

APPENDIX B

SELF ASSESSMENT



**2019 OUTFALL RENEWAL AND REHABILITATION:
THE NORTH DRIVE AND RED RIVER BOULEVARD OUTFALLS
SELF ASSESSMENT REVIEW**

FINAL

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APPENDICES

1.0 GENERAL

1.1 PROPONENT AND CONSULTANT INFORMATION

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1.2 PROJECT UNDERSTANDING

The 2019 Outfall Renewal and Rehabilitation project involves the restoration or replacement of ten outfalls along the Red River, Assiniboine River, Seine River, La Salle River, Sturgeon Creek, and Bunn's Creek. The ten outfalls are listed below along with their City of Winnipeg Asset Number, sewer type, length, diameter, and material.

Site	Outfall Name	Asset #	Sewer	Length (m)	Dia. (mm)	Material
1	Bishop Grandin Outfall	S-MA70015994	LDS	17.50	800	CMP
2	Gateway Road Outfall	S-MA40003056	LDS	65.00	1825	CSP
3	Henderson Hwy. Outfall	S-MA40000289	LDS	27.52	1050/1200	Conc./CMP
4	Hindley Ave. Outfall	S-MA50018567	LDS	32.42	525	CMP
5	Jae Eadie Park Outfall	S-MA20008967	CS	41.26	2340	Conc./CMP
6	North Drive Outfall	S-MA60013422	LDS	129.89	1200	Conc./CMP
7	Pembina Hwy. Outfall	S-MA70028476	LDS	61.80	450	CMP
8	Red River Blvd. Outfall	S-MA00000073	LDS	81.00	750	Conc./CMP
9	St. Charles St. Outfall	S-MA20003569	LDS	92.03	900	CMP
10	Valley View Dr. Outfall (Abandonment + New Outfall)	S-MA20000078	LDS	59.10	400	Conc.

Out of the 10 outfalls listed, the following outfalls have been identified as submerged or partially submerged at the high water mark:

Site	Water Body	Location (UTM Zone 14 Coordinates)	
North Drive Outfall	Red River	Northing: Easting:	5523496.175 634767.598
Red River Boulevard Outfall	Red River	Northing: Easting:	5535266.039 637597.317
Henderson Highway Outfall	Bunn's Creek	Northing: Easting:	5535817.962 638441.491
Gateway Road Outfall	Bunn's Creek	Northing: Easting:	5533847.619 639402.940
Bishop Grandin Outfall	Seine River	Northing: Easting:	5522622.146 637545.956
Hindley Avenue Outfall	Seine River	Northing: Easting:	5523253.492 637208.688

The North Drive Outfall outlet is submerged at the high water mark and approximately 50% submerged at the unregulated winter river level (UWRL). Therefore, it is expected that the works to repair this outfall will require a temporary clay cofferdam to be installed to facilitate construction in-the-dry. Further, the North Drive Outfall exits at the Red River in which the Mapleleaf Mussel is known to exist, an endangered aquatic species identified under the *Species at Risk Act* (SARA). As such, **a substrate assessment of the site was conducted early on in the project design phase** to determine if there is potential to cause harm to mapleleaf mussel habitat. The substrate assessment report is attached. In following the *Fisheries Act* and Fisheries and Oceans Canada (DFO) Guidelines, **A Request for Review for this project site has also been submitted to DFO** as our works will involve placing temporary clean clay fill below the high water mark.

The proposed in-water works for the North Drive Outfall are shown on the attached KGS Group Figure.

The Red River Boulevard Outfall, Henderson Highway Outfall, Gateway Road Outfall, Bishop Grandin Outfall, and Hindley Avenue Outfall are submerged or partially submerged at the high water mark, however **the UWRL fully exposes the outlets**. Additionally, the Red River and Seine River shoreline typically freezes 2 to 3 feet below the surface, and Bunn's Creek completely freezes throughout. As such, it is expected that no in water-works requiring temporary or permanent fill, or any temporary or permanent increase to the existing footprint, will be required at these project locations. Therefore, it is determined that there is no threat to harming fish or fish habitat, including no threat or harm to any SARA endangered species or habitat, and a Request for Review is not required for these project locations.

1.3 NEED FOR PROJECT

The purpose of the proposed works is to protect the upstream neighborhoods from surface and basement flooding. The outfalls are important and necessary assets of the City of Winnipeg Sewer Management System.

