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CSO Master Plan

Mission District Plan

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City of Winnipeg

CSO Master Plan

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1. Mission District

1.1 District Description

Mission district is located along the eastern boundary of the combined sewer (CS) area. The district is bounded by the Hart and Roland districts to the north, Area 13 and Area 22 to the east, Windsor Park to the south, and the La Verendrye, Dumoulin, Despins, and Marion districts to the west. The Seine River forms the western boundary, the northern boundary is Thomas Avenue, the eastern boundary is Lagimodière Boulevard, and Maginot Street and Berkshire Bay within the Windsor Park area form the southern boundary.

Many regional transportation routes pass through the district. Archibald Street runs north-south through the western side of the district, Marion Street runs east-west through the centre of the district, Mission Street runs east-west, and Lagimodière Boulevard runs north-south along the eastern border. Mission is a major industrial area and contains many rail lines, including the following:

- Canadian National Railway (CNR) Mainline
- Canadian Pacific Railway (CPR) Emerson
- CPR Mainline
- City-owned Greater Winnipeg Water District
- CNR Sprague
- CNR St. Bon Stocky

Mission consists mainly of industrial land with smaller commercial and residential areas spread throughout the district. The commercial land is found along the major transportation routes. Residential land use areas, including single-family, two-family, and multi-family, are located in three district areas spread throughout the district. In each case the residential land use consists of a small neighborhood. Industrial land is distributed in the Mission district and ranges from light to heavy industrial uses, with approximately 450 ha of heavy manufacturing land use classification. Greenspace in Mission district includes small areas for parks and recreational use, including Shell Canada Park and part of St. Boniface Golf Club.

1.2 Development

Mission is historically a heavy industrial neighbourhood; however, based on its location near downtown and surrounding residential areas, it is undergoing some de-industrialization. This includes the Stock Yards south of Marion Street and east of the CPR Emerson, which is identified as the Public Markets Major Redevelopment Site in OurWinnipeg. This Major Redevelopment Site is considered underused and will be prioritized to be developed into a higher density, mixed-use community.

A portion of Lagimodière Boulevard is located within the Mission District. Lagimodière Boulevard is identified as a Regional Mixed-Use Corridor as part of the OurWinnipeg future development plans. As such, focused intensification along Lagimodière Boulevard is to be promoted in the future.

A study was completed concerning Marion Street and Dugald Road to explore different options of transportation through this area in order to avoid widening or separation of these transportation routes. The *Marion Dugald Transportation Improvement Study* was developed due to the affordability and risk of the Marion Street widening and grade separation project (City of Winnipeg, 2017). This study was completed in September 2017.

Winnipeg Bus Rapid Transit could potentially impact the northern and western portions of the district. The Eastern Corridor Study (City of Winnipeg, 2018) is underway to determine the most suitable location for providing service between downtown and the eastern portion of the city. This study will include a review of drainage and utility infrastructure to determine if modifications and upgrades are required to support development and to minimize the impact to existing infrastructure. One of the options for the eastern corridor is conceptually shown as running north-south along the eastern side of the Seine River. This

could also present an opportunity to coordinate sewer separation works alongside the transit corridor development.

1.3 Existing Sewer System

Mission district encompasses an area of approximately 730 hectares (ha)[1] based on the GIS district boundary information and includes combined sewer (CS), wastewater sewer (WWS) and land drainage sewer (LDS) systems. As shown in Figure 27, there is approximately 2.6 percent (19 ha) already separated and less than 1 percent (2 ha) of the total district is separation-ready. Approximately 43 ha of the district is classified as greenspace.

The Mission combined sewer system includes a CS lift station (LS) (also referred to as the Montcalm CS LS), a flood pump station (FPS), CS outfall and a gate/junction chamber. The CS system for the district ultimately drains towards Mission Street west of Archibald Street near the confluence of the Seine River with the Red River, where the FPS and primary CS outfall are located. Sewage flows collected in Mission district converge to a 1950 by 2925 mm CS trunk sewer that runs west along Mission Street towards the Mission CS outfall. An 1800 by 2700 mm CS sewer runs northwest on Dawson Road towards the Mission trunk sewer, this Dawson Road secondary trunk sewer carries the majority of the CS from the central and southeastern portions of the district. There is then a collector pipe that runs north of Archibald that carries the sewage from the primarily residential areas on the western portion of the district.

