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CSO Master Plan

Tuxedo District Plan

August 2019

City of Winnipeg

CSO Master Plan

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Jacobs Engineering Group Inc.

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

Document History and Status

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2	05/2019	Final Draft Submission	SB / JT	MF	SG
3	08/15/2019	Final Submission For CSO Master Plan	MF	MF	SG

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1. Tuxedo District

1.1 District Description

Tuxedo district is located towards the southwestern limit of the combined sewer (CS) area. Regional roadways bordering the district are Wellington Crescent to the north, Corydon Avenue to the south, Park Boulevard North to the west, and Edgeland Boulevard to the east. The major transportation routes passing through Tuxedo are Corydon Avenue and Tuxedo Avenue, each of which conveys a high volume of traffic. Figure 41 provides an overview of the sewer district and the location of the proposed Combined Sewer Overflow (CSO) Master Plan options. Tuxedo district is directly adjacent to Assiniboine Park and bounded by the Assiniboine River on the north.

Land use in Tuxedo is mainly residential with a small amount of commercial near major transportation routes. Commercial lands are located along Corydon Avenue and on the eastern side of Tuxedo Avenue including the large Tuxedo Park Shopping Centre and other smaller businesses. The district consists mostly of single-family homes with apartment complexes situated between Tuxedo Avenue and Edgeland Boulevard. Most of the area was developed in the 1960s to the early 1970s. Aside from the river bank along Assiniboine River, the district only has a few small parcels of green space.

1.2 Developments

A Route 90 Improvement Study is currently underway that will lead to a significant amount of construction and right of way adjustments along Route 90/Kenaston Boulevard. This work, which will impact both Doncaster and Ash districts but should not affect Tuxedo substantially as there is limited land area available for development within Tuxedo district.

Updates to the land drainage system along Wellington Crescent are anticipated to occur, and this will have a potential impact on control options selected.

1.3 Existing Sewer System

Tuxedo district has an approximate service area of 52 ha[1], based on the district boundary, making it the third smallest CS district and includes combined sewers (CSs), wastewater sewers (WWS), and land drainage sewers (LDSs). Approximately 27 percent (14 ha) of the total district is already separated. While approximately 28 percent (15 ha) of the total district area is considered separation ready. Approximately 3 ha of the district is classified as greenspace.

The CS system includes a dual flood and lift pump station (LFPS) (referred to as Chataway LFPS), primary diversion weir, and an outfall gate chamber located at Wellington Crescent adjacent to the Assiniboine River. All domestic wastewater and combined sewage flows collected in Tuxedo district converge to the 900 mm circular trunk sewer located along Nanton Boulevard, which then converts into an egg-shaped 2280 mm by 1520 mm main trunk flowing north along the back lane of Chataway Boulevard toward the CS outfall.

During dry weather flow (DWF), the Tuxedo primary weir diverts flow to the lift station pumps of the CS LFPS through a 200 mm off-take pipe. The 150 mm force main from the CS LFPS then pumps the combined sewage to the Doncaster interceptor sewer that flows by gravity into the Doncaster district and eventually to the Ash district. Flow is then pumped across the Assiniboine River to the North End Sewage Treatment Plant (NEWPCC) for treatment.

[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.

During wet weather flow (WWF) events, any flow that exceeds the diversion capacity overtops the weir and is discharged to the river from the 900 mm CS primary outfall. Sluice and flap gates are installed on the CS outfall to prevent back-up of the Assiniboine River into the CS system under high river level conditions. When the river level is high however gravity discharge is not possible due to the flap gate, the excess flow is then pumped through a 200 mm pipe by the flood chamber of the CS LFPS into the gate chamber downstream of the sluice gate and to the river via the CS primary outfall. The flood chamber component of the CS LFPS contains one pump to accommodate WWF.

Figure 41 shows the separate area located on the west and east boundaries of the district. The first separate area along the west boundary discharges LDS flow via gravity at a 2400 mm LDS outfall located along Park Boulevard North to the Assiniboine River. A second separate area located on the southeastern boundary of the district near Tuxedo Avenue and Edgeland Boulevard routes LDS flow by gravity into Tuxedo South separate sewer district through a 750 mm pipe and back through to the Tuxedo district eventually discharging at the Assiniboine River through the same 2400 mm LDS outfall along Park Boulevard North. There are three locations in Tuxedo where the separate WWSs connect into the CS system.

A central portion of the district is considered separation ready with LDS installed but flowing back into the CS system. LDS on Handsart Boulevard, Grenfell Boulevard and Girton Boulevard connect into the CS trunk along Nanton Boulevard.

