

Eastern Health Health Science Centre Berm Revised Environmental Preview Report

173056.02 • Environmental Preview Report • March 2019


Prepared for:



Prepared by:



CBCL LIMITED
Consulting Engineers

Final	C Bentley	2019/03/07	M. Rutherford
Issued for Review	C Bentley	2019/02/25	M. Rutherford
<i>Issue or Revision</i>	<i>Reviewed By:</i>	<i>Date</i>	<i>Issued By:</i>
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CBCL LIMITED

Consulting Engineers

March 7, 2019

Dept. of Municipal Affairs and Environment
PO Box 8700
St. John's, NL
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Attention: Ms. Joanne Sweeney.
Director of Environmental Assessment

*RE: Eastern Health – Health Science Center (HSC) Berm Environmental Preview Report
(EPR) Document CBCL Project # 173056.02*

Dear Ms. Sweeney:

Enclosed is our application and associated materials required for your review of the Environmental Preview Report (EPR) for the above noted project. Six printed copies and an electronic version have also been included for the submission. If you have any questions or require clarification, please contact me.

Yours very truly,

CBCL Limited

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- APPENDIX A – Berm Engineering Drawings
- APPENDIX B – Plant Inventory

APPENDIX C – Site Photos

APPENDIX D – Birds Detected on Newfoundland and Labrador

APPENDIX E – Eastern Health Open House / Public Meeting

APPENDIX F – Pippy Park Commission Approval

APPENDIX G – Fisheries and Oceans Canada (DFO) Response

Submission Checklist. Please see the report sections indicated in the table below to locate the required information for the Environmental Preview Report, as outlined in the Newfoundland and Labrador Department of Municipal Affairs and Environment (MAE) Revised Guidelines for Environmental Preview Report for the Health Science Centre Berm (2018).

Required Information from EPR Guidelines		
Item	Description	Chapter /Section
1	Name of Undertaking	Chapter 1
2	Proponent	Chapter 2
3	The Undertaking	Chapter 3, Appendix A
4	Description of the Undertaking	Chapter 4
4.1	Geographical Location / Physical Components / Existing Environmental	Section 4.1, Appendix B, C, D
4.2	Construction	Section 4.2
4.3	Operation and Maintenance	Section 4.3
5	Alternatives	Chapter 5
6	Potential Environmental Effects and Mitigation	Chapter 6
6.1	Mapping and Evaluation	Sections 4.1.3, 6.1.1 and 6.2
6.2	Other Legitimate Land Users	Section 6.1.11 and 6.2
6.3	Justification of the Berm Design and Construction	Section 6.1.2 and 6.2
6.4	Protection of Riparian, Aquatic and Avian Species	Section 6.1.4, 6.1.5, 6.1.6 , 6.1.7, and 6.2
7	Decommissioning and Rehabilitation	Chapter 7
8	Project Related Documents	Chapter 8
9	Public Meeting	Chapter 9, Appendix E
10	Approval of Undertaking	Chapter 10, Appendix F, G

CHAPTER 1 **NAME OF UNDERTAKING**

Eastern Health – Health Science Center (HSC) Berm (the Project)

CHAPTER 2 **PROPONENT**

2.1 Name of Corporate Body

Eastern Health

2.2 Address

300 Prince Philip Drive
St. John's, NL
A1B 3V6

2.3 Proponent

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3.1 Nature of the Project

The proposed Project includes the construction of flood protection berms to protect the Health Science Centre (HSC) Hospital in St. John's, Newfoundland and Labrador (NL) and surrounding areas from risk of flooding from the adjacent Leary's Brook and tributaries. The Project will include the construction of two flood protection berms located on either side of Leary's Brook between Clinch Crescent West and East. The proposed north flood protection berm (North Berm) is located along the bottom edge of the Eastern Health property on the north side of Leary's Brook. The south flood protection berm (South Berm) is located on the south side of Leary's Brook, and will be constructed along the north side of Prince Philip Drive between Clinch Crescent East and Clinch Crescent West.

The proposed Project will improve flood protection for the HSC, surrounding properties, such as the Canadian Broadcasting Corporation (CBC), Memorial University (MUN) Core Sciences Building, and National Research Council (NRC) buildings and meet the design criteria for a 1:100 Annual Exceedance Probability (AEP) with climate change (CC) flow event. The North Berm will also protect the HSC for the 1:100 AEP with climate change plus 30% event.

3.2 Purpose/Rationale/Need for the Undertaking

The proposed North Berm would serve as protection from flooding problems associated with a 1:100 AEP with climate change plus 30% flow event for HSC (CBCL, 2014; 2016) and would protect against inundation caused by water levels and wave action, to adjacent HSC buildings (AMEC, 2014). There is an immediate need for this Project as HSC is essential to health services to the province. The South Berm is proposed to be completed in conjunction with the construction of the North Berm and mitigates the effects of flooding to the adjacent properties.

This proposed Project is part of a series of potential flood protection solutions identified within the Rennie River Watershed in the Rennies River Catchment Stormwater Management Plan (RRCSWMP). Identified measures included a range of options such as the two berms located on either side of Leary's Brook between Clinch Crescent West and East, two berms upstream of the HSC between Wicklow Street and Thorburn Road, and a weir at the end of Long Pond near Allandale

Road (CBCL, 2014). Evaluation and completion of these projects are important to overall stormwater / flood management within the Rennie River Watershed.

Many of these proposed stormwater management measures do not protect HSC from the risk of flooding, and many are not located within Eastern Health property or jurisdiction. These structures, and others associated with the RRCSWMP, are outside of the scope of this Project, unless identified as mitigation measures for the North Berm for HSC protection. Alternatives to mitigate flooding risks were assessed and additional details of these alternatives are located in Chapter 5.

4.1 Geographic Location / Physical Components / Existing Environmental**4.1.1 Geographic Location**

The proposed location of the flood protection berm is on the property at 300 Prince Philip Drive, St. John's, NL (Figure 4.1). The North Berm is located along the undeveloped portion on the south side of the HSC property adjacent to Leary's Brook, between Leary's Brook and HSC. The South Berm will be located on the south side of Leary's Brook, and is proposed to be constructed along the north side of Prince Philip Drive between Clinch Crescent East and Clinch Crescent West (Figure 4.2). The proposed Project is located on Eastern Health property, lands managed by Newfoundland and Labrador Department of Transportation and Works (DTW), and land under the jurisdiction of the C.A. Pippy Park Commission. A berm already exists on the east end of the property, and is approximately situated along the widening (pond) of Leary's Brook south of the main hospital building (Figure 4.3).

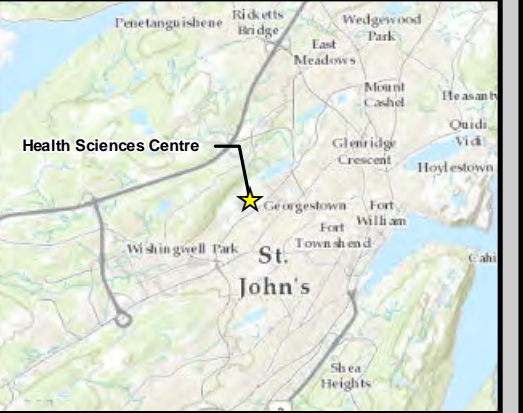
Clinch Crescent, a collector road that loops around the HSC, provides access to HSC, from two intersections with Prince Philip Drive. An access road on the south side of HSC and Warner's Road provides access to the North Berm work site and movement of equipment and materials. The South Berm is accessible by Clinch Crescent and Prince Phillip Drive.

The Project will require an estimated total construction disturbance area of 13,260 m².

The footprint for the North Berm includes the 4,850 m² berm footprint and an approximately 5 meter buffer of additional excavation on the Leary's Brook side of the berm along the west side of the berm and the South Berm footprint of 2,665 m². Approximately 8,637 m² of delineated wetland is proposed to be altered to construct the Project.

The North Berm is approximately 500 m long, ranging from the southwest end of the Angus Cowan Hostel to Clinch Crescent East (Figure 4.3). Within the berm footprint, a portion of the berm will be located along the Leary's Brook Pond. This area is proposed to be constructed with an approximately 77 m long concrete block wall, preserving the existing waterline and maintaining the existing infrastructure north of the North Berm. The remainder of the berm is proposed to be constructed approximately 5-10 m from the normal waterline. The North Berm engineering design

is still under development, and final alignment may vary from the conceptual design provided in this EPR (Appendix A).



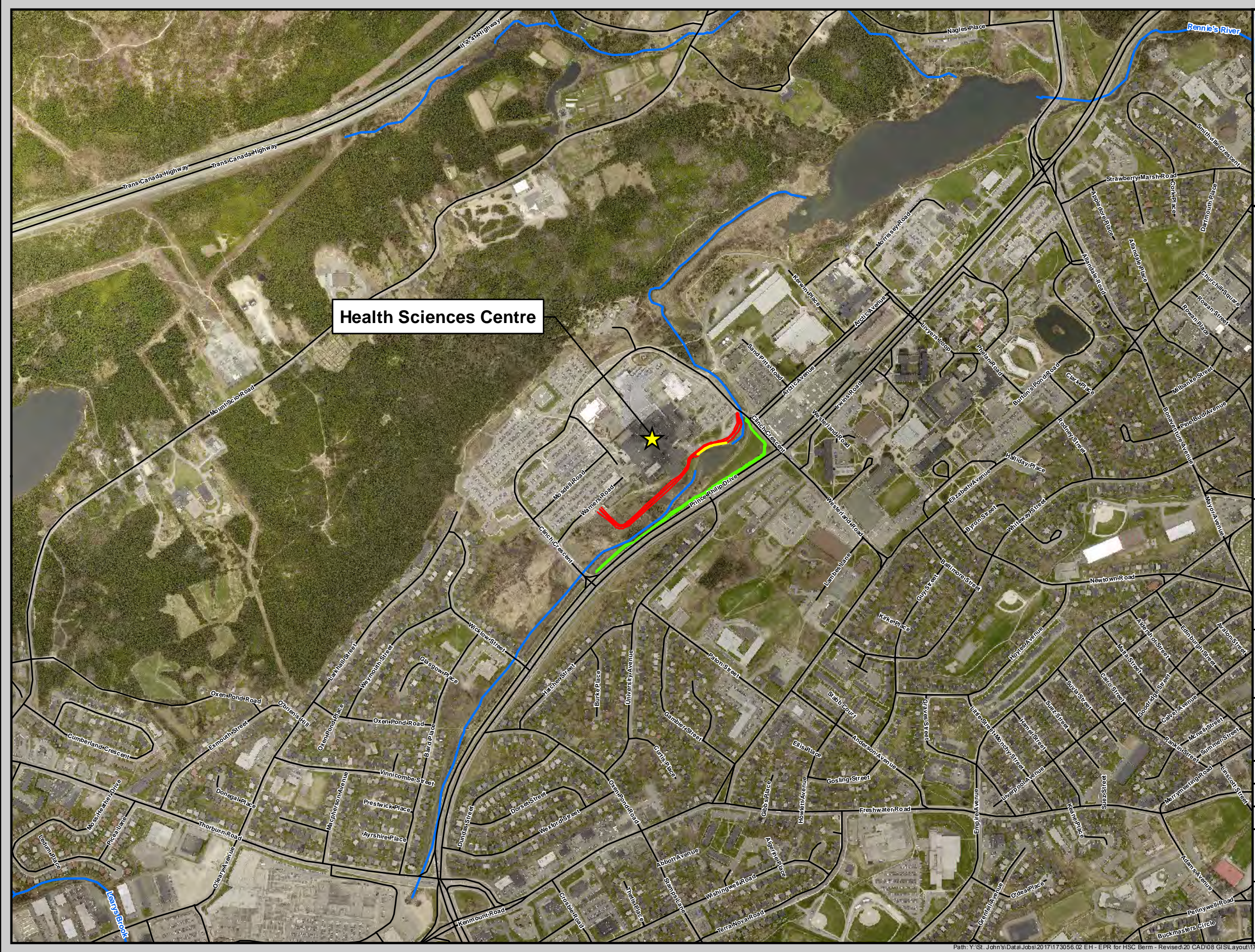
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BERM**

Figure 4.1 - Site Location

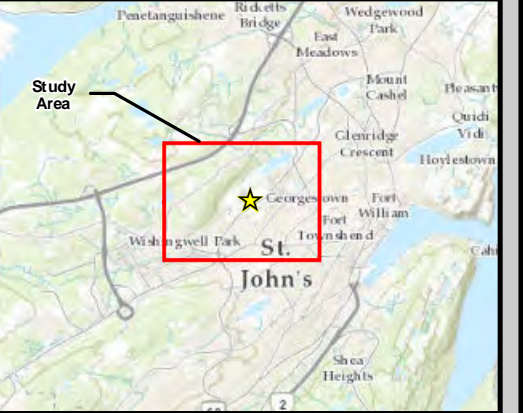
Drawn: BH	Date: 20/02/2019
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17" 1:2,400,000

Notes:

Coordinate System: NAD 1983 MTM 1
Units: Meter



Health Sciences Centre



- North Berm
- South Berm
- Retaining Wall
- Roads
- Watercourses

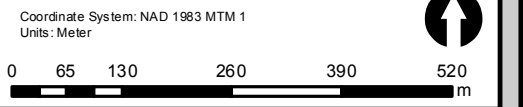


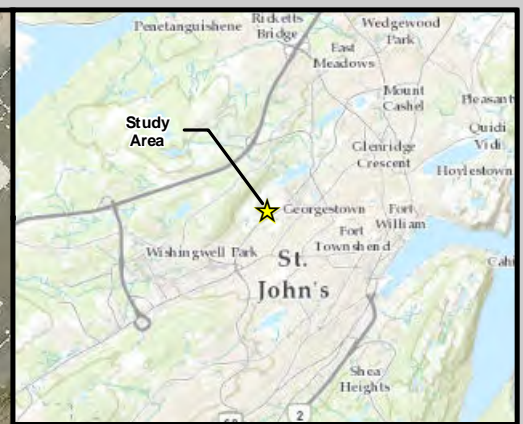
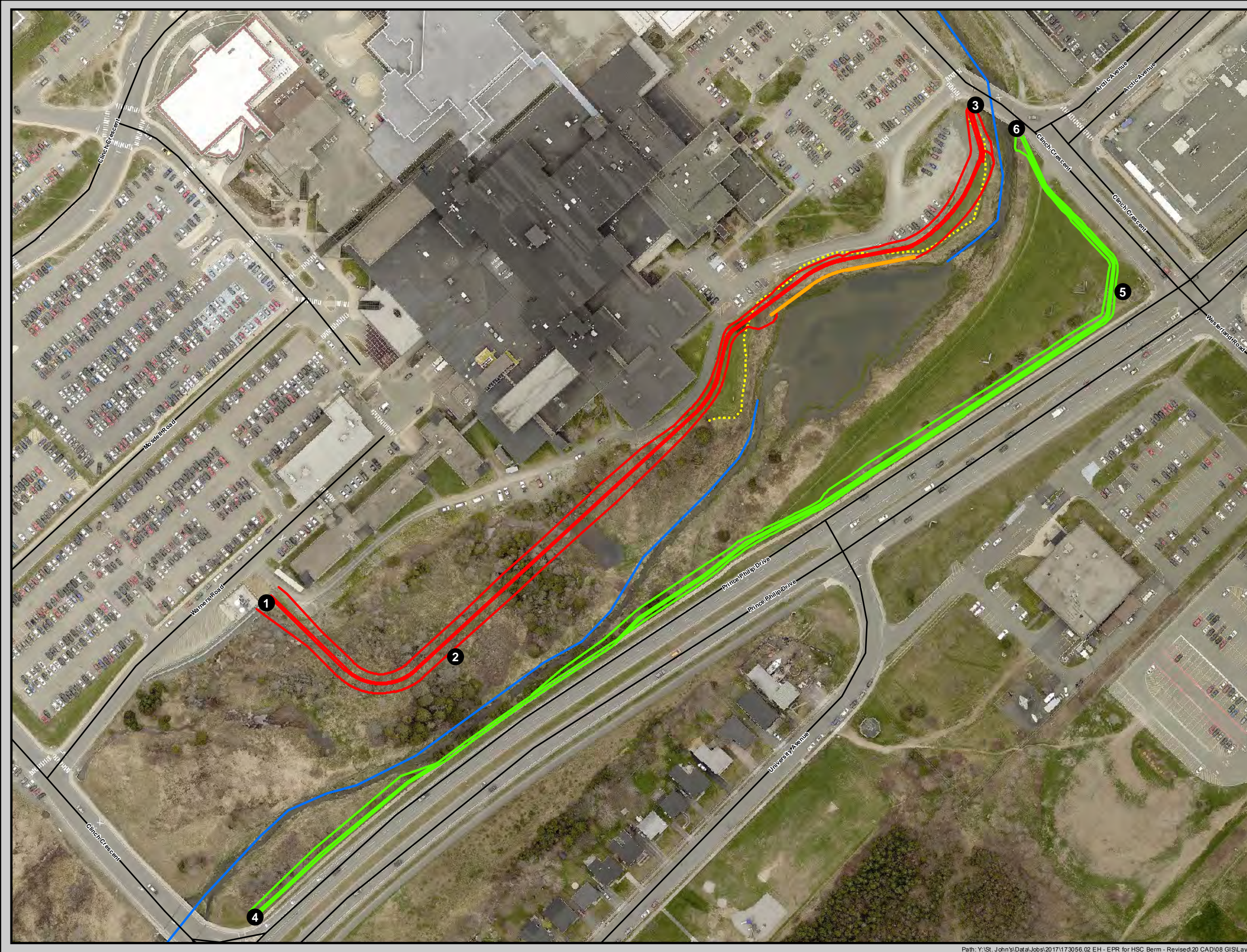
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Figure 4.2 - Project Location

Drawn: BH	Date: 20/02/2019
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17" 1:8,933

Notes:





- Berm Coordinates
- North Berm
- South Berm
- Retaining Wall
- ⋯ Approx. Extent of Existing Berm
- Roads
- Watercourses

1	368864 E 5269973 N
2	368955 E 5269945 N
3	369216 E 5270208 N
4	368854 E 5269820 N
5	369286 E 5270115 N
6	369236 E 5270195 N



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Figure 4.3 - Proposed Berm Layout

Drawn: BH	Date: 20/02/2019
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17" 1:1,750

Notes:

Coordinate System: NAD 1983 MTM 1
Units: Meter

The South Berm engineering design is still under development, and final alignment may vary from the conceptual design provided in this EPR. The South Berm is approximately 615 m long and includes an approximately 555 m earth berm and 60 m concrete block wall along the edge of Leary’s Brook (Figure 4.3).

The proposed boundaries for the berms, as identified in Figure 4.3 and Table 4.1, are (NAD83, MTM 1, 22T):

Table 4.1 Proposed Project Boundaries

Location	Coordinates	
	Easting (E)	Northing (N)
1	368864	5269973
2	368955	5269945
3	369216	5270208
4	368854	5269820
5	369286	5270115
6	369236	5270195

The proposed site is located within the Pippy Park land use zone pursuant the *Pippy Park Commission Act*. An approval is required from the C.A. Pippy Park Commission prior to development.

4.1.2 Physical Components of the Undertaking

DESCRIPTION OF THE PROJECT

As part of the Project and proposed mitigations, two berms will be constructed, the North Berm and the South Berm.

The North Berm, located along north side of Leary’s Brook, is proposed to be approximately 500 m long and will extend from the southwest end of the Agnes Cowan Hostel to the Clinch Crescent East Bridge (Figure 4.3). The North Berm will be designed to accommodate a 1:100 AEP with climate change plus 30% flow event; which is greater than the engineering design requirement of a 1:100 AEP with a climate change flow event. The berm will be constructed with 2:1 side slopes. The maximum top of berm elevation is 59.0 m at the southwest end of the Agnes Cowan Hostel, which is adjacent to the proposed location of the New Adult Mental Health and Addiction Facility. The top of berm elevation will gradually decrease from west to east. The lowest top of berm elevation will be 57.6 where the berm meets the Clinch Crescent east bridge. Some segments are proposed to be constructed with a concrete block wall rather than an engineered slope, in order to reduce impact to the waterbodies (Appendix A). Within the North Berm footprint, an approximately 77 m long concrete block retaining wall is proposed along the Leary’s Brook Pond bank, preserving the existing waterline. There is an existing 26 m long concrete block wall near Clinch Crescent east, which was also incorporated into the design. The concrete block retaining wall is proposed to be built on undisturbed native soils or competent fill base. Hydraulic riprap will be placed along the toe of the

concrete block retaining walls and earthen berms to protect against erosion. The existing wingwall of the Clinch Crescent east bridge will also be raised by approximately 0.5 m.

The approximately 615 m South Berm is proposed to be located on the south side of Leary's Brook, and will be constructed along the north side of Prince Philip Drive between Clinch Crescent East and Clinch Crescent West. The South Berm will also meet the design criteria for a 1:100 AEP with a climate change flow event. The maximum top of berm elevation is estimated to be 59.0 m in elevation near Clinch Crescent west. As with the North Berm, the top elevation will gradually decrease from west to east. The lowest top of berm elevation will be 57.3 m near the Clinch Crescent east bridge. To reduce impact to Leary's Brook, an approximately 60 m long segment of the berm will include a concrete block retaining wall, complete with hydraulic riprap, rather than an engineered slope. The final design selection will be determined during the design stage; the preliminary design also includes modification to the existing sidewalk along Prince Philip Drive. As part of the Project, approximately 200 m of sidewalk along Prince Philip Drive is proposed to raise the elevation and incorporate into the berm and concrete block wall, thereby reducing the footprint of the South Berm. The sidewalk is proposed to be reinstated to the top of the concrete block wall and berm, and constructed in compliance with the City of John's applicable design requirements.

Site preparation along the proposed North Berm and South Berm will include clearing of vegetation and grubbing of all organic materials to prepare a base for construction. The existing berm located within the North Berm footprint, is comprised of suitable material, and will be left in place and incorporated as part of the North Berm.

Approximately 8,637 m² of wetland will be altered, including an area of approximately 4,267 m² of wetland removed to construct the berms, and an area of approximately 4,370 m² north of the North Berm. These areas may require temporary dewatering depending on water conditions during construction (i.e., periods of rain). Where wetland infilling or work adjacent to a watercourse is required, the berms will be constructed with 200 mm of clean rockfill (minimal fines; Appendix A). The remainder of the berms are proposed to be built over dry land and will be constructed of a typical sand and gravel mixture containing 10-15% fines content and a maximum particle size of 200 mm in diameter.

The portions of the North and South Berms constructed as earthen berms will include top soil and a mix of hydroseed and/or sod for stabilization and erosion control. In addition, native shrubs and trees will predominately be planted to provide further stability, and to blend the berm into the surrounding landscape.

Depending on the final design, the berms may be designed to assist local drainage by the installation of stormwater management systems. The stormwater management systems could include items such as a rock infiltration swale, stormwater piping including duckbill style valves (backwater prevention valves) / sub drains discharging stormwater to Leary's Brook, or incorporation into a new storm sewers system. The infiltration swales will channel water to stormwater drainage pipes and valves during storm events. The duckbill style valves will allow stormwater to flow from the HSC side

of the berm to Leary's Brook during normal runoff conditions. During large storm events, as the water level rises above the stormwater pipe outlet (Leary's Brook side), the duckbill valves close and prevent water from flowing from the Leary's Brook side to the opposite side of the Berm, i.e. HSC and Prince Phillip Drive. Flow resumes when Leary's Brook recedes below the stormwater pipe. These valves will be installed at the outlet of the stormwater pipe (on the Leary's Brook side) and allow for regular visual inspections. An alternative design under consideration includes the installation of a trunk storm sewer along the North berm that would intercept runoff and redirect it to below the Clinch Crescent East Bridge. If a trunk sewer is installed, back flow prevention valves would not be required.

Rock infiltration swales may be installed at the toe of the slope on the north side of the North Berm, and south side of the South Berm. Depending on the final design, the existing stormwater system may be either modified or removed, particularly, at the west end of the North Berm at the location of the proposed New Adult Mental Health and Addiction Facility. The rock infiltration swale will not be included in the area adjacent to the parking lot at Clinch Crescent East. In this area, stormwater will be collected and redirected to the parking lot catch basin.

Along the South Berm, there is a culvert running under the Prince Philip Drive, which drains stormwater from the grassed area between Prince Philip Drive and the rear of residential properties on University Avenue, and discharges to Leary's Brook. This culvert will be updated with a backflow prevention device. The final location and mechanism for the backflow prevention device will be determined in the final design phase; however, it is anticipated to be similar to the backwater valves described above.

Surface water management practices will be employed to prevent erosion of the berms and release of material that may harm fish habitat; these practices will include an engineered slope design, landscaping and rock stabilization techniques. An Environmental Protection Plan (EPP) including Erosion & Sediment Control will be implemented during construction (Section 6.2).

SCHEDULE

The Project design is in the development stage. Upon receipt of all required approvals and authorizations, the estimated start date for construction is April 2019. This date will facilitate clearing of vegetation prior to the breeding bird nesting season (mid-April to mid-August: ECCC, 2018).

The construction is expected to occur over a six-month period including mobilization to demobilization. In-water works is estimated to commence sometime between June 1, 2019, and June 30, 2019. All in-water works will be completed within periods of low flow, low rainfall periods or in isolation from flows, to further reduce the risk to fish and fish habitat. The identified timing window as specified by MAE is roughly from June 1 to October 30 (MAE, 1997).

In the interest of protecting the HSC and its services, the North Berm will be the first construction priority. The South Berm construction is anticipated to be completed in quick succession. The final sequencing of construction will be determined based on the final design and contractor.

4.1.3 Existing Environment

Setting & Major Vegetation: The project is located in the Pippy Park Land Use area. The site is located in the Southeastern Barrens Subregion of the Maritime Barrens Ecoregion. The Ecoregion is characterized by stunted and almost pure stands of balsam fir (*Abies balsamea*), that are divided by extensive open heathland. As result of development in the area, including historical practices and development of City of St. John's, much of the original ecoregion vegetation was previously altered. Other factors influencing vegetation include wind, lack of protective snow cover and soil frost disturbance (Government of Newfoundland and Labrador, 2018a).

The Project site itself is relatively flat, and falling slightly in elevation from west to east. The project area varies from approximately 60 to 100 m in width and over 500 m in length. The area is characterized primarily by urban development, including roads, buildings and lawns; remnant natural areas consist primarily of wetlands, and the open water of Leary's Brook.

Site Vegetation: During CBCL's 2017 surveys, a total of 82 species of vascular plants were noted at the HSC property (both in wetland and upland), of which 38 (46.3%) were exotic species. In August 2018, a supplemental survey was conducted at the area southwest of Clinch Crescent and along Leary's Brook. The results of the survey yielded 105 species, of which 43 (41%) were exotic (Appendix B and Appendix C). The wetland area, which spans both sides of Clinch Crescent, exhibits many hallmarks of anthropogenic disturbance. A rather large proportion of the project area and adjacent wetland is colonized by exotic species, a number of which are strongly dominant in some locations; reed canary grass (*Phalaris arundinacea*) and reed meadowgrass (*Glyceria maxima*) are two such species. Reed canary grass is ubiquitous throughout the wetland; reed meadowgrass appears to be contained largely to the shores of the ponded area at the northern portion of the Project site. A number of other exotic species are scattered throughout the body of the wetland, including climbing nightshade (*Solanum dulcamara*), purple loosestrife (*Lythrum salicaria*), policeman's helmet (*Impatiens glandulifera*), and marsh hedge-nettle (*Stachys palustris*). The wetland-upland edge yields abruptly to the developed surrounding of the HSC facilities to the north, and Prince Philip Drive to the south. A vegetated upland buffer is largely absent from the wetland, and where present, is composed primarily of groomed lawn areas, or other urban development such as roads and residential areas. An abundance of exotic forb species occupy the upland areas immediately adjacent to the wetland, and include species such as Japanese knotweed (*Polygonum cuspidatum*), butter and eggs (*Linaria vulgaris*), black starthistle (*Centaurea nigra*), St. John's wort (*Hypericum perforatum*), sheep sorrel (*Rumex acetosella*), sticky groundsel (*Senecio viscosus*), dandelion (*Taraxacum officinale*), coltsfoot (*Tussilago farfara*), various clovers (*Trifolium* spp.), among many other species.

A number of species of conservation concern were observed during surveys, as noted below:

- Bulb-bearing water hemlock (*Cicuta bulbifera*) – Ranked S3 (Vulnerable);

- Stinging nettle (*Urtica dioica* ssp. *gracilis*) – Ranked S3S5 (Vulnerable to Secure);
- American bur-reed (*Sparganium americanum*) – Ranked S3 (Vulnerable); and
- Pointed broom sedge (*Carex scoparia*) – Ranked S3 (Vulnerable).

Surveys were also conducted along Leary’s Brook north of the HSC property and along the periphery of Long Pond. A large marsh exists at the southeastern extent of Long Pond and along Leary’s Brook. In these areas, conditions are considered representative of those previously described at the HSC property. The surveys yielded a total of 129 species, of which 50 (38.8%) are exotic. At this site, a number of species of conservation concern were observed, as noted below:

- Bulb-bearing water hemlock (*Cicuta bulbifera*) – Ranked S3 (Vulnerable);
- Stinging nettle (*Urtica dioica* ssp. *gracilis*) – Ranked S3S5 (Vulnerable to Secure);
- Black holly (*Ilex verticillata*) – Ranked S3 (Vulnerable);
- Northern water-plantain (*Alisma triviale*) – Ranked S2 (Imperiled); and
- Bayonet rush (*Juncus militaris*) – Ranked S3 (Vulnerable).

Forestry: The Project is located in District 1 of the Eastern Region of Newfoundland. There are no known timber harvest rights on the property (Government of Newfoundland and Labrador, 2018b).

Soils: Soils within the project area are loose fill at the surface with scattered organic debris overlies. The thickness of the fill varies from 1.2 to 3.3 meters thick. Below the fill, there is a compacted layer of till ranging from well-graded sand with gravel to a silty sand with gravel, with occasional cobbles and boulders (Stantec, 2016).

Climate: The Maritime Barrens Ecoregion has the coldest summers in Newfoundland and Labrador, which are often frequent with fog and strong winds. The winters are mild, with intermittent snow cover particularly on the coastline (Government of Newfoundland and Labrador, 2018a). The coldest day on average was recorded in February (daily average -4.9°C), with a peak summer temperature observed in August (16.1°C, Government of Canada 2018). Average annual precipitation is 1,534.2 mm, with most precipitation falling as rain. The highest precipitation was recorded in December with an average of 164.8 mm. Average monthly rain was recorded to be in excess of 120 mm monthly from September to November, with the highest monthly average of rain occurring in October with 153.7 mm (Government of Canada, 2018). Within Newfoundland, peak hurricane months can range from June 1st to November 30th; however, hurricanes and tropical storms can occur outside of this window (Wood, 2018).

Hydrology: Leary’s Brook is a tributary of Rennie’s River watershed system that flows west to east, south of the HSC property. This watercourse drains a watershed of approximately 20 km². Land use within this watershed system ranges from undeveloped areas, around the headwaters of the river, to high-density urban development towards the downstream section, where the HSC is located. Leary’s Brook includes a series of open channels, bridges and culverts. The stream has an average width of 1 m along the northwest section, expanding into Long Pond, a 4,000 m² waterbody downstream and northeast of HSC. A wetland is present where Leary’s Brook enters Long Pond, north of the HSC site.

The hydrologic and hydraulic calculations presented within this EPR were conducted using the computer model of Rennies River developed for the RRCSWMP study. The model was built using XPSWMM, a modelling software developed by XP Solutions that uses standard hydrological methods to estimate runoff flows in a watershed and solves dynamic flow equations to calculate 1D flows through pipes, culverts, narrow channels, etc. The software also calculates 2D flows through floodplains, large bodies of water, wide bridges, etc. (CBCL, 2014). Further details of the RRCSWMP model are provided in the RRCSWMP report (CBCL, 2014).

The RRCSWMP study included estimating runoff flows under a range of rainfall events. Hydrologic inputs for these calculations include watershed areas, slopes, percentage of impervious land, surface roughness, infiltration parameters, and rainfall hyetographs (precipitation time series). The physical characteristics of each sub-catchment were estimated using topographical survey data, 1 m contour mapping and LiDAR data from 2012.

The hydrologic model was calibrated by comparing the flow hydrograph recorded at Environment Canada’s (EC) Leary’s Brook at Prince Philip Drive hydrometric station (02ZM020) with the hydrograph simulated at the same location, using the observed precipitation data during Hurricane Igor. Modelling parameters such as the overland roughness coefficients were adjusted until the simulated hydrograph was representative of the observed hydrograph.

The hydrologic analysis was reviewed again using LiDAR data captured in 2015. The peak flows calculated with the 2015 LiDAR information were slightly smaller than those calculated using the 2012 LiDAR information. A comparison is presented in Table 4.2. Since the RRCSWMP hydrologic model was calibrated to a major flood event using the 2012 LiDAR dataset, and this version of the model produces more conservative peak flows, the hydrologic model originally developed for the RRCSWMP was selected to calculate the boundary conditions for the hydraulic calculations.

Table 4.2 Slope and 1:100 AEP with Climate Change Peak Flows Calculated Using the 2012 and 2015 LiDAR Dataset

Watershed	2012 LiDAR Dataset		2015 LiDAR Dataset	
	Slope (%)	1:100 AEP + CC flow (m ³ /s)	Slope (%)	1:100 AEP + CC flow (m ³ /s)
Great Eastern Ave. at Ken Brook	3.1	8.2	2.8	8.0
Lady Smith Dr. at Ken Brook	4.8	20.8	4.8	20.6
NL Power Yard at Yellow Marsh	3.8	27.5	3.8	27.4
O'Leary Ave. at Leary's Brook	5.2	42.9	4.8	42.5
Pippy Place at Leary's Brook	2.5	67.8	2.2	66.6
Wicklow St. at Leary's Brook	4.9	91.9	4.6	90.4

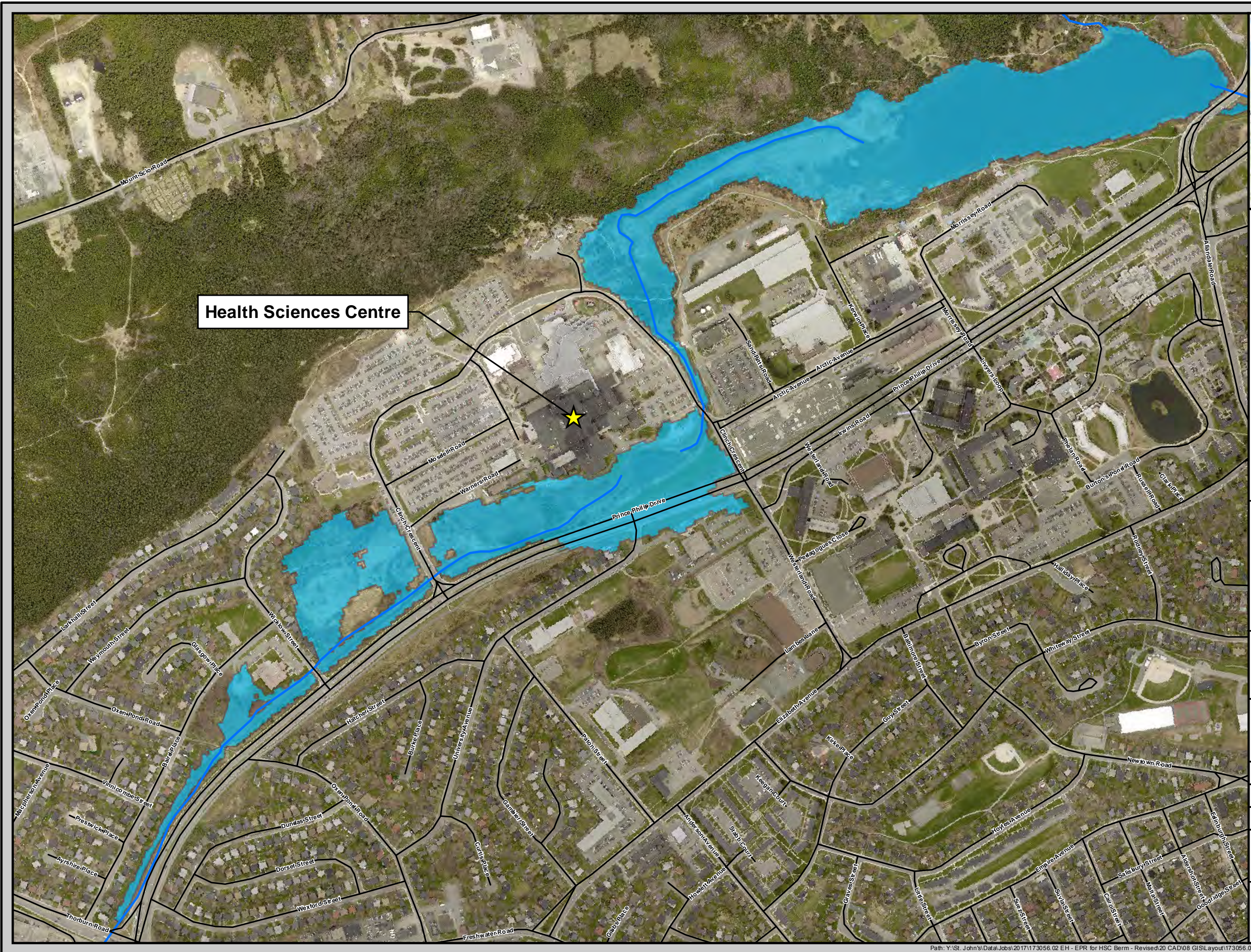
Watershed	2012 LiDAR Dataset		2015 LiDAR Dataset	
	Slope (%)	1:100 AEP + CC flow (m ³ /s)	Slope (%)	1:100 AEP + CC flow (m ³ /s)
Allandale Rd. at Rennies River	6.8	22.7	6.8	22.7
Prince Philip Dr. at Rennies River	8.8	10.1	8.0	10.0
Portugal Cove Rd. at Rennies River	4.7	25.0	4.3	24.5
Carnell Dr. at Rennies River	7.6	28.9	7.0	28.4

The hydraulic module of XPSWMM was used to estimate the water levels and flow rates through the river channel, the river floodplains, and the structures located along the river reach. The 2D model results were also used to produce floodplain maps under existing conditions and after construction of the berms.