2.0 DESCRIPTION OF PROPOSED WORKS

2.1 NORTH DRIVE OUTFALL

The North Drive outfall is a 1200 mm LDS outfall that extends from a gate chamber on the northeast side of North Drive approximately 130 m to the Red River. The water level in the December 2016 CCTV inspection was at 50% of the pipe height.

The North Drive Outfall requires the replacement of the CMP end section. The proposed works include:

- Construction of a clay coffer dam required to facilitate construction work “in-the-dry”;
- Removal and replacement of (+/-) 15.4 m of 1200 mm diameter CMP outfall with (+/-) 15.4 m of 1200 mm diameter CMP with polymer coating;
- Cleaning and CCTV Inspection of upstream concrete section of the outfall;
- Installation of mid-bank manhole;
- Localized regrading to match existing bank contours;
- Installation of 0.6 m thick riprap flush to the existing bank below the pipe at the outlet;
- Removal of clay coffer dam installation; and
- Site restoration and revegetation.

The proposed in-water works are shown on the attached KGS Group figure.

Proposed works for the remaining outfall sites to be updated and included within this report upon completion of design. The remaining outfall sites require no in-water works, however the existing conditions, construction activities, potential effects, and mitigation measures provided within this report are to be applied to all project site locations as required.

3.0 EXISTING CONDITIONS

3.1 TERRESTRIAL VEGETATION

The vegetation along the riverbank of proposed project areas of the Assiniboine River, Red River, and Seine River consists of mature trees and native grasses that extends from the top of bank area down to the top river edge of bank.

The vegetation along the riverbank of proposed work at Sturgeon Creek, Bunn's Creek and La Salle River consists of native grasses.

3.2 BIOTIC COMMUNITY

The Assiniboine River and its tributaries in Manitoba are known to contain at least 45 species of fish. In a recent study seven (7) large fish species were captured at twelve (12) sites downstream of Portage la Prairie. These species included sauger, shorthead redhorse, goldeye, quillback, mooneye, silver redhorse, and silver chub. During the summer and early fall of 1999 fish sampling within the project area found channel catfish, sauger, goldeye, mooneye, quillback, silver redhorse, white sucker, walleye, carp, shorthead redhorse and fathead minnow. No fish were captured in the project area during February gillnetting.

The Mapleleaf Mussel is an endangered species known to occur in the Assiniboine River and Red River within the City of Winnipeg. Bigmouth buffalo and silver chub have been designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as species of special concern (a species with characteristics that make it particularly sensitive to human activities or natural events) (COSEWIC 2001). The Manitoba Conservation Data Centre (MCDC) lists silver chub, bigmouth shiner and river shiner as species of concern, and bigmouth buffalo, channel catfish, flathead chub, golden redhorse and spotfin shiner on their watch list. Lake Sturgeon has been stocked by the Manitoba Fisheries Branch into the Assiniboine River near Brandon. Reports since 1996 have indicated that the sturgeon have remained in the Brandon area. The majority of fish species in the Assiniboine River spawn in the spring during high flows and rising temperatures. Several species such as channel catfish, freshwater drum, carp, and goldeye spawn in late spring or early summer. Burbot spawn under the ice during late

winter. Specific spawning and rearing locations within the Assiniboine River main channel are not well known.

Manitoba Fisheries Branch consumption advisory guidelines indicate that most species in the Assiniboine River are safe to eat. The exceptions are large walleye and channel catfish, which may contain elevated mercury levels. The two advisories issued by the Manitoba Fisheries Branch in regard to elevated mercury levels pertain to walleye over 58 cm at Lake of the Prairies and channel catfish over 79 cm at Brandon.

Fish species within the Red River are known to travel extensive distances during spring, summer, and fall. Tag returns from fish originally captured in the vicinity of the City of Winnipeg have been recorded as far south as Halstad Minnesota (~412 km), and as far north as Dogwood Point on Lake Winnipeg (~246 km) (Clark et al 1980). Tracking studies have shown that fish can travel as much as 55 km in two days (Barth and Lawrence in prep). Channel catfish movements of up to 400 km in 14 days have been documented (Goldstein 1995). Fish movements in late fall appear to be primarily in a downstream direction (Barth and Lawrence in prep). Fish that remain within the City of Winnipeg during winter remain relatively stationary within the deeper pools of the river (Barth and Lawrence in prep).

