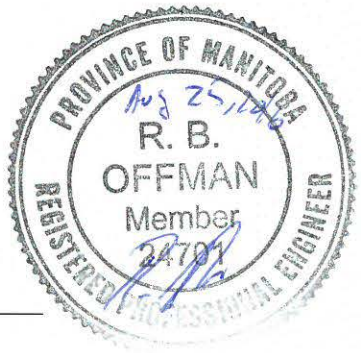
Water and Waste Department • Service des eaux et des déchets

# WEWPCC Effluent Monitoring Station
# Construction Plan
# S0976-14DD-PLA-0002

FINAL – REV 02

KGS Group 15-0107-019
August 2016

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# 1.0 INTRODUCTION

This plan details the proposed construction sequence and schedule for the work associated with the construction of the new effluent monitoring station at the West End Sewage Treatment Plant (WEWPCC). The sequence and schedule herein, demonstrate a methodology for constructing the work in accordance with the design drawings, specifications and requirements listed in the construction tender documents. The actual construction sequencing used to undertake the work will be the responsibility of the Contractor.

## 2.0 CONSTRUCTION SEQUENCE AND SCHEDULE

A proposed sample construction and commissioning schedule (Figure 2.1) has been developed that provides a timeline and sequence of work activities from the estimated award of construction date to the end of construction.

The general construction activities associated with the project are shown below in Table 2.1 with estimated durations for completing each task. These tasks and durations are also shown on Figure 2.1 with their associated sequencing.

**TABLE 2.1**
**GENERAL CONSTRUCTION ACTIVITIES**

| Tasks | Timeline |
|---|---|
| Shop Drawing Submission and Review | 4 week |
| Procurement of Materials | 2 months |
| Mobilization/Site Development/Rough Grading | 2 weeks |
| Shoring and Excavation | 3 weeks |
| By-pass Pumping | 7 weeks |
| Chamber Construction | 1.5 months |
| Superstructure Construction | 1 month |
| Buried Electrical Distribution and Fiber | 2 weeks |
| Process and Mechanical | 5 weeks |
| Replace Gate in Existing Gate Chamber | 2 weeks |
| Building Electrical | 1 month |
| Electrical Switchover (including Temporary Power Supply) | 1 day |
| Decommissioning of Existing Distribution Poles | 1.5 weeks |
| Civil Works (Road/Gravel Lot, Ditching/Grading, Fencing) | 2 weeks |
| Site Restoration | 2 weeks |

It is the intention that the Contractor will begin the shop drawing submission and review process in advance of award of contract in order to ensure that the delivery of the gates and any other critical materials are on site in advance of the critical date for by-pass pumping (described herein) of March 1, 2017. Provisions have been included within the tender document to

compensate the low bidder for their efforts, should they not be awarded the construction contract. If the low bidder is awarded the contract they will not be compensated.

Figure 2.1 also illustrates the proposed sequencing of the pre-commissioning and commissioning activities. The specific requirements of the commissioning and pre-commissioning are described in the Commissioning Plan (S0976-14DD-PLA-0001).

The following dates have been considered for the purpose of the sample schedule. The dates of Substantial Performance and Total Completion represent achievable timelines and not the actual contract dates listed in the RFP:

- Critical Date (completion of By-pass Pumping) – March 1, 2017.
- Substantial Performance – May 15, 2017.
- Total Completion – June 21, 2017.

## 3.0 CONTROLS TO MAINTAIN PLANT OPERATIONS

Project controls have been developed to ensure that plant operations at the WEWPCC are maintained at all times. The work associated with the effluent monitoring station is largely focused around the area west of the polishing ponds located on the south side of the main facility. These areas include the polishing ponds, the existing gate chamber/monitoring station, the outfall over which the new station will be constructed, and above and below ground utilities surrounding the polishing ponds. It is not anticipated that the work will impact plant operations within the main facility.

