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NOTICE OF ALTERATION REPORT
Decommissioning Plan for Cell 4 City of Brandon Wastewater Treatment Lagoons

Environment Act Licence No. 2991

May 2021

CITY OF BRANDON

DEVELOPMENT SERVICES DIVISION

Alexia Stangherlin, P.Eng.
Director of Utilities

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638 Princess Avenue – Brandon, MB – Canada – R7A 0P3

April 29, 2021

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

Dear Ms. Kohler,

Re: Notice of Alteration Request for *Environment Act* Licence No. 2991 – City of Brandon Proposed Decommissioning of Cell 4, City of Brandon Wastewater Treatment Lagoons

The City of Brandon (the City) is making an application under *The Environment Act* for an alteration to the City's wastewater treatment lagoon system which is located in Sections 21 and 22-10-18 WPM within the City and is operated per *Environment Act* Licence No. 2991 (the Licence), issued in 2012. The proposed alteration consists of the decommissioning Cell No. 4 of the wastewater lagoon system (Cell 4) from industrial use, in fulfillment of Section 37 of the Licence.

From 1981 to 2013, Cell 4 was dedicated for use by Wyeth Organics (acquired by Pfizer Inc. in 2009) for treatment of industrial wastewater from their facility which is located approximately 5 km west of Cell 4. The proposed approach for the decommissioning of Cell 4 includes dewatering, excavation of lagoon sediments, and placement of the lagoon sediments in a constructed, dedicated on-site containment cell within the northeastern portion of Cell 4's current footprint, for long term management. Once Cell 4 is decommissioned from its current use, the City anticipates using the remnant portion of the cell for wet weather wastewater capacity. The decommissioning of Cell 4 is not anticipated to result in adverse effects considering the City's proposed mitigation measures and is understood to be a "minor alteration" under *The Environment Act*.

Please find enclosed with this cover letter, a filled-out Notice of Alteration Form, 2 hard copies and 1 electronic copy (submitted by email to: eabdirector@gov.mb.ca) of the Notice of Alteration Report. A payment of the fee for the Minor Alteration application ($500) will be made electronically at submission of the application.

Should you have any questions regarding this Notice of Alteration application, please contact the undersigned, or Keith Sears, P.Eng. at AECOM Canada Ltd (email: keith.sears@aecom.com; phone: 204-477-5380), or Kevin Beechinor at Wood Environment & Infrastructure Solutions (email: kevin.beechinor@woodplc.com; phone: 204-488-2997) who are coordinating the Notice of Alteration submission on our behalf.

Sincerely,

[redacted]

Alexia Stangherlin, P.Eng.
Director of Utilities

Notice of Alteration Form

Manitoba Sustainable Development

Client File No. : 5510.00	Environment Act Licence No. : 2991

Legal name of the Licencee: City of Brandon

Name of the development: Wastewater Treatment Facility

Category and Type of development per Classes of Development Regulation:

Waste Treatment and Storage — Wastewater treatment lagoons

Licencee Contact Person: Alexia Stangherlin, P.Eng. Director of Utilities Development Services Division
Mailing address of the Licencee: 638 Princess Avenue
City: Brandon Province: Manioba Postal Code: R7A 0P3
Phone Number: (204) 729-2214 Fax: Email: a.stangherlin@brandon.ca

Name of proponent contact person for purposes of the environmental assessment (e.g. consultant):
Kevin Beechinor, Wood Canada Ltd., (204) 999-5587 & Keith Sears, AECOM, (204) 477-5380

Phone: Fax:	Mailing address:

Email address: kevin.beechinor@woodplc.com & keith.sears@aecom.com;

Short Description of Alteration *(max 90 characters):*
Decommisioning of Cell 4 of the Wastewater treatment lagoons from industrial use.

Alteration fee attached: Yes: ☐ No: ☑

If No, please explain: Payment to be made electronically.

Date:	Signature: [redacted] Printed name: Alexia Stangherlin

A complete Notice of Alteration **(NoA)** consists of the following components:

- ☑ **Cover letter**
- ☑ **Notice of Alteration Form**
- ☑ **2 hard copies and 1 electronic copy of the NoA detailed report** (see "Information Bulletin - Alteration to Developments with Environment Act Licences")
- ☑ **$500 Application fee, if applicable** (Cheque, payable to the Minister of Finance)

Submit the complete NoA to:

Director
Environmental Approvals Branch
Manitoba Sustainable Development
1007 Century Street
Winnipeg, Manitoba R3H 0W4

For more information:

Phone: (204) 945-8321
Fax: (204) 945-5229
http://www.gov.mb.ca/sd/eal

Note: Per Section 14(3) of the Environment Act, Major Notices of Alteration must be filed through submission of an Environment Act Proposal Form (see "Information Bulletin – Environment Act Proposal Report Guidelines")

Executive Summary

The City of Brandon (the City) is submitting this Notice of Alteration (NoA) report as part of their NoA application for the decommissioning of Cell 4 from industrial use. Cell 4 is part of the City's wastewater lagoon system which is located within Sections 21 and 22-10-18 WPM and is regulated per the City's *Environment Act* Licence No. 2991 (the Licence). The Licence was issued in 2012 for a Class 2 Development (the Development) which consists of the wastewater lagoon system, a wastewater collection system, a municipal wastewater pre-treatment facility located in NW 17-10-18WPM, and a centralized wastewater treatment facility located on part of Section 16-10-18 WPM. The decommissioning of Cell 4 is being planned in fulfillment of Section 37 of the Licence.

This NoA report presents a detailed decommissioning plan for Cell 4. The plan includes dewatering of the cell, excavation of lagoon sediments, and placement of the lagoon sediments in a constructed, dedicated on-site containment cell for long-term management. The onsite containment cell would be located within the northeastern portion of Cell 4's current footprint. Once Cell 4 is decommissioned from its current use, the City anticipates using the cell for wet weather wastewater capacity. The decommissioning of Cell 4 will not alter the Development's current Class 2 Development classification and the Licence will remain in place. Based on initial discussions with MCC, the Project is deemed to constitute a minor alteration of the Licence.

This NoA report has been prepared by Wood Environment & Infrastructure Solutions, a Division of Wood Canada Ltd. (Wood) on behalf of the City and Pfizer Inc. (Pfizer) in support of the City's proposed alteration to the Licence (i.e., decommissioning of Cell 4). The NoA application comprises of a cover letter, the completed NoA form, the application fee of $500, and this NoA report, in fulfilment of MCC's NoA submission requirements.

The Existing Development

The proposed alteration pertains only to the decommissioning of Cell 4, thus this summary of the existing development is focused on Cell 4 of the Development.

The wastewater treatment lagoons, including Cell 4, were constructed in 1964 and used to treat municipal sewage and wastewater generated by the City. From 1981 to 2013, Cell 4 was dedicated for use by Pfizer's Wyeth Organics for treatment of industrial wastewater from their facility located approximately 5 km away, at 720 – 17th Street East in Brandon. Upgrades to the treatment system by Wyeth Organics were completed in the mid 1990's and consisted of modifications to Cell 4 including the addition of two smaller cells (i.e., Cell 4A, Cell 4B), an unloading station and pump building as well as an aeration system to increase Cell 4's treatment capabilities and capacity.

The Wyeth Organics wastewater which was discharged into Cell 4 for treatment contained Spent Pregnant Mare's Urine (SPMU) and consisted of wash-water, and rinse-water mix, and was characterized as a high organic strength, nitrogen rich, highly saline, and alkaline waste. Additionally, equine hormones were commingled within the wastewater and, prior to 2010, the wastewater also contained a preservative compound which is referred to as Compound A in this report for confidentiality/proprietary reasons. SPMU discharge to Cell 4 ended in 2013 when the City's industrial wastewater treatment plant was

completed and the wastewater from Wyeth Organics was redirected to the new facility for disposal. Aeration systems installed in Cell 4 have been removed from the lagoon cell, including electrical feeds and control systems, and the electrical service to the Site has been disconnected.

Currently, there is no active management of Cell 4 apart from lagoon level maintenance.

