Kelsey Generating Station
Wastewater Treatment Lagoon
Environment Act Proposal Report

Manitoba Hydro

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Environment Act Proposal Form

Manitoba
Conservation and Water Stewardship

Name of the development:
Kelsey Generating Station Sewage Lagoon

Type of development per Classes of Development Regulation (Manitoba Regulation 164/88):
Class 2

Legal name of the applicant:
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1.0 Project Background

Manitoba Hydro has initiated the design and construction of a new facultative wastewater treatment lagoon at the Kelsey Generating Station (GS), located on the upper arm of the Nelson River. The project also requires the installation of a new sewage lift station, gravity sewer line to the new lift station, a forcemain from the lift station to the new lagoon, and the construction of a new access driveway to the site. The existing mechanical wastewater treatment facilities will be decommissioned and removed.

The Kelsey GS was constructed between 1957 and 1961 to supply power to the International Nickel Company's (INCO) mining and smelting operations located in Moak Lake and Mystery Lake. Presently, the GS supplies power to the city of Thompson as well as the Province of Manitoba's electrical system. Figure 1 shows the location of the GS in the province of Manitoba.

The GS is located 680 km north of Winnipeg and 90 km northeast of Thompson. It is also located approximately 14 km south of Tataskweyak Cree Nation lands and 25 km west of York Factory First Nation lands. The site is accessible year round by air with a privately owned airstrip, and by train via the Hudson Bay Railway Company operated by OmniTRAX Canada Freight Services.

The Kelsey GS Camp site is capable of housing approximately 120 persons. The main facilities on site include:

- Powerhouse;
- Water Treatment Facility (in Powerhouse);
- Wastewater Treatment Plant (described below);
- 40-Man Camp Building;
- Service Centre;
- Warehouse & Maintenance Building;
- Recreation Centre;
- Staff House;
- Fish Cleaning Building; and
- Landfill.

For potable water supply, the GS currently obtains raw water from the Nelson River, which is treated on site using a PALL Mobile Water Treatment System and chlorine disinfection prior to distribution. The town site collects wastewater using a gravity and low pressure sewer system. Wastewater produced at the GS is treated using an existing Sequencing Batch Reactor (SBR) plant and a Bio-Brane plant that operate in parallel to treat the wastewater. The Bio-Brane process is similar to a combination of a Membrane

Bioreactor (MBR) and Integrated Fixed-Film Activated Sludge (IFAS). The GS town site is shown in Figure 2.0.

The existing SBR plant is operated under Environment Act Licence Number 1580 RR, and the Bio-Brane plant and associated sludge dewatering system are operated under Environment Act Licence Number 2909. These two systems will be replaced by the proposed new facultative lagoon.

1.1 Regulatory Requirements

This Environment Act Proposal Report has been prepared to obtain an Environment Act Licence under the Environment Act (Manitoba). The proposed development, a wastewater treatment lagoon, is considered to be a Class 2 development under Section 3 of the Classes of Development Regulation (164/88).

The project is not classified as a Designated Project under the Canadian Environmental Assessment Act (2012) and therefore does not require an Environmental Assessment under this federal act.

1.2 Purpose of the Project

The purpose of the project is to decommission and replace the existing wastewater treatment plants with a new facultative wastewater treatment lagoon. A new wastewater treatment lagoon will be simpler to operate than the existing systems and will produce a consistent quality of treated effluent, with a lower risk of mechanical failure. Accompanying the new wastewater treatment lagoon will be a new lagoon access road, a new sewage lift station and forcemain, and new gravity sewer and manhole to connect the existing wastewater collection system to the new lift station.

This Environment Act Proposal will describe the proposed development, the existing environment, the environmental and human health effects and mitigation measures associated with the construction, operation, maintenance and decommissioning of the proposed wastewater treatment lagoon.

1.3 Previous Studies and Investigations

Manitoba Hydro conducted a preliminary geotechnical investigation in 2015, involving hand-augered test holes at three potential lagoon locations within the Kelsey Generating Station site. This initial report is included in the Preliminary Design Brief, Appendix C.

The preliminary design phase began by considering these three sites. The northern site was discounted because it was near a cabin occupied by local trappers from the nearby Tataskweyak Cree Nation. During a preliminary site visit in November 2015, the central site and the southern site were investigated. The central site was relocated to the north

to avoid encroaching on the right of way for transmission lines along the south of that site.

In January 2016 a geotechnical investigation was completed to further investigate the central site (referred to as Option 1) and the southern site (Option 2). The geotechnical report is included in the Preliminary Design Brief, Appendix B.

The geotechnical investigation concluded that either of the two locations had suitable material for a lagoon. The Option 1 site was the preferred site for Manitoba Hydro, as it is closer to the existing developed area of the Generating Station, and the construction costs are anticipated to be lower. Therefore the Option 1 site was selected. The location of the site is shown in the Preliminary Design Brief, Appendix A, Figure 3.0.

1.4 Existing Wastewater Treatment Infrastructure

The Kelsey Generating Station is currently serviced by two wastewater treatment systems that treat the wastewater generated throughout the facility:

- Sequencing Batch Reactor (SBR) System (1992);
- Bio-Brane System (2012).

The existing wastewater treatment facilities are highly automated and require a skilled operator with a Class 2 certification. One of the motivations for the new lagoon project is to replace these systems with a simple, more straight-forward and reliable system that requires less skilled operator oversight.

While both systems are in operation, during times of normal occupancy the BioBrane system is used to treat over 90% of the sewage. The SBR system is operated as required to maintain a minimum baseline flow to keep the system operational.

Wastewater from the town site flows through a gravity collection system with all wastewater passing through one manhole (MH 3) before it flows into the SBR Trash Tank. From this tank it is pumped to a Transfer Tank, and from there it is directed either to the SBR or to the BioBrane system.

The treated wastewater is discharged to the Nelson River, downstream of the Kelsey GS Dam.

The SBR plant has the ability to treat 56 m^3/day, and the Bio-Brane plant has a design capacity of 60 m^3/day. The new lagoon system, sized to the average wastewater production at peak occupancy, will have a capacity of 62 m^3/day.

2.0 Project Description

The project consists of the design, construction and operation of a new wastewater treatment lagoon, gravity sewer, lift station, forcemain, access road, and effluent outfall swale. The project also includes the decommissioning and removal of all existing wastewater treatment plants.

The Preliminary Design Report has additional detail on the project design, and has been included with this report in Annex B.

2.1 General Description

The Kelsey GS is has a maximum potential occupancy of 120 people, with a typical baseline staffing being approximately 25-35 people. The proposed wastewater treatment lagoon will be sized to accommodate the hydraulic loading produced by 120 people with twice yearly discharge, but will also be sufficient for the hydraulic loading produced by the baseline population with a single discharge per year. The proposed location for the lagoon and related infrastructure is shown in Drawing G-01 in Annex F.

2.1.1 Project Location

The Kelsey GS is located 680 km north of Winnipeg and 90 km northeast of Thompson, on the upper arm of the Nelson River. The location within Manitoba is shown in Figure 1.0 of the Preliminary Design Report, included in Annex B.

The site is also located approximately 14 km south of Tataskweyak Cree Nation lands and 25 km west of York Factory First Nation lands.

The proposed lagoon location is in the NW Quarter of Section 24, Township 81, and Range 6E.

2.1.2 Land Ownership / Land Use

The proposed location of the lagoon is on Crown Land, to which Manitoba Hydro has a Crown Reservation under the Kelsey Generating Act. Manitoba Hydro submitted a Property Department Work Request to obtain a permit for the construction of the lagoon at the Kelsey Site, along with three figures depicting the location of the site. The permit application for this land use is included in Annex A.

The extents of the project, as submitted with the lands application, are shown in Figure L3.0 of Annex A. To the north and east of the lagoon site is the developed area of the Kelsey Generating Station. To the south and west are undeveloped, with a creek located to the west. A transmission line (KS 37) extends east-west along the southern border of the site. The lagoon is positioned such that the berm will be outside of the 91.4 m (300 ft) right of way for the transmission line.

To the north of the site, on the shore of the river downstream of the dam, there is a cabin occupied by a trapper from the local Tataskweyak Cree Nation. The proposed location of the lagoon was reviewed on site by Manitoba Hydro with the trapper during the preliminary design stage.

The proposed location is not currently developed, and consists of mainly of spruce, poplar, and other brush. Tree and brush clearing will be required as part of this project, and it is expected to be approximately 4.5 ha in total area cleared. A figure depicting the area designated for tree clearing is included in Annex E.

2.2 Proposed Project Schedule

The planning and design stages of the project are underway. The preliminary stages of the project began in November 2015, and detailed design will progress through April to June 2016, with tendering of the project scheduled for February 2017. Construction will begin only after the EAL is granted. Construction is anticipated to begin in April of 2017. However, the tree clearing component of the project will be tendered separately and is anticipated to take place in December 2016.

It is anticipated that construction will take approximately 5-6 months, with commissioning of the project in September 2017. Once the new lift station and lagoon are in operation, the existing wastewater treatment system will be decommissioned, scheduled for October 2017.

The GS is accessible year round by air and train, and it is expected that all materials and heavy equipment will be transported by train.

2.3 Project Funding

The project will be funded by Manitoba Hydro and is managed through the Power Projects Division.

2.4 Other Known Regulatory Approvals

In addition to the Environment Act Licence for which this EAP Submission is required, the project will also require a Certificate of Approval for a Wastewater Collection System Project under the Public Health Act. This application will be made once sealed drawings are completed.

Due to the proximity of the proposed lagoon to the Kelsey GS airport, less than the Transport Canada recommendation of 3.2 km, approval from Transport Canada may be required. However NBL has not yet been able to confirm with Transport Canada what the process is to obtain this approval.

To conform to Manitoba Hydro requirements, all electrical panels installed as part of the project will be subject to an Arc Flash study.

2.5 Design Overview

2.5.1 Design Flow

Manitoba Hydro advised NBL during preliminary meetings that they preferred to have the lagoon sized to treat the maximum potential occupancy of 120 people, opposed to the expected average baseline staff population of approximately 25-35 people. This is because large-scale upgrade projects may bring the on-site population to the maximum level for an extended period of time, even several years.

Wastewater flow records were reviewed from 2014 and 2015. To determine the design flow for the new wastewater treatment lagoon, it is necessary to consider the available data for high the highest population months, which were July and August 2014 (98 and 90 people, respectively), with an average flow of 46.2 m^3/day. Extrapolating the flow data to a population of 120 people yields a design flow of approximately 59 m^3/day. A small additional flow to accommodate minor variations was added to obtain a design flow of 62 m^3/day.

More discussion of the historical flows the design flows is included in Section 2.1 of the Preliminary Design Report, included in Annex B.

2.5.2 Design Parameters

Manitoba Conservation and Water Stewardship (CWS) has issued Design Objectives for Wastewater Treatment Lagoons that apply to all facultative lagoons located on provincial land. Some of the key parameters specified in these guidelines are as follows:

- 227 days of storage volume (hydraulic loading);
- BOD_5 loading of 56 kg/hectare/day;
- Half of the primary cell effective volume being utilized for storage;
- The entire secondary cell effective volume used for storage;
- Minimum distance of 460 m to centre of population and 300 m to individual residences;
- Minimum top width of berm to be 3 m;
- Maximum allowable embankment slopes:
    - Four horizontal to one vertical on inner slopes
    - Three horizontal to one vertical on outer slopes
- Minimum freeboard of 1 m;
- Minimum normal liquid depth to be 0.3 m;
- Maximum normal liquid depth to be 1.5 m; and

- Soil liner to have a hydraulic conductivity of 1 x 10^{-7} cm/s or less, with a minimum thickness of 1 m.

2.5.3 Effluent Targets

The applicable wastewater effluent quality guidelines and regulations that were reviewed for this study include the following:

- Manitoba CWS Design Objectives for Wastewater Treatment Lagoons (September 2014)
- Manitoba Water Quality Standards, Objectives, and Guidelines (November 2011)
- Federal Wastewater Systems Effluent Regulations (2012)

The Federal Wastewater Systems Effluent Regulations are mandated to be applicable to systems with a design flow of 100 m^3/day or greater. Therefore, the Kelsey system would not fall within the mandate of these regulations. However, the design will still endeavour to meet the effluent quality limits given in the regulations.

The applicability of the Provincial regulations is defined separately for each parameter, under Tier 1 (Water Quality Standards) the most generally applicable section of the Provincial Regulations.

Phosphorous: Communities with a population of 2000 or less (such as Kelsey GS) are required to achieve 1.0 mg/L total phosphorous, or a demonstrated nutrient reduction strategy. However, the Manitoba Water Protection Act Regulation 196/2011 specifically requires that facilities owned or operated by the provincial government must have a maximum allowable concentration for phosphorous removal of 1.0 mg/L, effective January 1, 2016.

Ammonia: The provincial requirement for ammonia applies only to continuously discharging facilities, and is derived from a set of tables, using site-specific data, available within the Tier 2 Water Quality Objectives. Therefore this requirement is not applicable to the Kelsey GS system.

Nitrogen: The provincial limit of 15 mg/L total nitrogen applies to community systems servicing 10,000 or more people. Therefore this requirement is not applicable to the Kelsey GS system.

The provincial standards for Fecal Coliform, E. Coli., and Total Suspended Solids apply to all municipal wastewater effluents discharged to a water body.

The 25 mg/L limit for Biochemical Oxygen Demand (BOD) applies to all facilities without ammonia or total nitrogen limits – i.e. systems using seasonal discharge with a population below 10,000. For facilities with ammonia or total nitrogen limits, a standard of 25 mg/L Carbonaceous Biochemical Oxygen Demand is instead applicable.

The effluent quality objectives are summarized below in Table 2.1.

Table 2.1 Kelsey GS Lagoon Wastewater Effluent Quality Objectives			
Parameter	**Proposed Objectives**	**Source**	**Notes**
BOD	25 mg/L	Provincial	Applicable for Seasonal Discharge (Applicable to the Kelsey Lagoon project)
CBOD	25 mg/L	Provincial/Federal	Continuous Discharge in Provincial Regulations. Not applicable to the Kelsey Lagoon project.
TSS	25 mg/L	Provincial/Federal	Applicable to the Kelsey Lagoon project.
Fecal Coliform	200 per 100 mL	Provincial	Applicable to the Kelsey Lagoon project.
E.Coli	200 per 100 mL	Provincial	Applicable to the Kelsey Lagoon project.
Total Phosphorus	1 mg/L	Provincial	Allowance for an alternative "nutrient reduction strategy" but Provincially owned facilities must provide treatment. Applicable to the Kelsey Lagoon project.
Un-Ionized Ammonia	1.25 mg/L at 15°C +/- 1°C expressed as nitrogen (N)	Federal	Not applicable to the Kelsey Lagoon project.
Ammonia	Site Specific	Provincial	Applies to continuously discharging facilities. Not applicable to the Kelsey Lagoon project.
Nitrogen	15 mg/L total N	Provincial	Applies to new systems serving over 10,000 people. Not applicable to the Kelsey Lagoon project
Total Chlorine Residual	0.02 mg/L	Federal	Not applicable to the Kelsey Lagoon project.

The design of the lagoon is such that the effluent quality objectives will be met at the lagoon discharge point, prior to discharge to the natural wetland area. This is a conservative approach, as it neglects the additional treatment and nutrient uptake provided by the natural wetland area.

2.5.4 Lagoon Sizing Calculations

A facultative lagoon is typically sized according to two criteria: hydraulic loading, and BOD loading. Hydraulic loading is the capacity of the lagoon to hold the incoming sewage generated between discharge periods, and relates to the lagoon's liquid volume.

BOD loading is the capacity of the lagoon to treat the biochemical oxygen demand (BOD) of the incoming sewage, and is related to the surface area of the primary treatment cell. The lagoon has been sized based on the wastewater generation projection for the GS Site of 62 m^3 as outlined in Section2.5.1.

The lagoon sizing calculations are based on the following assumptions, taken from available historical data and from the guidelines given in the Province of Manitoba Design Objectives for Wastewater Treatment Lagoons:

- Design population of 120 people;
- BOD_5 generation of 77 g/person/day;
- BOD_5 loading capacity of 56 kg/ha/day;
- 227-day storage volume required for secondary cell;
- Liquid depth of both lagoon cells is 1.5 m, with a minimum depth of 0.3 m to be considered when calculating storage volumes;
- Half of the primary cell effective volume being utilized for storage; and
- The entire secondary cell effective volume used for storage.

Based on these parameters the BOD_5 loading from the community is:

120 people x 77 g/person/day = **9.24 kg BOD_5/day**

The required primary cell area is:

(9.24 kg BOD_5/day) / (56 kg/ha/day) = 0.165 ha = **1,650 m^2**

A minimum area of 1,650 m^2 is required to treat the design organic load of 56 kg/ha/day. NBL has designed the lagoon so that the base area of the primary cell is a minimum of 1,650 m^2. This is a conservative approach that neglects the additional surface area above the lagoon embankment slopes.

With a maximum depth of 1.5 m and an operating depth of 1.2 m, the effective lagoon volume is 2,000 m^3.

The minimum lagoon volume necessary for twice yearly discharge is:

62 m^2 /day x 227 days = **14,074 m^3**

Half of the primary cell may be allocated for storage, so the secondary cell effective volume is:

14,074 m^3 – (2,000 m^3 / 2) = **13,074 m^3**

Thus, assuming an operating depth of 1.2 m, the minimum secondary cell area is:

13,074 m^3 / 1.2 m = **10,895 m^2**

A summary of the design volume and area for each lagoon cell is given below in Table 2.1.

Table 2.1
Kelsey GS Lagoon
Lagoon Cell Design Summary

Lagoon Cell	Surface Area	Volume	Liquid Depth	Inside Berm Slope	Outside Berm Slope
Primary Cell	1,650 m^2	2,000 m^3	1.5 m	4:1	4:1
Secondary Cell	10,900 m^2	13,100 m^3	1.5 m	4:1	4:1

2.5.5 Lagoon Layout & Construction

The location for the wastewater treatment lagoon must be cleared of trees prior to construction. Trees and brush will be removed and piled to be burned during the following winter (2016/2017). It is expected that grubbing services to remove stumps will be completed when construction of the lagoon begins, in April 2017, under the same work permit as the lagoon construction project.

Construction of the lagoon is expected to take place over a 5-month period, from April 2017 to October 2017, which will begin after the issuance of an Environment Act Licence. A preliminary (approximately 60% complete) design drawing set is included in Annex F.

A geotechnical investigation has been completed to assess the suitability of the on-site clay material for use as a lagoon liner. This material was found to meet the Provincial requirement of a maximum hydraulic conductivity of 1 x 10^{-7} cm/s with an undisturbed Shelby tube sample. The geotechnical investigation determined that the material has a moderate to high probability that it will have low enough hydraulic conductivity with compaction of the lagoon base to 97% of MDD. However, the geotechnical engineer recommended that to provide greater assurance that the liner will be adequate, that the top 500mm of the clay liner be removed and recompacted, which will eliminate cracks or fissures. The exposed base 500mm below the final grade will be scarified and compacted.

The lagoon will be constructed using a cut & fill method, whereby material removed from the lagoon cells will be used to construct the embankments and dykes. The interior and exterior embankments will have slopes of 4 horizontal to 1 vertical. The top of each berm will have a minimum 3 m wide flat section to facilitate vehicle access.

The proposed lagoon location is near a natural wetland area that will be used as the effluent receiver, and therefore perimeter ditching around the lagoon embankments will be provided. Perimeter fencing will be provided by a 1.8 m (6 ft.) chain link fence outside the perimeter ditch, to restrict human and wildlife access to the lagoon.

A concrete truck discharge ramp will be constructed to facilitate sewage truck discharge into the primary cell. Interconnecting piping will be provided between the primary and secondary cells, and an effluent discharge line will be installed from the secondary cell to the effluent discharge swale. Flow between the cells and out to the effluent discharge will be by gravity.

Due to the topography of the site, the primary cell will be 1.5 m higher than the secondary cell. Both cells will have a maximum operating depth of 1.5 m, while the minimum operating depth of both cells will be 0.3 m. Between the primary and secondary cell, a controlled discharge line is provided with a weir control that will passively maintain the liquid level in the primary cell at 1.5 m during normal operation. In addition, a direct discharge line is provided to allow operators to partially drain the primary cell to a lower level when required for maintenance or to provide additional storage room prior to the winter.

Effluent discharge will be achieved with an effluent discharge pipe from the secondary cell, with a valve control. To conform with Manitoba Conservation and Water Stewardship recommendations, no uncontrolled overflow lines will be provided.

2.5.6 Gravity Sewer Connection

The existing GS wastewater collection system relies on gravity sewer and low pressure sewer piping to deliver wastewater to the SBR and Bio-Brane treatment systems. To connect the existing collection system to the new lift station, a new gravity sewer line will be installed from the manhole nearest the wastewater treatment systems (MH 3, installed as part of the 2014 Upgrades Project). One new precast concrete manhole will be required, and will be 1200 mm in diameter complete with frost straps and 100 mm of insulation to prevent freezing. The gravity sewer will be SDR 35 PVC pipe, pre-insulated with 50 mm of rigid polyurethane insulation, installed with a minimum burial depth of 2.1 m.

2.5.7 Lift Station and Forcemain

A new duplex sewage lift station is proposed to be located to the southeast of the existing wastewater treatment plants. The new lift station will receive all the wastewater flows from the town site and powerhouse and pump it to the new lagoon.

A 2.44 m (8 ft.) diameter prefabricated fiberglass lift station will be used. The lift station depth of approximately 4.5 m below ground level was selected because of the hydraulic

gradient of the gravity sewer service from upstream “New MH3”, and to provide sufficient wastewater storage to limit the number of pumping cycles.

A 100 mm HDPE DR 11 forcemain will be installed to deliver the sewage flows from the lift station to the lagoon. The forcemain will be pre-insulated with 50 mm insulation, and buried to a minimum depth of 2.4 m.

The alignment of the forcemain from the lift station to the lagoon passes through an area that was used by Manitoba Hydro as a disposal grounds for concrete rubble. It is also near a decommissioned landfill area. Therefore, it is possible that construction debris or other garbage will be uncovered during the forcemain installation. The design drawings and specifications will include direction that any garbage uncovered will be taken to the new landfill while concrete rubble will be buried at a designated site near the forcemain route and fully covered by in situ soils.

