



April 22, 2016

File No. 15-1736-008

Manitoba Conservation and Water Stewardship
Environmental Approvals Branch
Suite 160 -123 Main Street
Winnipeg, Manitoba
R3C 1A5

ATTENTION: Mr. Bruce Webb
Water Development and Control Assessment Officer

RE: Churchill Marine Observatory, Environment Act Proposal
File number: 5803.00
License Amendment

3rd Floor
865 Waverley Street
Winnipeg,
Manitoba
R3T 5P4
204.896.1209
fax: 204.896.0754
www.kgsgroup.com

Dear Mr. Webb:

On behalf of the University of Manitoba, KGS Group has prepared this notice to update you on proposed project changes from the Environment Act Proposal (EAP) submitted November 9, 2015 for licencing approval to construct and operate the Churchill Marine Observatory (CMO). The proposed changes from the EAP are provided in the paragraphs below. This information is being provided for inclusion in the project file and so that you can continue processing the proposal. Supporting information is enclosed with this letter, when necessary, as identified in the following paragraphs.

Proposed Changes

Since the EAP was submitted there have been 3 changes to the project description, which are described in greater detail in the paragraphs below:

- 1) The project site layout has been optimized to reduce construction costs and decrease the already limited potential adverse effects.
- 2) An alternate route for the utilidor and water intake pipe (with pump house) has been devised as an agreement was not able to be reached with OmniTrax to cross their land, as originally proposed.
- 3) The exhaust fume hood and HEPA filter system has been eliminated from the design.

The project site layout has been modified slightly from that proposed in the EAP and from what was previous issued as Figure 2 of the letter dated February 1, 2016 (Figures 1 and 2). The garages, labs and OSIM tanks have been relocated slightly west of their previous locations and the number of access points for the site has been reduced from 3 to 1. The parking area remains to the west of the facility and the outside boat storage is still proposed to be south of the facility. The proposed new layout has been optimized to reduce the amount of rock blasting required at the site. Reducing the rock blasting both reduces the project cost but more importantly reduces potential adverse effects to the environment associated with the blasting.

The route of the utilidor and location of the water intake pipe and pump house has changed from what was proposed in the EAP. To date an agreement has not been reached with OmniTrax for the utilidor, water intake pipe and pump house to be located on OmniTrax land and; therefore, an alternate route has been selected on federal crown land and the water intake pipeline route and pump house location has been modified as shown in Figure 1. The water will be delivered to the CMO through the utilidor, which crosses the Parks Canada and Transport Canada property and will go beneath the access road that runs to the shoreline to the Provincial Crown Land on which the CMO is located. The exact final alignment for the section of pipeline that will be installed at the shoreline using Horizontal Directional Drilling (HDD) cannot be confirmed until test drilling is conducted. It is however expected to be within at least 10 to 20 m of the alignment shown in Figure 1. The change in the proposed utilidor route will result in minimal changes in environmental effects from the original assessment provided in the EAP.

In addition to the change in the utilidor route, it will now be buried in order to reduce its visibility. In the EAP, it was stated that the utilidor would run along the ground from the OSIM facility to the pump house at the shoreline of the river. Burying the utilidor will require some additional blasting to create a trench and approximately 300m³ of material will be affected. Most of the proposed utilidor route will be beneath the shoulder area of the adjacent access road right-of-way. The new utilidor route will require the same activities as described in the EAP with the main differences being that the utilidor will be buried and a slightly shorter portion of the pipeline will be on the river bottom and longer portion of pipeline will be on land.

It is proposed that the fume hood and HEPA filter system will be eliminated from the project based on the very short duration (6 minutes/month) of the oil burn tests, Manitoba air quality regulation, and the very limited practicality of a HEPA filter for very hot emissions.