Risks were identified during the design process that could impact plant operations. The mitigation of these risks was developed into design criterion for this project. The following criteria were developed to mitigate risks to plant operations. Subsections 3.1-3.4 discuss the design details incorporated into the project that address these criteria:

- Polishing cells are not to be impacted by construction activities to ensure appropriate disinfection time of the effluent before entering the outfall at the gate chamber. The dikes supporting the polishing ponds are also access roads to the construction area. Damage to these dikes from construction vehicles will need to be monitored and any damage repaired to ensure the integrity of the dikes/ponds.
- Pond levels/outlet flows to existing gate chamber are to be maintained throughout construction. The pond levels are controlled by a weir within the existing gate chamber. Lowering of the pond during winter months could result in freezing of portions of the ponds which could impact the disinfection of the effluent.
- Access to the existing monitoring station for WEWPCC staff must be maintained throughout construction. The Contractor must provide access to the existing effluent monitoring station (located on the east side of the existing gate chamber) at all times. WEWPCC staff sample the effluent daily (7 days/week) to meet Provincial regulations.
- Power must be maintained to the existing gate chamber at all times throughout construction. Sampling equipment runs 24 hours/day to meet Provincial regulations. The Contractor must ensure that power is provided to the facility at all times. Generators will be required to be supplied by the Contractor during any planned power interruptions.

The following controls have been included within the construction plan to ensure that the above plant operations are maintained. These controls are described within the design drawings and specifications included within the construction tender documents. The project controls including specific reference to construction drawings are described below.

## 3.1 CONSTRUCTION ACCESS/EGRESS

Access and egress during construction is illustrated on Drawing 1-0103-CGAD-Z001 initiating from the gate in the south east corner of the main plant and extending along the top of the north dike for polishing cells 1 and 5, and the west dike of polishing cell 5 to the effluent station site. Review of the original dike construction drawing (CSL-02) indicates that the dikes were constructed with a clay core, silty clay fill for the embankments, approximately 3 m of clay capping the wet side and top, and topsoil and grass capping the dry side. A gravel traffic surface has been added to the top of the dike above the clay cover. The side slope along the sections of dike proposed to be used as the access road varies from 5:1 to 7:1. Given the material make-up of the dike, the side slopes, and the expected freezing conditions during the winter construction season, it is unlikely that construction vehicles will cause major damage to the dike. It can be expected when the temperature hovers close to freezing that rutting will develop along the running surface of the dike. This rutting should be repaired following construction. Should ruts extend into the clay zone of the dike, the gravel running surface should be removed, clay recompacted, and gravel reinstalled. The access/egress route, a cross section of the dike construction (taken from drawing CSL-02), and dike repair requirements are shown on tender drawing 1-0103-DGAD-ZT01.

## 3.2 TEMPORARY BYPASS PUMPING

The new station is being constructed over the existing outfall pipe that carries the flows from the WEWPCC to the Assiniboine River. As part of the construction of the plant, a segment of the outfall pipe will need to be removed while the cast-in-place substructure is erected. In order to accommodate these construction activities, at a minimum the flows from the outfall will need to be temporarily by-passed to ensure that the effluent flows from the polishing ponds to the Assiniboine River are maintained. As part of the construction tender package, and this construction plan, KGS has assumed that the flows will be controlled with temporary by-pass pumping from the existing gate chamber to the downstream manhole (MH-70006409) located approximately 100 meters west of the gate chamber. The construction is anticipated to occur during the winter months. The maximum average daily flow recorded between the months of November through to the end of February from 2013 to 2016 at the Perimeter Pumping station,

that feeds the WEWPCC, was 25.4 ML/day. As such a maximum design flow rate of 30ML/day has been assumed for the by-pass pumping requirements.

The design assumes that two completely separate suction pump systems will be used to control the flows. One system will be a back-up for the other. Each system will include a suction pump sized for the maximum design flow of 30ML/day. i.e., one system complete with pump, suction and discharge piping, and level control system will provide redundancy in the case that the primary system fails to operate properly. Diesel engine generators will be used to drive the pumps whenever by-pass pumping is required.