The location of the lift station is shown in Drawings G-01 and G-02 in Annex F, along with the proposed gravity sewer and forcemain routes.

2.5.8 Effluent Outfall

The outfall location for the proposed lagoon will be near the southwest corner of the secondary cell, consisting of a 200 mm diameter HDPE piping. A swale will be constructed to direct the treated effluent south to a natural wetland area that will serve as tertiary treatment and provide additional nutrient removal. From the wetland, effluent will naturally drain to a watercourse to the west of the town site. A three week discharge period will be used during the design.

The location of the effluent discharge and route for effluent towards the watercourse is shown in Drawing G-01 in Annex F.

2.5.9 Access Road / Truck Dump Ramp

Year-round road access is required to the new wastewater treatment lagoon from the GS town site. Furthermore, the site must be accessible to large sewage disposal trucks when required. The access road will use the following design, with a typical cross section shown in the Preliminary Design Brief, Appendix A, Figure 4.0.

- 250 mm Granular Base Course
- 350 mm Granular Sub-base Course
- Non-Woven Geotextile Fabric
- Subgrade Compaction

To facilitate trucked sewage disposal services, a concrete discharge ramp will be located at the lagoon primary cell. The truck dump ramp will be a 4 m x 14 m reinforced concrete

slab that will allow sewage trucks to back up to the edge of the lagoon and empty their tanks, without eroding or degrading the lagoon embankments.

2.5.10 Decommissioning, Site Restoration and Rehabilitation

Once the new wastewater treatment lagoon is operational, the existing wastewater treatment facilities (SBR and Bio-Brane) and UV building will be decommissioned and completely removed from the GS site, as per the existing Environment Act Licences. There are no current plans to salvage any process materials. The sludge disposal building will remain in place but will be repurposed. The electrical services mounted on the exterior wall of the UV building will be housed in new outdoor enclosure which will also service the new lift station.

Sludge Disposal

The sludge associated with the existing facilities will be disposed of according to the relevant License requirements (License No. 1580 RR & License No. 2909). Once the new lagoon is commissioned and begins service, the flow to the existing wastewater treatment systems will cease. Any sludge produced by the BioBrane treatment system will be adequately dewatered and disposed of in an appropriate facility. To the greatest extent possible, solid sludge will be taken to an engineered clay-lined sludge bed which is located at the Kelsey GS Solid Waste Management Facility. The remaining sludge which is not adequately dewatered will be pumped out of the holding tanks and will be applied to the inside slopes of the lagoon berms to promote vegetation growth.

The Kelsey GS operations current procedure for sludge disposal is to test the sludge with a slump test to confirm that it has the required solids content to be taken to the landfill.

Process Materials and Buildings

All process materials and buildings will be decommissioned and removed from site by the Contractor under the new lagoon project. Only the sludge disposal building will remain in place, and will be repurposed, with the process equipment removed. Refer to Drawing D-01 in Annex F for decommissioning details.

All materials will be disposed of at appropriate facilities off of the Kelsey GS site, with the exception of burnable wood material that may be disposed of in the Kelsey GS Landfill site. Steel materials suitable for recycling will be placed into appropriately labelled containers and also transported off site. Some process equipment from the sludge building will be taken to Winnipeg and salvaged for possible resale and/or reuse.

Underground tankage and piping associated with the systems will also be removed from the site.

Original Dewatering Pond

Under the original Licence 1580, there was a sludge dewatering pond associated with the original SBR system. This sludge dewatering pond was taken out of service when the new solid waste management facility at the Kelsey GS was put into operation. The new waste disposal facility includes 5 sludge disposal cells each with a compacted clay liner. The original dewatering pond was decommissioned in 2015 by Manitoba Hydro personnel. The pit was dry at this time, and was backfilled with clay fill placed and compacted in 150mm lifts. The backfill was mounded with positive drainage away from the decommissioned sludge pond.

2.6 Operation and Maintenance

It is anticipated that the lagoon will be classified as a Small System, and following the completion of the detailed design stage of the project, an application will be submitted to Manitoba Conservation to classify it as such. This system will prove to be simpler to operate than the existing mechanical wastewater treatment systems already at the Kelsey GS Site. An operator will be required to have certification to operate the new lagoon, and will be responsible for seasonal sampling of the effluent prior to discharge, submitting the samples to the appropriate testing laboratory and interpreting the results. During times of baseline flow, it is not anticipated that the operator will need to apply chemical dosing for nutrient removal since the lagoon will discharge to a natural wetland area which is expected to provide adequate nutrient removal. During high occupancy periods chemical dosing is required, and the operator will be responsible to do so.

The lagoon will be designed to provide sufficient storage for the period between November 1 and June 15, during which time the lagoon may not be discharged. The lagoon will be discharged to a swale that will transport the treated effluent to the natural wetland area, discussed in Section 2.5.8, and the expected duration of the discharge is 1 week.

If required, the spring discharge sequence will be done in the following manner:

1. Transfer valve between the primary and secondary cells will remain closed. The weir control will remain functioning to maintain the primary cell level at 1.5m.
2. Discharge valve on secondary cell will be opened, and only the secondary cell will be discharged.
3. The discharge valve will be closed when the secondary cell has been drained to an acceptable level.
4. If there is sufficient storage left in the secondary cell, as is anticipated during years with normal baseline occupancy, the spring discharge can be skipped with only one discharge per year in the fall.

The fall discharge sequence will be done in the following manner:

1. Transfer valve between the primary and secondary cells will remain closed. The weir control will remain functioning to maintain the primary cell level at 1.5m.
2. Discharge valve on secondary cell will be opened, and only the secondary cell will be discharged.
3. The discharge valve will be closed when the secondary cell has been drained to an acceptable level, depending on the anticipated flows over the coming winter.
4. If high flows are anticipated for the coming winter, open direct discharge valve between the primary and secondary cells as required to transfer liquid to the secondary cell for storage during winter months. A minimum level of 0.6 m above the transfer piping must be maintained in the primary cell to allow for sufficient buildup of ice without the risk of freezing of piping.

Facultative lagoons are typically preferred to treat wastewater for remote locations because of their low operational and maintenance needs, simplicity of construction and operation, and their ability to produce a consistent quality of treated effluent. The ongoing operation and maintenance needs for the proposed wastewater treatment lagoon at the Kelsey GS Site will include:

- Periodic access road grading, resurfacing, and maintaining accessibility (snow clearing);
- Lift station maintenance including maintaining pump and forcemain operation;
- Removal of vegetation on lagoon berms;
- Maintenance of discharge swale including removal of vegetation, removal of accumulated solids/debris, and maintaining proper drainage grade;
- Maintenance of lagoon inter-cell piping and valves to ensure functionality; and
- Maintenance of lagoon perimeter fencing.

Sludge Removal

Over the long term, sludge removal will be required. The number of years before this is necessary is dependent on the amount of loading. If the occupancy at the GS site remains at its lower baseline level, then sludge removal may not be required for over 25 years.

It is proposed that every 10 years a sludge measurement be taken by coring holes into the lagoon during winter months to determine sludge depth in each cell.

The proposed means of desludging the lagoon is by using woven geotextile filter bags. The bags would be placed beside the lagoon and filled with sludge pumped from the bottom of the cells to be desludged. The bags would be positioned in such a way that the liquid filtered through the bags would drain back into the lagoon. After being filled

the bags would be allowed to dry over a summer season, and then the dried sludge would be removed and either transported off site for disposal in a landfill, or further dried and stabilized on site at an approved location such as at the landfill.

The desludging operation would typically require a separate Environment Act Proposal submission to proceed. This application would be made in the future at the time that desludging is required.

2.7 Service Life Span and Decommissioning

The estimated service life of the wastewater treatment lagoon is 30 years or more if it is maintained and desludged as required. The lagoon may be expanded to increase its capacity if there is a large population increase at the GS. Mechanical equipment at the Lift Station will require replacement from time to time. If equipment requires replacement or upgrading due to new regulations, existing equipment will be removed and disposed of.

If the lagoon needs to be decommissioned, a detailed decommissioning plan would need to be prepared. This would involve disposal of the treated effluent liquid in accordance with the Environment Act Licence, removal, dewatering and disposal of accumulated sludge at an approved facility, and levelling of the embankments to fill in the lagoon cells. All inter-cell piping would need to be either completely removed and disposed of, or capped and sealed in place and buried. If the lift station, forcemain and gravity sewer also required decommissioning, the lift station and manhole would be removed and disposed of at an approved facility and all piping and fittings would be removed and disposed of at an approved facility or capped in place and buried.

3.0 Environmental Setting

3.1 Climate

The Kelsey Generating Station is located within the Pikwitonei Lake Ecodistrict of the Hayes River Upland Ecoregion in the Boreal Shield Ecozone. The northern section of this ecodistrict, where Kelsey GS is located, is a colder subdivision of the High Boreal Ecoclimate. The ecodistrict is marked by short, cool summers and long, very cold winters [(1)].

The nearest weather recording station at the Thompson Airport indicates the mean average annual temperature is approximately -3.5˚ C, with an average annual precipitation of 530 mm [(2)].

The prevailing wind direction for the region, as recorded by the weather station at Thompson airport, gusts towards the south east (northwesterly wind). The location of the new lagoon is to the south of the generating station town site and all residences, so it is not anticipated that foul odors would be a concern.

3.2 Land/Geological Description

The topography of the Pikwitonei Lake Ecodistrict is undulating to hummocky clayey glaciolacustrine plain. Local granitoid rock outcrops and associated glacial till are common throughout the ecodistrict, and gently sloping sites are typically covered by glaciolacustrine clay blankets and veneers overlain by peat. Organic deposits are common throughout the ecodistrict and are composed of shallow veneer bogs on low slopes, and deep peat plateau bogs and horizontal fens on low-lying terrain [(1)].

According to the geotechnical investigation of the proposed wastewater treatment lagoon location options and GS site, the general soil stratigraphy at the site, as interpreted from the borehole logs, consists of clay overlying bedrock. Silt intrusions are also present in the general area.

Permafrost is known to exist throughout the Pikwitonei Lake Ecodistrict, and is most associated with organic deposits.[(1)] During the preliminary hand-augered geotechnical investigation by Manitoba Hydro, auger refusal in frost was encountered as some locations within the South Site, which was not ultimately selected for the lagoon location. During the January 2016 geotechnical investigation with a drill rig, no permafrost was encountered at either the South Site or the preferred North Site.

A layer of peat is over top of the clay layer can be found in some areas on site, typically lower elevation areas. The geotechnical investigation of the proposed lagoon location, Option 1, did not identify bedrock. Auger refusal was at approximately 3.4 – 4.7 m in

highly plastic clay material. The borehole logs and a borehole site plan are included Geotechnical Report, which can be found in the in the Design Brief, Appendix B.

3.3 Water/Hydrological Description

No regional hydrogeological map was identified for the Kelsey Generating Station area. Because of adequate surface water availability and low demand for groundwater resources, information on the location, distribution, yield, and quality of aquifers is limited. There is some evidence of a high water table in the area based on observations from the valve chamber located near the existing STP systems.

The Precambrian formation underlying the area is relatively insoluble and groundwater flow is primarily through fractures within the bedrock as bulk rock permeability is low, but local permeability may be high in fracture zones [(3)]. Most groundwater movement occurs through secondary permeability features such as joints, shears, and faults, or in the sand and gravel aquifers created by surficial glacial deposits on top of the bedrock. Many sections of the Boreal Shield ecozone in Manitoba have a layer of glaciolacustrine clay, deposited in Lake Agassiz or the Tyrrell Sea, limiting recharge to underlying surface aquifers [(3)].

The Pikwitonei Lake Ecodistrict is part of a few different watersheds, mainly the Nelson Watershed, that are all within the Nelson River drainage system. Primary drainage is provided by the Nelson River and Burntwood River, generally in a northward direction [(1)].

The nearest major body of water to the proposed wastewater treatment lagoon is the Nelson River located approximately 250 m to the north and its upstream reservoir, located approximately 500 m to the east. There is a small watercourse 130 m west of the lagoon, and a marshy wetland area to the south.

Land drainage from the site would flow south to a natural wetland area that drains into a watercourse to the west and ultimately to the Nelson River.

3.4 Biological Communities

3.4.1 Vegetation

The Pikwitonei Lake Ecodistrcit consists of bog peatlands that contribute to the widespread manifestation of stunted forests. The most common tree species is the black spruce (Picea mariana), however, jack pine (Pinus banksiana) is also common due to stand replacing forest fires that regularly sweep through the area. Trembling aspen (Populus tremuloides) occurs throughout the ecodistrict, but is confined to local pockets. White spruce trees are also found in this ecodistrict, but typically are only found in favourable sites in river valleys and adjacent to lakes. In bog peatland, communities of stunted black spruce, sphagnum and other mosses and ericaceous shrubs are common.

Fens, in comparison, consist of sedges, brown mosses, shrubs and stunted tamarack (Larix laricina).

3.4.2 Wildlife

The Hayes River Upland Ecoregion supports a variety of wildlife including moose, caribou, lynx, wolf, beaver, snow-shoe hare, mink, martin, weasel, otter and muskrat. A variety of duck, geese, and pelican species due to the abundance of water sources; other varied bird species include passerines, sand hill cranes, spruce grouse, willow ptarmigan and others.

The Manitoba Conservation Data Centre (MCDC) lists caribou (Status: G5T4, S2S3), barred owl (G5, S3S4), great blue heron (G5, S4S5B), red-sided garter snake (S4), common nighthawk (G5, S3B), olive-sided flycatcher (G4, S3S4B), and the rusty blackbird (G4, S3S4B) as vertebrate species of concern with the ecoregion. Of these species the common nighthawk, olive-sided flycatcher, rusty blackbird, and caribou are listed on the Federal Species at Risk Act Public Registry (SARA Registry). All of these species are listed as Schedule 1, Threatened on the SARA Registry and therefore federally protected. Caribou are grazers that will feed on any available plant matter, in particular, they are well known for being able to utilize lichen as a food source. Caribou typically utilize mature and old growth coniferous forests associated with marshes, bogs, lakes and rivers which contain large volumes of terrestrial and arboreal lichens, although in summer the species may feed in young stands that have generated after fire or logging activity [(4)].

3.4.3 Aquatic Life

The Nelson River Watershed is reported to have a total of thirty eight (38) species of fish (31 native, 3 introduced, and 4 estuarine), all of which have the potential to be present with the regional study area for the proposed project [(6)]. Table 3.0 of Annex C shows the fish species that are present within the Nelson River Watershed.

Immediately downstream of the Kelsey GS Dam is Split Lake, where common fish species are walleye, sauger, northern pike, and lake whitefish.

As the Kelsey GS is within the Nelson River Drainage Basin, it forms part of the habitat for the Southern Hudson Bay-James Bay population of lake sturgeon which has been classified as Endangered by Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Information available from MCDC indicates that there are no records of aquatic species at risk within the Hayes River Ecoregion [(5)].

3.5 Resource Use and Social Environment

3.5.1 Services

The Kelsey Generating Station is part of the Nelson River Hydroelectric Project, and owned by the crown corporation of Manitoba Hydro. The GS was originally developed to deliver power to the International Nickel Company's (INCO) mining and smelting operations located in Moak Lake and Mystery Lake, however it now supplies power to the city of Thompson as well as the Province of Manitoba's electrical system.

The GS is accessible year round by air, with Manitoba Hydro owning and operating a private airstrip to the east of the GS town site. Workers and cargo are regularly transported to the GS using this runway. The GS is also accessible year round by train operated by OmniTRAX Canada Freight Services.

Telephone service is maintained by Manitoba Telecom Services (MTS), which provides local and long distance calling, as well as internet services and facsimilie lines.

The nearest communities are Thompson, Split Lake Cree First Nation, York Factory First Nation, Fox Lake Cree Nation and War Lake First Nation

3.5.2 Archaeological Resources

The Manitoba Heritage Resources Branch has identified 1 site: 6361 (a potential historic campsite) as a previously found historic site. However, the site does not overlap with the proposed wastewater treatment lagoon.

The Heritage Resources Branch has confirmed that they have no concerns with the proposed development. The associated correspondence is included in Annex D.

3.6 Land use

The land is primarily used for residential occupation and required maintenance operations for the development of hydroelectric power using the Kelsey Generating Station. Trapping, hunting and fishing also occur in the area, with a trapper's cabin located to the west of the GS town site. It is not anticipated that the project will interfere with any of these activities.

According to the Interactive Map of Wildlife Management Areas (WMAs) provided by Manitoba Conservation and Water Stewardship, the nearest WMA is the Churchill WMA approximately 150 km northeast.

The lagoon site is approximately 2.0 km from the Kelsey airport, which is closer than the set-back distance of 3.2 km recommended by Transport Canada.

3.7 Economy

The Kelsey GS site provides accommodations for up to 120 people, who all may be involved with projects at the GS site as employees or subcontractors for Manitoba Hydro.

4.0 Environmental Effects

The potential environmental effects associated with the construction and operation of the wastewater treatment lagoon are discussed in the following section. Potential environmental effects and mitigation measures are listed in Table 1.0 and 2.0 of Annex C.

4.1 Construction and Site Clearing

4.1.1 Vegetation

There is existing vegetation consisting of forested regions in the proposed construction zones. To facilitate the geotechnical investigation, approximately 0.3 ha of bush was cleared in cut lines to allow access of the drilling rig, prior to the construction of the wastewater treatment lagoon. To clear the full lagoon site, a total of approximately 4.5 ha will be cleared. An additional 0.1 ha will be cleared for the proposed forcemain route. The extents of the tree clearing are shown in Figure 1.0 in Annex E.

To avoid concerns with nesting birds in the area, it was originally proposed to clear the trees in the winter prior to March 31. This is the recommended approach, but if this is not possible because the tree clearing work is to be considered as construction work under the EAL, then a bird survey of the area may be required.

The permanent loss of habitat is not considered to be significant. Resulting impacts may be mitigated with the restoration of affected areas following the completion of the contract works. Where possible, usable timber from clearing of the sites will be salvaged for the GS site. The remaining cleared timber will be piled and burned at a controlled area within the Kelsey GS site.

4.1.2 Wildlife

Impacts on wildlife will likely be minimal in the project area, and will result from minor habitat loss and disturbance during the construction stage. During construction, noise, vibration and human presence will disturb birds and mammals that may be transitory within the study area, or resident adjacent to the site. It can be expected that species less tolerant of disturbance will move farther away from the disturbance area. Dispersal will continue as long as the disturbance persists. The timing of construction activities will have an effect on wildlife most likely to be disturbed due to the seasonal nature of some of these species. Once the disturbances cease, wildlife is expected to return to the area.

4.1.3 Fish Habitat and Surface Water

Surface water could be contaminated by an accidental spill of fuel or hazardous material near a waterbody or the shoreline. However, the potential for such adverse impact is

minimal as there are no construction activities near rivers or creeks; the nearest small body of water (not named) is located 300 m west of the site. The drinking water source for the GS is the Nelson River, located approximately 500 m east of the proposed site.

There is not anticipated to be any significant impacts on fish or fish habitat as a result of the project. Given the separation from surface water bodies, the proposed works and undertakings are considered to not likely result in the harmful alteration, disruption or destruction (HADD) of fish habitat, which is prohibited unless authorized by the Department of Fisheries and Oceans (DFO). No disturbance of the effluent receiving creeks will take place to install the effluent discharge swale. Rather, the effluent will be directed to an adjacent wetland and will flow naturally over land towards the creek.

Therefore an approval as described in Subsection 35(2) of the Fisheries Act is not necessary. Regular inspection of erosion control measures to ensure that they are functioning properly until vegetation is re-established will be undertaken.

4.1.4 Erosion, Sedimentation and Soils

There will be some disturbance of the existing natural drainage system from construction activities which may cause increased sediment concentrations in run-off during precipitation events. Construction of the access road, site works, and drainage courses will result in minor alterations to surface drainage patterns within the project area.

Fine and course-grained granular material, to be brought in via railway, will be needed for construction. Lagoon embankments will be constructed using material removed from the lagoon cells after it has been scarified and compacted. Development of borrow areas for common fill material may need to be investigated and mitigation plans prepared to restore any new borrow areas once the project has been completed. Organic soil will be stripped and stockpiled for use in decommissioning the borrow area once the project is completed. The borrow areas will be graded and contoured to match existing drainage patterns and ensure that there are no areas for free standing water to accumulate. Organic soils will then be redistributed to encourage re-growth. Roadways disturbed by construction activities will need to be restored following the completion of the work.

4.1.5 Groundwater

Leaks and accidental spills or releases of fuels or other hazardous substances during site preparations would be a potential risk to contaminate the groundwater during site preparation and construction. Further, during operation of the wastewater treatment lagoon, groundwater quality in and directly surrounding the project site could also be impacted by accidental fuel or wastewater spillage. The groundwater is assumed to flow down gradient towards the Nelson River. However, existing groundwater quality at the site has not been tested; groundwater is not a source of potable water for the site. Spills

and/or leaks occurring during construction are likely to be small and cleaned immediately, with minor adverse effects to the groundwater.

The contractor may use, store, and handle petroleum hydrocarbon products and other chemicals during construction. Spills or leaks from fuel storage and usage have the potential to impact soil and groundwater quality, however the contractor will be required to have a spill kit on hand during construction.

4.1.6 Air Quality

During construction, increased dust near the GS camp building is a potential concern. Dust may be generated through clearing and grubbing, excavation of trenches, transportation, placing and compacting of excavated materials. The dust levels are unlikely to exceed Manitoba's air quality guidelines. The construction area is located approximately 300 m from the nearest residential dwelling.

4.1.7 Aesthetics

The use of heavy equipment and large vehicles for transporting equipment to and from the site will result in temporary increase in noise and vibration levels. These increases in noise and vibration are not expected to exceed what is regularly observed during GS maintenance activities. Given the distance from the proposed site to the nearest GS camp building, it is not anticipated that GS staff will be impacted by the increased noise and vibration levels from construction activities on the site.