Manitoba Fisheries Branch consumption advisory guidelines indicate that most species in the Red River are safe to eat. The exceptions are large walleye and northern pike, which may contain elevated mercury levels. Thirty-three advisories have been issued by the United States Environmental Protection Agency (EPA) in regard to elevated mercury levels in several species of fish in the Red River (<http://fish.rti.org/>). Examinations of contaminants within large fish captured from the Red River in 1974 indicated that pesticide and PCB levels were usually below detectable levels (Clarke et al. 1980). One advisory has been issued by the EPA for elevated PCB levels in small white sucker (12.7-38.1 cm) (<http://fish.rti.org/>).

Peak fish migration through the adjacent river areas would occur in the spring, as fish move between over-wintering and spawning areas, and in the fall, as fish move from summer habitat to over-wintering areas. The value of this reach as overwintering habitat is unknown.

Sandy bottom substrates that dominate the Assiniboine River downstream of Portage la Prairie and Red River within the City of Winnipeg provide a favourable habitat for freshwater mussels. Eighteen (18) species of Unionic mussels and two (2) genera of Sphaeriid clams (fingernail clams) may inhabit these areas. The three ridge clam (*Amblema plicata*) has some economic importance but are not commercially harvested in the Assiniboine River. The three ridge and wabash pigtoe (*Fusconaia flava*) have been designated species of special concern by the Manitoba Conservation Data Centre. Mapleleaf mussel is known to inhabit in the area of Assiniboine and Red Rivers and is listed as endangered under the federal SARA. SARA prohibits the killing, harming, harassment, possession, capturing or taking of a species listed as extirpated, endangered or threatened; the damage or destruction of a residence or the destruction of any part of the critical habitat of such a listed species. As such, KGS Group had a substrate assessment completed by North South Consultants at the North Drive Outfall site along the Red River where in-water works is expected to determine if our project would cause damage or harm to the endangered Mapleleaf Mussel. **The North Drive Outfall site substrate assessment results determined that the section of river adjacent to the pipe outlet and proposed in-water work area is not suitable for Mapleleaf Mussel habitat.**

Based on previous studies, the substrates found in the Assiniboine River downstream of the Osborne Street Bridge are similar to those substrates found in the Red River. The only invertebrates found within the reach of the Assiniboine River from the Osborne Street Bridge downstream to the Forks were oligochaets. In addition, due to high velocity that these outfalls experience during spring melt and rainfall events it is expected that benthic communities may be scoured away in an excessively high velocity.

4.0 CONSTRUCTION DETAILS

4.1 CONSTRUCTION SCHEDULE

The construction works will be scheduled to avoid spring and summer spawning activity.

No work is conducted between April 1 and June 30 of any year. No disruptions to spawning or spawning migrations are expected as a result of the North Drive Outfall in-water works scheduled in between January 1st and March 15th, 2019. Every reasonable effort will be made to minimize the duration of in-water activity and disturbance to the bed and shore at the project location. Site restoration and revegetation will be completed before June 30, 2018.

4.2 SITE ACCESS

Site access and works near the river edge will be conducted during low flow (winter) and during frozen ground and ice conditions. Access by fording should be restricted to one crossing location, and traffic should be limited. Minor regrading of the riverbank area may be required for equipment access; it will be performed by excavation only. Under no circumstances will any fill be allowed on the riverbank for equipment access. In general, all excavation shall proceed from the top of bank area down to the bottom so as not to jeopardize riverbank stability. All material excavated shall be disposed of off-site immediately upon excavation. The stockpiling of excavated material at the site will not be allowed. Upon completion of the works, any access ramps constructed along the riverbank shall be restored to the pre-construction condition and geometry.

4.3 SEDIMENT AND EROSION CONTROL

Any excavation or other construction activities on the site that may cause sediment laden runoff to enter the water bodies will be prevented by the use of silt fences and erosion control blankets. These improvement measures will be maintained until re-vegetation has been re-established. Any sediment, sand, or debris introduced to the ice surface shall be removed upon project completion and prior to spring thaw. Effective long term erosion and sediment control measures (e.g. erosion control blankets, sediment barriers, straw mulch, silt fences) will be used to prevent any construction activities from contributing sediment to the water bodies. This

includes stabilizing and seeding disturbed areas after construction and ensuring they are reclaimed to vegetation within one growing season. In addition to the above, all work will be performed in accordance with an Environmental Protection Plan approved by the Contract Administrator.