During dry weather flow (DWF), the sewage received is diverted by the primary weir, located beneath Archibald Street at the intersection of Archibald Street and Mission Street. The intercepted sewage then flows northbound by gravity via the 750 mm interceptor approximately 225 m along Archibald Street to the gate/junction chamber before entering the Montcalm CS LS. The intercepted sewage from the Roland district to the north also enters the Mission district from a 600 mm pipe flowing southbound along Archibald Street and ties into this same gate/junction chamber for the Montcalm CS LS. From there, the intercepted sewage from the Mission district and the Roland district is pumped across the Red River via two parallel 600 mm WWS force mains and into a 1200 mm CS secondary interceptor sewer in the Syndicate district. It then flows into the Main Interceptor, and eventually to the North End Sewage Treatment Plant (NEWPCC) for treatment.

During wet weather flow (WWF) events the CS flow in the system may increase the level in the sewer above the primary weir, causing an overflow which discharges by gravity through the Mission primary CS outfall into the Seine River. A flap gate and a sluice gate are installed at the outfall to prevent high river levels from entering back into the system when the Seine River levels are particularly high. However not only does the flap gate prevent river water intrusion, but it also prevents gravity discharge from the Mission CS outfall. Under these conditions the excess flow is pumped by the Mission FPS to a point in the Mission CS Outfall downstream of the flap gate, where it can be discharged to the river by gravity once more.

In addition to the Mission FPS and Montcalm LS, a small pumping station is located at the Lagimodière Boulevard underpass. This station pumps a small volume of collected runoff from the immediate catchment area into the existing CS network within Mission. A second underpass pumping station is located approximately 100 m north of the Montcalm LS. This second underpass pumping station however pumps the collected runoff into the Red River via a dedicated land drainage sewer (LDS) outfall.

The LDS system within the Mission district is scattered in various locations. Ditches and swales are present throughout the industrial areas of the district and interconnect with the CS system in multiple locations. One major LDS ditch crosses the district from east to west along Dugald Road, called the Dugald Drain. The Dugald Drain extends along the south side of Dugald Road from Murdock Road in the South Transcona area of the city to the St. Boniface Industrial Park across Lagimodière Boulevard and receives surface runoff

[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.

from a significant part of east Winnipeg. This LDS drains then travels southwest of Dugald, eventually discharging into the Seine River just south of Marion Street near Happyland Park. The Dugald Drain receives the majority of its runoff flow from the South Transcona Drainage Basin (AECOM, 2014). The Shell Terminal on Panet Road has a private LDS system that collects all internal storm water from within the Shell boundary. These flows are transferred to the existing CS system at a rate as determined by the City. The LDS systems discharge surface runoff directly to the Seine River with outfalls located at the ends of Guilbault Street, Evans Street, St. Catherine Street, Kavanagh Street, La Verendrye Street, and Dumoulin Street.

Mission district has a single storm relief sewer (SRS) interconnection located at the end of Dumoulin Street that connects the partially separated WWS to an LDS outfall. This interconnection will relieve the WWS if there is a particularly large wet weather response along this wastewater lateral sewer. All combined sewage received in this WWS during a large wet weather response would then discharge into the Seine River via this LDS outfall.

In addition to the main CS outfall, there are a number of secondary CS outfalls located along the Seine River. Each of the secondary CS outfalls act as a high level overflow within the district CS system. These will only operate under high return design storm events, and provide localized relieve to one or more laterals at the far upstream extents of the district. The City has decommissioned the Prosper CS outfall (ID76) and this is no longer operational.