4.1.8 Human Health and Safety

The increased traffic flow due to site preparation and construction has the potential to result in vehicle-wildlife and vehicle-vehicle interactions resulting in vehicle damage and human injury. Because the work will take place within a controlled Manitoba Hydro site, these risk of these interactions is assessed to be negligible to minor in nature.

Nearly all people who may be affected by the project are Manitoba Hydro employees and other visitors to the Kelsey site, with the exception of the individual who operates the trapper cabin to the west of the proposed site. Increased noise and vibrations from construction activities to people in the area including Hydro employees and inhabitants of the trapper's cabin. The cabin is located approximately 300 m from the lagoon site, and the proposed development was reviewed on site with the residents during the preliminary design stage of the project.

The lagoon location is approximately 2.0 km from the airport. Transport Canada Guidelines do not recommend situating a lagoon within 3.2 km of an airport reference point, which typically is the geometric center of the runway, due to the possibility of bird/airplane hazards. However, there are significantly larger bodies of water such as

the Nelson River between the airport and the lagoon site, and therefore the impact caused by the lagoon development on additional bird presence at the airport is not likely to be significant.

4.1.9 Heritage and Resources

The construction activities do not have a high possibility of uncovering and disturbing an archaeological site. The Manitoba Heritage Resources Branch has identified one historic site near the Kelsey GS town site but it is located south of the town site and there are no planned construction activities in this area. In addition, the site is near existing developed areas of the GS site and it was selected by GS staff. Therefore the likelihood of adversely affecting a culturally significant area is minimal [(7)].

Correspondence with the Heritage Resources Branch is included in Appendix D.

4.2 Operation and Maintenance

4.2.1 Odour

Odour management is typically a concern in the construction and operation of wastewater treatment lagoons. Preference has been given to selecting a site at a distance that satisfies the minimum design objectives set forth by the Province of Manitoba. Odour is expected to be of most concern during the spring thaw, as the lagoon will be undergoing anaerobic digestion during this period in which sulphur dioxide and other noxious gasses may be released.

4.2.2 Lagoon Discharge

The new wastewater treatment lagoon is designed to be discharged over a three week period into a natural wetland area to the south of the proposed lagoon location. A discharge rate of approximately 430 L/min will be used to empty the secondary storage cell over the three week period.

The lagoon is designed to meet the anticipated provincial Environment Act Licence limits, and is expected produce a more consistent treated effluent than the existing wastewater treatment systems at the GS site. As the lagoon will use seasonal discharge, the effluent quality can be further controlled. Prior to discharge, the lagoon will be sampled to ensure compliance with the licence limits, and additional treatment or chemical dosing will be done as required before discharging to the environment.

4.2.3 Lagoon Maintenance

A facultative lagoon is preferred for remote applications, such as the Kelsey GS, because of the minimal maintenance activities required and simplicity of operation. Maintenance activities that will be necessary include management of vegetation by

mowing grass on the lagoon embankments and outfall swale, and removing bulrushes, reeds and trees within the lagoon area.

Periodic exercising of control valves in the lift station, forcemain, inter-cell and discharge piping is also required to ensure continued operation throughout the life of the lagoon.

Routine perimeter fencing and access road maintenance will also be required. Access road maintenance will include resurfacing and grading as required as well as snow removal to ensure continued access to the lagoon.

4.2.4 Wildlife

The new wastewater treatment will be located in relative close proximity to the town site. As well, there are no rare or endangered species known to occur in the areas affected by the project. Therefore, there is no long term disturbance anticipated to the wildlife population.

4.2.5 Fish Habitat and Surface Water

Because of the separation distance from the site to the nearest major surface water body, the Nelson River, and the expected high quality of effluent produced, there are no significant effects anticipated on the fish and fish habitat from the operation and maintenance of the new lagoon.

Discharging of lagoon effluent will take place either once per year in the fall, or twice per year in early summer (after June 15) and again in fall. The effluent will be discharged to a wetland area before flowing naturally to the creek which will provide additional nutrient uptake and further reduce the potential impact to any fish which may inhabit the creek located to the west of the site.

A potential risk to surface water quality would be a major failure of the lagoon berms causing a large discharge of partially treated effluent to reach the environment. However, the design of the lagoon follows or exceeds the recommendations of the geotechnical engineers who conducted a slope stability analysis of the lagoon design and determined the berm design, with 4:1 slopes, to be stable.

4.2.6 Soils and Groundwater

Impacts on soil and groundwater may result from accidental spills or leakage of stored chemicals, fuels or wastewater. Potential for minor leaks and spills to occur during the operation of the facility are as follows:

- Fuel spill from the fuel tank of the backup generator at the lift station;
- Discharge of wastewater into the lagoon by sewage trucks;
- Storage of hazardous materials;

- Refuelling of machinery during maintenance activities; and
- Embankment or clay liner failure causing release of untreated or treated effluent.

As noted above in Section 4.2.5, the potential for an embankment or clay liner failure is expected to be minor.

4.2.7 Socio-Economic Impacts

The economic benefits associated with the construction of a new wastewater treatment lagoon and decommissioning and removal of existing SBR and Bio-Brane treatment facilities is expected to be realized in lower annual operational and maintenance costs, and simpler operational procedures.

There are only minor socio-economic impacts anticipated from the development. The lagoon is near a cabin utilized by local First Nation members, and the development may impact trapping activities. However, Manitoba Hydro, through the Aboriginal Relations department, has reviewed the proposed development with the primary users of the cabin.

5.0 Mitigation

The environmental impact assessment of the project consisted of an evaluation of the interaction between each of the project components and the environment (physical, biological and social). The results of this evaluation are presented in the Environmental Matrices, Tables 1.0 and 2.0 in Annex C. Potential effects were determined to be either “Not Likely Significant”, “Beneficial”, “Slight Impact (Localized, Not Lasting)", or "Potentially Significant, but Mitigable". The results of the evaluation did not produce any impacts that would be considered "Significant - Not Mitigable" or "Unknown Effect". When potential environmental effects were identified, they were examined in greater detail and mitigation measures and monitoring programs were outlined. Discussion of these impacts and the mitigation and monitoring of the impacts are presented in the following sections.

There are substantial positive benefits resulting from this project. The most significant beneficial impact relates to the social and economic benefit to the Kelsey GS Site, as it will simplify sewage treatment process at the site for Hydro personnel, increase the quality of treated effluent produced, and allow for sampling of effluent before it is discharged.

5.1 Site Clearing and Construction

5.1.1 Vegetation

Construction of the lagoon will result in the loss of vegetation and habitat, through clearing approximately 4.5 ha of land. The site presently contains vegetation consisting of shrubs, grasses and trees. The lagoon embankments will be seeded above the water line and on the outside face of the embankments of the lagoon with perennial type, low growing, and spreading grass.

Borrow areas and any trenching will be restored to their original condition after completion of removal of the required material. The borrow areas will be graded and contoured to match existing drainage patterns and ensure that there are no areas for free standing water to accumulate. Clearing or damage to vegetation outside of the construction area will not be permitted without prior justification and authorization from the Engineer and Manitoba Hydro.

Vegetation will be protected at all locations on-site unless designated for clearing. Roots of designated trees will be protected to their drip line and a minimum setback of 6 meters maintained from marked trees that are to be retained. Unnecessary traffic over root zones will not be permitted. Topsoil stripping will not be permitted unless authorized by the Engineer. Topsoil that must be stripped at the lagoon site will be stockpiled and used in the topsoil and seeding of the lagoon berms, side slopes of roads, ditches, and other locations.

Temporary and long-term sediment and erosion control measures and re-vegetation (using native plants over any exposed soils to prevent transportation of sediment into waterways), will be implemented.

5.1.2 Wildlife

The project is not anticipated to have a significant impact on wildlife. It is anticipated that any clearing and grubbing will not take place during nesting seasons, or that a bird survey be completed if it is not possible to avoid these seasons. Construction noise will be limited, and the amount of vegetation removal will be kept at a minimum to limit habitat loss and dispersal of small animals and birds.

5.1.3 Fish Habitat and Surface Water

The project is not anticipated to have a significant impact on fish and fish habitat. Alteration to existing drainage patterns will be kept to a minimum and waterways will be protected by sediment controls. Appropriate precautions such as the use of silt screens will be taken to ensure that potentially deleterious substances (such as fuel, hydraulic fluids, oil sediments, etc.) do not enter water bodies that may contain fish.

The risks of impacts to surface water have been reduced by setting the lagoon outfall to discharge into a natural wetland area that will provide additional nutrient removal prior to treated effluent entering any watercourse. The lagoon will be situated approximately 250 m from the Nelson River, but the effluent discharge will take a longer route before it reaches the river, being initially discharged to a wetland attenuation area to reduce the impacts on surface water and fish habitats. Adherence to the design parameters and standard Environmental Management Practices will also reduce the risk of fuel spills or other contamination during construction.

To avoid contamination of the environment, it is not permitted to allow liquid or solid wastes or fuel to be deposited upon the ground or into bodies of water contrary to enactments, regulations and guidelines of any regulatory agencies[5]. When servicing requires the drainage or pumping of lubricating oils or other fluids from the equipment, a groundsheet of suitable material and size will be spread on the ground to catch the fluid in the event of a leak or spill. An adequate supply of suitable absorbent material and any other supplies and equipment necessary to immediately clean up spills must be available. Storage and disposal of liquid wastes and filters from equipment maintenance, and any residual material from spill clean-up must be contained in an environmentally safe manner and in accordance with any existing regulations.

Waste oils, fuels, dangerous goods, construction material, chemicals and hazardous wastes (if any) will be handled in a safe manner. Transport, store and handle all such substances as recommended by the suppliers and/or manufacturers and in compliance

with all applicable federal, provincial or municipal regulations. Manitoba Conservation as well as Environment Canada will be notified immediately if a reportable spill occurs.

Construction vehicle maintenance and storage of construction materials and fuels will occur far enough away from all watercourses such that accidental spills can be prevented from entering the watercourse. There will be no re-fuelling or oil changes within 100 meters of any watercourse, nor will any bulk storage of fuels or lubricants be permitted within 100 meters of any watercourse. Contractors will be required to keep construction machinery in good working condition to avoid localized objectionable gaseous and particulars emissions.

5.1.4 Erosion, Sedimentation and Soils

Temporary drainage and pumping will be provided as necessary to keep all excavations and the site free of water. Water containing suspended materials will not be pumped into waterways or drainage systems. Existing drainage patterns will not be intentionally altered and appropriate measures will be taken in the vicinity of watercourses to provide proper erosion control to prevent excessive siltation and sedimentation. The grading of surfaces will minimize the slope and thus limit any erosion problems. Perimeter ditching around the lagoon will be done to minimize the potential for erosional loss, and will attempt to not alter the existing drainage patterns.

During construction and potential decommissioning, the potential for erosional loss will occur during clearing, grubbing, excavation, site grading, embankment construction and eventual embankment removal, and site restoration. The mitigation measures will be specified in the contract tender documents to address this erosion and sedimentation issues.

5.1.5 Groundwater

All waste materials will be removed from site and disposal of waste or volatile materials such as mineral spirits, oil or fuel is not permitted in any waterways or drainage courses.

Leaks, spills and releases that may occur during construction will be mitigated by providing secondary containment for fuel and hazardous materials, requiring drip trays for equipment, providing spill clean-up equipment, excavating contaminated soils and disposing contaminated soils to an approved site, and preparing an emergency spill response plan.

The mitigation measures described above in Section 5.1.3 to prevent leaks, spills and releases will also mitigate adverse effects on groundwater.

5.1.6 Air Quality

Dust will be suppressed with water as required. Water spraying is an important, common and practical procedure to control dust during construction. This procedure will be applied, as required, to alleviate potential dust problems.

5.1.7 Aesthetics

Any waste disposal will be undertaken in accordance with existing regulations. Contractors will be required to conduct all day-to-day operations in such a manner as to avoid creating any unpleasant appearances or any conditions that are detrimental to the surrounding area. Waste materials and refuse will be promptly disposed of in a manner that will not contaminate or impair the surrounding area.

5.1.8 Human Health and Safety

Potential impacts to human health related to increased vehicle traffic during construction period will be mitigated by informing GS staff of construction activities, placing traffic signs, and erecting barriers and fencing to indicate construction and operation activities.

Noise creation due to increased heavy equipment operation during normal working hours will be reduced by muffling vehicles and equipment and limiting long-term idling thus mitigating potential adverse effects of increased noise and vibration.

Any negative public perceptions may be mitigated by informing the public of construction activities, completing work during normal working hours erecting fencing/barriers to indicate construction and operation activities.

The Contractor will follow all appropriate Workplace Safety and Heath guidelines when undertaking the proposed work. Excavations left open overnight will be barricaded with temporary security fencing and signage to warn GS staff.

Routine safety meetings will be held as per Manitoba Hydro policies to ensure that general safety measures are adhered to and to provide workers a chance to voice any safety concerns that may arise.

5.1.9 Heritage and Resources

If human remains, cultural artifacts, or other historic resources are uncovered during the course of any work, the work is to be stopped immediately until the appropriate authorities have been notified and instructions provided to the Contractor. Notification will be to Manitoba Hydro, RCMP (if human remains are present) and Manitoba Historic Resources Branch.

Discussions with the Archaeological Unit of the Historic Resources Branch indicated that there was a low potential to impact significant heritage resources and that a Heritage Resources Impact Assessment would not be required in advance of construction. If required, archaeological work will be conducted during construction to ensure that any cultural and historic resources encountered are protected.

5.2 Operation and Maintenance

5.2.1 Land and Resource Use

The lagoon was located at Manitoba Hydro's preferred location, which places it away from the developed areas of the generating station but close enough to facilitate maintenance and to avoid a long forcemain. The selection of the lagoon site versus an alternative site in the south also avoids the need to construct a road and forcemain through the wetland area which would have a greater environmental impact.

The primary resource use in the area is the hydroelectric power production at the Kelsey GS itself. This lagoon project will benefit that primary resource use by providing ongoing wastewater treatment for the site to allow it to remain in operation.

The location of the lagoon and forcemain were reviewed with the residents of the nearby trapper's cabin. It is not anticipated that there will be concerns from the users of that cabin with the new lagoon. The effluent discharge will direct effluent to the south, which is away from the cabin.

5.2.2 Odour

To mitigate the negative effect that odour generation will have on the GS site, the lagoon will be situated approximately 300 m from the nearest individual residence and more than 400 m from the centre of population (defined as the residences and Staff House). The effects of odour will also be mitigated by the low expected organic loading of the wastewater leading to a weaker strength of wastewater.

The primary cell surface area was designed based on the area of the bottom of the cell, which is more conservative as it does not consider the larger area provided when the cell is full and extends partway up the inside berms.

5.2.3 Lagoon Maintenance

Regular maintenance of the lagoon is required to ensure that it remains functional and able to provide adequate sewage treatment. The ongoing operation and maintenance needs for the proposed wastewater treatment lagoon at the Kelsey GS Site will include:

- Periodic access road grading, resurfacing, and maintaining accessibility (snow clearing);

- Lift station maintenance including maintaining pump and forcemain operation;
- Removal of vegetation on lagoon berms;
- Periodic inspections of the berms for slope stability;
- Maintenance of discharge swale including removal of vegetation, removal of accumulated solids/debris, and maintaining proper drainage grade;
- Maintenance of lagoon inter-cell piping and valves to ensure functionality; and
- Maintenance of lagoon perimeter fencing.

5.2.4 Effluent Discharge

The lagoon outfall swale will be designed to prevent erosion of materials during lagoon discharge events, and aggregate rip-rap may be used if required to dissipate energy at the outfall. The lagoon discharge is not anticipated to alter the temperature of the natural wetland or receiving watercourse because the treated effluent will be at ambient temperatures. No adverse health effects on fish are expected to occur.

Effluent discharge will take place either once annually or twice annually depending on the volume of wastewater loading. Because the lagoon uses seasonal discharge it is possible to sample the effluent and ensure it meets Manitoba standards prior to discharge.

Prior to any discharge, it will be necessary to take an effluent quality sample to ensure that it does not exceed any of the regulatory limits. To control nutrient loading, an alum dosing system will be provided with an injection point at the lift station. This will help to control phosphorus. In the unlikely event that phosphorus is found to be too high, alum could also be dosed directly into the secondary cell, either by spraying from the berm, or application and mixing with a boat/outboard motor.

5.2.5 Wildlife

The risk to wildlife during the operation and maintenance of the lagoon would primarily be through loss of habitat or relocation. The location of the lagoon is remote, and the loss of habitat will be negligible because of the abundance of suitable habitat nearby and the relatively small area impacted by the development.

The site will be protected with a 1.8 m chain link fence preventing larger animals from entering the lagoon site. The new lift station will be protected from wildlife intrusion by being housed within a building. Vents will include bird screens.

5.2.6 Fish Habitat and Surface Water

The potential for embankment failure, causing partially treated wastewater to reach nearby watercourses, will be mitigated by following or exceeding the design recommendations of the professional geotechnical engineer responsible for the project.

Perimeter ditching will be used to remove standing water from the toe of the embankments.

The potential for clay liner failure will be mitigated by scarifying and mixing the clay material prior to compaction. Regular inspection of compaction effort will be done during the construction of the clay liner, and the design will adhere to provincial design objectives for wastewater treatment lagoons.

As with the construction and site clearing stage, during regular operation, all waste materials will be regularly removed from site and disposal of waste or volatile materials such as mineral spirits; oil or fuel is not permitted in any waterways or drainage courses.

In the event of a major spill or leak of a hazardous material, a contaminated soil remediation plan will be followed and contaminated material will be disposed of appropriately.

5.2.7 Soils and Groundwater

Soils and groundwater will be protected by following proper procedures when discharging sewage by truck into the lagoon, when transporting chemicals within the site and when refueling machinery used for lagoon maintenance.

Proper containment will be provided for the fuel tank of the backup generator located adjacent to the lift station.

5.2.8 Human Health and Safety

Human health and safety will be protected at the lagoon site with the perimeter fence and warning signage on all sides of the fence.

At the lift station, the systems will all be contained within a building and will be accessible only to authorized personnel who have cleared Manitoba Hydro's Personnel Risk Assessment clearance procedure.

5.2.9 Economic Benefit

The construction project is expected to have a positive economic benefit for the GS Site by simplifying wastewater treatment operations on site and providing a reliable wastewater treatment facility for the GS site for the long term. Mitigation measures are not required.

6.0 Significance of Residual Environmental Effects

There are no significant direct or indirect residual impacts predicted for this project after the mitigation requirements specified under Section 5.0 of this report have been implemented. The area cleared for the lagoon will remain cleared and replaced with the two lagoon cells that will typically be filled with liquid, and this will have a slight lasting impact on wildlife in that area.

The existing wastewater systems will be decommissioned and removed from the site for proper disposal at an approved facility. Some items will be salvaged, and the sludge building will remain in place but be repurposed. The lagoon contactor will be required to restore the wastewater treatment plant area with clean granular material as part of the decommissioning activities.

No direct residual impacts are forecast for the operation and maintenance of the wastewater treatment lagoon other than ongoing monitoring procedures and proper maintenance of equipment by Manitoba Hydro. Existing Operator(s) will be provided training in all applicable operating and maintenance procedures needed in the operation of the proposed wastewater treatment lagoon prior to project turnover. Ongoing training will be important for operators, including future operators who take on responsibility for the lagoon and lift station in future years.

In future years, a lagoon desludging project may be necessary. Therefore it is recommended that the sludge drying bed at the Kelsey GS landfill remain in place to accommodate the dewatered sludge that would be produced at that time.

7.0 References

1. Smith, R.E.; Veldhuis, H,; Mills, G.F.; Eliers, R.G.; Fraser, W.R.; Lelyk, G. W. 1998. Terrestrial Ecozones, Ecoregions, and Ecodistricts of Manitoba: An Ecological Stratification of Manitoba's Natural Landscapes

2. National Climate Data and Information Archive website, visited January 2016. http://climate.weatheroffice.gc.ca/climate_normals/results_e.htm

3. Betcher, R.; Grove, G.; Puup, C. 1995. Groundwater in Manitoba: hydrogeology, quality, concerns, management.

4. Manitoba conservation data centre Occurrence of Species by Ecoregion Hayes River Upland, http://www.gov.mb.ca/conservation/cdc/ecoreg/hayesriver.html.

5. SOR/2008-197 System for Petroleum Products and Allied Petroleum Products Regulations

6. Stewart, Kenneth W. and Douglas A. Watkinson, *The Freshwater Fishes of Manitoba*. (Winnipeg: University of Manitoba Press, 2004), 249-257.

7. Manitoba Culture, Heritage and Tourism, Historic Resources Branch. January 2016. Personal communication with Heather McClean, Heritage Resources Registrar, Provincial Heritage Registry Services.

NEEGAN BURNSIDE

Annex A

Figures

0733 Rev 14 09
v1.0

PROPERTY DEPARTMENT WORK REQUEST

SAP REFERENCE		
WBS	Order or Network no. *	Network Activity *
P	253809	0420

PROJECT DESCRIPTION:

Project description *
Construction of a Lagoon and associated works for Kelsey Generating Station

Purpose (MUST check at least one box in either Hydro or Gas section)

HYDRO: ☐ Transmission Line _____ kV ☒ Site ☐ Fibre Optic
☐ Sub-Transmission Line _____ kV ☐ Distribution Line _____ kV
☐ Budget Estimate ☐ Retracement

GAS: ☐ Transmission Line _____ mm ☐ Distribution Line _____ mm
☐ Service Line _____ mm ☐ Site

Particulars
☐ Overhead ☐ Underground

Joint Use * (MUST check at least one box; if Yes, then complete contact/company name)
MTS: ☐ Yes - _____ MTS CONTACT
☒ No
CABLE: ☐ Yes - _____ COMPANY NAME
☒ No

Method of acquisition
☐ Easement ☐ Purchase ☐ Lease ☒ Permit

Crossing approvals
☐ Pipeline ☐ Railway ☐ Navigable Waters

Permits required
☐ Access road ☒ Other, specify: Construction Of Lagoon

PROPERTY DESCRIPTION:

City or municipality		Town or village: Kelsey Generating Station	
Portion	Lot	Block	Plan
Portion	Section	Township: 81	Range: 6E NW-24
Portion	River Lot	Parish	

Latitude/longitude

Physical description
Length _____ Width _____ * Drawing Reference no. See Attached Figures

Special remarks
See Attached figures 1, 2 and 3. Area is +/- 13 Ha which includes lagoon site, influent line, effluent discharge ditch, access road and lift station.