4.4 CONSTRUCTION EQUIPMENT REQUIRED

- Site Access: Excavators, loaders
- Rockfill Riprap: Excavators, loaders

4.5 CONSTRUCTION OF TEMPORARY CLAY COFFER DAM

A small footprint area (would not exceed 8 meters from the pipe outlet) will be required to install the Temporary Clay Cofferdam and shall be constructed to the elevations as shown on the attached drawing. Temporary Clay Cofferdam materials shall be clean clay fill free of deleterious materials such as roots, organic materials, ice, snow or other unsuitable materials. The Contractor will check the Temporary Clay Cofferdam periodically to ensure of no leakage. The temporary clay cofferdam materials shall be removed following construction.

4.6 DECANTING EXISTING WATER FROM THE COFFER DAM / PIPE

All existing river water, free of sediments from inside the cofferdam / pipe shall be pumped back into the river. The Contractor will ensure that the pumped water is free of sediment and is directed to an appropriately sized energy dissipating outlet device to prevent bed or bank erosion at the point of discharge into the natural water body. The decanting activities shall be monitored continuously to address the turbidity of the water. Contractor will continuously monitor the pump pressure. Contractor will cease pumping operation prior to taking in sediment. All sediment material shall then be pumped into a storage tank and will be disposed of off-site. The water withdrawal rates will not exceed 10% of the instantaneous stream flow at the time. Vacuum unit and pumping systems size, screens and capacity will be sized according to the Department of Fisheries and Oceans' Freshwater Intake End-of-Pipe Fish Screening Guidelines (1995) to prevent debris blockage and fish mortality.

4.7 CLEANING AND REMOVAL OF SEDIMENT IN THE PIPE AND INSPECTION

Pipe shall be cleaned by a reverse setup method. This involves the cleaning equipment to be positioned at the upstream chamber manhole and cleaning the entire sewer run from that location. The Contractor will use appropriately sized high velocity sewer jet and vacuum unit due to the site specific conditions as well as ensure appropriately sized storage tank that will allow the liquid portion to be displaced off-site. All cleaned sewer and manholes shall be video inspected by CCTV as per City of Winnipeg Standard Specification S-32 CCTV Sewer Inspections. **The cleaning will result in reduced sediments in the river during spring melt and rainfall events.**

4.8 OUTFALL PIPE REPLACEMENT

The end CMP outlet section of the North Drive Outfall pipe will be replaced as part of the proposed works; Approximately 15.4 m. The pipe material will include 15.4 m of 1.2 m diameter corrugated metal pipe (CMP). The pipe will be replaced within a shored excavation. The pipe invert at the shoreline is to be approximately Elev. 222.35 m ± for the 1.2 m diameter outfall. The pipe will be bedded in clean granular material extending 0.6 meters above the top of pipe. The remaining backfill will consist of selected excavated clay. Lastly, a 0.6m thick riprap blanket will then be placed around the pipe outlet. The riprap blanket is to be set flush to the existing bank contours above the UWRL and placed resting on the existing bank slope below the UWRL.

4.9 RIVERBANK REGRADING

Native riverbank grass seed installation, silt fencing, and erosion control blanket is to be used at the mid and lower bank as erosion mitigation. Backfilled excavations and areas disturbed by construction activities will be regraded to match the existing river bank contours. The materials will consist of clean clay fill, compacted in 150 mm lifts. All deleterious materials shall be removed off site during the re-grading operations. Placement of Sod and seed at the top of bank within the limits of the bank access, and any damaged areas, will be completed by June 15, 2019.

4.10 AFFECTED AREA

See attached drawings.

4.11 PLANS, MAPS AND DRAWINGS

See attached drawings.

5.0 POTENTIAL EFFECTS OF PROPOSED WORKS AND MITIGATION MEASURES

The following section describes potential effects of the proposed in-water works on fish and fish habitat along with the associated mitigation measures to avoid, mitigate or offset harm to fish and fish habitat, including aquatic species at risk.

An environmental protection plan will be completed and implemented for the proposed 2019 Outfall Renewal and Rehabilitation works, which includes measures to mitigate the potential environmental effects identified plus follow up and reporting requirements. The plan will be enforced under the requirements of the construction contract.