The duration of the proposed combustion of 45 L of crude oil on a 1.5 m by 1.5 m pan with an oil thickness of 20 mm is calculated to be just under 6 minutes using a burning rate of 0.062 mm/s. This would produce a total of 6 kg of smoke particulates using a very conservative 14% smoke yield, defined as the mass of smoke particulate produced per mass of fuel consumed. Based on the projection of natural diffusion of the plume, the particulate concentration is calculated to be less than 5 ug/m³ in air without wind at a distance of 1 km from the proposed burning site. The distance from the proposed site to the nearest residential area is over 1 km. Based on criteria monitoring for 24 hour average, there should be no measurable levels of particulates at the town and residential area with a burning time of 6 minutes.

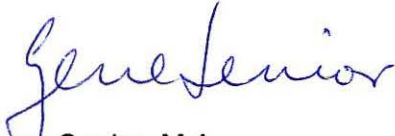
The current Manitoba air quality regulation focuses on industrial air emissions on a more or less continuous basis. The industrial systems are based on large robust systems such as wet scrubbers designed for year round operation for particulate removal. Air quality is determined by the types and level of suspended particulate and gases in the air. Combustion of hydrocarbon fuel (crude oil) releases smoke, a complex suspended mixture of small particles and liquid droplets, into the air which are defined as Particulate Matter (PM). The regulations are focused on particulates that are 10 micrometers (PM₁₀) in diameter and smaller because these particulates can enter the human respiration system. The Objectives and Guidelines for Various Air Pollutants: Ambient Air Quality Criteria in Manitoba follows the Canada-Wide Standard with a maximum acceptable level concentration (MAC) of 30 ug/m³ of air for PM_{2.5} and 50 ug/m³ of air for PM₁₀ based on a 24 hour envelope.

In addition, a review of crude oil burn experiment literature determined that the flame from the oil-burn-on-ice experiments would extend 3 to 4 meters in the air with hot gas a few meters higher. The literature did not show the use of a HEPA collection system and there is no real

practicality for using a flammable HEPA filter for these experiments. As well, the regulation framework is focused on continuous industrial discharges as noted above with large wet scrubbers for particulate management. Therefore the fume hood and HEPA filter are no longer being proposed.

Should you require any additional information or have any questions regarding the proposed changes, please contact the undersigned at 204-896-1209.

