GI, with no additional cost for RTC. This has been listed as part of the Opportunities costs.
- The Preliminary Proposal capital cost is in 2014-dollar values.
- The CSO Master Plan capital cost is based on the control options presented in this plan and in 2019-dollar values.
- The 2019 Total Annual Operations and Maintenance (over 35-year period) cost component is the present value costs of each annual O&M cost under the assumption that each control option was initiated in 2019. Each of these values include equipment replacement and O&M costs.
- The 2019 Annual Operations and Maintenance Costs were based on the estimated additional O&M costs annually for each control option in 2019 dollars.
- Future costs will be inflated to the year of construction.

Cost estimates were prepared during the development of the Preliminary Proposal and updated for Phase 3 during the CSO Master plan development. The differences identified between the Preliminary Proposal and the CSO Master Plan are accounting for the progression from an initial estimate used to compare a series of control options, to an estimate focusing on a specific level of control for each district. Any significant differences between the Preliminary Proposal and CSO Master Plan estimates are identified in Table 1-8.

Table 1-8. Cost Estimate Tracking Table

Changed Item	Change	Reason	Comments
Control Options	Sewer Separation	Sewer Separation was not included in the preliminary estimate	The Master plan identified sewer separation as the most cost effective control option over in-line storage.
	Removal of In-Line Storage	In-Line Storage was not included in the Master Plan.	The Master plan identified sewer separation as the most cost effective control option.
	Removal of Screening	Screening was not included in the Master Plan.	With sewer separation recommended all CSO events will be removed, and there will no longer be a requirement for screening.
Opportunities	A fixed allowance of 10 percent has been included for program opportunities	Preliminary Proposal estimate did not include a cost for GI opportunities	
Lifecycle Cost	The lifecycle costs have been adjusted to 35 years	City of Winnipeg Asset Management approach	
Cost escalation from 2014 to 2019	Capital Costs have been inflated to 2019 values based on an assumed value of 3 percent per for construction inflation.	Preliminary Proposal estimates were based on 2014-dollar values.	

1.10 Meeting Future Performance Targets

The proposed complete separation of the Metcalfe district will achieve the 100 percent capture figure and no further work will be required to meet the future performance target.

1.11 Risks and Opportunities

The CSO Master Plan and implementation program are large and complex, with many risks having both negative and positive effects. The objective of this section is to identify significant risks and opportunities for each control option within a district.

The CSO Master Plan has considered risks and opportunities on a program and project delivery level, as described in Section 5 of Part 2 of the CSO Master Plan. A Risk And Opportunity Control Option Matrix covering the district control options has been developed and is included as part of Appendix D in Part 3B. The identification of the most significant risks and opportunities relevant to this district are provided in Table 1-9.