5.1 POTENTIAL ALTERATION OR LOSS OF FISH HABITAT

The project scheduling of replacing CMP pipe, including rockfill riprap placement may disrupt fish spawning, and installation of the clay coffer dam may trap, if present, a resident fish population, alter the physical characteristics of the aquatic environment and scour the river bottom and dislodge, as well as, if present, physically damage the benthic community.

An area of approximately 90 m² of substrate will be covered with 300 mm diameter rockfill riprap below the UWRL (Elev. 221.76 m±) at the North Drive Outfall and approximately 11 m² of substrate will be covered with 300 mm diameter rockfill riprap below the Summer River Level (Elev. 223.83 m±). Based upon direct observation by KGS Group since 1988, interstitial spaces in the riprap do fill with sediments quickly and are frequently (usually) silted over between the St-James Bridge and the Forks because this lower portion of the Assiniboine River is frequently hydraulically backed up by controlling higher Red River flows. It is expected that sedimentation will occur throughout the summer, while some level of scouring (sediment and removal) may occur during spring. KGS Group has completed post construction monitoring of installed riprap blankets for DFO at the CAR*RAC Hugo Street Dock site and the Waterfront Drive project on the Red River. In addition, other ongoing observations at Balmoral Hall School, 29 Balmoral Street, 333 Wellington Crescent, and 7 Roslyn Road are of older intact riprap blankets that have completely silted over. Results of the monitoring indicate that significant infilling of the recently installed riprap has occurred below the Summer River Level at all of the above sites. Monitoring

was also completed along Kingston Row/Crescent after the annual fall drawdown in 2003 by KGS Group. Results of the monitoring once again indicated that significant infilling of the installed rockfill riprap had occurred below the Summer River Level.

The primary value of the existing substrate to fish in the Assiniboine River is probably the production of benthic invertebrates for foraging. The stability and structural complexity that riprap provides has also been shown to benefit macroinvertebrate populations (Wesche 1985). Where riprap provides unique habitat within a river, it can support higher densities of macroinvertebrates than along natural bank habitats (Beckett et al. 1983; Henderson 1986). Zrum and Davies (2000) found that artificial substrate samples composed of uniformly-sized rocks set in the Red River yielded the same number of invertebrate taxa as ponar grabs from softer substrates. Nelson and Franzin (2000) found that larger particle size substrates (i.e. boulder, cobble, gravel) in the Assiniboine River, whether they occurred in bank or channel habitats, were always over utilized compared to other substrates.

Therefore, it is expected that the addition of riprap as part of the replacing and removing CMP pipe will have no negative long-term effect on foraging habitat. There may be some short-term reduction in the benthic community after the riprap has been placed on the river bottom. However, due to the relatively small area that is going to be occupied by construction works (placing rip rap or installation of the temporary clay coffer dam) on proposed locations it is expected that re- colonization will occur quickly, and that invertebrate production will be equal to or greater than pre-project levels within the first open water season. In addition, considering proposed works will occur during low flow (winter) or during frozen ground and ice conditions, and the referenced winter river levels at the proposed locations, it is not expected that the proposed areas of the temporary clay coffer dam installation, placed in close vicinity of outfalls, be suitable habitat for Maple Leaf mussels. The North Drive Outfall substrate assessment also confirms this.

5.2 POTENTIAL EFFECTS ON WATER VOLUME AND VELOCITY

Alteration of the river hydraulics may be influenced by the installation of the temporary clay coffer dam and placement of rockfill riprap at the North Drive Outfall.

The small footprint area to install the temporary clay coffer dam will not reduce stream width by an amount that would lead to erosion of banks both upstream and downstream of the site or will not impede the movement of migration fish. The maximum depth and wetted perimeter of the Red River are not expected to change. Consequently, no significant effects to overwintering and foraging habitat are expected. Because of the small reduction in cross-sectional area, increases in water velocity are expected to be insignificant.

5.3 POTENTIAL EFFECTS DUE TO PROJECT SCHEDULING THAT MAY DISTURPT FISH SPAWNING

Placement of rock and installation of the temporary clay coffer dam may cause a physical disturbance within the water column and has the potential to directly harm aquatic biota.