The single CS outfall to the Assiniboine River is as follows:

ID47 (S-MA70029012) – Tuxedo CS Outfall

1.3.1 District-to-District Interconnections

There are several sewer system interconnections between Tuxedo district and the adjacent districts; see Figure 41. Interconnections include gravity and pumped flow from one district to the other. Each interconnection is listed in the following subsections:

1.3.1.1 Interceptor Connections – Downstream of Primary Weir

Doncaster

- A 150 mm force main from the CS LFPS pumps CS to the Doncaster interceptor sewer along Wellington Crescent and flows by gravity into the Doncaster district and then on to the Ash district. Flow is then pumped across the Assiniboine River to the North End Sewage Treatment Plant (NEWPCC) for treatment.
    - Wellington Crescent and Doncaster boundary interceptor invert - 228.57 m (S-CO70008639)

1.3.1.2 District Interconnections

Tuxedo South

CS to CS

- High point CS manhole (flow is directed into both districts from this manhole): A 750 mm CS pipe will either flow by gravity north to the NEWPCC service area or south to the West End Sewage Treatment Plant (WEWPCC) service area.
    - Corydon Avenue and Lamont Boulevard invert at Tuxedo district boundary - 228.98 m (S-MH60005864)

LDS to LDS

- A 750 mm LDS pipe from Tuxedo South district LDS system at Corydon Avenue and Park Boulevard North flows by gravity eastbound into Tuxedo LDS system and does not interact with the CS system.

  - Corydon Avenue and Park Boulevard North invert at Tuxedo district boundary - 227.65 m (S-MH60003117)

- A 2400 mm LDS pipe from Tuxedo South district LDS system at Corydon Avenue and Park Boulevard North flows by gravity northbound into Tuxedo LDS system and does not interact with the CS system.
  - Corydon Avenue and Park Boulevard North invert at Tuxedo district boundary - 227.65 m (S-MH60003117)
- A 750 mm LDS pipe from Tuxedo district LDS system at Southport Boulevard and Corydon Avenue flows by gravity southbound into Tuxedo South LDS system and does not interact with the CS system.
  - Corydon Avenue and Southpoint Boulevard invert at Tuxedo district boundary - 228.79 m (S-MH60005920)

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.