REQUIRED BY yyyy mm dd	Requested by *	yyyy mm dd	Phone no. *	Organization unit title
2016 07 04	Erik Buus	2016 04 04	360-4757 Department: Power Pojects	Power Supply

Authorized by (Design Section Head or Delegate)	yyyy mm dd	Approved by (Property Department)	yyyy mm dd
Sandy Miller	2016 04 04		

CONFIRMATION OF LAND ACQUISITION:

FOR PROPERTY USE ONLY

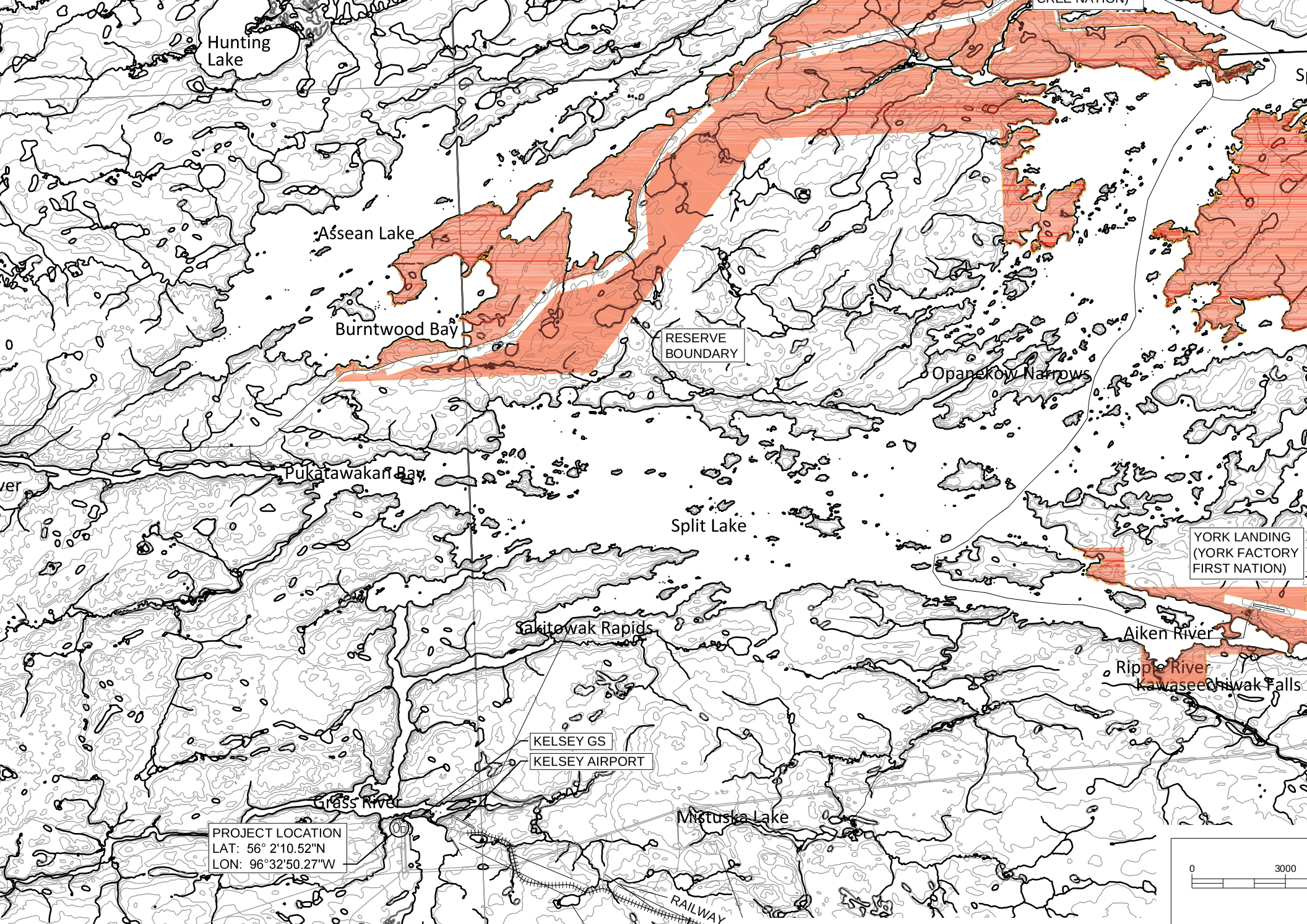
This is to confirm the land acquisition requested above has been completed subject to the following conditions

File no.	Confirmed by (Property Department)	yyyy mm dd

DISTRIBUTION:

NAME - REGION _____ NAME - AREA _____

D.O. - DISTRICT _____ GAS DESIGN _____



NEEGANBURNSIDE

307 Commerce Drive, Winnipeg, Manitoba, R3P 1B3

Figure Title

KELSEY GE
LAGOON
PRO

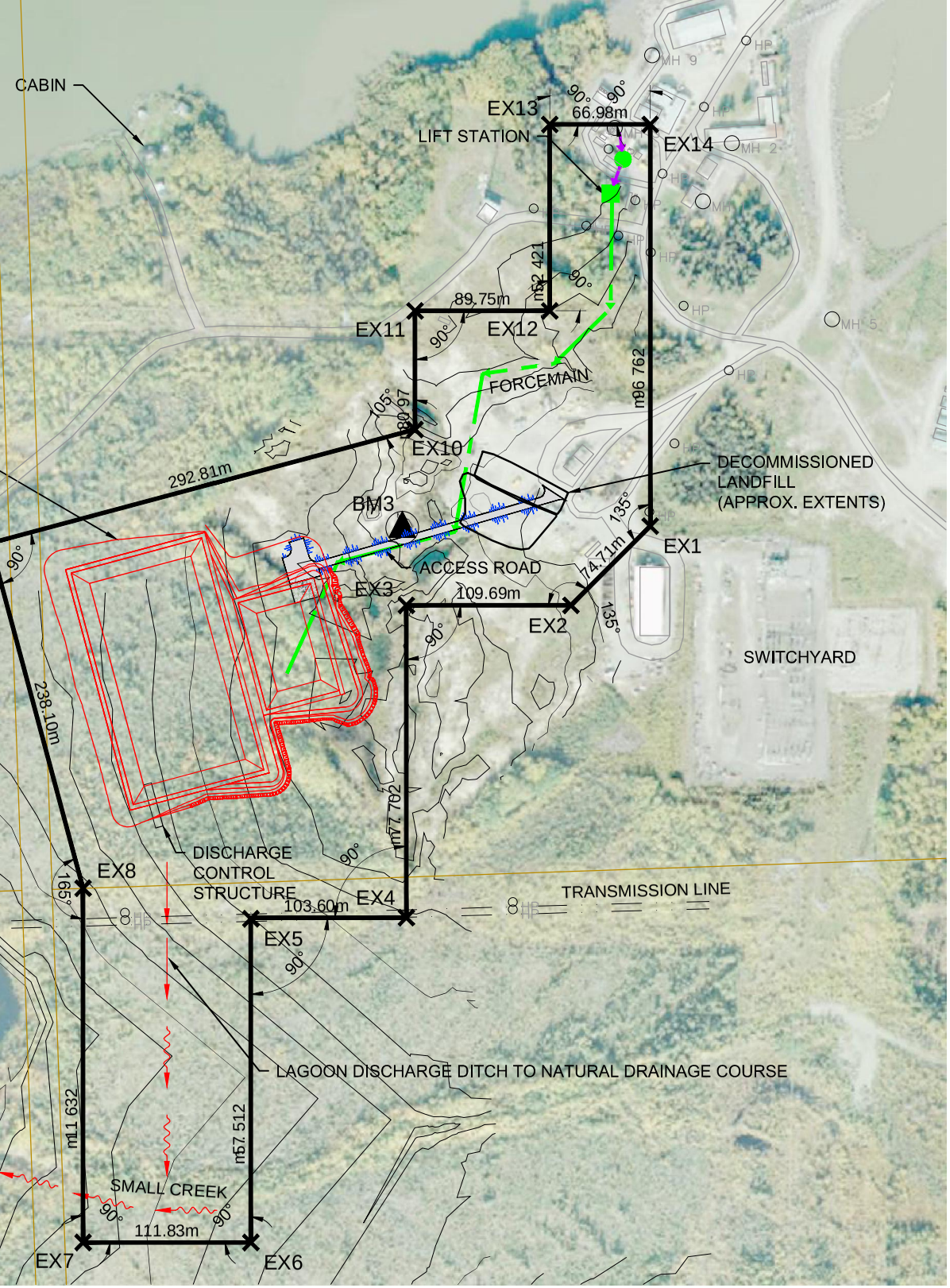
MARK COORDINATES: SEE FIGURE L3.0.

NEEGAN BURNSIDE

307 Commerce Drive, Winnipeg, Manitoba, R3P 1B3

Figure Title

KELSEY GE
LAGOON
SI



EX1	N 6212925.9 E 653134.6	EX6	N 6212448.4 E 652868.5	EX1
EX2	N 6212873.1 E 653081.8	EX7	N 6212448.4 E 652756.7	EX1
EX3	N 6212873.1 E 652972.1	EX8	N 6212684.5 E 652756.7	EX1
EX4	N 6212664.9 E 652972.1	EX9	N 6212914.5 E 652695.1	EX1
EX5	N 6212664.9 E 652868.5	EX10	N 6212990.3 E 652977.9	TC PR 13.

BENCHMARK COORDINATES

UTM NAD 83 ZONE 14

BENCHMARK #1:
BRASS CAP - 99MH11
(IN BEDROCK)

N: 6213268.9
E: 653563.7
Z: 189.0

BENCHMAI
BRASS CA
(IN CONCR

N: 6213310
E: 653298.0
Z: 186.3

BENCHMARK #2:
BRASS CAP - 99MH12
(IN BEDROCK)

N: 6212934.5
E: 653510.5
Z: 188.5

BENCHMAI
BRASS CA
(IN CONCR

N: 6213071
E: 654160.9
Z: 186.3

BENCHMARK #3:
BRASS CAP - 99MH13
(IN BEDROCK)

N: 6212924.7
E: 652969.5
Z: 185.9

BENCHMAI
BRASS CA
(IN CONCR

N: 6213004
E: 654288.6
Z: 186.3

NEEGAN BURNSIDE
307 Commerce Drive, Winnipeg, Manitoba, R3P 1B3

Figure Title
KELSEY GE
LAGOON
PRO

NEEGAN BURNSIDE

Annex B

Preliminary Design Report (Under Separate Cover)

NEEGAN BURNSIDE

Annex C

Environmental Matrix

Table 1.0					
POTENTIAL ENVIRONMENTAL EFFECTS MATRIX					
Legend:			**PROJECT ACTIVITIES**		
NS	Not Likely Significant		**Design**	**Construction**	**Operations and Maintenance**
B	Beneficial				
S	Slight Impact (localized, not lasting)				
M	Potentially Significant – Mitigable				
NM	Potentially Significant – Not Mitigable				
UE	Unknown Effect				
Ecological Effects	Terrestrial	Vegetation	-	M	M
		Wildlife (Including waterfowl)	-	M	M
		Habitats/Communities	-	S	NS
		Rare or Endangered Species	-	NS	NS
	Aquatic	Fish	-	NS	NS
		Vegetation	-	S	NS
		Habitats/Communities	-	NS	NS
		Rare or Endangered Species	-	NS	M
Human Health	Long Term Effects			-	B
	Inhalation/Ingestion			-	B
Physical/Chemical Effects	Ground water	Flow and Water Table Alteration	-	NS	NS
		Interaction with Surface Drainage	-	NS	M
	Surface water	Drainage/Flood Characteristics	-	NS	NS
		Flow Variation	-	NS	NS
		Water Quality Changes	-	NS	NS
	Land	Erosion	-	M	NS
		Unique Physical Features	-	-	-
		Stability (Slides and Slumps)	-	NS	NS
		Buffer Zone	-	-	-
		Compatibility of Land Uses	-	NS	NS
	Noise	Intensity	-	M	NS
		Duration	-	M	NS
		Repetition	-	M	NS

Table 1.0					
POTENTIAL ENVIRONMENTAL EFFECTS MATRIX					
Legend:			**PROJECT ACTIVITIES**		
NS	Not Likely Significant		**Design**	**Construction**	**Operations and Maintenance**
B	Beneficial				
S	Slight Impact (localized, not lasting)				
M	Potentially Significant – Mitigable				
NM	Potentially Significant – Not Mitigable				
UE	Unknown Effect				
Physical/Chemical Effects (Cont.)	Atmosphere	Air Quality	-	S	NS
		Atmosphere	-	S	M
		Air Characteristics	-	S	NS
Aesthetic Effects		Topographic	-	M	NS
		Odours	-	NS	NS
		Sounds	-	M	NS
		Visual	-	NS	NS
		Biota – Animal/Diversity of Vegetation	-	NS	NS
		Water Appearance & Taste	-	NS	NS
		Man-Made Objects/Consonance with Nature	-	NS	NS
Socio-Economic Effects		Employment & Manpower	B	B	B
		Housing & Infrastructure	-	B	B
		Economic Benefits to Site	B	B	B
		Health, Education & Social Services	-	NS	B
		Lifestyle & Quality of Life	-	B	B
Physical & Cultural Heritage		Protection of Sites	-	NS	NS
		Cultural Interests & Values of Nearby Aboriginal Peoples	-	NS	NS

Table 2.0 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES – SUMMARY			
(A) Key Project Activities		**(B) Potential Environmental Effect(s)**	**(C) Mitigation Measures**
1	**Mobilization / Demobilization**	Dust and noise pollution from construction activity. Erosion of sediment into nearby drainage structures (ditches). Hazardous waste could leach into surrounding vegetation.	Shipments by air or railway transportation will be completed following all applicable federal and provincial regulations. Storage of material and equipment within vicinity of construction site will be limited. All heavy equipment will have appropriate sound control devices and will be operated only within permissible hours. Roadways will be misted with water for dust control. Construction foremen and labourers will be instructed on special precautions for preventing erosion of sediment into ditches and for dust and noise control.
2	**Site Work** Site Clearing and Grubbing	Dust and noise pollution from construction activity. Erosion of sediment into nearby drainage structures (ditches). Potential for soil/water contamination due to leaks/spills. Tree clearing will lead to minor loss of habitat. Disturbing of cultural or historic sites.	All heavy equipment will have appropriate sound control devices and will be operated only within permissible hours. Roadways will be misted with water for dust control. Construction foremen and labourers will be instructed on special precautions for preventing erosion of sediment into ditches and for dust and noise control. Regular maintenance and repair of equipment will be provided. Silt screens will be used to prevent any sediment entering ditch conveyed by surface water. Revegetation of exposed soils after site works complete. Designated refueling sites will be located minimum of 100 m from any surface water course. Fuel will be handled in accordance with the fuel handling act. A spill kit will be on site and a spill response plan will be prepared in conjunction with Manitoba Hydro. In the event of a spill, every possible measure will be taken to stop and contain the spill immediately as long as it can be safely achieved, without risk to the employee. Spills

Table 2.0 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES – SUMMARY			
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures
			will be reported to Manitoba Conservation at (204) 944-4888 as soon as possible. Tree clearing will be minimized and topsoil will be restored and affected areas reseeded. Topsoil stripping will not be permitted unless authorized by the Engineer. Roots of designated trees will be protected to their drip line and a minimum setback of 6 meters maintained from a marked trees that are to be retained. Unnecessary traffic over root zones will not be permitted. If human remains, cultural artifacts, or other historic resources are uncovered during the course of any work, the work is to be stopped immediately until the appropriate authorities have been notified.
3	**Construction** Installation of gravity sewer. Installation of lift station and forcemain. Access road and truck dump ramp construction. Lagoon cell construction. Site grading and outfall swale construction. Installation of fencing.	Dust and noise pollution from construction activity. Erosion of sediment into nearby drainage structures (ditches). Potential for soil/water contamination due to leaks/spills. Public health and safety.	Silt screens will be used to prevent any sediment entering ditch conveyed surface water. All heavy equipment will have appropriate sound control devices and will be operated only within permissible hours. Roadways will be misted with water for dust control. Construction foremen and labourers will be instructed on special precautions for preventing erosion of sediment into ditches and for dust and noise control. Access to the construction site will be controlled by fencing where necessary. Machinery will be properly maintained and carefully used. Signs and notices will be used to notify the GS. Excavations left open overnight will be barricaded with temporary security fencing and signage to warn GS staff. Workers will have proper safety training and equipment.

Table 2.0 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES – SUMMARY			
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures
			Regular maintenance and repair of equipment will be provided. All waste materials will be removed from the site. Designated refueling sites will be located a minimum of 100 m from any surface water source. Groundsheet will be used to catch spills or leaks. Fuel will be handled in accordance with the fuel handling act. A spill kit will be on site and a spill response plan will be prepared in conjunction with Manitoba Hydro. In the event of a spill, every possible measure will be taken to stop and contain the spill immediately as long as it can be safely achieved, without risk to the employee. Spills will be reported to Manitoba Conservation at (204) 944-4888 as soon as possible.
4	**Decommissioning** Removal of existing SBR and Bio-Brane Systems.	Improper disposal of hazardous waste could adversely affect surrounding vegetation, animal habitat and surface and ground water. Damaged vegetation and soil following site decommissioning.	Site restoration work will be performed at all construction locations to return the sites to pre-construction appearances. At the completion of the one-year warranty period an inspection will be conducted of all disturbed areas to confirm that site restoration and re-vegetation is complete. If soil is deemed to be contaminated, contractor will follow all applicable codes and guidelines required to safely haul and remediate impacted soil removed from site as per applicable provincial and federal regulations, standards and guidelines.
5	**Operation of New Wastewater Treatment Lagoon**	Discharge of untreated effluent to natural wetland area could increase nutrient loading. Erosion of sediment into nearby drainage structures (ditches). Wildlife could be negatively affected by wastewater.	Adequate distance between Kelsey GS Site and lagoon will be maintained to prevent foul odours or noise associated with maintenance. Effluent will be sampled and tested for compliance with Environment Act Licence limits prior to discharge. A concrete discharge pad will be provided at the lagoon, and rip-rap aggregate at the natural wetland outfall to dissipate energy. Management of vegetation on lagoon

Table 2.0			
ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES – SUMMARY			
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures
			embankments will be done in accordance with applicable regulations. Perimeter fencing will be installed to restrict wildlife and human access to the lagoon.

Table 3.0	
FISH SPECIES WITHIN THE NELSON RIVER WATERSHED	
Common Name	**Specific Name**
Silver lamprey	Ichthyomyzon unicuspis
Lake sturgeon	Acipenser fulvescens
Mooneye	Hiodon tergisus
Lake chub	Couesius plumbeus
Carp	Cyprinus carpio
Pearl dace	Margariscus margarita
Emerald shiner	Notropis atherinoides
Blacknose shiner	Notropis heterolepis
Spottail shiner	Notropis hudsonius
Fathead minnow	Pimephales promelas
Longnose dace	Rhinichthys cataractae
Longnose sucker	Catostomus catostomus
White sucker	Catostomus commersoni
Shorthead redhorse	Moxostoma macrolepidotum
Channel catfish	Ictalurus punctatus
Northern pike	Esox Lucius
Capelin	Mallotus villosus
Rainbow smelt	Osmerus mordax
Cisco	Coregonus artedi
Lake whitefish	Coregonus clupeaformis
Rainbow trout	Oncorhynchus mykiss
Brook trout	Salvelinus fontinalis
Lake trout	Salvelinus namaycush
Troutperch	Percopsis omiscomaycus
Burbot	Lota lota
Brook stickleback	Culaea inconstans
Ninespine stickleback	Pungitius pungitius
Slimy sculpin	Cottus cognatus
Fourhorn sculpin	Myoxocephalus quadricornis
Arctic sculpin	Myoxocephalus scorpioides
Shorthorn sculpin	Myoxocephalus scorpius

NEEGAN BURNSIDE

Annex D

Heritage Branch Correspondence

Manitoba

Memorandum

DATE: March 3, 2016

TO: Josh Daniels
E.I.T EPt
Neegan Burnside Ltd.
106-B Scurfield Blvd.
Winnipeg, Manitoba
R3Y 1G4

FROM: Christina Nesbitt
Impact Assessment
Archaeologist
Historic Resources Branch
Main Floor 213 Notre Dame
Avenue
Winnipeg MB
R3B 1N3
Christina.Nesbitt@gov.mb.ca
PHONE NO: (204) 945-8145

SUBJECT: 037851 MB Hydro Kelsey - Preliminary Plan-G-10
Wastewater Treatment Lagoon
HRB Review and Comments

HRB FILE: AAS-15-10270

Further to your memo requesting a heritage screening for the wastewater treatment lagoon (Planned Area), the Historic Resources Branch (HRB) has examined the applicable areas proposed for development in conjunction with the Branch's records for areas of potential concern and can advise you that HRB has no concerns with the project at this time..

However, pleased be advised that if any heritage resources are encountered in association with the Planned Area during development, the Developer is required to notify HRB and HRB may require that a heritage resource management strategy be implemented to mitigate the effects of development on the heritage resources.