Based on the characterization of the lagoon water and sediments in Cell 4 and Cell 4A, and soil in Cell 4B, Compound A concentrations in sediments within Cell 4 and Cell 4A and a nearby soil pile require management in order to reduce the potential future risk to ecological receptors.

Proposed Alteration - Decommissioning of Cell 4

The proposed decommissioning of Cell 4 and the management of the cell's lagoon water and sediment includes the following:

- Wastewater drawdown, treatment, and discharge through a discharge point associated with the Licence; and,
- Consolidation of lagoon sediment and soil from Cell 4 in an on-Site containment cell within the northeastern portion of the cell's footprint.

Upon completion of the proposed alteration, it is anticipated that the remnant portion of Cell 4 would be used as additional capacity for periods of excess wet weather flow and be a net benefit for the City's wastewater management.

Projects Effects and Mitigation

The proposed decommissioning of Cell 4 will yield net positive benefits. It will increase the City's wastewater management capacity during wet weather events and present sustainable long-term environmental risk management for the sediment excavated from Cell 4 through its storage in an engineered containment cell.

Potential adverse effects of the decommissioning of Cell 4 include the following:

- Road dust from moving vehicles and equipment as well as moving materials and earthworks around the Project Site during construction.
- Vehicle and equipment exhaust.
- Noise from equipment operation and material handling during construction.
- Odour from dewatered sediments.
- Reduced soil quality in the laydown, soil pile, and borrow site footprint areas due to potential for soil erosion, compaction and rutting in the laydown and soil pile areas, and removal of soil from the borrow site.
- Disruption to waterfowl usage of Cell 4.
- Effluent discharge into the Assiniboine River which is a habitat to fish and other aquatic organisms.
- Adverse surface water quality effects in the Assiniboine River due to the effluent discharges.
- Leaching of effluent from the restored Cell 4, or leachate generated from the Containment Cell.
- Generation of waste debris from demolished buildings and structures or non-repurposed materials.

The City commits to implementing mitigation and prevention measures to reduce the effects to the environment attributable to the decommissioning of Cell 4.

- To reduce the potential for vehicle and equipment emissions, dust generation, as well as emissions from the Containment Cell:
  - Construction activities will be limited to 07:00 to 19:00 from Monday to Friday.
  - All equipment will be maintained for good working order throughout project and free from any leaks (i.e., oil).
  - All equipment will be fitted with standard air emission control devices.
  - Unnecessary idling of vehicles and/or heavy machinery will be avoided.
  - Construction area speed limits will be posted and adherence to these speed limits encouraged
  - Topsoil stripped from the laydown/staging area will be stockpiled with appropriate erosion controls implemented.
  - Non-toxic dust control measures (e.g., spraying water, tackifier) will be implemented as required to prevent wind erosion and airborne dust.
  - Excavation activities will be avoided during extremely windy periods and during extreme wet weather events.
  - Re-vegetation of affected project development area (PDA) footprints will be implemented as soon as possible following construction.
  - To prevent gas vapour build up, gas vents were designed as part of the containment cell to allow for gas vapour release.
- To reduce the potential for adverse effects to soil quality:
  - Vehicles/machinery will use designated access roads/trails to avoid unnecessary compaction.
  - For the laydown/staging area, the footprint of disturbed/exposed areas will be kept to a minimum with site restoration occurring as soon as practical.
  - The topsoil stripped from the staging area will be stored in a stockpile for use in restoration. The topsoil stockpile will be stabilized and adequately protected from erosion (e.g., use of tackifiers, matting, cover crops). Appropriate erosion and sediment control measures will be implemented and maintained until spreading of topsoil is complete, post-construction.
  - The contractor will be responsible for the repair of any areas where equipment has compacted or impacted soils and/or other site areas, including grading and site restoration.
  - Traffic will be limited as much as possible during smoothing and levelling of soils to prevent further compaction. Smoothing and levelling shall be avoided if soils are near saturation.
  - Areas with vehicle ruts shall be de-compacted and regraded.
  - The affected PDA footprints would be leveled and graded for compatibility with the surrounding landscape and natural drainage.
- To reduce the potential for adverse impacts to wildlife, aquatic life, and surface water quality:
  - Cell 4 dewatering will be scheduled in accordance with the terms outlined in the existing MCC requirements.
  - During the decommissioning of Cell 4, the availability of other adjacent lagoon cells will continue

for use by the waterfowl as the project works will be Cell 4 centric.

- On-site treatment of effluent prior to discharge will reduce the potential for adverse impacts to water quality in the receiving Assiniboine River.
- A testing and monitoring program will be in place to ensure effluent will not be discharged into the Assiniboine River unless its quality satisfies MCC requirements as outlined in the current Licence for the facility prior to release.

- To reduce the potential for adverse impacts to groundwater quality:
  - The Cell 4 liner will be restored with a restored compacted clay liner following excavation of sediment for placement in containment cell. The restored lagoon liner will be compliant with MCC requirements.
  - Capping and a composite liner have been designed for the containment cell to minimize leachate generation within and its migration from the containment cell with a dedicated leachate collection system to allow redirection of any generated leachate. prevent leachate migration into the groundwater.
  - Groundwater quality will be monitored through installation of a groundwater monitoring well network.
- To reduce the potential for waste generation:
  - Materials will be salvaged for reuse where possible and kept separate from refuse.
  - All refuse and debris from demolition will be hauled off site to a licensed and operational landfill and disposed of according to Manitoba Regulations.
  - On site burning of materials shall be prohibited.
  - The guidelines in the Manitoba Guideline for Construction and Demolition Waste Management (Guideline 2002-01E) will be followed and other best practice or regulatory guidance and requirements will be consulted.

Based on the desktop studies undertaken, site observations and information available to date as presented in this NoA Report, the decommissioning of Cell 4 is not expected to create significant adverse effects to the environment due to the proposed engineered-design and other mitigation.

Accidents and Malfunctions

Given the proposed alteration, the potential for accidents and malfunctions would largely be associated with the construction phase of the Project, and related to failure of mechanical systems, fuel releases, chemical spills, and transportation accidents. Contractors will adhere to a Project-specific health and safety plan developed as appropriate and Project site employees will be kept aware of safety requirements and on-site construction works to ensure worker safety. Access to the Project Site will also be limited to relevant City personnel and contractors.

To mitigate the potential adverse effects of spills and leaks during construction, the contractor and the City will:

- Keep all equipment in good working order, is free of fluid leaks, and is well maintained.
- Equip storage containers for hazardous goods with secondary containment.
- Develop a Project and site-specific emergency response plan, including spill response procedures,

and emergency response measures for spill clean-up and remediation.
- Keep emergency spill kits on-site and train operators properly on their use so that any spills can be contained and cleaned up.
- Report relevant spills and leaks to the MCC Emergency Response Team at 204-944-4888.
- Comply with all permit conditions issued by MCC or other authority.
- Store water treatment chemicals and equipment in Cell 4B for containment in case of leaks or spills.
- Environmental monitoring by a wildlife biologist will be implemented during the Project to assist with protection measures should waterfowl or other wildlife be affected during the Project.

During the operational phase, accidents and malfunctions will pertain to the potential failure of the Containment Cell as well as maintenance-related activities. To mitigate operational-phase related malfunctions that could cause effluent leaching and adversely affect groundwater quality:

- A management plan for long term management and monitoring of the Containment Cell.
- Regular maintenance and repair of the Containment Cell cover and leachate collection system during the operational phase, as appropriate, will be implemented.
- Monitoring wells will be installed around the perimeter of the Containment Cell and a groundwater monitoring program will be implemented over the operational phase of the Project.

Project Assessment Summary

In summary, based on the proposed Project design features and with the application of the proposed mitigation measures and monitoring plans outlined in this NoA, adverse residual environmental impacts resulting from the Project are expected to be sufficiently mitigated.

Table of Contents

List of Figures

List of Tables

List of Appendicies

Appendix A

Photos

Appendix B

Lagoon Characteristics Summary

Appendix C

Limitations

1.0 Introduction

This Notice of Alteration (NoA) report has been prepared by Wood Environment & Infrastructure Solutions, a Division of Wood Canada Ltd. (Wood) on behalf of the City of Brandon (City) and Pfizer Inc. (Pfizer), in support of a NoA application for the City's *Environment Act* Licence No. 2991 (the Licence). This NoA was compiled per guidance outlined in Manitoba Conservation and Climate (MCC)'s Information Bulletin – Alterations to Developments with Environment Act Licences and Information Bulletin – Environment Act Proposal Report Guidelines.

