

# Notice of Alteration Form

Client File No. : 166.10	Environment Act Licence No. : 2687R
Legal name of the Licencee: Manitoba Conservation, Parks and Natural Areas	
Name of the development: Birds Hill Provincial Park Wastewater Treatment Lagoon	
Category and Type of development per Classes of Development Regulation: Waste Treatment and Storage                      Wastewater treatment lagoons	
Licencee Contact Person: Kathleen Brown, Park District Supervisor Mailing address of the Licencee: 68092 PR 206 City: Cooks Creek                      Province: Manitoba                      Postal Code: R5M 0C9 Phone Number: (204) 451-6555    Fax: (204) 654-6740    Email: kathleen.brown@gov.mb.ca	
Name of proponent contact person for purposes of the environmental assessment (e.g. consultant): Dana Bredin, P.Eng.	
Phone: (204) 479-0014 Fax:	Mailing address: WSP Canada Inc. 1600 Buffalo Pl, Winnipeg, MB R3T 6B8
Email address: dana.bredin@wsp.com	
Short Description of Alteration ( <i>max 90 characters</i> ): Repairs for lagoon dyke erosion of the wastewater treatment lagoon at Birds Hill Park.	
Alteration fee attached: Yes: <input type="checkbox"/> No: <input checked="" type="checkbox"/>	
If No, please explain: A lagoon dyke repair does not generally require an alteration fee. Please advise if fee is required. <span style="float: right;">+</span>	
Date: 2021-08-20	Signature: <div style="border: 1px solid red; height: 30px; width: 100%; background-color: black;"></div> Printed name: Dana Bredin, P.Eng.
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>A complete Notice of Alteration (<b>NoA</b>) consists of the following components:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> <b>Cover letter</b></li> <li><input checked="" type="checkbox"/> <b>Notice of Alteration Form</b></li> <li><input checked="" type="checkbox"/> <b>2 hard copies and 1 electronic copy of the NoA detailed report</b> (see "<a href="#">Information Bulletin - Alteration to Developments with Environment Act Licences</a>")</li> <li><input type="checkbox"/> <b>\$500 Application fee, if applicable</b> (Cheque, payable to the Minister of Finance)</li> </ul> </div> <div style="width: 45%;"> <p><b>Submit the complete NoA to:</b></p> <p>Director Environmental Approvals Branch Manitoba Sustainable Development 1007 Century Street Winnipeg, Manitoba R3H 0W4</p> <p><b>For more information:</b></p> <p>Phone: (204) 945-8321 Fax: (204) 945-5229 <a href="http://www.gov.mb.ca/sd/ea/">http://www.gov.mb.ca/sd/ea/</a></p> </div> </div>	
<p><b>Note: Per Section 14(3) of the Environment Act, Major Notices of Alteration must be filed through submission of an <a href="#">Environment Act Proposal Form</a> (see "<a href="#">Information Bulletin – Environment Act Proposal Report Guidelines</a>")</b></p>	



2021-08-20

Public

Director  
Environmental Approvals Branch  
Manitoba Conservation and Climate  
1007 Century Street  
Winnipeg, MB R3H 0W4

**Subject: Notice of Alteration – Birds Hill Provincial Park Wastewater Treatment Lagoon**  
**Client ref.: File no. 166.10**

Dear Director:

On behalf of Birds Hill Provincial Park and Manitoba Water Services Board, WSP Canada Inc. (WSP) is pleased to submit a Notice of Alteration regarding the lagoon dyke repair for the Birds Hill Provincial Park Wastewater Treatment Lagoon.

Should you have any questions or require further information, please contact Dana Bredin at (204)-479-0014 or [dana.bredin@wsp.com](mailto:dana.bredin@wsp.com).

Kind regards,

A black rectangular box redacting the signature of Dana Bredin.

Dana Bredin, P.Eng.  
Project Manager

cc:

Kathleen Brown, Manitoba Conservation and Climate – Parks and Protected Places  
Al Tomiuk, Manitoba Conservation and Climate – Parks and Protected Places  
Rebecca Lauhn-Jensen, Manitoba Conservation and Climate – Parks and Protected Places  
Rebecca Toews, E.I.T., Manitoba Water Services Board  
Bereket Assefa, Ph.D., P.Eng., Manitoba Conservation and Climate – Environmental Approvals Branch  
Kris Innes, Manitoba Conservation and Climate – Environmental Compliance and Enforcement Branch  
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Encl.

WSP ref.: 211-06448-00

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## NOTICE OF ALTERATION

**TO:** Director – Manitoba Conservation and Climate, Environmental Approvals Branch  
**FROM:** Dana Bredin, P.Eng. & Eva Kwok, E.I.T. – WSP Canada Inc.  
**SUBJECT:** Birds Hill Provincial Park Lagoon Dyke Repair  
**DATE:** August 20, 2021

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## INTRODUCTION

WSP Canada Inc. (WSP) is presently engaged with Manitoba Conservation and Climate – Parks and Protected Places (Parks) and Manitoba Water Services Board (MWSB) to provide professional engineering services regarding the repair to the lagoon dykes of the Birds Hill Provincial Park (Birds Hill) wastewater treatment lagoon. As part of this process, we are pleased to submit a Notice of Alteration for review and approval by the Environmental Approvals Branch of Manitoba Conservation and Climate.

## BACKGROUND

The Birds Hill wastewater treatment lagoon is located within in Birds Hill Provincial Park, south of North Dr. and approximately 0.5 km west of Kingfisher Lake. The primary cell is situated at the east side of the lagoon, and the secondary cell is situated at the west side. The lagoon currently operates under the Environment Act License No. 2687R that was issued in 2005.