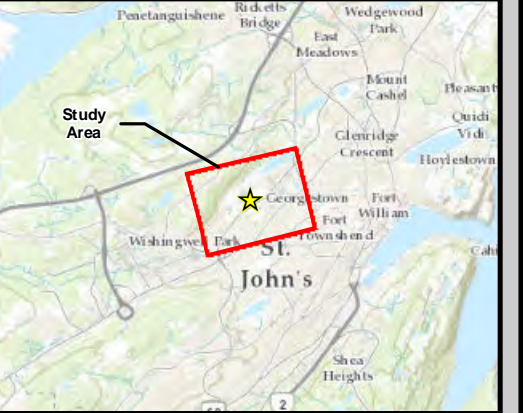
The input data for this module consists of river channel invert elevations, channel and floodplain roughness coefficients, the 2015 LiDAR information, hydraulic structure dimensions and flow hydrographs (flow time series) calculated using the hydrologic module of the software. The domain of the model consists mainly of a 5 m grid used to calculate the 2D flow of water within the floodplain. The grid was connected to the 1D elements in the model, which were used to calculate the flow through the main channel, bridges and culverts.

Hurricane Igor was also used as the calibration event for the hydraulic model. Water levels observed at the City-owned Long Pond level gauge during the hurricane event were compared to the water levels simulated by the hydraulic model. The calibrated model includes adjustments to the Manning’s roughness coefficient along the river channel and floodplains, and adjustments to the riverbed slope.

The project area is susceptible to localized flooding during 1:20 AEP and 1:100 AEP with climate change flow events (as illustrated in Figures 4.4 and 4.5).



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- Roads
- Watercourses
- Climate Change Boundaries (Existing Conditions)



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Figure 4.4 -
1:20 AEP Climate Change
Boundaries

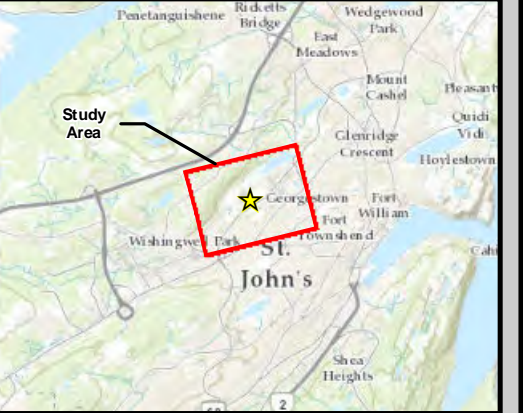
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Notes:





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- Roads
- Watercourses
- Climate Change Boundaries (Existing Conditions)

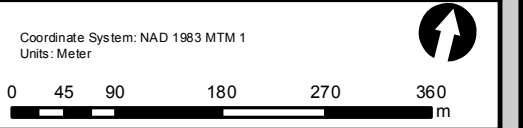


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Figure 4.5 -
1:100 AEP Climate Change
Boundaries

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On-Site Wetlands: The wetland area bordering the Project is primarily classified as a riparian fen¹/marsh complex. The boundaries of the wetland were delineated, and comprise of two hydrologically connected portions lying on either side of the western portion of Clinch Crescent (Figure 4.6). A culvert under the west side of Clinch Crescent maintains modest hydrological connectivity between these two areas. The present wetland characterization is limited to those areas bounded as follows, though, the physical extent of the wetland continues well beyond these areas in the downstream direction (i.e., along the periphery of Long Pond):

- On the north by the HSC and associated parking lots;
- On the south by Prince Philip Drive;
- On the east by Clinch Crescent; and
- On the west by Wicklow Street.

In the general sense, fens are peatlands that have a fluctuating water table that is either at or slightly below the wetland surface (Rydin & Jeglum, 2006) and are rich in dissolved minerals derived from the influence of surrounding mineral soils (National Wetlands Working Group, 1997). In Newfoundland, fens are highly variable in their size, ranging from small forest openings to large expanses on exposed uplands (Wells & Pollett, 1983). More specifically, riparian fens develop adjacent to waterbodies such as lakes, ponds and streams, and may be subject to occasional inundation by floodwaters (National Wetlands Working Group, 1997). In most cases, peat forms the interface between the wetland and its associated waterbody. The two components of riparian fens are shore fens (associated with lakes or ponds) and stream fens (associated with rivers or streams). In each of these, the water table within the wetland is directly affected by the water level of its associated waterbody, whether normal or flooded. Peat deposits occasionally will contain inorganic material deposited during flooding (National Wetlands Working Group, 1997). A defined vegetation gradient is typical in these wetlands, with graminoids and mosses proximal to the waters' edge, grading to shrubs and trees with increasing lateral and vertical distance from water.

Marshes are mineral based (or occasionally peat based) wetlands which are periodically inundated by standing or flowing water. These waters are nutrient rich, and their levels tend to fluctuate seasonally. The dominant vegetation comprises numerous herbaceous emergent species such as *Typha* spp. (cattails), *Juncus* spp. (rushes), *Calamagrostis* spp. (reed grasses), and sedges (*Carex* spp.); in shallow open water areas, there is occasional submergent and floating leaved species (Wells & Pollett, 1983). Riparian marshes occupy the riparian zones of rivers and streams. These receive their hydrologic regime from overland flow of water from adjacent uplands, and from periodic overbank flooding from the stream or river (National Wetlands Working Group, 1997).

¹ 'Fen' is a vernacular term, which has been used for a very long time, but has only in the last century been rigorously defined scientifically (Rydin & Jeglum, 2006). In Newfoundland, as in many other parts of the world, there is a tendency for peatlands (i.e., bogs and fens) to be collectively referred to as 'bog'. Within the present discussion on wetlands, the definition of the term 'fen' is based upon the scientific definition of this wetland class as elaborated herein, rather than the local tendency to refer to such wetlands as 'bog'.

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- North Berm
- South Berm
- Roads
- Watercourses
- Delineated Wetland

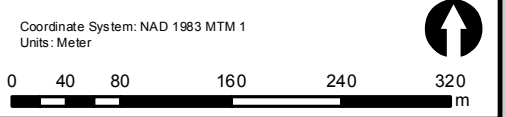


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Figure 4.6 - Wetland Boundaries

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Notes:



Groundwater: The depth of groundwater is located from 1.5 m to 3.0 m below ground surface. The local groundwater level is likely to fluctuate seasonally and in response to precipitation events (Stantec, 2016).

Wildlife: Common mammal wildlife that may be present within the Ecoregion where suitable conditions occur include black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), caribou (*Rangifer tarandus*), moose (*Alces alces*), lynx (*Lynx canadensis*) and other small fur bearing mammals (Government of Newfoundland and Labrador, 2018c; Heritage Newfoundland and Labrador, 2018). However, due to the proximity to the City of St. John's, the likelihood of larger species, such as moose, is decreased.

Over 372 bird species (204 native, 166 irregular visitors) have been found in Newfoundland and Labrador (Government of Newfoundland and Labrador, 2018c). The Project site is located in Bird Conservation Region 8 (BCR 8), the Boreal Softwood Shield. Priority bird species found in BCR 8 are primarily associated with wetland, coniferous forests, inland waterbodies and riparian habitats (Environment Canada, 2013). During North American Breeding Bird Surveys, which were conducted in close proximity to the Project site, 85 breeding bird species were recorded (Pardieck et al., 2018, Appendix D). The regional nesting period for the Project area is mid-April to mid-August (ECCC, 2018), although some species may breed outside of this period. In addition, 36 species have been observed within the Project site (eBird 2018; Appendix D).

The Project site primarily consists of a wetland and riparian area, which could be used by many species for breeding, feeding, and resting for at least part of the year. In addition, edges and ditches associated with roads can provide breeding habitat for bird species that are able to utilize disturbed and wet sites (e.g., Song Sparrow (*Melospiza melodia*), Savannah Sparrow (*Passerculus sandwichensis*), and Common Yellowthroat (*Geothlypis trichas*)). The Project site can also provide habitat for birds during the winter months. Waterfowl such as American Black Duck (*Anas rubripes*), American Wigeon (*Mareca americana*), Eurasian Wigeon (*Anas penelope*), and Mallard (*Anas platyrhynchos*) have been observed using the pond during the winter months. Other species observed during the winter months include but not limited to, Great Black-backed Gull (*Larus marinus*), Herring Gull (*Larus argentatus*), American Crow (*Corvus brachyrhynchos*), Dark-eyed Junco (*Junco hyemalis*), and European Starlings (*Sturnus vulgaris*) (eBird, 2018).

Fish and Fish Habitat: Species confirmed as present within the Rennies River Watershed include brown trout (*Salmo trutta*, D. Keefe. MAE, pers comm. September 20, 2017, NAACAP, 2015), brook trout (*Salvelinus fontinalis*), and Atlantic salmon (*Salmo salar*, NAACAP, 2015). Other species which may be present in Rennies River Watershed and Leary's Brook include American eel (*Anguilla rostrata*), and three-spined sticklebacks (*Gasterosteus aculeatus*). Leary's Brook and Rennies River are not designated as Scheduled Salmon Rivers (DFO, 2018).

Species of Concern: The Atlantic Canada Conservation Data Centre (ACDC) documented 36 rare plant observations and 759 rare animal observations within 5 km of the Project. Of the 759 rare animal records, the following species of conservation concern were documented:

- Red Crossbill (*Loxia curvirostra perna*);
- Ivory Gull (*Pagophila eburnea*);
- Bank Swallow (*Riparia riparia*);
- Bobolink (*Dolichonyx oryzivorus*);
- Rusty Blackbird (*Euphagus carolinus*);
- Short-eared Owl (*Asio flammeus*);
- Harlequin Duck (*Histrionicus histrionicus*);
- Gray-Cheeked Thrush (*Catharus minimus*);
- Barn Swallow (*Hirundo rustica*);
- Common Nighthawk (*Chordeiles minor*);
- Chimney Swift (*Chaetura pelagica*);
- monarch butterfly (*Danaus plexippus*); and
- polar bear (*Ursus maritimus*).

The remaining species observed were not provincially or nationally listed and weren't considered rare globally. There were 36 rare plant records including species that are not provincially or federally listed. Three species were identified in the 5 km buffer, including Hump-backed Elves (*Buxbaumia minakatae*), Fernald's Chuckleyppear (*Amelanchier fernaldii*) and Woodland Cudweed (*Omalotheca sylvatica*). Outside of Newfoundland & Labrador, these species are considered globally rare (A. Durocher, ACCDC, pers comm. August 30, 2017).

Based on ACCDC Expert Opinion Maps of provincially and federally listed species, no species have been identified within 5 km of the project location; however, the Expert Opinion Maps suggest that boreal felt lichen (*Erioderma pedicellatum*) presence is possible, while banded killifish (*Fundulus diaphanous*), and Newfoundland marten (*Martes americana atrata*) are possible, but unlikely. The Project is also identified within the Barrow's Goldeneye (*Bucephala islandica*) range (A. Durocher, ACCDC, pers comm. August 30, 2017).

Species of conservation concern are species that are protected by provincial and/or federal legislation. Species that are, or may be found in the project area, include the following (Table 4.3):

Table 4.3 Species of Conservation Concern

Species	NL <i>Endangered Species Act</i> Status	Canadian <i>Species at Risk Act</i> (SARA)	Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
Bird			
Bank Swallow <i>Riparia riparia</i>	No Status	Schedule 1 – Threatened	Threatened
Barn Swallow <i>Hirundo rustica</i>	No Status	Schedule 1 – Threatened	Threatened
Barrow's Goldeneye <i>Bucephala islandica</i>	Vulnerable	Schedule 1 – Special Concern	Special Concern
Bobolink <i>Dolichonyx oryzivorus</i>	Vulnerable	No Status	Threatened
Chimney Swift <i>Chaetura pelagica</i>	Threatened	Schedule 1 – Threatened	Threatened
Common Nighthawk <i>Chordeiles minor</i>	Threatened	Schedule 1 – Threatened	Threatened
Eskimo Curlew <i>Numenius borealis</i>	Endangered	Schedule 1 – Endangered	Endangered
Harlequin Duck <i>Histrionicus histrionicus</i>	Vulnerable	Schedule 1 – Special Concern	Special Concern
Ivory Gull <i>Pagophila eburnea</i>	Endangered	Schedule 1 – Endangered	Endangered
Newfoundland Gray-cheeked Thrush <i>Catharus minimus</i>	Threatened	No Status	
Olive-sided Flycatcher <i>Contopus cooperi</i>	Threatened	Schedule 1 – Threatened	Threatened
Red Crossbill <i>Loxia curvirostra percna</i>	Endangered	Schedule 1 – Endangered	Endangered
Red Knot <i>Calidris canutus rufa</i>	Endangered	Schedule 1 – Endangered	Endangered
Rusty Blackbird <i>Euphagus carolinus</i>	Vulnerable	Schedule 1 – Special Concern	Special Concern
Short-eared Owl <i>Asio flammeus</i>	Vulnerable	Schedule 1 – Special Concern	Special Concern
Fish			
American eel <i>Anguilla rostrata</i>	Vulnerable	No Status	Threatened
Banded Killifish <i>Fundulus diaphanous</i>	Vulnerable	Schedule 1 – Special Concern	Special Concern

Species	NL <i>Endangered Species Act</i> Status	Canadian <i>Species at Risk Act (SARA)</i>	Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
Insect			
Monarch Butterfly <i>Danaus plexippus</i>	No Status	Schedule 1 – Special Concern	Endangered
Mammal			
Polar Bear <i>Ursus maritimus</i>	Vulnerable	Schedule 1 – Special Concern	Special Concern
Plant			
Boreal Felt Lichen <i>Erioderma pedicellatum</i>	Vulnerable	Schedule 1 – Special Concern	Special Concern

Protected Areas: The Project is located within Pippy Park land use zone. Any development within Pippy Park is subject to the *Pippy Park Commission Act* and approval of the C.A. Pippy Park Commission.

There are no existing Provincial protected areas, such as provincial parks, wilderness reserves, wildlife reserves, wildlife parks, ecological reserves, provisional ecological reserves, public reserves, special management, or Canadian Heritage Rivers. There are also no Federal parks/reserves such as national parks, national historic sites, migratory bird sanctuaries or marine protected areas on the property.

4.2 Construction

The construction of the flood protection berm is estimated to take four (4) months in total. The activities are likely to commence from the most easterly point adjacent to Clinch Crescent East, moving west along Leary’s Brook. Project components will include the following major components described below.

- Site Preparation
 - Vegetation clearing; and
 - Grubbing of all organic materials in preparation of construction.
- Construction of the berm
 - Excavation for the berm foundation;
 - Dewatering of isolated areas of berm construction, as required;
 - Infilling of 8,637 m² wetland section with structural fill;
 - Placement of new materials such as clean rock fill and sand and gravel mixture containing 10-15% fines. Clean rock fill will be placed in areas directly adjacent to the waterbodies, in wetlands and where wet conditions are encountered;
 - Stabilization berm slopes using placement of concrete block retaining wall face around waterbody;
 - Installation of a handrail along concrete block retaining wall;

- Installation of stormwater management infrastructure (dependant on final design):
 - Installation of rock infiltration swale;
 - Replace existing corrugated metal pipes, polyvinyl chloride (PVC) pipes and stormwater outfalls;
 - Installation of duckbill valve outfalls;
 - Installation of sub drains; or
 - Integration into a new stormwater systems (trunk storm sewer);
- Stabilization of berm slopes using Class 1 hydraulic rip rap (as per City of St. John's Specifications Book) on berm faces adjacent to Leary's Brook;
- Placement of granular walk;
- Site compaction;
- Grading and shaping of berm to a 2H:1V embankment slope;
- Placement of 150 mm of topsoil in areas, unless noted otherwise in the construction plans;
- Vegetation of the constructed berms will be conducted using hydroseeding and/or sod. The finalized vegetation plan has not been determined at this time; preference will be given to native vegetation, trees, and shrubs. The hydroseed mixture is likely to be similar to that proposed in the previous design, which includes:
 - birdsfoot trefoil (*Lotus corniculatus*);
 - white clover (*Trifolium repens*);
 - boreal creeping fescue (*Festuca rubra rubra*);
 - timothy (*Phleum pratense*);
 - double cut red clover (*Trifolium pratense*); and
 - alsike clover (*hybridum*).
- Pocket plantings of mostly native shrubs and trees will provide some further stability. The finalized vegetation plan has not been determined at this time, preference will be given to native trees, and shrubs, such as red maple (*Acer rubrum*), mountain ash (*Sorbus decora*), pin cherry (*Prunus pensylvanica*), larch (*Larix laricina*), red osier dogwood (*Cornus sericea*), elderberry (*Sambucus canadensis*), serviceberry (*Amelanchier canadensis*) and pussy willow (*Salix discolor*). Some non-native species may be planted; based on previously issued planning plans and availability, these may include autumn blaze maple (*Acer freemanii*), and nannyberry (*Viburnum lentago*); and
- Environmental Protection, and sediment and erosion control measures (Section 6.2).

All construction works will be performed in accordance with the City of St. John's Specifications Book.

Regular Project hours for construction are to be Monday to Friday from 07:00 to 17:00 hours. Approval is required to work outside of regular hours or on weekends. Requests for changes to the schedule must be made at least 72 hours in advance if work is scheduled outside these times.

Machinery such as dump truck, loaders, bulldozers, and backhoes will be used for the construction. All equipment used on site will be in good working order, and idling will be minimized to reduce effects of air emissions, such as greenhouse gases and noise.

The North Berm and South Berm are proposed to remain in place for the known future with long-term management options and operational maintenance. Options identified for decommission and rehabilitation are outlined in Chapter 7 Decommissioning and Rehabilitation.

4.3 Operations and Maintenance

Operation and maintenance activities regarding the berms will be minimal. The following activities have been identified:

- Annual inspection of drainage piping and duckbill valves;
- Cleaning, repair and replacement of drainage piping and duckbill valves as a result of annual inspections;
- Annual inspection of berm conditions (planting and structural) for evidence of erosion, piping, and settlement;
- Berm repairs including regrading and planting to maintain berm conditions and aesthetic;
- Geotechnical inspection should be completed every five (5) years including review of annual inspections; and
- Pumping of water from the north side of the North Berm, as required.

The annual inspections will be completed during the spring/summer at minimum. The activity will be incorporated into the Eastern Health Operational Maintenance System as a preventative measure in which a work order will be set up within the system to comply with annual inspections.

CHAPTER 5 **ALTERNATIVES**

Structural methods of managing flooding, including upgrading existing infrastructure and construction of new alternatives, were assessed as alternatives to the Project. The potential alternatives were investigated within the Leary's Brook portion of the Rennies River watershed from Thorburn Rd. to Allandale Rd., the options derived from hydrologic and hydraulic models included (Figure 5.1):

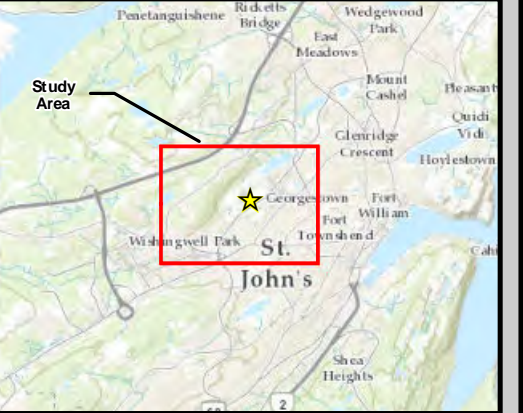
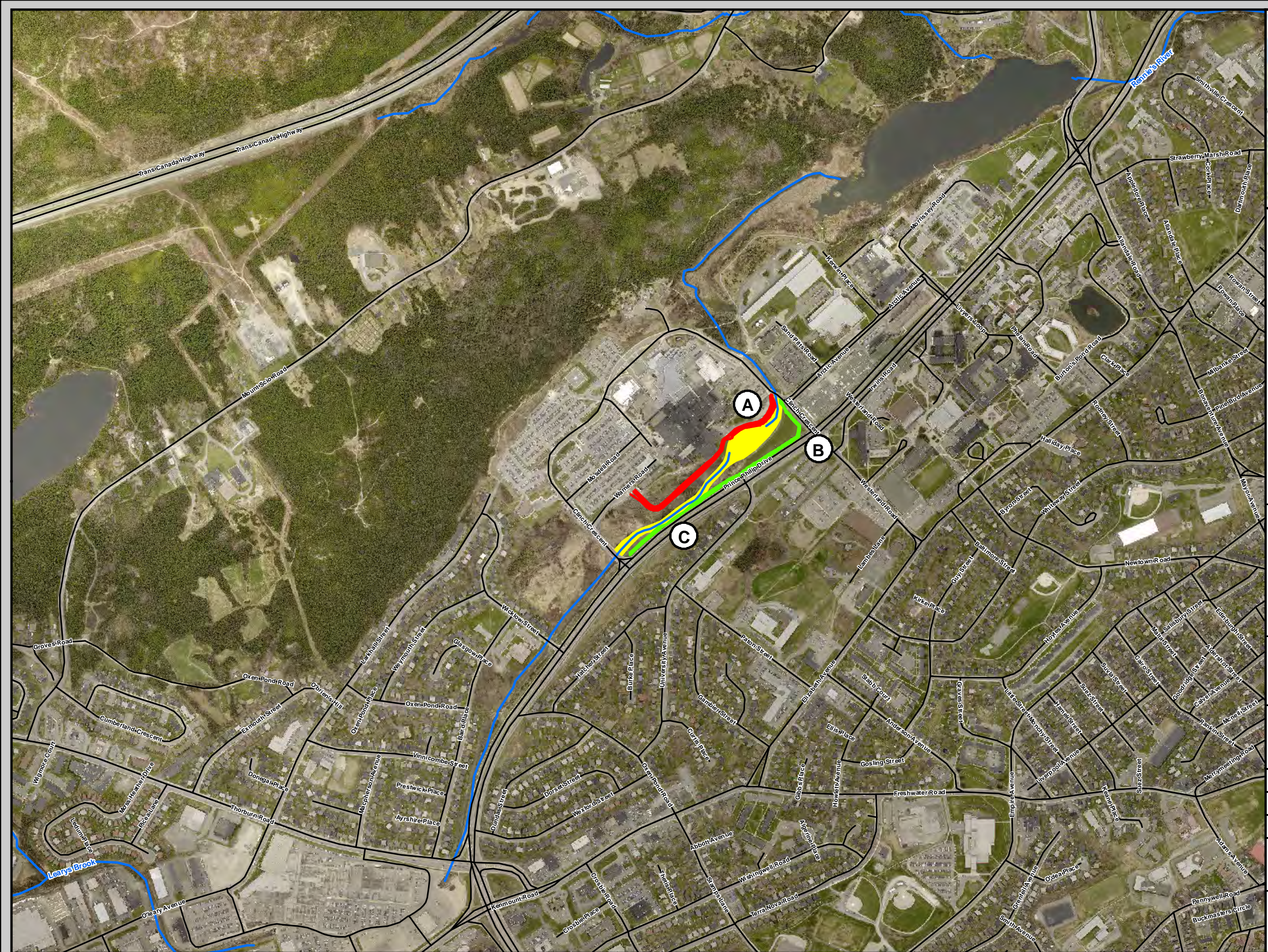
- Berms or Levees;
- Flood Control Reservoirs;
- Channel Modifications; and
- Diversion.

The option of a levee or berm (North Berm) within the Eastern Health property was ultimately selected for this Project as it satisfies the following criteria:

- Protects HSC from flooding;
- Located on Eastern Health managed property;
- Reduced potential damage to the natural environment, as part of the proposed berm is in the location of an existing berm; and
- Low capital cost and maintenance requirements.

The South Berm was also identified as a potential mitigative measure to protect the surrounding properties from additional flooding as a result of the construction of the North Berm. This berm was also recommended in the RRCSWMP to be completed with a berm on the north side of Leary's Brook (CBCL, 2014).

Upon evaluation of the other alternatives, the other options were considered impractical due to a combination of factors such as space limitations within the watershed, land ownership, and potential damage to the natural environment. The following section describes the alternatives and the preferred option.



- Proposed Berm Option A
- Proposed Berm Option B
- Roads
- Watercourses
- Proposed Channel Modifications - Option C

- (A)** Berm - North Side of Leary's Brook (North Berm)
- (B)** Berm - South Side of Leary's Brook (South Berm)
- (C)** Channel Modification - Leary's Brook

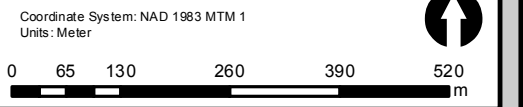


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Figure 5.1 - Location of
Alternatives

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Notes:



5.1 Berms or Levees

Berms or levees are engineered berms or earth dams used to restrict surplus water to a smaller area, reducing or controlling an area than would be flooded in absence of their protection.

5.1.1 Berm North side of Leary's Brook (Selected Option)

The North Berm option includes a 500 m berm from the southwest end of the Agnes Cowan Hostel to the Clinch Crescent East Bridge (Section 4.1.2.1, Figure 4.2 and Figure 4.3). The Project will require an estimated a total construction disturbance area of approximately 10,595 m², including the North Berm footprint of approximately 4,850 m². Along Leary's Brook and the pond, a 77 m long concrete block retaining wall will be installed, preserving the existing waterline. The remainder of the berm will be constructed approximately 5 to 10 m from the normal waterline. Constructed with a 2H:1V berm engineered slope, the berm will reach a maximum height of 59.0 m in elevation. The design parameters meet the 1:100 AEP CC +30% with 0.3 m of freeboard (as per the City of St. John's subdivision design manual for dry ponds).

The berm will be constructed of a sand and gravel mixture containing 10-15% fines content, and a maximum particle size of 200 mm in diameter. In areas encroaching on natural saturated areas, the berm will be constructed with 200 mm clean rockfill (minimal fines). Some segments will be constructed with a concrete block retaining wall rather than an engineered slope to reduce impact to the waterbodies, and will include hydraulic riprap at the toe. The remainder of the berm will have an engineered slope and will be covered with vegetation to provide further stability, mitigate releases of material that may harm fish habitat, and to blend the berm into the surrounding landscape.

The berm will be designed to assist local drainage by the inclusion of a rock infiltration swale placed at the toe of the slope on the side of the berm facing HSC. The infiltration swales will channel water to duckbill valves during storm events, directing stormwater back into the Leary's Brook and the pond. The stormwater management system will be stabilised with a rock fill mattress.

This option was selected as the preferred alternative, as it protects HSC from the effects of a 1:100 AEP with climate change + 30% flow event combined wind and wave actions. A berm north of Leary's Brook was also recommended in the RRCSWMP north of Leary's Brook south of HSC (CBCL, 2014). Analysis of potential environmental effects are outlined in Section 6, and include effects to surface water and surface water management; land use; vegetation; fish and fish habitat; wildlife and other land-users.

5.1.2 Berm South side of Leary's Brook (Selected Mitigation Option)

An additional berm assessed included one located on the south side of Leary's Brook, which would be constructed along the north side of Prince Philip Drive between Clinch Crescent East and Clinch Crescent West. This berm was identified in the RRCSWMP (CBCL, 2014).

The berm is approximately 615 m long and includes an approximately 555 m berm and 60 m concrete block wall along edge of Leary's Brook (Figure 5.1). The berm will reach a maximum height

of 59.0 m in elevation, which will be able to handle the 1:100 AEP with climate change flow event. The berm will be constructed following the same design principles as identified in Section 5.1.1.

Analysis of potential environmental effects are similar to that of the selected option (Section 5.1.1) and include effects to surface water and surface water management; land use; vegetation; fish and fish habitat; wildlife and other land-users.

The proposed location of the South Berm does not protect HSC against flooding. Due to this reason, the South Berm was not considered a viable alternative when constructed in isolation. However, the installation of the South Berm in conjunction with the North Berm will act as a mitigation measure to reduce any increase in flooding in the localized area as a result of the propose North Berm. As a result, the South Berm was identified as a suitable mitigation measure as part of the Project.

5.2 Flood Control Reservoirs

Flood Control Reservoirs can be used to temporary store floodwaters, reducing the magnitude of the peak discharge and peak stages downstream of the reservoir. Requirements for this alternative include sufficient area available to locate a flood-control reservoir (AMEC, 2014).

There is little space between Clinch Crescent West and Clinch Crescent East suitable for water retention in the form of a flood-control reservoir. Potential areas were investigated for flood control reservoirs upstream of Long Pond. There are no available areas upstream of the HSC to allow for the construction of a flood-control reservoir with a capacity to reduce flooding at the hospital (AMEC, 2014). There was a site located west of Clinch Crescent West, which was suggested as an option during the Public Information Meeting. Unfortunately, the location demonstrated little water retention capacity as the space already floods (CBCL 2014) and is at a similar elevation to the HSC area, which reduces its potential for use of water retention. As a result, this alternative was given no further consideration.

5.3 Channel Modification

Channel modifications, such as deepening and/or widening, can increase the capacity of a channel, which may result in lower water levels at the area of concern. This option would require channel modifications to Leary's Brook, using activities such as dredging (Figure 5.1).

Channel modifications could result in effects to the aquatic and riparian zones of Leary's Brook, such as removal of naturally graded rock and gravel, and modifications of the natural low flow pool and riffle system, which is critical for fish survival during summer low flows. Detailed environmental assessments, as well as, various permits from several different provincial and federal departments may be required to assess the potential environmental effects (AMEC, 2014).

Increasing the flow capacity of the channel in Leary's Brook by channel modification, may also result in higher flows reaching the downstream areas, increasing the risks of flooding at downstream locations.

Due to the potential environment effects and potential increase in flooding risk in the downstream area, this option was given no further consideration.

5.4 Diversion

Diversions can be used to protect vulnerable areas by bypassing areas vulnerable to flooding. This would reduce the magnitude of the peak discharge and consequent stage for any given return event. Requirements for this alternative include sufficient area available to locate a diversion channel and inlet.

Diversion could result in the increase of flow capacity to downstream areas such as Long Pond, which may result in higher flows reaching the downstream areas, increasing the risks of flooding at these locations.

As there are no available areas surrounding HSC to allow for the construction of a diversion (AMEC, 2014), and due to the risk of additional flooding effects downstream, this option was given no further consideration.

POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION

The project components and environmental components identified in Chapter 4 have been assessed to determine if there is a potential environmental effect.

The Project will be designed and constructed to minimize risk and potential environmental effects.

Identified potential environmental effects include:

- Flooding;
- Silt and sedimentation runoff;
- Risk of fuel, lubricant and hydraulic fluid release;
- Removal of vegetation;
- Removal of wetlands and aquatic habitats;
- Disruption of wildlife, including birds and fish;
- In-water works (berm placement);
- Dust;
- Construction debris;
- Airborne emissions from construction equipment;
- Noise pollution from construction activities; and
- Effects to other land users.

Potential sources of pollutants that may occur as a result of construction include the following:

- Spills and releases (fuel, lubricant and hydraulic fluid release);
- Silt and sedimentation runoff;
- Airborne exhaust emissions from construction equipment;
- Noise from construction activities;
- Dust; and
- Construction debris.

The following Table outlines the potential interactions between project components and environmental components.

Table 6.1 Potential Interactions between Project and Environmental Components

PROJECT PHASES / COMPONENTS	ENVIRONMENTAL COMPONENTS														
	Land			Water				Air		Natural Systems					Socio-Economic
	Terrain and Topography	Soil Quality	Erosion / Slope Stability	Surface Water Quality	Surface Water Quantity	Groundwater Quality	Groundwater Quantity	Air Quality	Noise	Vegetation	Wetlands	Species at Risk	Wildlife / Wildlife Habitat	Fish and Fish Habitat	Land User
Construction:															
Site Preparation	X	X	X	X		X		X	X	X	X	X	X	X	X
Construction of Berm	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Operation / Maintenance:															
Use of Berm			X	X	X					X					
Cleaning and Repair			X	X	X					X		X	X	X	
Pumping of Water				X	X									X	
Decommissioning:															
Berm Removal	X	X	X	X		X		X		X	X	X	X	X	X
Vegetation Planting		X	X	X						X	X	X	X	X	X
Berm Alteration	X	X	X	X		X		X		X	X	X	X	X	X

6.1 Potential Environmental Effects

The following environmental components have been identified and are discussed further below:

- Surface Water and Surface Water Management;
- Land Use;
- Groundwater;
- Soils and Geology;
- Vegetation;
- Wetlands;
- Fish and Fish habitat;
- Wildlife;
- Air Emissions and Quality;
- Health and Safety; and
- Other Land-Users.

Appropriate mitigation measures to the identified environmental effects are outlined in Section 6.2.

6.1.1 Surface Water and Surface Water Management

FLOODING AND SURFACE WATER MANAGEMENT

The potential environmental effects of flooding caused by the North Berm construction alone, and the North Berm and South Berm combined, were evaluated. Floodlines were delineated for existing conditions for the 1:20 AEP with climate change, 1:100 AEP with climate change and 1:100 AEP with climate change plus 30% floods were compared to those for post North Berm construction (Figure 6.1, Figure 6.2, Figure 6.3 and, Table 6.2).

Floodlines were also delineated following the construction of the North Berm and the South Berm for mitigation measures against existing conditions for the same scenarios (Figure 6.4, Figure 6.5, Figure 6.6 and, Table 6.3).

North Berm

The modelled flooding extents varied depending on the scenario modelled. The following section includes a summary of the modelled scenarios for the North Berm only. A summary is provided for the following events: 1:20 AEP with climate change, 1:100 AEP with climate change and the sensitivity analysis of 1:100 AEP with climate change plus 30% (Table 6.2).

Table 6.2 Summary of the Hydrologic and Hydraulic Conditions for North Berm Scenario 1:20 AEP CC and the 1:100 AEP CC, and 1:100 AEP CC + 30%

Scenario	Maximum Change in Water Level along North Berm between Existing Conditions and Post-Construction (m)	Average Width from Existing Conditions Floodline to Post-Construction Floodline (m)	Additional Area Flooded from the Existing Floodline and Post-Construction (m ²)	Areas showing Additional Floods
1:20 AEP CC	0.21	5-10	6,190	Parking lot and green areas south of Prince Phillip Drive (such as ditches, greenways, and yards), green space south of Warner's Road.
1:100 AEP CC	0.24	5-10	11,850	Clinch Crescent East, Prince Phillip Drive, parking lot and green areas south of Prince Phillip Drive (such as ditches, greenways, and yards), Arctic Ave, Sand Pitts Road, Adjacent to Core Sciences, and green space adjacent to the NRC Building.
1:100 AEP CC 30%	0.32	10-15	28,770	Clinch Crescent East, Prince Phillip Drive, parking lot and green areas south of Prince Phillip Drive (such as ditches, greenways, and yards), Arctic Ave, Sand Pitts Road, Adjacent to Core Sciences, and surrounding the NRC Building.

1:20 AEP with Climate Change: The proposed North Berm reduces flooding next to the HSC. Post berm construction, the water level increases by up to 0.21 m between Clinch Crescent East and West, resulting in an area of 6,190 m² with an average 5 to 10 m flood extent increase from the existing conditions floodline, a maximum of 100 m in a green recessed area south of Prince Phillip Drive. The areas affected include Prince Phillip Drive, adjacent parking lots and green areas (such as ditches, greenways, and yards) located south of Prince Phillip Drive. The change in flood extent does not affect additional buildings. Downstream of Clinch Crescent East and around Long Pond, the calculated flood extents do not show changes after construction of the berm. Although the post-construction floodline extends past the existing conditions floodline south of Prince Phillip Drive, the overall flooding extent decreases, mostly within the area of the North Berm and HSC from 30.94 ha to 30.13 ha within the modelled area (Figure 6.1).