The temporary pumping plan, shown on Drawing 1-0103-CGAD-ZT01, depicts the assumed set-up of the pumps within the existing gate chamber. The existing gate chamber has two separate wet wells that receive flows. One on the north side that receives flows from Polishing Cell 5 and one on the south side that receives flows from Polishing Cell 4. Each wet well is equipped with a stop log weir that can provide level control to the ponds. The weir in the north wet well (from Polishing Pond 5) is used as the primary weir for pond control. Under average flow conditions (as expected during the winter construction season) all effluent flows enter the gate chamber from Pond 5 and pass over the weir in the north wet well. The weir in the south wet well is set higher and only passes flows from pond 4 during higher flow periods (rain events, spring melt, etc.). The wet wells are also equipped with guides along the upstream end of the chamber where a second stop log weir can be erected. During by-pass pumping, the Contractor will erect a second stop log weir at the upstream end of the north wet well to control the pond levels. The upstream weir will be set at the same elevation as the downstream weir is currently set at, to maintain the current pond levels. Temporary pumping will be set-up in the north wet well between the upstream and downstream stop log weirs. Stop logs for the upstream weir are not known to exist and the Contractor will need to provide these during construction. Furthermore, the upstream guides have not been used in recent years. The Contractor will be responsible to ensure that the upstream weir is installed during by-pass pumping. This may require a diver to assist with the installation.

The suction pipes from the by-pass pumps will be directed out of the existing building via the door near the southeast corner of the building. The Contractor will be responsible to supply temporary access to the building (e.g. a temporary vestibule) that allows the hoses to leave the

building, and the Contractor to access the building, while maintaining the building's existing thermal conditions and without disturbing the existing walls (due to the presence of asbestos). The suction and discharge pipes shall both be weather resistant, insulated and heat traced (if required) to prevent freeze-up. The hoses shall also be protected from construction activities by burial or other structural means. The discharge pipes shall be installed into the downstream manhole in such a manner that flows are directed downstream into the outfall pipe. If required, a temporary sandbag dike shall be erected by the Contractor upstream of the manhole to ensure flows in the outfall do not impact the upstream construction of the effluent station.

The existing gate chamber stop log weirs are known to leak. The Contractor shall seal these weirs with the means necessary to limit leakage during construction. This is anticipated to require a combination of polyethylene sheeting, plywood and water stop sealant. Even with these efforts, some leakage through or over the weirs may occur. Secondary temporary sandbag cofferdams shall be erected in the west well of the gate chamber to control these flows. Smaller pumps shall be installed to dewater the sandbag cofferdams. Flows from the cofferdams shall be directed to the upstream side of the stop log weirs.

The construction plan developed by KGS assumes that the temporary pumping will be in place at the start of the construction of the substructure, and will be in place until the downstream gate in the existing gate chamber has been replaced and pre-commissioned (flow tested). The actual duration of temporary pumping, or alternate flow bypass options proposed by the Contractor, will be the responsibility of the Contractor and based on their construction schedule.

### 3.3 ACCESS TO THE EXISTING MONITORING STATION

The Contractor will ensure that access to the existing monitoring station on the east side of the existing gate chamber will be maintained at all times for WEWPCC staff. This requirement is indicated on Drawing 1-0103-CGAD-Z001. The WEWPCC staff will need access each day (seven days per week) to take effluent samples from the equipment within the existing monitoring station. The Contractor's construction site shall be developed in such a manner to allow for safe access to the door on the southeast corner of the building. A procedure will be developed as part of the Contractor's safety plan that addresses the daily access of WEWPCC staff.