1.1 Project Overview

In addition to a city wastewater collection system and a municipal wastewater pre-treatment facility located in NW 17-10-18WPM, the City operates a centralized wastewater treatment facility located on part of Section 16-10-18 WPM, and a wastewater treatment lagoon system located within Sections 21 and 22-10-18 WPM (see Figure 1). These components collectively constitute the Development outlined in the Licence.

The wastewater treatment lagoon system consists of 10 individual cells (see Figure 2). From 1981 to 2013 Cell 4 (as well as Cell 4A and 4B) was dedicated to managing wastewater containing Spent Pregnant Mare's Urine (SPMU) generated at the Wyeth Organics facility in Brandon, Manitoba. Pfizer Inc. (Pfizer) acquired Wyeth in 2009. The remaining seven cells in the wastewater lagoon system (i.e., Cells 1, 2, 3, 3A, 3B, 3C and 5) are utilized by the City for the City's wastewater treatment system.

The City is proposing to decommission Cell 4 of the wastewater lagoon system from industrial use, in fulfillment of Section 37 of the Licence. A decommissioning plan for Cell 4 previously developed by Golder Associates in 2014 (Decommission Plan, City of Brandon Wastewater Treatment Lagoon Cell 4) included a generalized approach for decommissioning Cell 4. Through this NoA, a detailed decommissioning plan for Cell 4 is presented, which includes dewatering, excavation of lagoon sediments, and placement of the lagoon sediments in a constructed, dedicated on-site containment cell within the northeastern portion of Cell 4's current footprint, for long term management. Once Cell 4 is decommissioned from its current use, the City anticipates using the cell for wet weather wastewater capacity.

Accompanying this NoA report are a cover letter, completed NoA form, and application fee of $500 in fulfilment of MCC's NoA submission requirements.

1.2 The Proponent

Name of the Project	Decommissioning of Wastewater Treatment Lagoon Cell 4
Name of Proponent	**City of Brandon**
Proponent Contact Person	**Alexia Stangherlin, P.Eng.** Director of Utilities Development Services Division City of Brandon 638 Princess Ave., Brandon, MB R7A 0P3 Email: a.stangherlin@brandon.ca
Principal Contact Person(s) for this Notice of Alteration	**Keith Sears, P.Eng. PhD** AECOM Canada Ltd. 99 Commerce Drive, Winnipeg, MB R3P 0Y7 Email: keith.sears@aecom.com **Kevin Beechinor, B.Sc.** Wood Environment and Infrastructure Solutions 440 Dovercourt Drive, Winnipeg, Manitoba, CA. R3Y 1N4 Office: +1 (204) 488-2997 Email: kevin.beechinor@woodplc.com

1.3 Land Ownership and Property Rights

The licenced development, including Cell 4, is located on City-owned land in Sections 21 and 22-10-18 WPM, and the proposed alteration will be wholly contained within property owned by the City.

1.4 Purpose of the Project

Since the completion of the City's Water Reclamation Facility (WRF) in 2013, wastewater generated at the Wyeth Organics facility has been directed to the new treatment plant and no longer requires the use of Cell 4. The purpose of the Project is to decommission Cell 4 from industrial wastewater use and enable future use of this cell by the City for additional wet weather management.

1.5 Regulatory Framework

The City currently operates Cell 4 as part of the larger Development described in the Licence. Section 37 of the Licence, outlines that the City of Brandon (the City) shall:

a) Prepare an engineering report detailing the decommissioning of the aerators and associated infrastructure of Cell 4 of the wastewater lagoon system; and

b) Submit the engineering report to the Director for approval within six months upon commissioning of the Development.

In pursuit of fulfilling the above, a Decommissioning Plan compiled by Golder Associates for Pfizer, Inc. and entitled "Decommissioning Plan, City of Brandon Wastewater Treatment Lagoon – Cell 4" which was dated June 2014 and outlined a generalized approach for the decommissioning of Cell 4, was submitted to Manitoba Conservation and Climate (MCC) (previously Manitoba Conservation and Water Stewardship).

The decommissioning plan presented in this report is an updated and more detailed version of the 2014 decommissioning plan and was presented to MCC during a teleconference call on the 2nd of September 2020.

Based on initial discussions with MCC, the Project is understood to constitute a minor alteration of the Licence.

1.6 Previous Alterations

Following the Licence's issuance by MCC in 2012, it has not undergone any alterations. However, a NoA application was filed with MCC in October 2018 by AECOM Canada Ltd. on behalf of the City. The NoA was for the aeration upgrade project at the municipal wastewater pre-treatment facility, to upgrade and replace aeration system components that had reached the end of their service life. This minor alteration was approved by MCC in December 2018 and did not result in a revision of the Licence. There have been no alterations related to Cell 4 of the Development.

1.7 Funding

While the City owns Cell 4, per an agreement with the City and from 1981 to 2013, this cell was utilized by Wyeth Organics (acquired by Pfizer in 2009) for their industrial wastewater treatment. As such, Wyeth Organics will be funding the decommissioning of Cell 4.

2.0 The Existing Development

The Project pertains to the decommissioning of wastewater treatment lagoon system Cell 4; therefore, this section is focused only on Cell 4 of the Development rather than the whole licenced Development.

The wastewater treatment lagoons were constructed in 1964 and used to treat municipal sewage and wastewater generated by the City. From 1981 to 2013, Cell 4 was dedicated for use by Wyeth Organics for treatment of industrial wastewater from their facility, located at 720- 17th Street East in Brandon Manitoba, approximately 5 km west of the wastewater lagoons (see Figure 1). Upgrades to the treatment system by Wyeth Organics were completed in the mid 1990's and included modifications of Cell 4 with the addition of two smaller additional cells (i.e., Cell 4A, Cell 4B), the unloading station and pump building as well as an aeration system to increase treatment capabilities and capacity of Cell 4 (see Figure 2).

The wastewater from Wyeth Organics which was discharged into Cell 4 for treatment contained SPMU) and was made up of process wastewater, that is, wash and rinse-water mixture. The SPMU was characterized as a high organic strength, nitrogen rich, high saline, and alkaline waste. The wastewater also contained equine hormones, and, prior to 2010, included a preservative compound which is referred to in this report as Compound A for confidentiality/proprietary reasons. Compound A is hydrophobic and has a high propensity to adhere to solids and is characterized as recalcitrant to degradation in the environment (US EPA 1999, Golder 2014). SPMU discharge to Cell 4 ended in 2013 when the City's Water Reclamation Facility was completed and the wastewater from Wyeth Organics was redirected to the new facility for disposal. Aeration systems installed in Cell 4 have been removed from the lagoon cell, including electrical feeds and control systems, and the electrical service to the Site has been disconnected.

Wastewater from Cell 3 has periodically been added to Cell 4 as part of the City's management of the lagoon system to maintain lagoon levels; however, the active industrial wastewater management of Cell 4 has ceased. Appendix A shows photographs of Cell 4 and the immediate area around the cell.

2.1 Current Lagoon System Operations and Maintenance

The wastewater lagoon cells are monitored and maintained by the City. Following a wet weather event and when capacity has been reached at the Pre-Treatment Facility, Cell 3 receives flow directly from this facility. Depending on the magnitude of weather events, this may happen several times each year. Wet weather flow is balanced via transfers from Cell 3 to either Cell 4 or Cell 5, to maintain water levels and to ensure structural stability of the lagoon banks.

The lagoon sludge cells (i.e., Cells 1, 2, 3A, 3B and 3C) receive flow daily from the WRF. Supernatant from the sludge cells is pumped back daily to the WRF for further treatment.

Discharge from Cell 5 has been limited since 2011. The last time Cell 5 discharged to the Assiniboine River was during a Local State of Emergency, due to overland flooding, in June and July of 2014. During this period, discharge from the lagoons into the Assiniboine River was required due to water storage capacity levels being reached.

