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CSO Master Plan

Doncaster District Plan

August 2019

City of Winnipeg

CSO Master Plan

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3	08/16/2019	Final Submission For CSO Master Plan	MF	MF	MF

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1. Doncaster District

1.1 District Description

Doncaster district is located towards the southwestern limit of the combined sewer (CS) area. The district stretches from the Canadian National Railway main line north to the Assiniboine River. The eastern boundary consists of Centennial Street, Kenaston Boulevard, and Doncaster Street, and the western boundary follows Edgeland Boulevard and Morpeth Boulevard. Doncaster is surrounded by Ash to the east; Area 3.4 and Area 3.1 to the south; and Tuxedo, Area 3, and Area 1 to the west. Doncaster district contains numerous major transportation routes that pass through the district. They consist of Kenaston Boulevard, Tuxedo Avenue, Grant Avenue, and Corydon Avenue.

Land use in Doncaster is balanced between residential and commercial with the majority being occupied by residential. Most single-family residential homes are located in the northern and eastern section of the district. A mix of single and multi-family properties are located along Kenaston Boulevard. The commercial businesses are located along the major transportation routes. A large section of Doncaster is taken up by the Kapyong Barracks, which is currently unused but will be redeveloped in the future.

Major non-residential properties include the Real Canadian Superstore on the corner of Grant Avenue and Kenaston Boulevard, Joe Malone Park, and Kapyong Barracks on Kenaston Boulevard. Approximately 2 ha of the district is classified as greenspace.

1.2 Development

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 the Doncaster and Ash districts, could impact the Combined Sewer Overflow (CSO) Master Plan.

One area within the Doncaster CS district has also been identified as a Major Redevelopment Site with OurWinnipeg, the former Kapyong Barracks. This site includes the lands primarily west of Kenaston Boulevard, from Taylor Avenue to Grenadier Drive. This Major Redevelopment Site is considered underused and will be prioritized to be developed into a higher density, mixed-use community.

1.3 Existing Sewer System

Doncaster district encompasses an area of 152 ha[1] based on the district boundary GIS information and includes combined sewer (CS), wastewater sewers (WWS), and land drainage sewer (LDS) systems. As shown in Figure 13, there is approximately 1 percent (2 ha) already separated and 8 percent (12 ha) of the district by area is separation ready.

The Doncaster CS system includes a CS outfall gate chamber discharging to the Assiniboine River at the northern end of Doncaster Street. The CS system collects sewage from the district and transports it northward along the main 2100 mm sewer trunk on Doncaster Street towards the CS outfall. The trunk decreases in size to 450 mm on the western edge of Doncaster Street and connects with the interceptor pipe that carries sewage from Tuxedo district.

[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.
The discrepancy between the area attributed to the Doncaster district between the GIS district boundary (152 ha) and InfoWorks model (118 ha) is due to the multiple bifurcations between the Doncaster and Ash districts changing the allocation of subcatchments, large permeable areas not included as model subcatchments and the missing area that is not covered by the GIS boundary. The City is currently reviewing the district boundaries.

A small number of land drainage sewers (LDS) exist in the south part of the district. The district includes an LDS system at the southern boundary which flows south through a 750 mm pipe beneath the Kenaston Boulevard underpass, and ties into the separate sewer districts south of Doncaster. In the future district boundary for Doncaster may be revised to exclude this section of LDS, as it is no longer associated with the CS system.

During dry weather flow (DWF), the primary weir diverts the wastewater southbound through a 2250 mm pipe and into the CS system of Ash district, where it is conveyed to the Ash sewage LS and sent across the Assiniboine River via river crossing, and ultimately to the North End Sewage Treatment Plant (NEWPCC) for treatment.

The district does not have a flood pump station (FPS) or a lift station (LS). During wet weather flow (WWF), any flow that exceeds the diversion capacity overtops the primary weir and is discharged to the Assiniboine river via the Doncaster CS outfall. Sluice and flap gates are installed on the Doncaster CS outfall to prevent back-up of the river into the CS system under high river levels along the Assiniboine River. When the Assiniboine River levels are high during WWF events however, no gravity discharge is possible due to the flap gate installed on the CS outfall. Under these high river level conditions, the excess flow assumes regular flow, diverting into the CS system of Ash district.