Yours truly,

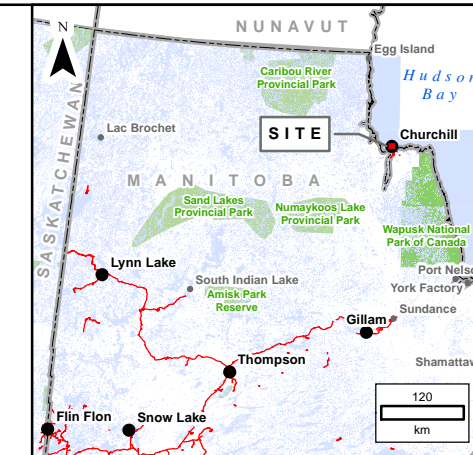
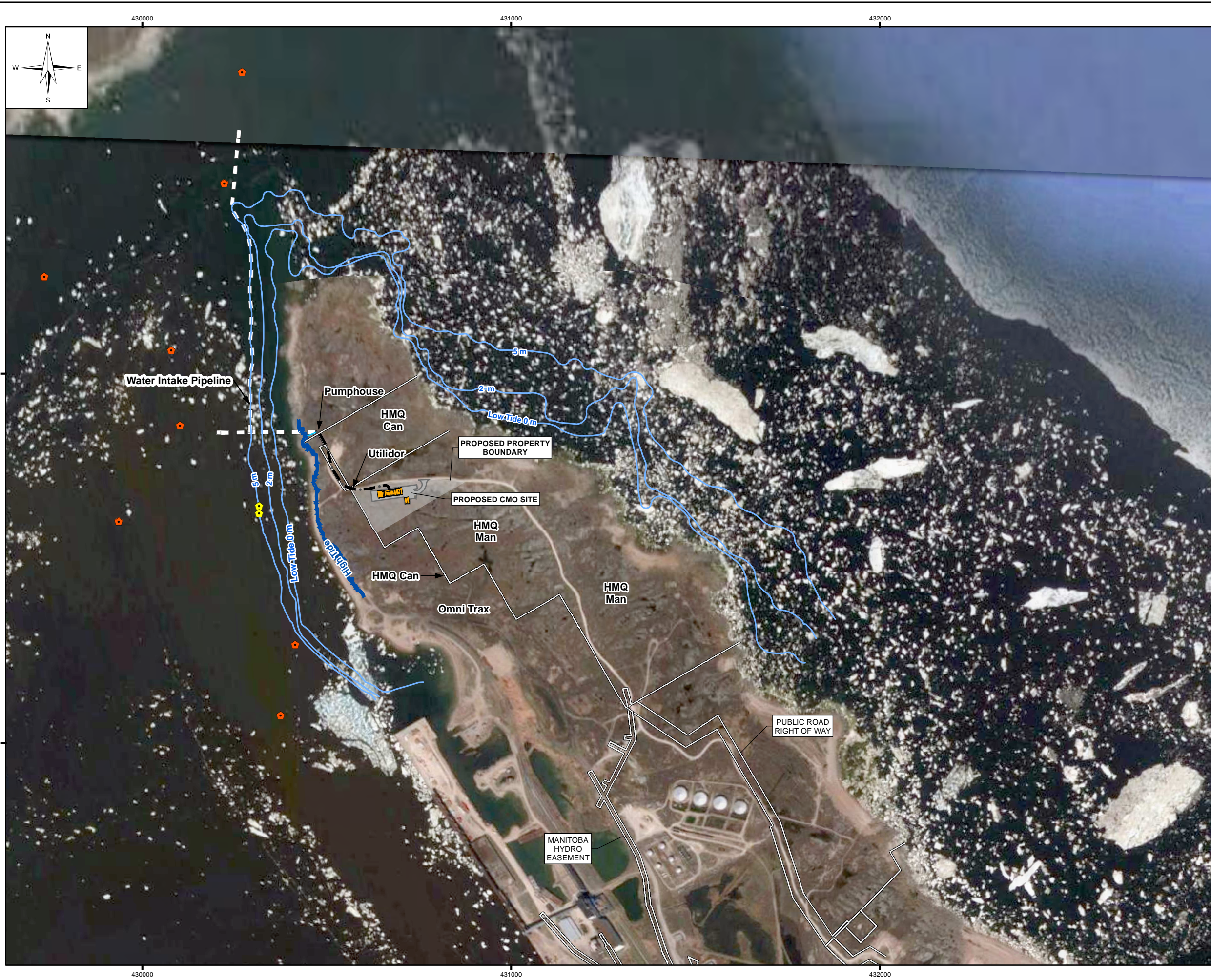
A handwritten signature in blue ink that reads "Gene Senior". The signature is written in a cursive, flowing style.

Gene Senior, M.A.
Environmental Scientist

GS/jr

cc: David Barber, University of Manitoba
Jackie Cooney-Birch, University of Manitoba
Melissa McAlister, Prairie Architects
Rudy Derksen, KGS Group

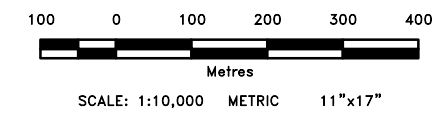
FIGURES



LEGEND:

- Existing Buoy
- Proposed Buoy
- High Tide Level (Estimated)
- Bathymetry Contour
- Proposed Water Intake Pipeline
- Above Ground Water Discharge Pipeline
- Utilidor (Proposed)
- Limits of Crown Land (approximate)
- CMO Building (Proposed)
- Pumphouse (Proposed)
- Access Roadways (Proposed)
- Property Boundary (Proposed)

- Notes:**
1. Imagery as shown supplied by Google Earth.
 2. Bathymetry shown obtained from Fisheries and Oceans chart 5640 dated May 10, 2013.
 3. Linework displayed is approximate only.
 4. Limits of Her Majesty the Queen (HMQ) at this time are approximate based on information received from the Province of Manitoba.
 5. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 15. Elevations are in metres above sea level (MSL).