2.2 Current Cell 4 Components

Based on current information, Cell 4 infrastructure presently includes the following facilities which will be decommissioned as part of the Project and are shown on Figure 2.

Cell 4 (main cell) –A lagoon cell approximately 319,000 square meters (m^2) in area. It is connected to Cell 4A, as well as Cell 3 and Cell 5 through controlled inlet/outlet structures. An aeration system consisting of aerators and electrical infrastructure was formerly present within the main cell but was previously removed in approximately 2014.

Cell 4A (clarification cell) - Cell 4A was a part of the Cell 4 upgrades that were implemented by Wyeth Organics in the mid-1990s. Cell 4A design drawings indicate the capacity was approximately 22,000 m^3, with a design depth approximately 2.5 m deeper than the main cell. Cell 4A infrastructure includes the transfer chamber to Cell 5, a transfer chamber to Cell 4, as well as sludge piping inset into the bottom of the lagoon.

Cell 4B – Cell 4B was constructed for storage of SPMU prior to treatment. However, it was reportedly never used. Cell 4B has an approximate capacity of 13,600 m^3 and is currently a dry, grass covered cell.

Control Building – A control building is located southwest of Cell 4. The building was constructed in approximately 1993 as a part of the Wyeth Organics upgrades. The building consists of a two-level SPMU unloading station on the west side of the building, as well as a workshop, pumps, piping, and tankage associated with pumping and management of the unloaded SPMU and the management of the lagoon. A small transformer yard is located adjacent to the east side of the building.

Related Infrastructure - Other Cell 4 related infrastructure includes 33 kV power-feed to the Cell 4 lagoon control building and north electrical building on the north side of the lagoon area. As well, electrical lines are buried to electrical substations around the lagoon that are associated with the former aerator system.

Soil Pile - A soil pile located northwest of Cell 4 (the Soil Pile) contains approximately 2,000 m^3 of soil which was formerly lagoon sediment which was excavated from Cell 4 during the 1990's upgrades. Analytical results for soil samples collected from the pile in 2011 indicated elevated Compound A concentrations (relative to background). As a result, the sediment from this soil pile will be handled in the

same manner as the sediment material in Cell 4.

2.3 Summary of Findings from Cell 4 Environmental Investigations

The use of the Cell 4 Lagoon for the treatment of SPMU has resulted in the accumulation of sediment within Cell 4 and Cell 4A. Based on the characterization of the lagoon water and sediments in Cell 4 and Cell 4A, and soil in Cell 4B conducted in 2011 and 2012, as well as the screening level risk assessment conducted as a part of investigations conducted in 2012, Compound A concentrations in sediments within Cell 4 and Cell 4A and soil from the Soil Pile could pose a potential future risk to ecological receptors. Updated quantity estimates derived from using 50% probability and 15% contingency factors were assumed per basis of design work that was conducted in 2016:

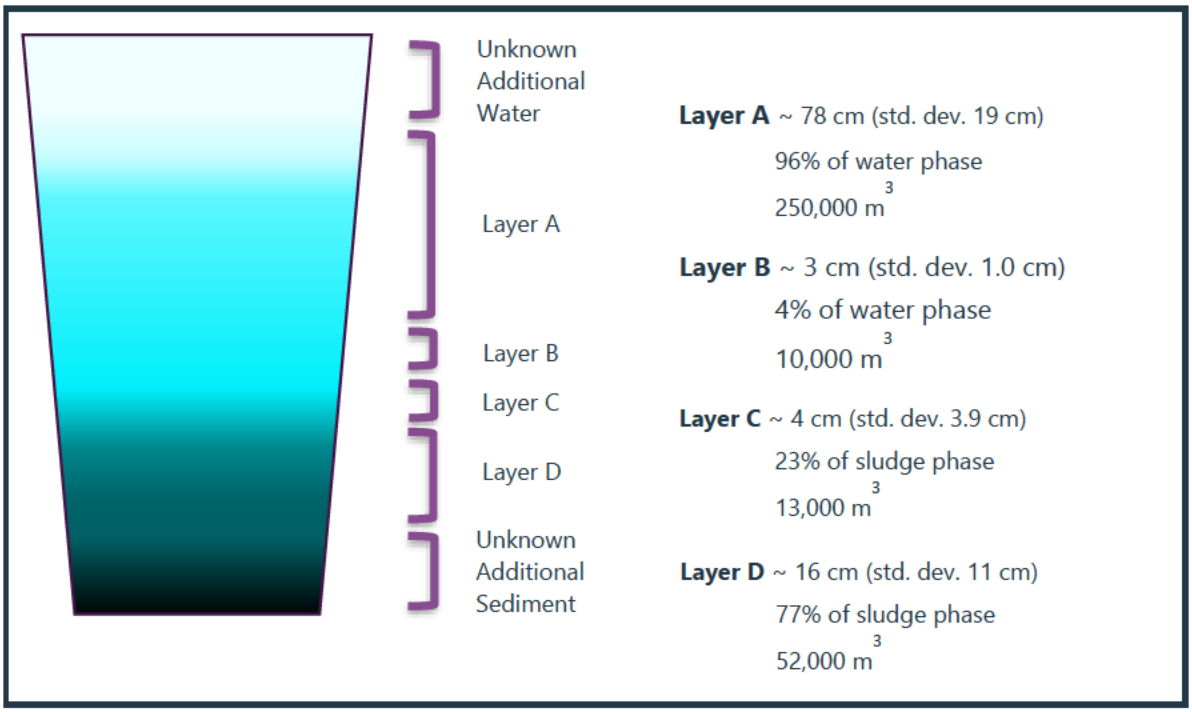
- The impacted media requiring management includes approximately 111,500 m^3 of material which consists of lagoon sediment, soils, riprap and rock, sludge from water treatment, and soil from construction related berms and dykes.
- The distribution of Compound A concentrations that exceeded sediment screening levels (58 mg/kg) were primarily associated with the active layer and upper base layer.
- Compound A concentrations above the soil screening level (0.199 mg/kg) have been identified in samples collected from the Soil Pile.
- Historical analytical results for lagoon water samples collected from Cell 4 have shown a substantial decline in Compound A over time, with Compound A concentrations largely undetected in the dissolved phase from sampling events in 2011, 2012 and 2016. Compound A is known to be hydrophobic in nature and has a high propensity to bind to solids.
- Decommissioning options were reviewed in 2014 with the general preferred concept included for dewatering of Cell 4, excavation of lagoon sediments from Cell 4, and placement of the lagoon sediments in a constructed, dedicated on-site containment cell for long term management.

With design concept outlined in the 2014 Decommissioning Plan, additional basis-of-design investigations were conducted in 2016 by Wood (then as Amec Foster Wheeler) to characterize and further refine the concept. Investigations included the following activities:

- **Geotechnical Drilling and Analysis** was conducted with the purpose of understanding the soil and groundwater conditions along the perimeter of Cell 4 dykes to assess the conditions as they pertain to slope stability and groundwater seepage. A test hole drilling program was conducted with the purpose of assessing the suitability of soils that could be used for restoration of the Cell 4 clay liner and clay materials used for the construction of the containment area. Geotechnical drilling was also conducted within a potential borrow location within 5 km of the Site to facilitate testing and sampling of the soils in the proposed borrow area.
- **Cell 4 Water and Sediment Analysis** was conducted in August 2016 and was comprised of lagoon water and sediment sampling from Cell 4, including treatability assessments. For the sampling and treatability studies, Cell 4 was divided into four layers with each layer sampled at twelve locations, and one additional sample collected for sediment only from the SPMU discharge area. The four layers are described as follows and shown in Figure 2-1:
  - Layer A (Upper Water Layer) – Low solids water layer
  - Layer B (Lower Water Layer) – High solids water layer
  - Layer C (Upper Sediment Layer) – High water/moisture sediment layer
  - Layer D (Lower Sediment Layer) – Low water/moisture sediment layer

- **Treatability Studies** were conducted in the field and at Wood's Cambridge lab and considered a range of common treatment methods for both water treatment and sediment dewatering. Dewatering options were considered for sediment layers that could be pumped, while solidification and drying focussed on the sediment layers which could not be pumped.
- **Treatment Options Comparison** was conducted to consider the best options for decommissioning and consider the combination of water treatment; sludge processing and management; and the sediment dewatering and handling requirements.