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

- ID48 (S-MA70019277) – Doncaster CS Outfall

1.3.1 District-to-District Interconnections

There are several district-to-district interconnections between Doncaster and the surrounding districts. Each interconnection is shown in Figure 13 and shows gravity and pumped flow from one district to another. Each interconnection is listed as follows:

1.3.1.1 Interceptor Connections – Downstream of Primary Weir

Ash

– A 750 mm CS pipe during a surge flows by gravity southbound on Doncaster Street and connects into the CS system in Ash:
    - Willow Avenue and Doncaster Street invert = 226.37 m (S-MH60006151)

1.3.1.2 Interceptor Connections – Upstream of Primary Weir

Tuxedo

– A 150 mm force main from the Tuxedo CS lift and flood pumping station (CS LFPS) pumps CS into the Doncaster interceptor sewer along Wellington Crescent. This CS is then intercepted along with the CS in the Doncaster district by the primary weir for the Doncaster district, and flows by gravity to the Ash district.
    - Wellington Crescent and Doncaster boundary interceptor invert - 228.57 m (S-CO70008693)

1.3.1.3 District Interconnections

Ash

<u>CS to CS</u>

- Common high point CS manhole:

– Kenaston Boulevard and Corydon Avenue = 227.70 m (S-MH60006019)

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.