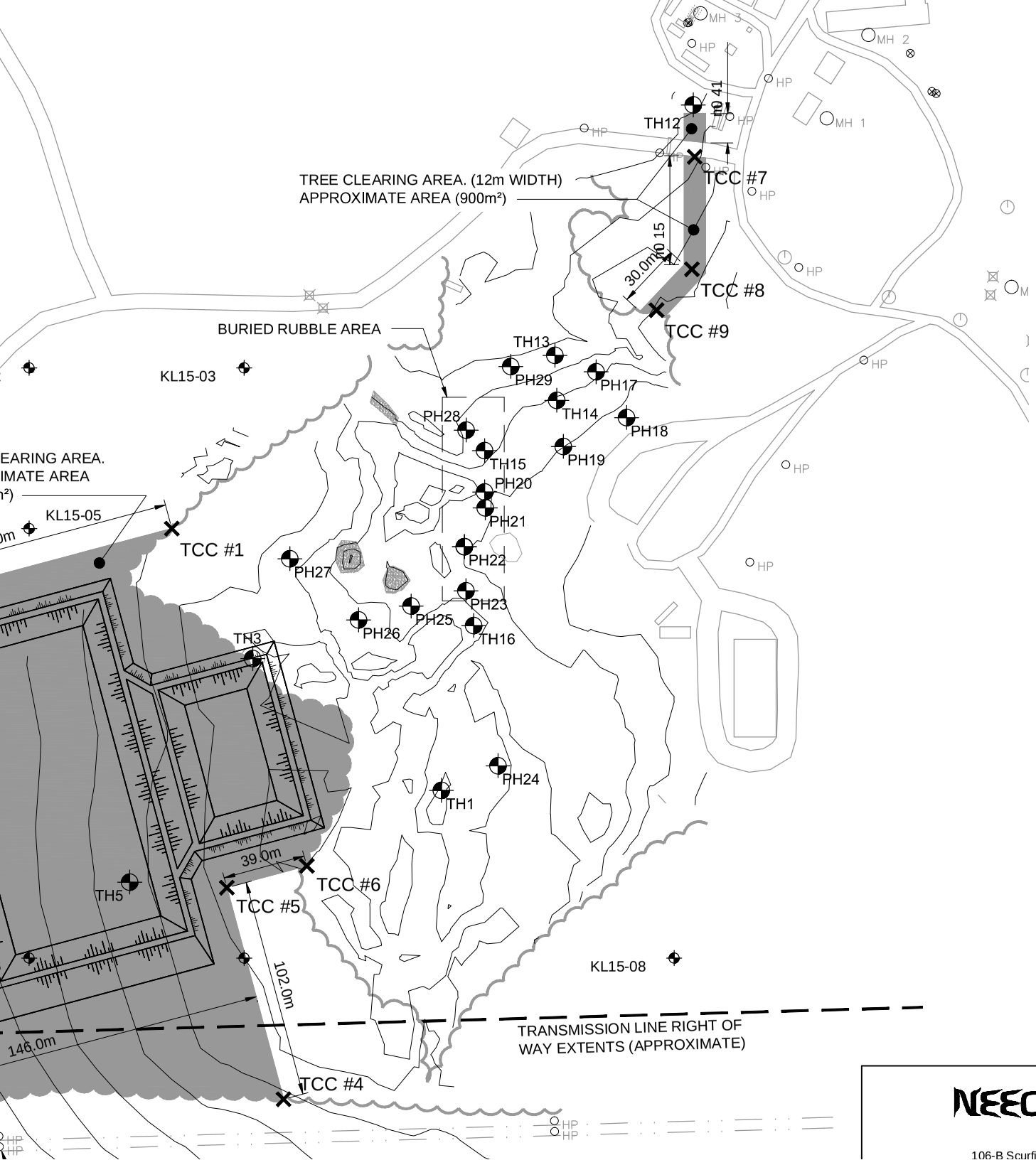
If you have any questions or comments, please feel free to contact the undersigned at the above noted address, phone number, or e-mail.

Christina Nesbitt

NEEGAN BURNSIDE

Annex E

Tree Clearing Figures



#	COORDINATES	#
1	N 6212950.0 E 652866.3	6
2	N 6212907.4 E 652707.3	7
3	N 6212682.0 E 652767.7	8
4	N 6212684.2 E 652918.3	9
5	N 6212782.9 E 652891.8	

NOTE: APPROXIMATE LOCATION; TO BE SET

PI
NOT

	BOREH
HP	HYDRO
	FORCE
	TRANSMISS
	BUSH
	BUILD
	TREE CLEARING
EXISTING	LEGEND

0 50

NEEGANBURNSIDE

106-B Scurfield Blvd., Winnipeg, Manitoba, R3Y 1G4

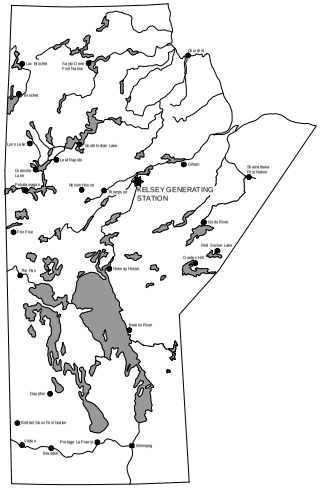
Figure Title

KELSEY

NEEGAN BURNSIDE

Annex F

60% Design Figures



MANITOBA HYDRO
KELSEY GENERATING STATION
SEWAGE LAGOON

ISSUED FOR EAP SUBMISSION
2016-05-13

DRAWING INDEX

	TITLE
CIVIL	
G-01	GENERAL SITE PLAN
G-02	FORCEMAIN PLAN & PROFILE
G-03	SEWER/WATER DETAILS
LAGOON CIVIL	
L-01	SEWAGE LAGOON PLAN
L-02	SEWAGE LAGOON SECTIONS
L-03	LAGOON DETAILS
BUILDING	
B-01	LIFT STATION BUILDING PLANS ELEVATIONS AND DETAILS
MECHANICAL	
M-01	LIFT STATION PROCESS MECHANICAL
DECOMMISSIONING	
D-01	SEWAGE TREATMENT FACILITIES DECOMMISSIONING PLAN

Neegan Burnside Limited
307 Commerce Drive
Winnipeg, Manitoba, R3P 1B3
telephone (204) 949-7110
fax (204) 949-7111
web www.neeganburnside.com

Burnside Project No. 300037851

REFERENCE DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
◇	1-00000-XX-00000-0000 0000	
◯	1-00000-MC-00000-0000	

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
Neegan Burnside Ltd.

REV.	DATE	DESCRIPTION	BY	CKD	APP
02	2016-05-13	ISSUED FOR EAP SUBMISSION	JJ	PK	GP
01	2016-04-29	ISSUED FOR 60% CLIENT REVIEW	CPG	PK	GP

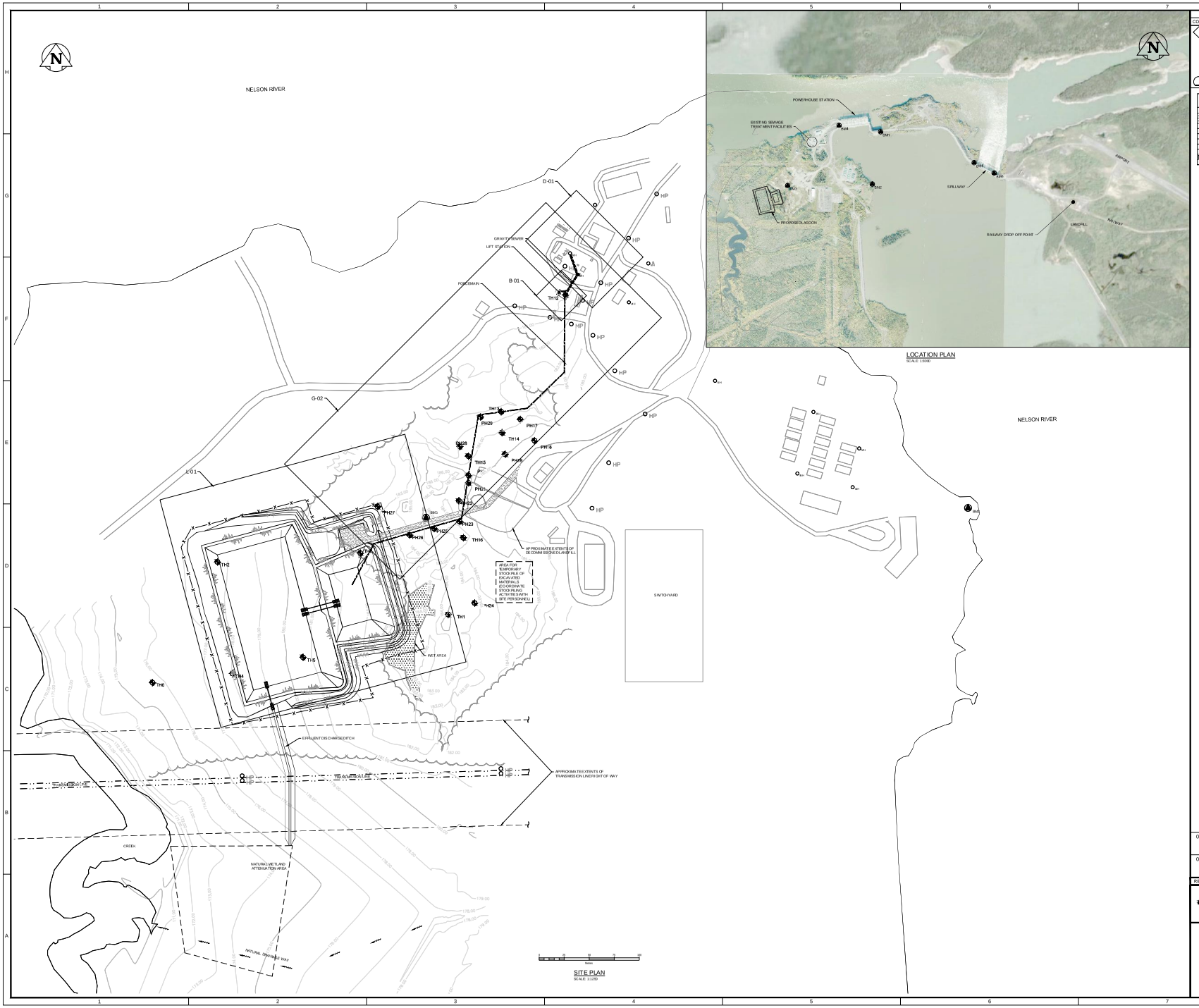
DRAWN: CT	CHECKED: GP	SCALE: AS NOTED
DESIGNED: P.K.	DATE: 4/29/2016	

KELSEY GENERATING STATION

AUTHENTICATION FOR CURRENT REVISION

COVER PAGE

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	CP	02



LOCATION PLAN
SCALE: 1:6000

REFERENCE DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
	1-00000-XX-00000-0000 0000	
	1-00000-MC-00000-0000	

LEGEND - PLAN

EXISTING		PROPOSED	EXISTING		PROPOSED
	SEWER MAIN			HEAT TRACE	
	WATER MAIN			M.T.S.	
	HYDRANT			FORCEMAIN	
	VALVE			CONCRETE	
MH	MANHOLES	MH		FENCELINE	
0.000	ELEVATIONS	0.000		BUILDING	
	FLOW DIRECTION			TEST PIT	
	BENCHMARK			CURB STOP	
	CULVERT			BOLLARD	
	HYDRO POLE			MELL	

BENCHMARK COORDINATES

UTM NAD 83 Z ONE 14

- BENCHMARK #1: BRASS CAP - 99MH11 (IN BEDROCK)
  N: 6213288.9
  E: 653563.7
  Z: 189.0
- BENCHMARK #2: BRASS CAP - 99MH12 (IN BEDROCK)
  N: 6212934.5
  E: 653510.3
  Z: 188.5
- BENCHMARK #3: BRASS CAP - 99MH13 (IN BEDROCK)
  N: 6212924.7
  E: 652969.5
  Z: 185.9
- BENCHMARK #4: BRASS CAP - 99M540 (IN CONCRETE)
  N: 6213310.0
  E: 653288.0
  Z: 190.3
- BENCHMARK #5: BRASS CAP - 99M542 (IN CONCRETE)
  N: 6213071.0
  E: 654160.9
  Z: 190.3
- BENCHMARK #6: BRASS CAP - 99M543 (IN CONCRETE)
  N: 6213004.6
  E: 654288.6
  Z: 190.3

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
Newgen Engineering Ltd.

REV.	DATE	DESCRIPTION	BY	CKD.	APP.
02	2016-05-13	ISSUED FOR EAP SUBMISSION	JJ	PK	GP
01	2016-04-29	ISSUED FOR 60% CLIENT REVIEW	CPG	PK	GP

Manitoba Hydro

AUTHENTICATION FOR CURRENT REVISION

DRAWN:	CHECKED:	SCALE:
JJ	GP	AS NOTED
DESIGNED:	DATE:	
PK	4/29/2016	

KELSEY GENERATING STATION

GENERAL SITE PLAN

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	G-01	02

X:\Land Desktop\300037851 MB Hydro Kelsey Sewage Lagoon\dwg\com\t\0037851 G-01.dwg 5/13/2016 10:20 AM

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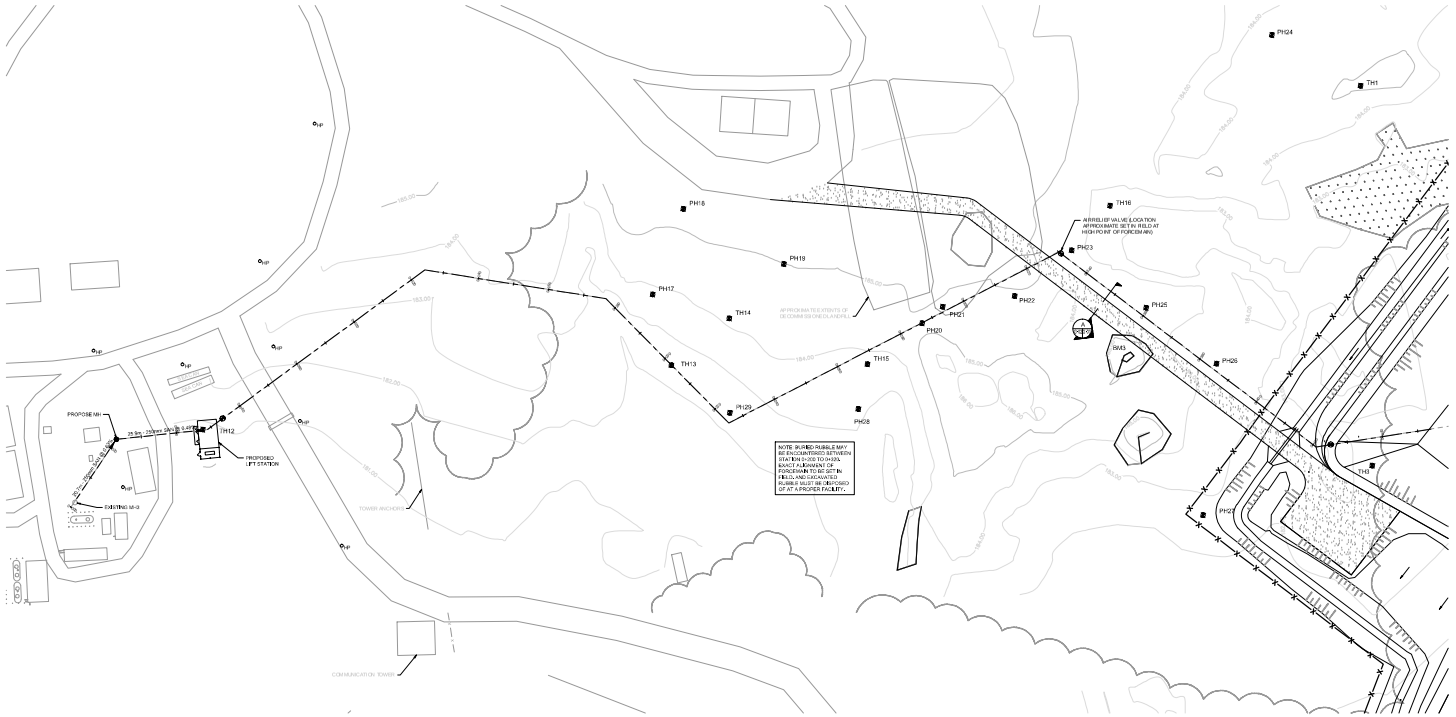
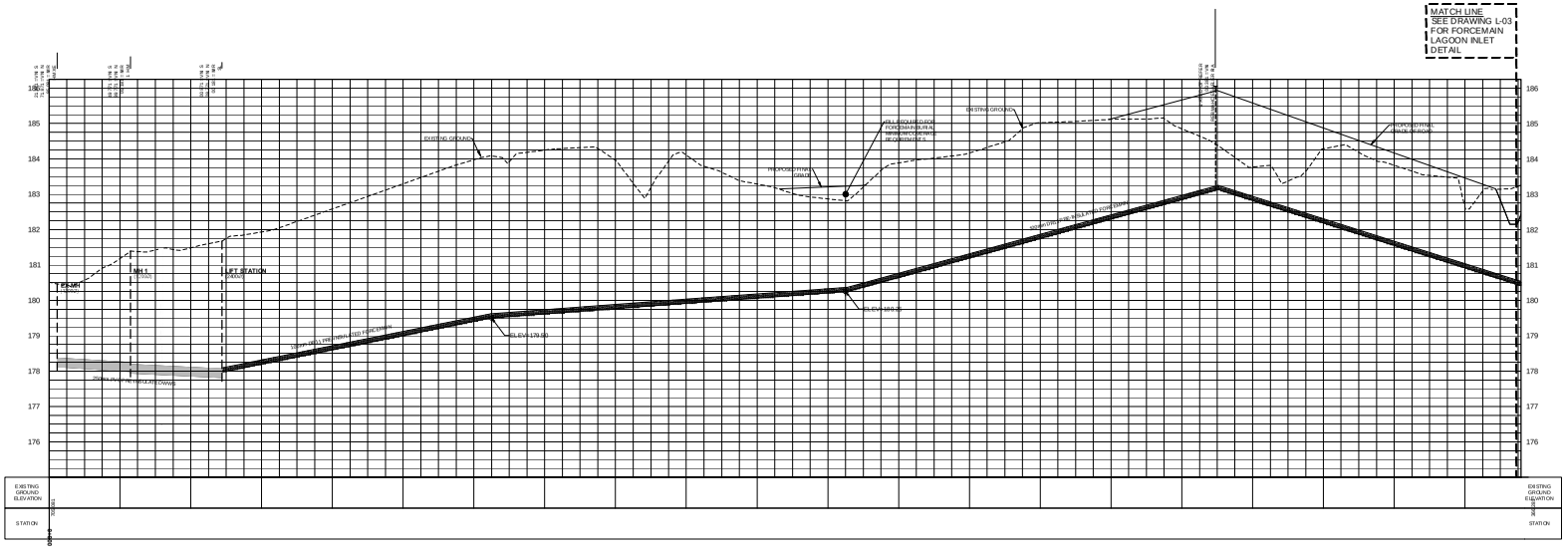


PLAN
SCALE 1:500



REFERENCED DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
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	1-00000-MC-00000-0000	

LEGEND - PLAN

EXISTING		PROPOSED	EXISTING		PROPOSED
	SEWER MAIN			HEAT TRACE	
	WATER MAIN			W.T.S.	
	HYDRANT			FORCEMAIN	
	VALVE			CONCRETE	
	MANHOLE			FENCELINE	
	ELEVATIONS			BUILDING	
	FLOW DIRECTION			TEST PIT	
	BENCHMARK			CURB STOP	
	CULVERT			BOLLARD	
	HYDRO POLE			WELL	

GENERAL NOTES:

1. CONTRACTOR TO CONFORM TO ALL FEDERAL, PROVINCIAL AND LOCAL CODES, STANDARDS AND REGULATIONS.
2. CONTRACTOR SHALL NOTIFY THE AUTHORITY HAVING JURISDICTION AND OBTAIN ALL APPROVALS, PERMITS AND PAY ALL FEES.
3. THE CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO AVOID CAUSING ANY DAMAGE TO EXISTING INFRASTRUCTURE AND PROPERTY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING INFRASTRUCTURE AND PROPERTY THAT ARE RELATED TO HIS ACTIONS. ANY DAMAGE SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN EXPENSE TO A MINIMUM PRE-CONSTRUCTION CONDITION.
4. EXACT LOCATION OF UNDERGROUND SERVICES AND UTILITIES ARE APPROX. CONTRACTOR IS RESPONSIBLE FOR COORDINATING LOCATES WITH UTILITIES AND VERIFYING BY EXPOSING PRIOR TO CONSTRUCTION.
5. BEDDING & BACKFILL TO SPECIFICATIONS WITH MINIMUM OF 150mm DEPTH BELOW PIPE INVERT.
6. FINAL MANHOLE RIM ELEVATIONS TO BE SET IN THE FIELD. ADJUST MANHOLE RIMS TO BE 200mm ABOVE FINISHED GRADE ELEVATION AS SHOWN ON DRAWINGS.
7. CONTRACTOR TO PROVIDE AS-BUILT DRAWING TO ENGINEER ONCE CONSTRUCTION COMPLETED.
8. BEDDING SAND IS TO BE COMPACTED UNDER SERVICES, ALONG SIDES OF PIPE WHEN HALF COVERED. SAND TO BE COMPACTED IN MAXIMUM THICKNESS OF 300mm LAYERS.
9. CONTRACTOR IS TO CONFIRM THE INVERT ELEVATION OF THE EXISTING TIE IN MANHOLE AND NOTIFY THE ENGINEER OF ANY DISCREPANCY GREATER THAN 0.05m.
10. TEMPORARY SUPPORT TO BE PROVIDED FOR ALL HYDRO POLES AFFECTED DURING CONSTRUCTION.
11. DRIVEWAYS, ROADS, BOULEVARDS, DITCHES ETC. AFFECTED BY CONSTRUCTION TO BE REINSTATED TO ORIGINAL CONDITION.
12. CLEARING & GRUBBING TO PERMIT ROAD, DRAINAGE, SEWER AND WATER INSTALLATIONS IS CONSIDERED INCIDENTAL TO THE WORKS. CLEARING AND GRUBBING SHALL EXTEND TO A DISTANCE OF 4.0m ON EITHER SIDE OF OF THE PROPOSED SERVICING ALIGNMENT.
13. PIPE CROSSING UNDER ROADS AND PARKING AREAS REQUIRE 100mm INSULATION (SEE BOARD INSULATION DETAIL). ALL BOX INSULATION TO EXTEND A MINIMUM 1.0m PAST ROAD AND PARKING LIMITS.