Figure 2-1: Average Cell 4 Profile (2016 Data)



A summary of the 2016 chemical characteristics is provided in Section 3.0 and in Appendix B.

3.0 Proposed Alteration – Decommissioning of Cell 4

3.1 Key Considerations

In planning for the decommissioning of Cell 4, the following aspects are deemed key for consideration:

1. Liquid discharge criteria.
2. Changing water conditions.
3. Sludge dewatering and handling.
4. Sediment variability and impacts on dewatering/handling; and
5. Restoration of Cell 4.

It is assumed that the liquid discharged from Cell 4 (and its treatment processes) would be transported via Manhole 12 of Cell 5 to the Assiniboine River discharge point and would need to meet the discharge criteria for discharging into the Assiniboine River. The Cell 5 discharge criteria are listed below:

Table 3-1: Discharge Criteria

Parameter	Cell 5 Discharge Criteria
Total Suspended Solids	<25 mg/L
Ammonia, Total (as N)	<3 mg/L
Total Kjeldahl Nitrogen	<15 mg/L
Phosphorus, Total	<1 mg/L
Biological Oxygen Demand	<25 mg/L
Fecal Coliform	< 200 count/ 100 ml
Total Coliform	< 1,500 count/ 100 ml
Compound A	No criteria or limit

3.2 Proposed Cell 4 Decommissioning Approach

The proposed approach for the decommissioning of Cell 4 and management of the cell's impacted media involves wastewater drawdown, treatment, and discharge through the discharge point associated with the Licence and the consolidation of lagoon sediment from Cell 4 and soil from the Soil Pile in an on-Site containment cell located in the northeastern portion of Cell 4's current footprint. Once Cell 4 is decommissioned from its current use, the City anticipates using the remainder of Cell 4 for excess wet weather wastewater capacity as outlined in the Licence.

3.2.1 Cell 4 Dewatering, Treatment and Discharge

3.2.1.1 Cell 4 Dewatering and Effluent Treatment

Cell 4 dewatering will involve the drawdown of water (Layers A and B) in the cell by flowing the lagoon water through a temporary water treatment system and discharging the treated effluent to the Assiniboine River through the discharge point associated with the Licence.

Based on the wastewater characterization conducted during the 2016 basis of design investigations, the proposed water treatment option involves lime precipitation, with lime added and mixed in the inlet to Cell 4A. The lime would react, precipitate, and form a thickened sludge that would be stored in Cell 4A. The remaining effluent water would have its pH adjusted and a coagulant added before filtration. Following pH adjustment and coagulant addition, the water would be passed through a zeolite ion exchange filter. Layer C and Layer D (see Figure 2-1) would then be mixed and dried in Cell 4.

- Using pumps and piping, lagoon water would be collected from Cell 4, while minimizing additional scouring of bottom solids. Solids will be monitored to minimize entrainment of solids and potentially elevated levels of non-absorbable soluble Total Kjeldahl Nitrogen (TKN).

- Adding lime to the inlet of Cell 4A will allow the lime to sweep and flocculate the solids from the water column at the same time as it generates and co-precipitates calcium-phosphorus salts. This process would also generate calcium carbonate precipitates. The lime treatment and flocculation will result in the water being lime-softened and may bind and remove any potential soluble Compound A. The existing Cell 4A inlet structure will be used to manage and control lime feeding and precipitation process.
- Treated water leaving Cell 4A, would be relatively free of solids but may have a fine cloudy stable suspension due to lime softening. Some calcium carbonate species can form a stable supersaturated solution. If this becomes problematic one mitigation option would be to install a sludge recycling step to help seed the precipitation reaction at the inlet to Cell 4A.
- Regardless of whether sludge is recycled it will still be necessary to adjust the pH of the effluent from Cell 4A and add a coagulant upstream of a polishing filter. The polishing filter would be necessary to remove trace solids, specifically the phosphorus within those solids. Preliminary tests conducted by Wood's testing indicated that even if the Cell 4A is compliant with the total dissolved solids (TSS) discharge criteria, it may not be compliant with the total phosphorus (TP) discharge criteria. Therefore, the primary purpose of the filtration step is to achieve TP compliance.
- Passing of the effluent through a zeolite filter help remove soluble TKN. Tests on the lagoon water have indicated that the concentration of such soluble TKN could be around 20 mg/L, and that between 9 mg/L and 12 mg/L of this TKN may not be absorbable.
- Monitoring and minimization of entrained sediment will be conducted during the final stages of the lagoon water removal process to avoid the need for additional treatment of materials high in soluble TKN (and other constituents). The TKN appears to have a high fraction that cannot be removed via chemical precipitation or ion exchange. If this material is scoured during the lagoon dewatering process it will likely be necessary to use oxidation to remove these recalcitrant forms of TKN and get it down to the discharge concentration.
- Layer C will be handled by mixing/cultivating it into Layer D and allowing these combined layers to naturally dry in the bottom of Cell 4. If wet conditions persist in certain areas, it may be necessary to supplement the natural drying process by adding solidification agents. Portland cement and lime were tested and would be an option for additional solidification.

The sludge generated in Cell 4A during the treatment process will be quite dense and will thicken naturally as it rests and compresses in the bottom of Cell 4A. It is anticipated that the expected volume of precipitates to be generated by treating water Layers A and B can be stored in the bottom half to two thirds of Cell 4A. At the end of the water treatment cycle, water in Cell 4A would be decanted off, the sludge can be allowed to dry for a few days, and finally the sludge can be excavated and disposed of in the containment cell. If needed, this material can also be removed and blended with the sediment to help dry and solidify any wet pockets in Cell 4.

A basic block flow diagram for the process is shown in Figure 3-1.

3.2.1.2 Discharge of Treated Water to Assiniboine River

Treated effluent will be directed per Appendix C of the Licence and discharged into the Assiniboine River through the final discharge point of the wastewater treatment lagoon system, i.e., manhole MH 12 of Cell 5.

Treated effluent discharges will be monitored for compliance with Clauses 46 to 49 of the Licence. Final discharge flow rates and schedule are yet to be determined. The fully developed water treatment plan will be provided upon completion of updated chemical and volume characterization of lagoon water.

3.2.2 Lagoon Sediment Consolidation and Containment

Upon completion of drawdown of the Cell 4 water, the remaining sediment layers will be allowed to dry as much as practical, with supplemental mixing using traditional mechanical excavation equipment to facilitate additional drying of the sediments. This includes the use of cultivators to work the wetter solids in with the drier solids and to turn over the material to maximize the drying. Where wet pockets persist, it may be necessary to add solidification amendments (e.g., lime sludge from the water treatment process, hydrated lime, or Portland cement) to the sediment using a broadcasting spreader, backhoe or pay loader. Amendment rates will be prescribed based on conditions.