## 3.4 TEMPORARY POWER SUPPLY

The design assumes that the Contractor will provide a temporary power supply capable of providing adequate power for the following electrical demands:

- Temporary By-Pass Pumping (as described above)
- Existing Gate Chamber/Monitoring Station

  Sampling equipment in the existing monitoring station runs 24 hours per day, seven days per week. This equipment is required to meet the current Provincial Regulations on the plant. A power outage could result in the plant failing to meet these regulations. The Contractor shall have a power supply on hand to provide power for any power losses caused by construction activities (planned or unforeseen).

- Electrical Switchover

  A planned power outage is expected from the switchover from the existing overhead distribution lines to the new buried distribution lines. The Contractor shall provide a generator with adequate power to supply the needs of the existing gate chamber and monitoring station during this switchover.

# 4.0 TEMPORARY CONSTRUCTION REQUIREMENTS

Additional temporary construction supports, beyond those described above are anticipated to be required for this project. These additional supports are described below.

## 4.1 CONSTRUCTION ACCESS AND SITE DEVELOPMENT

For construction staging, the Contractor will be required to develop a large laydown area for material storage, site office and large construction vehicles (tandems, concrete trucks, etc.). The adjacent property extending from the west fence line west to the Manitoba Hydro utility corridor is owned by the City of Winnipeg. Significant area exists for the Contractor to set up a laydown area during construction. A proposed laydown area is shown on drawing 1-0103-CGAD-Z001; however, alternate configurations may be accepted.

## 4.2 SHORING REQUIREMENTS

Temporary shoring will be required to construct the substructure of the effluent monitoring station at the WEWPCC. It is envisioned this system will consist of steel soldier piles driven to a depth below the base of the excavation, complete with internal waler frames. Timber lagging will bridge between adjacent soldier piles to retain the earth beyond the excavation. Shoring will be installed 1 m from the outside edge of the proposed building. Details of the shoring are shown on Structural Drawing 1-0103-SGAD-Z001.

Design and installation of the shoring will be the responsibility of the Contractor. The specific design requirements for the shoring are listed within the drawings, specifications and geotechnical report provided as part of the tender documents. Shoring design drawings bearing the seal of a registered Professional Engineer in the Province of Manitoba will be required as a review submittal for approval prior to commencement of installation.

## 4.3 GROUND DEWATERING REQUIREMENTS

The geotechnical report (S0976-12DC-RPT-0001) indicates that the proposed effluent monitoring building should be of sufficient weight and embedment within soil, or otherwise

anchored to resist the maximum anticipated hydrostatic uplift forces. This statement was based on the groundwater levels that were monitored from a standpipe piezometer installed in the vicinity of the new effluent monitoring station. Ground water levels can fluctuate. The Contractor shall monitor levels during construction and ensure that the uplift criteria are maintained.

Flow control from runoff or seepage into the excavation will be required during construction. This can be achieved with a sump pit and pumping (as required). The observed groundwater levels and other relevant geotechnical data is summarised within the geotechnical report. This report will be provided to the Contractor as part of the tender documents.

## 4.4 MISCELLANEOUS REQUIREMENTS

The aging Distribution Control System (DCS) has limited integration capabilities and there will be a requirement to connect to this system. The City will be providing programming services but due to a limited capacity to do this work the City may encounter unexpected resource and/or technical issues, which may cause a delay in the schedule. The contractor shall provide as much advance notice as possible to the Contract Administrator and the City when programming needs to be undertaken.

## 5.0 RISK ANALYSIS

The purpose of this section is to identify additional potential risks associated with the work, along with contingency plans to mitigate the risks. The Contractor is required to take an active role in the identification of risks and take all reasonable measures to reduce the risk of unintended impact on station operation. Note that this is not an exhaustive list of risks and does not relieve the Contractor of their due diligence in all aspects of the project.

