

APPENDIX 'A'

DFO SELF ASSESSMENT



SELF-ASSESSMENT REVIEW
2018 OUTFALL RENEWAL AND REHABILITATION:
THE VOYAGEUR AVENUE, ASSINIBOINE CRESCENT,
ARCHIBALD STREET AND FORT ROUGE PARK OUTFALLS

FINAL

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1.0 GENERAL

1.1 PROPONENT AND CONSULTANT'S NAME, ADDRESS

PROponent	CONSULTANT
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1.2 WATERBODY NAME AND LOCATION

The two of a four locations of the proposed works lies within the City of Winnipeg on the shorelines of the **Assiniboine River** at the Fort Rouge Park and Assiniboine Crescent Outfalls, third location is on the shoreline of the **Sturgeon Creek** at the Voyageur Avenue Outfall and forth is on the shoreline of Seine River at the Archibald Street Outfall. The proposed works are shown on attached KGS Group drawings numbered LD-8456, LD-8459, LD-8467, LD-8468.

1.3 NEED FOR PROJECT

The purpose of the proposed works is to protect the upstream neighborhoods from surface and basement flooding, as well as the structural integrity of the buildings located on the site by conducting the emergent replacement of existing outfall at the Assiniboine Crescent and Voyageur Avenue Outfalls, and by investigating the submerged outfalls, the Archibald Street Outfall, which is beyond design life; and the Fort Rouge Park Outfall.

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 VOYAGEUR AVENUE OUTFALL

The Voyageur outfall is a 1650 mm LDS outfall that extends from a manhole on the west side of Crestview Park Drive and extends approximately 34 m to Sturgeon Creek. The water level in the February, 2017 CCTV inspection was at 50% of the pipe height.

The project involves the replacement of Voyageur Avenue Outfall and the works involve:

- Construction of a clay coffer dam required to facilitate construction work “in-the-dry”
- Removal and replacement of (+/-) 14.6 m of 1650 mm diameter CMP outfall with (+/-) 14.6 m of 1650 mm diameter SPCSP with polymer coating.
- Installation of concrete collar at the joint between the concrete outfall pipe and CMP.
- Lining (+/-) 18.3 m of existing 1650 CMP with 1220 mm spiral wound HDPE pipe (RCS 250)
- Localized regrading to provide a minimum of 600 mm cover over the outfall pipe.
- Installation of 0.6 m thick grouted riprap flush to the existing bank below the top of the pipe at the outlet
- Removal a clay coffer dam installation
- Site restoration and revegetation

The proposed works are shown on attached KGS Group drawings numbered LD-8456 and LD-8465.

2.2 ASSINIBOINE CRESCENT OUTFALL

The Assiniboine outfall is an LDS outfall that starts at a manhole located in the southwest corner of the Birchwood Terrace building (located at 2440 Portage Avenue) and extends to the south, passing between the residential properties at 2450 and 2454 Assiniboine Crescent. The outfall initiates as a 2200 mm concrete sewer and extends for 84 m, where it transitions to a 2250 LDS CMP (liner plate) that extends approximately 18 m to a CMP manhole. From the Manhole the CMP portion slopes dramatically downwards through an orifice plate to an elevation below the summer river level of the Assiniboine River.

The project involves the replacement of Assiniboine Crescent Outfall and the works involve:

- Construction of a clay coffer dam required to facilitate construction work “in-the-dry”
- Removal and replacement of (+/-) 19.5 m of 2250 mm diameter CMP outfall with (+/-) 19.5 m of 2250 mm SPCSP with polymer coating outfall pipe
- Regrading of the existing river bank
- Installation of 0.6 m thick grouted riprap flush to the existing bank below the top of the pipe at the outlet
- Removal a clay coffer dam installation
- Site restoration and revegetation

The proposed works are shown on attached KGS Group drawings numbered LD-8459 and LD-8465.

2.3 FORT ROUGE PARK AND ARCHIBALD STREET OUTFALLS

The location of the proposed works at Fort Rouge Park Outfalls lies at a gentle outside bend of the south bank of the Assiniboine River approximately 500 m downstream of the Osborne St Bridge. This Fort Rouge outfall is a 2400 mm SPCSP outfall that was replaced in 2008 as part of the Outfall Renewal and Rehabilitation Program. The outfall is completely submerged when the river is at the Regulated Summer River Level (RSRL), and partially submerged (approximately 400 mm) when the river is at the UWRL.