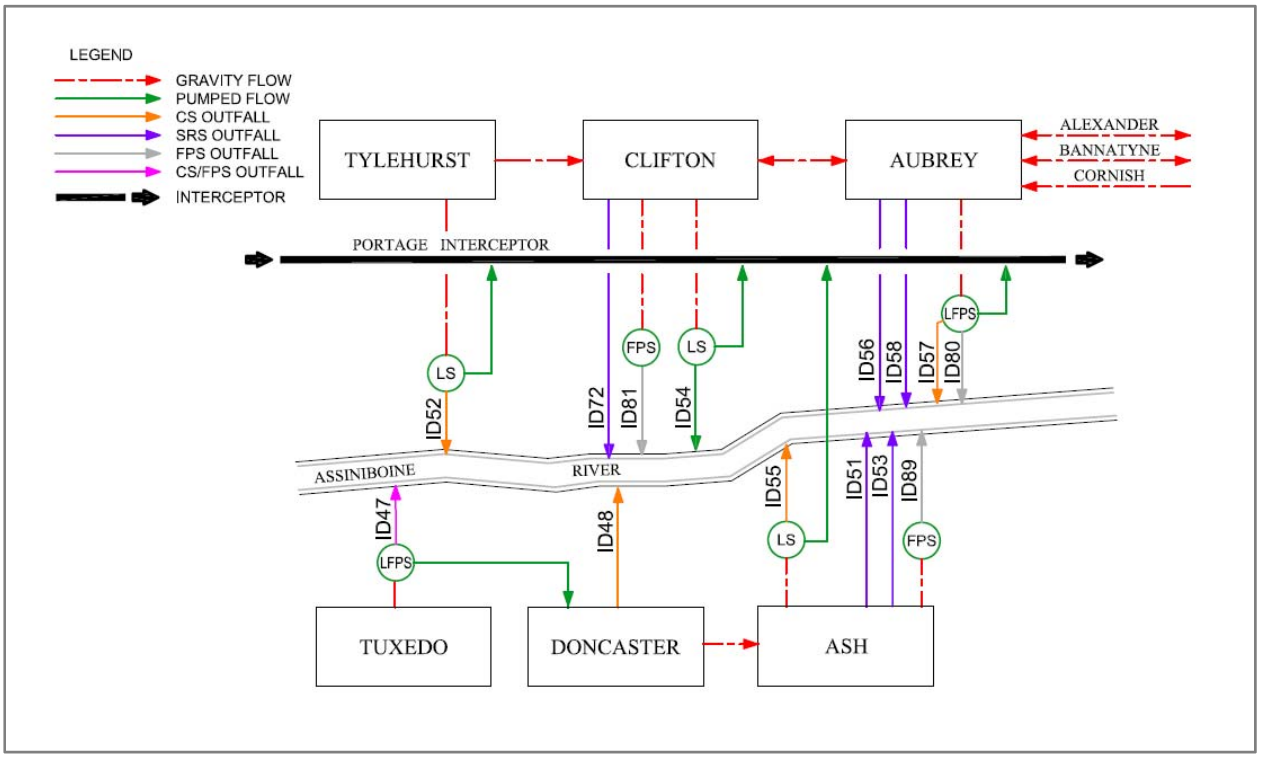


Figure 1-1. District Interconnection Schematic

1.3.2 Asset Information

The main sewer system features for the district are shown on Figure 41 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 (ID47)	S-MH70010676.1	S-MA70029012	900 mm	Circular pipe Invert: 225.33 m
Flood Pumping Outfall (ID47)	S-MH70010676.1	S-MA70029012	900 mm	Circular pipe Invert: 225.33 m

Other Overflows	N/A	N/A	N/A	
Main Sewer Trunk	S-MH6006079.3	S-MA70029065	2280 x 1520 mm	Egg-shaped pipe
Storm Relief Sewer Outfalls	N/A	N/A	N/A	No SRS system within the district.
Storm Relief Sewer Interconnections	N/A	N/A	N/A	No SRS system within the district.
Main Trunk Flap Gate	S-AC70013735.1	S-CG00000749	900 mm	Circular, Invert = 225.51 m
Main Trunk Sluice Gate	TUXEDO_GC.1	S-CG00000750	900 mm	Invert = 225.42 m
Off-Take	S-MH60005247.1	S-MA70018595	200 mm	Circular pipe
Dry Well	N/A	N/A	N/A	
Lift Station Total Capacity	N/A	N/A	0.036 m^3/s	2 pumps x 0.018 m^3/s
Lift Station ADWF	N/A	N/A	0.004 m^3/s	
Lift Station Force Main	S-AC70008688.1	S-MA70018599	150 mm	Dual Flood and Lift Station[a]
Flood Pump Station Total Capacity	N/A	N/A	0.063 m^3/s	1 pump, Force main – 200 mm
Pass Forward Flow – First Overflow	N/A	N/A	0.021 m^3/s	

Notes:

[a] Tuxedo uses a Dual Lift and Flood Pump Station, with the FPS using one pump that connects to its respective 200 mm force main. This force main flows past the sluice gate gates to the outfall.
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	Tuxedo – 224.51
2	Trunk Invert at Off-Take	225.40
3	Top of Weir	225.48
4	Relief Outfall Invert	N/A
5	Relief Interconnection	N/A
6	Sewer District Interconnection (Tuxedo South)	228.98
7	Low Basement	230.67
8	Flood Protection Level	230.53

[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 for Tuxedo district was the Report on Separate Sewer Relief Project, Tuxedo Sanitary Sewer District (Reid Crowther, 1982). It describes necessary relief measures to reduce or eliminate basement flooding for the Tuxedo combined sewer district. The report on Basement Flooding Relief Program was then completed in 1986.

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 Tuxedo CS district was included as part of this program. Instruments installed at each of the thirty nine primary CSO outfall locations has 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
41 – Tuxedo	1986	Future Work	2013	Study Complete	N/A

1.5 Ongoing Investment Work

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

The Route 90 Widening Project is planned from Carpathia Road to St. James Bridge in Ash district and will improve traffic along Kenaston Avenue. Implementation of sewer separation has yet to be determined at this stage; however, separation would be advantageous to reducing the overflows occurring in Ash as well as Doncaster districts.

The existing CSs will be evaluated for separation potential as part of the Route 90 Widening Project. Opportunistic separation will be incorporated where there is benefit. The separation costs may be reduced if separation work is planned as part of road reconstruction. There will be minimal impacts associated with Tuxedo CSD however.

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 Tuxedo sewer district are listed in Table 1-4. The proposed CSO control projects will include 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 Tuxedo district is not identified as a priority project within the existing Basement Flood Relief Program.

The existing CS system was originally reviewed for in-line storage as well as floatable management. The marginal evaluation indicated that full separation will be similar to the in-line/screening control option even though the majority of the district has already been separated along with its smaller overall area. Operations and maintenance (O&M) costs required with the in-line / screening option are also taken into consideration, and this associated O&M cost results in the selection of full separation is the most preferable in this district.