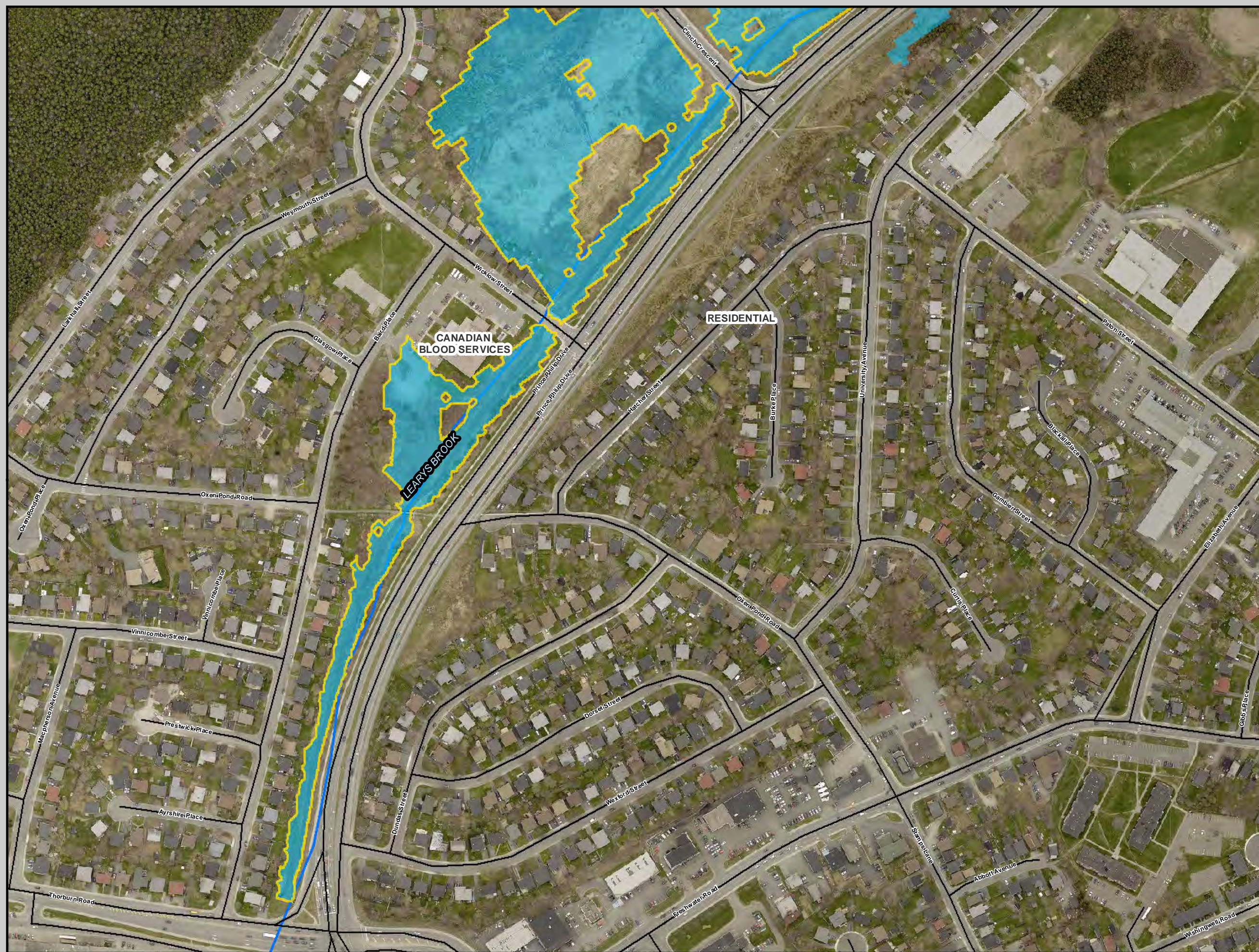
1:100 AEP with Climate Change: The North Berm reduces the extent of the floodplain to the north (toward HSC). Post berm construction, the water level along the berm is expected to increase by up to 0.24 m between Clinch Crescent East and West, resulting in an increased flooded area of 11,850 m². The average post-construction floodline extends 5 to 10 m from the existing floodplain, in similar areas to the 1:20 AEP scenario, particularly south of Prince Philip Drive. The impacted

areas south of the berm include Prince Phillip Drive, adjacent parking lots and green areas (such as ditches, greenways, and yards). East of Clinch Crescent east, the proposed floodline runs along Arctic Avenue, extending approximately 180 m from the existing floodline. Affected areas east of Clinch Crescent include Clinch Crescent East, Arctic Ave, Sand Pitts Road, parking lots, green areas (such as ditches, greenways, and yards), the north and west side of the Core Sciences building, as well as the green space west of the National Research Council (NRC) Building.

In the downstream area around Long Pond, the floodplain extents show minimal changes after construction of the berm. Although the post-construction floodline extends past the existing conditions floodline south of Prince Phillip Drive and over Clinch Crescent East, the flooding decreases, mostly within the area of the constructed berm and HSC from 36.14 ha to 35.75 ha within the modelled area (Figure 6.2).

1:100 AEP with Climate Change plus 30%: Under this scenario, water levels along the proposed berm increased by up to 0.32 m increasing the flooded area by 28,770 m² with a linear extent up to 180 m, and an average of 10-15 m from the existing floodline. After construction of the berm, areas affected include areas east of Clinch Crescent, and south of Prince Phillip Drive.

The flooding extent is similar pre and post berm construction in the area surrounding Long Pond. The difference between the existing and post construction floodlines varied, increasing from 40.26 ha to 41.56 ha within the modelled area. Affected areas east of Clinch Crescent include Clinch Crescent East, Arctic Ave, Sand Pitts Road, parking lots, green areas (such as ditches, greenways, and yards), the north and west side of the Core Sciences building, as well as surrounding the NRC Building. The areas affected south of the berm include Prince Phillip Drive, adjacent parking lots and green areas (such as ditches, greenways, and yards) located south of Prince Phillip Drive (Figure 6.3).



- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)

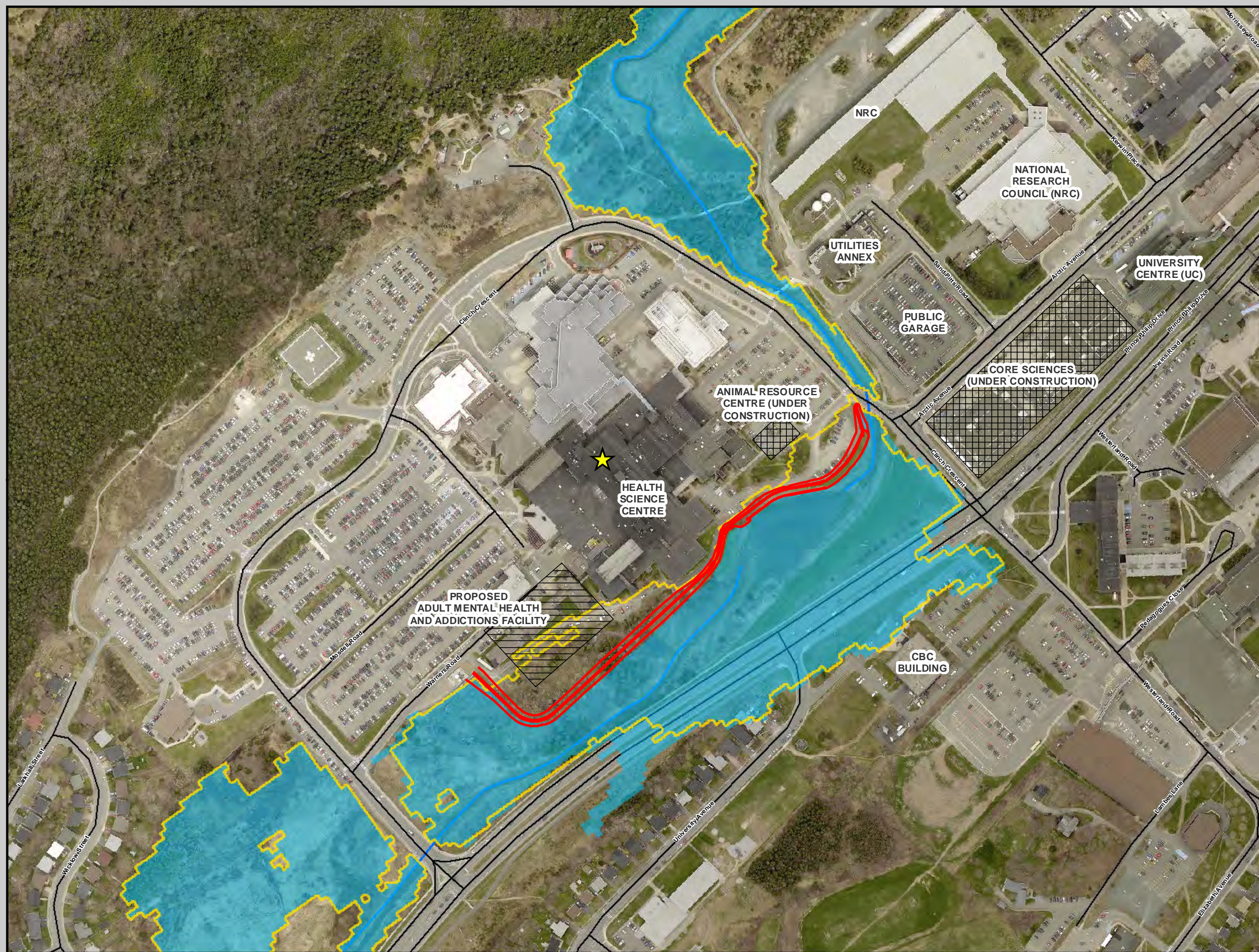


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Figure 6.1-
1:20 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm)

Drawn: BH	Date: 20/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)



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Figure 6.1-
1:20 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm)

Drawn: BH	Date: 20/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)

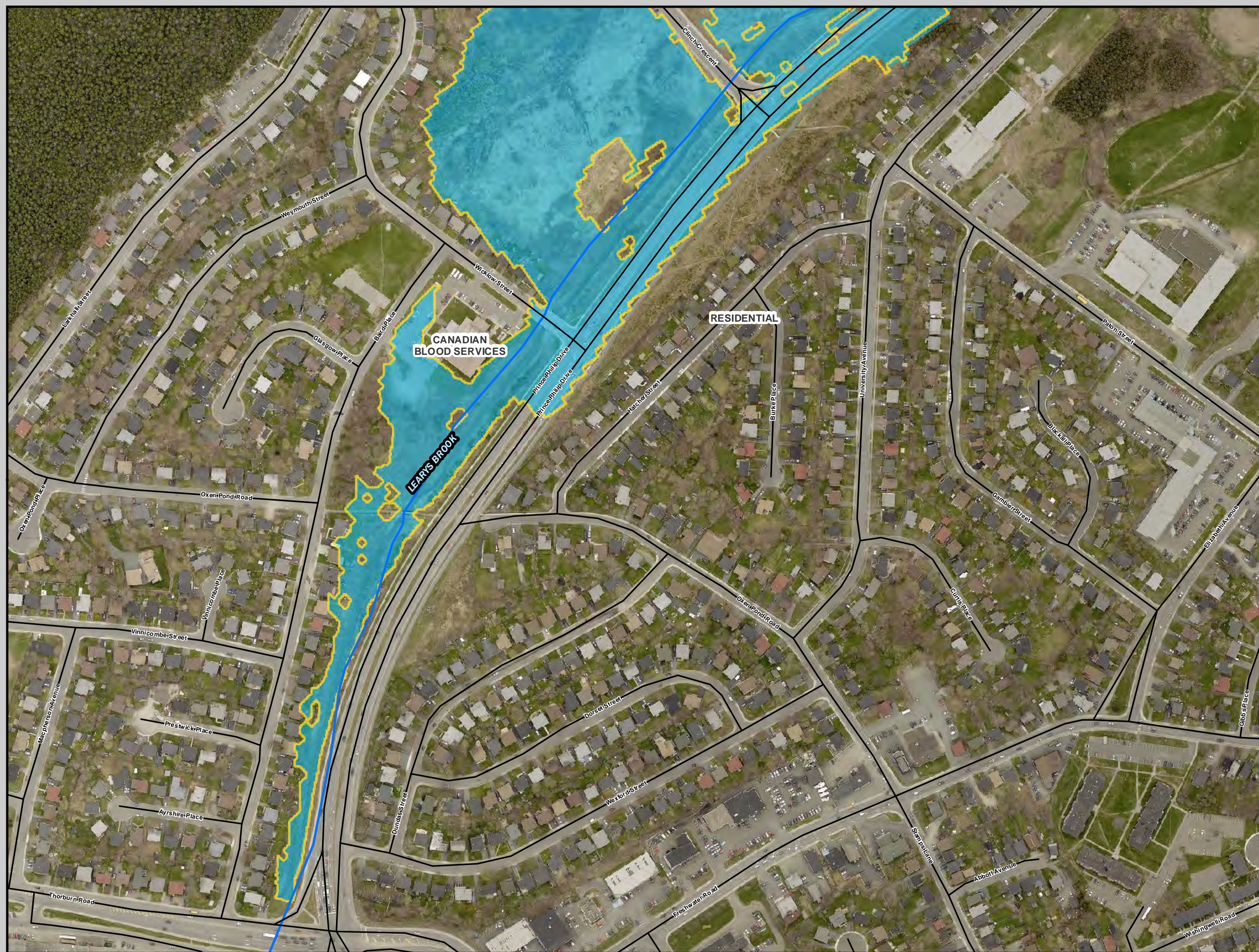


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Figure 6.1-
1:20 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm)

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Checked: MR	Project #: 173056.02	
Approved: MR	Scale @ 11"x17"	

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)

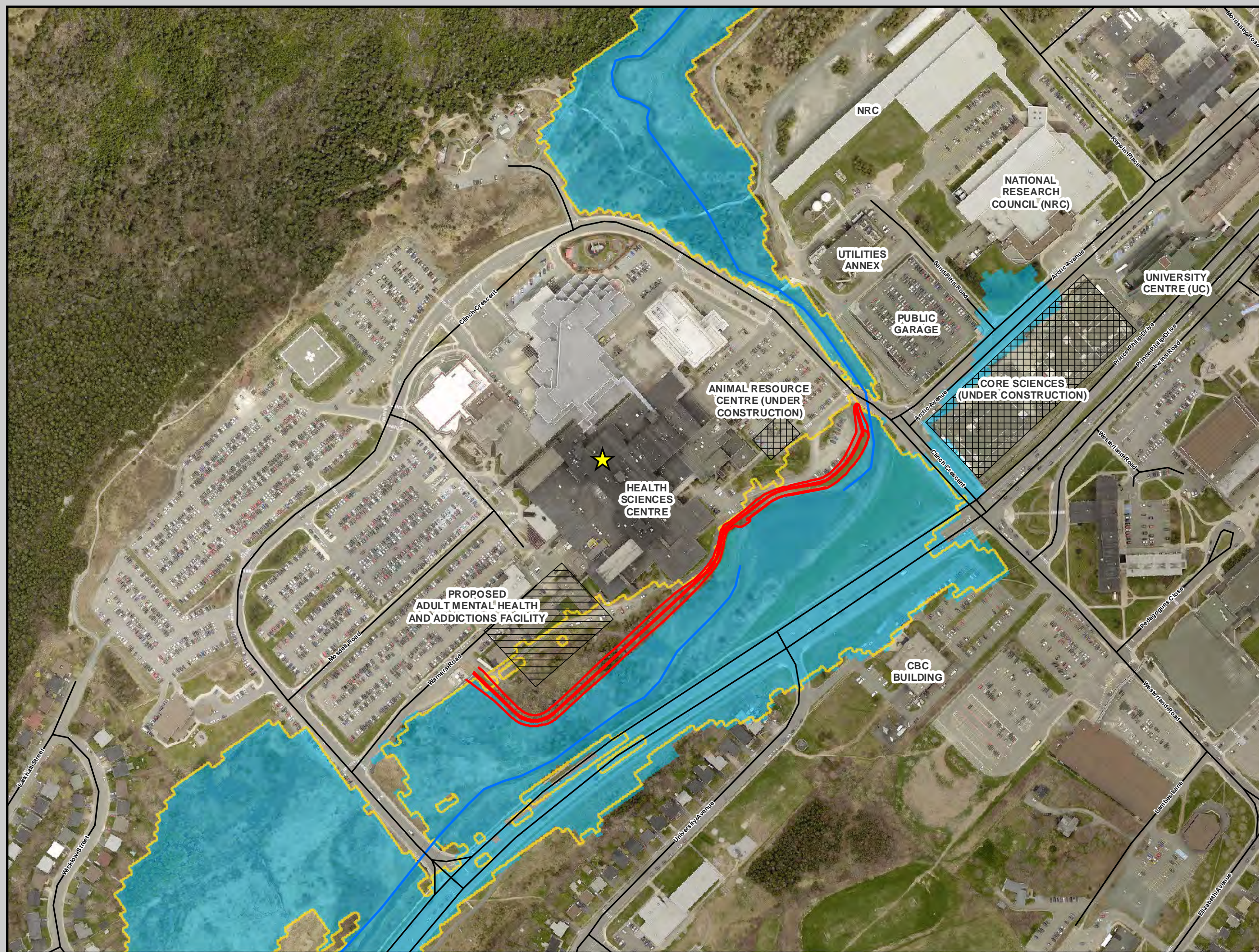


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Figure 6.2-
1:100 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm)

Drawn: BH	Date: 22/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)



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Figure 6.2-
1:100 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm)

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Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)



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Figure 6.2-
1:100 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm)

Drawn: BH	Date: 22/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)

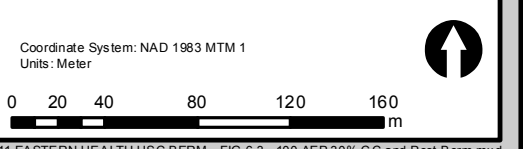


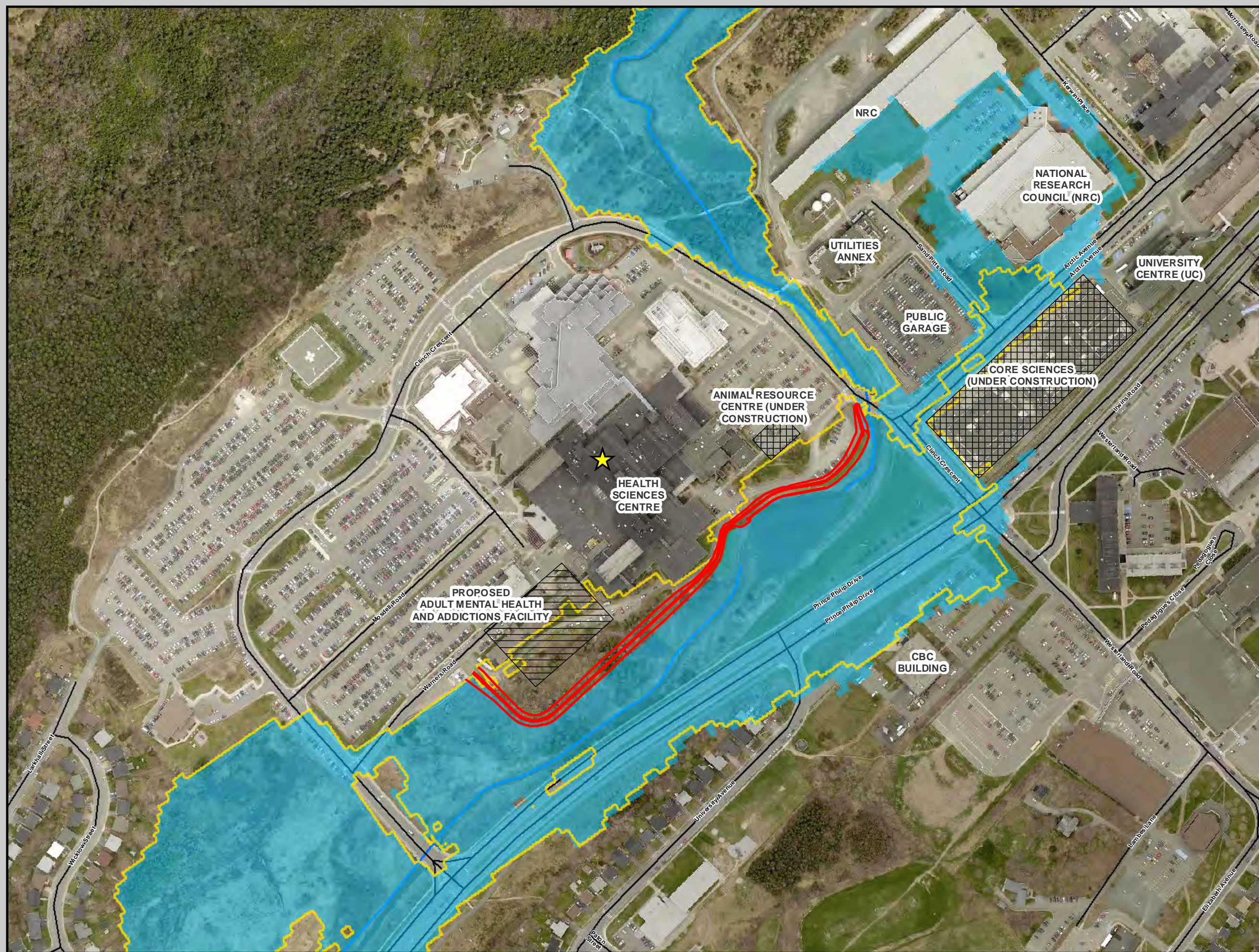
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Figure 6.3-
1:100 AEP plus 30% Climate Change
Boundaries and Post Berm Construction
(North Berm)

Page 1 of 3

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- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)



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Figure 6.3-
1:100 AEP plus 30% Climate Change
Boundaries and Post Berm Construction
(North Berm)

Drawn: BH	Date: 20/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



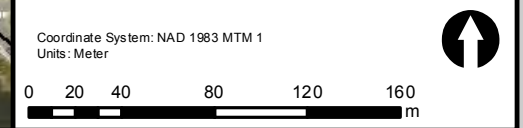
- North Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)



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Figure 6.3-
1:100 AEP plus 30% Climate Change
Boundaries and Post Berm Construction
(North Berm)

Drawn: BH	Date: 20/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"



North Berm and South Berm

This section includes a summary of the following scenarios for the North Berm and South Berm construction: 1:20 AEP with climate change, 1:100 AEP with climate change and the sensitivity analysis of 1:100 AEP with climate change plus 30% (Table 6.3).

Table 6.3 Summary of the Hydrologic and Hydraulic Conditions for North Berm and South Berm Scenario computer 1:20 AEP CC and the 1:100 AEP CC, and 1:100 AEP CC + 30%

Scenario	Maximum Change in Water Level along North Berm and South Berm between Existing Conditions and Post-Construction (m)	Average Width from Existing Conditions Floodline to Post-Construction Floodline (m)	Additional Area Flooded from the Existing Floodline and Post-Construction (m ²)	Areas showing Additional Floods
1:20 AEP CC	0.38	5	1,480	Parking lot and green areas south of Warner's Road (such as ditches, greenways, and yards)
1:100 AEP CC	0.47	5	2,580	Parking lot and green areas south of Warner's Road (such as ditches, greenways, and yards) and south of Prince Phillip Drive (such as ditches, greenways, and yards)
1:100 AEP CC 30%	0.67	10	7,250	Parking lot and green areas south of Warner's Road (such as ditches, greenways, and yards), Clinch Crescent East, Prince Phillip Drive, parking lot and green areas south of Prince Phillip Drive (such as ditches, greenways, and yards). East of Clinch Crescent East: includes Arctic Ave, Sand Pitts Road, Adjacent to Core Sciences, and green space adjacent to NRC Building.

1:20 AEP with Climate Change: For the modelled scenario, the North Berm and South Berm reduces flooding next to the HSC and surrounding area. Post berm construction, the water level increases by up to 0.38 m between Clinch Crescent East and West. Although the post-construction floodline extends up to 10 m from the floodline north of Prince Phillip Drive (1,480 m²), the overall flooding decreases, mostly south of the South Berm from 30.93 ha to 27.68 ha within the modelled area. The areas affected include the Parking lot and green areas south of Warner's Road (such as ditches, greenways, and yards). The change in flooding extent does not affect additional buildings. Downstream of Clinch Crescent East and around Long Pond, the calculated flood extents do not show changes after construction of the berm (Figure 6.4).

1:100 AEP with Climate Change: Under this scenario, the berm reduces the extent of the floodplain to the north toward HSC and south of the South Berm toward Prince Phillip Drive from 36.14 ha to

32.97 ha within the modelled area. South of Warner's Road, there are green areas (such as ditches, and greenways) and Parking lots, which may be effected by localized flooding, where the floodline extends 5 to 10 m from the existing floodplain. In total, an area of 2,580 m² may experience additional flooding. Post berm construction, the water level along the berm is anticipated to increase by up to 0.47 m between Clinch Crescent East and West. In the downstream area around Long Pond, the floodplain extents show minimal changes after construction of the berms. Although the post-construction floodline extends past the existing conditions floodline south of Warner's Road, the flooding decreases, mostly south of the South Berm from 36.14 ha to 32.97 ha within the modelled area (Figure 6.5).

1:100 AEP with Climate Change plus 30%: Under this scenario, water levels along the proposed berms are anticipated to increase by up to 0.67 m. This will increase the flooded area extent by 7,250 m² with an average of a 10 m extension from the existing flood line and a maximum linear extent up to 30 m from the existing floodline. After construction of the berm, areas affected include areas east of Clinch Crescent, and south of Prince Phillip Drive.

The flooding extent is similar pre and post berm construction in the area surrounding Long Pond.

In general, the difference between the existing and post construction floodlines varied, decreasing overall from 40.26 ha to 38.75 ha within the modelled area. Affected areas east of Clinch Crescent include Clinch Crescent East, Arctic Ave, Sand Pitts Road, parking lots, green areas (such as ditches, greenways, and yards), the north and west side of the Core Sciences building, as well as, the green area adjacent to the NRC Building.

The areas affected south of the berm include Prince Phillip Drive, adjacent parking lots and green areas (such as ditches, greenways, and yards) located south of Prince Phillip Drive.

Overall mitigation measures include the installation of the South Berm to reduce the flooding extent to the existing properties and surrounding properties during the 1:100 AEP climate change event. Additional mitigation measures have been identified in Section 6.2. Following these requirements and the installation of the South Berm, minimal potential effects are expected, and overall flooding in the area is decreased.



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)

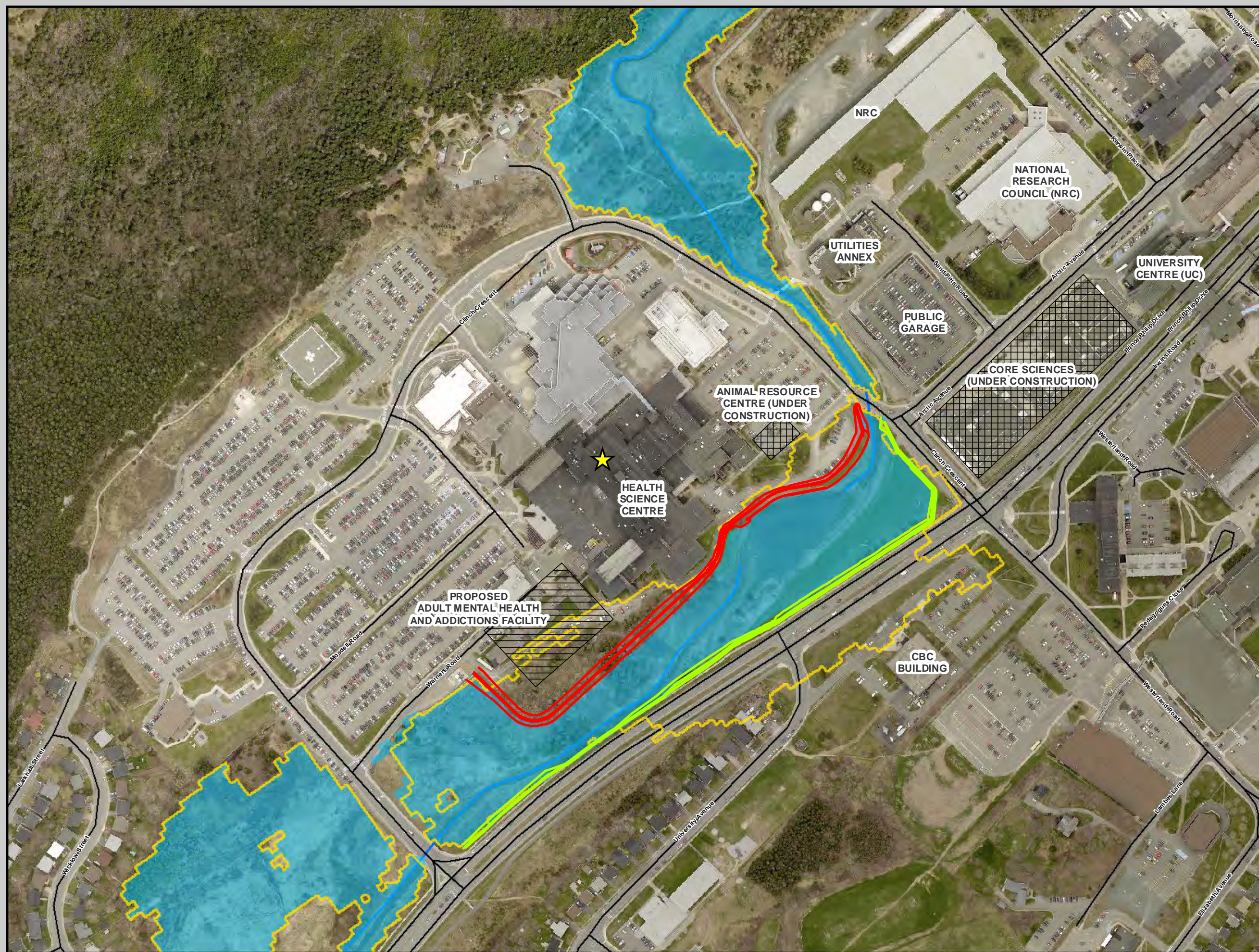


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Figure 6.4-
1:20 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm and South Berm)

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Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)



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Figure 6.4-
1:20 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm and South Berm)

Drawn: BH	Date: 22/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)

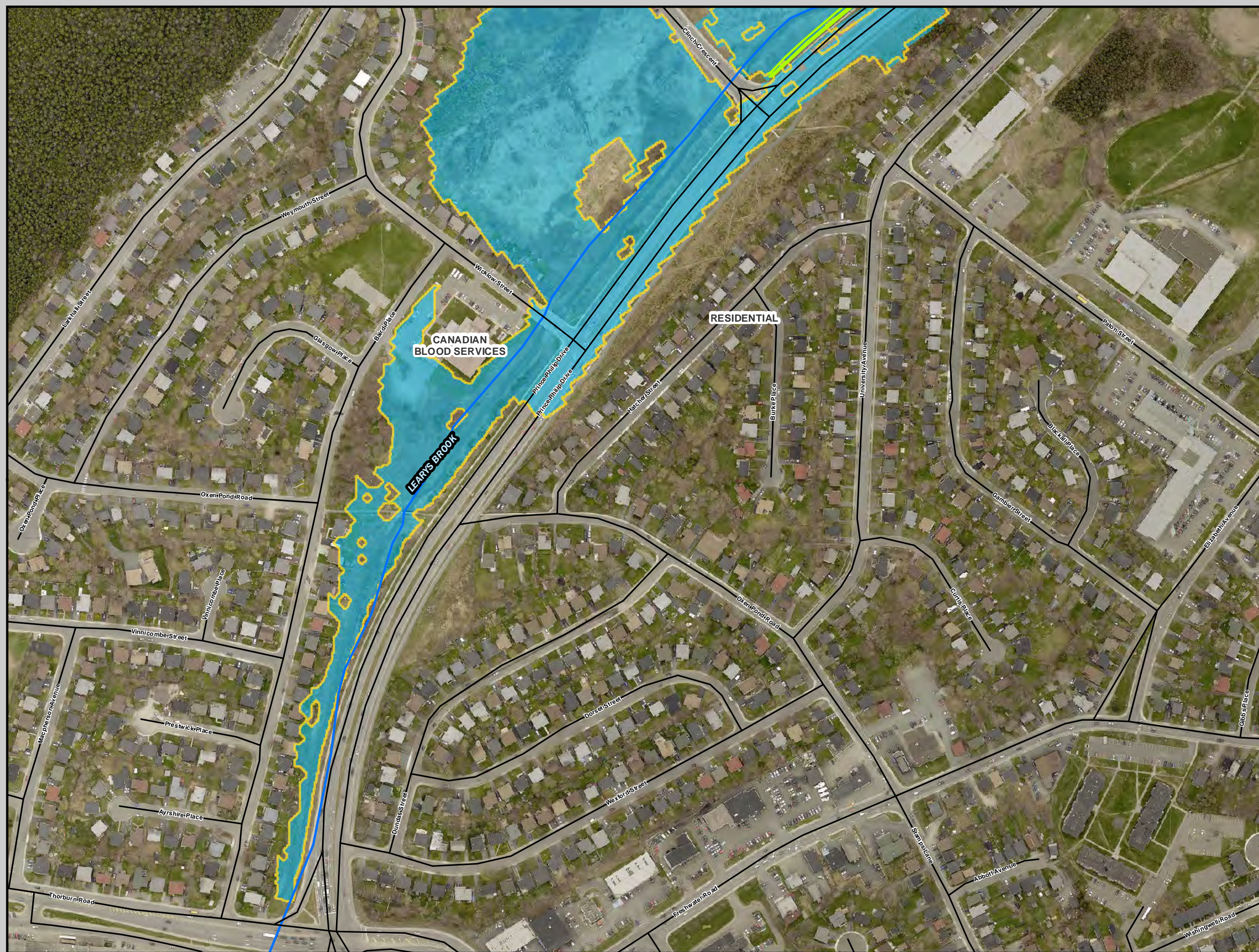


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Figure 6.4-
1:20 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm and South Berm)

Drawn: BH	Date: 22/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)

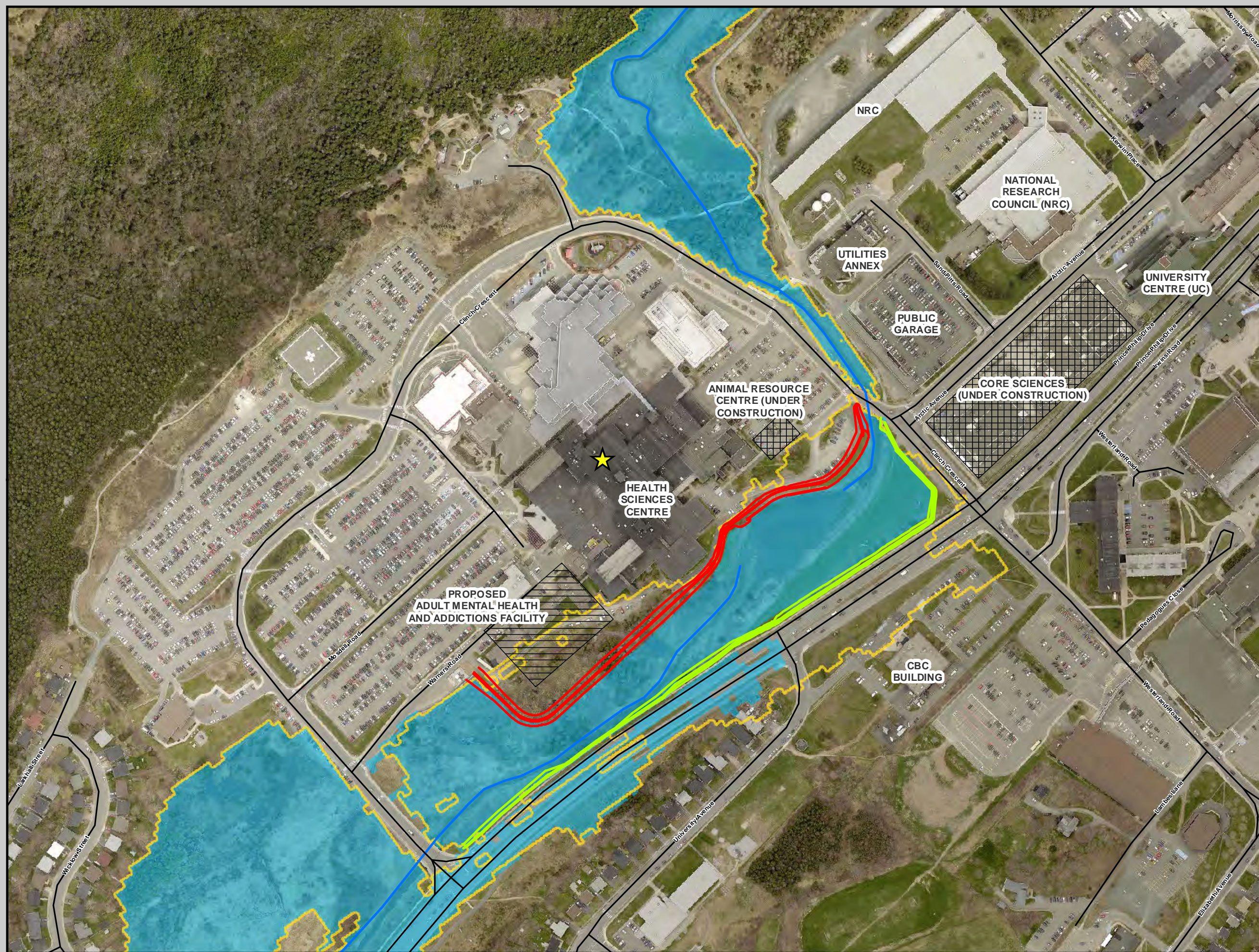


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BERM**

Figure 6.5-
1:100 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm and South Berm)