MANHOLE COORDINATES LOCATION

DESCRIPTION	COORDINATES
MH # 1	N 5773353.1 E 411295.2
MH # 2	N 5773307.8 E 411252.9
MH # 3	N 5773280.7 E 411247.1
MH # 4	N 5773275.1 E 411278.0
SEWAGE LIFT STATION	N 411209.8 E 5 773254.5

FORCEMAIN COORDINATES LOCATION

#	COORDINATES	#	COORDINATES
1		5	
2		6	
3		7	
4		8	

NOTES:

1. VERIFY COORDINATES IN THE FIELD.
2. MANHOLE & LIFT STATION MAY BE SET IN FIELD WITH DIRECTION FROM ENGINEER OR ENGINEER'S REPRESENTATIVE.
3. MAXIMUM SPACING BETWEEN MANHOLES IS 90m.

BENCHMARK COORDINATES

UTM NAD 83 ZONE 14

- BENCHMARK #1: BRASS CAP - 99MH1.1 (IN BEDROCK)
  N: 6213268.9
  E: 653563.7
  Z: 189.0
- BENCHMARK #2: BRASS CAP - 99MH1.2 (IN BEDROCK)
  N: 6212934.5
  E: 653510.5
  Z: 188.5
- BENCHMARK #3: BRASS CAP - 99MH1.3 (IN BEDROCK)
  N: 6212924.7
  E: 653963.5
  Z: 185.9
- BENCHMARK #4: BRASS CAP - 69M5.40 (IN CONCRETE)
  N: 6213310.0
  E: 653288.0
  Z: 186.3
- BENCHMARK #5: BRASS CAP - 69M5.42 (IN CONCRETE)
  N: 6213071.0
  E: 654160.9
  Z: 186.3
- BENCHMARK #6: BRASS CAP - 69M5.43 (IN CONCRETE)
  N: 6213004.6
  E: 654288.6
  Z: 186.3

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
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Manitoba Hydro

AUTHENTICATION FOR CURRENT REVISION

DRAWN: TS/JJ	CHECKED: GP	SCALE: AS NOTED
DESIGNED: PK	DATE: 4/29/2016	

KELSEY GENERATING STATION

FORCEMAIN PLAN & PROFILE

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	G-02	02

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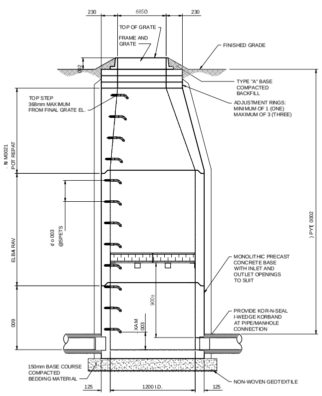
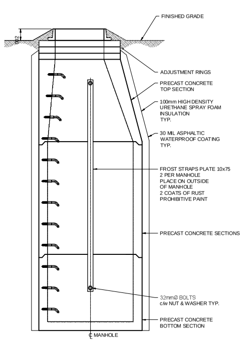


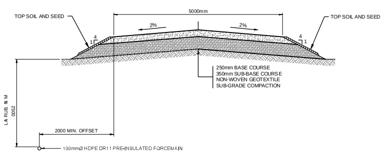
TOP OF GRATE
FRAME AND GRATE
FINISHED GRADE
TYPE "A" BASE COMPACTED BACKFILL
ADJUSTMENT RINGS: MINIMUM OF 1 (ONE) MAXIMUM OF 3 (THREE)
TOP STEP 368mm MAXIMUM FROM FINAL GRATE EL.
MONOLITHIC PRECAST CONCRETE BASE WITH INLET AND OUTLET OPENINGS TO SUIT
PROVIDE KOR-N-SEAL I WEDGE KORBAND AT PIPE/MANHOLE CONNECTION
150mm BASE COURSE COMPACTED BEDDING MATERIAL
NON-WOVEN GEOTEXTILE
1200 I.D.

1200mmØ PRECAST MANHOLE DETAIL
SCALE: N.T.S.



FINISHED GRADE
ADJUSTMENT RINGS
PRECAST CONCRETE TOP SECTION
100mm HIGH DENSITY URETHANE SPRAY FOAM INSULATION TYP.
30 MIL ASPHALTIC WATERPROOF COATING TYP.
FROST STRAPS PLATE 10x75 2 PER MANHOLE PLACE ON OUTSIDE OF MANHOLE 2 COATS OF RUST PROHIBITIVE PAINT
PRECAST CONCRETE SECTIONS
32mmØ BOLTS c/w NUT & WASHER TYP.
PRECAST CONCRETE BOTTOM SECTION
℄ MANHOLE

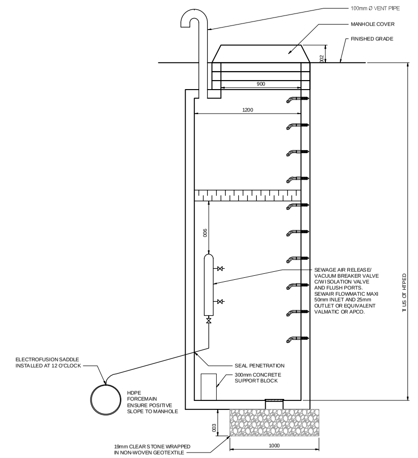
FROST PROTECTION AND STRAP DETAIL
SCALE: N.T.S.



NOTES:

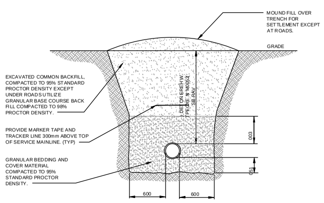
1. ROAD CROSS SECTION DESIGN APPLIES TO NEW ROAD AND LAGOON TRUCK PAD AREA.
2. AVOID CONSTRUCTION OF ROAD DIRECTLY ON EXPOSED BEDROCK.

A ACCESS ROAD CROSS SECTION
SCALE: N.T.S.



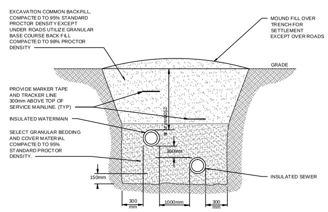
100mm Ø VENT PIPE
MANHOLE COVER
FINISHED GRADE
900
1200
SEWAGE AIR RELEASE/ VACUUM BREAKER VALVE C/W ISOLATION VALVE AND FLUSH PORTS. SEWAIR FLOWMATIC MAXI 50mm INLET AND 25mm OUTLET OR EQUIVALENT VALMATIC OR APCO.
ELECTROFUSION SADDLE INSTALLED AT 12 O'CLOCK
HDPE FORCEMAIN ENSURE POSITIVE SLOPE TO MANHOLE
SEAL PENETRATION
300mm CONCRETE SUPPORT BLOCK
19mm CLEAR STONE WRAPPED IN NON-WOVEN GEOTEXTILE
1000

AIR RELEASE CHAMBER DETAIL
SCALE: N.T.S.



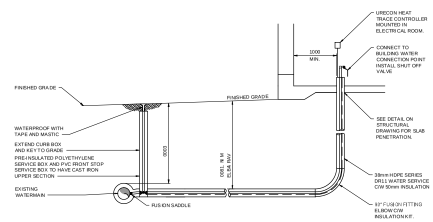
MOUND FILL OVER TRENCH FOR SETTLEMENT EXCEPT AT ROADS.
GRADE
EXCAVATED COMMON BACKFILL, COMPACTED TO 95% STANDARD PROCTOR DENSITY EXCEPT UNDER ROADS UTILIZE GRANULAR BASE COURSE BACK FILL COMPACTED TO 98% PROCTOR DENSITY.
PROVIDE MARKER TAPE AND TRACKER LINE 300mm ABOVE TOP OF SERVICE MAINLINE. (TYP)
GRANULAR BEDDING AND COVER MATERIAL COMPACTED TO 95% STANDARD PROCTOR DENSITY.
600
600

TYPICAL MAINLINE PIPE TRENCH DETAIL (SINGLE PIPE)
SCALE: NTS



EXCAVATION COMMON BACKFILL, COMPACTED TO 95% STANDARD PROCTOR DENSITY EXCEPT UNDER ROADS UTILIZE GRANULAR BASE COURSE BACK FILL COMPACTED TO 98% PROCTOR DENSITY
MOUND FILL OVER TRENCH FOR SETTLEMENT EXCEPT OVER ROADS
GRADE
PROVIDE MARKER TAPE AND TRACKER LINE 300mm ABOVE TOP OF SERVICE MAINLINE. (TYP)
INSULATED WATERMAIN
SELECT GRANULAR BEDDING AND COVER MATERIAL COMPACTED TO 95% STANDARD PROCTOR DENSITY.
INSULATED SEWER
150mm
300
1000mm
300

SEWER AND WATERMAIN COMMON TRENCH DETAIL
SCALE: NTS

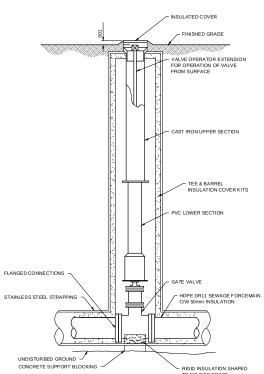


URECON HEAT TRACE CONTROLLER MOUNTED IN ELECTRICAL ROOM.
CONNECT TO BUILDING WATER CONNECTION POINT INSTALL SHUT OFF VALVE
1000 MIN.
FINISHED GRADE
WATERPROOF WITH TAPE AND MASTIC
EXTEND CURB BOX AND KEY TO GRADE
PRE-INSULATED POLYETHYLENE SERVICE BOX AND PVC FRONT STOP SERVICE BOX TO HAVE CAST IRON UPPER SECTION
EXISTING WATERMAIN
FUSION SADDLE
SEE DETAIL ON STRUCTURAL DRAWING FOR SLAB PENETRATION.
38mm HDPE SERIES DR11 WATER SERVICE C/W 50mm INSULATION
90° FUSION FITTING ELBOW C/W INSULATION KIT.

NOTES:

1. PROVIDE STAINLESS STEEL INSERTS AT ALL CONNECTIONS.
2. USE PREMOLDED URETHANE HALVES AND HEAT SHRINK SLEEVES AS SUPPLIED BY URECON, OR APPROVED EQUAL, PRE-INSULATED PIPING SYSTEM TO INSULATE AND SEAL JOINTS.

LIFT STATION BUILDING WATER SERVICE DETAIL
SCALE: N.T.S.

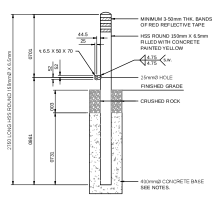


INSULATED COVER
FINISHED GRADE
VALVE OPERATOR EXTENSION FOR OPERATION OF VALVE FROM SURFACE
CAST IRON UPPER SECTION
TEE & BARREL INSULATION COVER KITS
PVC LOWER SECTION
FLANGED CONNECTIONS
STAINLESS STEEL STRAPPING
GATE VALVE
HDPE DR11 SEWAGE FORCEMAIN C/W 50mm INSULATION
UNDISTURBED GROUND CONCRETE SUPPORT BLOCKING
RIGID INSULATION SHAPED TO FIT INTO SPACE BETWEEN INSULATION KIT & UNDERSIDE OF FITTING

NOTES:

1. PROVIDE 1 CUBIC METER OF BASE COURSE GRANULAR BACKFILL AROUND VALVE BASE.

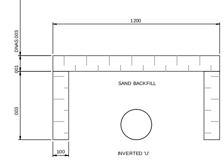
FORCEMAIN VALVE AND BOX DETAIL
SCALE: N.T.S.



NOTES:

1. MATERIAL
ALL ROLLED STEEL MEMBERS SHALL BE IN ACCORDANCE WITH CAN/CSA-G40.21-M92, GRADE 300W.
ALL HOLLOW STRUCTURAL STEEL SECTIONS SHALL BE IN ACCORDANCE WITH CAN/CSA-G40.21-M92, GRADE 350W.
2. WORKMANSHIP
STRUCTURAL STEEL FABRICATION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH CAN/CSA-S16.1-94.
ALL WELDING SHALL CONFORM TO CSA W59-M1989.
WELDING SHALL BE PERFORMED ONLY BY SHOPS WHICH HAVE BEEN CERTIFIED IN ACCORDANCE WITH CSA W47.1-92.
3. GALVANIZING
ALL MATERIALS AND FITTINGS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH CAN/CSA-G164-M92.
4. GROUNDING
BOLLARD SHALL BE GROUNDED ABOVE GRADE ACCORDANCE TO CANADIAN ELECTRICAL CODE 36-308.
5. CONCRETE FOR BASE SHALL HAVE A MINIMUM STRENGTH OF 25 MPa AT 28 DAYS.

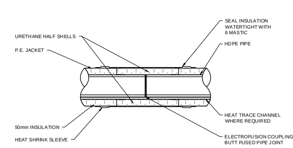
TYPICAL BOLLARD DETAIL
SCALE: N.T.S.



NOTES:

1. TO BE USED WHERE PIPE RUNS UNDER PARKING AREAS, ROADWAYS AND DITCHES, OR AS DIRECTED BY THE ENGINEER.
2. INSULATION TO BE 100mm RIGID POLYSTYRENE TYPE IV. STYROFOAM HI-40 OR APPROVED EQUAL.

BOARD INSULATION DETAIL
SCALE: N.T.S.



TYPICAL INSULATED PIPING JOINT DETAIL
SCALE: N.T.S.

REFERENCE DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
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	1-00000-MC-00000-0000	

GENERAL NOTES:

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4. EXACT LOCATION OF UNDERGROUND SERVICES AND UTILITIES ARE APPROX. CONTRACTOR IS RESPONSIBLE FOR COORDINATING LOCATES WITH UTILITIES AND VERIFYING BY EXPOSING PRIOR TO CONSTRUCTION.
5. BEDDING & BACKFILL TO SPECIFICATIONS WITH MINIMUM OF 150mm DEPTH BELOW PIPE INVERT
6. FINAL MANHOLE RIM ELEVATIONS AND HYDRANT FLANGE ELEVATIONS TO BE SET IN THE FIELD. ADJUST MANHOLE RIMS TO MATCH FINISHED GRADE ELEVATIONS.
7. CONTRACTOR TO PROVIDE AS-BUILT DRAWING TO ENGINEER ONCE CONSTRUCTION COMPLETED.
8. BEDDING SAND IS TO BE COMPACTED UNDER WATER AND SEWER MAINS, ALONG SIDES OF PIPE WHEN HALF COVERED. SAND TO BE COMPACTED IN MINIMUM THICKNESS OF 150mm LAYERS.
9. TEMPORARY SUPPORT TO BE PROVIDED FOR ALL HYDRO POLES AFFECTED DURING CONSTRUCTION
10. DRIVEWAYS, ROADS, BOULEVARDS, DITCHES ETC. AFFECTED BY CONSTRUCTION TO BE REINSTATED TO ORIGINAL CONDITION.
11. EXISTING WATERMAIN AND SEWERMAIN LOCATIONS AND EXISTING INVERT ELEVATIONS ARE APPROXIMATE. CONTRACTOR TO CONFIRM IN FIELD.
12. PIPE CROSSING UNDER ROADS AND PARKING AREAS REQUIRES 100mm BOX INSULATION (SEE DETAIL ON DRAWING G-0 3). ALL BOX INSULATION TO EXTEND 3.0m PAST ROAD AND PARKING LIMITS.
13. REFER TO MECHANICAL DRAWINGS FOR CONNECTIONS TO BUILDING SERVICES.
14. NEW 100mmØ FORCEMAIN TO BE DR11 HDPE .
15. NEW GRAVITY SEWER SERVICES TO BE 250mmØ C/W 50mm INSULATION, MINIMUM SLOPE OF 0.5% .
16. CONTRACTOR TO PROVIDE PHOTOS OF ALL UNDERGROUND SERVICES PRIOR TO COVER WITH MONTHLY PROGRESS REPORTS.
17. CONTRACTOR SHALL NOT COVER UNDERGROUND SERVICES WITHOUT APPROVAL FROM THE ENGINEER .
18. PROVIDE 450mm VERTICAL SEPARATION WHERE WATER AND SEWER LINES INSTALLED IN A COMMON TRENCH WITH PREFERENCE FOR WATER ABOVE.

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
Neegan Burnside Ltd.

REV.	DATE	DESCRIPTION	BY	CKD.	APP.
02	2016-05-13	ISSUED FOR EAP SUBMISSION	JJ	PK	GP
01	2016-04-29	ISSUED FOR 60% CLIENT REVIEW	CPG	PK	GP

Manitoba Hydro

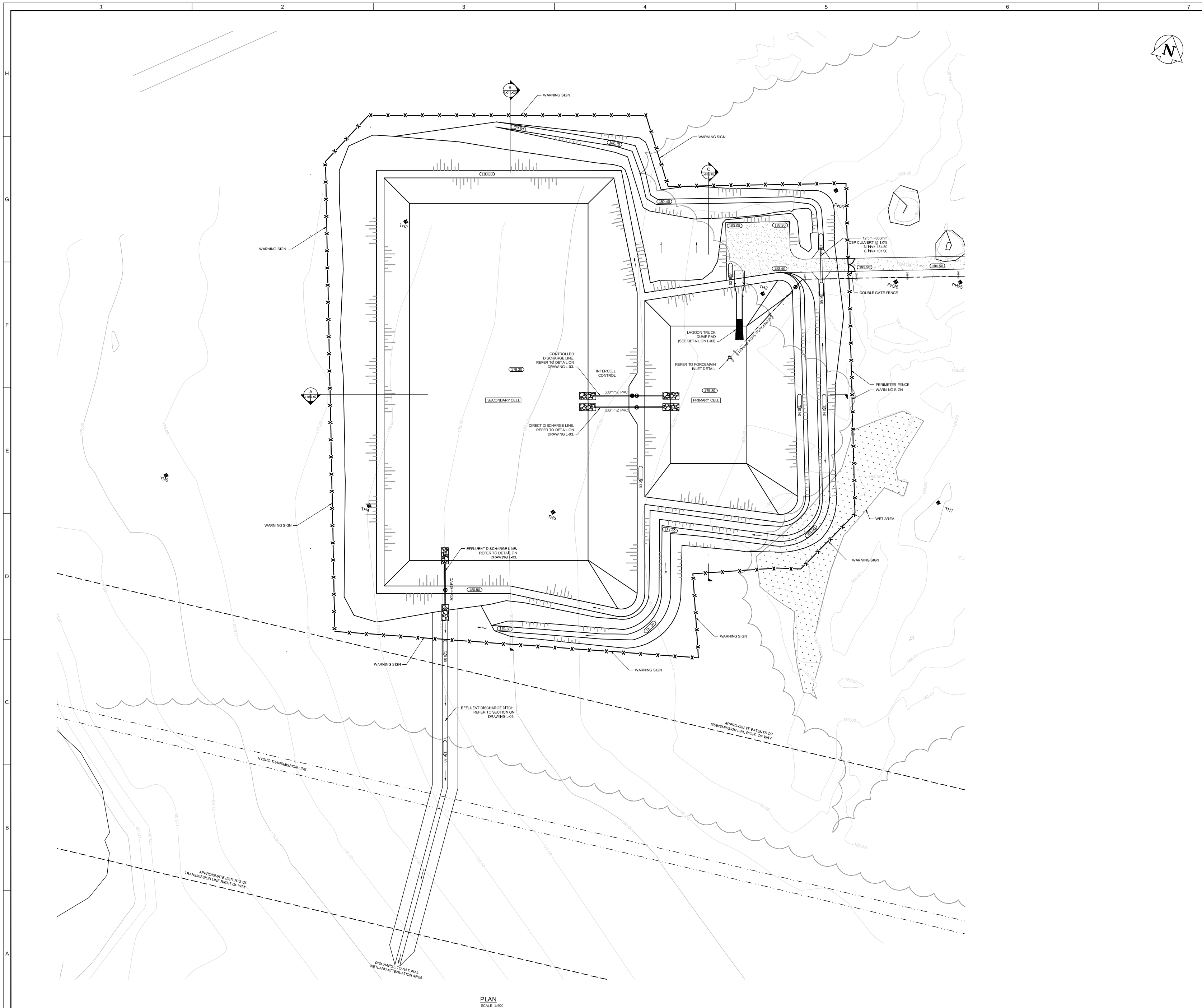
DRAWN: JJ	CHECKED: GP	SCALE: AS NOTED
DESIGNED: PK	DATE: 4/29/2016	

AUTHENTICATION FOR CURRENT REVISION

KELSEY GENERATING STATION

SEWER/WATER DETAILS

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	G-03	02


WARNING SIGN
WARNING SIGN
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WARNING SIGN
WARNING SIGN
WARNING SIGN
WARNING SIGN
WARNING SIGN
12.5m - 600mm CSP CULVERT @ 1.0%
DOUBLE GATE FENCE
LAGOON TRUCK DUMP PAD (SEE DETAIL ON L-03)
REFER TO FORCEMAIN INLET DETAIL
CONTROLLED DISCHARGE LINE. REFER TO DETAIL ON DRAWING L-03.
INTERCELL CONTROL
300mmØ PVC
300mmØ PVC
SECONDARY CELL
PRIMARY CELL
DIRECT DISCHARGE LINE. REFER TO DETAIL ON DRAWING L-03.
PERIMETER FENCE
WET AREA
EFFLUENT DISCHARGE LINE. REFER TO DETAIL ON DRAWING L-03.
EFFLUENT DISCHARGE DITCH. REFER TO SECTION ON DRAWING L-03.
APPROXIMATE EXTENTS OF TRANSMISSION LINE RIGHT OF WAY
HYDRO TRANSMISSION LINE
APPROXIMATE EXTENTS OF TRANSMISSION LINE RIGHT OF WAY
DISCHARGE TO NATURAL WETLAND ATTENUATION AREA
TH1
TH2
TH3
TH4
TH5
TH6
PLAN
SCALE: 1:500

REFERENCE DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
1	1-00000-XX-00000-0000 0000	
	1-00000-MC-00000-0000	