The six CS outfalls to the Red River and Seine River are as follows:

- ID20 (S-MA70016004) – Mission CS Outfall (Seine River)
- ID73 (S-MA70041411) – Plinguet CS Outfall (Seine River)
- ID74 (S-MA70041464) – Cherrier CS Outfall (Seine River)
- ID75 (S-MA70041462) – Doucet CS Outfall (Seine River)
- ID76 (S-MA50002566) – Prosper CS Outfall (Seine River) - decommissioned
- ID78 (S-MA70042084) – Gareau CS Outfall (Seine River)

1.3.1 District-to-District Interconnections

There are several district-to-district interconnections between Mission and the surrounding districts. Each interconnection is shown in Figure 27 and shows locations where gravity and pumped flow can cross from one district to another. Each interconnection is listed as follows:

1.3.1.1 Interceptor Connections - Downstream of Primary Weir

Roland

- A 600 mm secondary interceptor from Roland flows southbound by gravity into the Mission 600 mm interceptor sewer along Archibald Street towards the Montcalm LS gate/junction chamber. Flow is then pumped across the Red River to the North End Sewage Treatment Plant (NEWPCC) for treatment.
  - Archibald Street and Mission district boundary invert – 223.56 m (S-MA50018054)

Syndicate

- Two 600 mm force mains from the Montcalm LS pumps WWS west of Archibald Street and south of Elmwood Road, across the Red River into Syndicate district secondary interceptor:
  - Invert at Syndicate district boundary CS connection – 227.50 m (S-MH20012321)
  - Invert at Syndicate district boundary CS connection – 227.28 m (S-MH20012321)

1.3.1.2 District Interconnections

Windsor Park

WWS to WWS

- Common high point sanitary sewer manhole:
  - Ormiston Road invert at Windsor Park district boundary – 228.60 m (S-MH50004635)
- A 400 mm WWS force main pumps sewage from Windsor Park into the Mission district along Speers Road where it connects to the CS system:
  - Invert at WWS connection in Mission at the district boundary – 229.82 m (S-MA70020236)

LDS to LDS

- A 375 mm LDS collects surface runoff from Carolyn Bay and Ormiston Road, and crosses into Windsor Park district by gravity. Windsor Park is currently separated, and the LDS from Mission district flows into the LDS system in Windsor Park district:
  - Invert at Mission district boundary – 228.02 m (S-MA50011061)
- A 600 mm LDS collects surface runoff from the northeastern part of Windsor Park flows by gravity eastbound into Mission district. The LDS flows into Mission along and connects as follows:
  - Windsor Park district boundary and Maginot Street Invert – 228.49 m (S-MA70051318)
- A 750 mm LDS extends along Archibald Street from near Maginot Street to the district boundary near Autumnwood Drive. The LDS flows by gravity south on Archibald Street through Windsor Park district, where it is discharged into creeks in Niakwa Park:
  - Invert at Niakwa Park district boundary – 227.63 m (S-MA50009101)