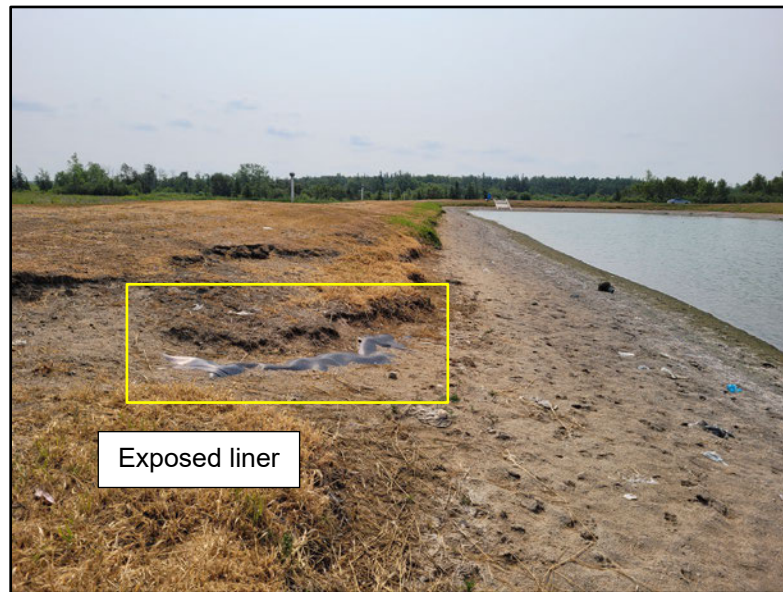
The Birds Hill lagoon was originally constructed in the mid-1960's as a two-cell facility. In 2007, a lagoon expansion was completed to construct a new primary cell, convert the previous primary cell to a secondary cell, and decommission the old secondary cell. The lagoon was constructed with an HDPE 60 mil liner with 300 mm of sand cover on the floor and 300 mm of sand cover on the dyke slopes. No rip rap was placed on the dyke slopes.

In 2019, WSP was retained by Parks and MWSB to review the Birds Hill lagoon site conditions. WSP completed two site reviews and found noticeable erosion of the sand cover on all the interior dykes or the secondary cell and some erosion of the sand cover on the interior dykes of the primary cell. Two topographic surveys were also conducted, which indicated uneven elevations of the intercell dykes. Following the site reviews and surveys, WSP recommended erosion repairs on both the primary and secondary cells. A final report of the lagoon dyke review is enclosed.

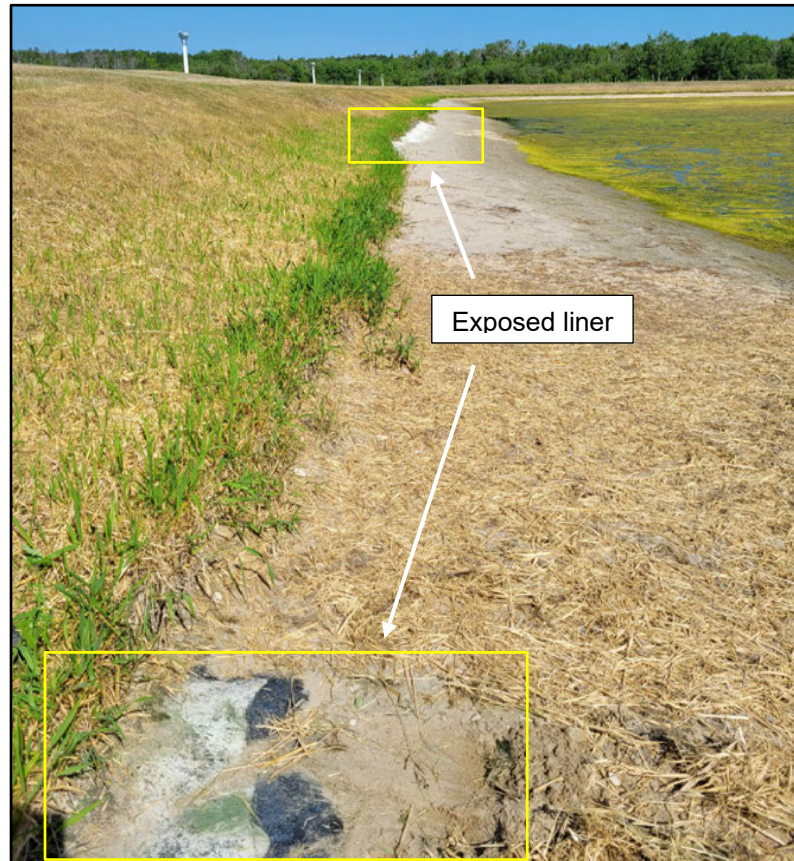
In 2021, WSP was retained by Parks and MWSB to repair the erosion found on the Birds Hill lagoon dykes. The lagoon dyke repairs are further discussed in the following section.

## LAGOON DYKE REPAIR

Two additional site visits were completed on June 30, 2021 and July 13, 2021 to further investigate the lagoon cells in preparation for the repairs. As observed in the previous site visits, the interior slopes of the lagoon dykes showed various levels of erosion. In addition, the HDPE liner was found to be exposed in some areas of both cells, as shown in Figure 1 and Figure 2. WSP engineers reviewed the exposed liner to confirm its construction and integrity; no issues were observed.



*Figure 1: Exposed liner on the east side of the primary cell dyke, looking south (July 13, 2021).*



*Figure 2: Exposed liner on the west side of the secondary cell dyke, looking north (June 30, 2021).*

The figures above also show how the sand cover has been eroded from the upper to lower area on the dyke slopes, giving the appearance of slumping.

