CSO Master Plan

Parkside District Plan

August 2019

City of Winnipeg

Winnipeg CSO Master Plan

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1	02/15/2019	DRAFT 2 for City Review	MF	SG	MF
2	08/12/2019	Final Draft Submission	DT	MF	MF
3	08/19/2019	Final Submission For CSO Master Plan	MF	MF	SG

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1. Parkside District

1.1 District Description

The Parkside sewer district is in the western section of north end sewage treatment plant (NEWPCC) catchment area of the combined sewer (CS) area and adjacent to the Assiniboine River. Parkside is bordered by Portage Avenue to the north, Bourkevale Drive to the west, and the Assiniboine River to the south and east.

Land use in Parkside is mainly single-family residential with commercial along Portage Avenue. École Assiniboine School and Jae Eadie Park are significant non-residential land use parcels present in the district. Portage Avenue is the only regional transportation route that passes through Parkside district parallel to the Assiniboine River along the north district boundary.

1.2 Development

A portion of Portage Avenue is located within the Parkside District. Portage Avenue is identified as Regional Mixed Use Corridor as part of the OurWinnipeg future development plans. As such, focused intensification along Portage Avenue is to be promoted in the future.

1.3 Existing Sewer System

Parkside encompasses a combined area of 16 hectares (ha)[1] based on the district boundary. Parkside was identified for sewer separation as part of the Ferry Road and Riverbend sewer relief work. As of December 2018, sewer separation work has been completed in the Parkside district.

This district includes both a CS and LDS system and a CS outfall. It is interconnected to the Riverbend district. The combined sewage from the western section of the district is collected from three residential blocks from Cavell Drive eastwards and flows to the 600 mm trunk sewer for the district. This trunk sewer is then intercepted by the primary weir at the CS outfall, flows north into the Riverbend CS district, via a 250 mm offtake along Parkside Drive. There is also a 450 mm CS which serves the small residential area along Riverbend Crescent east of the Parkside District in the past, this 450mm pipe would pass directly over the Riverbend CS outfall, and continue west to the Parkside district. It was realized that by constructing an outlet pipe directly below the base of where this 450 pipe passes over the Riverbend CS outfall trunk can be used to more efficiently tie this CS into the Riverbend district directly. This was constructed in the late 1960s, along with a 1 meter high brick weir to ensure the CS collected from the Riverbend Crescent area is captured by the hole in the manhole base. This essentially diverts all CS flow from this Riverbend Crescent area from the Parkside district to the Riverbend district, under DWF conditions.

During dry weather flow (DWF) Parkside district combined sewage flows towards the 600mm trunk sewer along Assiniboine Avenue, and enters a manhole with a flap gate located within it at the intersection of Assiniboine Ave and Parkside Drive. This manhole flap gate structure is part of the CS outfall for the Parkside district. The flap gate's invert is higher than the invert of all CS pipes entering the manhole, and the flap gate invert acts as the district's primary weir to prevent DWF from spilling to the outfall. All intercepted DWF in this manhole then flows north into a 250 mm interceptor sewer along Parkside Drive that connects to the Riverbend CS system.

During wet weather flow (WWF) events, the CS outfall provides relief to sewers along Assiniboine Avenue. The Parkside CS outfall allows overflow to the Assiniboine River during wet weather flow (WWF)

[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.

events when the level rises above the flap gate invert. Any flow that exceeds the flap gate invert and exerts a significant enough fluid pressure to push open the flap gate is discharged to the river. A sluice gate is installed further downstream at the end of the CS outfall for flap gate maintenance purposes. The flap gate restricts back-up from the Assiniboine River into the CS system under high river level conditions. There is also no flood station at this location; when high river levels are expected and overflow operation will be prevented by the flap gate during a WWF event, temporary flood pumping can be put in place. Under WWF conditions as well, the flow received from the 450mm CS servicing the Riverbend Crescent area in the Riverbend CS district may spill over the 1 metre brick weir installed in the manhole directly above the Riverbend CS outfall. All flow which spills over this brick weir then continues west to be intercepted in the Parkside district, at which point it may rise above the flap gate invert and discharge to the Assiniboine River.

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

- ID49 (S-MA20008800) – Parkside CS Outfall

1.3.1 District-to-District Interconnections

There are three district-to-district interconnections between Parkside and the surrounding districts. These interconnections are shown on Figure 32 for Parkside district and show the locations where gravity flow crosses from one district to another. Each interconnection is listed in the following subsections.