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

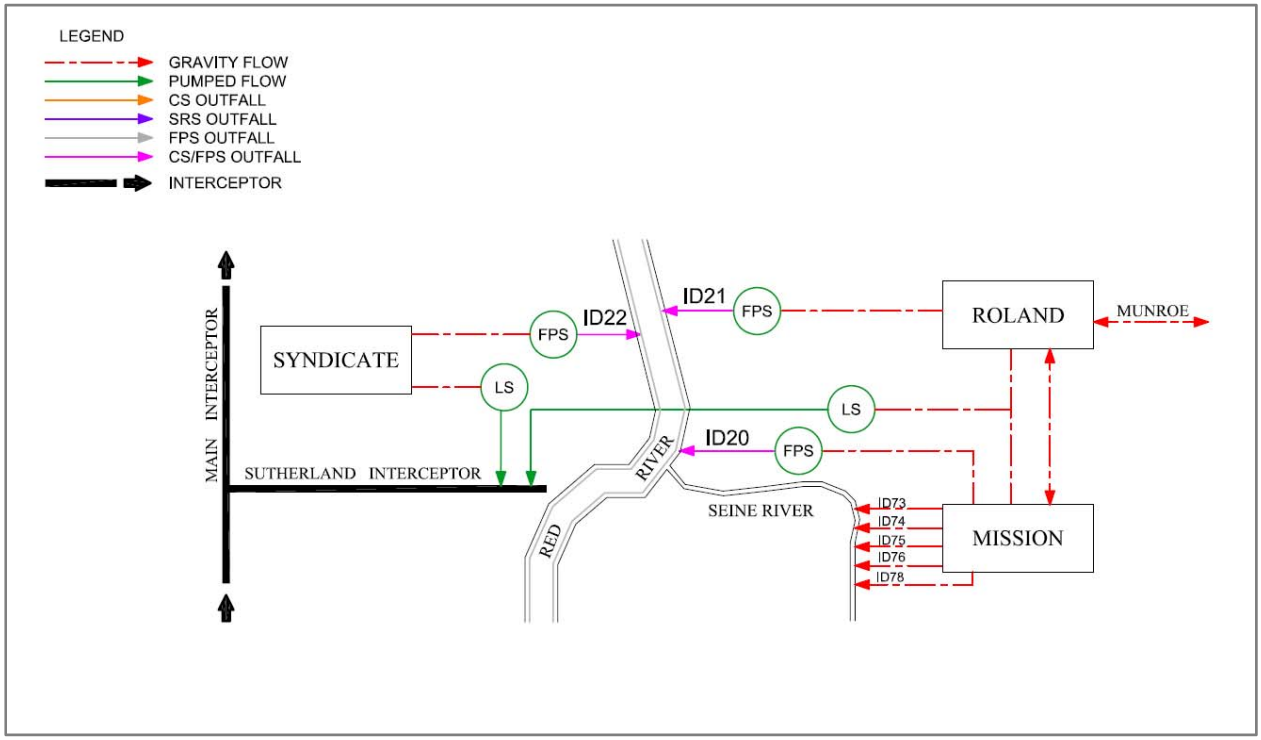

Figure 1-1. District Interconnection Schematic

1.3.2 Asset Information

The main sewer system features for the district are shown on Figure 27 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 (ID20)	S-MH70001112.1	S-MA70016004	2600 mm	Seine River Outfall
Flood Pumping Outfall (ID20)	S-MH70001112.1	S-MA70016004	2600 mm	Seine River Outfall
Other Overflows	364X001080.1 364X001013.1 364X001012.1 S-PL50000392.1 S-AC70015634.1	S-MA70041411 S-MA70041464 S-MA70041462 S-MA50002566 S-MA70042084	300 300 300 300 450	Seine River Outfall Seine River Outfall Seine River Outfall Seine River Outfall Seine River Outfall
Main Trunk	N/A	S-MA70019992	1950 x 2950 mm	Egg-shaped Invert: 222.50 m
SRS Outfalls	N/A	N/A	N/A	No SRS outfall within district
SRS Interconnections	S-MH50008095.2	S-MH50008095	227.39 m	SRS Overflow into Seine River. WWS connects to the CS on Archibald Street
Main Trunk Flap Gate	S-TE70026473.2	S-CG00001077	1685 mm	Invert: 222.6 9 m
Main Trunk Sluice Gate	S-CG00001078.1	S-CG00001078	1829 x 1829 mm	Invert: 222.78 m
Off-Take	S-MA-ID-70028467	S-MA70028467	750 mm	Circular Invert: 222.50 m
Dry Well	N/A	N/A	N/A	N/A