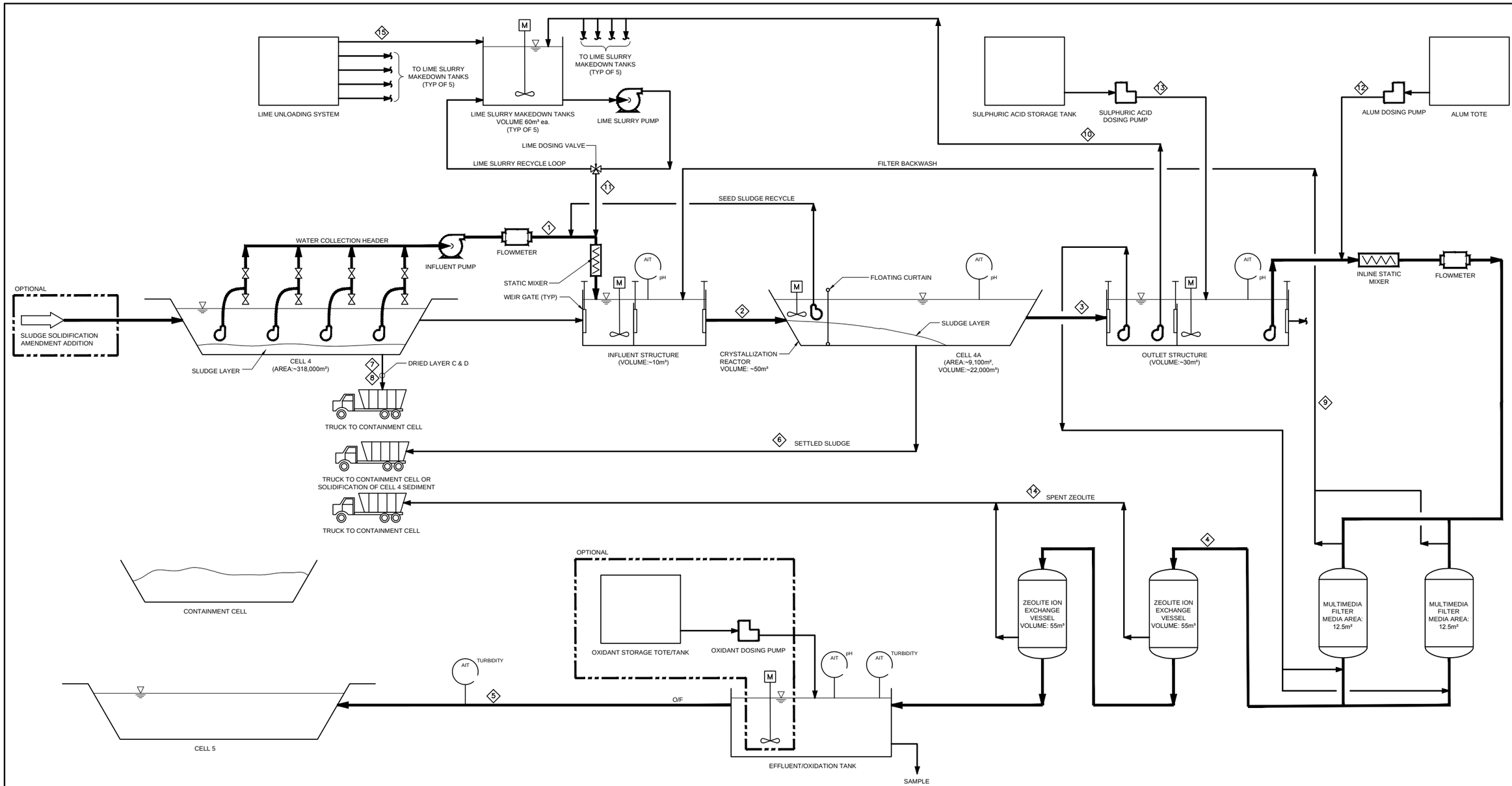
Segmenting the bottom of the lagoon into sections via drainage ditches and sumps will also accommodate segregating and managing different sections of sediment in the lagoon in different ways at different points in time. It may be practical to mound or pile sediment in some sections that dry out more quickly. Mounding and piling the sediment will free up sections of the lagoon bottom for other construction activities (e.g., berm installation, containment cell installation, lagoon berm repair, and lagoon liner repair).

To minimize the contact and erosion effects of precipitation, sediment will be moved, piled, and wind rowed to allow for drainage ditches and sumps at various logical low points in the cell. Traditional construction silt fences, straw bales, and other typical practices will be used to try and prevent the sediment accumulated and piled from getting into the stormwater collection areas. The stormwater will be managed through collection within low areas and get pumped to Cell 4A for testing and batch treatment, if necessary.

A combination of excavators, dozers, and loaders would be used to collect the dried lagoon sediment and load it into haul trucks. It is estimated that there may be 73,400 m^3 of lagoon sediment in the bottom of Cell 4 that will need to be moved from the bulk area of Cell 4 to the new containment cell.

3.2.2.1 Post excavation Sampling

Post excavation confirmatory sampling will be done using a uniform-grid sampling approach with samples collected from the cell bottom for analysis of Compound A. Results of Compound A concentrations in samples will be evaluated against an average concentration of 58 mg/kg which corresponds to the Ecological Risk-Based Screening Level developed for the lagoon sediment.



NOTES:

1. CHEMICAL DOSES ARE pH SET POINTS TO BE VERIFIED DURING PILOT TESTING.
2. FLOW RATES BASED ON A 60 DAY TREATMENT PERIOD.
3. VOLUMES BASED ON AUGUST 2016 SITE INVESTIGATION. LOWER SLUDGE LAYERS AND WATER ADDED TO CELL 4 AFTER AUGUST 2016 ARE NOT INCLUDED.

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No	Date	Drawn	Appr'd	Revisions
1	–	C.F.	K.F.	–

APPROVALS

Municipal	Regional
Engineer	Engineer
Date	Date

Design	K.F.	Checked	–	
Drawn	C.F.	Checked	–	
Scale	N.T.S.			
Date				

WATER & SEDIMENT TREATMENT

PFIZER

TREATMENT SYSTEM PROCESS FLOW DIAGRAM OVERALL

wood.

Drawing No. P100
Consultant File No. WX17989
Drawing No. - SHEET - OF -

3.2.3 Containment Cell Design and Construction

3.2.3.1 Containment Cell Features

The Containment Cell which will permanently store the sediments removed from Cell 4 is to be constructed in the northeast portion of Cell 4. The Containment Cell will be configured by constructing a dyke extending across Cell 4 from about the centre of the east dyke to about the centre of the north dyke (see Figures 3 through 5).

The size of the Containment Cell is dependent on the volume of material to be deposited within the cell. In general, the sediment layers are the largest proportion of the total volume to be stored in the containment cell. Materials planned to be placed in the cell include the following:

- Cell 4 sediment (partially dried and/or blended – estimated 73,400 m^3);
- Impacted clay liner from Cell 4;
- Impacted soil material from Cell 4B;
- Soil Pile material from Cell 4A&B construction;
- Sludge or wastes from any treatment processes for water or sediment (including spent zeolite);
- Impacted riprap and rock materials that cannot be cleaned; and
- Impacted materials from any temporary coffer dams, sectioning, or slope reinforcement.

Based on a 50% probability volume calculation and application of a 15% contingency (to counter the risk of containment cell under sizing), the source materials that will be placed in the Containment Cell are estimated to total 111,500 m^3.

3.2.3.2 Geotechnical Design (Berms and Fill)

Prior to construction of the Containment Cell, the existing dykes between Cell 3 and Cell 4 as well as the north dyke of Cell 4 will undergo inspection and potential re-enforcement to stabilize and shape the slopes in these areas for the use as a part of the containment structure. Additionally, the remainder of the area for the cell containment and new dyke construction should be inspected and investigated for re-affirming the location and design are appropriate for the conditions.

Given the current grades, the new dyke is to be approximately 3.2 m high on the east and about 2.4 m high on the north. The new dyke is to have a 3 m wide crest to accommodate construction and maintenance equipment and slopes with a 4H:1V configuration consistent with slopes of the existing dykes. Engineered cover material (i.e., cap) will be constructed over the Containment Cell once all the material has been placed. The cap will minimize infiltration of precipitation into the sediment that will prevent the material from becoming saturated.

3.2.3.3 Containment Cell Liner Components

The conceptual liner design proposed by Golder in the Cell 4 Decommissioning Plan (2014) consisted of two single liners separated by a leak detection layer (typically referred all together as a double liner system). While this configuration provides adequate containment for this type of facility, Wood is of the technical opinion that a composite liner will provide equivalent or superior containment and likely be more cost effective.

Therefore, the lining system of the containment cell is proposed to consist of the following:

- A 1.5 mm (60 mil) thick, double-sided textured High-Density Polyethylene (HDPE) geomembrane

installed directly over and in intimate contact with a natural clay or Geosynthetic Clay Liner (GCL).