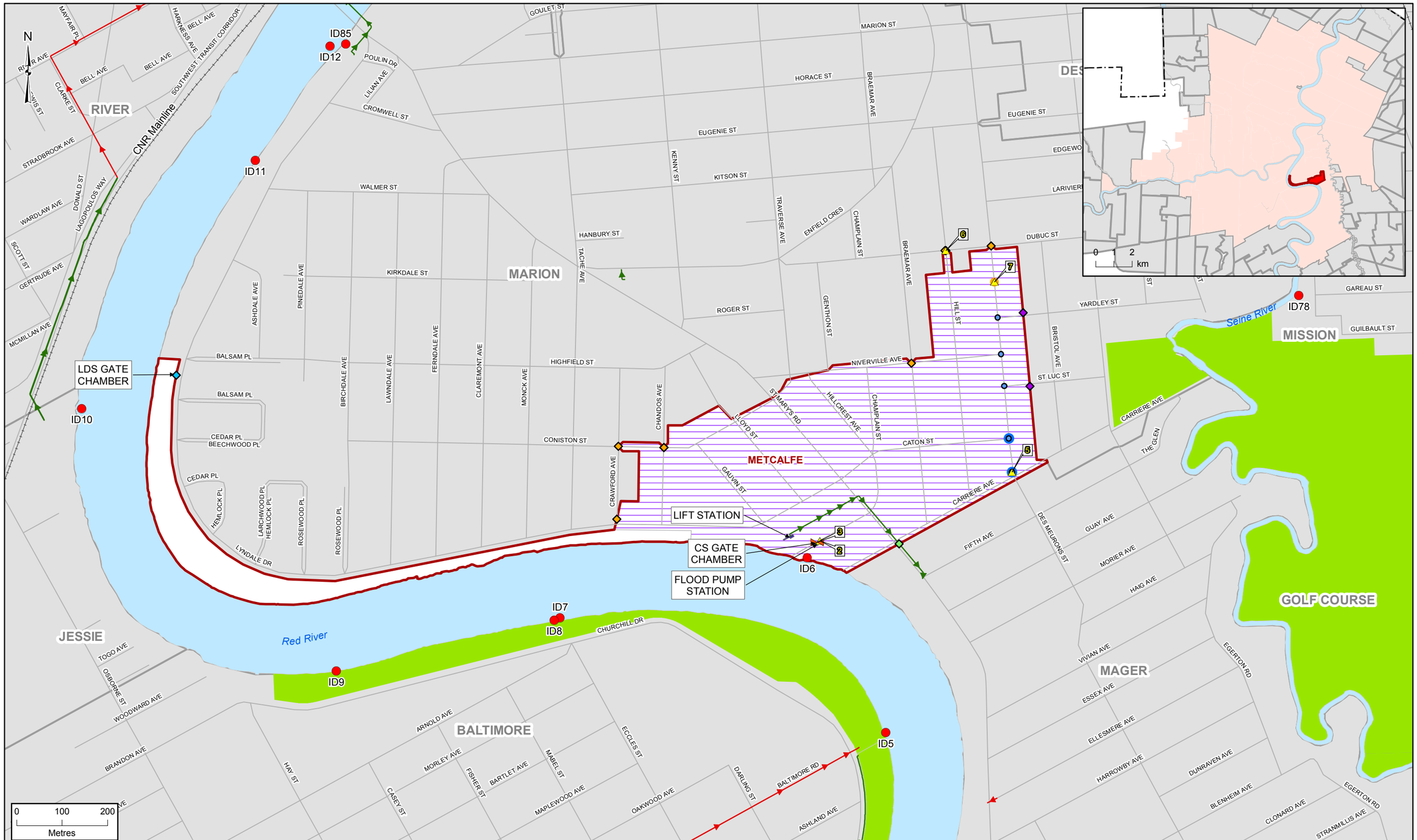
Table 1-9. Control Option 1 Significant Risks and Opportunities

Risk Number	Risk Component	Latent Storage / Flap Gate Control	In-line Storage / Control Gate	Off-line Storage Tank	Off-line Storage Tunnel	Sewer Separation	Green Infrastructure	Real Time Control	Floatable Management
1	Basement Flooding Protection	-	-	-	-	O	-	-	-
2	Existing Lift Station	-	-	-	-	-	-	R	-
3	Flood Pumping Station	-	-	-	-	O	-	-	-
4	Construction Disruption	-	-	-	-	R	-	-	-
5	Implementation Schedule	-	-	-	-	R	-	R	-
6	Sewer Condition	-	-	-	-	-	-	-	-
7	Sewer Conflicts	-	-	-	-	R	-	-	-
8	Program Cost	-	-	-	-	R	-	-	-
9	Approvals and Permits	-	-	-	-	-	R	-	-
10	Land Acquisition	-	-	-	-	-	R	-	-
11	Technology Assumptions	-	-	-	-	O	O	O	-
12	Operations and Maintenance	-	-	-	-	R / O	R	O	-
13	Volume Capture Performance	-	-	-	-	-	O	O	-
14	Treatment	-	-	-	-	O	O	O	-

Risks and opportunities will require further review and actions at the time of project implementation.

1.12 References

Reid Crowther & Partners Ltd. 1996. *Metcalfe Combined Sewer District Sewer Relief Study SWMM Input and Output*. Prepared for the City of Winnipeg Water and Waste Department. January.



LEGEND

- Primary Weir
- Critical Elevation
- CSO Outfall
- Low CS Manhole
- Low SRS Connection
- Inter-System Connection: SRS - CS
- District Boundary Crossing: CS, LDS, SRS, WWS
- Interceptor Sewer
- Force Main
- Street
- Railway
- District Boundary
- Watercourse
- Greenspace

CSO MASTER PLAN PROPOSED SOLUTIONS

Sewer Separation - Planning

ALL PROPOSED SOLUTIONS SHOWN IN RED TEXT

JACOBS

Notes:
1. Map data source - City of Winnipeg, 2013

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

FIGURE 26
District Overview Map
Sewer District: Metcalfe
City of Winnipeg
Combined Sewer Overflow Master Plan

\\WPGFSP01\PROJ\WINNIPEGCITYOF\470010MASTERPLANCSO\500DESIGNWORKFILES\503STUDIES\MASTER PLAN CONCEPTUAL DEVELOPMENT\MAPPING\MAPS\PACKAGE3\METCALFE\METCALFE_DISTRICT_OVERVIEW_MAP.MXD SBEGG1 7/29/2019 8:39:12 AM