Table 1-1. Sewer District Existing Asset Information

Asset	Asset ID (model)	Asset ID (GIS)	Characteristics	Comments
Lift Station Total Capacity	S-TE70026535.1 (P1) S-TE70026538.1 (P2) S-TE70026539.1 (P3) S-TE70026537.1 (P4)	N/A	1.037 m^3/s max discharge rate	P1 x 0.192 m^3/s P2 x 0.328 m^3/s P3 x 0.186 m^3/s P4 x 0.331 m^3/s
Lift Station ADWF	N/A	N/A	0.126 m^3/s	Montcalm CS LS includes Roland district. Mission ADWF at 0.110 m^3/s
Lift Station Force Main	North force main S-AC70017214.1 South force main S-AC70017215.1	North force main S-MA70046432 South force main S-MA70046417	600 mm 600 mm	North force main Invert: 221.04 m South force main Invert: 220.90 m
Flood Pump Station Total Capacity	N/A	N/A	2.67 m^3/s (min) 3.12 m^3/s (max)	1 x 0.710 m^3/s 1 x 0.950 m^3/s 1 x 1.010 m^3/s
Pass Forward Flow – First Overflow	N/A	N/A	0.464 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	Mission – 223.71
2	Trunk Invert at Off-Take Pipe	222.77
3	Top of Weir	223.76
4	Relief Outfall Invert	N/A
5	Relief Interconnection (S-MH50008095)	227.39
6	Sewer District Interconnection (Windsor Park)	223.20
7	Low Basement	229.03
8	Flood Protection Level	229.39

[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 concept design completed in Mission district was the *Mission Combined Sewer District Sewer Relief, Pollution Abatement Works and North East Interceptor Study* (AECOM, 2014). This study provides a report on design work on sewer basement flooding relief and CSO abatement for the Mission CS district, the provision of a land drainage outlets to relieve certain areas in the district, and a review of the Northeast Interceptor service area (AECOM, 2014).

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. Both the Mission and Montcalm outfall structures from the Mission Combined Sewer District were 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
27 - Mission	2014 - Conceptual	2018 District Flow Monitoring	2013	Planning and Design for Separation	N/A

Source: Report on Mission Combined Sewer District Sewer Relief, Pollution Abatement Works and North East Interceptor Review, 2014

1.5 Ongoing Investment Work

Study and preliminary design of the Mission district is currently underway as a result of the City's Basement Flood Relief program. It is expected that this work will progress as normal and continue through the beginning stages of the CSO Master Plan.

A flow monitoring campaign was commenced over the summer of 2018 to capture current sewer system observed flow data for future hydraulic model calibration.

There is ongoing maintenance and calibration of permanent instruments installed within the primary outfall within the Mission 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 Mission district are listed in Table 1-4. The proposed CSO control projects will include 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	Storage / Transport Tunnel	Sewer Separation	Green Infrastructure	Real Time Control	Floatable Management
85 Percent Capture in a Representative Year	-	-	-	-	-	-	-	✓	✓	✓	-

Notes:- = not included
✓ = included

Mission was previously identified as a priority project as part of the City's Basement Flooding Relief program. The proposed complete sewer separation scheme includes the entire Mission 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

Complete sewer separation is proposed as part as part of the CSO Master Plan. The proposed sewer separation will remove a large volume of land drainage runoff from the CS system, thereby reducing the flow at the outfall and eliminating CSO events under the 1992 representative year. A reduction of the runoff would also reduce the pass forward flow to the interceptor system. Separation would also reduce the amount of flood pumping required at the Mission FPS, potentially allowing for the FPS to be decommissioned in the future.

Work would include the installation of an independent LDS system to separate the surface runoff from the CS system. Collected storm water runoff will be routed through the new LDS system to outfalls along the Seine River.

The 2014 AECOM study, identified in Table 1-3, focused on the basement flooding issues within the Mission district. The study district indicated that complete separation could be achieved through expansion of the proposed land drainage system construction, developed originally for basement flood protection. This sewer separation design would provide basement flood protection under the 10-year MacLaren design storm. The main components of the conceptual LDS system construction proposed in this 2014 study are outlined below:

- Construction of a Plinguet Street LDS outfall proposed, with the upstream system capturing stormwater from the north west portion of the Mission district. This includes the areas surrounding Dawson Road, Archibald Street and Plinguet Street.

- Construction of an outfall structure and upstream system capturing stormwater from the northern portion of the district, collecting the area along Mission Street, west of Plinguet Street, and around Provencher Boulevard within the Mission district.