Should an emergency situation arise resulting in equipment damage and/or failure, or an unplanned station shutdown, please contact the WEWPCC Supervisor immediately, followed by the Contract Administrator. Emergency contact information is provided in Section 6.0.

| **Risk** | **Issues Related to Disturbance of Asbestos** |
|---|---|
| Description | Asbestos exists in the existing Effluent Gate Chamber and disturbance of it may cause project delays, increased costs and health risks. |
| Contractor's Requirements | Contractor to take necessary precautions to not disturb asbestos when working within the existing Effluent Gate Chamber.<br>If asbestos is disturbed, then the Contractor shall repair the damage using the appropriate health and safety and disposal measures, such as to leave the Effluent Gate Chamber Building with no greater asbestos risk than prior to the Work. |

| **Risk** | **Condition of Old Assets** |
|---|---|
| Description | There are old assets associated with this project and their conditions are unknown. There could be failures which may impact the project (e.g. schedule delay). |
| Contractor's Requirements | Contractor to be aware of this and to take due diligence when working around old assets. |

| **Risk** | **Maintain Effluent Sampling (as per section 3.3)** |
|---|---|
| Description | Sampling of effluent must be maintained throughout the project. |
| Contractor's Requirements | Contractor to ensure safe access for City staff to the existing effluent sampling equipment. |

| Risk | Leaking Stop Logs (as per section 3.2) |
|---|---|
| Description | Old stop logs exist in the existing Effluent Gate Chamber building and may cause unsafe working conditions due to leakage through the logs. |
| Contractor's Requirements | Plan for old stop logs to be leaking and take the appropriate measures (as identified in Section 3.2). |

| Risk | Integrity of Excavations (further to section 4.2) |
|---|---|
| Description | Excavations will be required as part of this project and there is the possibility of excavation collapse if the appropriate measures are not taken. Collapse of excavations could cause injury, schedule delays. |
| Contractor's Requirements | Contractor shall plan for this and take the appropriate precautions and safety measures when working in and around excavations, as specified in the Bid documents. |

| Risk | Damage to Roads Due to Heavy Equipment (further to section 3.1) |
|---|---|
| Description | Heavy equipment will be required for construction purposes and the existing road may be damaged with possible schedule delays and increased costs. |
| Contractor's Requirements | Carry out due diligence during construction activities to eliminate potential road damage. Contractor to limit routes in and out of the site and to return the road to pre-existing conditions or better once it is no longer used for construction. |

| Risk | Work in Geese-Inhabited Areas |
|---|---|
| Description | Construction will occur in geese-inhabited areas in and around the ponds. Geese can create a safety hazard to workers. |
| Contractor's Requirements | Contractor to address safe working procedures in their safety plan. |

| Risk | Control of Pond Levels (as per section 3.2) |
|---|---|
| Description | Pond levels will need to be maintained with temporary flow control measures to mitigate freezing of the ponds, ice jamming and damage to pipes caused by freezing. Frozen water may diminish or stop the flow of water through the ponds and may bypass ultraviolet treatment. |
| Contractor's Requirements | Provide temporary flow control during construction to avoid flow interruption and changes to pond water levels. |

| **Risk** | **De-Energizing of Electrical Service to Effluent Gate Chamber Building (further to section 3.4)** |
|---|---|
| Description | De-energizing the electrical service to the existing effluent gate chamber building will be necessary to complete this project. This will cause a disruption to sampling and heating. |
| Contractor's Requirements | Contractor shall have temporary power included in their Bid. |

| **Risk** | **Construction Near Power Lines** |
|---|---|
| Description | Existing power lines may be accidentally damaged by the Contractor during construction. This may cause short term power interruption to the plant and loss of sampling and heat. |
| Contractor's Requirements | Contractor to take due diligence working around power lines. |

| **Risk** | **Long Lead Time for Delivery of Gate** |
|---|---|
| Description | The delivery time for the gate could be 10 to 12 weeks. May impact schedule. |
| Contractor's Requirements | Shop drawings to be prepared by the Lowest Responsive Bidder in advance of the Contract award to expedite procurement. |