The Archibald Outfall originates at the flap gate located within the Mission flood pumping station. The upstream 79 m of the outfall consists of 2600x2080 mm egg shaped brick lined cast-in-place concrete pipe. The downstream 36 m of the outfall consist of 2600 mm CMP towards Sein River. Previous inspections have identified serious degradation to pipe at the Unregulated Winter River Level (UWRL). No inspection exists of the pipe condition below UWRL which typically obscure the bottom 0.4 m of the pipe. A complete inspection of this pipe is required to determine if the outfall require immediate rehabilitation.

The project involves the inspection of Fort Rouge Park and Assiniboine Crescent Outfalls and the works for both locations involve:

- A clay coffer dam installation will be required to facilitate construction work “in-the-dry”
- Decanting the existing water from the pipe

- Backsplash cleaning and vacuuming sediments
- CCTV Inspection
- Removing clay coffer dam
- Site restoration and revegetation

The proposed works are shown on attached KGS Group drawings for Fort Rouge Park Outfall and Archibald Street Outfall numbered LD-8467 and LD-8468.

3.0 EXISTING CONDITIONS

3.1 TERRESTRIAL VEGETATION

The vegetation along the riverbank of proposed project areas of the Assiniboine River and Seine River consists of mature trees and native grasses located along the bank and extends from the top of bank area down to the top river edge of bank. Mature trees located in the mid bank area were observed to be leaning in the predominant direction of an existing failure scarp consistent with ongoing bank movements.

The vegetation along the riverbank of proposed work at Sturgeon creek 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.

There are no endangered species of fish known to occur in the Assiniboine River, Red River, Seine 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/>).

Although the section of the river adjacent to work area might be used by a number of fish species and Mapleleaf mussel, the degree to which the proposed areas are used for spawning or nursery habitat is unknown. The habitat probably provides foraging opportunities for most fish

species occurring within the City of Winnipeg. Peak fish migration through the area 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 Species at Risk Act (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. However 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 all spawning activity that may occur in the Assiniboine River. 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 instream work scheduled in between January 1st and March 15th, 2018. Every reasonable effort will be made to minimize the duration of in-water activity and disturbance to the bed and shore of Assiniboine River, Sein River and Sturgeon Creek. Site restoration 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 Assiniboine River and Seine River or Sturgeon Creek will be prevented by the use of silt fences. 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 Assiniboine River, Seine River or Sturgeon Creek. This includes stabilizing and seeding disturbed areas after construction and ensuring they are reclaimed to vegetation within one growing season. In addition to 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, tandem trucks

Rockfill Riprap: Excavators, loaders, dozers, tandem trucks

De-icing / decanting activities: Heating and hoarding equipment, flood pumps,

4.5 CONSTRUCTION OF CLAY COFFER DAM

Clay Coffe Dams installation and decanting activities will be undertaken outside of the timing restriction for in-water construction to protect the fish spawning. A small footprint area (would not exceed 3 to 4 meters from the pipe outlet) will be required to install the clay Coffe Dam and shall be constructed to the elevations as shown on the Drawing LD-8465. Coffe Dam 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 clay Coffe Dam periodically to ensure of no leakage. The clay coffe dam materials shall be completely removed following construction without conducting any dredging or excavation activities.

4.6 DECANTING EXISTING WATER FROM THE COFFER DAM / PIPE

All existing river water, free of sediments from inside the coffe dam / pipe shall be pumped back into the river. The Contractor will ensure that the pumped water free of sediments is directed to an appropriately sized energy dissipating outlet device to prevent bed or bank erosion at the point of discharge into the natural waterbody. 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 when the pump begins to take in sediment. All 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 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 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

Two lengths of outfall pipe will be replaced as part of the proposed works, Voyageur Avenue, a 1.6 m outfall and Assiniboine Crescent, a 2.2 m outfall. The pipes materials will include 14.6 m of 1.6 m diameter corrugated metal pipe (CMP) and 19.5 m of 2.2 m diameter corrugated metal pipe (CMP). The pipes will be replaced within a shored excavation. The pipe invert at the shoreline will be Elev. 231.8 m ± for the 1.6 m diameter outfall and Elev. 225.2 m ± for the 2.2 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.

4.9 RIVERBANK REGRADING

Native riverbank grass seed installation and straw mulch as erosion mitigation measure will be ensured. Backfilled excavations and areas disturbed by construction activities will be regraded to match the current site geometry. The materials will consist of the in-situ overburden soils including, but not necessarily limited to organic topsoil, clay, silt, sand, gravel and fill. All deleterious materials shall be removed off site during the re-grading operations. Placement of

sod within the limits of the lower bank access, and any damaged areas will be completed in Spring, 2018.

4.10 AFFECTED AREA

See Attached Drawings.