WSP, on behalf of Parks and MWSB, is proposing to repair the lagoon dyke erosion and armour the dykes with geotextile and rip rap material to prevent future erosion. The following methodology is proposed for the lagoon dyke repair and rip rap armouring:

1. Begin the repair work by stripping the existing topsoil and vegetation of the interior slope of the lagoon dykes and stockpile for reuse.
2. Place the excavated and/or imported sand material on the dykes, verifying a 300 mm depth of sand cover on the liner.
3. Place non-woven geotextile and a 300 mm thick layer of 100 mm to 200 mm diameter rip rap. Rip rap will be placed from the toe of the dyke to an elevation approximately 1.8 m above the floor of the cell. This equates to a width of approximately 7.5 m, based on the as-constructed slopes of 4H:1V.
4. Place topsoil and seed areas affected by construction activity.

Detailed design drawings of the proposed works are enclosed.



## CONCLUSION

Parks and MWSB is anticipating completing the dyke repairs in fall 2021. WSP looks forward to your timely response on this matter. If you have any questions or require further information, please contact the undersigned.



Dana Bredin, P.Eng.  
WSP Canada Inc.

Encl.

Cc: Kathleen Brown, Manitoba Conservation and Climate – Parks and Protected Places  
Al Tomiuk, Manitoba Conservation and Climate – Parks and Protected Places  
Rebecca Lauhn-Jensen, Manitoba Conservation and Climate – Parks and Protected Places  
Rebecca Toews, E.I.T., Manitoba Water Services Board  
Bereket Assefa, Ph.D., P.Eng., Manitoba Conservation and Climate – Environmental Approvals Branch  
Kris Innes, Manitoba Conservation and Climate – Environmental Compliance and Enforcement Branch  
Tyler Kneeshaw, Manitoba Conservation and Climate – Environmental Compliance and Enforcement Branch





THE MANITOBA WATER SERVICES BOARD

# BIRDS HILL PROVINCIAL PARK LAGOON DYKE ASSESSMENT REPORT

OCTOBER 28, 2019

ORIGINAL





# BIRDS HILL PROVINCIAL PARK LAGOON

## DYKE ASSESSMENT REPORT

THE MANITOBA WATER SERVICES  
BOARD

TYPE OF DOCUMENT (VERSION)  
ORIGINAL

PROJECT NO.: 191-07355-00  
CLIENT REF: 19-05  
DATE: OCTOBER 28, 2019

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October 28, 2019

Original

The Manitoba Water Services Board  
Unit 1A - 2010 Currie Blvd.  
Brandon, MB R7B 4E7

**Attention: Travis Parsons, M.A.Sc., P.Eng.**

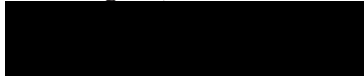
Dear Sir:

**Subject: BIRDS HILL LAGOON DYKE ASSESSMENT**  
**Client ref.: 19-05**

WSP Canada Inc. is pleased to submit our report for the Birds Hill Lagoon Dyke Assessment, MWSB Project No. 19-05.

Please contact the undersigned if you have any questions. Thank you for the opportunity to serve you on this assignment.

Kind regards,



Dana Bredin, P.Eng.  
Project Manager  
Tel. 204-259-1486

cc: Michael Arbeau, E.I.T., MWSB  
WSP ref.: 191-07355-00

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# REVISION HISTORY

## FIRST ISSUE

October 8, 2019	DRAFT REPORT			
Prepared by	Reviewed by	Approved By		
Dana Bredin, P.Eng.	Bill Burgess, P.Eng.	Ian Parkinson, P.Eng.		
REVISION 1				
October 28, 2019	FINAL REPORT			
Prepared by	Reviewed by	Approved By		
Dana Bredin, P.Eng.	Bill Burgess, P.Eng.	Ian Parkinson, P.Eng.		
REVISION 2				
Prepared by	Reviewed by	Approved By		

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# SIGNATURES

PREPARED BY



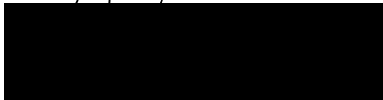
Dana Bredin, P.Eng.  
Project Manager

October 28<sup>th</sup>, 2019

Date



APPROVED<sup>1</sup> BY



Ian Parkinson, P.Eng.  
Manager – Water & Wastewater Infrastructure

October 28<sup>th</sup>, 2019

Date



WSP Canada Inc. prepared this report solely for the use of the intended recipient, The Manitoba Water Services Board, in accordance with the professional services agreement. The intended recipient is solely responsible for the disclosure of any information contained in this report. The content and opinions contained in the present report are based on the observations and/or information available to WSP Canada Inc. at the time of preparation. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP Canada Inc. does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report. This limitations statement is considered an integral part of this report.

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# 1 INTRODUCTION & BACKGROUND

## 1.1 INTRODUCTION

WSP Canada Inc. (WSP) was retained by the Manitoba Water Services Board (MWSB) and Manitoba Sustainable Development – Parks and Protected Spaces (Parks) to complete a review of the Bird Hill Provincial Park Lagoon.

The objectives of this lagoon dyke assessment report are to:

- Provide a brief discussion of the observed conditions of the interior lagoon dyke slopes, as well as other issues that have been identified by operations staff and observed during WSP's site reviews.
- Recommend an option to complete the repair of the identified issues for the lagoon with associated costs.

## 1.2 BACKGROUND

Birds Hill Provincial Park is located approximately 10 km northeast of Winnipeg and is one of Manitoba's busiest parks with over one million visitors annually. The Birds Hill Park lagoon was originally constructed in the mid 1960s as a two-cell facility. A more recent Environment Act Licence (EAL no. 2687) was issued for the lagoon expansion in 2005. The lagoon expansion was completed in 2007 with the construction of a new primary cell, conversion of the old primary cell to a secondary cell and the decommissioning of the old secondary cell. The design of the lagoon was completed by Cochrane Engineering (a WSP legacy firm) and was constructed by River East Construction.