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

The sewer separation project for Tuxedo will provide immediate benefits to the CSO program when complete. The work includes installation of a new LDS trunk sewer along Nanton Boulevard as well as a new LDS collector sewer along Lamont Boulevard. Current LDS systems will be extended to collect road drainage along Handsart Boulevard, Grenfell Boulevard, and Girton Boulevard. Collected stormwater runoff will be routed to the existing 2400 mm LDS outfall discharging to the Assiniboine River at Park Boulevard North. The approximate area of sewer separation is shown on Figure 41.

The flows to be collected after Tuxedo separation will be as follows:

- Dry weather flows will remain the same for Tuxedo district.
- Tuxedo WWF will consist of sanitary sewage combined with foundation drainage.

This will result in a significant reduction in combined sewage flow received at Chataway LFPS after the separation project is complete. The separation project will provide a full reduction of overflows for the 1992 representative year.

In addition to reducing the CSO volume, the benefits of Tuxedo separation include a reduction of pumped flows entering both the immediate downstream Doncaster and Ash CS districts, as well as reducing the amount of flood pumping required at the Chataway LFPS.

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 applicable GI controls.

Tuxedo has been classified as a medium GI potential district. Land use in Tuxedo is mainly residential with a small amount of commercial, the north end of the district is bounded by the Assiniboine River. This district would be an ideal location for cisterns/rain barrels, and rain garden bioretention. There are a few commercial areas which may be suitable to green roofs and parking lot areas which would be ideal for paved porous pavement.

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 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 flows 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 districts.

The reduction in storm flows entering the CS LFPS will reduce the requirement for operation of the flood pump within the CS LFPS. 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 (i.e., foundation drain connections to the CS system) within the Tuxedo district.

1.8 Performance Estimate

An InfoWorks CS hydraulic model was created as part of the CSO Master Plan development. Two versions of the sewer system model were created and used to measure system performance. The 2013 Baseline model represents the sewer system baseline in the year 2013 and the 2037 Master Plan – Control Option 1 model, which includes the proposed control options in the year 2037. A summary of relevant model data is provided 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	47	47	932	31	-
2037 Master Plan – Control Option 1	47	18	932	3	SEP

Notes:

Table 1-5. InfoWorks CS District Model Data

Model Version	Total Area (ha)	Contributing Area (ha)	Population	% Impervious	Control Options Included in Model

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. The 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. The table also includes overflow volumes specific to each individual control option when simulations were completed; these are listed to provide an indication of benefit gained only and are independent volume reductions unless noted otherwise.

Table 1-6. District Performance Summary – Control Option 1

Control Option	Preliminary Proposal	Master Plan			
	Annual Overflow Volume (m^3)	Annual Overflow Volume (m^3)	Overflow Reduction (m^3)	Number of Overflows	Pass Forward Flow at First Overflow
Baseline (2013)	14,695	13,843	0	18	0.021 m^3/s [b]
In-Line	14,658	N/A	N/A	N/A	N/A
Separation	N/A [a]	0	13,843	0	0.025 m^3/s [c]
Control Option 1	**14,658**	**0**	**13,843**	**0**	**0.025 m^3/s [c]**

[a] Separation was not simulated during the Preliminary Proposal assessment.
[b] Pass forward flows assessed with the 1-year design rainfall event
[c] Pass forward flows assessed with the 5-year design rainfall event

The revised CSO Master Plan control option to separate the Tuxedo district has been based on the more focused district assessment as opposed to the previous Preliminary Proposal network performance assessment. In addition, the non-identified improvements (not recorded in Table 1-6) to the overflow performance at the downstream Doncaster and Ash districts were part of the overall selection process.

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 elimination of the district overflows represents 100 percent capture at this district.

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. District Cost Estimate – 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 (Over 35-year period)
Sewer Separation	N/A [a]	$8,790,000	$10,000	$110,000
In-Line Storage	$ [b]	N/A	N/A	N/A
Screening		N/A	N/A	N/A
Subtotal	**$0**	**$8,790,000**	**$10,000**	**$110,000**
Opportunities	N/A	$880,000	$1,000	$10,000
District Total	**$0**	**$9,670,000**	**$11,000**	**$120,000**

[a] Sewer separation not assessed in this district for the Preliminary Proposal
[b] Solution developed as refinement to Preliminary Proposal costs. Costs for these items of work found to be $1,200,000 in 2014 dollars

The estimates include changes to the control option selection since the Preliminary Proposal, and updated construction costs, and the addition of GI opportunities. The calculations for the CSO Master Plan cost estimate includes the following:

- Capital costs 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	Separation	Separation was not included in the Preliminary Proposal.	The Master plan identified sewer separation as the control option.
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 Tuxedo 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 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

ID Number	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**	-

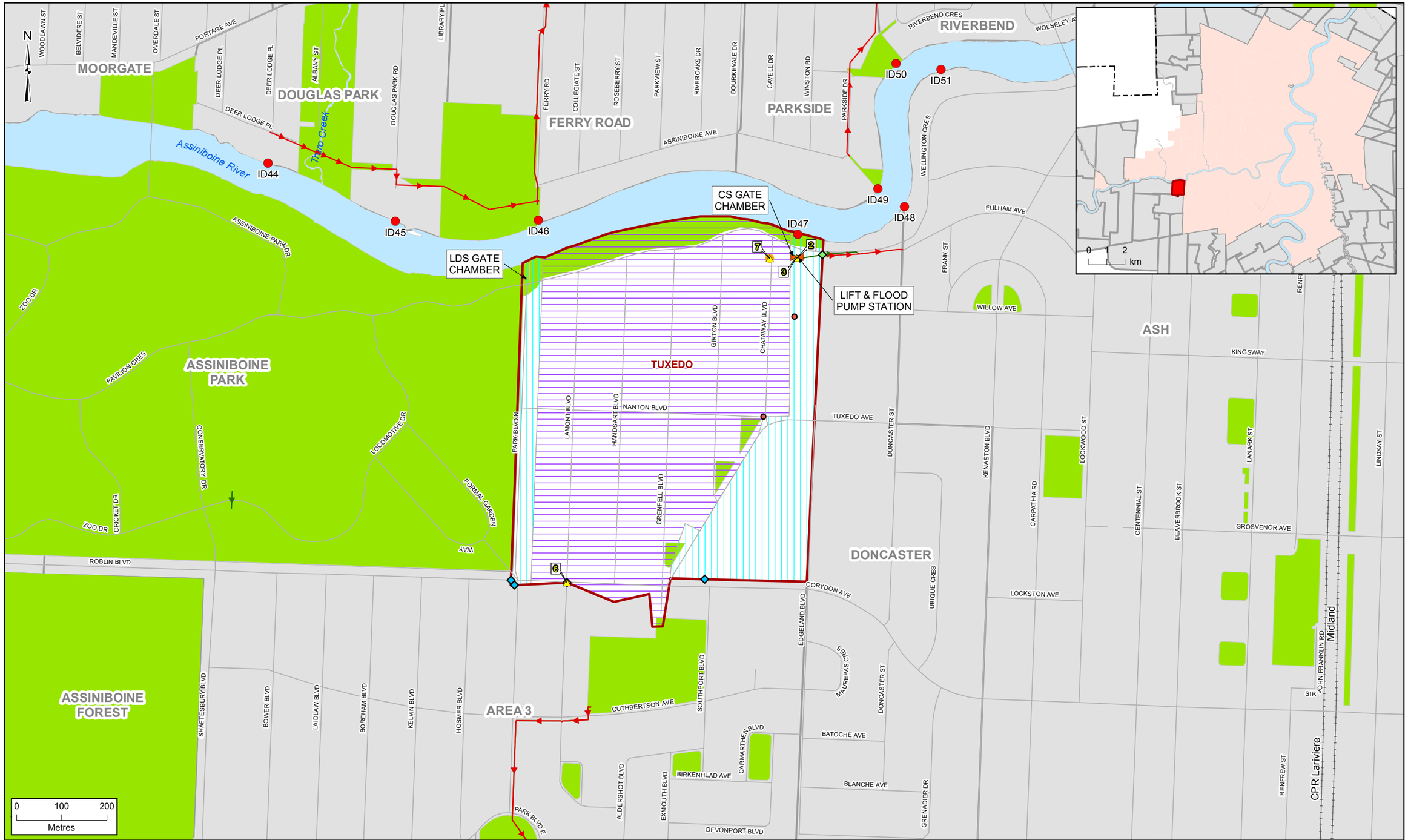
Table 1-9. Control Option 1 Significant Risks and Opportunities

ID Number	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
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 Limited (Reid Crowther). 1982. *Report on Separate Sewer Relief Project, Tuxedo Sanitary Sewer District*. Prepared for City of Winnipeg. September.



LEGEND

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

CSO MASTER PLAN PROPOSED SOLUTIONS

- Sewer Separation - Planning
- Sewer Separation - Complete

ALL PROPOSED SOLUTIONS SHOWN IN RED TEXT

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

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

FIGURE 41
District Overview Map
Sewer District: Tuxedo
City of Winnipeg
Combined Sewer Overflow Master Plan

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