Drawn: BH	Date: 20/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)



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BERM**

Figure 6.5-
1:100 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm and South Berm)

Drawn: BH	Date: 20/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter

Path: Y:\St. John's Data\Jobs\2017\173056.02 EH - EPR for HSC Berm - Revised\20 CAD\08 GIS\Layout\173056.02 MXD-014 EASTERN HEALTH HSC BERM - FIG 6.5 - 100 AEP CC and Post Berm ADD SOUTH.mxd



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries (Post Berm Construction)

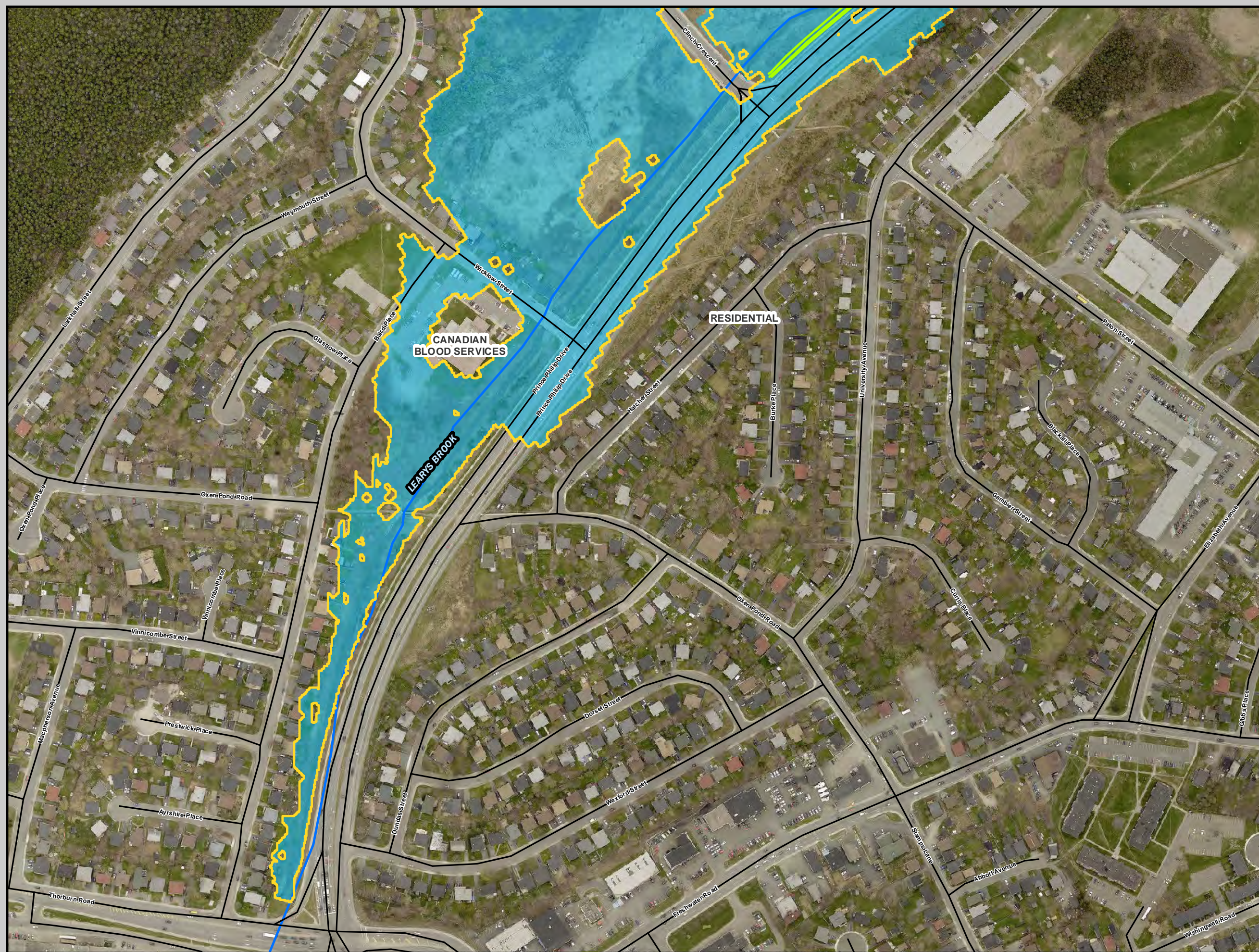


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BERM**

Figure 6.5-
1:100 AEP Climate Change Boundaries
and Post Berm Construction
(North Berm and South Berm)

Drawn: BH	Date: 20/02/2019 1:3,250
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17"

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries

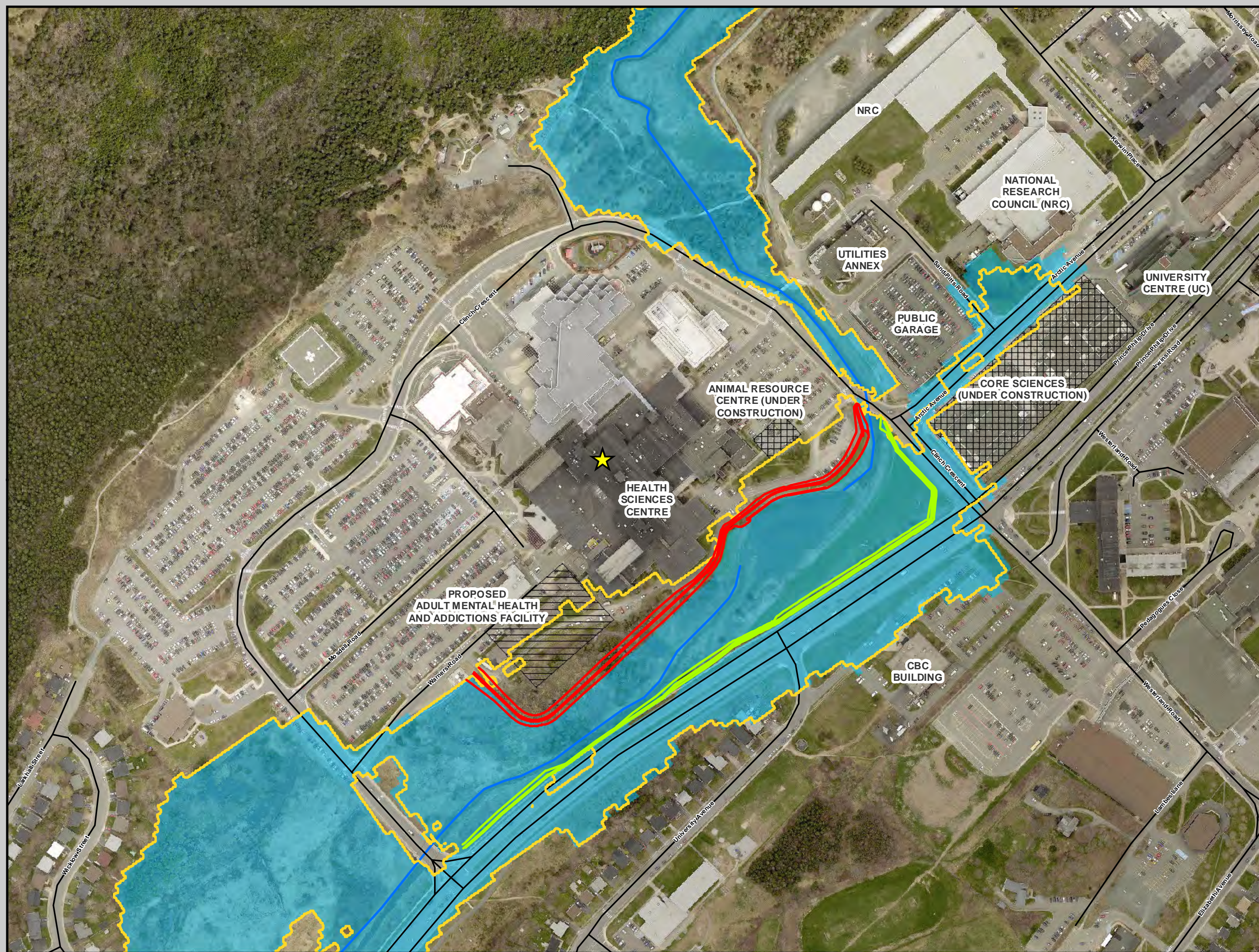


**EASTERN HEALTH
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Figure 6.6-
1:100 AEP Plus 30% Climate Change
Boundaries and Post Berm Construction
(North Berm and South Berm)

Drawn: BH	Date: 22/02/2019
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17" 1:3,250

Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries



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Figure 6.6-
1:100 AEP Plus 30% Climate Change
Boundaries and Post Berm Construction
(North Berm and South Berm)

Drawn: BH	Date: 22/02/2019
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Coordinate System: NAD 1983 MTM 1
Units: Meter



- North Berm
- South Berm
- Roads
- Watercourses
- Buildings Under Construction
- Proposed Buildings
- Climate Change Boundaries (Existing Conditions)
- Climate Change Boundaries



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Figure 6.6-
1:100 AEP Plus 30% Climate Change
Boundaries and Post Berm Construction
(North Berm and South Berm)

Drawn: BH	Date: 22/02/2019
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17" 1:3,250

Coordinate System: NAD 1983 MTM 1
Units: Meter

SEDIMENTATION, EROSION, SPILLS AND RELEASE OF DELETERIOUS SUBSTANCES

There is a potential for loss of soil by stormwater run-off or wind erosion, and spills during construction.

The earth berm portions will be designed with a 2V:1H to reduce the effects of run-off. In addition, sediment and erosion control measures will be implemented. When working near watercourses, retaining wall and riprap will be used to reduce encroachment into watercourses.

Mitigation measures include protecting topsoil by stockpiling for reuse; reducing potential for sedimentation of storm sewer or receiving streams by use of temporary erosion and pollution control devices; and dust suppression measures to mitigate pollution of the air with dust and particulate matter. Temporary erosion and pollution control devices such as silt fences will be used to mitigate the possible sources of pollutants. Mitigation measures such as an EPP including an Erosion and Sediment Control Plan and Spill Response Plan will be prepared as outlined in Section 6.2. Additional mitigation measures have been identified in Section 6.2. Following these requirements, minimal potential effects are expected.

6.1.2 Land Use

The proposed North and South Berms are located in the Pippy Park land use zone. The berms are designed to complement the aesthetics of Pippy Park. The berms will be designed and constructed with engineered slopes, which will result in minimal maintenance requirements. Adjacent to watercourses, only clean rock fill materials (minimal fines) will be used to reduce the potential of release of sediments or any other materials considered deleterious to fish and fish habitat. Post construction, the berms will be covered with topsoil, hydroseed and/or sod as well as revegetated with preference to native trees and shrubs. The existing granular walkway located north of the berm will remain intact.

A care and maintenance program will be implemented to assess berm conditions annually, at a minimum. Following the yearly assessment, the berms will be rehabilitated, as required, to maintain the berms aesthetics and function. The surface water management system within the berm will also be assessed annually. Items will be repaired and cleaned as required to maintain the function of the infrastructure.

Construction equipment will not be permitted to operate outside the construction zone to prevent damaging adjacent areas, such as Leary's Brook.

Upon implementation of these mitigation measures, the potential for interaction between project activities and Land Use is expected to be minimal.

6.1.3 Groundwater

The use of equipment on site during the construction phase may result in activities whereby effluent/pollutants enter the hydrological cycle and adversely impact groundwater quality. For

example, accidental spills or leaks of fuels, lubricants, or hydraulic fluids may negatively impact groundwater quality. Improper disposal and treatment of potentially contaminated soils during construction could also lead to contaminated groundwater. An Emergency Spill Response Plan and measures for mitigating the improper handling, storage and disposal of hazardous and other waste materials are outlined in Section 6.2.

There is also potential of inflow of groundwater into onsite excavations. Whenever possible, all construction including the work in wet areas should be completed during dry or low-flow periods. The identified timing window in Newfoundland and Labrador is from June 1 to September 30.

Dewatering plans and associated measures will be implemented to control the inflow of groundwater into excavations. Measures may include use of earthworks such as perimeter ditches and sump pumps. Any discharge of water from the site will be conducted in accordance with applicable environmental guidelines.

Upon implementation of these mitigation measures, the potential for interaction between project activities and groundwater is expected to be minimal.

6.1.4 Soil Quality

To mitigate risk of damage to adjacent areas, construction equipment will be restricted to the construction zone and will not be permitted to operate outside the construction zone. Where possible, surface soil will be reused. All soils and surface water impacted via spills and releases will be disposed of off-site in accordance with all applicable environmental regulations and legislation. Mitigation measures are outlined in Section 6.2. Upon implementation of such mitigation measures, potential effects to geology and soils are expected to be minimal.

6.1.5 Vegetation

Site preparation (e.g., clearing and grubbing) of the Project area will result in the direct loss, or alteration, of vegetation. Indirect effects to vegetation may include the introduction of invasive and exotic species to existing natural communities, primarily via heavy machinery during construction. The removal of vegetative communities within the wetland and riparian area may also impact wildlife that utilize these communities for cover, foraging, and breeding activities.

The berms will be covered with topsoil, hydroseed and/or sod, as well as revegetated with preference given to native vegetation, trees and shrubs. Non-native species may be used in cases where they provide increase structural durability or appropriate native vegetation cannot be sourced. A hydroseed mixture will be used in areas directly adjacent to watercourses. The use of sod may be used in some locations not directly adjacent to watercourse.

Mitigation measures will be implemented to reduce effects to vegetation; such as clearing timing (Section 6.1.8 and 6.2.7), operation of equipment to avoid transfer of invasive and exotic species, as well as, the restoration of native plants post construction as outlined in Section 6.2. Whenever possible, vegetation clearing will occur outside the breeding bird period (mid-April to mid-August).

Please see Section 6.2.7 for further details on mitigation measures. Upon implementation of such mitigation measures, potential effects to vegetation are expected to be minimal.

6.1.6 Wetlands

The proposed undertaking will interact with a single wetland located within the Project area (Figure 6.7). The wetland encompasses a minimum of 3.6 ha, delineated during a site visit by a CBCL representative on August 14 and 15, 2018. The total wetland area extends beyond the project area and delineation boundaries. During construction of the proposed berms, approximately 8,637 m² of wetland will be altered, approximately 4,267 m² as a result of the berm or infilling and 4,370 m² north of the North Berm, resulting in the direct loss of wetland (Figure 6.7).

Indirect effects to the wetland may include the loss or alteration of ecological function via flooding, deposition of deleterious substances, sedimentation and erosion. Measures to mitigate these potential effects are outlined in Section 6.2. Upon implementation of these measures, the effect of the proposed undertaking on the wetland is expected to be minimal.

Health Sciences Centre



- North Berm
- South Berm
- Roads
- Watercourses
- Wetland Impact - Areas of Infill (8637 m2)
- Delineated Wetland



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Figure 6.7 - Proposed Wetland Alterations

Drawn: BH	Date: 21/02/2019
Checked: MR	Project #: 173056.02
Approved: MR	Scale @ 11"x17" 1:1,750

Notes:

Coordinate System: NAD 1983 MTM 1
Units: Meter

6.1.7 Fish and Fish Habitat

Due to the proximity of the Project to Leary's Brook and the pond situated at the northeast end of Leary's Brook, there is potential for Project activities to impact fish and fish habitat. Potential effects of Project activities on fish and fish habitat (e.g., clearing, grubbing, etc.) include the following:

- Bank erosion and sediment loading;
- Changes to channel morphology and water flow;
- Alteration to riparian habitat through vegetation removal; and
- Release of deleterious substances associated with accidental spills/leaks, improper disposal of waste materials, or the use of chemical-based dust suppressants.

The berm is to be designed to minimize potential effects to any water body and, subsequently, fish and fish habitat. Such measures include the stabilization of berm slopes facing the waterbody through the installation of hydraulic riprap and a concrete retaining wall. The remainder of the berm will be an earthen berm covered with topsoil, hydroseed, sod and native vegetation for further stabilization. As outlined in Section 6.2, further mitigation measures to address the above-mentioned effects will be prepared and included in an Erosion and Sediment Control Plan and Emergency Spill Response Plan, both of which will be incorporated into an all-encompassing EPP. These mitigation measures shall include those recommended by Fisheries and Oceans Canada (DFO) for projects conducted near water and are outlined in Section 6.2 and Appendix H. Following implementation of these mitigation measures, DFO has determined that the proposed undertaking will not cause serious harm to fish. Project activities, however, will need to comply with subsection 35(1) of the *Fisheries Act*.

Upon implementation of mitigation measures, potential effects to fish and fish habitat are expected to be minimal.

6.1.8 Wildlife

Potential effects to wildlife, i.e., terrestrial mammals and migratory birds, may result from the following:

- Habitat loss or alteration;
- Deposition of harmful substances into areas utilized by wildlife;
- Noise associated with machinery;
- Improper disposal of refuse; and
- Construction lighting.

Loss or alteration of habitat, particularly wetland and riparian habitat, may impact wildlife that utilize these habitats for cover, foraging and important life functions (e.g., breeding and nesting). Deposition of harmful substances into waterbodies or areas utilized by wildlife could potentially occur due to accidental spills or leaks. Operation of machinery, human presence and associated noise during the construction phase of the Project may result in short-term disturbance to wildlife and temporary avoidance of the area. Conversely, improper disposal of domestic refuse by on-site personnel may attract wildlife that opportunistically forage on these materials. Construction

lighting can also attract wildlife, specifically migratory birds, to the area, increasing the likelihood of wildlife interactions with machinery and subsequent injury.

Whenever possible, vegetation clearing will occur outside the breeding bird period (mid-April to mid-August). If this is not avoidable and without implementation of mitigation measures, there could be a risk of impacting breeding birds and their nests. If vegetation clearing outside the breeding bird nesting period (mid-April to mid-August) is unavoidable, breeding bird /nest surveys will be completed prior to removal of vegetation or disturbance of potential habitat. A trained biologist should complete surveys to confirm the present of breeding birds and their nests. All nests and neighbouring vegetation will be left undisturbed until nesting is complete. If nests containing eggs or young of migratory birds are discovered during construction, all disruptive activities in the nesting area should cease until nesting is completed. A buffer zone should be established at an appropriate set-back distance surrounding the nest. Appropriate set back distances should be based on setbacks identified in the literature or in consultation with a provincial or federal wildlife biologist.

Best practices for the protection of wildlife during construction, such as those outlined in Section 6.2, will be incorporated into the EPP. Upon implementation of mitigation measures, such as vegetation clearing, noise and waste management, the potential effects to wildlife and species at risk are expected to be minimal.

6.1.9 Air Quality

Air emissions, noise and air quality protection measures will be incorporated into the EPP to mitigate potential interactions dust, particulate matter and noise emissions. All equipment and construction activities on site will occur during approved working hours and all equipment used on site will be in good working order to reduce effects of air emissions, such as greenhouse gases and noise. Following these best management practices, interactions between construction activities and air emissions/quality are expected to be minimal.

6.1.10 Health and Safety

The berm has been designed following applicable engineering standards and will be constructed using a qualified contractor. Following Health and Safety Guidelines and best management practices, interactions between construction activities and health and safety are expected to be minimal.

6.1.11 Land Users

The Project area is located less than a kilometer from residential and commercial properties. Effects to neighbouring land users include air quality, noise, and flooding. During the construction phase of the Project, activities will be conducted in full compliance with municipal by-laws to minimize disturbance to surrounding land users.

During the operational phase of the Project, there is risk of flooding to adjacent properties thereby impacting adjacent land users. Locations within the Rennies River Watershed with known flooding

problems under existing conditions include Prince Philip Drive and the CBC building parking lot between Clinch Crescent East and Clinch Crescent West (CBCL, 2014). Effects of flooding is further discussed in Section 6.1.1.

Mitigation measures to avoid or minimize effects associated with noise, air quality and flooding on surrounding infrastructure and land users are provided in Section 6.2.

6.2 Mitigation Measures

Eastern Health has identified the following project specific mitigation measures and best management procedures to minimize potential environmental effects and resource conflicts. Eastern Health and their contractors will follow all identified mitigation measures, construction best management practices and specified permit conditions during construction. The following project specific mitigation measures are divided into the following categories:

- General;
- Surface Water and Surface Water Management;
- Vegetation;
- Wetlands;
- Fish and Fish Habitat;
- Wildlife;
- Groundwater;
- Air Emissions and Quality; and
- Land Users.

6.2.1 General

- Project activities will be conducted in compliance with federal, provincial legislation and municipal by-laws and regulations, such as the *Environmental Protection Act* (SNL 2002: Chapter E-14.2), *Wild Life Act*, *Occupational Health and Safety Act*, *Fisheries Act*, *Migratory Birds Convention Act*, *Species at Risk Act* and their regulations.
- A site specific EPP will be developed and followed. The EPP will include training and mitigation measures to reduce effects to terrestrial, aquatic and human health such as accidental spills/leaks and release of fuel and mechanical fluids, hazardous materials and deleterious substances. At minimum, the EPP will include the following:
 - Emergency Response Plan;
 - Emergency Spill Response Plan including locations of spill response equipment;
 - Erosion and Sediment Control Plan;
 - Site dewatering plans;
 - Handling and storage of fuel, gasoline and associated products;
 - Waste management strategy;
 - Invasive Species Mitigation Plan;
 - Wildlife Management Plan; and
 - Operation and maintenance of machinery.

- An Erosion and Sediment Control Plan will be implemented prior to construction and will describe the measures implemented to prevent loss of soil during construction by stormwater run-off and wind erosion. The plan will include protecting topsoil by stockpiling for reuse; preventing sedimentation of storm sewer or receiving streams; and preventing air pollution by dust and particulate matter. Temporary erosion and pollution control devices such as silt fences will be used to mitigate possible sources of pollutants.
- In the event of a spill or leak, the operator must immediately notify MAE and the Environmental Emergencies 24 Hour Report Line (1-800-563-9089), abate the discharge and restore the affected area to the satisfaction of the Department.
- All debris and waste materials will be disposed of in accordance with the provisions of the *Environmental Protection Act* and latest regulations, guidelines and policies. A construction waste management strategy will be developed and will include designated specific area(s) on the construction site for segregated or comingled collection of recyclable materials. Non-hazardous construction and demolition debris will be either recycled or salvaged. Items may include cardboard, metal, concrete, plastic, clean wood, and glass. The disposal of all waste materials not reused, resold or recycled will be at an approved waste disposal site.
- On completion of the Project, all construction equipment, surplus materials and temporary works will be cleared away and removed from the site.
- On completion of the Project, any disturbed areas will be restored to the original conditions or better.
- Only new or reused, clean materials will be used for the purposes of the berm construction, backfill, and grading.
- All construction activities will occur during working hours as defined in the permit.
- Weekly environmental inspection reports, with a minimum of three (3) digital photographs, will be provided to Eastern Health by the Contractor. The photographs will include general progress and documentation of erosion and sediment control measures. The inspection reports will document any deficiencies and corrective actions taken to address problems. All corrective actions will be implemented within 24 hours of the inspection. Environmental Inspection reports will occur at minimum weekly and after each rainfall events.
- The berm inspections will be implemented annually for inspection of drainage piping and duckbill valves. Berm conditions (planting and structural) for evidence of erosion, piping, and settlement, and geotechnical inspection will be completed every 5 years including review of annual inspections.
- Stormwater components will be cleaned, repaired and replaced, as required, to keep in good working order.
- Berm repairs will be completed, including regrading and planting, to maintain berm conditions and aesthetic.
- Geotechnical inspection will be completed every 5 years including review of annual inspections.

6.2.2 *Surface Water and Surface Water Management*

- The South Berm will be constructed as part of the mitigation measures for Surface Water Management and Land Users. The berm will be constructed to the design criteria for a 1:100

AEP with a climate change event. The South Berm will contain the water within the location of Leary's Brook to reduce the effects of surface water as a result of flooding and to other Land Users as a result of flooding.

- An Erosion and Sediment Control Plan will be implemented prior to construction and will describe the measures implemented to prevent the release of sediment and deleterious substances during construction by stormwater run-off and wind erosion. The plan at a minimum will address the following:
 - Site dewatering;
 - Protecting topsoil by stockpiling for reuse;
 - Preventing sedimentation of storm sewer or receiving streams;
 - Preventing air pollution by dust and particulate matter; and
 - Temporary erosion and pollution control devices such as silt fences will be used to mitigate possible sources of pollutants and their removal at completion of the Project.
- Dewatering plans and associated measures will be implemented to control the inflow of water into excavations. Measures may include use of earthworks such as perimeter ditches and sump pumps. Any discharge of water from the site will be conducted in accordance with applicable environmental guidelines.
- Discharge of sewage or other materials into a body of water, public sewer or sewer leading to a public sewer, is prohibited unless authorized under the *Environmental Control Water and Sewage Regulations (2003)*.
- Fueling and storage of gasoline and associated products (e.g. oils, greases, diesel, hydraulic and transmission fluids), should occur in a designated refueling /storage area at least 30 m from any waterbody or wetland and on flat, paved terrain.
- All maintenance of equipment should occur at least 30 m from any waterbody or wetland and on flat, paved terrain.
- Storm water management structures, such as duckbill valves, will be installed, if necessary, within the berm to facilitate the flow of water towards Leary's Brook during storm events. As the water rises above the stormwater drainage piping on the Leary's Brook Side, the duckbill valves close and prevent water from flowing from the Leary's Brook side to the HSC side.
- Water held on the north side of the berm will be released to Leary's Brook after water levels have receded below the stormwater drainage pipe elevation.

6.2.3 Groundwater, Geology and Soils

- Surface soil stripping will be minimized where possible; and material will be stockpiled and reused where possible.
- Construction methods will be implemented to suit local soil conditions.
- Any quarried materials required for the proposed Project shall be purchased from an external supplier permitted under the *Quarry Materials Act (1998)*.
- All soils and water impacted via spills and releases will be disposed of off-site in accordance with all applicable environmental legislation.

- Dewatering plans and associated measures will be implemented to control the inflow of groundwater into excavations. Measures may include use of earthworks such as perimeter ditches and sump pumps. Any discharge of water from the site will be conducted in accordance with applicable environmental guidelines.

6.2.4 Vegetation

- The Project will be designed to minimize disruption to existing natural areas. All removal and disposal of trees, brush, stumps, surface litter, boulders and grubblings will follow applicable legislation, permits and best management practices. Vegetation, such as trees, and shrubs, should be retained when possible.
- The berms will be covered with topsoil, hydroseed and/or sod as well as revegetated with preference to native vegetation, trees and shrubs. A hydroseed mixture will be used in areas directly adjacent to watercourses. Sod will not be placed in locations directly adjacent to watercourse.
- All equipment must be devoid of soils, seeds, and residual debris prior to use on-site. Undercarriages, wheels, tracks and blades / buckets should be cleaned (i.e. pressure washed) prior to use on the site.
- The contractor shall develop an Invasive Species Mitigation Plan as part of the EPP, outlining measures to reduce the risk of introducing invasive species to Project areas, particularly wetlands. Mitigation measures may include activities such as limiting mechanical clearance in areas adjacent to the wetland or clearing during the winter.

6.2.5 Wetlands

- Where alteration to a wetland is unavoidable, the initiatives outlined in the MAE Policy for Development in Wetlands to sustain wetland functions will be considered.
- Implementation of sediment and erosion control measures such as and installing erosion and sediment barriers (i.e., silt fence) as well as drainage control measures (e.g., sediment traps or settling ponds) along the edge of the construction area to reduce the likelihood of contaminants entering the wetland during construction by directing surface run-off into retention/sedimentation basins placed away from wetlands.
- Minimizing grubbing activities and timing such activities to avoid periods of heavy rainfall, clearing wetlands during winter.
- Revegetating disturbed areas immediately post construction.

6.2.6 Fish and Fish Habitat

- Existing watercourses (i.e., Leary's Brook and its banks) are not to be disturbed, other than that identified in the conceptual construction drawings. No heavy machinery is permitted in this area.
- All in-water works will be completed within periods of low flow to further reduce the risk to fish and fish habitat or isolated from flows. The identified timing window in Newfoundland and Labrador is from June 1 to September 30.
- Adjacent to watercourses, only clean rock fill materials (minimal fines) will be used to reduce the potential of release of sediments or any other materials considered deleterious to fish and fish habitat.

- Erosion and sediment control measures shall be implemented to reduce effects to fish and fish habitat. Such measures may include, but are not limited to, isolation measures (e.g., silt fences, and sand bags), minimizing the removal of vegetation and natural debris (i.e., rocks, logs, sand), and shoreline stabilization with appropriate materials (e.g., native vegetation, rip-rap or armour stone).
- Removal of materials from below the high water mark is not permitted.
- Fish passage and flow should be maintained at all times.
- All guidance and mitigation measures issued from DFO shall will be followed for projects conducted near water (Appendix H).

6.2.7 Wildlife

- The contractor shall develop a management plan encompassing measures to mitigate effects to migratory birds and incorporate this plan into the EPP. These measures shall include ways to avoid disturbing birds' nests or eggs. Avian surveys conducted by trained biologists are recommended prior to commencement of construction, particular if clearing is required during the breeding bird nesting season. Any species at risk observations should be reported to Environment and Climate Change Canada - Canadian Wildlife Services (ECCC-CWS).
- Mitigation measures to deter migratory birds from nesting in stockpiles during the breeding season shall also be implemented.
- If possible, any clearing of vegetation will occur prior to the breeding bird nesting season (mid-April to mid-August). If unavoidable, breeding bird /nest surveys will be completed prior to removal of vegetation or disturbance of potential habitat. A trained biologist should complete surveys to confirm the present of breeding birds.
- If nests containing eggs or young of migratory birds are discovered during construction, all disruptive activities in the nesting area should cease until nesting is completed. A buffer zone should be established at an appropriate set-back distance surrounding the nest. Appropriate set back distances should be based on setbacks identified in the literature or in consultation with a provincial or federal wildlife biologist.
- Contractors should implement management practices to reduce the effects to migratory birds as a result of human induced light, such reducing the number of site illuminating lights in the project area, utilizing LED lights, where possible, and low intensity strobe lights at night.
- Best management practices for wildlife protection during construction will be incorporated into the EPP, such as proper waste management to deter wildlife from entering the Project area.
- To minimize effects to wildlife, it is recommended that the earthen berms be revegetated with native trees and plants, particularly on the side of the berms facing Leary's Brook and adjoining pond in addition to the adjacent riparian area.

6.2.8 Air Quality

- To minimize effects to air quality, all Project activities will be in compliance with the Air Pollution Control Regulations (2004); dust mitigation measures will be implemented.

Specific measures might include dust suppression activities such as wetting of the construction areas and sweeping and washing of paved road surfaces.

- All heavy machinery should be in good working order and operated in a manner to maximize fuel efficiency, thereby reducing greenhouse gas emissions and effects to air quality such as noise.
- Utilization of water for dust suppression over other less environmentally sound methods (i.e., chloride and lignin-based suppressants). If the former is not possible, alternate methods of dust suppression and ways to negate effects to the environment will be outlined in the EPP.
- Construction will be scheduled to avoid extreme wind, and rainy period to reduce potential erosion and sediment mobility.

6.2.9 Land Users

- The South Berm will be constructed as part of the mitigation measures for Surface Water Management and Land Users. The South Berm will be constructed to the design criteria for 1:100 AEP with climate change to mitigate the effects of a 1:100 AEP with a climate change event. The proposed mitigation will contain the water within the location of Leary's Brook to reduce the effects of surface water as a result of flooding and to other Land Users as a result of flooding.
- As required, traffic control will be provided by certified traffic control persons, in accordance with the Traffic Control Manual issued by the Newfoundland and Labrador Department of Transportation and Works. Access will be maintained for all emergency vehicles in construction areas.
- All construction activities will occur during working hours as defined in the permit.
- The South Berm will be constructed to the required design standards (1:100 AEP with Climate Change) as part of the Project to reduce the degree of flooding which could potentially affect neighboring Land Users. Additional detail on mitigation measures are provided in Section 6.2.2.

DECOMMISSIONING AND REHABILITATION

The construction of the North Berm and South Berm will serve to support flood protection for the surrounding properties for updated flood prediction conditions.

The Project is to stay in place indefinitely, with appropriate care and maintenance.

The HSC is planned to be a long-standing fixture within the City of St. John's and the Province of Newfoundland and Labrador. North Berm and South Berm are proposed to remain in their existing location for the known future with long-term management options and operational maintenance. In the case that the hospital is re-located, or the berms are no longer determined to be sufficient for flood protection, the following options have been identified for decommission and rehabilitation:

- the berms will be revised or incorporated into additional flood / water control structures for HSC property;
- the berms will be removed and the area will be replanted with vegetation; or
- the berms will be left in place and integrated into overall water management for the Rennie's River watershed.

Eastern Health commits to work with MAE on the selected closure options in advance of planning closure of the HSC.

PROJECT RELATED DOCUMENTS

The following project related documents have been included as resources in this document:

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CBCL. 2014. Rennies River Catchment Stormwater Management Plan (RRCSWMP): Final Report. File No. 123097.00. Report prepared for City of St. John's by CBCL, St. John's, NL. Dated April 15, 2014. Available: http://www.stjohns.ca/sites/default/files/files/publication/Rennies%20River%20Catchment%20Stormwater%20Management%20Plan_0.pdf. Accessed February 6, 2019

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PUBLIC INFORMATION MEETING

Eastern Health held an Open House Public Information Session in St. John's, NL on September 13, 2018 from 6:30 pm to 8:30 pm. The purpose of the meeting was to present information on the project and to outline the process for the registration of the undertaking according to the *Environmental Protection Act* and *Environmental Assessment Regulations*.

9.1 Public Meeting Announcements

Under the requirements of the *Environmental Assessment Regulations* and the EPR, Eastern Health provided the following Announcements and Notice Postings regarding the Eastern Health Berm Public Information Session to the Public (Table 9.1). MAE was notified of the Public Information Meeting on September 5, 2018.

Table 9.1 Dates of Announcements and Notice Postings for the Eastern Health Berm Public Information Session

Location of Announcement / Notice Posting	Days of Posting
The Telegram	September 8, 2018 September 10, 2018 September 11, 2018 September 12, 2018
City Hall	September 6, 2018
Memorial University Main bulletin board	September 6, 2018
CBC Building Main Entrance	September 6, 2018
Canadian Blood Services	September 6, 2018
National Research Council	September 6, 2018
Eastern Health's New Centre	September 6, 2018
Eastern Health's Issued Public Service Announcement	September 6, 2018
Eastern Health's Health Science Centre Berm Webpage	September 6, 2018
Facebook	September 6, 2018 September 11, 2018 September 13, 2018

Location of Announcement / Notice Posting	Days of Posting
Twitter	September 6, 2018 September 11, 2018 September 13, 2018

9.1.1 Public Advertisements per the Environmental Preview Report

The public meeting was advertised following the EPR Guidelines. All newspaper ads were at two (2) column widths and a minimum of 17.8 cm by 12.7 cm (seven (7) inches by five (5) inches). A copy of the notice was posted in the following locations as outlined in Table 9.1 (Appendix E):

- The Telegram Newspaper;
- City Hall;
- Memorial University Main bulletin board and / or website;
- CBC Building main Entrance; and
- National Research Council.

Also, Eastern Health distributed notices at local residential properties along University Avenue, Baird Place, and Hatcher Street.

Invitations to the Public Information session were provided to Memorial University, City of St. John's, Pippy Park Commission, Newfoundland and Labrador Department of Health and Community Services, Newfoundland and Labrador Department of Transportation and Works, and MAE.

9.1.2 Additional Notification Efforts

In addition to the public advertising requirements of the EPR, Eastern Health also provided notification and additional information through the Eastern Health website and social media.

Announcements were posted in the following locations (Table 9.1, Appendix E):

- Eastern Health's News Centre;
- Eastern Health's issued Public Service Announcement;
- Eastern Health's Health Science Centre Berm Webpage;
- Memorial University, Faculty of Medicine website, under the events section;
- Memorial University, Faculty of Medicine notice monitors throughout the facility;
- Facebook; and
- Twitter.

9.2 Summary of Public Information Meeting

The Public Information Meeting, held from 6:30 pm to 8:30 pm on September 13, 2018, included members of the public and other invited guests including Eastern Health Executive/Board, Eastern Health employees, Representatives of Memorial University, City of St. John's, Pippy Park Commission, and Provincial Government Departments. A sign-in sheet was available for members of the public to sign-in. The sign-in sheet is available for review by MAE upon request; however, was not included in the EPR as contact information was provided. Fifteen to twenty members of the public attended, including invited guests.