## 6.0 EMERGENCY CONTACTS

### CITY OF WINNIPEG

| NAME | ROLE | PHONE # | CELL PHONE # |
|---|---|---|---|
| Lana Obach, P.Eng. | Project Engineer, Engineering Division, Water and Waste Department | 204-986-8335 | 204-782-4925 |
| Curtis Reimer, P.Eng. | Program Technical Lead, Veolia North America | 204-986-8650<br>204-928-7414 | 204-619-3940 |
| Courtney Diduck | Analytical Services Branch Head, Environmental Standards Division, Water and Waste Department | 204-986-4752 | 204-479-5450 |
| Mark Jacobson | WEWPCC Supervisor | 204-986-5220 | 204-805-3291 |

### ENGINEERING CONSULTANT – KGS GROUP

| NAME | ROLE | PHONE # | CELL PHONE # |
|---|---|---|---|
| Ray Offman, P.Eng. | Project Manager | 204-896-1209 | 204-793-0391 |
| Rudy Derksen, P.Eng. | Lead Mechanical Engineer | 204-896-1209 | |
| Jason Bouchard, P.Eng. | Lead Electrical Engineer | 204-896-1209 | |
| Ken Dyck, P.Eng. | Lead Structural Engineer | 204-896-1209 | |

### CONTRACTOR
### (TO BE DETERMINED)

| NAME | ROLE | PHONE # | CELL PHONE # |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

# 7.0 STATEMENT OF LIMITATIONS AND CONDITIONS

## 7.1 THIRD PARTY USE OF REPORT

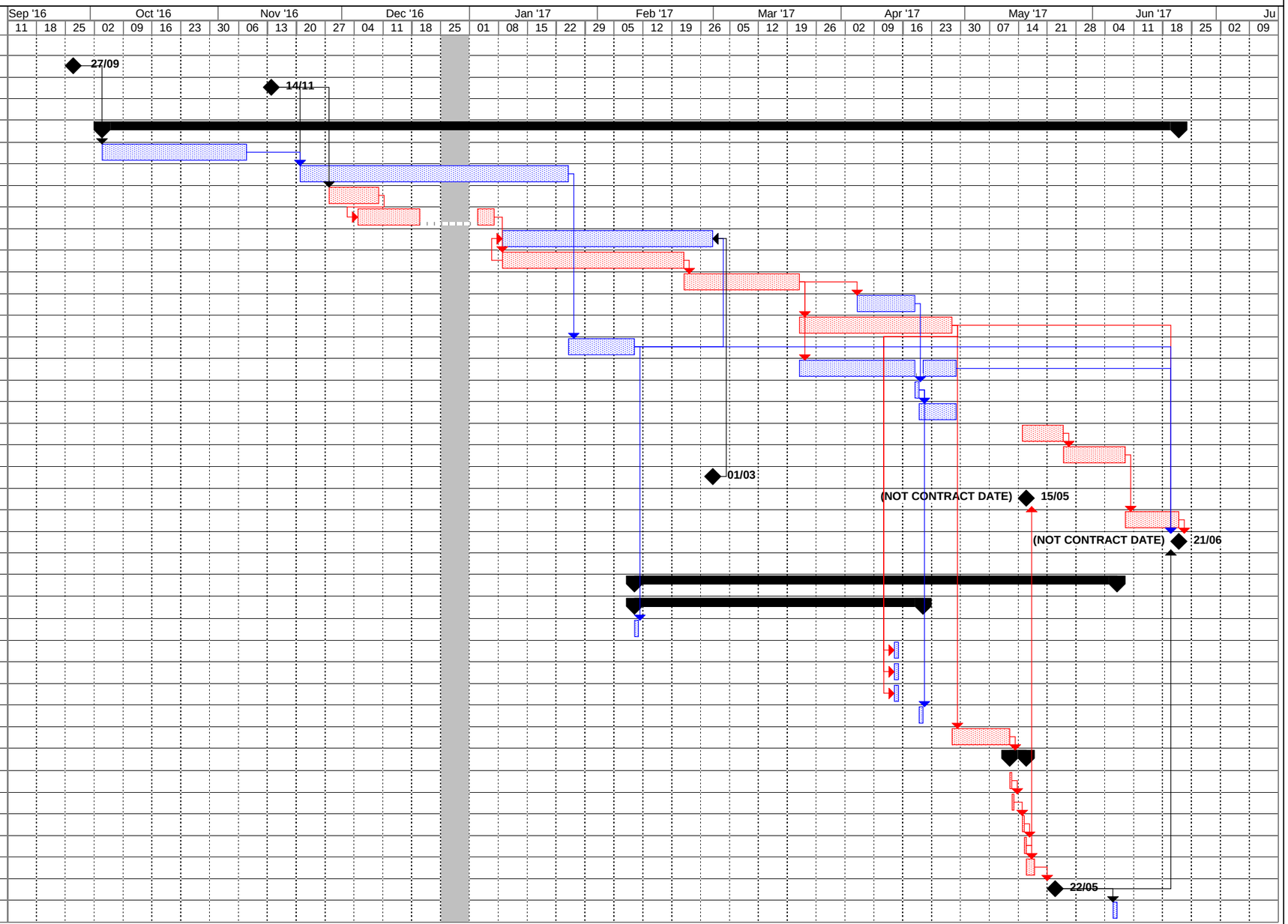
This report has been prepared for the City of Winnipeg and their contractors and/or potential bidders for the WEWPCC to whom this report has been addressed and any use by any other party that makes use of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