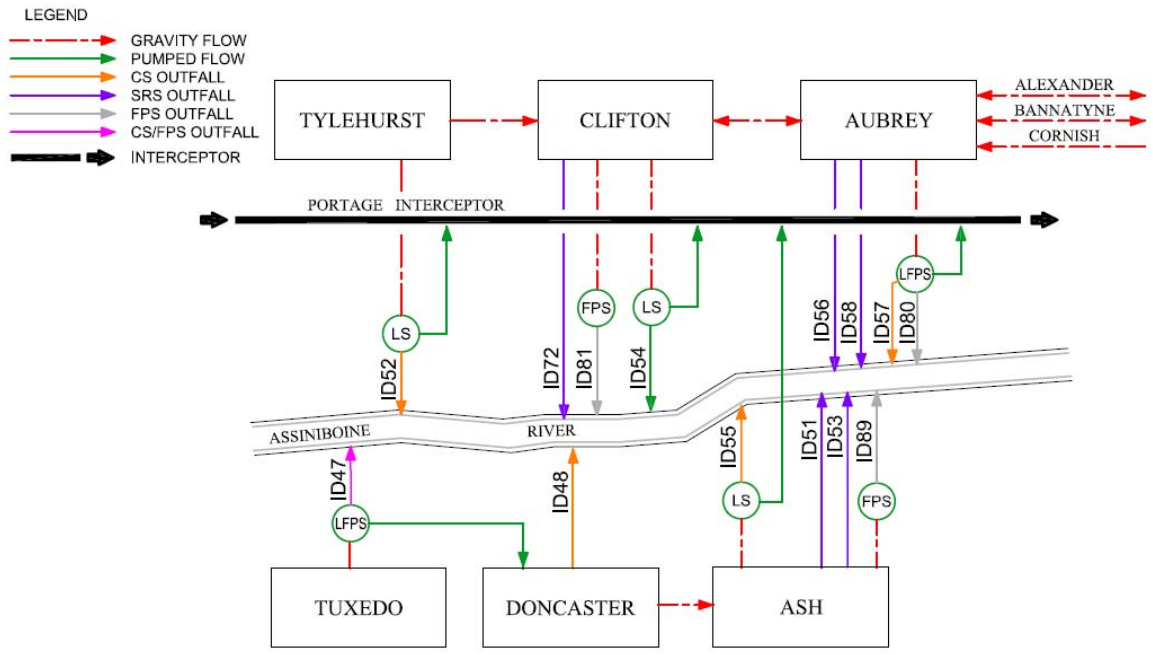


Figure 1-1. District Interconnection Schematic

1.3.2 Asset Information

The main sewer system features for the district are shown on Figure 13 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 (ID48)	S-AC70016534.1	S-MA70019277	1810 mm	Assiniboine River Invert: 225.22 m
Flood Pumping Outfall	N/A	N/A	N/A	No flood pumping station in this district.
Other Overflows	N/A	N/A	N/A	No flood pumping station in this district.
Main Trunk	S-TE60002661.2	S-MA60007598	2250 mm	Invert: 226.48 m
SRS Outfalls	N/A	N/A	N/A	No SRS system in this district.
SRS Interconnections	N/A	N/A	N/A	No SRS system in this district.
Main Trunk Flap Gate	DONCASTER_GC2.1	S-CG00000686	2250 mm	Invert: 226.76 m
Main Trunk Sluice Gate	DONCASTER_GC1.1	S-CG00000685	2250 x 2250 mm	Invert: 226.76 m
Off-Take	S-MH60006151.1	S-MA60007599	750 mm	Invert: 226.37 m
Dry Well	N/A	N/A	N/A	Diversion structure, no lift station as part of outfall in this district.
Lift Station Total Capacity	N/A	S-MA60007599 (1)	750mm (1)	0.355 m^3/s (1)
Lift Station ADWF	N/A	N/A	0.013 m^3/s	District ADWF (not considering

Table 1-1. Sewer District Existing Asset Information

Asset	Asset ID (Model)	Asset ID (GIS)	Characteristics	Comments
				Tuxedo ADWF)
Lift Station Force Main	N/A	N/A	N/A	Diversion structure, no lift station force main as part of outfall in this district.
Flood Pump Station Total Capacity	N/A	N/A	N/A	No flood pumping station in this district
Pass Forward Flow – First Overflow	N/A	N/A	0.106 m^3/s	

Notes:

(1) – Gravity pipe replacing Lift Station as Doncaster is a gravity discharge district

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

Doncaster does not use an SRS system; therefore, an SRS outfall and interconnections to the combined sewers are not available.

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	Doncaster – 224.51
2	Trunk Invert at Off-Take	226.48
3	Top of Weir	227.25
4	Relief Outfall Invert	N/A
5	Relief Interconnection	N/A
6	Sewer District Interconnection (Willow Avenue and Doncaster Street)	Invert at district boundary = 226.37
7	Low Basement	230.67
8	Flood Protection Level	230.60

[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 Doncaster was the 1986 Basement Flooding Relief Program Review (Girling, 1986). No other work has been completed on the district 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 Doncaster Combined Sewer District was included as part of this program. Instruments installed at each of the 39 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	Expected Completion
13 – Doncaster	1986	Future Work Following Separation	2013	Study Complete	N/A

1.5 Ongoing Investment Work

Proposed investment work is being considered for Kenaston Boulevard/Route 90, which will occur in both Doncaster and Ash with more of the work taking place in Doncaster. This major route runs through the central and eastern sections of Doncaster and, therefore, will affect the sewer systems in this district. The existing combined sewers 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 is ongoing maintenance and calibration of permanent instruments installed within the primary outfall within the Doncaster district. This consists of monthly site visits in confined entry spaces to verify 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 Doncaster sewer district are listed in Table 1-4. The proposed CSO control projects will be primarily complete sewer separation of the district. 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 marginal evaluation completed during the CSO Master Plan development indicated that complete separation will be similar to the in-line/screening control option in life cycle costs. In-line storage in combination with screening was originally recommended for the Doncaster district as part of the Preliminary Proposal. 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 as the most preferable in this district. The redevelopment of the vacant Kapyong barracks may

also provide the opportunity to fully separate these areas as part of the Doncaster district, which would be beneficial to the district as well as the downstream Ash 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 the Doncaster district will provide immediate benefits to the CSO program when complete. The work proposed includes installation of a new LDS trunk and collector sewers within the district. The existing CS trunks along Kenaston Boulevard will be separated into distinct storm and sanitary sewer systems, which will allow for sanitary sewage that contains untreated domestic, industrial, and commercial wastes to be separated from the storm runoff. A 2400 mm SRS outfall is currently in place off Wellington Crescent in the Ash district, which would allow for the addition of a new LDS or SRS system and a connection to the existing SRS system. The storm runoff could then be discharged into the Assiniboine River during high rainfall events. The existing combined sewers would be retained for use as separate WWS to convey sanitary sewage through the Ash sewer system to the appropriate treatment plant. The drawbacks of sewer separation are the high cost and the wide-spread disruption to the neighbouring residential homes, but the control option would address the majority of the CSO issues.