A brief presentation was provided, and two poster boards were available for review (Appendix E). The public was encouraged to ask questions. Those questions regarding the environmental effects of the undertaking were recorded. Questions asked about other undertakings not included within this assessment have not been included. Presentation materials, such as presentations and poster boards, are include in Appendix E. Presentation topics general included:

- Purpose of the Public Meeting;
- Background;
- The Project;
- Flooding and Surface Water Management;
- Alternatives;
- Permits and Authorizations; and
- Closure.

9.2.1 Public Comments, Questions, and Concerns

A summary of questions and concerns raised and location of where they are addressed in the EPR are presented in Table 9.2 and Appendix E. Response to questions and concerns from the meeting, and as a result of the public notice posting, are located in Appendix E.

Table 9.2 Summary of Questions and Concerns from Public Information Meeting and Location addressed in the EPR

Theme	Topic	Response Location in the EPR
Existing Conditions	Where is the newly proposed berm located, and where is this located relative to the location of the wetlands?	Section 4.1.1 Geographic location; Section 4.1.3 Existing Environment, Figure 4.6, Section 6.1.4 Wetlands and Figure 6.4.
	Are you able to tell me whether the low water levels in the bog across from Kent’s Pond on Higgins Line/Allandale Road is related to the berm?	Chapter 3.0. The Undertaking
Berm Location / Construction	Where is the location of the proposed New Adult Mental Health and Addiction Facility in relation to the Berm?	Section 4.1 Geographic Location / Physical Components / Existing Environmental and (Appendix A).
	Why was this location selected?	Comment included reference to other potential projects and undertakings, comment was recorded but not addressed in the EPR.
Flooding Risks	Will the project increase flooding downstream at Long Pond?	Section 4.1.3 Existing Environment Section 6.1.1 Surface Water and Surface Water Management

Theme	Topic	Response Location in the EPR
	How will the weir effect the Health Sciences Centre and upstream of Long Pond?	Section 4.1.3 Existing Environment Section 6.1.1 Surface Water and Surface Water Management Comment included reference to other potential projects and undertakings, comment was recorded but not addressed in the EPR.
Alternatives	As an alternative and potential mitigation, a berm was identified on the South Side of Leary's Brook and south of the proposed berm along Prince Phillip Drive. Will the berm located on the South Side of Leary's Brook effect the proposed berm?	Section 5.0 Alternatives and 6.2 Mitigation Measures
Approvals	Pippy Park Approvals	Section 10.0 Approval of the Undertaking; and Appendix F

9.3 Continued Public Consultation

Eastern Health is still undergoing public consultation efforts. A summary of questions and concerns raised and location of where they are addressed in the EPR are presented in Table 9.3 and Appendix E.

Table 9.3 Summary of Continued Public Consultation Efforts and Location addressed in the EPR

Date	Theme	Topic	Response Location in the EPR
September 19, 2018	Flooding Risks	What mitigation measures can be completed to reduce the flooding risks along University Avenue because of the proposed berm?	Section 4.1.3 Existing Environment Section 6.1.1 Surface Water and Surface Water Management

CHAPTER 10 APPROVAL OF UNDERTAKING

Additional permits, approvals and authorizations may be required for the construction and operation of the Project. The following permits, approvals, and authorizations from various issuing agencies have been identified, but are not limited to, the items listed in Table 10.1.

Table 10.1 List of Permits, Approvals and Authorization for the Undertaking

Permit, Approval or Authorization	Applicable Legislation	Issuing Body	File Number Registration Number
Approval for the Undertaking	<i>Environmental Protection Act, SNL 2002 / Environmental Assessment Regulation</i>	Minister of Municipal Affairs and Environment	1887
Development, Building, and Occupancy Permits	<i>City of St. John's Act, RSNL 1990</i>	St. John's City Council	
Approval from the C.A. Pippy Park Commission	<i>Pippy Park Commission Act, RSNL 1990</i>	C.A. Pippy Park Commission	N/A
Permit to Alter a Body of Water Schedule J - Miscellaneous Works in a Freshwater Body i.e. Other works not specific to above schedules	<i>Water Resources Act, SNL 2002 and MAE Policy for Development in Wetlands</i>	Department of Environment and Climate Change. Water Resources Management Division	
Request for Review	<i>Fisheries Act</i>	Fisheries and Oceans Canada (DFO)	16-HNFL-00368

The Pippy Park Commission provided Eastern Health with a letter on June 30, 2017 granting approval of the HSC Berm subject to receipt of the all other required approvals (Appendix F). Since this time, the proposed location of the North Berm has changed, and the addition of the South Berm is proposed as a mitigation measure. Eastern Health is actively working with the Pippy Park

Commission to gain their approval for the new concept. Eastern Health understands that any approval received from MAE will be contingent on the Approval from the Pippy Park Commission.

The Fisheries Protection Program branch responded with a letter (File No: 16-HNFL-00368) dated September 16, 2016, to a request for review submitted on August 17, 2016. The letter concluded with the provided mitigation measures implemented into the project planning, that it will not result in serious harm to fish and that no formal approval is required under the *Fisheries Act* (Appendix G).

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APPENDIX A – Berm Engineering Drawings

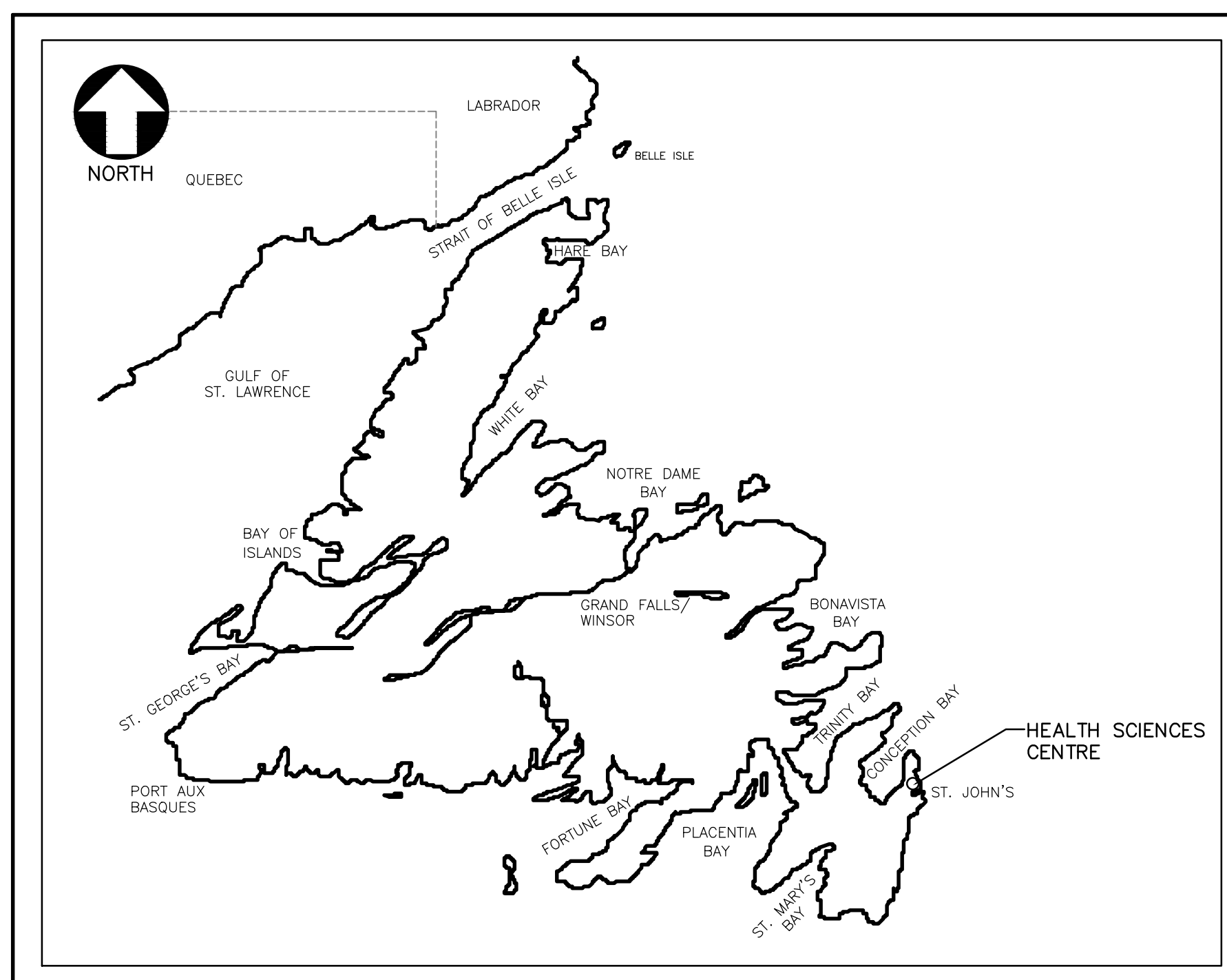
CBCL PROJECT # 193007.00

<u>Drawing No.</u>	<u>DRAWING LIST</u> <u>Drawing Title</u>
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C01	GENERAL LOCATION PLAN
C02	SITE PLAN – NORTH BERM SHEET 1
C03	SITE PLAN – NORTH BERM SHEET 2
C04	SITE PLAN – NORTH BERM SHEET 3
C05	SITE PLAN – SOUTH BERM SHEET 1
C06	SITE PLAN – SOUTH BERM SHEET 2
C07	SITE PLAN – SOUTH BERM SHEET 3
C08	SITE PLAN – SOUTH BERM SHEET 4
C09	SITE SECTIONS – STA. 0+000 TO STA. 0+291
C10	SITE SECTIONS – STA. 0+291 TO STA. 0+579



HEALTH SCIENCES CENTRE FLOOD PROTECTION BERMS

300 PRINCE PHILIP DRIVE, St. John's, NL A1B 3V6



LOCATION MAP
SCALE: N.T.S.

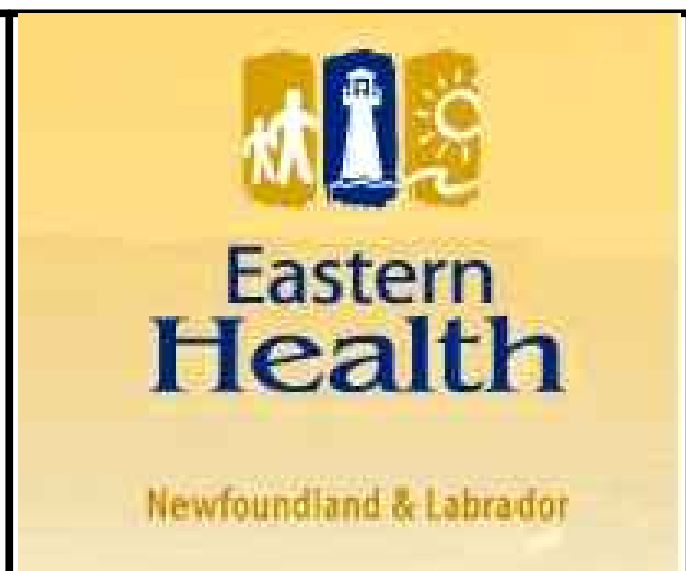
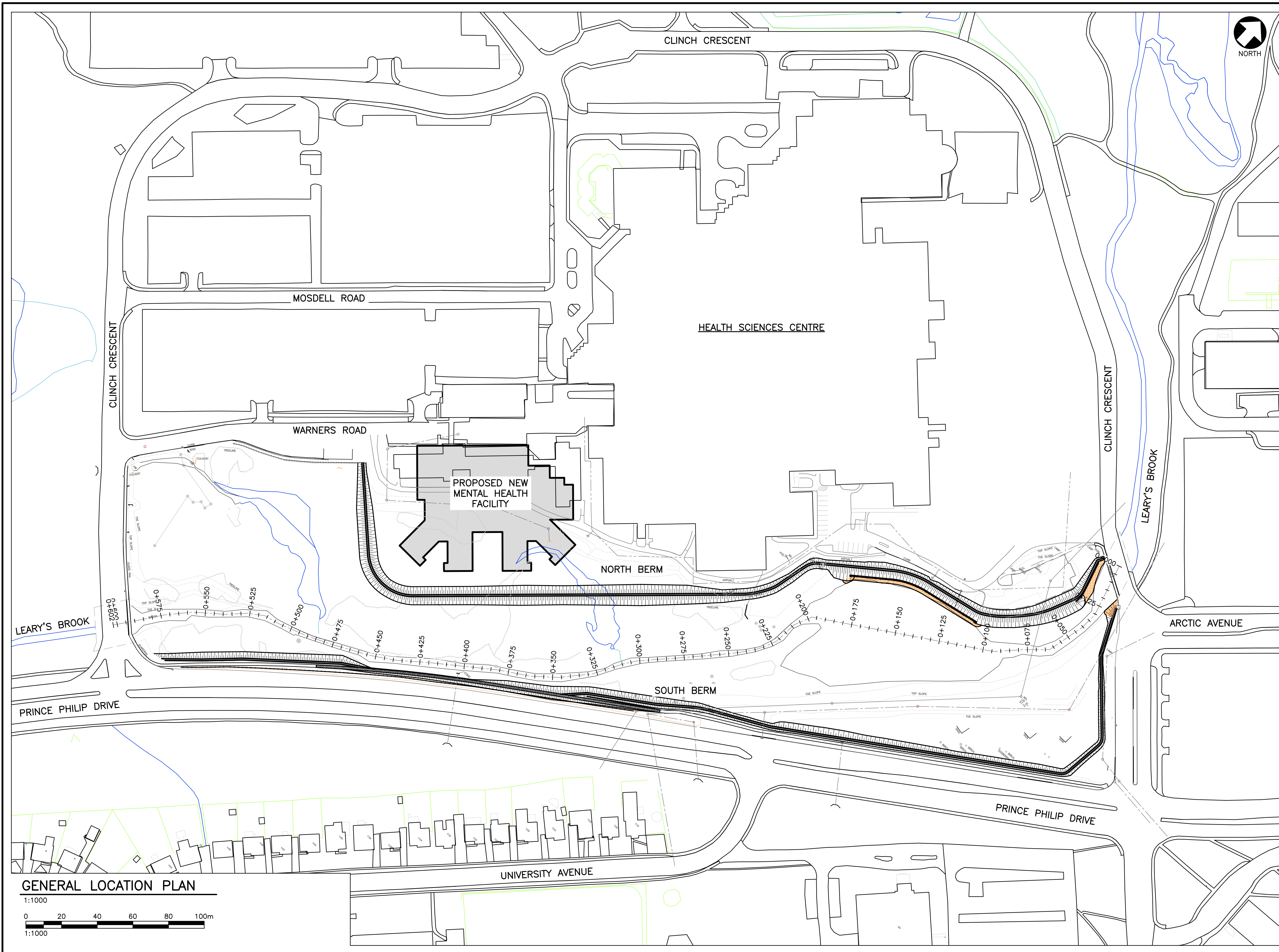


CBCL LIMITED
Consulting Engineers

ISSUED FOR
66% REVIEW

DATE: FEBRUARY, 26, 2019

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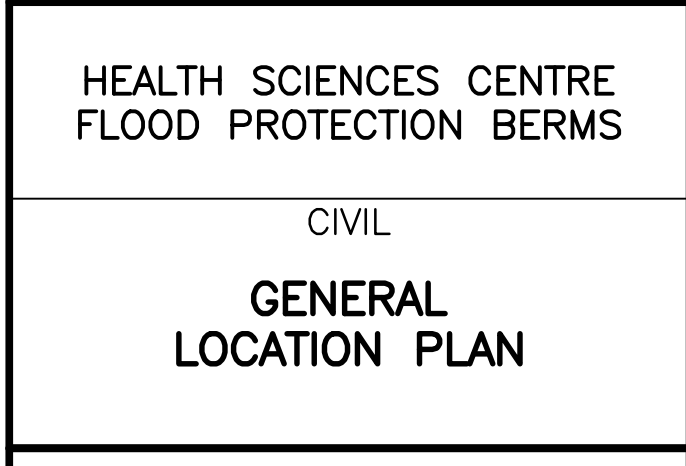


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A	ISSUED FOR 60% REVIEW	19/02/26	SRB

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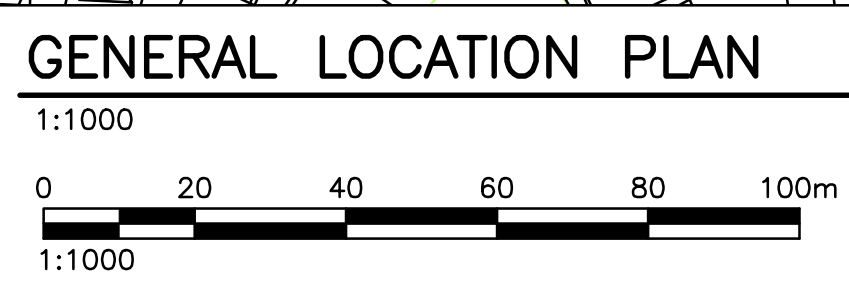
HEALTH SCIENCES CENTRE
FLOOD PROTECTION BERMS

CIVIL
GENERAL
LOCATION PLAN

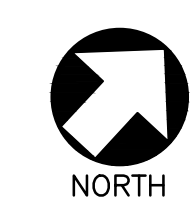
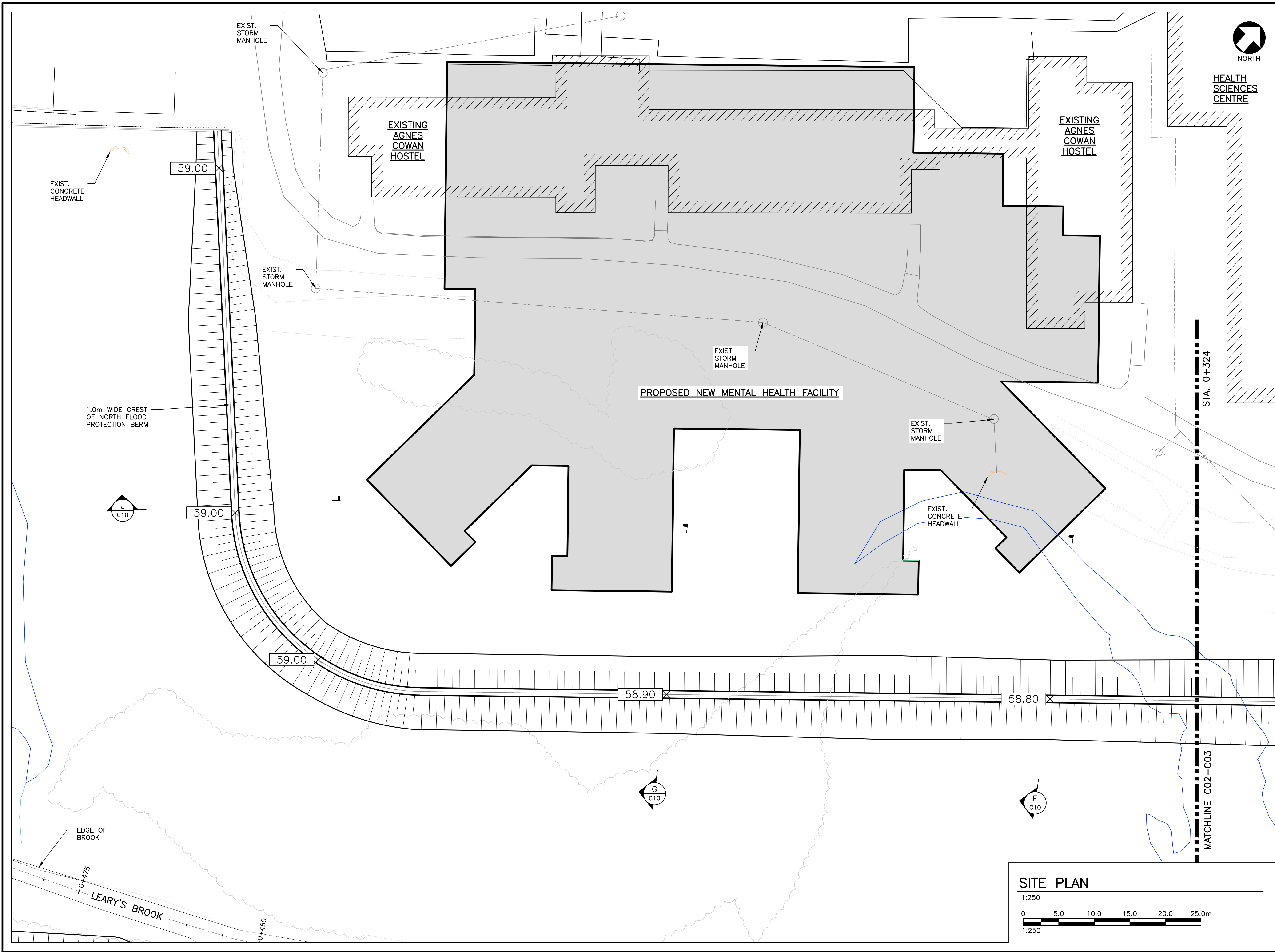


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**HEALTH SCIENCE CENTRE
FLOOD PROTECTION BERMS**

**CIVIL
SITE PLAN
NORTH BERM
SHEET 1**



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SITE PLAN
1:250

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1:250

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Drawing No C02	



HEALTH SCIENCES CENTRE

ASPHALT PARKING

APPROX. LOCATION OF EXIST. WATER MAIN

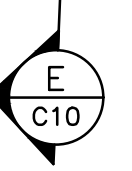
APPROX. LOCATION OF EXIST. WATER MAIN

EXIST. STORM SEWER

±78m RECON CONCRETE BLOCK RETAINING WALL STA. 0+181

1.0m WIDE CREST OF NORTH FLOOD PROTECTION BERM

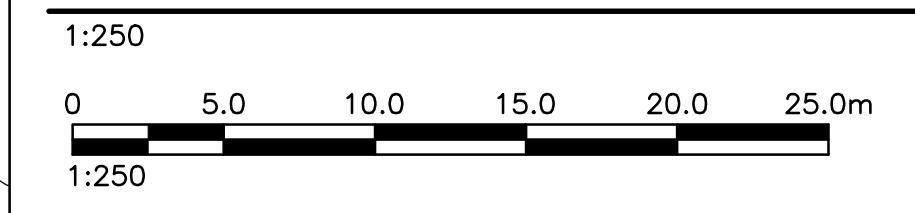
EXIST. DITCH



EDGE OF BROOK

LEARY'S BROOK

SITE PLAN



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HEALTH SCIENCES CENTRE
FLOOD PROTECTION BERMS

CIVIL
SITE PLAN
NORTH BERM
SHEET 2



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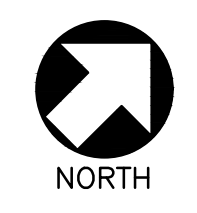
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3 of 10
Drawing No

C03

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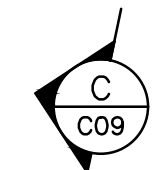
HEALTH SCIENCES CENTRE



STA. 0+163

CLINCH CRESCENT

CLASS 1 HYDRALIC RIP RAP

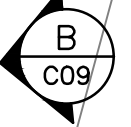


EXIST. STORM SEWER

±78m RECON CONCRETE BLOCK RETAINING WALL STA. 0+107

1.0m WIDE CREST OF NORTH FLOOD PROTECTION BERM

LEARY'S BROOK



SOUTH FLOOD PROTECTION BERM SEE DWG C08

CAST IN PLACE CONCRETE WINGWALL EXTENSION

EXISTING RECON CONCRETE BLOCK RETAINING WALL

CLASS 1 HYDRALIC RIP RAP

ARCTIC AVENUE

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Revision or Issue

HEALTH SCIENCES CENTRE FLOOD PROTECTION BERMS

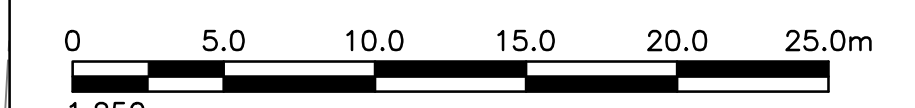
CIVIL SITE PLAN NORTH BERM SHEET 3



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SITE PLAN

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Sheet No 4 of 10

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CLINCH CRESCENT

NORTH FLOOD PROTECTION BERM
SEE DWG C02

EDGE OF BROOK

LEARY'S BROOK

1.0m WIDE CREST
OF SOUTH FLOOD
PROTECTION BERM

±60m RECON
CONCRETE BLOCK
RETAINING WALL
STA. 0+453

59.00 58.90 58.70

58.60

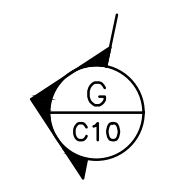
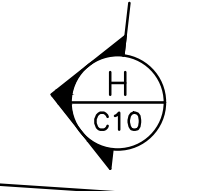
NEW CONCRETE SIDEWALK TO
TRANSITION TO EXISTING GRADE
AT APPROX. 0+480

185.0m OF NEW
CONCRETE SIDEWALK

PRINCE PHILIP DRIVE

STA. 0+429

MATCHLINE C05-C06



SITE PLAN

1:250



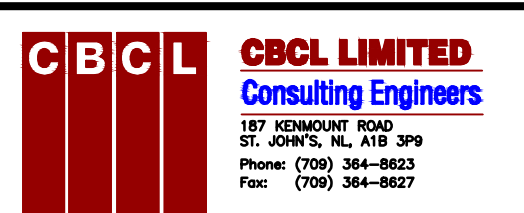
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HEALTH SCIENCES CENTRE
FLOOD PROTECTION BERMS

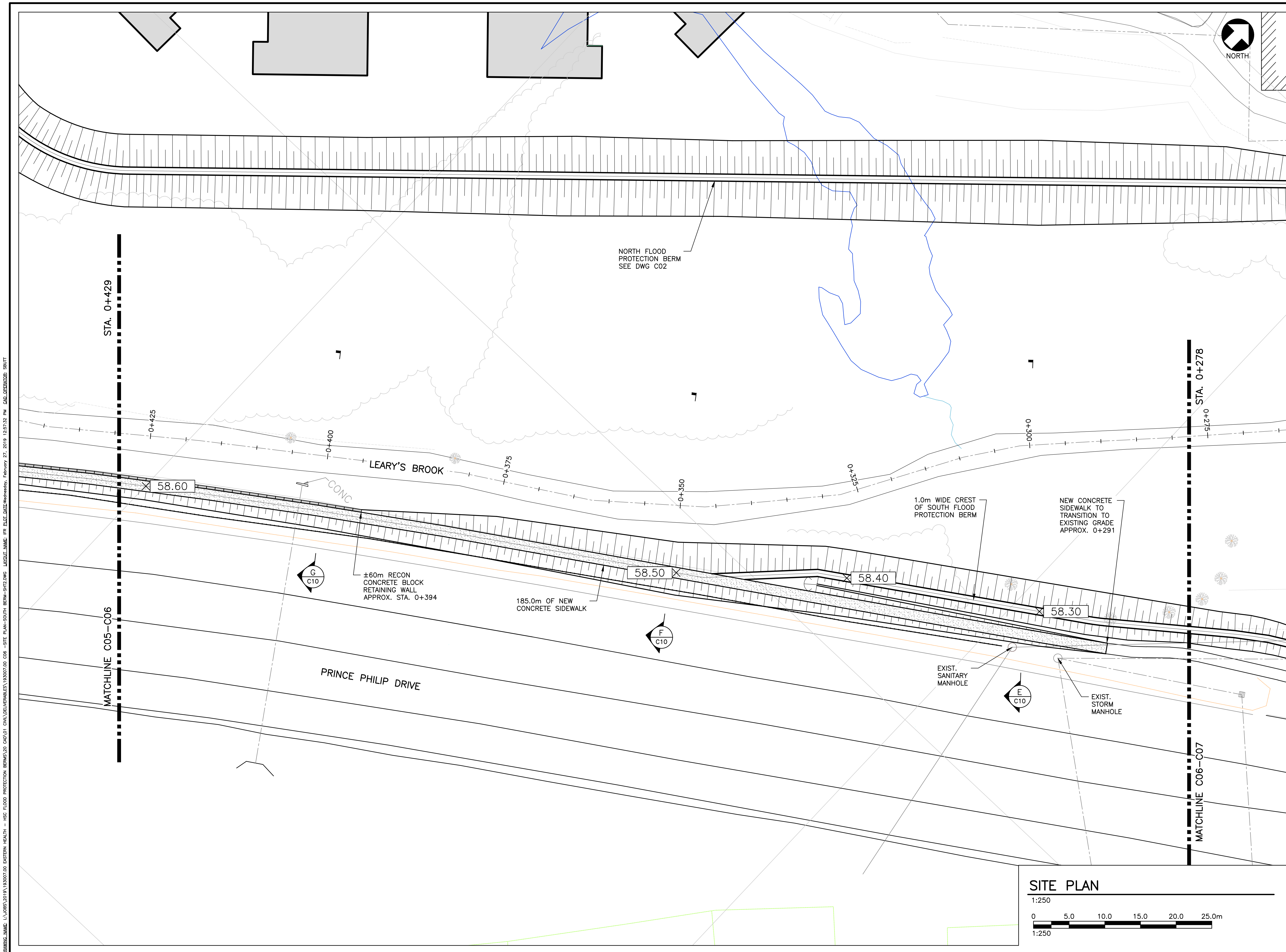
CIVIL
SITE PLAN
SOUTH BERM
SHEET 1



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HEALTH SCIENCES CENTRE
FLOOD PROTECTION BERMS

CIVIL
SITE PLAN
SOUTH BERM
SHEET 2

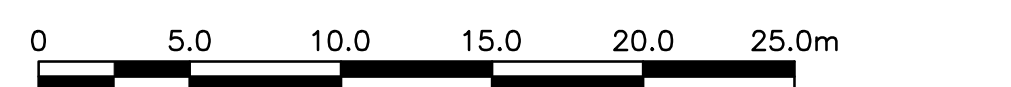


CBCL LIMITED
Consulting Engineers
187 KENMOUNT ROAD
ST. JOHN'S, N.L. A1B 3P9
Phone: (709) 364-8823
Fax: (709) 364-8827

CBCL No 193007.00	Contract No NA	Date FEB 2019	Scale AS SHOWN
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SITE PLAN

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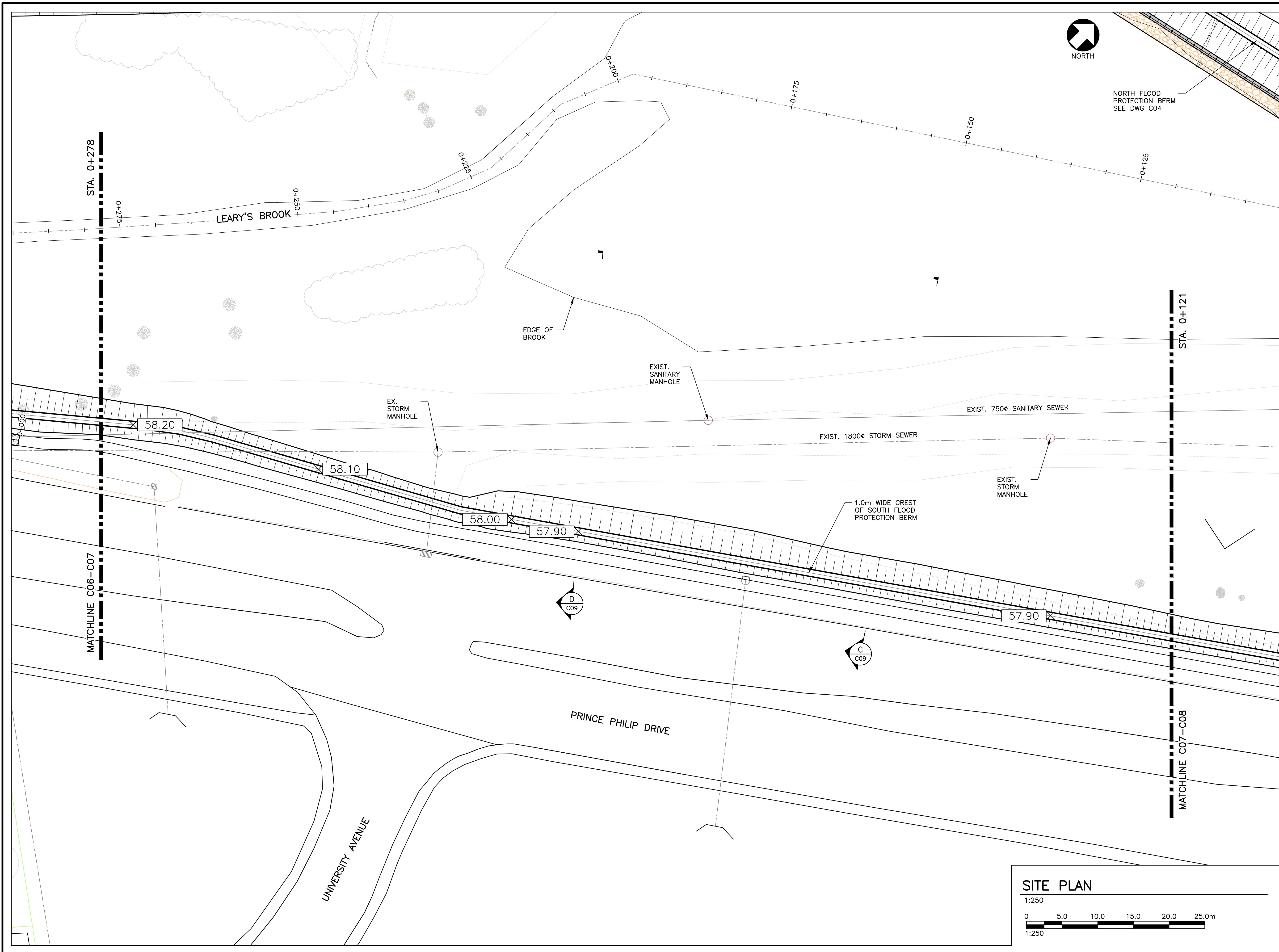
Eastern Health

Newfoundland & Labrador



NORTH

NORTH FLOOD PROTECTION BERM SEE DWG C04



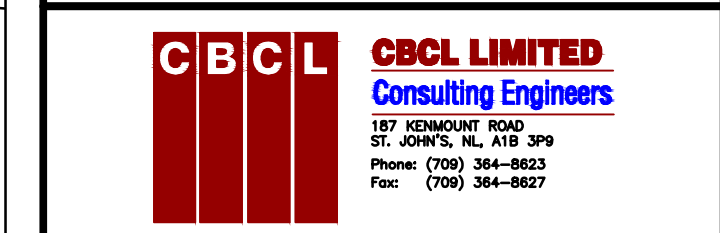
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HEALTH SCIENCES CENTRE FLOOD PROTECTION BERMS

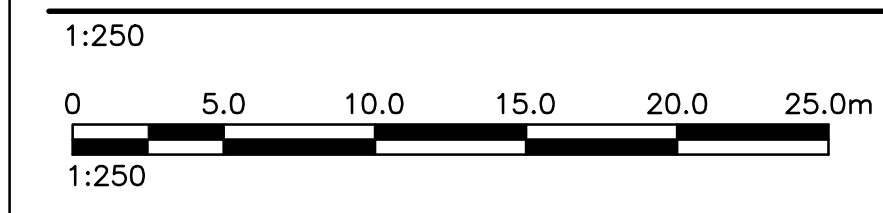
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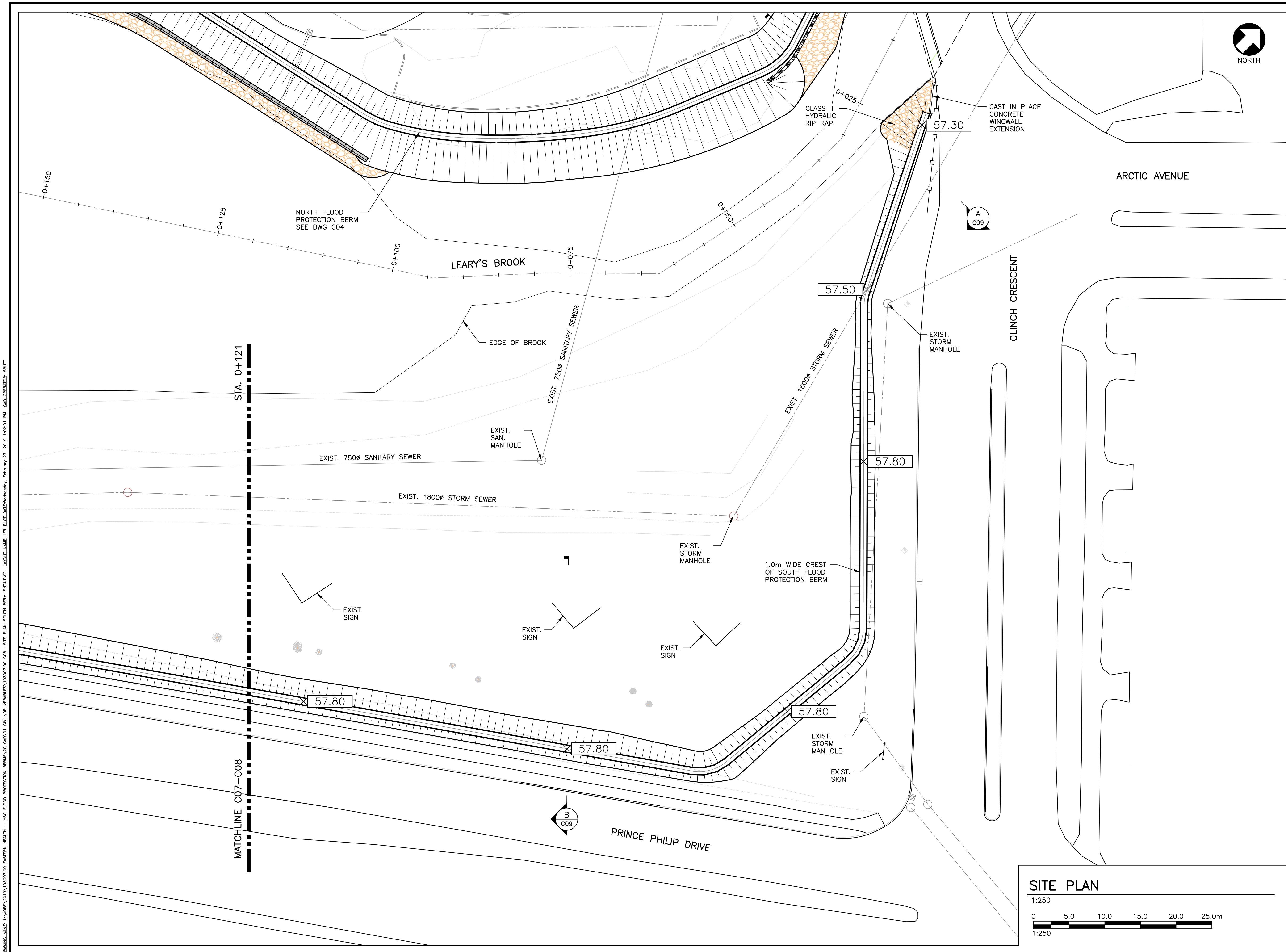