1.3.1.1 Interceptor Connections – Downstream of Primary Weir

Riverbend

- Combined sewage is directed into a 300 mm interceptor pipe at the Parkside outfall gate chamber, and into the Riverbend CS district:
  - Invert at district boundary - 226.79 m (S-MH70005194)

1.3.1.2 District Interconnections

Ferry Road

<u>CS to CS</u>

- The main 750 mm interceptor pipe flows eastbound by gravity on Portage Avenue from Ferry Road into Riverbend:
  - Invert at Riverbend district boundary – 230.65 m (S-MA20008863)
- High Point Manhole (flow is directed into both districts from this manhole)
  - Assiniboine Avenue and Bourkevale Drive – 229.87 m (S-MH70016002)

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.

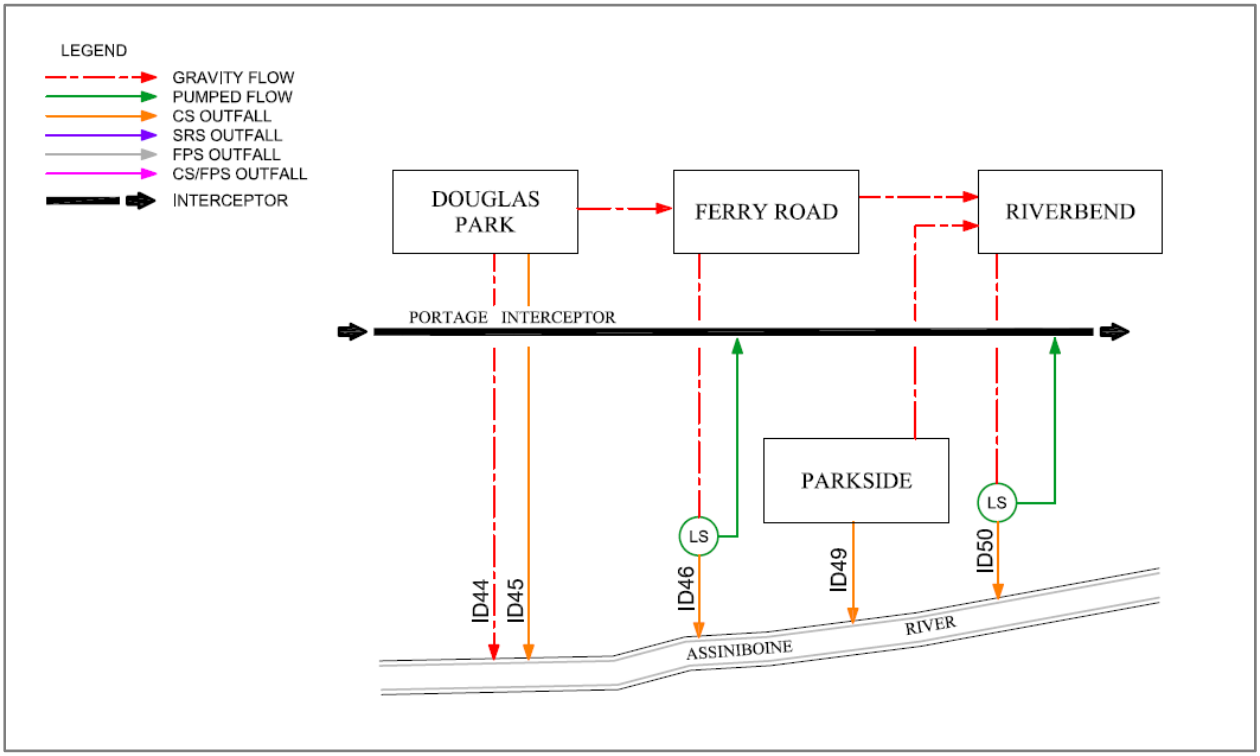


Figure 1-1. District Interconnection Schematic

1.3.2 Asset Information

The main sewer system features for Parkside are shown on Figure 32 and are listed in Table 1-1.