- Construction of an LDS outfall at Happyland Park immediately south of Marion Street discharging into the Seine River proposed. This outfall would service the southeast portion of the Mission district, beginning at the intersection of Dugald Road and Lagimodiere Boulevard, travelling south along Lagimodiere Boulevard, west along Dawson Road and following Marion Road up to the Seine River as the west boundary. This area is referred to as South Transcona Stormwater Trunk Service Area in the design study.

- Construction of two storm retention basins (SRB); one located southwest of Dawson Road and south of the South Transcona Stormwater Truck collecting stormwater from southeast area of the Mission district. The second pond is proposed to be located in the northeast corner of the district, north of Warman Road and east of the Lagimodiere overpass. This second pond would collect surface runoff flows from the northeast portion of the district including the areas surorunding Mission Street, Softley Road and Warman Road.

The proposed separation scheme outlined in the study focused on partial separation, associated with the existing primary weir level increases and offline storage implementation. This was based on the requirements to achieve a four-overflow target as was defined for the particular study. As the CSO Master Plan has the 85 percent capture target as the long-term goal, the complete separation proposal is now the most cost effective solution to address within the Mission district. Further investigation will be necessary to assess the proposed SRB pond and LDS system arrangement to determine what would be most beneficial to the Mission district.

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

- DWF will remain the same – collected flow pumped from Montcalm CS LS to the interceptor.

- WWF will consist of sanitary sewage combined with foundation drainage from the older residential homes in the district.

This will result in a reduction in combined sewage flow received at the Montcalm CS LS after the separation project is complete. It is proposed that future monitoring of the district is completed to verify that the sewer separation is fully compliant with the goal of elimination of all CSO overflows under the 1992 representative year rainfall conditions. A static weir elevation increase may be necessary at the primary weir to eliminate the occurrence of all CSO events during the 1992 representative year. Any weir elevation raise will be further evaluated in terms of actual flow monitoring data to confirm 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.

Mission has been classified as a medium GI potential district. Land use in Mission is mostly industrial with some residential and commercial. Bioswales and green roofs may be suitable to the industrial areas while cisterns/rain barrels, and rain garden bioretention are suitable for the residential areas. Parking lots located in commercial areas are 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.

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 Montcalm LS will reduce the requirement for operation of the FPS. 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 Mission 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	735	384	2,668	16	N/A
2037 Master Plan – Control Option 1	735	127	2,668	12	SEP

Notes:

Total area is based on the model subcatchment boundaries for the district.
SEP = Sewer 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. 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)	19,567	12,809	-	6	0.464 m^3/s [a]
Separation	0	0	12,809	0	0.434 m^3/s [b]
Control Option 1	**0**	**0**	**12,809**	**0**	**0.434 m^3/s [b]**

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

[b] Pass forward 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 proposed elimination of CSO overflow results in 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 **Error! Reference source not found.**. 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)
Separation	N/A [a]	$130,320,000	$77,000	$1,660,000
Subtotal	N/A [a]	**$130,320,000**	**$77,000**	**$1,660,000**
Opportunities	N/A	$13,030,000	$8,000	$170,000
District Total	**N/A** [a]	**$143,350,000**	**$85,000**	**$1,830,000**

[a] Sewer Separation not included in the Preliminary Proposal 2015 costing. Solution developed as refinement to Preliminary Proposal work following submission of Preliminary Proposal costs. Costs for the Sewer Separation item of work found to be $77,070,000 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 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.
- 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.	Sewer separation added as Master Plan solution.
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 estimates were based on 2014-dollar values	

1.10 Meeting Future Performance Targets

The proposed complete separation of the Mission district will achieve the 100 percent capture figure and no further work will be required in this district 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 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.

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

AECOM. 2014. *Mission Combined Sewer District Sewer Relief Pollution Abatement Works and North East Interceptor Study*. August.