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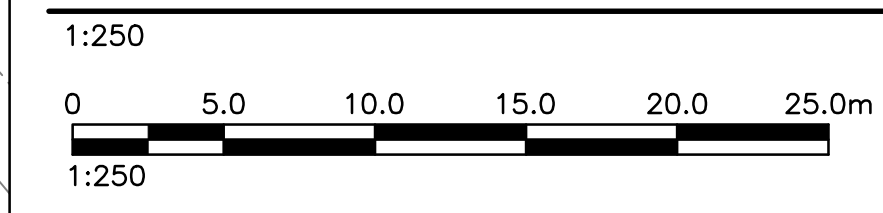
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Drawing No C07	

SITE PLAN





SITE PLAN



No.	Description	Date	By
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Revision or Issue

HEALTH SCIENCES CENTRE
FLOOD PROTECTION BERMS

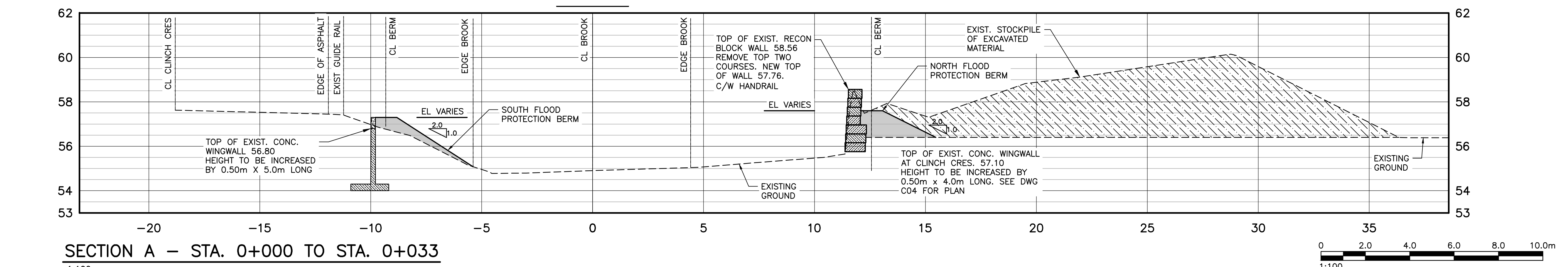
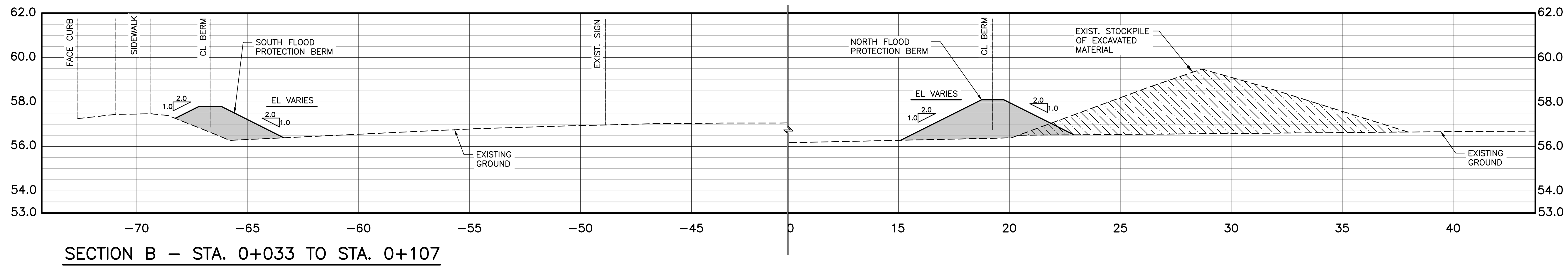
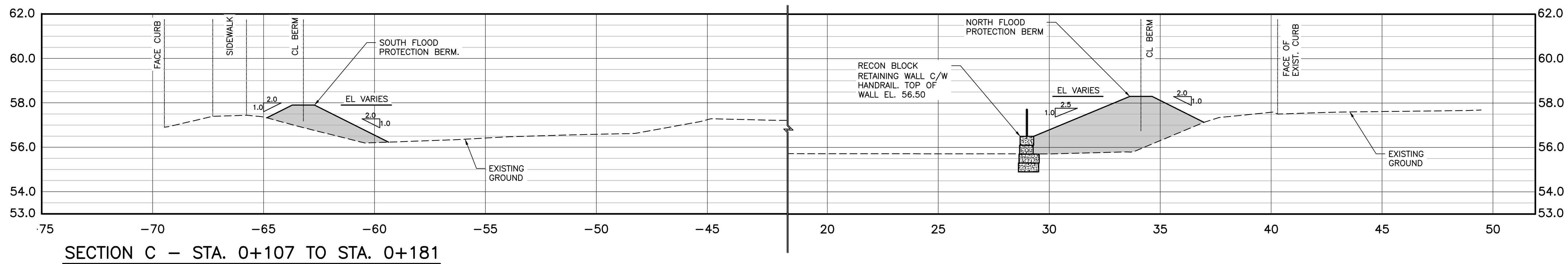
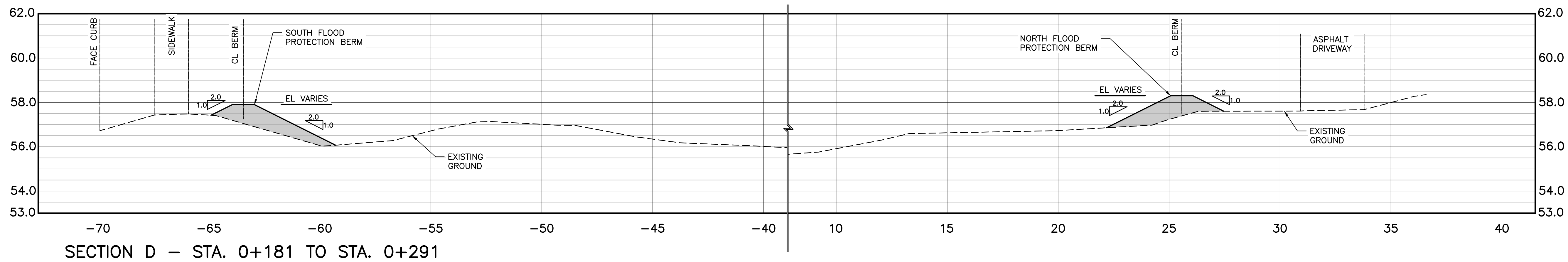
CIVIL
SITE PLAN
SOUTH BERM
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CBCL No 193007.00	Contract No NA	Date FEB 2019	Scale AS SHOWN
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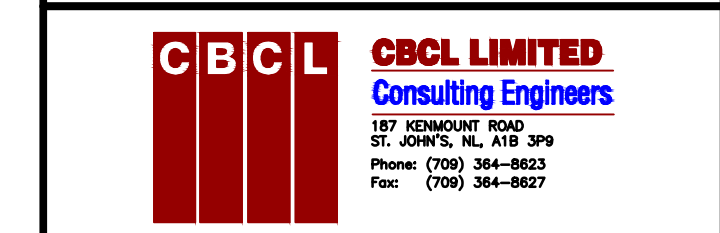
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A	ISSUED FOR 66% REVIEW	19/02/26	SRB

Revision or Issue

HEALTH SCIENCES CENTRE
FLOOD PROTECTION BERMS

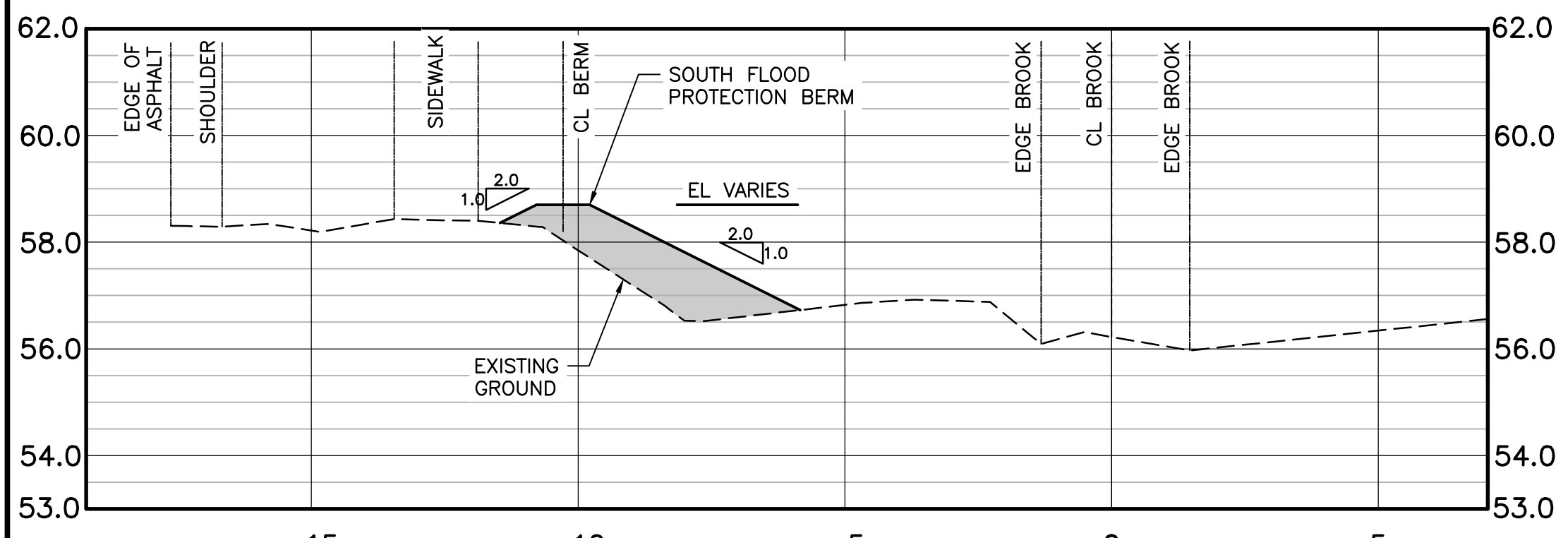
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SITE SECTIONS
STA. 0+000 TO STA. 0+291

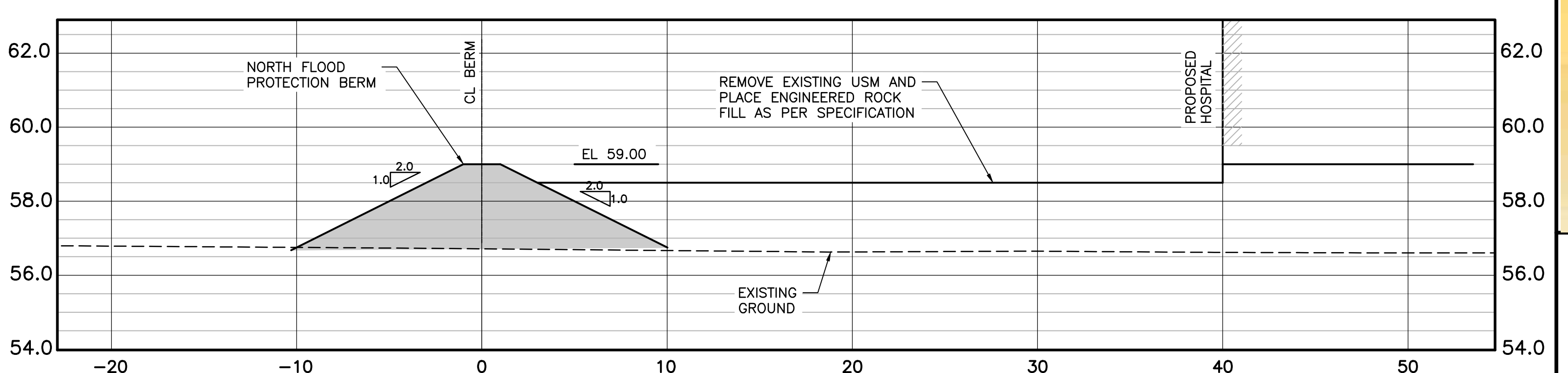


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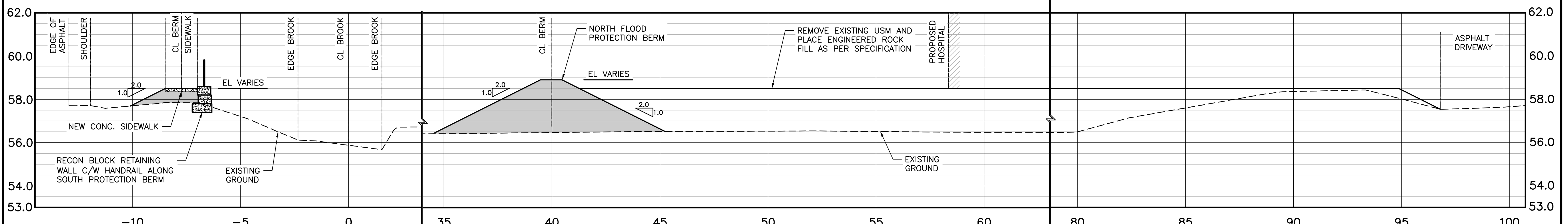
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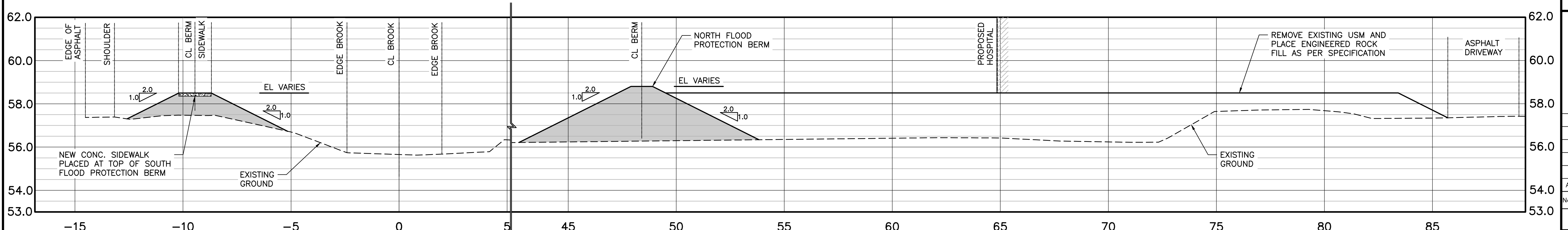
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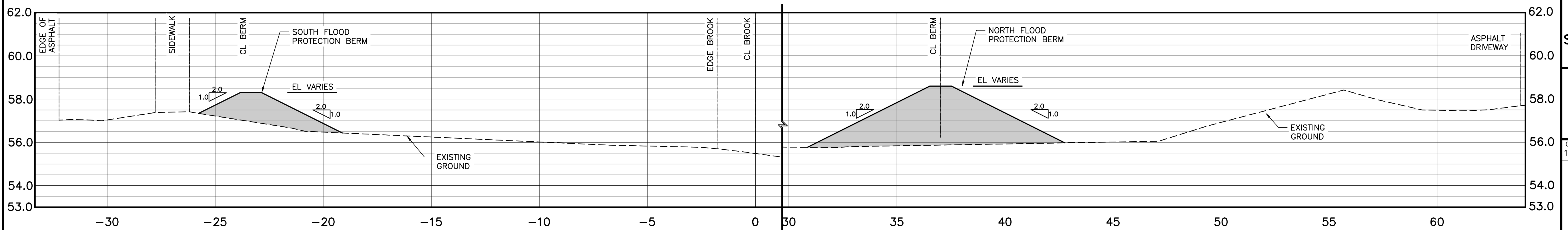
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SECTION G - STA. 0+394 TO STA. 0+453
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SECTION F - STA. 0+345 TO STA. 0+394
1:100



SECTION E - STA. 0+291 TO STA. 0+345
1:100



No.	Description	Date	By
A	ISSUED FOR 66% REVIEW	19/02/26	SRB

Revision or Issue

HEALTH SCIENCES CENTRE
FLOOD PROTECTION BERMS

CIVIL
SITE SECTIONS
STA. 0+291 TO STA. 0+579



CBCL No 193007.00	Contract No NA	Date FEB 2019	Scale AS SHOWN
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Sheet No 10 of 10			
Drawing No C10			

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APPENDIX B – Plant Inventory

Species Name	Common Name	S-Rank
<i>Abies balsamea</i>	Balsam Fir	S5
<i>Acer pseudoplatanus</i>	Sycamore Maple	SNA
<i>Achillea millefolium</i>	Common Yarrow	SNA
<i>Aegopodium podagraria</i>	Bishops Goutweed	SNA
<i>Alnus incana</i>	Speckled Alder	S5
<i>Alnus viridis</i>	Green Alder	S5
<i>Anaphalis margaritacea</i>	Pearly Everlasting	S5
<i>Angelica atropurpurea</i>	Great Angelica	S4
<i>Artemisia vulgaris</i>	Common Wormwood	SNA
<i>Barbarea verna</i>	Early Winter-Cress	SNA
<i>Betula papyrifera</i>	Paper Birch	S5
<i>Calamagrostis canadensis</i>	Blue-Joint Reedgrass	S5
<i>Calamagrostis stricta</i>	Slim-Stem Small-Reedgrass	S5
<i>Carex stipata</i>	Stalk-Grain Sedge	S4S5
<i>Centaurea nigra</i>	Black Starthistle	SNA
<i>Chamerion angustifolium</i>	Fireweed	S5
<i>Chelone glabra</i>	White Turtlehead	S4
<i>Cicuta bulbifera</i>	Bulb-Bearing Water-Hemlock	S3
<i>Cornus stolonifera</i>	Red Osier Dogwood	S5
<i>Epilobium ciliatum</i>	Hairy Willow-Herb	S5
<i>Euthamia graminifolia</i>	Flat-Top Fragrant-Golden-Rod	S5
<i>Eutrochium maculatum</i> var. <i>maculatum</i>	Spotted Joe-Pye Weed	S4S5
<i>Fragaria virginiana</i>	Virginia Strawberry	S5
<i>Galium palustre</i>	Marsh Bedstraw	S4S5
<i>Glyceria canadensis</i>	Canada Manna-Grass	S5
<i>Glyceria maxima</i>	Reed Meadowgrass	SNA
<i>Glyceria striata</i>	Fowl Manna-Grass	S5
<i>Gnaphalium uliginosum</i>	Low Cudweed	SNA
<i>Hieracium praealtum</i> var. <i>decipiens</i>	King Devil	SNA
<i>Hieracium umbellatum</i>	Umbellate Hawkweed	S4
<i>Hypericum perforatum</i>	A St. John's-Wort	SNA
<i>Impatiens glandulifera</i>	Policeman's Helmet	SNA
<i>Jacobaea vulgaris</i>	Common Ragwort	SNA
<i>Juncus articulatus</i>	Jointed Rush	S5
<i>Juncus bufonius</i>	Toad Rush	S5
<i>Juncus canadensis</i>	Canada Rush	S4S5
<i>Juncus effusus</i>	Soft Rush	S5
<i>Leucanthemum vulgare</i>	Oxeye Daisy	SNA
<i>Linaria vulgaris</i>	Butter-And-Eggs	SNA
<i>Lupinus polyphyllus</i>	Lupine	SNA
<i>Lythrum salicaria</i>	Purple Loosestrife	SNA
<i>Mentha canadensis</i>	Canada Mint	S5
<i>Myosotis scorpioides</i>	True Forget-Me-Not	SNA
<i>Myrica gale</i>	Sweet Bayberry	S5
<i>Onoclea sensibilis</i>	Sensitive Fern	S4S5
<i>Osmundastrum cinnamomeum</i>	Cinnamon Fern	S5

Species Name	Common Name	S-Rank
<i>Persicaria maculosa</i>	lady's-thumb, redshank	SNA
<i>Persicaria sagittata</i>	arrowleaf tearthumb, arrow-vine	SNA
<i>Phalaris arundinacea</i>	Reed Canary Grass	SNA
<i>Phleum pratense</i>	Meadow Timothy	SNA
<i>Picea glauca</i>	White Spruce	S5
<i>Polygonum cuspidatum</i>	Japanese Knotweed	SNA
<i>Potentilla recta</i>	Sulphur Cinquefoil	SNA
<i>Prunus pensylvanica</i>	Fire Cherry	S4S5
<i>Ranunculus acris</i>	Tall Butter-Cup	SNA
<i>Ranunculus repens</i>	Creeping Butter-Cup	SNA
<i>Rosa virginiana</i>	Virginia Rose	S4S5
<i>Rubus idaeus ssp. strigosus</i>	wild red raspberry	S5
<i>Rumex acetosella</i>	Sheep Sorrel	SNA
<i>Rumex crispus</i>	Curly Dock	SNA
<i>Salix discolor</i>	Pussy Willow	S5
<i>Sambucus racemosa</i>	Red Elderberry	S4
<i>Scirpus atrocinctus</i>	Black-Girdle Bulrush	S5
<i>Scirpus microcarpus</i>	Small-Fruit Bulrush	S4S5
<i>Senecio viscosus</i>	Sticky Groundsel	SNA
<i>Solanum dulcamara</i>	Climbing Nightshade	SNA
<i>Solidago rugosa</i>	Rough-Leaf Goldenrod	S5
<i>Sonchus arvensis</i>	Field Sowthistle	SNA
<i>Sorbus americana</i>	American Mountain-Ash	S4S5
<i>Sorbus decora</i>	Northern Mountain-Ash	S5
<i>Spiraea latifolia</i>	Broadleaf Meadowsweet	S4S5
<i>Stachys palustris</i>	Marsh Hedge-Nettle	SNA
<i>Symphyotrichum novi-belgii</i>	New Belgium American-Aster	S5
<i>Taraxacum officinale</i>	Common Dandelion	SNA
<i>Thalictrum pubescens</i>	Tall Meadow-Rue	S5
<i>Trifolium arvense</i>	Rabbit-Foot Clover	SNA
<i>Trifolium campestre</i>	Low Hop Clover	SNA
<i>Trifolium pratense</i>	Red Clover	SNA
<i>Tussilago farfara</i>	Colt's-foot	SNA
<i>Typha latifolia</i>	Broad-Leaf Cattail	SNA
<i>Vicia cracca</i>	Tufted Vetch	SNA
<i>Urtica dioica ssp. gracilis</i>	Stinging nettle	S3S5

Species Name	Common Name	S-Rank
<i>Acer pseudoplatanus</i>	Sycamore Maple	SNA
<i>Aegopodium podagraria</i>	Bishops Goutweed	SNA
<i>Agrostis capillaris</i>	Colonial Bentgrass	SNA
<i>Alnus incana</i>	Speckled Alder	S5
<i>Alnus viridis</i>	Green Alder	S5
<i>Anaphalis margaritacea</i>	Pearly Everlasting	S5
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	SNA
<i>Artemisia vulgaris</i>	Common Wormwood	SNA
<i>Betula cordifolia</i>	Heartleaf Birch, mountain white birch	S4S5
<i>Betula papyrifera</i>	Paper Birch	S5
<i>Calamagrostis canadensis</i>	Blue-Joint Reedgrass	S5
<i>Calamagrostis stricta</i>	Slim-Stem Small-Reedgrass	S5
<i>Callitriche palustris</i>	Vernal Water Starwort	S4S5
<i>Calystegia sepium</i>	Hedge Bindweed	SNA
<i>Carex brunnescens</i>	Brownish Sedge	S5
<i>Carex echinata</i>	Little Prickly Sedge	S5
<i>Carex gynandra</i>	A Sedge	S4
<i>Carex nigra</i>	Black Sedge	S5
<i>Carex scoparia</i>	Pointed Broom Sedge	S3
<i>Carex stipata</i>	Stalk-Grain Sedge	S4S5
<i>Carex utriculata</i>	Bear Sedge	S4S5
<i>Centaurea nigra</i>	Black Starthistle	SNA
<i>Chamaedaphne calyculata</i>	Leatherleaf	S5
<i>Chamerion angustifolium</i>	Fireweed	S5
<i>Chelone glabra</i>	White Turtlehead	S4
<i>Conioselinum chinense</i>	Hemlock Parsley	S5
<i>Cornus stolonifera</i>		S5
<i>Dactylis glomerata</i>	Orchard Grass	SNA
<i>Digitalis purpurea</i>	Purple Foxglove	SNA
<i>Epilobium ciliatum</i>	Hairy Willow-Herb	S5
<i>Equisetum arvense</i>	Field Horsetail	S5
<i>Equisetum fluviatile</i>	Water Horsetail	S4
<i>Euthamia graminifolia</i>	Flat-Top Fragrant-Golden-Rod	S5
<i>Eutrochium maculatum var. maculatum</i>	Spotted Joe-Pye Weed	S4S5
<i>Fallopia convolvulus</i>	black bindweed, corn bindweed	SNA
<i>Fragaria virginiana</i>	Virginia Strawberry	S5
<i>Galium palustre</i>	Marsh Bedstraw	S4S5
<i>Glyceria canadensis</i>	Canada Manna-Grass	S5
<i>Glyceria maxima</i>	Reed Meadowgrass	SNA
<i>Glyceria striata</i>	Fowl Manna-Grass	S5
<i>Gnaphalium uliginosum</i>	Low Cudweed	SNA
<i>Hieracium piloselloides</i>	Tall Hawkweed	SNA
<i>Hypericum perforatum</i>	A St. John's-Wort	SNA
<i>Ilex mucronata</i>		S5
<i>Iris versicolor</i>	Blueflag	S5
<i>Jacobaea vulgaris</i>		SNA

Species Name	Common Name	S-Rank
<i>Juncus articulatus</i>	Jointed Rush	S5
<i>Juncus canadensis</i>	Canada Rush	S4S5
<i>Juncus effusus</i>	Soft Rush	S5
<i>Juncus filiformis</i>	Thread Rush	S5
<i>Juncus tenuis</i>	Slender Rush	S4
<i>Larix laricina</i>	American Larch	S5
<i>Leontodon autumnalis</i>	Autumn Hawkbit	SNA
<i>Leucanthemum vulgare</i>	Oxeye Daisy	SNA
<i>Linaria vulgaris</i>	Butter-And-Eggs	SNA
<i>Lotus corniculatus</i>	Birds-Foot Trefoil	SNA
<i>Lupinus polyphyllus</i>	Lupine	SNA
<i>Lythrum salicaria</i>	Purple Loosestrife	SNA
<i>Maianthemum canadense</i>	Wild Lily-of-The-Valley	S5
<i>Malva moschata</i>	Musk Cheeseweed	SNA
<i>Mentha canadensis</i>	Canada Mint	S5
<i>Menyanthes trifoliata</i>	Bog Buckbean	S5
<i>Myosotis scorpioides</i>	True Forget-Me-Not	SNA
<i>Myrica gale</i>	Sweet Bayberry	S5
<i>Oclemena nemoralis</i>	Bog Aster	S5
<i>Onoclea sensibilis</i>	Sensitive Fern	S4S5
<i>Osmundastrum cinnamomeum</i>		S5
<i>Persicaria maculosa</i>	lady's-thumb, redshank	SNA
<i>Phalaris arundinacea</i>	Reed Canary Grass	SNA
<i>Picea glauca</i>	White Spruce	S5
<i>Picea mariana</i>	Black Spruce	S5
<i>Pinus sylvestris</i>	Scotch Pine	SNA
<i>Plantago major</i>	Nipple-Seed Plantain	SNA
<i>Platanthera clavellata</i>	Club-Spur Orchid	S5
<i>Polygonum cuspidatum</i>	Japanese Knotweed	SNA
<i>Prunus pensylvanica</i>	Fire Cherry	S4S5
<i>Ranunculus acris</i>	Tall Butter-Cup	SNA
<i>Ranunculus repens</i>	Creeping Butter-Cup	SNA
<i>Rhododendron groenlandicum</i>		S5
<i>Rhynchospora alba</i>	White Beakrush	S4S5
<i>Rosa virginiana</i>	Virginia Rose	S4S5
<i>Rubus canadensis</i>	Smooth Blackberry	SU
<i>Rubus idaeus ssp. strigosus</i>	wild red raspberry	S5
<i>Rumex acetosella</i>	Sheep Sorrel	SNA
<i>Rumex crispus</i>	Curly Dock	SNA
<i>Scirpus atrocinctus</i>	Black-Girdle Bulrush	S5
<i>Senecio viscosus</i>	Sticky Groundsel	SNA
<i>Solanum dulcamara</i>	Climbing Nightshade	SNA
<i>Solidago rugosa</i>	Rough-Leaf Goldenrod	S5
<i>Sonchus arvensis</i>	Field Sowthistle	SNA
<i>Sorbus decora</i>	Northern Mountain-Ash	S5
<i>Sparganium americanum</i>	American Bur-Reed	S3

Species Name	Common Name	S-Rank
<i>Spiraea latifolia</i>		S4S5
<i>Stachys palustris</i>	Marsh Hedge-Nettle	SNA
<i>Taraxacum officinale</i>	Common Dandelion	SNA
<i>Thalictrum pubescens</i>	Tall Meadow-Rue	S5
<i>Triadenum fraseri</i>	Marsh St. John's-Wort	S5
<i>Trifolium arvense</i>	Rabbit-Foot Clover	SNA
<i>Trifolium campestre</i>	Low Hop Clover	SNA
<i>Trifolium pratense</i>	Red Clover	SNA
<i>Trifolium repens</i>	White Clover	SNA
<i>Tussilago farfara</i>	Colt's-foot	SNA
<i>Typha latifolia</i>	Broad-Leaf Cattail	SNA
<i>Urtica dioica ssp. gracilis</i>	Stinging nettle	S3S5
<i>Vicia cracca</i>	Tufted Vetch	SNA

APPENDIX C – Site Photos

Eastern Health HSC Berm EPR
APPENDIX 'C' – August 31, 2017 Site Photos



PHOTO 1: Wetland conditions observed adjacent to the existing retaining wall at the hospital site. Dominant species at this location is reed canary-grass (*Phalaris arundinacea*). Looking northeast.



PHOTO 2: Wetland conditions observed adjacent to the existing retaining wall at the hospital site. Dominant species at this location is reed canary-grass (*Phalaris arundinacea*). Looking southeast.

Eastern Health HSC Berm EPR
APPENDIX 'C' – August 31, 2017 Site Photos



PHOTO 3: Stormwater outflow, presumably from parking areas, discharging into wetland. Looking northwest.



PHOTO 4: Typical vegetation and water pooling within area located down-gradient from stormwater outflow. Looking southeast.

Eastern Health HSC Berm EPR
APPENDIX 'C' – August 31, 2017 Site Photos



PHOTO 5: Typical conditions within pooled area down-gradient from stormwater outflow, adjacent to existing bank. Looking southwest.



PHOTO 6: Typical conditions within pooled area down-gradient from stormwater outflow. Stagnant conditions, with apparent presence of iron-reducing bacteria. Looking southeast.

Eastern Health HSC Berm EPR
APPENDIX 'C' – August 31, 2017 Site Photos



PHOTO 7: Water pooling down-gradient of stormwater outflow, with wet-meadow vegetation dominated by bluejoint reedgrass, reed canary grass, and various sedges. Looking south.



PHOTO 8: Water pooling down-gradient of stormwater outflow, with wet-meadow vegetation dominated by bluejoint reedgrass, reed canary grass, and various sedges. Looking northeast.

Eastern Health HSC Berm EPR
APPENDIX 'C' – August 31, 2017 Site Photos



PHOTO 9: Some vegetation clearing has taken place at the periphery of the wetland and along the existing berm, in preparation for construction. Looking northeast.



PHOTO 10: Main channel of Learys brook, where it flows into the ponded area adjacent to The HSC. The brook is flanked on both banks by tall grasses, chiefly reed manna-grass (*Glyceria maxima*) and reed canary-grass (*Phalaris arundinacea*) at this location. Looking southwest.

Eastern Health HSC Berm EPR
APPENDIX 'C' – August 31, 2017 Site Photos



PHOTO 11: Poned area east of the HSC. Sediment control boom visible at site of retaining wall construction. Looking northeast.



PHOTO 12: Eastern bank of Learys Brook, dominated by reed canary-grass (*Phalaris arundinacea*). Looking east.

Eastern Health HSC Berm EPR
APPENDIX 'C' – August 31, 2017 Site Photos



PHOTO 13: Western bank of Learys Brook, dominated by reed manna-grass (*Glyceria maxima*). Looking west.



PHOTO 14: Typical gravel and cobble substrate of Learys Brook, where it enters the ponded area adjacent to the HSC.



PHOTO 15: Site of initial retaining wall construction, adjacent to Clinch Crescent bridge. Looking south.



PHOTO 16: Learys Brook – outflow from ponded, looking northeast towards Clinch Crescent bridge.

Eastern Health HSC Berm EPR
APPENDIX 'C' – August 31, 2017 Site Photos



PHOTO 17: Typical wet meadow conditions south of parking lot, dominated by reed canary grass. Looking north from near intersection of Clinch Crescent and Prince Phillip Drive.



PHOTO 18: Ditch leading to culvert under Clinch Crescent, near southernmost entrance to parking lot. Looking southwest.

APPENDIX D – Birds Detected on Newfoundland and Labrador

D.1 Breeding Birds Detected on Newfoundland and Labrador’s “St. John’s (57003)” BBS Route.

D.2 Species observed within the Project area and submitted to eBird.

Appendix D.1 Breeding Birds Detected on Newfoundland and Labrador's "St. John's (57003)" BBS Route.
(Pardieck et al., 2018)

Species	
Canada Goose	Boreal Chickadee
American Black Duck	Red-breasted Nuthatch
Mallard	Golden-crowned Kinglet
Northern Pintail	Ruby-crowned Kinglet
Green-winged Teal+A98	Gray-cheeked Thrush
Ring-necked Duck	Swainson's Thrush
Black Scoter	Hermit Thrush
Rock Pigeon	American Robin
Mourning Dove	European Starling
Least Sandpiper	Cedar Waxwing
Wilson's Snipe	House Sparrow
Spotted Sandpiper	American Pipit
Greater Yellowlegs	Pine Grosbeak
Black Guillemot	Purple Finch
Black-legged Kittiwake	Red Crossbill
Ring-billed Gull	White-winged Crossbill
Herring Gull	Common Redpoll
Great Black-backed Gull	Pine Siskin
Common Tern	American Goldfinch
unid. Tern	Ovenbird
Common Loon	Northern Waterthrush
Leach's Storm-Petrel	Black-and-white Warbler
Northern Gannet	Tennessee Warbler
American Bittern	Mourning Warbler
Osprey	Common Yellowthroat
Northern Harrier	American Redstart
Sharp-shinned Hawk	Magnolia Warbler
Belted Kingfisher	Yellow Warbler
Downy Woodpecker	Blackpoll Warbler
Hairy Woodpecker	Palm Warbler
Northern Flicker	Yellow-rumped Warbler
Merlin	Black-throated Green Warbler
Olive-sided Flycatcher	Wilson's Warbler
Yellow-bellied Flycatcher	Savannah Sparrow
Alder Flycatcher	Fox Sparrow
Red-eyed Vireo	Song Sparrow
Gray Jay	Lincoln's Sparrow
Blue Jay	Swamp Sparrow
American Crow	White-throated Sparrow
Common Raven	Dark-eyed Junco

Species	
Tree Swallow	Bobolink
Barn Swallow	Rusty Blackbird
Black-capped Chickadee	

Appendix D.2. Species observed within the Project area and submitted to eBird. (eBird, 2018.)