LEGEND - PLAN

EXISTING		PROPOSED	EXISTING		PROPOSED
	SEWERMAIN			HEAT TRACE	
	WATERMAIN			M.T.S.	
	HYDRANT			FORCEMAIN	
	VALVE			CONCRETE	
	MANHOLES			FENCELINE	
	ELEVATIONS			BUILDING	
	FLOW DIRECTION			TEST PIT	
	BENCHMARK			CURB STOP	
	CULVERT			BOLLARD	
OHP	HYDRO POLE			WELL	

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Manitoba Hydro

DRAWN: TS/JJ	CHECKED: GP	SCALE: AS NOTED
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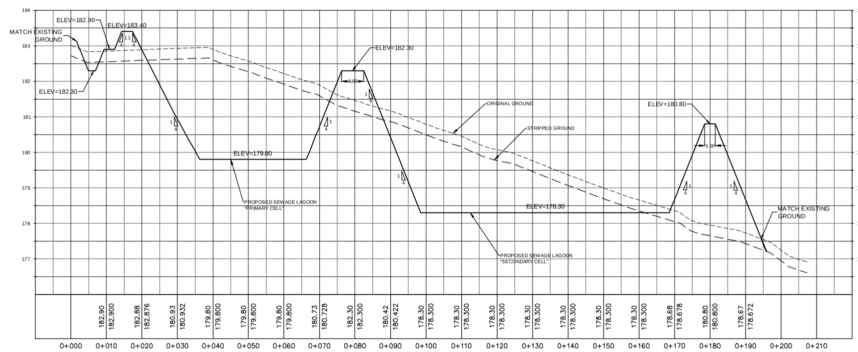
AUTHENTICATION FOR CURRENT REVISION

KELSEY GENERATING STATION

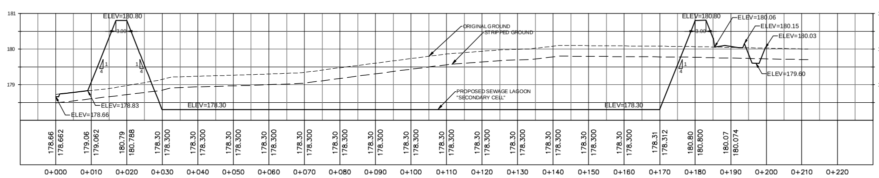
SEWAGE LAGOON PLAN

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	L-01	02

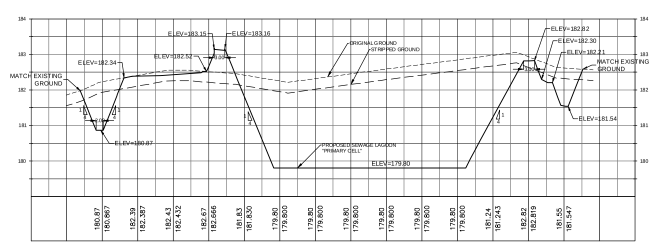
X:\Land Desktop\300037851 MB Hydro Kelsey Sewage Lagoon\dwg\contr\037851 G-02 L-01 L-02.dwg 5/13/2016 10:41 AM


MATCH EXISTING GROUND
ELEV=182.90
ELEV=183.40
ELEV=182.30
ELEV=179.80
ELEV=182.30
PROPOSED SEWAGE LAGOON "PRIMARY CELL"
ORIGINAL GROUND
STRIPPED GROUND
ELEV=178.30
PROPOSED SEWAGE LAGOON "SECONDARY CELL"
ELEV=180.80
MATCH EXISTING GROUND
0+000 0+010 0+020 0+030 0+040 0+050 0+060 0+070 0+080 0+090 0+100 0+110 0+120 0+130 0+140 0+150 0+160 0+170 0+180 0+190 0+200 0+210

A SECTION
SCALE: 1:500 (HORIZONTAL)
1:50 (VERTICAL)


ELEV=180.80
ELEV=178.83
ELEV=178.66
ELEV=178.30
ORIGINAL GROUND
STRIPPED GROUND
PROPOSED SEWAGE LAGOON "SECONDARY CELL"
ELEV=178.30
ELEV=180.80
ELEV=180.06
ELEV=180.15
ELEV=180.03
ELEV=179.60
0+000 0+010 0+020 0+030 0+040 0+050 0+060 0+070 0+080 0+090 0+100 0+110 0+120 0+130 0+140 0+150 0+160 0+170 0+180 0+190 0+200 0+210 0+220

B SECTION
SCALE: 1:500 (HORIZONTAL)
1:50 (VERTICAL)


MATCH EXISTING GROUND
ELEV=182.34
ELEV=180.87
ELEV=182.52
ELEV=183.15
ELEV=183.16
ORIGINAL GROUND
STRIPPED GROUND
PROPOSED SEWAGE LAGOON "PRIMARY CELL"
ELEV=179.80
ELEV=182.82
ELEV=182.30
ELEV=182.21
MATCH EXISTING GROUND
ELEV=181.54
0+000 0+010 0+020 0+030 0+040 0+050 0+060 0+070 0+080 0+090 0+100 0+110 0+120 0+130 0+140 0+150

C SECTION
SCALE: 1:500 (HORIZONTAL)
1:50 (VERTICAL)

REFERENCE DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
1	1-00000-XX-00000-0000 0000	
	1-00000-MC-00000-0000	

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
Neegan Burnside Ltd.

REV.	DATE	DESCRIPTION	BY	CKD.	APP.
02	2016-05-13	ISSUED FOR EAP SUBMISSION	JJ	PK	GP
01	2016-04-29	ISSUED FOR 60% CLIENT REVIEW	CPG	PK	GP

Manitoba Hydro

DRAWN: TS/JJ | CHECKED: GP | SCALE: AS NOTED
DESIGNED: PK | DATE: 4/29/2016

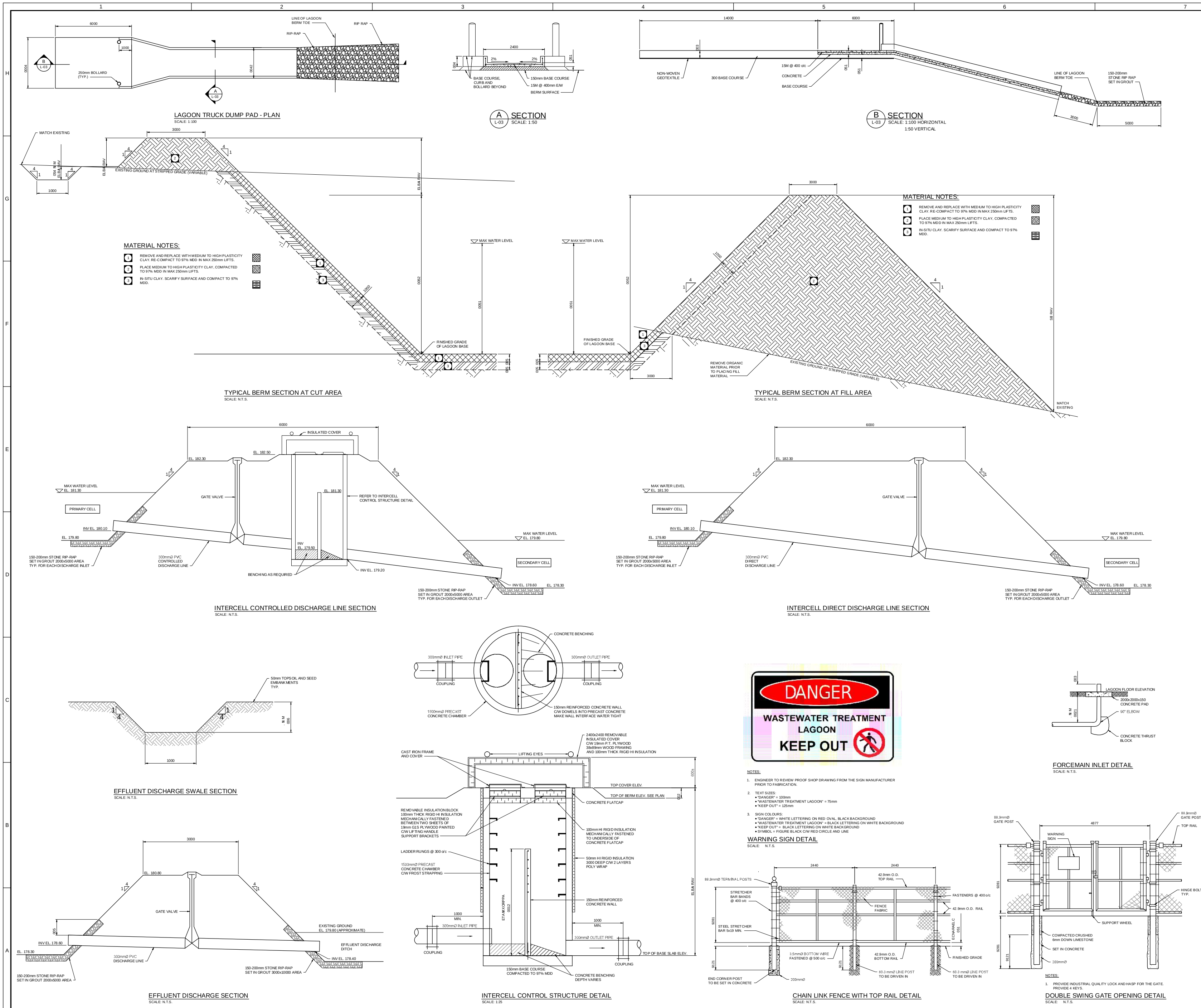
AUTHENTICATION FOR CURRENT REVISION

KELSEY GENERATING STATION

SEWAGE LAGOON SECTIONS

DRAWING NUMBER: 1-00000-EE-00000-0000 | SHEET: L-02 | REVISION: 02

X:\Land Desktop\300037851 MB Hydro Kelsey Sewage Lagoon\dwg\contr\037851 G-02 L-01 L-02.dwg 5/12/2016 3:46 PM


LAGOON TRUCK DUMP PAD - PLAN
SCALE: 1:100
LINE OF LAGOON BERM TOE
RIP-RAP
RIP RAP
250mm BOLLARD (TYP.)
A SECTION
SCALE: 1:50
BASE COURSE, CURB AND BOLLARD BEYOND
150mm BASE COURSE
15M @ 400mm E/W
BERM SURFACE
B SECTION
SCALE: 1:100 HORIZONTAL
1:50 VERTICAL
NON-WOVEN GEOTEXTILE
300 BASE COURSE
15M @ 400 o/c
CONCRETE
BASE COURSE
150-200mm STONE RIP-RAP SET IN GROUT
MATCH EXISTING
EXISTING GROUND AT STRIPPED GRADE (VARIABLE)
MATERIAL NOTES:
1 REMOVE AND REPLACE WITH MEDIUM TO HIGH PLASTICITY CLAY, RE-COMPACT TO 97% MDD IN MAX 250mm LIFTS.
2 PLACE MEDIUM TO HIGH PLASTICITY CLAY, COMPACTED TO 97% MDD IN MAX 250mm LIFTS.
3 IN-SITU CLAY, SCARIFY SURFACE AND COMPACT TO 97% MDD.
MAX WATER LEVEL
FINISHED GRADE OF LAGOON BASE
REMOVE ORGANIC MATERIAL PRIOR TO PLACING FILL MATERIAL
TYPICAL BERM SECTION AT CUT AREA
SCALE: N.T.S.
TYPICAL BERM SECTION AT FILL AREA
SCALE: N.T.S.
INSULATED COVER
GATE VALVE
REFER TO INTERCELL CONTROL STRUCTURE DETAIL
PRIMARY CELL
SECONDARY CELL
300mmØ PVC CONTROLLED DISCHARGE LINE
BENCHING AS REQUIRED
150-200mm STONE RIP-RAP SET IN GROUT 2000x5000 AREA TYP. FOR EACH DISCHARGE INLET
150-200mm STONE RIP-RAP SET IN GROUT 2000x5000 AREA TYP. FOR EACH DISCHARGE OUTLET
300mmØ PVC DIRECT DISCHARGE LINE
INTERCELL CONTROLLED DISCHARGE LINE SECTION
SCALE: N.T.S.
INTERCELL DIRECT DISCHARGE LINE SECTION
SCALE: N.T.S.
50mm TOPSOIL AND SEED EMBANKMENTS TYP.
EFFLUENT DISCHARGE SWALE SECTION
SCALE: N.T.S.
CONCRETE BENCHING
300mmØ INLET PIPE
300mmØ OUTLET PIPE
COUPLING
1500mmØ PRECAST CONCRETE CHAMBER
150mm REINFORCED CONCRETE WALL C/W DOWELS INTO PRECAST CONCRETE MAKE WALL INTERFACE WATER TIGHT
2400x2400 REMOVABLE INSULATED COVER C/W 19mm P.T. PLYWOOD 38x89mm WOOD FRAMING AND 100mm THICK RIGID HI INSULATION
CAST IRON FRAME AND COVER
LIFTING EYES
TOP COVER ELEV.
TOP OF BERM ELEV. SEE PLAN
CONCRETE FLATCAP
REMOVABLE INSULATION BLOCK 100mm THICK RIGID HI INSULATION MECHANICALLY FASTENED BETWEEN TWO SHEETS OF 19mm G1S PLYWOOD PAINTED C/W LIFTING HANDLE SUPPORT BRACKETS
100mm HI RIGID INSULATION MECHANICALLY FASTENED TO UNDERSIDE OF CONCRETE FLATCAP
LADDER RUNGS @ 300 o/c
50mm HI RIGID INSULATION 3000 DEEP C/W 2 LAYERS POLY WRAP
1500mmØ PRECAST CONCRETE CHAMBER C/W FROST STRAPPING
150mm REINFORCED CONCRETE WALL
150mm BASE COURSE COMPACTED TO 97% MDD
CONCRETE BENCHING DEPTH VARIES
TOP OF BASE SLAB ELEV.
INTERCELL CONTROL STRUCTURE DETAIL
SCALE: 1:25
DANGER
WASTEWATER TREATMENT LAGOON
KEEP OUT
NOTES:
1. ENGINEER TO REVIEW PROOF SHOP DRAWING FROM THE SIGN MANUFACTURER PRIOR TO FABRICATION.
2. TEXT SIZES: • "DANGER" = 100mm • "WASTEWATER TREATMENT LAGOON" = 75mm • "KEEP OUT" = 125mm
3. SIGN COLOURS: • "DANGER" = WHITE LETTERING ON RED OVAL, BLACK BACKGROUND • "WASTEWATER TREATMENT LAGOON" = BLACK LETTERING ON WHITE BACKGROUND • "KEEP OUT" = BLACK LETTERING ON WHITE BACKGROUND • SYMBOL = FIGURE BLACK C/W RED CIRCLE AND LINE
WARNING SIGN DETAIL
SCALE: N.T.S.
LAGOON FLOOR ELEVATION
2000x2000x150 CONCRETE PAD
90° ELBOW
CONCRETE THRUST BLOCK
FORCEMAIN INLET DETAIL
SCALE: N.T.S.
EXISTING GROUND EL. 179.80 (APPROXIMATE)
EFFLUENT DISCHARGE DITCH
150-200mm STONE RIP-RAP SET IN GROUT 3000x10000 AREA
150-200mm STONE RIP-RAP SET IN GROUT 2000x5000 AREA
300mmØ PVC DISCHARGE LINE
EFFLUENT DISCHARGE SECTION
SCALE: N.T.S.
88.9mmØ TERMINAL POSTS
STRETCHER BAR BANDS @ 400 o/c
STEEL STRETCHER BAR 5x19 MIN.
42.9mm O.D. TOP RAIL
FENCE FABRIC
FASTENERS @ 400 o/c
42.9mm O.D. RAIL
3.5mmØ BOTTOM WIRE FASTENED @ 500 o/c
42.9mm O.D. BOTTOM RAIL
60.3 mmØ LINE POST TO BE DRIVEN IN
FINISHED GRADE
END CORNER POST TO BE SET IN CONCRETE
CHAIN LINK FENCE WITH TOP RAIL DETAIL
SCALE: N.T.S.
88.9mmØ GATE POST
TOP RAIL
WARNING SIGN
HINGE BOLT TYP.
SUPPORT WHEEL
COMPACTED CRUSHED 6mm DOWN LIMESTONE
SET IN CONCRETE
NOTES:
1. PROVIDE INDUSTRIAL QUALITY LOCK AND HASP FOR THE GATE. PROVIDE 4 KEYS.
DOUBLE SWING GATE OPENING DETAIL
SCALE: N.T.S.

REFERENCE DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
1	1-00000-XX-00000-0000 0000	
	1-00000-MC-00000-0000	

GENERAL NOTES

PRELIMINARY
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Neegan Burnside Ltd.

REV.	DATE	DESCRIPTION	BY	CKD.	APP.
02	2016-05-13	ISSUED FOR EAP SUBMISSION	JJ	PK	GP
01	2016-04-29	ISSUED FOR 60% CLIENT REVIEW	CPG	PK	GP

Manitoba Hydro

AUTHENTICATION FOR CURRENT REVISION

DRAWN: CT	CHECKED: GP	SCALE: AS NOTED
DESIGNED: PK	DATE: 4/29/2016	

KELSEY GENERATING STATION

LAGOON DETAILS

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	L-03	02

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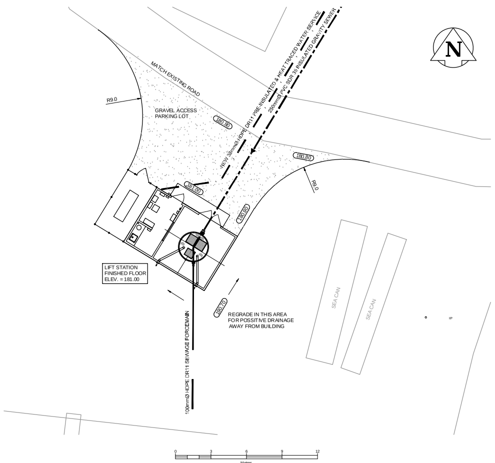
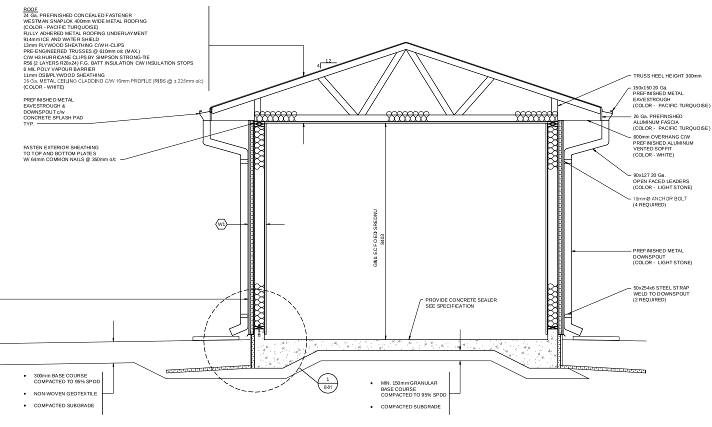
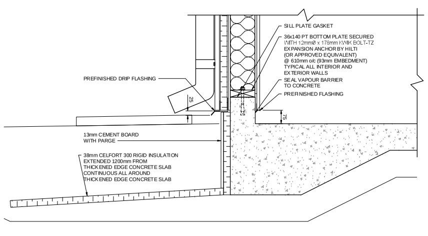


LIFT STATION AREA SITE PLAN
SCALE: 1:150



A / B-01 SECTION
SCALE: 1:25



1 / B-01 DETAIL
SCALE: 1:10

DOOR SCHEDULE

QUANTITY	NUMBER	DOOR SIZE	MATERIAL	FINISH	RATING (HOURS)	REMARKS	FRAME	HARDWARE CODES
1	D100	1829x2130x45	METAL , INSULATED	PAINTED		DOUBLE DOOR, STEEL STIFFENED	INSULATED PRESSED STEEL	A, B, C, D, F, G, I, J, K, L, M, P
1	D200	1067x2130x45	METAL , INSULATED	PAINTED		STEEL STIFFENED	INSULATED PRESSED STEEL	A, B, C, D, F, G, I, J, K, L, M, P, S

A. BUTT HINGES
B. DOOR CLOSER
C. SELF-LATCHING HARDWARE
D. DEADBOLT
E. PASSAGE SET
F. PANIC SET
G. PUSH/PULL
H. BARRIER FREE HARDWARE
I. KICK PLATE
J. DOOR STOP
K. WEATHER STRIPPING
L. THRESHOLD
M. SWEEP
N. KEY ACCESS FROM EXIT
O. WASHROOM SET (PRIVATE)
P. WIND LIMITER (INTEGRAL WITH CLOSER)
Q. UNIVERSAL BARRIER FREE SIGNAGE
R. POWER DOOR OPERATOR
S. FULL LENGTH ASTRAGAL

NOTES:
1. PASSAGE HARDWARE INSTALLED AT 1000mm AFF.
2. ALL DOOR SWINGS AS SHOWN ON BUILDING MAIN FLOOR PLAN ON THIS DRAWING.

WINDOW SCHEDULE

A
O.S.M. LOW E DOUBLE GLAZED PICTURE WINDOW
PVC FRAME C/W 41mm BRICKMOULD
FIN AND JAMB EXTENSIONS TO SUIT WALL CONSTRUCTION
(COLOR - WHITE)
(ROUGH OPENING 1220mmWx2420mmH)
JELD-WEN SERIES ES7000 OR APPROVED EQUAL.

PICTURE WINDOW MOUNT 1000mm A.F.F.