Table 1-1. Parkside Sewer District Existing Asset Information

Asset	Asset ID (Model)	Asset ID (GIS)	Characteristics	Comments
Combined Sewer Outfall (ID49)	S-CG00001138.1	S-MA20008800	750 mm	Circular Invert: 227.00 m
Flood Pumping Outfall	N/A	N/A	N/A	No flood pump station within the district.
Other Overflows	N/A	N/A	N/A	
Main Trunks (from Ferry Road and Riverbend)	S-AC70013535.1 S-MH70007104.1	S-MA20008803 S-MA70019339	750 mm 600 mm	Circular, Invert: 228.21 m Circular, Invert: 228.46 m
SRS Outfalls	N/A	N/A	N/A	No SRS within the district.
SRS Interconnections	N/A	N/A	N/A	No SRS within the district.
Main Trunk Flap Gate	S-MH70005190.2	S-CG00000894	750 mm	Flap Gate size Invert: 228.36 m
Main Trunk Sluice Gate	S-MH20008110.1	S-CG00001138	750 x 750 mm	Sluice Gate size Invert: 227.25 m
Off-Take	S-MH70005190.1	S-MA70013033	250 mm	Circular Invert: 228.17 m
Dry Well	N/A	N/A	N/A	No lift station within the primary CS outfall.
Lift Station Total Capacity	N/A	S-MA70013033 (1)	250 mm (1)	0.049 m^3/s (1)

Table 1-1. Parkside Sewer District Existing Asset Information

Asset	Asset ID (Model)	Asset ID (GIS)	Characteristics	Comments
Lift Station ADWF	N/A	N/A	0.0002 m^3/s	
Lift Station Force Main	N/A	N/A	N/A	No lift station within the primary CS outfall.
Flood Pump Station Total Capacity	N/A	N/A	N/A	No flood pump station within the district.
Pass Forward Flow – First Overflow	N/A	N/A	0.011m^3/s	

Notes:

(1) – Gravity pipe replacing Lift Station as Douglas Park is a gravity discharge district
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	Parkside Drive – 224.40
2	Trunk Invert at Off-Take	228.17
3	Top of Weir	N/A
4	Relief Outfall Invert	N/A
5	Low Relief Interconnection	N/A
6	Sewer District Interconnection (Ferry Road)	228.93
7	Low Basement	231.49
8	Flood Protection Level	229.69

[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 for Parkside was in 2006 with the *Ferry Road and Riverbend Combined Sewer Relief Works* (Wardrop, 2006). This study discussed the possible relief work available for the Ferry Road, Douglas Park, Parkside and Riverbend CS Systems to reduce the incidences of basement flooding.

The majority of Parkside has been separated as part of a large scale sewer relief project which resulted from this 2006 study. This includes the installation of a separate land drainage sewer (LDS) system to collect surface runoff. There are plans to abandon the Parkside CS outfall completely following post separation flow monitoring. All three contracts for the sewer separation portion of the works have been completed.

Table 1-3. District Status

District	Most Recent Study	Flow Monitoring	Hydraulic Model	Status	Planned Completion
32 - Parkside	2006 - Conceptual	Future Work	2013	Sewer Separation Complete	2018

1.5 Ongoing Investment Work

The separation work was completed between 2016 and 2018 and will be integrated into the CSO Master Plan. Post-separation flow monitoring and decommissioning of the Parkside CS outfall is to be completed as future work. There is no further study or construction proposed for the Parkside district at this time.

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 Parkside district are listed in Table 1-4. The proposed CSO control is 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 decision to include complete separation of Parkside as part of the CSO and BFR program has removed a large volume of existing land drainage from the CS system, thereby reducing the volume and number of CSOs for the district. The proposed outfall abandonment would eliminate CSO occurrences entirely from the 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

Sewer separation has been recently completed in the Parkside district as part of the Ferry Road and Riverbend Basement Flood Relief project. Complete separation of Parkside removes a large volume of land drainage runoff from the CS system, thereby reducing the volume and number of CSOs for the district.

The work included installation of a new independent LDS system to collect road drainage. The collected stormwater runoff will be routed through the new LDS via local streets to Winston Drive, east along Parkside Drive and through Jae Eadie Park to a new dedicated LDS outfall discharging to the Assiniboine River.

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

- DWF will remain the same – with it being diverted by gravity to the Riverbend CS LS via the primary weir for the district.
- WWF will consist of sanitary sewage combined with foundation drainage.