As per the as-constructed drawings the lagoon was constructed with an HDPE 60 mil liner, with 200 mm of sand cover on the floor, and 300 mm of sand cover on the dyke slopes. No rip rap was placed on the dyke slopes. **Table 1-1** outlines the as-constructed lagoon parameters.

**Table 1-1 – As-constructed lagoon parameters**

PARAMETER	PRIMARY CELL	SECONDARY CELL
Cell bottom dimensions	43 m x 140.6 m	79 m x 140.6 m
Top of dyke (inside to inside) dimensions	68 m x 165.6 m	104 m x 165.6 m
Operating depth	1.5 m	1.5 m
Freeboard	1.0 m	1.0 m
Interior Dyke Slopes	5H:1V	5H:1V
Total Volume (at operating depth)	11,200 m <sup>3</sup>	19,200 m <sup>3</sup>
Storage Volume (at operating depth)	5,600 m <sup>3</sup>	15,800 m <sup>3</sup>
Surface Area (at operating depth)	9.0 ha	14.6 ha



# 2 LAGOON DYKE ASSESSMENT

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## 2.1 SITE REVIEW OBSERVATIONS

WSP completed a site review with MWSB and Parks staff in attendance on May 8, 2019. WSP then completed a second site review with Parks staff on July 25, 2019 after the discharge of the secondary cell and the equalization of the two lagoon cells. The following observations were made:

- Noticeable erosion of the sand cover on all the interior dykes of the secondary cell, in particular the south and east sides. The primary cell also had some erosion on its interior dykes, though not as substantial.



**Figure 1 - West secondary cell dyke, looking south (May 8, 2019)**



**Figure 2 - Primary intercell dyke, looking north (May 8, 2019)**

- The sand cover has been eroded from the upper area of the dyke slopes and has deposited on the lower area, giving the appearance of slumping.



**Figure 3 - Secondary intercell dyke, looking south (July 25, 2019)**



**Figure 4 - Secondary cell southeast corner, looking northeast (July 25, 2019)**



- Signs of burrowing animals within the sand cover, predominantly at the northwest corner of the secondary cell.



**Figure 5 - Burrowing animal hole, northwest corner of secondary cell (May 8, 2019)**

- No signs of exposed liner were observed by WSP during the site reviews, though exposed liner on the west secondary cell dyke was noted and photographed by Parks staff when the lagoon was at a lower operating level.



**Figure 6 - Exposed liner, west secondary cell berm looking south (Source: Parks)**

- The top elevation of the east primary cell dyke was visibly lower than the surrounding dykes. This was indicated as one of the main concerns of the Operations staff, due to the potential of overtopping when the primary cell is full and storage levels encroach on freeboard.
- Vegetation on the dykes is well established and maintained.
- Truck dump ramp and turnaround area are in good condition, with no erosion observed around the exterior of the truck dump ramp (no rip rap).
- Fence and access gate are in relatively good condition, with only a couple barbed wire strands broken at the southwest corner of the lagoon.
- No groundwater issues or liner bubbling was noted by WSP or Parks staff.
- Slope instability or exterior toe bulging of the lagoon dykes were not observed.

## 2.2 TOPOGRAPHIC SURVEY

WSP completed two topographic surveys, the first on July 10, 2019 after the discharging of the secondary cell and the second on July 25, 2019 after primary cell was equalized with the secondary cell. Top of dyke elevations were collected as well as the interior dyke slope cross sections to the water level. The overall average top of dyke elevation, measured along the centreline, is **249.85 m**. Table 2-1 outlines the average top of dyke elevations for each section and compares it to the overall average.

**Table 2-1 - Average top of dyke elevations**

LAGOON DYKE	AVERAGE CENTRELINE ELEVATION [m]	DIFFERENCE TO OVERALL AVERAGE [m]
North exterior dyke – secondary cell	249.89	+0.04
West exterior dyke – secondary cell	249.75	-0.10
South exterior dyke – secondary cell	249.81	-0.04
North exterior dyke – primary cell	249.72	-0.13
East exterior dyke – primary cell	249.68	-0.17
South exterior dyke – primary cell	249.86	+0.01
Intercell dyke	250.11	+0.26

Both the primary cell north and east dyke average top of dyke elevations are noticeably lower (0.13 m to 0.17 m) than the overall lagoon average top of dyke elevation, corroborating the observations during the site reviews. There are also some spot elevations that are 0.25 m lower than the overall average lagoon elevation. As well, the west secondary cell is lower (0.10 m) than the average top of dyke elevation, with some spot elevations that are 0.15 m lower than the overall average.

Conversely, the average top of dyke elevation of the intercell dyke is significantly higher (0.26 m) than overall average. With the intercell dyke being visibly higher than the surrounding dykes, this certainly gives the appearance that the primary cell dykes are much lower, as the difference between the highest surveyed point on the intercell dyke and the lowest surveyed point of the primary cell east dyke is 0.69 m. This discrepancy between top of dyke elevations makes operating the lagoon difficult, as it is challenging for an operator to interpret the operating level of the lagoon cell.

It is important to note that there were no observed signs of slope instability or settlement caused by weak subgrade, such as toe bulging along the exterior of the dyke or tension cracking running parallel to the top of the dyke.

## 2.3 REVISED AS-CONSTRUCTED LAGOON PARAMETERS

Based on the topographic surveys of the lagoon, [Table 2-2](#) revises the lagoon parameters previously presented in Table 1-1.

**Table 2-2 - Revised as-constructed lagoon parameters**

PARAMETER	PRIMARY CELL	SECONDARY CELL
Cell bottom dimensions <sup>1</sup>	45.9 m x 144.6 m	83.9 m x 146.2 m
Top of dyke (inside to inside) dimensions	63.4 m x 163.3 m	106.4 m x 166.2 m
Operating depth	1.5 m	1.5 m
Calculated Freeboard <sup>2</sup>	0.74 m	0.85 m
Calculated Interior Dyke Slopes	Varies, 3H:1V – 4H:1V	Varies, 4H:1V – 5H:1V

<sup>1</sup> Based on the surveyed top of dyke dimensions, the surveyed interior dyke slopes and total lagoon depth of 2.5 m.