4.11 PLANS, MAPS AND DRAWINGS

See Attached Drawings.

5.0 POTENTIAL EFFECTS OF PROPOSED DEVELOPMENT AND MITIGATION MEASURES

The following section describes potential effects of development proposals on fish and fish habitat with 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 2018 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.

A total of approximately 42.25 m² of substrate will be covered with 600 mm diameter rockfill riprap below the water level (Elev. 232.4 m±) at Voyageur Avenue Outfall and approximately 34.2 m² of substrate will be covered with 600 mm diameter rockfill riprap below the Summer River Level (Elev. 226.3 m±) at Assiniboine Crescent Outfall. 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 (located 3 km downstream of the project area) 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 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 coffer dam installation, placed in close vicinity of outfalls, be suitable habitat for Mapleleaf mussels.

5.2 POTENTIAL EFFECTS ON WATER VOLUME AND VELOCITY

Alteration of the river hydraulics - velocity of the Assiniboine River and Seine River and Sturgeon Creek may be influenced by the installation of clay coffer dam and placement of rockfill riprap.

The small footprint isolated area to install 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 Assiniboine 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 DISRUPT FISH SPAWNING

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

No disruptions to spawning or spawning migrations are expected as a result of instream work being scheduled in between January 1st and March 15th, 2018 or 2019. The proposed locations repair and investigations works will be scheduled to avoid almost all spawning activity in the Assiniboine River, Seine River and Sturgeon Creek. However, since construction will occur after winter drawdown, when fish abundance in the Assiniboine and Seine Rivers 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 Assiniboine 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, 7 days per week when the bypass pumping system is in operation. 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 use of 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 Contractor 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 shall be implemented so that only the minimum necessary number of trees is cleared. After construction will help to compensate for some of the lost vegetation and contribute to urban green space. In addition, natural grass vegetation will be installed on those

areas affected by the construction works. Both native grasses and topsoil and sod will be installed at the locations as shown on the Drawings. Placement of sod within the limits of the lower bank access, and any damaged areas will be completed in spring 2018.

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 the Assiniboine and Seine Rivers or Sturgeon Creek, 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 15 metres of the high water mark of the Assiniboine and Seine River nor Sturgeon Creek. No fuel storage will be within 100 meters of the Assiniboine and Seine River nor Sturgeon Creek, and in accordance with Manitoba Regulation MR 188/2001. Contractor shall restore banks to pre-existing condition if disturbance occurs.