1200 × 1800

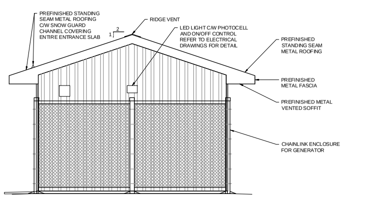
WALL SCHEDULE

W1
EXTERIOR WALL (1 HR FIRE RATING)
26 ga. /35mm PROFILE EXTERIOR VERTICAL METAL CLADDING C/W RIBS @ 100mm o/c
38mm DEEP 24 ga. GALVANIZED HORIZONTAL Z-GIRTS @ 610 o/c
38mm TYPE 2 RIGID INSULATION
TYVEK AIR BARRIER
13mm CSP EXTERIOR GRADE SHEATHING
R20 FIBREGLASS BATT INSULATION
38mmx140mm WOOD STUDS @ 406mm o/c
6 MIL POLY VAPOUR BARRIER
16mm COATED FIBERGLASS MAT FACE TYPE 'X' MOISTURE RESISTANT DRYWALL
26 ga. /16mm PROFILE INTERIOR VERTICAL METAL CLADDING C/W RIBS @ 225 o/c
258

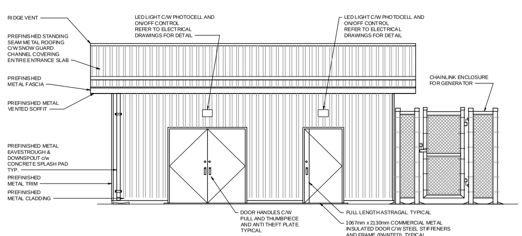
W1A
EXTERIOR WALL (1 HR FIRE RATING)
26 ga. /35mm PROFILE EXTERIOR VERTICAL METAL CLADDING C/W RIBS @ 100mm o/c
38mm DEEP 24 ga. GALVANIZED HORIZONTAL Z-GIRTS @ 610 o/c
38mm TYPE 2 RIGID INSULATION
TYVEK AIR BARRIER
13mm CSP EXTERIOR GRADE SHEATHING
R20 FIBREGLASS BATT INSULATION
38mmx140mm WOOD STUDS @ 406mm o/c
6 MIL POLY VAPOUR BARRIER
16mm PLYWOOD BACKING (FOR SECURING CABINETS ETC.)
16mm COATED FIBERGLASS MAT FACE TYPE 'X' MOISTURE RESISTANT DRYWALL
26 ga. /16mm PROFILE INTERIOR VERTICAL METAL CLADDING C/W RIBS @ 225 o/c

W2
INTERIOR PARTITION WALL (1 HR FIRE RATING)
26 ga. /16mm PROFILE INTERIOR VERTICAL METAL CLADDING C/W RIBS @ 225 o/c
16mm COATED FIBERGLASS MAT FACE TYPE 'X' MOISTURE RESISTANT DRYWALL
38mmx140mm WOOD STUDS @ 406mm o/c
MINERAL WOOL INSULATION
16mm COATED FIBERGLASS MAT FACE TYPE 'X' MOISTURE RESISTANT DRYWALL
26 ga. /16mm PROFILE INTERIOR VERTICAL METAL CLADDING C/W RIBS @ 225 o/c

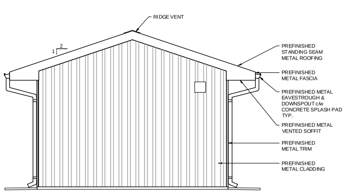
W3
INTERIOR WALL
26 ga. /16mm PROFILE INTERIOR VERTICAL METAL CLADDING C/W RIBS @ 225 o/c
16mm PLYWOOD
38mmx140mm WOOD STUDS @ 406mm o/c
16mm PLYWOOD
26 ga. /16mm PROFILE INTERIOR VERTICAL METAL CLADDING C/W RIBS @ 225 o/c



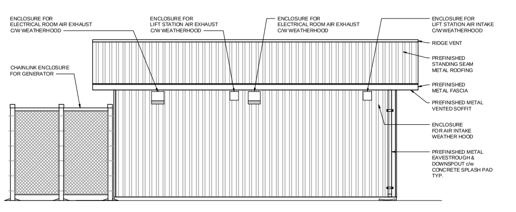
WEST ELEVATION
SCALE 1:50



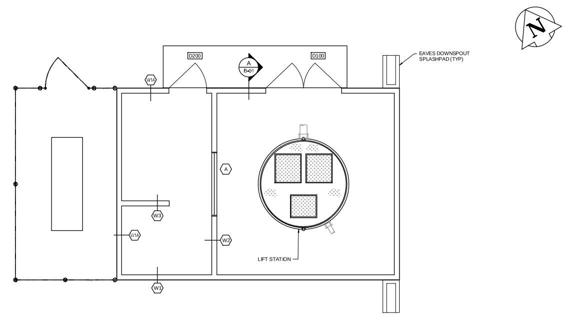
NORTH ELEVATION
SCALE 1:50



EAST ELEVATION
SCALE 1:50



SOUTH ELEVATION
SCALE 1:50



LIFT STATION BUILDING WALL TYPES
SCALE 1:50

REFERENCE DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
◇	1-00000-XX-00000-0000 0000	
◠	1-00000-MC-00000-0000	

GENERAL NOTES

1. ENTER NOTES HERE.

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
Neegan Burnside Ltd.

REV.	DATE	DESCRIPTION	BY	CKD.	APP.
02	2016-05-13	ISSUED FOR EAP SUBMISSION	JJ	PK	GP
01	2016-04-29	ISSUED FOR 60% CLIENT REVIEW	CPG	PK	GP

Manitoba Hydro

DRAWN: CPG	CHECKED: GP	SCALE: AS NOTED
DESIGNED: PK	DATE: 4/29/2016	

AUTHENTICATION FOR CURRENT REVISION

KELSEY GENERATING STATION

LIFT STATION BUILDING PLANS ELEVATIONS AND DETAILS

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	B-01	02

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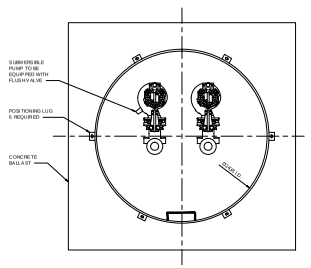
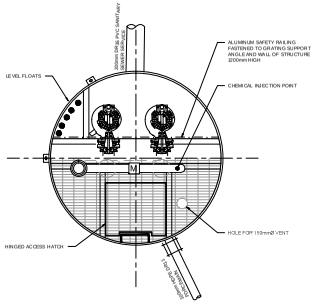
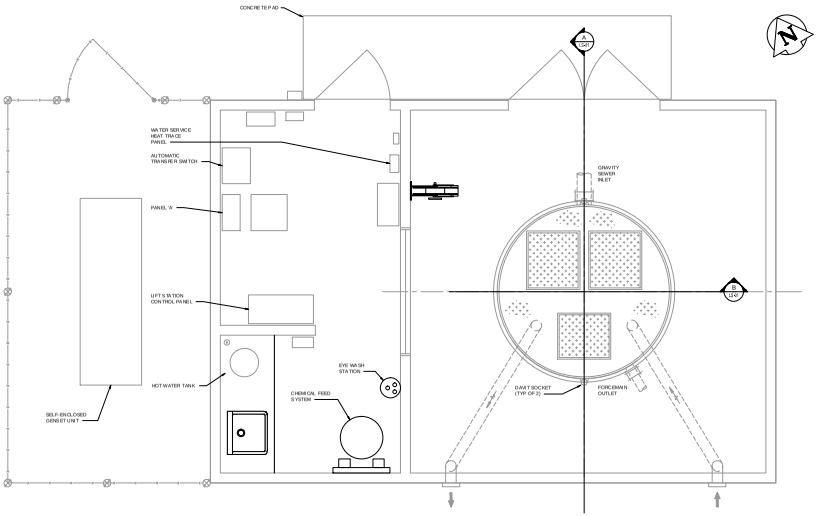


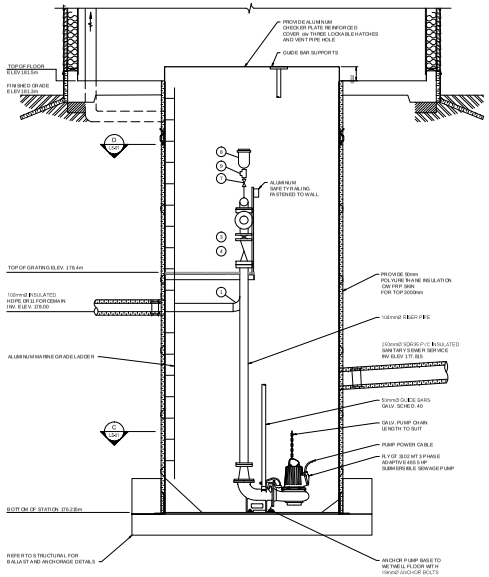
C LS-01 SECTION AT LIFT STATION BASE
SCALE: 1:25



D LS-02 SECTION AT INTERMEDIATE PLATFORM
SCALE: 1:25



LIFT STATION BUILDING
PLAN
SCALE: 1:25



A LS-02 SECTION
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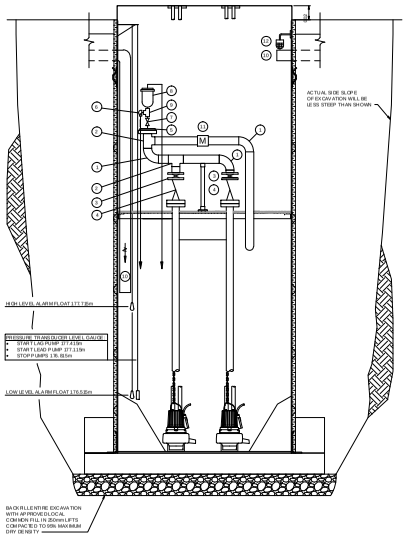

B LS-01 SECTION
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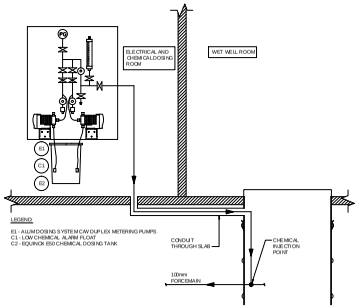
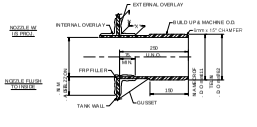


LIFT STATION BUILDING
CHEMICAL INJECTION DETAIL
SCALE: N.T.S.

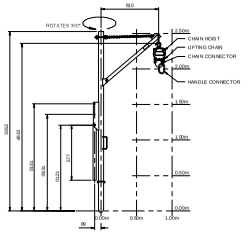
PARTS LIST	
MARK	DESCRIPTION
1	100mm 90° ELBOW
2	100mm TEE
3	100mm EPOXY COATED BALL CENTRIC PLUG VALVE
4	100mm BALL CHECK VALVE
5	REDUCING COMPANION FLANGE
6	150mm 90° ELBOW
7	150mm DATE VALVE
8	AIR RELEASE VALVE APCO OR EQUAL
9	150mm TEE
10	150mm S.S. VENT C/W INSECT SCREEN
11	100mm MAGNETIC FLOW METER
12	EXPLOSION PROOF LIGHT



NOTES:

1. A MINIMUM OF 2 LAYERS OF WOVEN ROVING IS REQUIRED FOR NOZZLE PORTION OF OVERLAY. 'MIN' FOR TION OF OVERLAY SHALL BE SAME THICKNESS AS TANK WALL. DIMENSION 'X' SHALL BE GREATER THAN ONE HALF THE NOZZLE DIAMETER. INTERNAL OVERLAY TO HAVE A MINIMUM OF 2 LAYERS MATT. FRP REINFORCING MATERIAL TO BE CUT TO A SHAPE TO ENSURE A SMOOTH LAMINATE.
2. O.D.'S REFER TO MINIMUM THICKNESSES REQUIRED FOR ADEQUATE NOZZLE STRENGTH. TO BE CONNECTED TO EXTERIOR PIPING WITH A ROMAC TRANSITION COUPLER OR EQUAL. VERIFY OUTSIDE DIAMETERS OF INLET PIPE AND FORCEMAIN WITH PIPE SUPPLIER PRIOR TO MANUFACTURE.

NOZZLE DETAIL
SCALE: N.T.S.



LIFTING DAVIT DETAIL
SCALE: N.T.S.

REFERENCE DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
1	1-00000-XX-00000-0000 0000	
	1-00000-MC-00000-0000	

GENERAL NOTES

1. ALL INTERNAL LIFT STATION PIPING TO BE SCHEDULE 10 STAINLESS STEEL, AS PER TECHNICAL SPECIFICATIONS. REQUIRED TO COMPLETE THE PIPING SYSTEM AND CONNECT TO LIFT STATION EQUIPMENT.
2. ALL LIFT STATION FITTINGS TO BE STAINLESS STEEL, AS PER TECHNICAL SPECIFICATIONS. FITTINGS TO BE WELDED TO ASTM A778 AND FLANGED CONNECTIONS SHALL BE WITH RAISED FACE SLIP-ON FLANGES.
3. ALL METAL WORK EXCEPT ALUMINUM, STAINLESS STEEL, OR GALVANIZED STEEL SHALL BE PAINTED WITH TWO COATS OF RUST INHIBITING EPOXY.
4. CONDUCT ALL EXCAVATION AND TRENCHING IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
5. INSTALL LIFT STATION BARREL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
6. EXTERIOR ABOVE GRADE TO HAVE GELCOAT (COLOR DARK GREEN).
7. PROVIDE A PADLOCK WITH FOUR KEYS.
8. LAYOUT OF PIPE AND FITTINGS IS APPROXIMATE. TO BE SET IN THE FIELD BY THE CONTRACTOR.
9. PROVIDE ALUMINUM PIPE SUPPORTS AS REQUIRED TO PREVENT MOVEMENT OF PIPES.
10. LIFT STATION TO BE SECURED TO CONCRETE BALLAST PAD USING WEDGE ANCHORS APPROVED BY THE ENGINEER.
11. HATCHES TO BE SEALED AND AIR TIGHT.

PRELIMINARY
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Nexgen Burnside Ltd.

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Manitoba Hydro

AUTHENTICATION FOR CURRENT REVISION

DRAWN: CPG | CHECKED: GP | SCALE: AS NOTED
DESIGNED: PK | DATE: 4/29/2016

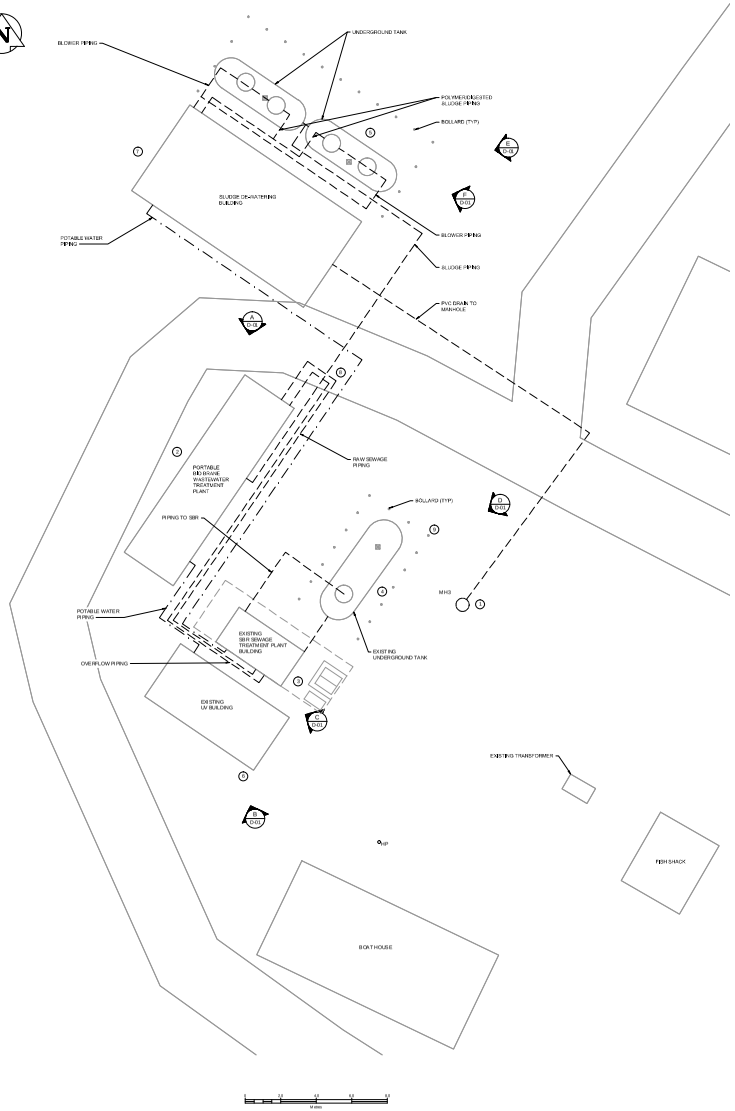
KELSEY GENERATING STATION

LIFT STATION PROCESS MECHANICAL

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	M-01	02

X:\Land Desktop\3000378\51 MB Hydro Kelsey Sewage Lagoon\dwg\con#037851 M-01.dwg 5/10/2016 11:39 AM

11 x 17 (Tabloid)



EXISTING WASTEWATER TREATMENT FACILITY DECOMMISSIONING PLAN
SCALE: 1:300

A D-01 BIO BRANE LOOKING EAST
SCALE: N.T.S.

B D-01 UV BUILDING LOOKING NORTH
SCALE: N.T.S.

C D-01 UV AND SBR CONNECTION LOOKING WEST
SCALE: N.T.S.

D D-01 TRANSFER TANK LOOKING SOUTH
SCALE: N.T.S.

E D-01 SLUDGE DE-WATERING BUILDING LOOKING SOUTHWEST
SCALE: N.T.S.

F D-01 SLUDGE TANKS LOOKING WEST
SCALE: N.T.S.

REFERENCED DRAWINGS

CODE	DRAWING NUMBER	DRAWING TITLE
1	1-00000-XX-00000-0000 0000	
	1-00000-MC-00000-0000	

GENERAL NOTES

1. DECOMMISSIONING OF EXISTING SBR AND BIO BRANE WASTEWATER TREATMENT PLANTS AND ASSOCIATED APPURTENANCES TO BE COMPLETED AFTER NEW WASTEWATER TREATMENT LAGOON HAS BEEN PUT INTO OPERATION. DECOMMISSIONING SHALL IN NO WAY IMPACT THE PROVISION OF SERVICES.
2. ALL MATERIAL SPECIFIED TO BE REMOVED FROM THE SITE IS THE RESPONSIBILITY OF THE CONTRACTOR FOR DISPOSAL OR SALVAGING.
3. MATERIAL AND EQUIPMENT SPECIFIED TO BE SLAVAGED AND RELOCATED TO BE MOVED TO A DESIGNATED AREA APPROVED BY THE CLIENT.
4. FILL AND LEVEL AREA ONCE UNDERGROUND TANKS AND INFRASTRUCTURE (PIPING ETC.) HAVE BEEN REMOVED WITH BORROW MATERIAL THAT SHALL BE COMPACTED COMMON FILL, CONFORMING TO SPECIFICATIONS.
5. LOCATION AND SIZES OF EXISTING BUILDINGS AND EQUIPMENT ARE APPROXIMATE. CONTRACTOR IS RESPONSIBLE FOR CONFIRMING INFORMATION IN THE FIELD.
6. SEE DECOMMISSIONING NOTES AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

DECOMMISSIONING NOTES

1. CONNECT NEW GRAVITY SEWER LINE TO EXISTING MANHOLE AS SHOWN ON DRAWING G-02. DISCONNECT AND PLUG LINE TO SBR TRASH TANK. ENCSURE SYSTEM IS NOPERATION.
2. DECOMMISSION AND REMOVE BIO BRANE SYSTEM SUCH THAT NO COMPONENTS REMAIN.
3. DECOMMISSION AND REMOVE ESBR BUILDING SUPERSTRUCTURE AND UNDERGROUND TANKAGE, SUCH THAT NO COMPONENTS REMAIN. BACKFILL AND LEVEL WITH COMPACTED COMMON FILL APPROVED BY THE ENGINEER.
4. REMOVE BURIED TRANSFER TANKAGE FROM SITE, BACKFILL AND LEVEL WITH COMPACTED COMMON FILL APPROVED BY THE ENGINEER.
5. REMOVE BURIED SLUDGE TANKAGE FROM SITE, BACKFILL AND LEVEL WITH COMPACTED COMMON FILL APPROVED BY THE ENGINEER. ALL SOLID SLUDGEMEETING REQUIREMENTS OF THE EXISTING LICENSE LIMIT MAY BE DISPOSEDOF AT THE EXISTING SLUDGE DISPOSAL GROUNDS. ALL LIQUID SLUDGE NOT MEETING SOLIDS REQUIREMENTS FOR DISPOSAL AT SLUDGE DISPOSAL GROUNDS MAY BE DISPERSED UPON INSIDE SLOPES OF LAGOON EMBANKMENTS AFTER TOPSOIL AND SEEDING.
6. REMOVE ALL PROCESS EQUIPMENT FROM UV BUILDING AND DISPOSE OF OFF SITE. DECOMMISSION AND REMOVE UV BUILDING COMPLETELY. RELOCATE ELECTRICAL SERVICE PANEL FROM EXTERIOR OF UV BUILDING AND COORDINATE RELOCATION WITH OWNER.
7. REMOVE ALL PROCESS EQUIPMENT FROM SLUDGE DE-WATERING BUILDING AND DECOMMISSION AND REMOVE BUILDING FROM SITE COMPLETELY. COORDINATE SALVAGE OF WATER HUS WITH OWNER.
8. REMOVE ALL UNDERGROUND PIPING CONNECTED TO EXISTING SEWAGE TREATMENT SYSTEMS AND DISPOSE OF OFF SITE.
9. REMOVE ALL BOLLARDS ASSOCIATED WITH UNDERGROUND TANKAGE REFERENCED IN ITEMS 4 AND 5 AND DISPOSE OF OFF SITE.

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
Newgen Engineering Ltd.

REV	DATE	DESCRIPTION	BY	CKD	APP
02	2016-05-13	ISSUED FOR EAP SUBMISSION	JJ	PK	GP
01	2016-04-29	ISSUED FOR 60% CLIENT REVIEW	CPG	PK	GP

Manitoba Hydro

AUTHENTICATION FOR CURRENT REVISION

DRAWN: JJ	CHECKED: GP	SCALE: AS NOTED
DESIGNED: PK	DATE: 4/29/2016	

KELSEY GENERATING STATION

SEWAGE TREATMENT FACILITIES DECOMMISSIONING PLAN

DRAWING NUMBER	SHEET	REVISION
1-00000-EE-00000-0000	D-01	02

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