The lining materials will meet current industry standards for manufacturing. Leachate compatibility testing would be completed as part of detailed design to confirm suitability of HDPE and GCL as a barrier system. A Quality Assurance/ Quality Control (QA/QC) program will also be developed that will include the following elements:

- Conformance testing of the geosynthetic materials to confirm that the manufactured materials meet or exceed industry standards and project specifications.
- Specifications for material installation including roll identification inventory, conditions for material installation, weld seaming procedures, weld testing procedures.
- Specifications for laboratory testing to verify field parameters.
- Full time construction quality assurance by the Owner's Engineer during geomembrane and GCL installation and covering.
- Requirements for documenting all quality control procedures to be included in a construction completion report.
- Electronic leak location surveys before and after covering the geomembrane.

3.2.3.4 Containment Cell Cover Components

Once the sediments have been placed within the containment cell, they will be graded to slope from a high point in the middle of the containment cell out to the perimeter. A minimum slope of 5% will be used for the grading of the materials. This slope will promote surface water run-off from the top of the cap towards the perimeter with the intent to prevent it from infiltrating into the sediment in the cell and becoming leachate. Slopes steeper than 5% will be considered, if it can be confirmed that the sediments have the geotechnical strength to be placed at higher slopes and remain stable for the long term. Increasing the slope on the top of the sediment will allow for reducing the overall footprint of the Containment Cell while still providing the required volume.

A final cap will be placed over the graded sediment that will include a non-woven geotextile as a cushion and gas venting/transmission layer, a 1.0 mm (40 mil) thick double sided textured Linear Low-Density Polyethylene (LLDPE) geomembrane to prevent ingress of surface water, a sand drainage layer to drain water from above the geomembrane to prevent instability and a topsoil layer to be seeded with suitable grasses. The grass will contribute to prevent run-off water going through the cap by taking up moisture through evapotranspiration. The grass will also prevent erosion of the topsoil and sand drainage layers. Gas vent risers will extend through the cap at select high points to prevent potential uplift on the cover due to gas pressures.

3.2.3.5 Leachate Collection

The base of the Containment Cell with be graded to slope to a low point or points to direct liquid to flow, by gravity to a collection point. The Containment Cell will include a leachate collection system above the composite liner.

The leachate collection system will consist of a layer of sand, at least 150 mm thick, to act as a cushion layer. Over the sand cushion material, a layer of free draining rock overlain by geotextile will be installed as the primary leachate collection layer. Within the drain rock, there will be a network of at least 150 mm diameter-perforated HDPE pipes to assist in the collection and control of leachate. The pipes will direct liquid to the sump at the low point. A sump will be constructed at the low points to allow leachate to

collect and act as a reservoir. A non-perforated pipe will be installed on the side slope running from the sump to the top of the berm. This will provide access for pumping the leachate from the sump. The leachate will be collected, analysed and disposed of according to provincial requirements.

3.2.3.6 Gas Collection

Due to the nature of the sediments and other materials that will be placed in the Containment Cell, it is deemed that there will be limited organics in the material that could degrade and create gas. Thus, it is not considered that a Landfill Gas Collection system will be required. However, a geotextile will be installed beneath the cover geomembrane and vents located at high points through it to protect against uplift due to potential gas pressures.

3.2.4 Cell 4 Restoration

As part of the decommissioning process, it is expected that partial removal of the Cell 4 clay liner will be required depending on the level of impacted sediment present in Cell 4. Based on information provided by the City, it is understood that the clay liner originally constructed within Cell 4 was acceptable to the Government of Manitoba, and included a material suitable for use as a clay liner having a hydraulic conductivity less than $1X10^{-7}$ cm/sec. Restoration of the Cell 4 clay liner will be implemented to attain a similar condition. Upon completion of sediment removal, additional investigations will be conducted to determine the condition of the Cell 4 lagoon liner in order to ascertain the full extent of restoration needed for future use of the lagoon as wet weather capacity for the City.

The borrow material required for cell construction, and clay liner restoration is expected to be obtained from a previously investigated borrow site that is located west of Cell 4, within a hauling distance of approximately 5 km from the Site. Previous testing of the borrow material conducted during the 2016 investigations indicated that the subject soils meet the requirements of the project for use in the restoration of the Cell 4 clay liner.

The Cell 4 restoration activities will generally follow standard industry construction methods. These are generally anticipated to include:

- Protection of liner from extreme desiccation and freezing and thawing cycles;
- Fill required for clay liner or dyke construction should be placed in horizontal lifts not exceeding 150 mm maximum in compacted thickness and uniformly compacted to 95% of standard proctor maximum dry density (SPMDD) within two percent wet of the optimum;
- Remove sand or silt layers or excessively softened soils and replace them with compacted fill;
- Dyke slopes and exterior slope of the Containment Cell will be protected against erosion. When required, erosion protection may consist of topsoil, seeding and a permanent turf reinforcement mat. More robust erosion protection consisting of riprap underlain by a layer of non-woven geotextile should be provided at inlet and outlet points and other locations when high flow conditions are encountered.
- The use of qualified geotechnical personnel, acting under the supervision of a geotechnical engineer, to approve and monitor construction activities and to perform quality control testing during construction.

3.2.5 Containment Cell Management Post-Decommissioning of Cell 4

While the long-term leachate generation potential of the material to be placed within the Containment Cell is expected to be minimal, the Containment Cell will have a dedicated leachate collection system. The leachate generation will be minimized through the management of moisture content of the lagoon sediment and other material during consolidation and placement within the cell.

Final details of the leachate characteristics and volume within the containment cell will be estimated upon completion of the construction activities.

No monitoring wells are currently in place at the wastewater lagoon facility. Monitoring wells will be installed in the vicinity of the Containment Cell prior to construction in order to assess baseline groundwater conditions. As the Containment Cell will be installed with adequate liner and leachate collection systems, it is expected that leachate will be contained. However, groundwater monitoring wells will allow for regular sampling to determine if impacts are occurring from the Containment Cell.

The Containment Cell cover and associated topsoil and vegetative cover will be constructed to achieve adequate sustainability and growth and require minimal maintenance. Maintenance activities are anticipated to include:

- Periodic sampling of leachate
- Mowing grass/vegetation
- Leachate removal and appropriate disposal
- Gas vent repairs (if damaged by facility operations)

Final details of the size, design and cell management will be determined upon completion of the containment cell and placement of the sediment within the cell.

3.2.6 Mobilization Staging and Temporary Facilities

The area to the northwest of Cell 4 and west of the Site's main access is anticipated to be used as the main laydown area for equipment and materials staging for the planned decommissioning activities (see Figure 3-2). This area would require topsoil stripping and laydown of granular base material for temporary base for traffic. It is understood that this area is owned by the City and leased for agricultural use. This area would be used for temporary storage, Site offices, security, health, and safety as well as storage and parking area for equipment. The timing of the use of this area, will depend on the final project schedule.

Figure 3-2: Proposed Staging Area

3.2.7 Buildings and Infrastructure Decommisioning

Prior to decommissioning activities, an inspection and inventory of Cell 4 associated equipment and materials within the control buildings will be conducted. This assessment will range from inspection of the buildings and equipment to determining what infrastructure (if any) will require special handling procedures for decommissioning. This could include materials and equipment that will require cleaning prior to disposal (e.g., piping, pumps, and tanks).

It is anticipated that most of the Cell 4 infrastructure will be turned over to the City following decommissioning. Timing of actual decommissioning activities will depend on the staging of the overall project; however, in general, the following would apply:

- Removal of remaining aerator electrical cabling and facilities within and near construction areas will be completed after drawdown of Cell 4 water, but prior to sediment movement.
- Decommissioning or relocation of piping or utilities in the proposed construction areas will be conducted prior to sediment movement or construction activities; and
- Decommissioning of other infrastructure (e.g., main control building and remaining transfer piping between cells) will be completed, upon completion of most decommissioning work, as this infrastructure may be used during lagoon sediment containment activities.

Buildings and equipment not retained by the City will be demolished, loaded, and transported offsite for final disposal at an appropriate waste disposal facility. The decommissioning, if necessary, will include high pressure steam flushing of any buried pipes tying into the control building. The pipes will be plugged with cement grout and capped. It is assumed that the general non-hazardous demolition waste from building decommissioning can be disposed at the City of Brandon Eastview Landfill waste facility located in Brandon, approximately 3 km west of the site.