| NO. | YY/MM/DD | DESCRIPTION | ISSUED BY | CHECK BY |
|-----|----------|------------------------------------|-----------|----------|
| 2 | 16/04/15 | RE-ISSUED FOR ENVIRONMENTAL REPORT | SFM | MSW |
| 1 | 16/01/29 | RE-ISSUED FOR ENVIRONMENTAL REPORT | RED | SFM |
| 0 | 15/11/06 | ISSUED FOR ENVIRONMENTAL REPORT | RED | MSW |

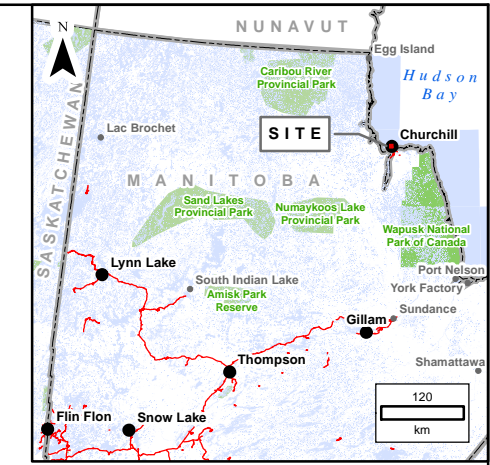
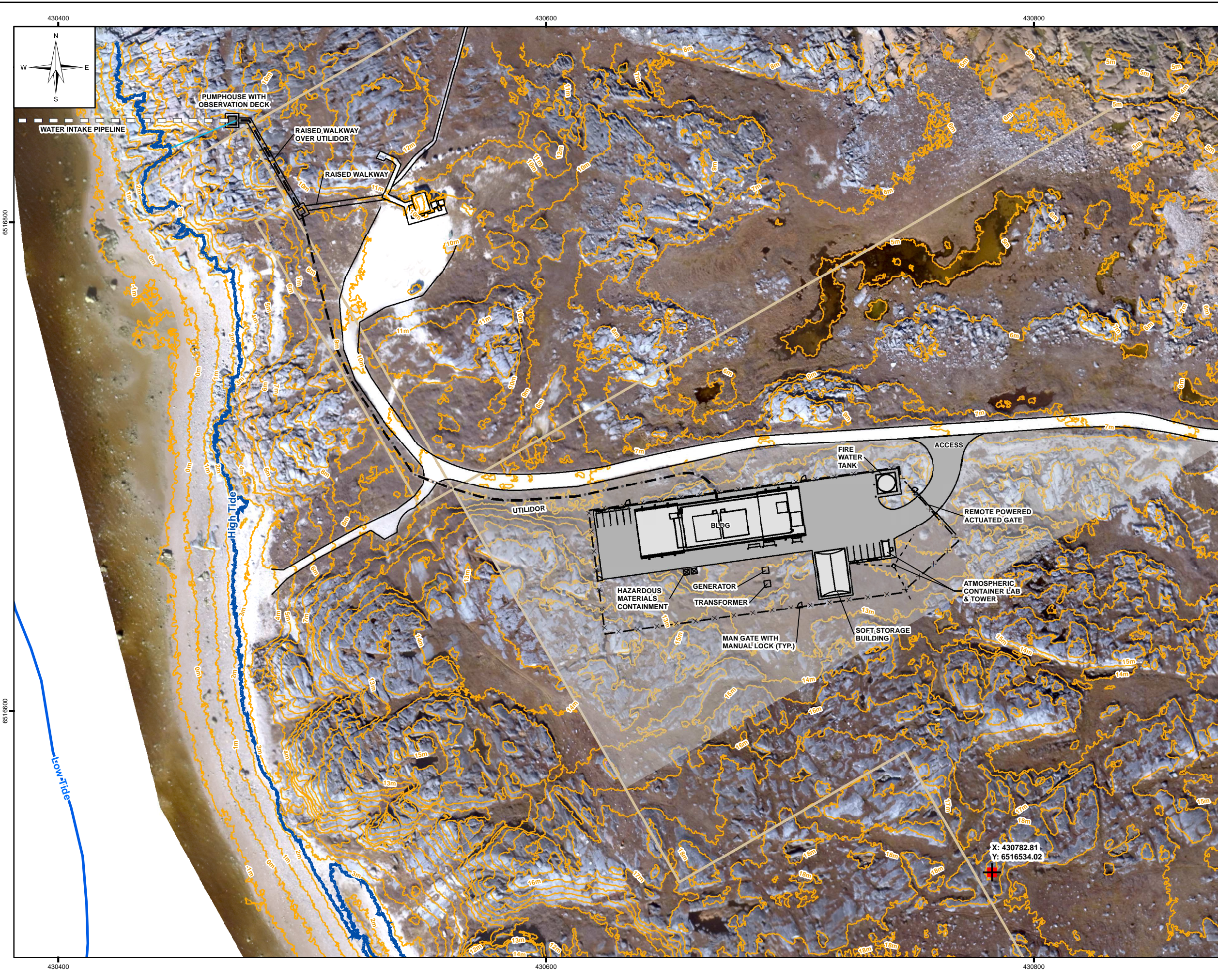
REVISIONS / ISSUE