This will result in a reduction in combined sewage flow received at Riverbend CS LS after the separation project is complete. It is proposed that future flow monitoring of the district during DWF and WWF is completed to verify that the sewer separation is fully compliant with the modelled removal of all CSOs. A static weir elevation increase may be necessary at the CS diversion to eliminate all occurrences of CSO. Should the flow monitoring confirm the removal of all CSOs occurrences, work to abandon the Parkside CS outfall entirely will be evaluated.

1.6.3 Green Infrastructure

The approach to GI is described in Section 5.2.1 of Part 2 of the CSO Master Plan. 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.

Parkside has been classified as a medium GI potential district. Land use in Parkside is mainly single-family residential with commercial along Portage Avenue. There are also greenspace areas. 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 master plan projects with long term consideration for implementation on a system wide basis.

1.7 System Operations and Maintenance

Systems 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.

It is recommended to complete a temporary flow monitoring campaign for the district, 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 Riverbend district. Should it be confirmed that there is no further CSOs under WWF events, complete decommissioning of the Parkside CS outfall can occur. This will remove the O&M component for this outfall from the City's overall O&M program.

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	11	11	88	77	N/A
2037 Master Plan – Control Option 1	11	8	88	7	SEP

Notes:

Total area is based on the model subcatchment boundaries for the district.
SEP = Separation
% = percent

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 applied uniformly. 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; 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 [a]
Baseline (2013)	2,983	2,979	-	16	0.011 m^3/s
Separation	0	0	2,979	0	TBD
Control Option 1	**0**	**0**	**2,979**	**0**	**TBD**

[a] Pass forward flows assessed up to 5-year design rainfall event. Possible overflow for larger design events to be confirmed.

The percent capture performance measure is not included in Table 1-6, as it is applicable to the entre CS system, and not for each district individually. However, the full capture of overflows volumes for the Parkside 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 relevant control option with overall program costs summarized and described in Section 3.4 of Part 3A of the CSO Master Plan. 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 estimate with a level of accuracy range of minus 50 percent to plus 100 percent.

Table 1-7. Cost Estimates – Control Option 1

Control Option	2014 Preliminary Proposal Capital Cost [a]	2019 CSO Master Plan Capital Cost [b]	2019 Annual Operations and Maintenance Cost	2019 Total Operations and Maintenance (Over 35-year period) [b]
Sewer Separation	$0	$0	$0	$0
Subtotal	**$0**	**$0**	**$0**	**$0**
Opportunities	N/A	$0	$0	$0
District Total	**$0**	**$0**	**$0**	**$0**

[a] Parkside separation was underway at the time of the Preliminary Proposal Cost development, however all costs for the remaining work for the district was already budgeted within the City of Winnipeg. Therefore the remaining separation costs for the district were omitted from the Preliminary Proposal future cost projections.

[b] Parkside separation has been recently completed and therefore zero costs have been included for the Master Plan capital cost and O&M costs. Actual Annual O&M costs were established as $5,200 and Total cost of $120,000 over the 35-year period.

The estimates include updated construction costs based on level of completion of work to date. The calculations for the CSO Master Plan cost estimate include 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 costs for RTC. As there are no capital costs allocated to this district as the work to align with the CSO Master Plan is complete, there has also been no capital costs in this district allocated to GI or RTC opportunities.
- 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.
- 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
Opportunities	A fixed allowance of 10 percent has been included for program opportunities	Preliminary Proposal estimate did not include a cost for GI opportunities	No costs allocated opportunities as capital costs for district removed.

Lifecycle Costs	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 complete separation of the Parkside district has achieved the 100 percent capture figure, and no further work in this district will be required to meet the future performance target. It is recommended to complete post separation flow monitoring and model calibration to confirm the performance.

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 as part of the CSO Master Plan 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.

A specific acceptable risk for the Parkside district is connected to the complete sewer separation work already implemented within this district. As a result, no costs for GI opportunities have been allocated, since this cost is a percentage of future capital costs. However, this does not restrict any GI or RTC opportunities from occurring in this district, as in this situation the 10% allowance attributed to other districts will be utilized.