Species observed in Project area	
Blue-winged Teal	Herring Gull
Eurasian Wigeon	Iceland Gull
American Wigeon	Lesser Black-backed Gull
Eurasian/American Wigeon	Herring x Lesser Black-backed Gull (hybrid)
Mallard	Glaucous Gull
American Black Duck	Great Black-backed Gull
Mallard x American Black Duck (hybrid)	Common Tern
Northern Pintail	Rock Pigeon
Green-winged Teal	Snowy Owl
Ring-necked Duck	American Crow
Tufted Duck	Common Raven
Greater Scaup	American Robin
Lesser Scaup	European Starling
Bufflehead	Bohemian Waxwing
Hooded Merganser	Yellow Warbler
Great Cormorant	Dark-eyed Junco
Osprey	Savannah Sparrow
Northern Goshawk	Swamp Sparrow
Wilson's Snipe	American Goldfinch
Ring-billed Gull	

APPENDIX E – Eastern Health Open House / Public Meeting

PUBLIC NOTICE



Public Information Session on the Proposed

Health Sciences Centre Berm, St. John's, Newfoundland and Labrador

shall be held at

Health Sciences Centre, Lecture Theatre B (Room H1610)

Thursday, September 13, 2018, 6:30 – 8:00 p.m.

This session shall be conducted by the Proponent,
Eastern Health Infrastructure Support Department, (709) 777-5160,
as part of the environmental assessment for this project.

The purpose of this session is to describe all aspects of the proposed project, to describe the activities associated with it and to provide an opportunity for all interested persons to request information or state concerns.

ALL ARE WELCOME

An initial public information session was held on this project on January 18, 2018. Since that time the planned location of the berm has changed to accommodate the construction of a new facility adjacent to the Health Sciences Centre.



Eastern
Health

PUBLIC SERVICE ANNOUNCEMENT

Eastern Health to Hold Public Information Session on Health Sciences Centre Berm Project

September 6, 2018 - St. John's, NL: Eastern Health will hold a public information session on Thursday, September 13, 2018 to discuss the construction of a berm at the Health Sciences Centre in St. John's. The public information session will be held from 6:30 to 8:00 p.m. in Lecture Theatre B (Room H1610) on level 1 of the Health Sciences Centre.

The purpose of the session is to describe all aspects of the proposed project and the activities associated with it as well as to provide an opportunity for all interested persons to request information or state concerns. The information and feedback obtained will be considered as part of the Environmental Preview Report and the plans for the project going forward. This session is open to all members of the public and Eastern Health encourages stakeholders and those who live in the area to attend.

An initial public information session was held on this project on January 18, 2018. Since that time, the planned location of the berm has changed to accommodate the construction of a new facility adjacent to the Health Sciences Centre.

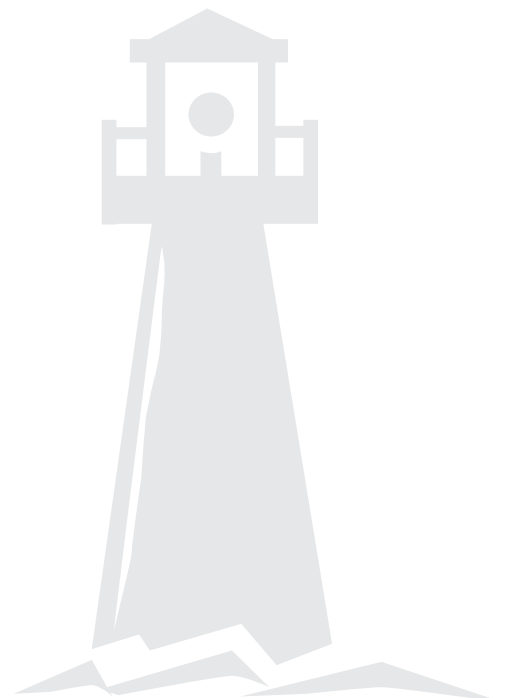
For more information, please visit <http://www.easternhealth.ca/AboutEH.aspx?d=4&id=2437&p=787> or call Eastern Health's Infrastructure Support Department at (709) 777-5160.

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Media Contact:

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Sep 13, 2018

[PSA Public Invited to Eastern Health's AGM](#)

Sep 06, 2018

[PSA Eastern Health to Hold Public Information Session on Health Sciences Centre Berm Project](#)

Aug 14, 2018

[PSA Relocation of Mental Health and Addictions Services in Bonavista](#)

Jul 25, 2018

[News Release Eastern Health Accepting Applications for Scholarships](#)

Jul 19, 2018

[PSA Relocation of Portugal Cove Community Health Clinic](#)

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Health Sciences Centre Berm

Public Information Session

Eastern Health will hold a public information session on **Thursday, September 13, 2018** to discuss the construction of a berm at the Health Sciences Centre (HSC) in St. John's. The public information session will be held from **6:30 to 8:00 p.m.** on level one of the **Health Sciences Centre in Lecture Theatre B (Room H1610)**.

The purpose of the session is to describe all aspects of the proposed project and the activities associated with it as well as to provide an opportunity for all interested persons to request information and/or state concerns. The information and feedback obtained will be considered as part of the Environmental Preview Report and the plans for the project going forward. This session is open to all members of the public and Eastern Health encourages stakeholders and those who live in the area to attend.

An initial public information session was held on this project on January 18, 2018. Since that time the planned location of the berm has changed to accommodate the construction of a new facility adjacent to the Health Sciences Centre.

For more information on the **Environmental Assessment Process** for this project, please visit:

- [Health Sciences Centre Berm, Department of Municipal Affairs and Environment, Government of Newfoundland and Labrador.](#)

Questions or feedback may be directed to Eastern Health's **Infrastructure Support Department at (709) 777-5160.**

Proposed Project Details

- [Health Sciences Centre Berm DESIGN - Public Meetings - Storyboard \(PDF\)](#)
- [Health Sciences Centre Berm LOCATION - Public Meetings - Storyboard \(PDF\)](#)

A berm is a raised bank of land bordering a river or canal used to prevent flooding. Eastern Health is proposing a flood protection berm on the Health Sciences Centre (HSC) property at 300 Prince Philip Drive, St. John's, NL. The berm will be located along the undeveloped portion of the property adjacent to Leary's Brook, between Leary's Brook and the HSC.

A berm currently exists onsite and was constructed with the initial construction of the hospital. This historical berm will be left in place and incorporated as part of the new berm.

The proposed project will enhance protection of the HSC from the risk of flooding from Leary's Brook. The flood protection berm would protect the building and critical infrastructure areas on the site from damage which are essential to provide uninterrupted hospital services.

The length of the berm will be approximately 500 m and will be located between the southwest end of the Agnes Cowan Hostel and the Clinch Crescent East Bridge. The berm will be constructed with 2.5:1 berm slopes to a height of 58.50 m in elevation. Some segments will be constructed with a retaining wall rather than an engineered slope to reduce impact to the waterbodies.

The berm will be stabilized with top soil and covered with a mix of hydroseed and /or sod for stabilization, erosion and sediment control. Mostly native shrubs and trees will be planted to provide further stability, and to blend the berm into the surrounding landscape. Berm slopes along the waterside edge or facing the water will be stabilized using hydraulic rip rap or armour stone, including at the foot of the retaining walls.

The berm will be designed to assist with local drainage by the inclusion of a rock infiltration swale - a basin designed to manage water runoff placed at the toe of the slope on the side of the berm facing HSC. The infiltration swales will channel water to backwater valves during storm events, directing storm water back into Leary's Brook. The swale will not be included in the area adjacent to the parking lot at Clinch Crescent East. In this area, stormwater will be collected and redirect stormwater to the parking lot catch basin.

Frequently Asked Questions

Project Schedule

When could the project start?

The start date for the project will depend on required approvals and authorizations. If authorization to proceed is received, clearing of vegetation will begin by March 2019 prior to the breeding bird nesting season (mid-April to mid-August).

How long will the project be under construction?

The construction is expected to occur over a four month period including mobilization to demobilization.

Alternatives

Have other options to the berm been investigated?

Other structural methods of preventing flooding were reviewed as alternatives to the project. The options that were reviewed included:

- berms or levees;
- flood – control reservoirs;
- channel modifications;
- increasing the hydraulic opening of the Clinch Crescent East Bridge; and
- diversion.

Why was this option selected?

Upon evaluation of the alternatives, this option was the only one that protected the hospital from flooding. The other options were not selected due to a combinations of factors such as technical suitability, space limitations within the watershed, land ownership, and potential damage to the natural environment.

Environmental Assessment Timeline

How long will the Environmental Preview Report (EPR) be under review?

The Minister has seven days to post the receipt of the Environmental Preview Report (EPR) document following submission. The Minister has 45 days to review the EPR document and 10 days to post the decision after the 45 day review period.

How will EPR document be available for comment?

The public will have 35 days following the posting of the EPR to provide comments to the Minister. The EPR will be available on the [Department of Municipal Affairs and Environment, Environmental Assessment Webpage](#).

How is this proposed project different than the Project submitted in April 2018?

The planned location of the berm has changed to accommodate the construction of a new facility adjacent to the Health Sciences Centre.

Why is another public meeting being held?

Revised Environmental Preview Report Guidelines were issued in June 2018 requiring a new public meeting to describe the proposed project, activities associated with the project, and provide an opportunity to request information or express concerns.

An initial public information session was held on January 18, 2018. This new public meeting will address the updated design.

[\[Top\]](#)

Updated Sep 6, 2018

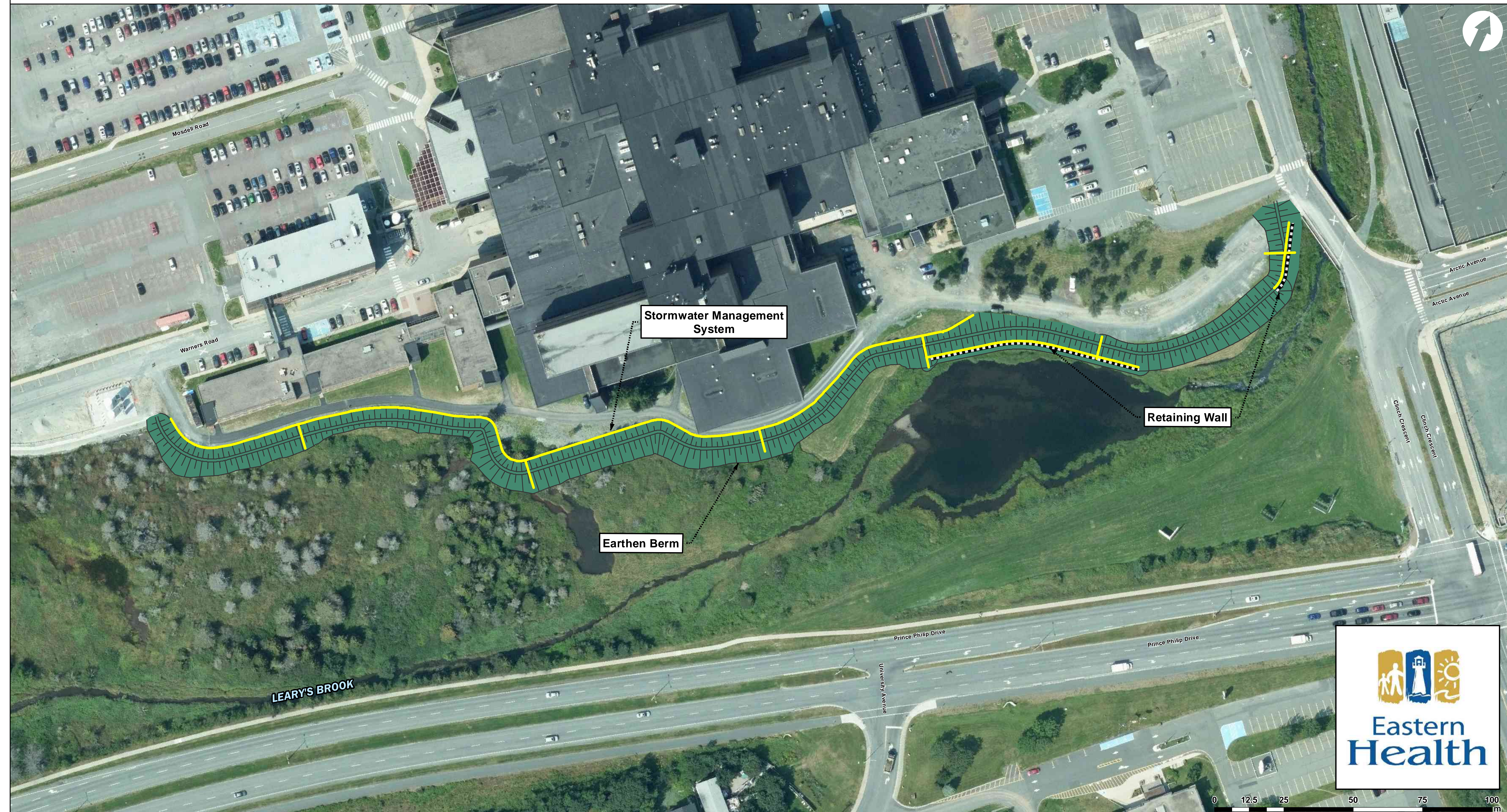
PROJECT LOCATION

Health Sciences Centre Flood Protection Berm Environmental Preview Report



PROJECT DESIGN


Health Sciences Centre Flood Protection Berm Environmental Preview Report



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<https://www.facebook.com/EasternHealthNL/>

September 6, 2018

**Eastern Health** September 6 at 10:37 AM · 🌐

Eastern Health will host a public information session on the Health Sciences Centre berm project on Thursday, September 13, 2018 from 6:30 to 8:00 p.m. in Lecture Theatre B (Room H1610), level 1, Health Sciences Centre.

This session is open to all members of the public. We encourage stakeholders and those who live in the area to attend.




An initial session was held on January 18, 2018. Since that time, the planned location of the berm has changed to accommodate the construct...
[See More](#)

EASTERNHEALTH.CA

Eastern Health - Health Science Centre Berm

Largest health authority in Newfoundland and Labrador offering the full continuum of health and community services.

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September 11, 2018

**Eastern Health** September 11 at 12:44 PM · 🌐

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[See More](#)

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Largest health authority in Newfoundland and Labrador offering the full continuum of health and community services.

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September 13, 2018



Eastern Health

September 13 at 1:52 PM · 🌐



Eastern Health will host a public information session on the Health Sciences Centre berm project tonight (Thursday, September 13, 2018) from 6:30 to 8:00 p.m. in Lecture Theatre B (Room H1610), level 1, Health Sciences Centre.

This session is open to all members of the public. We encourage stakeholders and those who live in the area to attend.

An initial session was held on January 18, 2018. Since that time, the planned location of the berm has changed to accommodate the co...

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Largest health authority in Newfoundland and Labrador offering the full continuum of health and community services.

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<https://twitter.com/EasternHealthNL>

September 6, 2018 - <https://twitter.com/EasternHealthNL/status/1037696546995879937>



Eastern Health @EasternHealthNL · Sep 6

EH will host a public information session on the Health Sciences Centre berm project on Thurs., Sept. 13, 2018 from 6:30-8:00pm in Lecture Theatre B (Rm H1610), level 1, HSC.



1



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September 6, 2018 - <https://twitter.com/EasternHealthNL/status/1037696604684410880>



Eastern Health @EasternHealthNL · Sep 6

An initial public information session was held on the berm project on Jan. 18, 2018. Since that time, the planned location of the berm has changed to accommodate construction of a new facility adjacent to the HSC.

For more info., please visit: easternhealth.ca/AboutEH.aspx?d...



1



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Eastern Health @EasternHealthNL · Sep 11

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Eastern Health @EasternHealthNL · Sep 11

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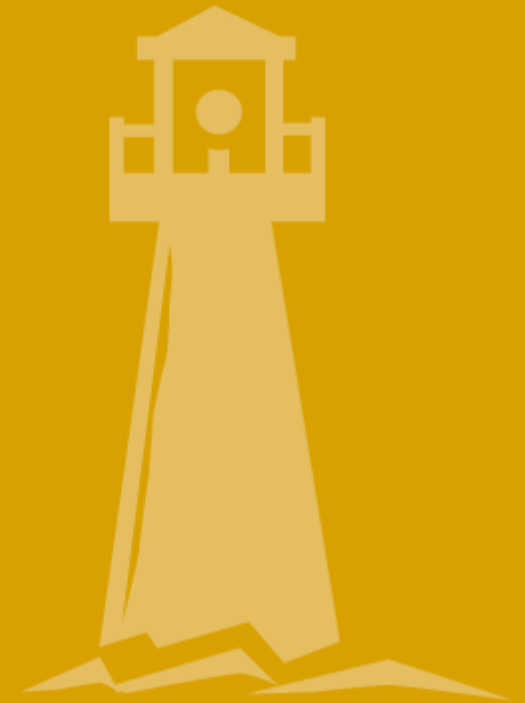
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Eastern
Health

Health Science Centre – Berm Project
Public Information Session

September 2018



Agenda



- ***Purpose of the Public Meeting***
- ***Background***
- ***The Project***
 - ***Location***
 - ***Project Design***
 - ***Project Activities***
 - ***Project Schedule***
- ***Flooding and Surface Water Management***
- ***Alternatives***
- ***Permits and Authorizations***
 - ***Environmental Assessment Process***
 - ***Other Permits***
- ***Closure***



Public Information Session



Purpose:

- To provide information on the proposed project to the people whose environment may be affected.
- To respond to questions and seek feedback from the local community.



Project Background



Background



Health Sciences Centre (HSC)

- Largest acute care health facility in NL
- Numerous health-care programs/services on site
- Specialized services to all residents of the province
- Risk mitigation strategies to protect HSC when faced with severe weather event

Risk Mitigation Strategies

- Goal: To provide uninterrupted services in the event of any external weather event or external disaster
- To implement strategies to continue access /operations



Risk Mitigation Strategies Completed

- 2016 – Completion of Emergency Access road to south of HSC
- 2016 – Completion of alternative access road from the HSC complex to Larkhall Street
- 2016 – Completion of above ground emergency power link between Memorial University Annex and HSC



Current Strategy: Berm

Design and construction of berm (2017-19):

- To help keep anticipated water from Leary's Brook and Leary's Brook Pond from moving toward the hospital in the event of heavy rainfall events

Studies:

- Previous engineering studies confirmed need for a berm at HSC and as part of overall water management in the Rennies River Watershed

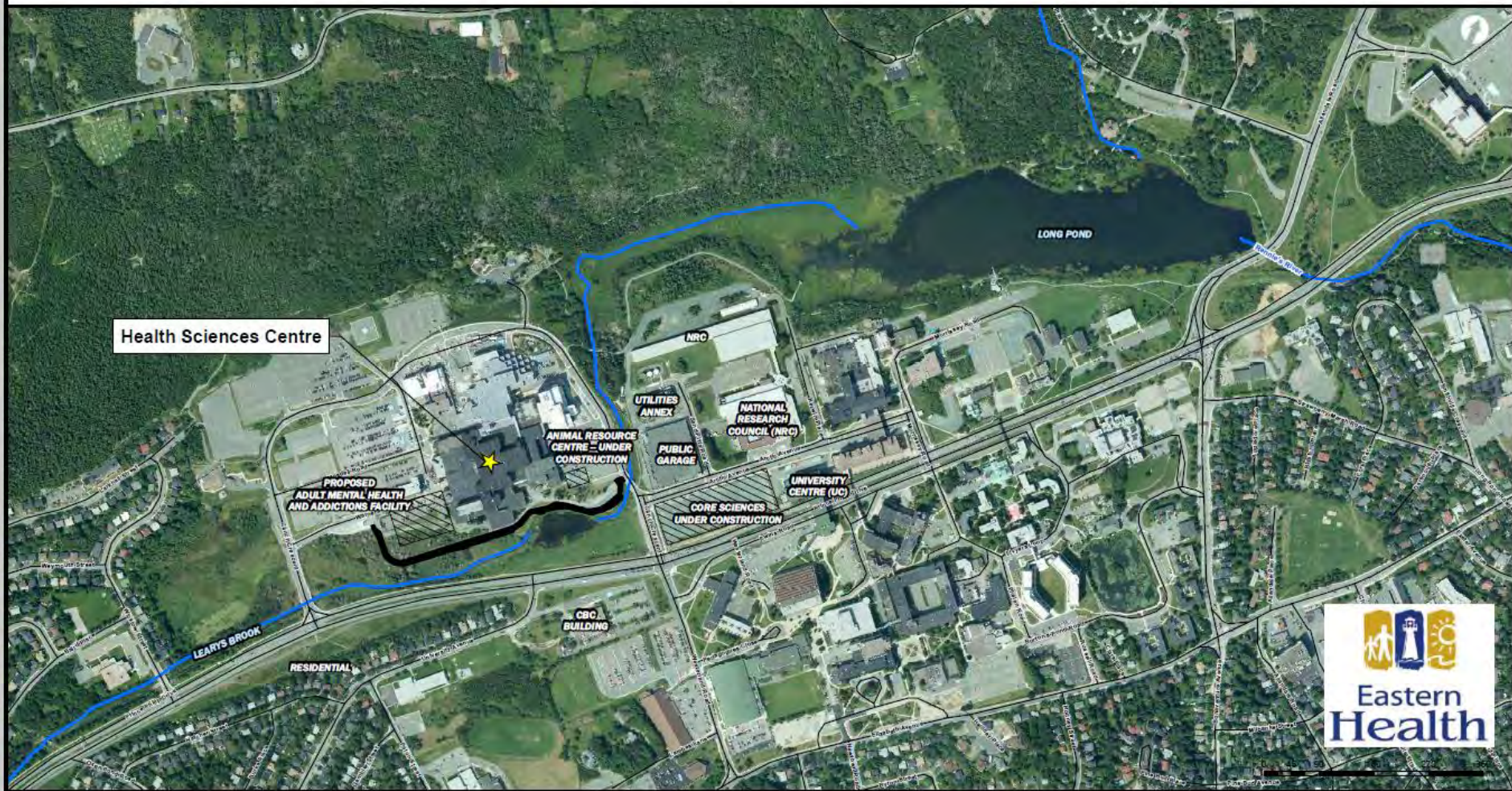


The Project



PROJECT LOCATION

Health Sciences Centre
Flood Protection Berm
Environmental Preview Report



PROJECT DESIGN

Health Sciences Centre
Flood Protection Berm
Environmental Preview Report





Stormwater Management System

Earthen Berm

Retaining Wall

- Berm Coordinates
- ▬▬▬ Approx. Extent of Existing Berm
- Roads
- Watercourses
- Proposed Berm
- Proposed Infiltration Swale
- Proposed Stormwater Drainage



Project Activities - Construction

Site Preparation

- Vegetation clearing and grubbing

Construction of the berm

- Excavation for the berm foundation
- Dewatering of isolated areas of berm construction
- Infilling of wetland
- Placement of new materials (clean rock fill, sand and gravel)
- Placement of concrete retaining wall face around waterbody
- Installation of storm water management infrastructure
- Stabilization of berm slopes
- Site compaction
- Grading and shaping of berm
- Placement of topsoil
- Revegetation of the constructed berm
- Environmental Protection, and sediment and erosion control measures



Project Activities – Operations and Maintenance



- Annual inspection of drainage piping and backwater valves
- Cleaning, repair and replacement of drainage piping and backwater valves
- Annual inspection of berm conditions (planting and structural)
- Berm repairs including regrading and planting
- Geotechnical inspection every 5 years
- Pumping of water from north side of the berm, as required



Project Schedule



- October 2018: Proposed submission of revised Environmental Preview Report (EPR) to Department of Municipal Affairs and Environment

Pending EPR approval:

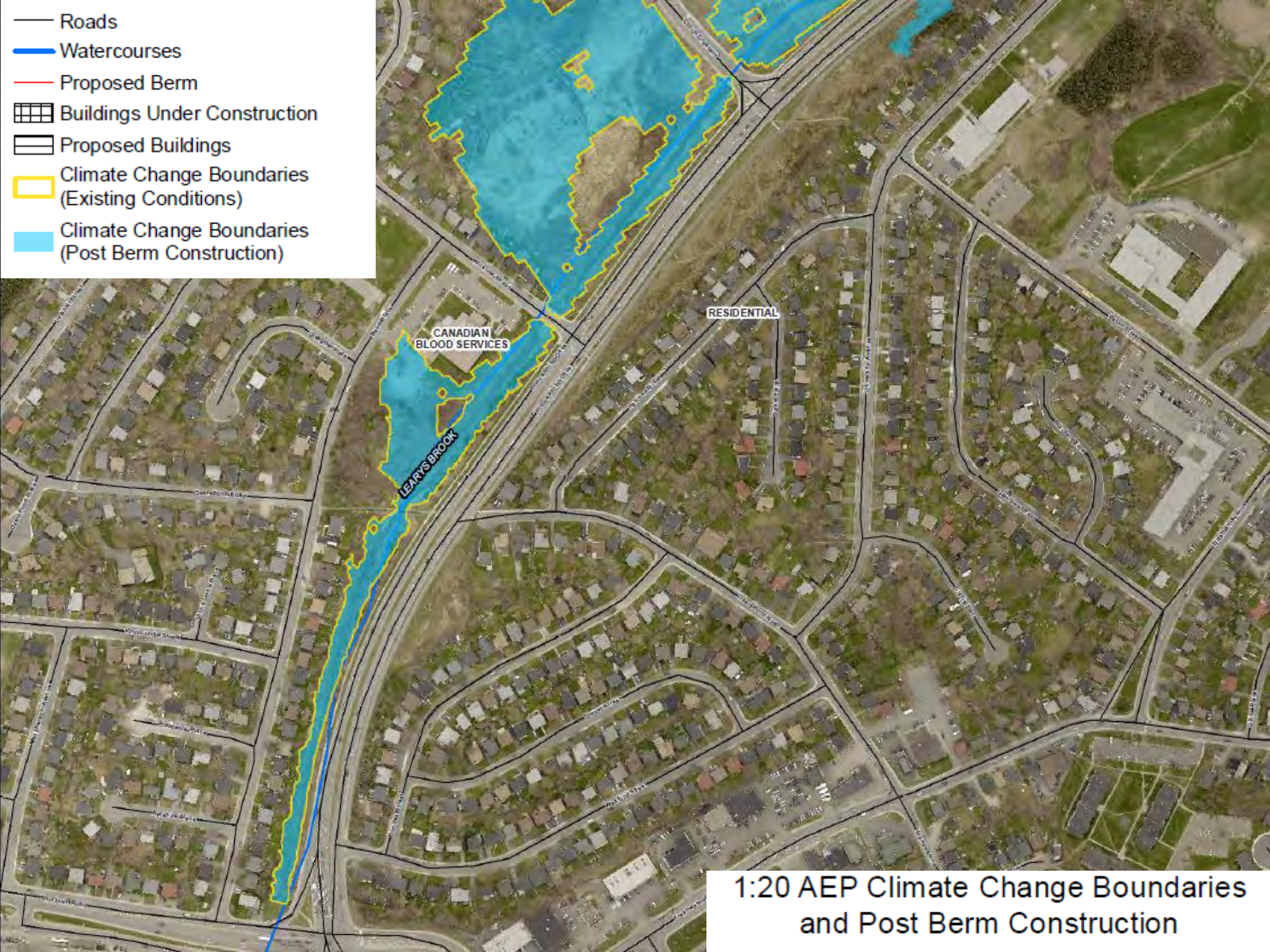
- March 2019: Estimated start date for site vegetation clearing
 - Construction to occur over an approximately 4-month period.
- June 1, 2019: In-water work construction to begin










***Flooding and Surface Water
Management***

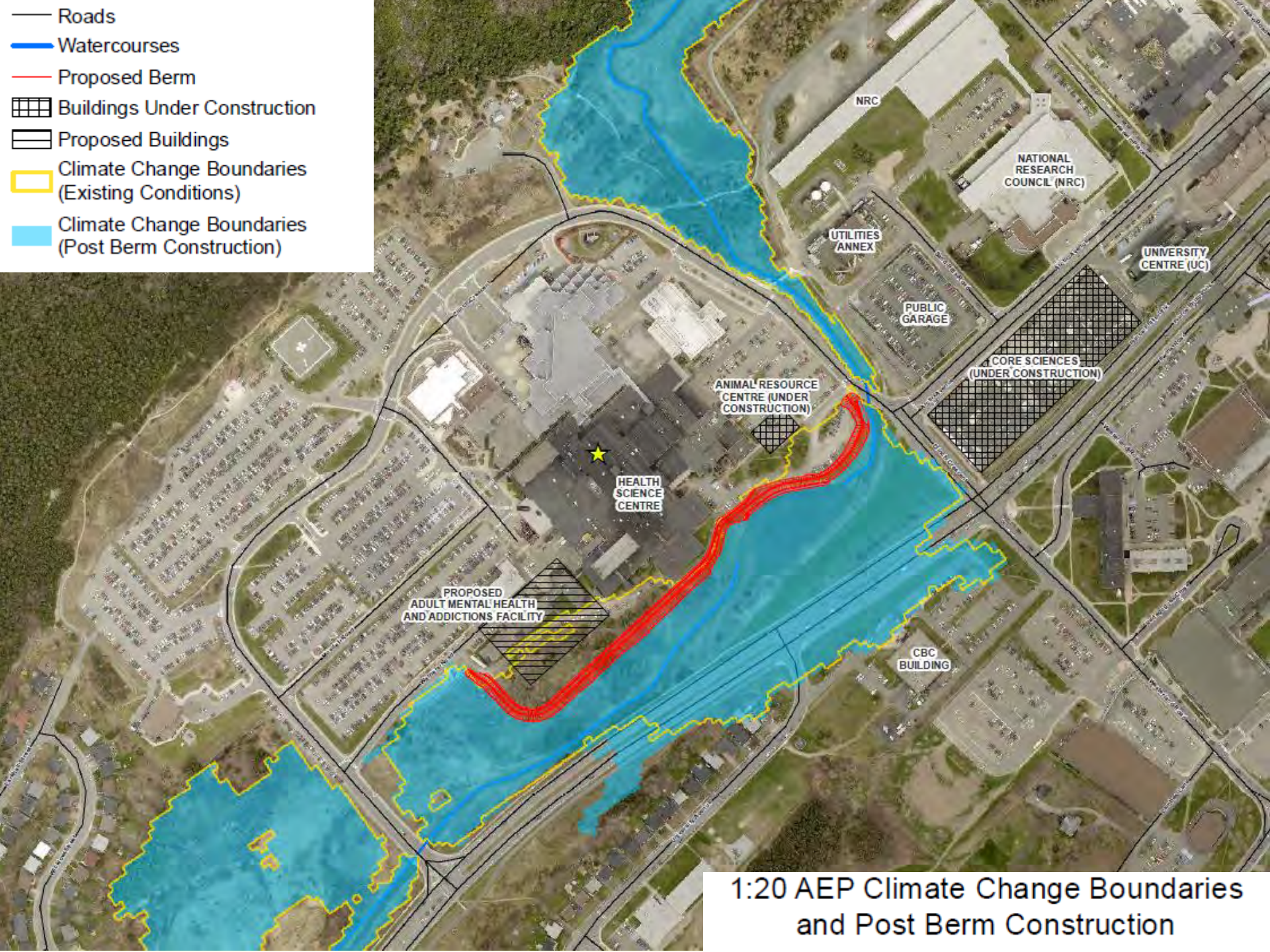


- Roads
- Watercourses
- Proposed Berm
- ▣ Buildings Under Construction
- ▣ Proposed Buildings
- ▣ Climate Change Boundaries (Existing Conditions)
- ▣ Climate Change Boundaries (Post Berm Construction)



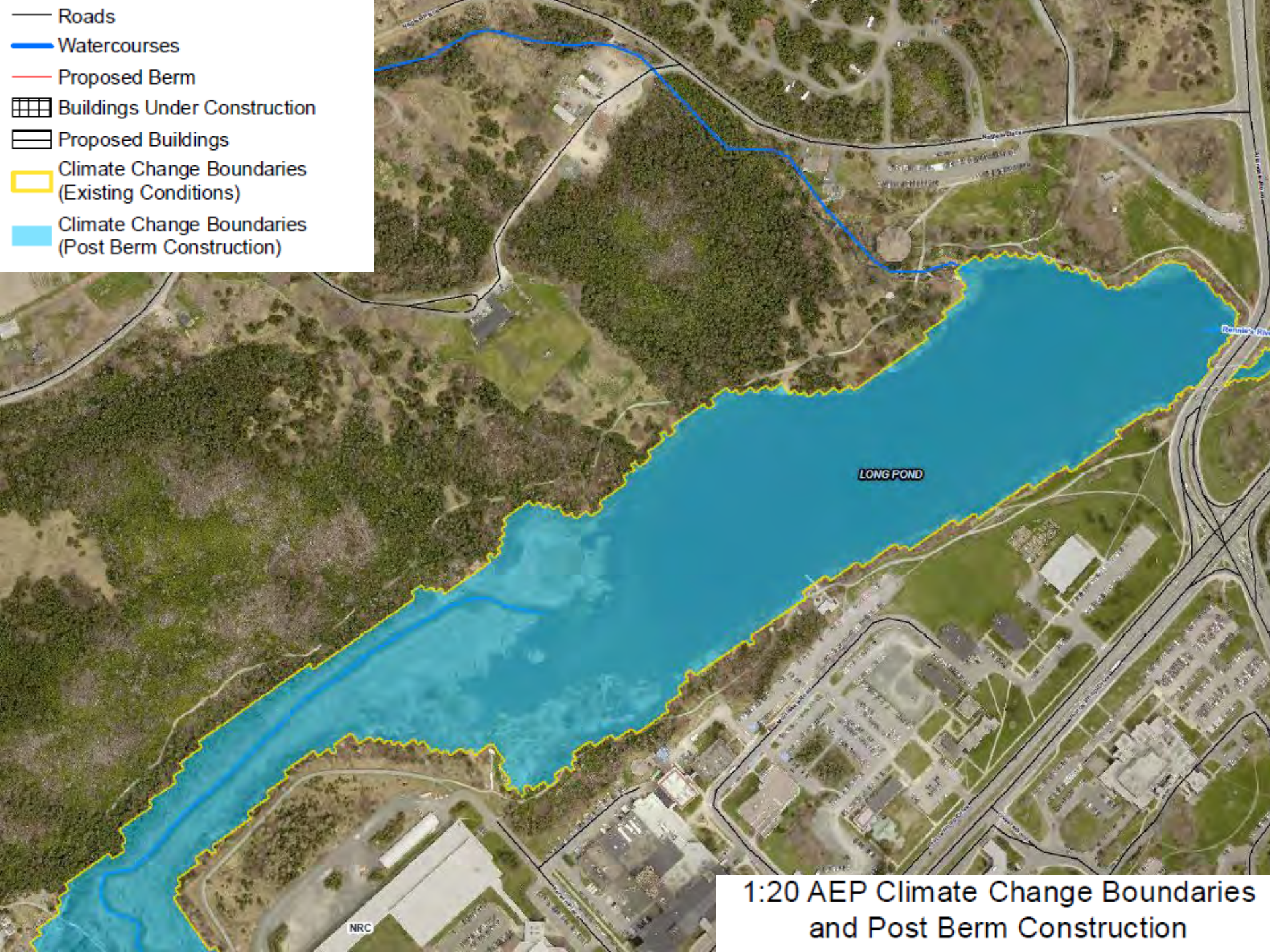
1:20 AEP Climate Change Boundaries and Post Berm Construction