The approximate area of sewer separation is shown on Figure 13.

The flows to be collected after Doncaster separation are proposed to be as follows:

- Dry weather flows will remain the same for the Doncaster district with all DWF being diverted to the Ash CS system through the sewer trunk along Willow Avenue. To reach the desired interceptor pipe, the flow passes through Ash district to the Ash CS LS and into Aubrey district. From there, it is taken to the NEWPCC for treatment.
- Doncaster WWF will consist of sanitary sewage combined with foundation drainage.

Sewer separation will provide the near complete removal of overflows for the 1992 representative year. In addition to reducing the CSO volume, the benefits of Doncaster separation include a reduction of flows entering both the immediate downstream Ash district as well as reducing the amount of flood pumping required at the Ash FPS. A static weir elevation increase may be necessary at the CS diversion structure for Doncaster to eliminate the occurrence of a CSO as the hydraulic model shows one CSO occurring following complete separation under the 1992 representative year. An increase of 250 mm is predicted to be required, this does not impact upstream hydraulic grade due to the removal of WWF from the separation projects. This will be verified from on site flow monitoring within the district after the separation has been completed.

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.

Doncaster has been classified as a high GI potential district. Land use in Doncaster 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 (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, 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 Ash FPS will reduce the requirements and frequency of operation of the flood pump. 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 drains) extent within the Doncaster district, and any static weir raises required.

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	118	116	2,678	32	-
2037 Master Plan – Control Option 1	118	93	2,678	10	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 will still need to be assessed and corrected.

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 discrepancy between the area attributed to the Doncaster district between the GIS district boundary (152 ha) and InfoWorks model (118 ha) is due to the multiple bifurcations between the Doncaster and Ash districts changing the allocation of subcatchments, large permeable areas not included as model subcatchments and the missing area that is not covered by the GIS boundary. The City is currently reviewing the district boundaries.

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)	30,171	30,644	-	18	0.021 m^3/s [b]
In-Line	30,180	N/A	-	N/A	N/A
Separation	N/A [a]	0	30,644	0	0.126 m^3/s [c]
Control Option 1	**30,180**	**0**	**30,644**	**0**	**0.126 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 Doncaster district has been based on the more focused district assessment as opposed to the previous Preliminary Proposal network performance assessment. In addition, several improvements to the overflow performance at the downstream Ash district was part of the overall selection process, but is not included as part of Table 1-6.

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 the 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 recommended, 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 Cost (Over 35-year period)
Sewer Separation	N/A [a]	$49,890,000	$30,000	$640,000
In-Line Storage	$- [b]	N/A	N/A	N/A
Screening		N/A	N/A	N/A
Subtotal	**$0**	**$49,890,000**	**$30,000**	**$640,000**
Opportunities	N/A	$4,990,000	$3,000	$64,000

District Total	**$0**	**$54,880,000**	**$33,000**	**$704,000**

[a] Sewer separation not assessed in this district for 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 $1,710,000 in 2014 dollars.

The estimates include changes to the control option selection since the Preliminary Proposal, and updated construction costs. 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	The Master plan identified sewer separation as the control option.	
	Removal Of In-Line Storage	Not included in the Master Plan Control Options	Removed during marginal analysis process in Master Plan development.
	Removal Of Screening	Not included in the Master Plan Control Options	Removed during marginal analysis process in Master Plan development.
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 Doncaster 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.