No disruptions to spring and summer spawning or spawning migrations are expected as a result of instream work being scheduled in between January 1 and March 15, 2019. The proposed locations repair and investigations works will be scheduled to avoid spring and summer spawning activity in the Red River. Since construction will occur after winter drawdown, when fish abundance in the Red River within the City of Winnipeg is lowest, direct effects to fish are expected to be minimal.

5.4 POTENTIAL EFFECTS DUE TO INTRODUCTION OF SEDIMENTS

The construction activities have the potential to introduce sediments to the river thereby increasing total suspended solids levels and resulting in sedimentation downstream of the project areas.

The Red River is characterized by high levels of turbidity and total suspended solids (TSS). Turbidity and TSS levels are derived from soil erosion and scouring of the riverbed during periods of high flow and are generally highest during April and lowest during the winter (Gurney 1991). Between 1980 and 1989, total suspended solid levels in the Assiniboine River exceeded Manitoba Water Quality Objectives 80 per cent of the time with the highest frequency of exceedances occurring in the summer months.

Because of the naturally high TSS levels, relatively small introductions of sediments as a result of the project would not be expected to have measurable effects on Assiniboine River fish or fish habitat. Disturbed sediments probably would settle within the first 1000 to 2000 m downstream. Scouring during the following spring would transport the sediments further downstream. Monitoring of downstream TSS loads during maintenance of the Red River Floodway Inlet Control Structure suggested that most of the introduced solids were deposited within one to two km downstream (C. Bezte, North/South Consultants Inc., Winnipeg, pers.comm.). Monitoring of sediment inputs from granular coffer dams used to repair the St. Andrews Lock and Dam during winter 1994/95 and winter 1995/1996, showed no detectable increase in TSS levels 1000 m downstream of the dams (MacDonell 1995, 1996).

Decanting practices shall be accomplished in such a manner as to prevent erosion and siltation into river or a creek. The Contractor shall provide on-site manual oversight of all decanting / pumping operations 24 hours per day if bypass pumping is required. Also, Contractor will ensure that the discharged water, free of sediments, is directed to an appropriately sized energy dissipating outlet device (such as rock pad, baffled outlet) to prevent bed erosion at the point of discharge into the river or a creek. In addition, any runoff will be prevented by the use of silt fences or other measures such as erosion control mats. These works will be maintained until re-vegetation is complete.

Any sediment, sand, or debris introduced to the ice surface shall be removed upon project completion and prior to spring thaw. In addition, the sediment and erosion control plan approved by the Contract Administrator will be implemented and adhered to.

Site access works near the river edge will be conducted during low flow (winter) or during frozen ground and ice conditions.

5.5 RE-VEGETATION PLAN

All sediment and erosion control measures will remain in place until vegetation is re-established. Best practices and all reasonable effort shall be made so that only the minimum necessary number of trees are cleared. After construction, replacement trees shall be planted in locations determined by the City of Winnipeg to compensate for some of the lost tree assets and

contribute to increasing the City's urban green space. In addition, natural grass vegetation will be installed on those areas affected by the construction works. Native grasses and placement of sod within the limits of bank access, and any damaged areas, will be completed in Spring 2019.

5.6 POTENTIAL EFFECTS OF ACCIDENTS AND/OR SPILLS OF HAZARDOUS SUBSTANCES

Accidents and/or spills of hazardous substances could occur during the use of construction equipment and/or product storage in the project area and could adversely impact the aquatic environment at and downstream of the project site.

5.6.1 Fuel Use and Storage

No fuel storage will be within 100 meters of any water body, and in accordance with Manitoba Regulation MR 188/2001 respecting Storage and Handling of Petroleum Products and Allied Products.

- Contractors will have spill clean-up materials on site with a minimum of 25kg of suitable commercial absorbent, 30 m² of 6 mil polyethylene, a shovel, and an empty barrel for spill collection and disposal (CPWCC, 1999).
- Contractors will report any spills of petroleum products in excess of 100 litres (22 imperial gallons) to Manitoba Conservation in accordance with Manitoba Regulation MR 439/87.

5.6.2 Waste Management

- Collection and disposal of waste hazardous materials, including oil and lubricating products from construction equipment will be in accordance with Manitoba regulations.
- Collection and disposal of all construction wastes from the development will be in a licensed waste disposal ground.