<sup>2</sup> Based on 1.0 m less the difference between average top of dyke elevation of 249.85 m and the lowest surveyed top of dyke elevation.

Note that there are only minimal differences in the surface area and storage volume of the lagoon between the as-constructed lagoon parameters in Table 1-1 and the revised parameters in Table 2-2. Furthermore, the discharge pipe invert within the secondary cell, as well as the intercell pipe inverts, were not surveyed as the liquid level of the lagoon was high at the time. Therefore, the deadspace (depth of liquid below the pipe inverts) could not be accurately calculated, which is used to determine the storage volume.

# 3 RECOMMENDATIONS

## 3.1 DYKE REPAIR RECOMMENDATIONS

Due to erosion observed on the majority of the interior dyke slopes, coupled with the lack of any erosion protection (i.e. rip rap), WSP recommends that the both the primary and secondary cells dyke erosion be repaired. This can be completed by placing either imported sand cover material or recovered sand material deposited at the toe of the dyke and placing rip rap for erosion protection.

WSP also recommends that the north and east dykes of the primary cell, as well as the west secondary cell dyke be raised to meet the average surveyed top of dyke elevation of 249.85 m. This will allow the lagoon to achieve a minimum 1.0 m of freeboard, which is required as per the Licence, Clause 11. Material to raise the dykes can be either sourced on site, or somewhere close by where it is easily accessible. As discussed in Section 2.2, there is no indication of dyke settlement caused by weak subgrade soils or slope instability. In view of that, there is minimal risk adding material to raise the dykes.

Regarding the issue of burrowing animals, it is recommended that Parks staff actively monitor and remove burrowing animals.

As discussed in Section 2.1, WSP did not encounter any exposed liner areas along the interior dyke slopes, though one exposed area was previously documented by Parks staff. This area may have been hidden due to higher liquid levels of the lagoon when the site reviews took place. Therefore, the condition of the exposed liner at this location could not be verified. Incidentally, there was no indication of any liner protrusions (i.e. bubbling) due to groundwater or gas build-up beneath the liner. HDPE type liners are a durable material that has good UV resistance, especially when compared to PVC type liners. While HDPE liners are susceptible to punctures and stress cracking, usually during the installation process, there is no indication that this is an issue at Birds Hill. A more thorough review of the entire liner system can only be accomplished if the lagoon is completely discharged exposing the floor of the cells. This should be completed prior to the repair of the dykes.

It is best for the repair works to start after the annual Folk Fest event, as this is when a large portion of wastewater is received at the lagoon. The secondary cell should be repaired first, as it can be discharged and briefly taken offline while the primary cell accepts and retains all wastewater. The primary cell works should begin once the secondary cell dyke repair is completed, and after the peak season so that the incoming wastewater is minimal. The following is a brief discussion on the construction details and sequencing for the proposed dyke repair works.

1. Secondary cell repair construction details and sequencing:
  - a. Discharge the secondary cell until the discharge pipe is exposed, then either pump the remaining liquid into the discharge ditch or back to the primary cell, exposing the floor (or as close as possible) of the secondary cell.
  - b. Review and assess the exposed dyke slopes for additional areas where the liner may be exposed now that the secondary cell is completely discharged.
  - c. Survey and calculate the amount of sand material that has sloughed down to the toe of the secondary cell and determine whether this material can be excavated and placed back on the dykes, or if sand material is required to be imported.
  - d. Begin the repair work by stripping the existing topsoil and vegetation of the interior slope of the secondary cell dykes and stockpile for reuse.
  - e. Place the excavated and/or imported sand material on the dykes, verifying a 300 mm depth of sand cover on the liner.
  - f. Place and compact excavated fill material from on site (or sourced somewhere nearby) to build up the west top of dyke.



- g. Place non-woven geotextile and a 300 mm thick layer of 100 mm to 200 mm diameter rip rap. Rip rap will be placed from the toe of the dyke to an elevation approximately 1.8 m above the floor of the cell. This equates to a width of approximately 7.5 m, based on the as-constructed slopes of 4H:1V.
    - h. Place topsoil and seed areas affected by construction activity.
  - 2. Primary cell repair construction details and sequencing:
    - a. Equalize the primary and secondary cells, after the repair works are completed on the secondary cell. Then pump the remaining liquid from the primary cell into the secondary cell, exposing the floor (or as close as possible) of the primary cell.
    - b. Review and assess the exposed dyke slopes for additional areas where the liner may be exposed now that the primary cell is pumped down.
    - c. Survey and calculate the amount of sand material that has sloughed down to the toe of the primary cell and determine whether this material can be excavated and placed back on the dykes, or if sand material is required to be imported.
    - d. Begin the repair work by stripping the existing topsoil and vegetation of the interior slopes and the east and north top of dykes of the primary cell and stockpile for reuse.
    - e. Place the excavated and/or imported sand material on the dykes, verifying a 300 mm depth of sand cover on the liner.
    - f. Place and compact excavated fill material from on site (or sourced somewhere close) to build up the east and north top of dykes.
    - g. Place non-woven geotextile and a 300 mm thick layer of 100 mm to 200 mm diameter rip rap. Rip rap will be placed from the toe of the dyke to an elevation approximately 1.8 m above the floor of the cell. This equates to a width of approximately 7.5 m, based on the as-constructed slopes of 4H:1V.
    - h. Place topsoil and seed areas affected by construction activity.
- 

## 3.2 ESTIMATED DYKE REPAIR COST

The estimated cost to repair the erosion, place rip rap and raise the dykes is \$301,250.00 including a 10% allowance for engineering fees and a 15% contingency, see [Table 3-1](#). The majority of the costs associated with the repair works is the supply and placement of rip rap material. Additionally, the cost of rip rap is further broken-down into a cost for each cell. Unit price costs are based upon representative 2018 and 2019 lagoon construction costs in the region.