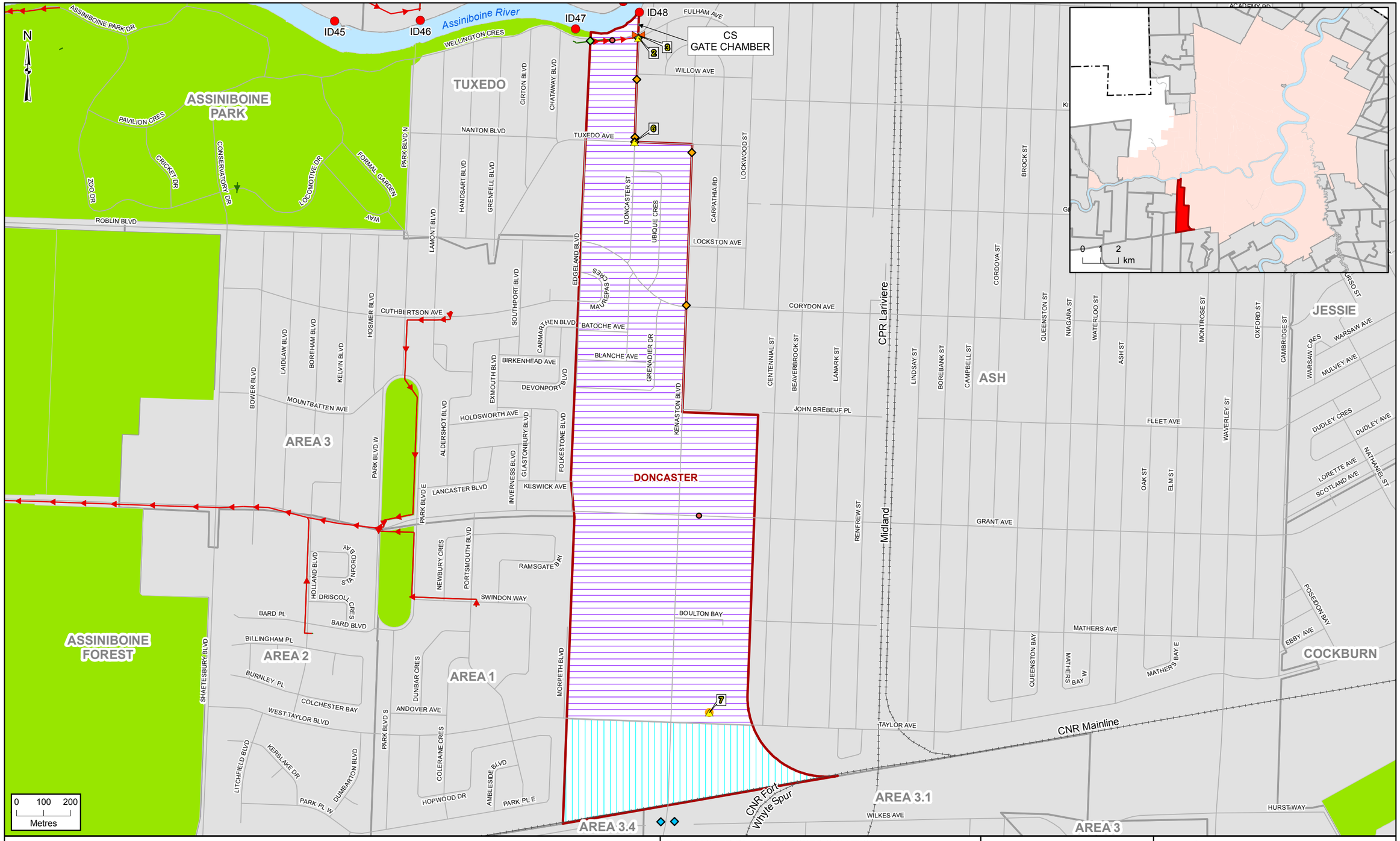
Table 1-9. Control Option 1 Significant Risks and Opportunities

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	-	-	-	-	-	-	-	-
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

Girling, R.M. & Sharp, E.J. 1986. *Basement Flooding Relief Program Review.* Prepared for City of Winnipeg.



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 13
District Overview Map
Sewer District: Doncaster
City of Winnipeg
Combined Sewer Overflow Master Plan

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