5.7 POTENTIAL EFFECTS OF OPERATION OF MACHINERY

The Contractor shall keep all equipment in good working order to avoid leakage of petroleum products. Access by fording should be restricted to one crossing location, and traffic should be limited. Site access and bank remediation works near the river edge will be conducted during

low flow (winter) or during frozen ground and ice conditions. Contractor shall ensure that due care and caution is taken to prevent spills. Contractor shall keep an emergency spill kit on site in case of fluid leaks or spills from machinery and equipment. Contractor shall periodically monitor and check equipment. No equipment re-fueling will be conducted within 50 metres of the high water mark of the river bodies. No fuel storage will be within 100 meters of any water body, and in accordance with Manitoba Regulation MR 188/2001. Contractor shall restore banks to pre-existing condition and match existing bank contours if disturbance occurs.

6.0 REFERENCES

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APPENDIX A
SITE PHOTOGRAPHS

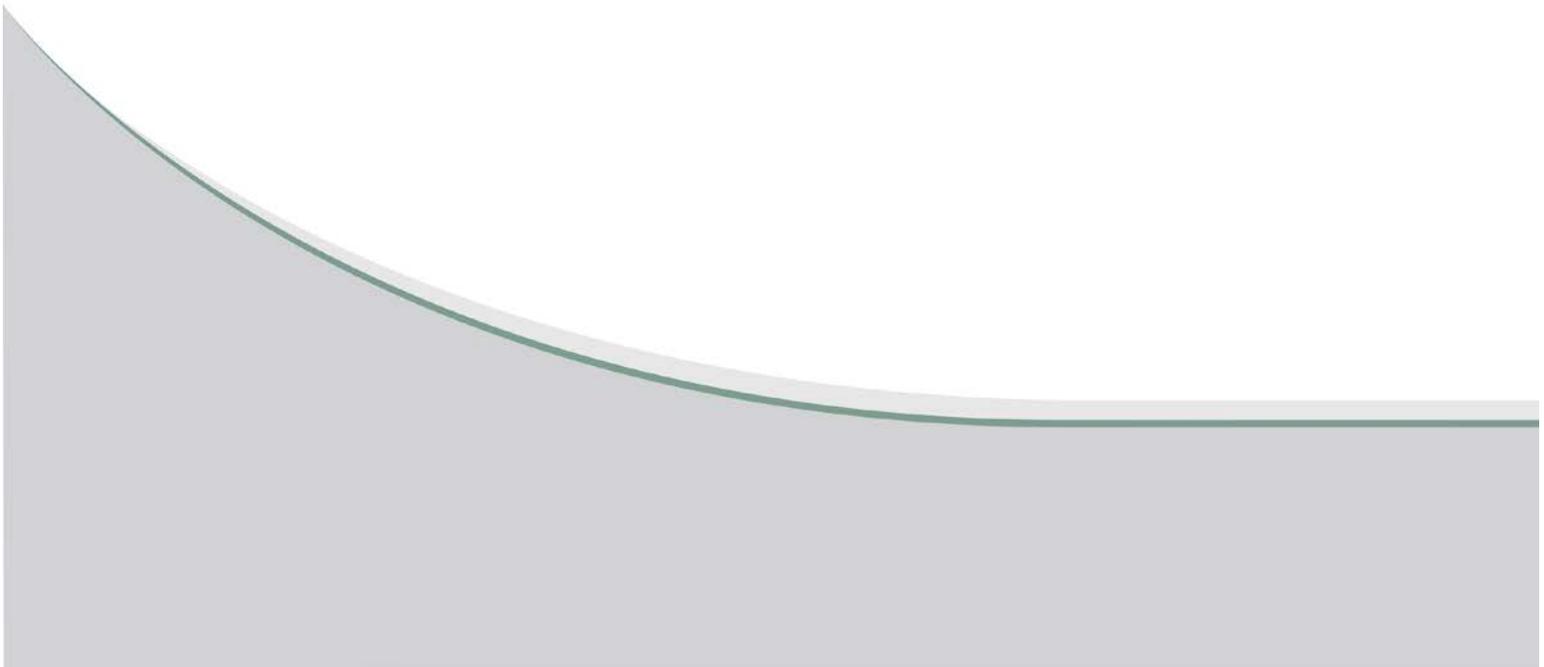


PHOTO 1
NORTH DRIVE OUTFALL AT RED RIVER (OUTLET SUBMERGED)



PHOTO 2
RIVERBANK AT NORTH DRIVE OUTFALL AT RED RIVER



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