# FIGURES

City of Winnipeg
WEWPCC Effluent Monitoring Station

August 2016
KGS# 15-0107-19
City # S0976-14DD-PLA-0002

| ID | Task Name |
|---|---|
| 1 | |
| 2 | Close Construction Tender |
| 3 | Award of Construction Contract |
| 4 | |
| 5 | **Construction Period** |
| 6 | Shop Drawings Submission and Review |
| 7 | Procurement of Materials |
| 8 | Mobilization/Site Development/Rough Grading |
| 9 | Shoring and Excavation |
| 10 | By-pass Pumping |
| 11 | Chamber Construction |
| 12 | Superstructure Construction |
| 13 | Buried Elect. Distribution and Fiber |
| 14 | Process and Mechanical |
| 15 | Replace Gate in Existing Gate Chamber |
| 16 | Building Electrical |
| 17 | Electrical Switchover (including Temporary Power Supply) |
| 18 | Decommissioning of Existing Distribution Poles |
| 19 | Civil Works (Road/Gravel Lot, Ditching/Grading, Fencing) |
| 20 | Site Restoration |
| 21 | Critical Date (Completion of By-Pass Pumping) |
| 22 | Substantial Performance |
| 23 | Complete Deficiencies |
| 24 | Total Performance |
| 25 | |
| 26 | **Construction Commissioning** |
| 27 | **Pre-Commissioning** |
| 28 | Gate Pre-Commissioning (Leakage Test) |
| 29 | Factory Acceptance of HMI and PLC |
| 30 | Process Pre-Commissioning |
| 31 | Mechanical Pre-Commissioning |
| 32 | Electrical Pre-Commissioning |
| 33 | Performance Verification |
| 34 | **Commissioning** |
| 35 | HVAC Commissioning |
| 36 | Process Commissioning |
| 37 | DCS Integration Commissioning |
| 38 | Automation Commissioning |
| 39 | Training |
| 40 | Hand over |
| 41 | Contractor Supply Operation Manuals |




Legend | Task | Critical Task | Milestone | Summary | Split | Progress

**Note: This sample schedule represents achievable timelines and does not reflect the actual contract dates.**

WEWPCC Effluent Monitoring Station
Figure 2.1: Sample Construction Sequencing Schedule