**Table 3-1 – Estimated dyke repair costs**

DESCRIPTION	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
Mobilization and demobilization	1	L.S.	\$20,000	\$20,000.00
Topsoil stripping & stockpiling	1	L.S.	\$5,000	\$5,000.00
Excavation & embankment material for dyke raising	1	L.S.	\$2,500	\$2,500.00
Sand placement on interior dyke slopes	1,500	cu.m	\$15.00	\$22,500.00
Rip rap and geotextile – secondary cell	3,350	sq.m	\$30.00	\$100,500.00
Rip rap and geotextile – primary cell	2,850	sq.m	\$30.00	\$85,500.00
Topsoil placement & seeding	1	L.S.	\$5,000	\$5,000.00
SUBTOTAL				\$241,000.00
ENGINEERING FEES			10%	\$24,100.00
CONTINGENCIES			15%	\$36,150.00
<b>TOTAL (excluding applicable taxes)</b>				<b>\$301,250.00</b>

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# BIRDS HILL PROVINCIAL PARK LAGOON DYKE REPAIR

MWSB# 1622

BIRDS HILL PROVINCIAL PARK, MANITOBA

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## ISSUED FOR TENDER

WSP Project No: 211-06448-00

Date: AUGUST 20, 2021






We see the future more clearly and design for it today.




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1. LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.
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3. DRAWING IS IN METRIC. WHOLE NUMBERS INDICATE MILLIMETRES, AND DECIMALIZED NUMBERS INDICATE METRES.
4. BENCHMARK - 250.237 TOP OF CONCRETE CURB ON TRUCK DUMP RAMP, ON SOUTHWEST CORNER.

[illegible]

<p>SEAL</p> 	 <p><b>ENGINEERS GEOSCIENTISTS MANITOBA</b></p> <p><b>Certificate of Authorization</b></p> <p><b>WSP Canada Inc.</b></p> <p><b>No. 5750</b></p>	<p>ORIGINAL SCALE: <b>AS SHOWN</b></p> <p>DESIGNED BY: <b>D.T.G.B.</b></p> <p>ASSISTED BY: <b>V.A.A.</b></p> <p>DRAWN BY: <b>V.A.A.</b></p> <p>MODIFIED BY: <b>V.A.A.</b></p> <p>APPROVED BY: <b>D.T.G.B.</b></p> <p>DISCIPLINE: <b>INFRASTRUCTURE</b></p>	<p>DATE: <b>2021/08/05</b></p> <p>IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE</p>  <p style="text-align: center;"><b>25mm</b></p>
<p>2021-08-20</p>			
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PROJECT NUMBER: 211-06448-00

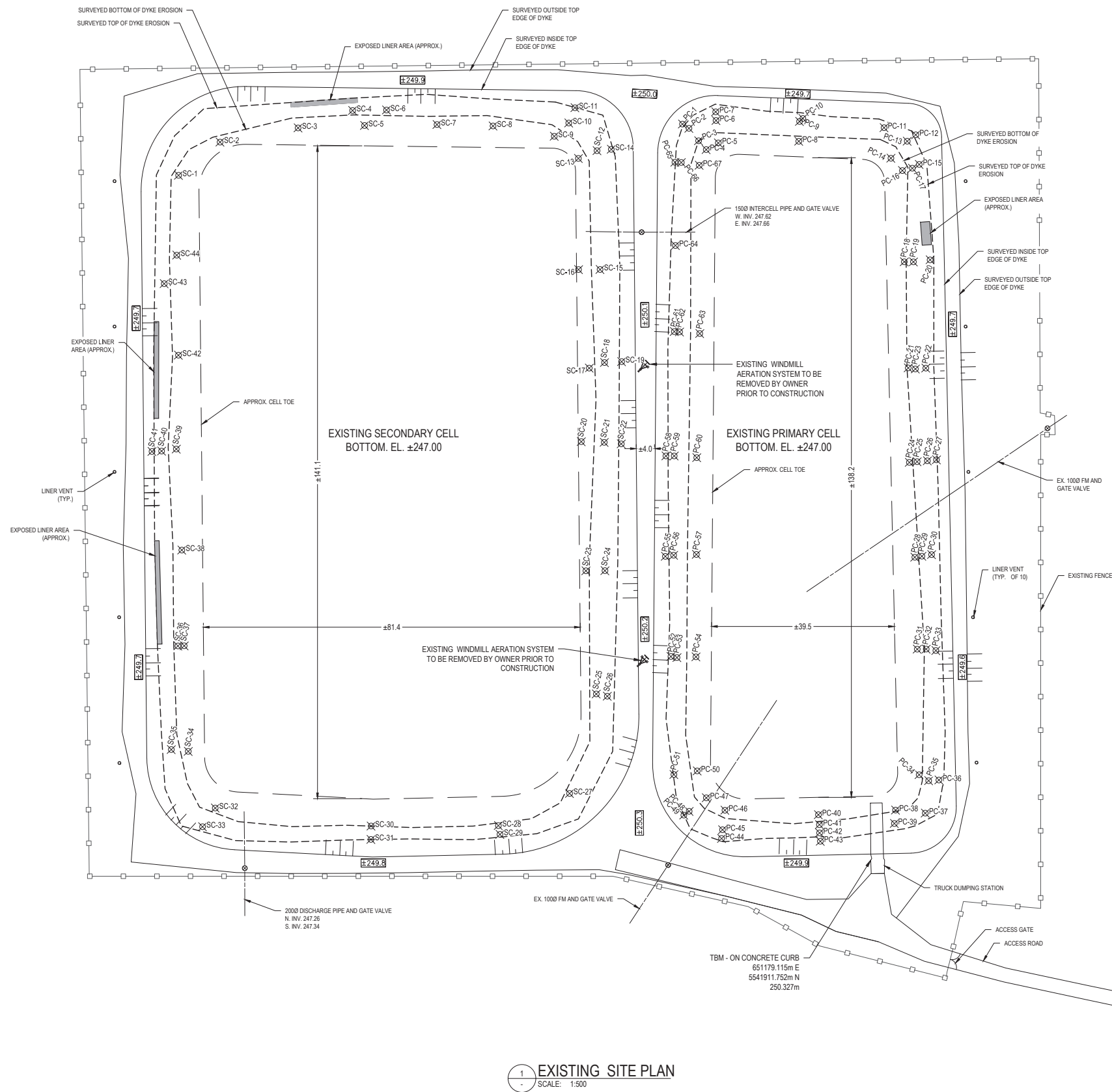
CLIENT:

THE MANITOBA WATER  
SERVICES BOARD

CLIENT REF. #: MWWSB# 1622

<p>TITLE:</p> <p>OVERALL SITE PLAN</p>	<p>PROJECT:</p> <p>BIRDS HILL PROVINCIAL PARK LAGOON DYKE REPAIR WINNIPEG, MANITOBA</p>	
	<p>DRAWING NUMBER:</p> <p>CL101</p>	<p>REV.</p> <p>0</p>



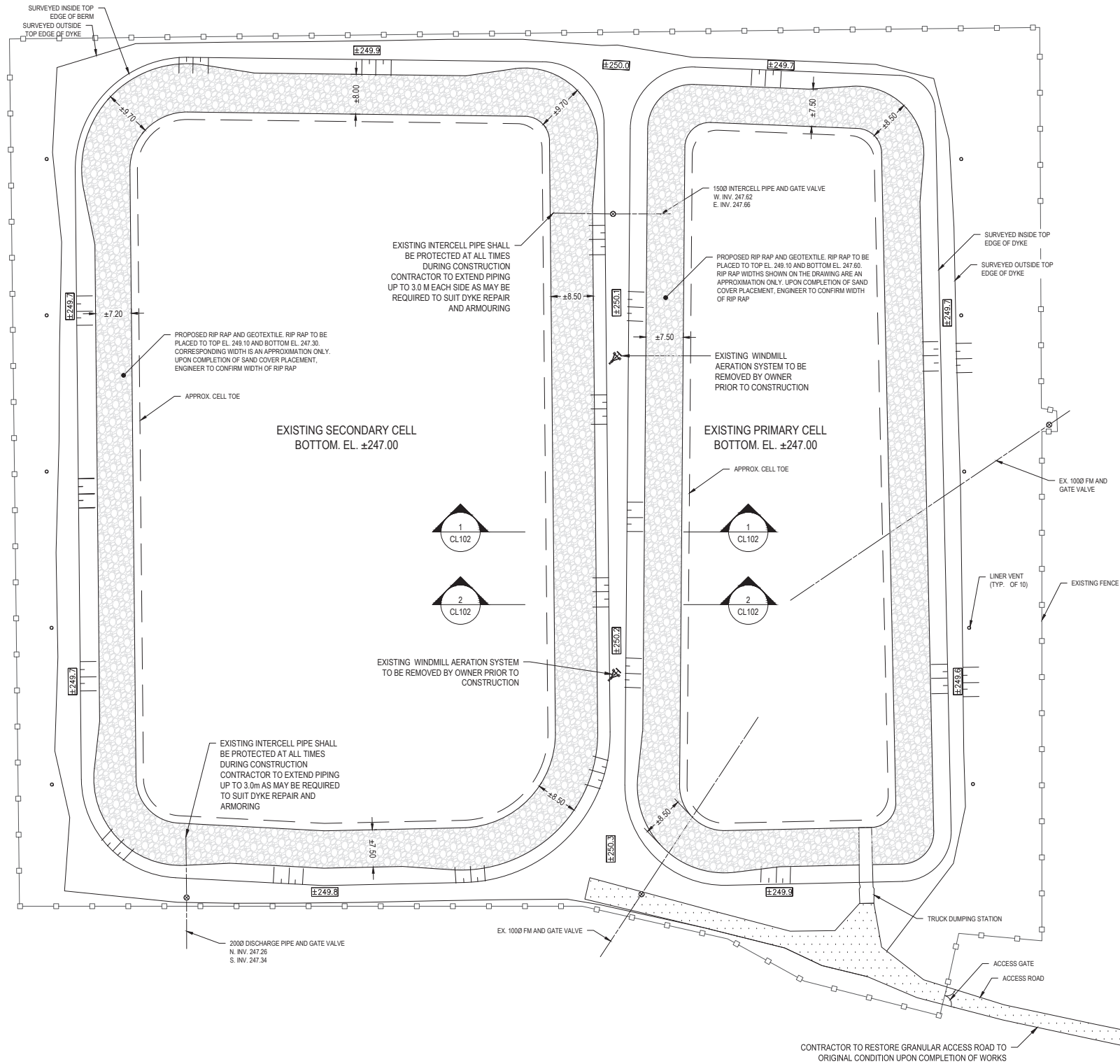


KEY NOTES:

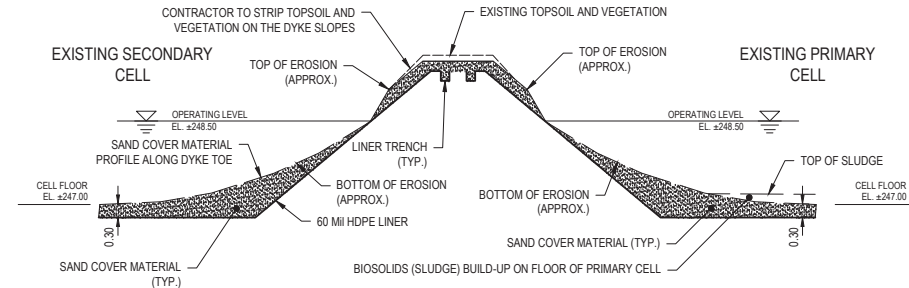
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3. DRAWING IS IN METRIC. WHOLE NUMBERS INDICATE MILLIMETRES, AND DECIMALIZED NUMBERS INDICATE METRES.
4. BENCHMARK - 250.237 TOP OF CONCRETE CURB ON TRUCK DUMP RAMP, ON SOUTHWEST CURB.

EXISTING	LEGEND-PLAN	PROPOSED
150 WM	WATER MAIN	
300 LDS	LAND DRAINAGE SEWER	
250 WWS	WASTE WATER SEWER	
250 FM	FORCEMAIN	
	EDGE OF ROAD / DYKE	
	DYKE TOE	
	APPROX. PROPERTY LINE	
	FENCE	
	TREE OR SHRUB LINE	
	FLOW DIRECTION	
	DITCH/SWALE	
59.367	GROUND ELEVATION	
00.00	ROAD ELEVATION	
00.00	DYKE ELEVATION	00.00
00.00	DITCH ELEVATION	
⚡	SIGN / SURVEY BAR	
⚡	TEST HOLE/TEST PIT	
⚡	GUY WIRE / HYDRO POLE	
⚡	CURB STOP / PLUG	
⚡	VALVE / HYDRANT	
○	MAN-HOLE / CLEANOUT	
	RIP RAP	

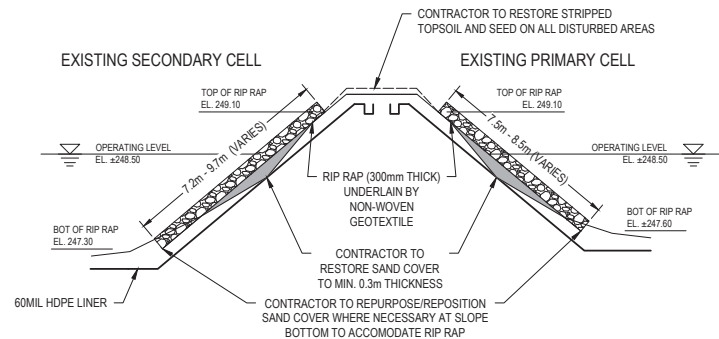
<p>TITLE:</p> <p>EXISTING SITE PLAN</p>	<p>PROJECT:</p> <p>BIRDS HILL PROVINCIAL PARK LAGOON DYKE REPAIR WINNIPEG, MANITOBA</p>	
	<p>DRAWING NUMBER:</p> <p>CL102</p>	<p>REV.</p> <p>0</p>



1  
-  
PROPOSED SITE PLAN  
SCALE: 1:500



1  
-  
TYPICAL EXISTING INTERCELL DYKE CROSS SECTION  
SCALE: NTS



2  
CL102  
-  
TYPICAL REPAIRED INTERCELL DYKE CROSS SECTION  
SCALE: NTS

KEY NOTES:

- LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.
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EXISTING	LEGEND-PLAN	PROPOSED
150 WM	WATER MAIN	
300 LDS	LAND DRAINAGE SEWER	
250 WWS	WASTE WATER SEWER	
250 FM	FORCEMAIN	
	EDGE OF ROAD / DYKE	
	DYKE TOE	
	APPROX. PROPERTY LINE	
	FENCE	
	TREE OR SHRUB LINE	
	FLOW DIRECTION	
	DITCH/SWALE	
59.367	GROUND ELEVATION	
(00.00)	ROAD ELEVATION	
(00.00)	DYKE ELEVATION	(00.00)
(00.00)	DITCH ELEVATION	
#	SIGN / SURVEY BAR	
•	TEST HOLE/TEST PIT	
⊙	GUY WIRE / HYDRO POLE	
⊕	CURB STOP / PLUG	
⊕	VALVE / HYDRANT	
○	MANHOLE / CLEANOUT	
	RIP RAP	

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REVISION:	REVISION:
0	2021/08/20
ISSUED FOR TENDER	D.T.G.B.
REV	DATE
DESCRIPTION	BY
REV	DATE
DESCRIPTION	BY

SEAL:

2021-08-20

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**ENGINEERS  
GEOSCIENTISTS  
MANITOBA**

Certificate of Authorization  
WSP Canada Inc.  
No. 5750

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ORIGINAL SCALE:  
AS SHOWN

DATE:  
2021/08/05

IF THIS BAR IS NOT  
25mm LONG, ADJUST  
YOUR PLOTTING SCALE.

25mm

APPROVED BY:  
D.T.G.B.

DISCIPLINE:  
INFRASTRUCTURE

**wsp**

WSP Canada Inc.  
1600 Buffalo Place, Winnipeg, Manitoba R3T 6B8  
T 204-477-6650 | www.wsp.com

PROJECT NUMBER: 211-06448-00

CLIENT:

**THE MANITOBA WATER  
SERVICES BOARD**

CLIENT REF. #: MWWSB# 1622

TITLE:

**PROPOSED SITE PLAN AND  
TYPICAL CROSS SECTIONS**

PROJECT:

**BIRDS HILL PROVINCIAL PARK  
LAGOON DYKE REPAIR  
WINNIPEG, MANITOBA**

DRAWING NUMBER:

**CL103**

REV:

**0**