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**	-	-	-

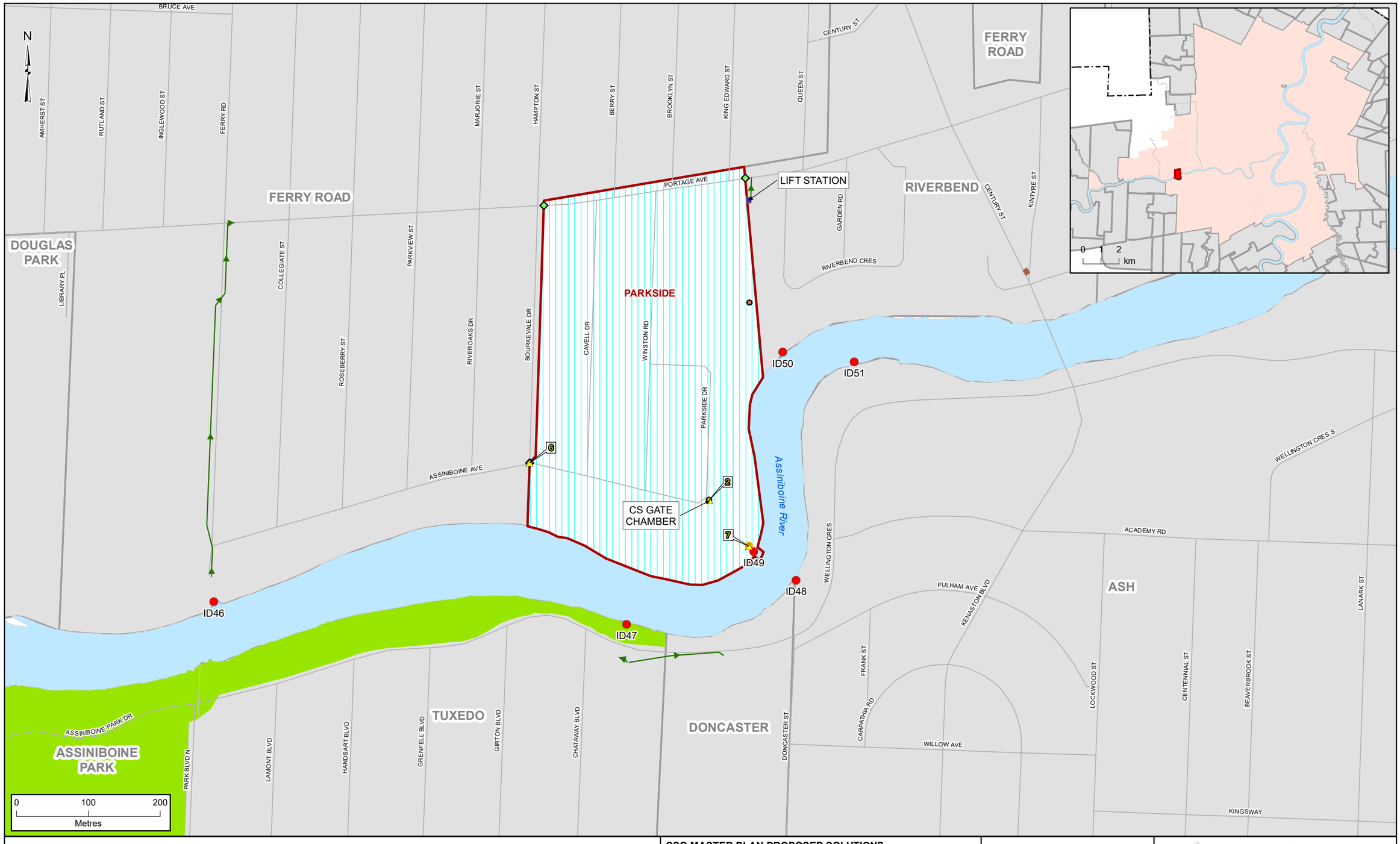
Table 1-9. Control Option 1 Significant Risks and Opportunities

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
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

Wardrop. 2006. *Ferry Road and Riverbend Combined Sewer Relief Works*. Prepared for the City of Winnipeg Water and Waste Department. November.



LEGEND

- Critical Elevation
- CSO Outfall
- Low CS Manhole
- Inter-System Connection: CS - WWS
- District Boundary Crossing: CS, WWS
- Force Main
- Street
- District Boundary
- Watercourse
- Greenspace

CSO MASTER PLAN PROPOSED SOLUTIONS

- Sewer Separation - Complete

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 32
District Overview Map
Sewer District: Parkside
City of Winnipeg
Combined Sewer Overflow Master Plan

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