**CHURCHILL MARINE OBSERVATORY
 ENVIRONMENT ACT PROPOSAL**

SITE LOCATION PLAN

| | | |
|------------|-----------|--------|
| APRIL 2016 | FIGURE 01 | REV: 2 |
|------------|-----------|--------|

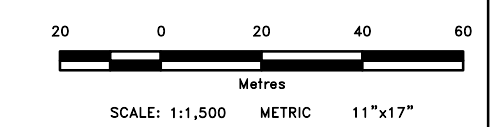
File Name: P:\Projects\2015\15-1736-008\DWG\GIS\MXD\15-1736-008_Fig02_Rev2_11x17.mxd
 11"x17" PLOT SCALE 1:1



LEGEND:

- Control Point
- High Tide Level (Estimated)
- Low Tide Level (Estimated)
- 1m UAV Contour
- Limits of Crown Land (approximate)
- Site Fence
- Proposed Water Intake Pipeline
- Above Ground Water Discharge Pipeline
- Utilidor (Proposed)
- CMO Building (Proposed)
- Pumphouse (Proposed)
- Property Boundary (Proposed)

- NOTES:**
1. Topography information shown was captured by KGS Group on October 1, 2015 by Unmanned Aerial Vehicle (UAV).
 2. Imagery information shown was captured by KGS Group on October 1, 2015 by UAV.
 3. Bathymetry shown obtained from Fisheries and Oceans chart 5640 dated May 10, 2013.
 4. Control Point ID 664000 Brass Tablet.
 5. Limits of HMQ at this time are approximate based on information received from the Province of Manitoba.
 6. Base elevation for Site Infrastructure is 8m.
 7. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 15. Elevations are in metres above sea level (MSL).



| NO. | YY/MM/DD | DESCRIPTION | ISSUED BY | CHECK BY |
|-----|----------|------------------------------------|-----------|----------|
| 2 | 16/04/15 | RE-ISSUED FOR ENVIRONMENTAL REPORT | SFM | MSW |
| 1 | 16/01/29 | RE-ISSUED FOR ENVIRONMENTAL REPORT | RED | SFM |
| 0 | 15/11/16 | ISSUED FOR ENVIRONMENTAL REPORT | RED | MSW |

REVISIONS / ISSUE

**CHURCHILL MARINE OBSERVATORY
ENVIRONMENT ACT PROPOSAL**

LAYOUT PLAN

| | | |
|------------|-----------|--------|
| APRIL 2016 | FIGURE 02 | REV: 2 |
|------------|-----------|--------|