-  Roads
-  Watercourses
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




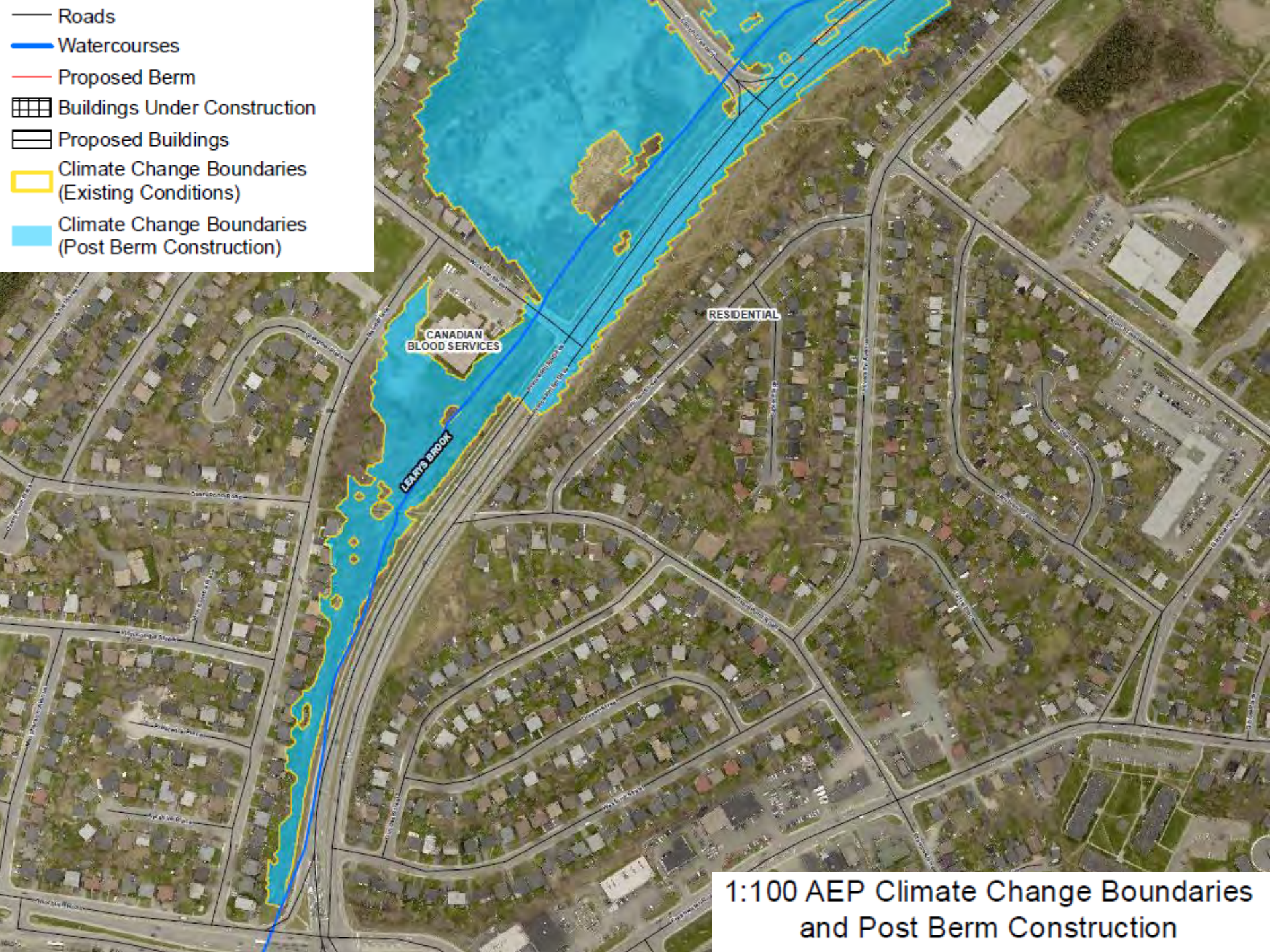
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




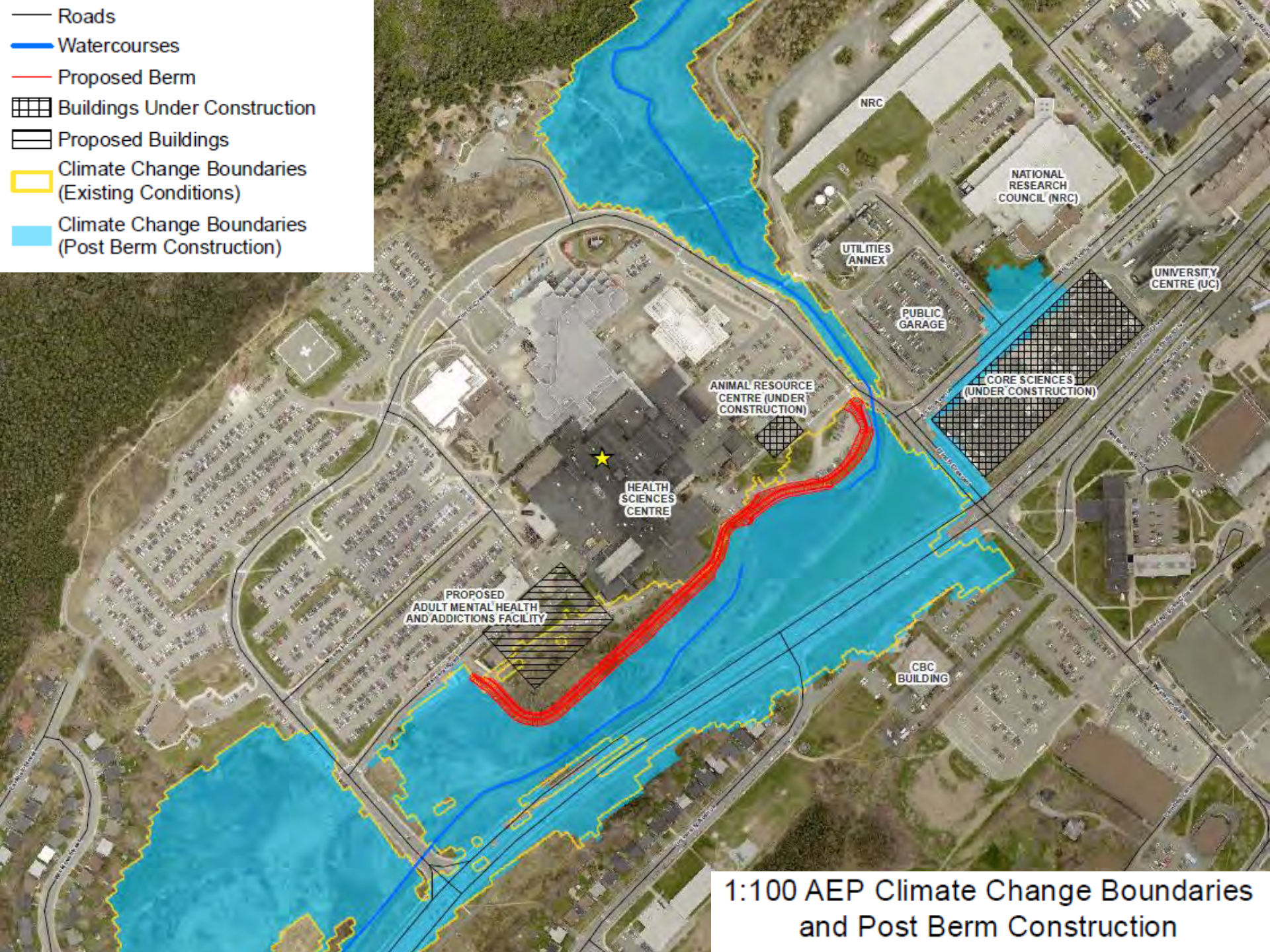
1:20 AEP Climate Change Boundaries and Post Berm Construction

-  Roads
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1:100 AEP Climate Change Boundaries and Post Berm Construction

-  Roads
-  Watercourses
-  Proposed Berm
-  Buildings Under Construction
-  Proposed Buildings
-  Climate Change Boundaries (Existing Conditions)
-  Climate Change Boundaries (Post Berm Construction)



PROPOSED
ADULT MENTAL HEALTH
AND ADDICTIONS FACILITY

★
HEALTH
SCIENCES
CENTRE

ANIMAL RESOURCE
CENTRE (UNDER
CONSTRUCTION)

UTILITIES
ANNEX

PUBLIC
GARAGE

CORE SCIENCES
(UNDER CONSTRUCTION)

NATIONAL RESEARCH
COUNCIL (NRC)

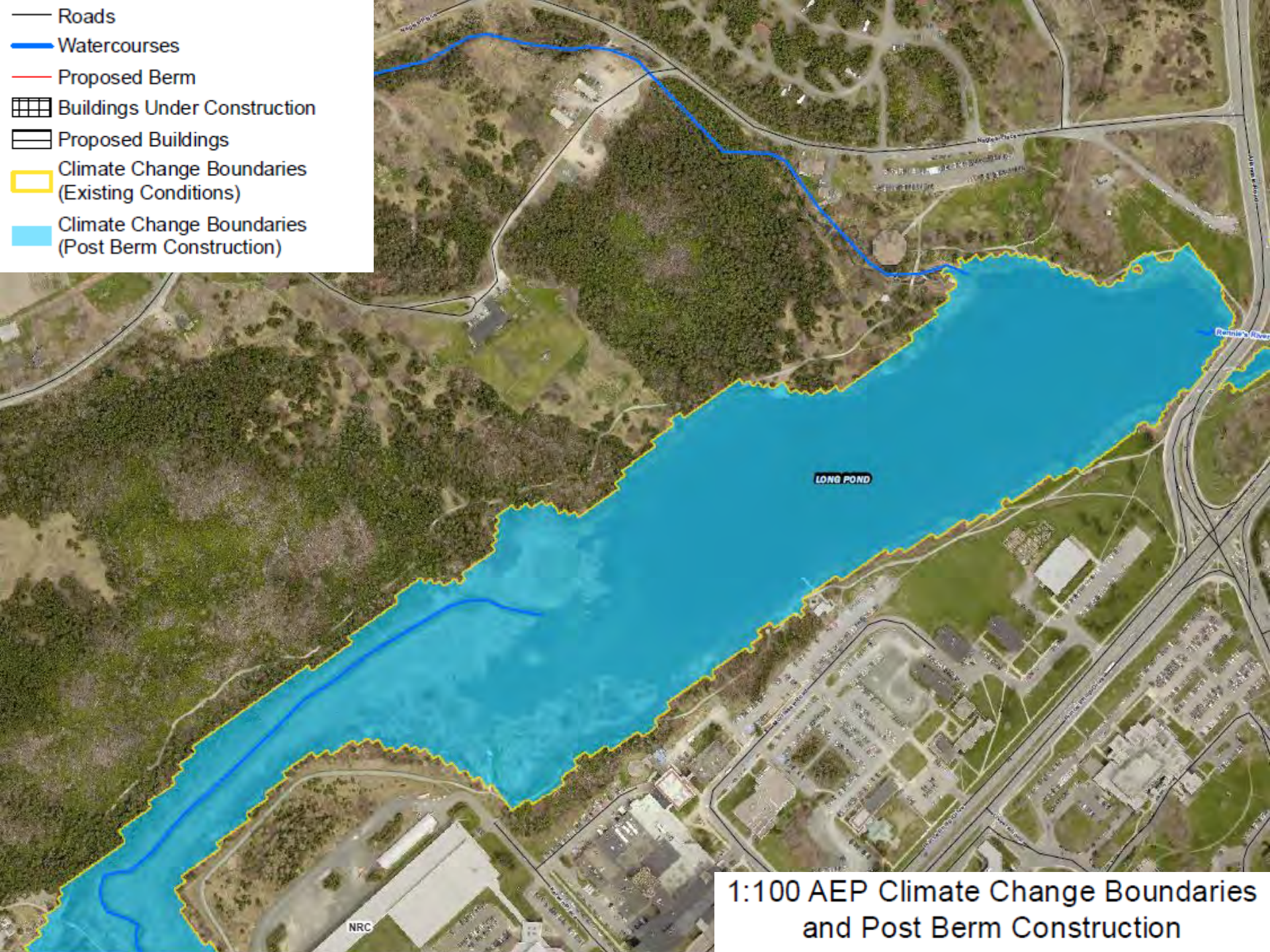
NRC

UNIVERSITY
CENTRE (UC)

CBC
BUILDING

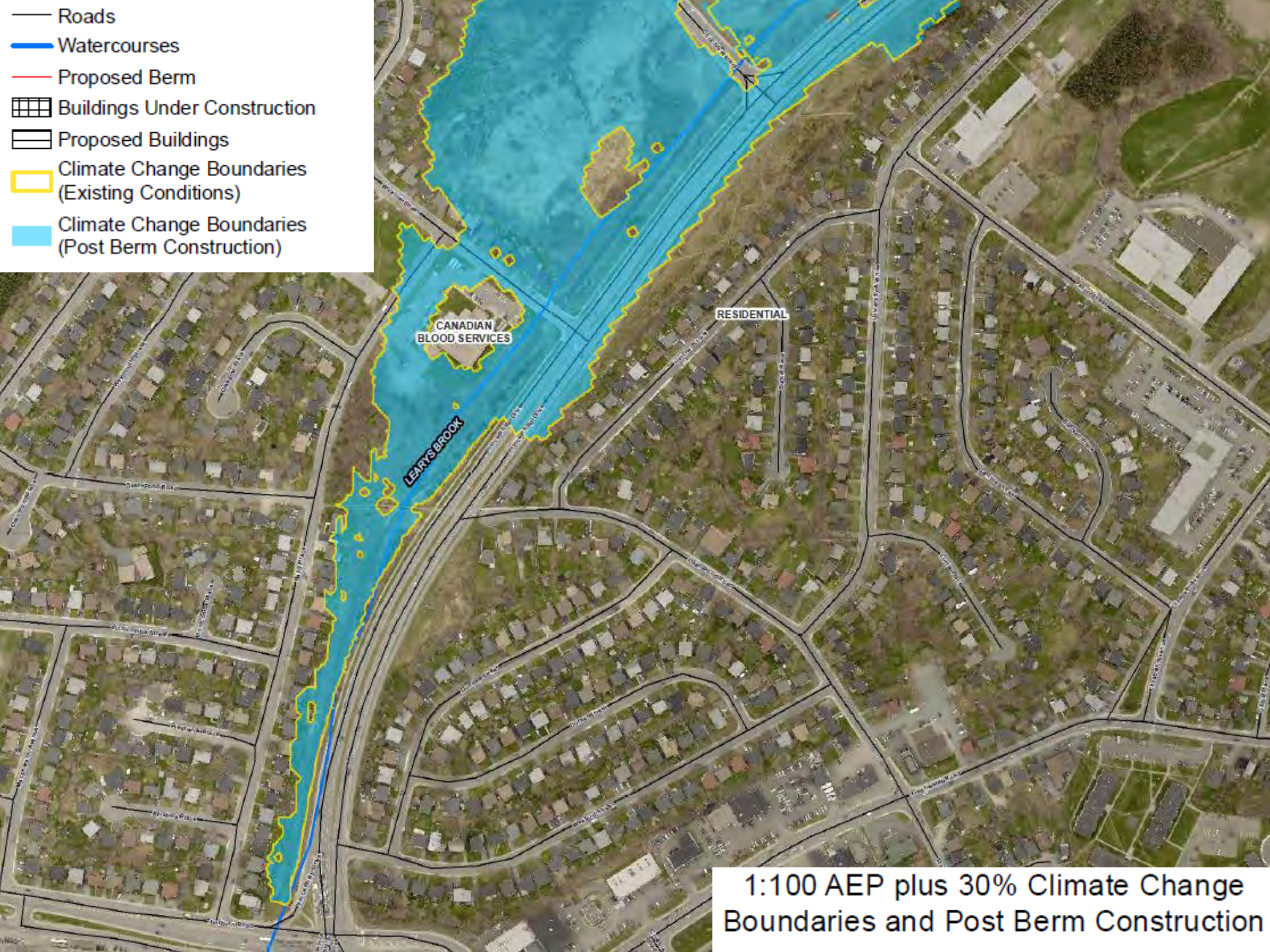
1:100 AEP Climate Change Boundaries
and Post Berm Construction

- Roads
- Watercourses
- Proposed Berm
- ▣ Buildings Under Construction
- ▣ Proposed Buildings
- ▣ Climate Change Boundaries (Existing Conditions)
- ▣ Climate Change Boundaries (Post Berm Construction)










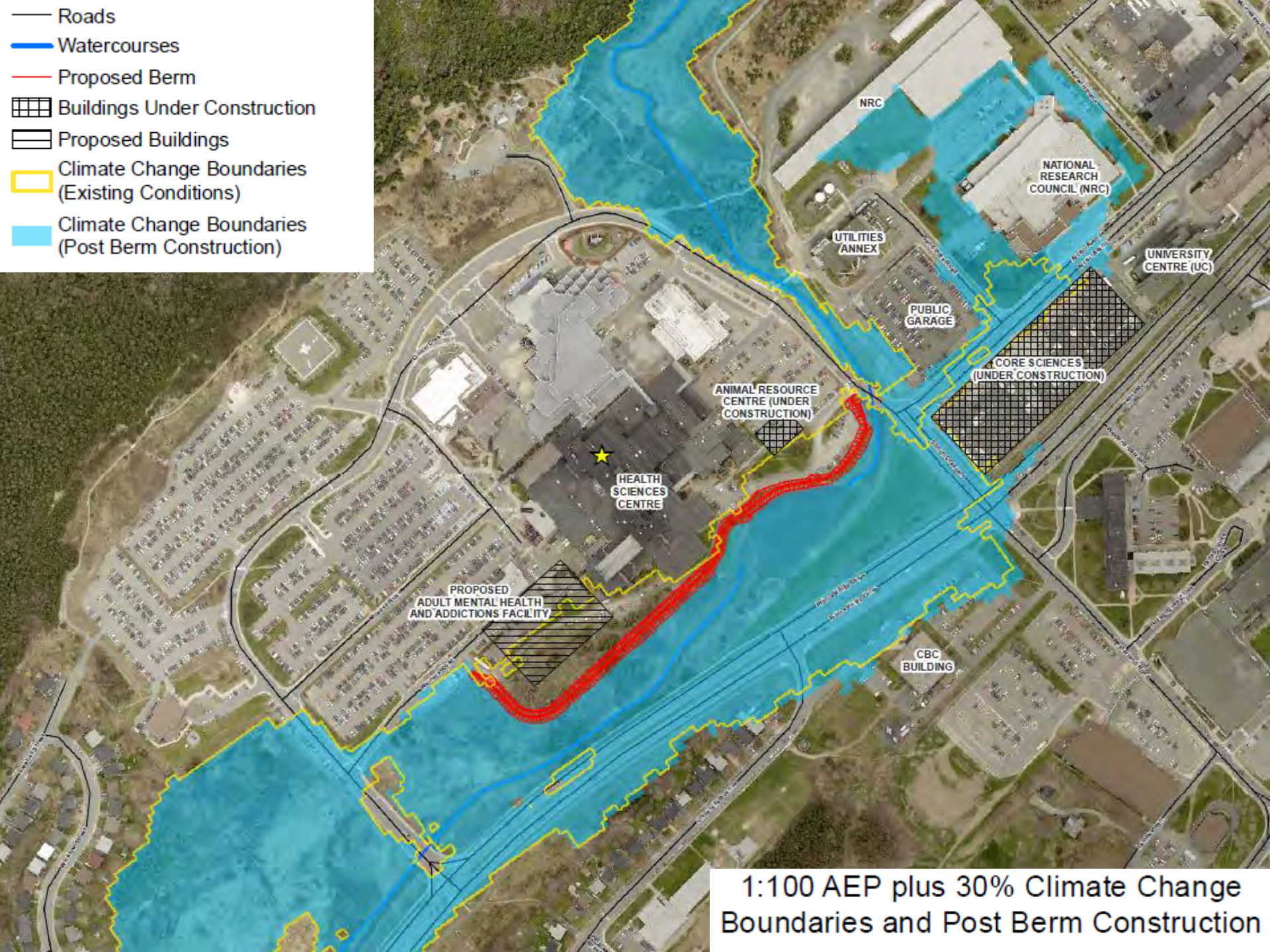
1:100 AEP Climate Change Boundaries and Post Berm Construction

- Roads
- Watercourses
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- ▣ Buildings Under Construction
- ▣ Proposed Buildings
- ▭ Climate Change Boundaries (Existing Conditions)
- ▭ Climate Change Boundaries (Post Berm Construction)



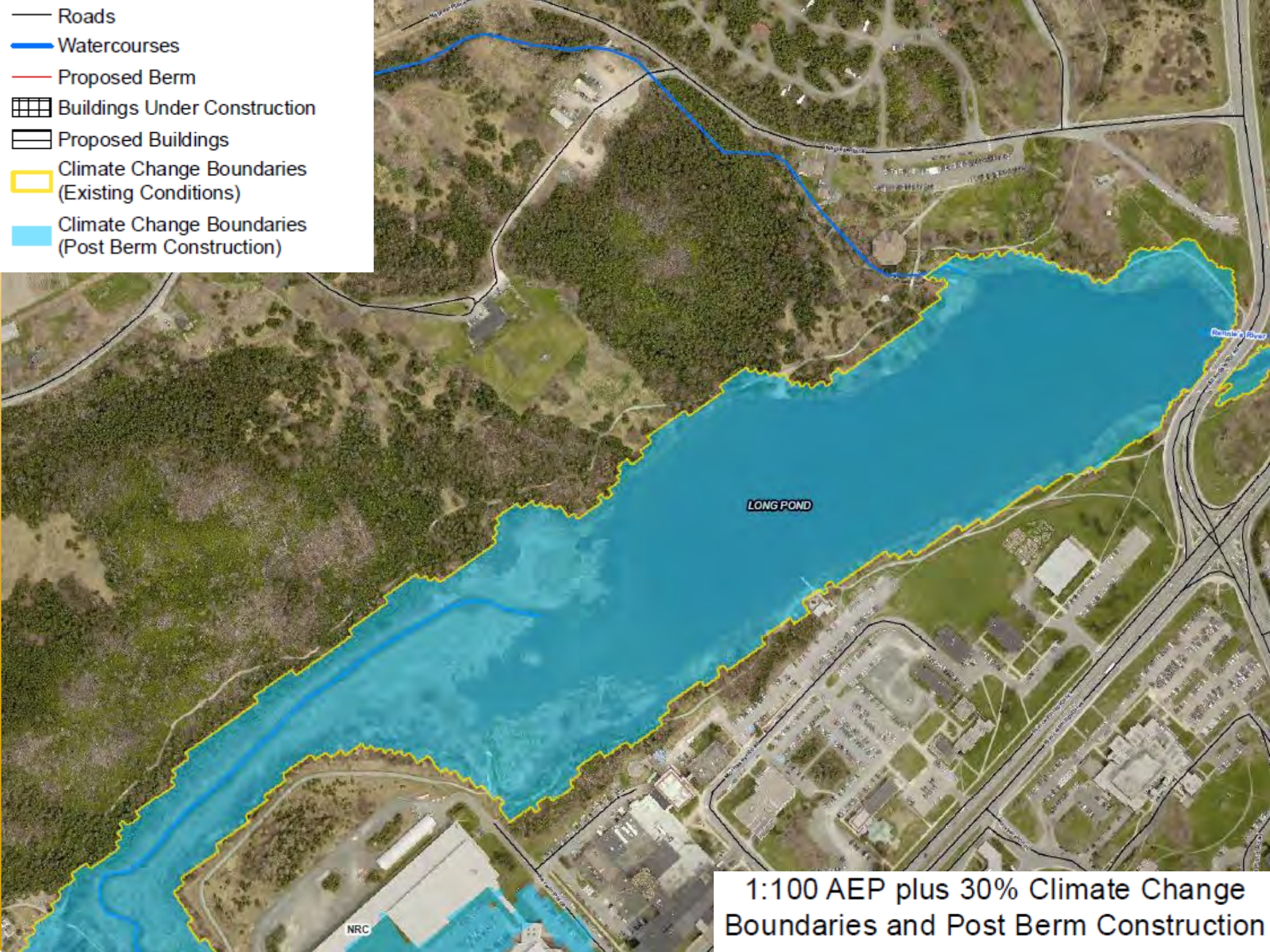
1:100 AEP plus 30% Climate Change Boundaries and Post Berm Construction

-  Roads
-  Watercourses
-  Proposed Berm
-  Buildings Under Construction
-  Proposed Buildings
-  Climate Change Boundaries (Existing Conditions)
-  Climate Change Boundaries (Post Berm Construction)



1:100 AEP plus 30% Climate Change Boundaries and Post Berm Construction

- Roads
- Watercourses
- Proposed Berm
- ▣ Buildings Under Construction
- ▣ Proposed Buildings
- ▣ Climate Change Boundaries (Existing Conditions)
- ▣ Climate Change Boundaries (Post Berm Construction)



1:100 AEP plus 30% Climate Change Boundaries and Post Berm Construction

Health Sciences Centre



- Proposed Berm
- Roads
- Watercourses
- Wetland Impact

Possible Alternatives

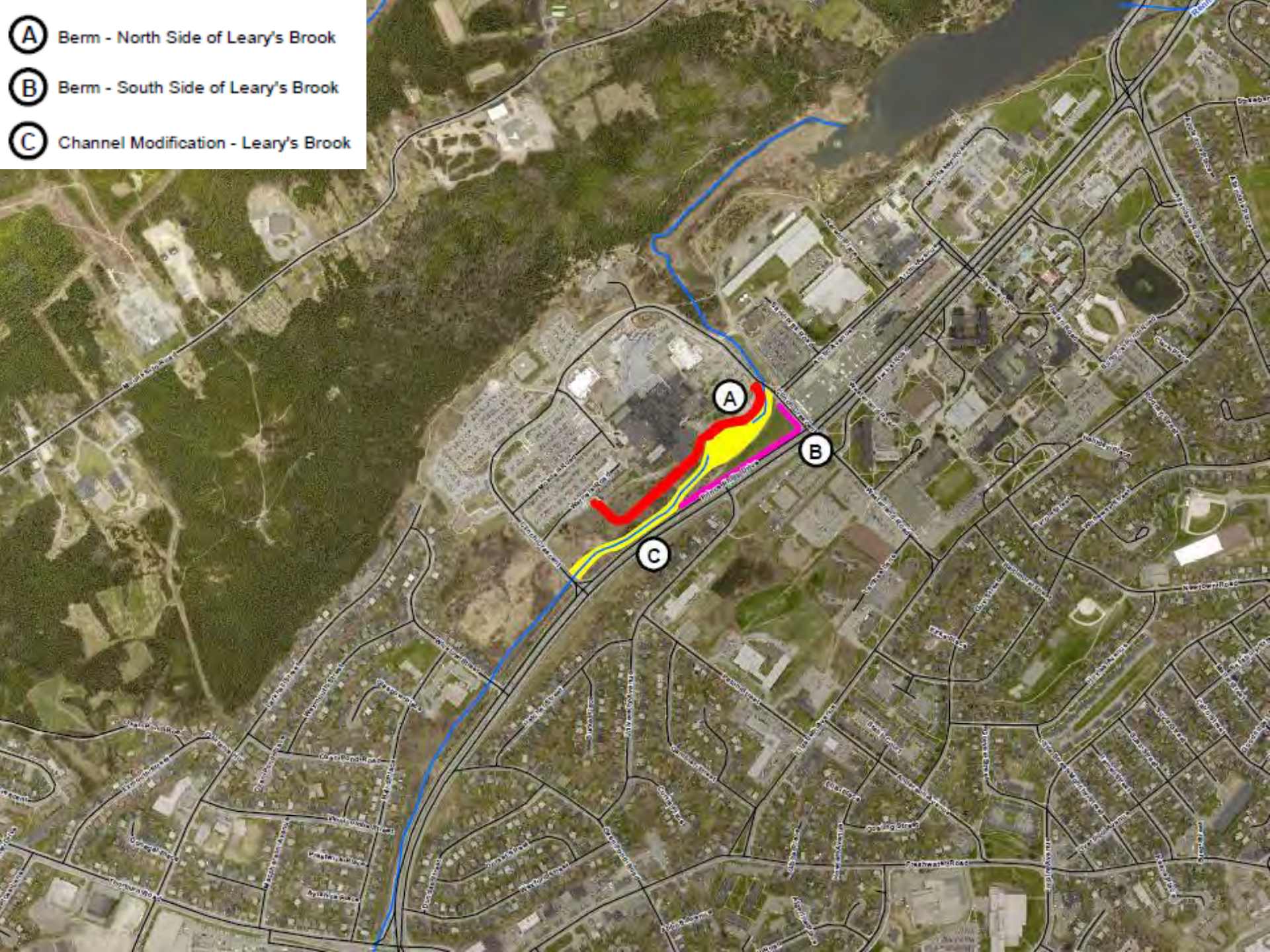


Possible Alternatives

- Berms or levees
- Flood control reservoirs
- Channel modifications
- Diversion



- (A)** Berm - North Side of Leary's Brook
- (B)** Berm - South Side of Leary's Brook
- (C)** Channel Modification - Leary's Brook



Permits and Authorizations



Environmental Assessment Process



- April 12, 2017 – Project registered as undertaking with Municipal Affairs and Environment (MAE)
- June 29, 2017 – MAE announced that Environmental Preview Report (EPR) is required
- August 3, 2017 – EPR Guidelines issued
- August, 2017 - Eastern Health starts EPR
- January 18, 2018 – Eastern Health holds Public Information Meeting / Open House Public Information Session
- March 22, 2018 – Eastern Health submits EPR to MAE
- May 2018 – Extension requested by Proponent
- June 15, 2018 – Revised EPR Guidelines issued
- September 13, 2018 – Eastern Health holds Public Information Session
- October 2018 – Proposed submission of revised EPR to MAE.



Environmental Assessment Process



Municipal Affairs and Environment Minister

- 7 days to post the receipt of the EPR document following submission
- 45 days to review the EPR
- 10 days to post the decision after 45-day review period

Public

- 35 days following posting of EPR to provide comments to Minister
- EPR available on MAE Environmental Assessment webpage
http://www.mae.gov.nl.ca/env_assessment/projects/Y2017/1887/index.html



Approvals, Authorizations and Permits



Permit, Approval or Authorization	Applicable Legislation	Issuing Body	File Number Registration Number
Approval for the Undertaking	Environmental Protection Act, SNL 2002 / Environmental Assessment Regulation	Minister of Municipal Affairs and Environment	1887
Development, Building, and Occupancy Permits	City of St. John's Act, RSNL 1990	St. John's City Council	
Approval from the C.A. Pippy Park Commission	Pippy Park Commission Act, RSNL 1990	C.A. Pippy Park Commission	N/A
Permit to Alter a Body of Water Schedule J - Miscellaneous Works in a Freshwater Body i.e. Other works not specific to above schedules	Water Resources Act, SNL 2002 and MAE Policy for Development in Wetlands	Department of Environment and Climate Change. Water Resources Management Division	
Request for Review	Fisheries Act	Fisheries and Oceans Canada (DFO)	16-HNFL-00368



Thank you

More information is available on the project at the following locations:

Eastern Health Project Website

<http://www.easternhealth.ca/AboutEH.aspx?d=4&id=2437&p=787>

Municipal Affairs and Environment Project Website

http://www.mae.gov.nl.ca/env_assessment/projects/Y2017/1887/index.html



APPENDIX F – Pippy Park Commission Approval

Pippy Park Commission

15 Mt. Scio Road
P.O. Box 8861
St. John's, NL
A1B 3T2
Tel: 709-737-3655
Fax: 709-737-3303



June 30, 2017

Mr. Daniel Parsons, B. Eng
Project Manager – Planning and Engineering
Eastern Health
Suite SM-135, Morrissey Wing
St. Clare's Mercy Hospital
St. John's, A1C 5B8

Re: Construction of an Earth Berm at the Health Sciences Center

Mr. Parsons,

To follow up on our discussion today and previous discussions I have prepared a written response to your request. In a letter dated June 22, 2016, Eastern Health made a request for Pippy Park Commission approval, as required under the Pippy Park Commission Act, to develop an earth berm on the south portion of the Health Science Center to ensure adequate protection against a 100 year flood. It has been recommended that an earth berm is required to mitigate the flood risk and protect the Health Sciences Center. A clear description of the project and design drawings prepared by Tract Consulting and Pinnacle Engineering Ltd. were attached to your letter.

Your request was discussed at the 530th meeting of the Pippy Park Commission and approval is given subject to your receipt of all other required approvals.

Sincerely,



Ric Mercer
Executive Director
C. A. Pippy Park Commission

- CAMPGROUND • NORTHBANK LODGE • PLAYGROUNDS
- GOLF COURSE & BANQUET FACILITIES • HIKING & SKIING TRAILS

APPENDIX G – Fisheries and Oceans Canada (DFO) Response



P.O. Box 5667
St. John's, NL A1C 5X1

Your file *Votre référence*

SEP 16 2016

Our file *Notre référence*
16-HNFL-00368

Daniel Parsons
Eastern Regional Health Authority
300 Prince Phillip Drive
St. John's, NL A1B 3V6

Dear Mr. Parsons:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish – Berm construction

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on August 17, 2016.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

The proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 and 58 of the *Species at Risk Act*.

Our review consisted of:

- Application for Review
- Additional information received September 1, 2016

We understand that you propose to:

- Construct a flood protection earthen berm along the property of the Health Sciences Centre.

To avoid the potential of serious harm to fish and their habitat, we are recommending that the attached mitigation measures be included into your plans.

Provided that these mitigation measures are incorporated into your plans, the Program is of the view that your proposal will not result in serious harm to fish. The Program is also of the view that your proposal will not contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

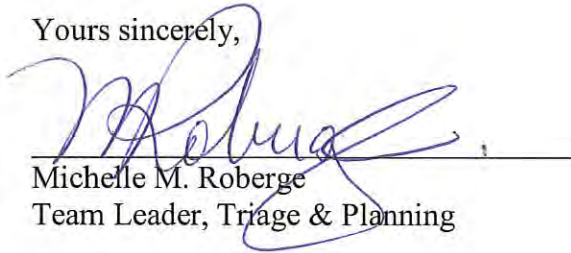
Provided that these mitigation measures are incorporated into your plans, the Program is of the view that your proposal will not result in serious harm to fish. No formal approval is required from the Program under the *Fisheries Act* in order to proceed with your proposal.

If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

A copy of this letter should be kept on site while the work is in progress.

If you have any questions, please contact Triage & Planning Unit at 709-772-4140, by fax at 709-772-5562, or by email at FPP-NL@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Michelle M. Roberge
Team Leader, Triage & Planning

Attch (2)



Shoreline Infill (Marine or Freshwater)

Fisheries and Oceans Canada

Measures to Avoid Causing Harm to Fish and Fish Habitat

On November 25, 2013 the Fisheries Protection Provisions of the **Fisheries Act** came into force. The **Fisheries Act** requires that projects avoid causing serious harm to fish unless authorized by the Minister of Fisheries and Oceans. This applies to work being conducted in or near waterbodies that support fish that are part of or that support a commercial, recreational or Aboriginal fishery.

If you are conducting a project near water, it is your responsibility to ensure you avoid causing serious harm to fish in compliance with the **Fisheries Act**. The following advice will help you avoid causing harm and comply with the **Act**.

- a. *Suitable fill material may include clean blasted rock or boulders; fill should be free of fines or sediment, concrete or any other substance deleterious to fish or fish habitat.*
- b. *Use site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required.*
- c. *Stabilize disturbed shorelines areas to prevent erosion using rip-rap or armour stone. Material used for shoreline stabilization must not be removed from below the high water mark. Material is to be of sufficient size to resist displacement by wave or tidal activity.*
- d. *All in-water works should be carried out in the dry.*
- e. *Fish passage and flows should be maintained at all times.*
- f. *Conduct in-water work during periods of low flow to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.*
- g. *Equipment should be mechanically sound to avoid leaks of oil, gas, and/or hydraulic fluids.*
- h. *When works are completed, banks and approaches should be restored to original condition.*

Additional measures that may be required to protect fish and fish habitat can be found on the DFO national website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) and in the *Guidelines for the Protection of Freshwater Fish Habitat in Newfoundland & Labrador* (<http://www.dfo-mpo.gc.ca/Library/240270.pdf>)

Should your plans change please contact the Fisheries Protection Program-Regulatory Review:

Fisheries Protection Program
Fisheries and Ocean Canada
80 East White Hills Road
St. John's NL A1C 5X1
Telephone: (709) 772-4140
Fax: (709) 772-5562
Email: FPP-NL@dfo-mpo.gc.ca

Note: This advice is only applicable to the project specified on the accompanying DFO letter.





Dredging

Fisheries and Oceans Canada

Measures to Avoid Causing Harm to Fish and Fish Habitat

On November 25, 2013 the Fisheries Protection Provisions of the **Fisheries Act** came into force. The **Fisheries Act** requires that projects avoid causing serious harm to fish unless authorized by the Minister of Fisheries and Oceans. This applies to work being conducted in or near waterbodies that support fish that are part of or that support a commercial, recreational or Aboriginal fishery.

If you are conducting a project near water, it is your responsibility to ensure you avoid causing serious harm to fish in compliance with the **Fisheries Act**. The following advice will help you avoid causing harm and comply with the **Act**.

- a. *Time work in water to protect fish, including their eggs, juveniles, spawning adults, migration and/or the organisms upon which they feed.*
- b. *Sensitive or important fish habitat should be avoided.*
- c. *Conduct in-water work during periods of low flow to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.*
- d. *Minimize duration of in-water work.*
- e. *Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.*
- f. *Minimize the amount of dredged material removed by only dredging the area and depth required.*
- g. *Equipment should be mechanically sound to avoid leaks of oil, gas, and/or hydraulic fluids.*
- h. *Operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbances to the bank and bed of the water body.*
- i. *Use site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required.*

Additional measures that may be required to protect fish and fish habitat can be found on the DFO national website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) and in the *Guidelines for the Protection of Freshwater Fish Habitat in Newfoundland & Labrador* (<http://www.dfo-mpo.gc.ca/Library/240270.pdf>)

Should your plans change please contact the Fisheries Protection Program-Regulatory Review:

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Note: This advice is only applicable to the project specified on the accompanying DFO letter.