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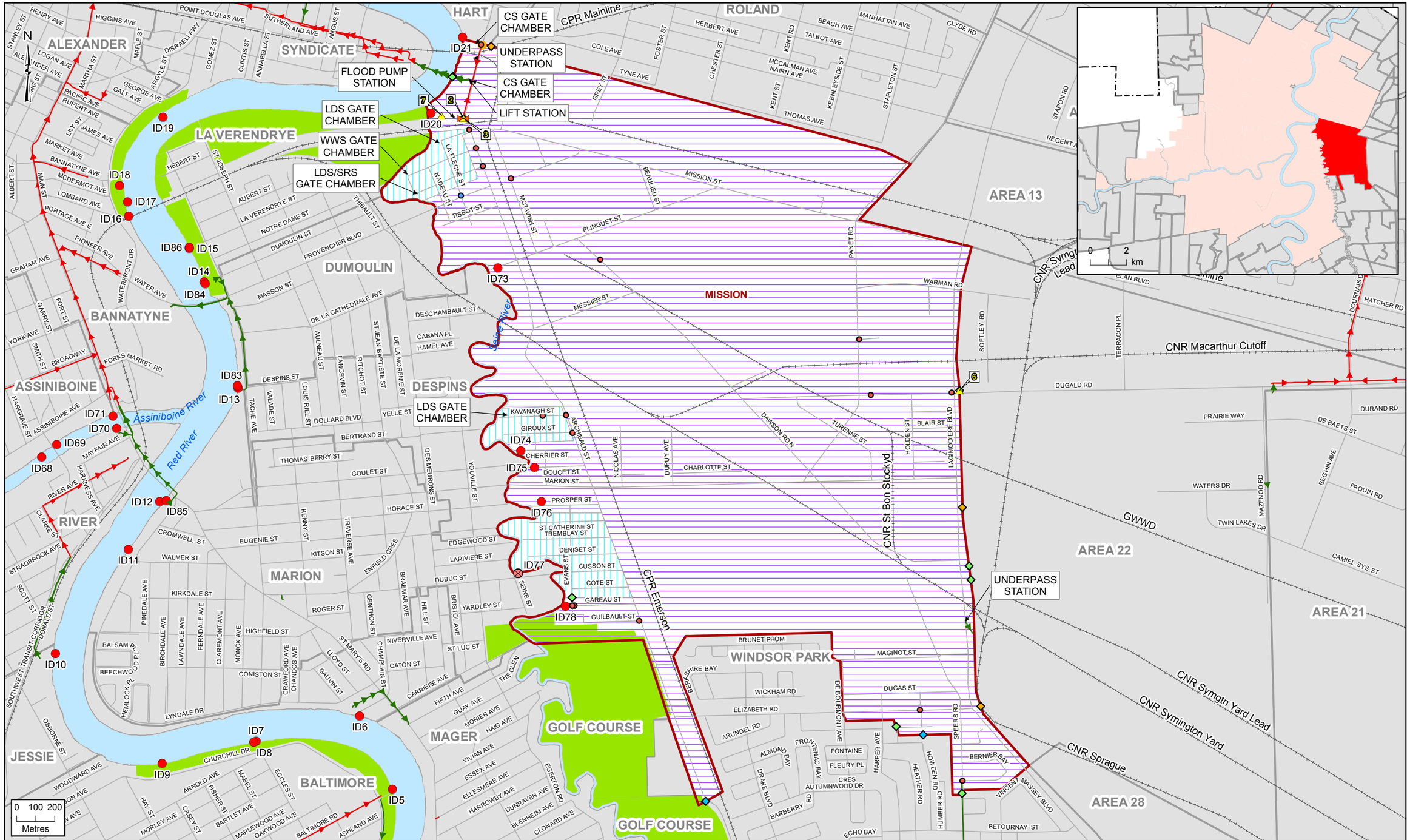

LEGEND

- Primary Weir
- Critical Elevation
- Decommissioned Outfall
- CSO Outfall
- Low CS Manhole

Inter-System Connection
- CS - WWS
- SRS - CS

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

JACOBS

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

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

FIGURE 27
District Overview Map
Sewer District: Mission
City of Winnipeg
Combined Sewer Overflow Master Plan

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