6.0 REFERENCES

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APPENDIX A
SITE PHOTOGRAPHS

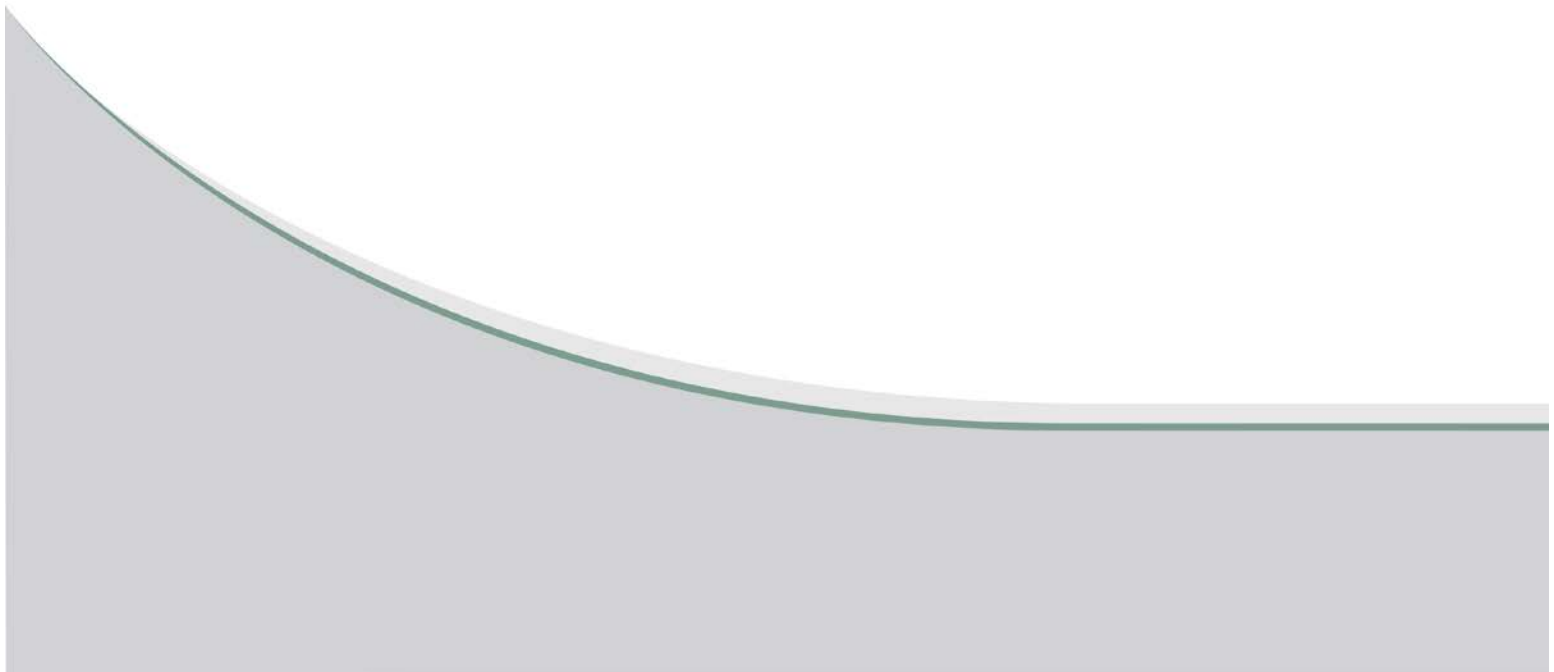


PHOTO 1
ASSINIBOINE CRESCENT OUTFALL OUTLET AT ASSINIBOINE RIVER



PHOTO 2
RIVERBANK AT ASSINIBOINE CRESCENT OUTFALL AT ASSINIBOINE RIVER



PHOTO 3
VOYAGEUR AVENUE OUTFALL OUTLET AT STURGEON CREEK



PHOTO 4
RIVERBANK AT VOYAGEUR AVENUE OUTFALL AT STURGEON CREEK



PHOTO 5
FORT ROUGE OUTFALL OUTLET AT ASSINIBOINE RIVER

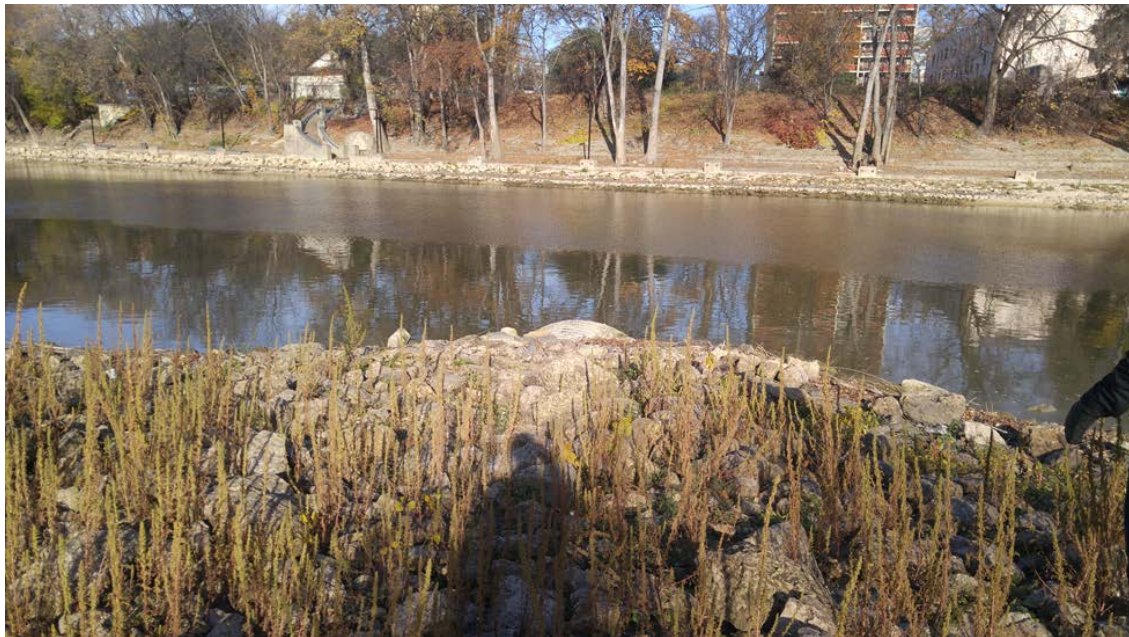


PHOTO 6
RIVERBANK AT FORT ROUGE OUTFALL AT ASSINIBOINE RIVER



PHOTO 7
ARCHIBALD STREET OUTFALL OUTLET AT SEINE RIVER



PHOTO 8
RIVERBANK AT ARCHIBALD STREET OUTFALL AT SEINE RIVER



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