3.2.7.1 Associated Electrical Systems

It is anticipated that the electrical facilities not requested to be left in place by the City (e.g., electrical transformers and switching gear) will be decommissioned and removed. These facilities were largely used to power the aerators used in the lagoons and would likely not be required for future use. Electrical equipment is generally present at the North Electrical Building and Transformer Yard, South Control Building and Transformer Yard, as well as various power points located around Cell 4 and the associated buried cable within duct banks that lead to the power points. The equipment will be inspected, and the condition will be documented. If the equipment has contacted the Cell 4 material, either directly or indirectly, it will be pressure washed as above, and inspected. Below ground electrical will be decommissioned in place if not required for future use.

3.2.7.2 Other Infrastructure

The control building present near the southwest corner of Cell 4A is used for electrical controls, maintenance, and storage, and was also a truck unloading area for SPMU. The building also contains various tanks (concrete and other), piping, pumps, and air handling units. Pumps, piping, or tanks within the control building formerly used for the storage and transfer of Cell 4 wastewater or SPMU will be inspected, cleaned, and documented, following similar procedures described above.

Unless otherwise agreed by the City, above-ground infrastructure associated with the treatment of wastewater from the Wyeth Facility will be removed and appropriately disposed off-site. The return sludge valve and transfer chambers between Cell 5 and Cell 4A, as well as the Cell 4 transfer chambers/valves between Cell 4 and Cell 4A, and Cell 4 and Cell 5 will be cleaned, inspected and condition documented prior to any re-use by the City.

3.3 Implementation Strategy for Cell 4 Decommissioning

3.3.1 Site Preparation

Geotechnical simulations were completed during 2016 basis of design investigations and included coupled seepage transient and slope stability analyses to determine the effects of water drawdown on the stability of the dykes and the potential for seepage to develop. The analysis conducted along the berm between Cell 3 and 4 utilized water and berm elevations measured during August 2016. For the analysis, water elevation of the adjacent Cell 3 was measured at 362.1 m above sea level (asl), with the top of dyke elevation near the midpoint of 362.5 m asl.

Results of the coupled seepage transient slope stability analyses indicated that the construction of a toe berm would be required along the eastern berm of Cell 4 given the high-water levels of the adjacent Cell 3. Based on the results of the analysis, it was estimated that the toe berm would have to transition from 1.5 m high by 3.5 m wide along the south half portion of the east dyke to 1.5 m high by 2.5 m wide along the north half portion. Alternatively, instead of a toe berm, a water management program to lower the

liquid levels in the adjacent Cell 3 could be implemented, or a combination of the two to provide the required factor of safety.

3.3.2 Water Treatment

Most of the equipment for the planned water treatment will be located within the general vicinity of Cell 4A (see Figure 3-3). The water collection pumps and piping will be located within Cell 4 to the north and east of Cell 4A with the following systems located around Cell 4A:

- Water collection header (near the Cell 4A inlet structure)
- Lime storage and dosing system (in or near Cell 4B)
- Cell 4A inlet structure (existing)
- Sludge recirculation system (inside of Cell 4A at inlet end)
- Cell 4A discharge structure (existing)
- Acid storage and dosing system (Near Cell 4A outlet structure)
- Alum storage and dosing system (Near Cell 4A outlet structure)
- Multi-media pressure filters (South/west of Cell 4A)
- Zeolite Ion Exchange Columns (South/west of Cell 4A)
- Effluent Tank (Next to zeolite columns and near Cell 5)
- Oxidant dosing system – contingency (near effluent tank)
- Generator(s) and fuel tank(s) (in or around Cell 4B)
- Operators trailer and hygiene facilities (in remaining available space)
- Safety showers and eyewashes (near lime, acid, alum, and oxidant)

Figure 3-3: Available Area for Water Treatment System

The fully developed water treatment plan will be provided upon completion of updated chemical and volume characterization of lagoon water.

3.3.3 Sediment Drying and Removal

Based on the thickness and type of sediment identified from the previous Cell 4 investigations, it is anticipated that there will be three areas having identifiable characteristics that may be managed differently as outlined below.

- Western Portion – this area would include areas that generally have a thicker deposit of sediment and higher concentrations of Compound A in sediment and would include:
  - Piped influent point – located central southern portion of the lagoon where thicknesses of sediment are up to 1 m or greater, and sediment is anticipated to be a more granular precipitate.
  - Former truck dumping area – located in the northwest portion of the lagoon, as well having greater thicknesses of sediment, and sediment is anticipated to be a more granular precipitate.
- Eastern Portion – this area would include generally thinner, organic, and soft sediment materials and would include:
  - The southeast corner - this area was used to introduce municipal influent into Cell 4, and deposition of a soft organic municipal-type sediment would be present.
  - Northeast – slower aeration velocity allowed settling.
- Perimeter - areas along the dyke, will have additional settling areas and potentially thicker sediment. Also, areas where erosion control stone has been placed will require special handling.

Moving and mixing the wetter sediment with the thicker drier sediment will maximize the overall uniformity of the sediment, speed up the overall drying time, and minimize the use of Portland cement as a solidification agent.

As previously mentioned, a combination of excavators, dozers, and loaders will be used to collect the dried sediment and load it into dump trucks for transportation from Cell 4 to the Containment Cell.

3.3.4 Containment Cell Construction

Prior to the construction of the Containment Cell, the existing dykes between Cell 3 and Cell 4 as well as the north dyke of Cell 4 would undergo inspection and potential permanent re-enforcement to stabilize and shape the slopes in these areas for the use as a part of the containment structure. Additionally, the remainder of the area for the cell and new dyke construction should be inspected and investigated for re-affirming the location and design are appropriate for the conditions.

The containment cell will be configured by constructing a dyke extending across Cell 4 from about the centre of the east dyke to about the centre of the north dyke (see approximate containment cell location in Figure 2).

Per Section 3.2.3, the containment cell will be furnished with a composite liner and leachate collection system, a geomembrane cover with drainage sand, topsoil and seeding, with a minimum 5% gradient away from the containment cell so that the sediments are not allowed to saturate. During liner installation, the only vehicles allowed on the liner would be quads and side-by-sides used for pulling out the liner with slip sheets utilized where required. Quads and side-by-sides will not damage the liner or subgrade and will assist in maintaining sufficient productivity. Quads and side-by-sides will access the cell from the slopes of the cell or from designated areas. Caution will be taken when entering and exiting the cell to reduce the potential for damage to the geosynthetic liners. Leak location surveys will be completed on the geomembrane at key points of the installation to confirm that any defects that occur

because of construction are located and repaired.

When installing the GCL, the subcontractor will only install as much GCL as can be covered by the HDPE liner each day, to minimize GCL exposure to the elements for more than one day. The final portion of geosynthetic installation will be a sump area. Completing the sump area last will be done so that water runs effectively towards the sump and does not become trapped beneath the completed area or between layers. Any water that does collect in the sump area will be pumped out to Cell 4 or Cell 4A for treatment.

3.3.5 Project Schedule

The proposed schedule for the project is outlined in Table 3-2. The proposed schedule is dependent on retaining a contractor to implement the Project, as well as the timing for reviews and approvals by MCC.

Table 3-2: Estimated Project Schedule

Description	Summer Year 1	Fall Year 1	Winter Year 1	Spring Year 2	Summer Year 2	Fall Year 2
Water Treatment	Installation of water treatment for runoff and seepage.	Water treatment of runoff, seepage, leachate, through Cell 4A				
Sediment Removal	Sediment drying	Selective sediment mixing, drying, solidify, & removal to containment				
Containment Cell Construction	Construction of berm and liner	Temporary liner cover. Place/compact sediment. Drain leachate to Cell 4A			Sediment placement completion	Final Cover for Containment Cell
Cell 4 Liner Restoration				Liner Restoration		Finish restoring liner and berms.
Demo/Decom. Infrastructure					Control Buildings and Piping Decommissioning	

4.0 Existing Physical and Socioeconomic Environment

The existing physical and socioeconomic environment for the wastewater treatment lagoon system in Sections 21 and 22-10-18 WPM and including the vicinity of Cell 4 where the Project will be implemented has been documented and described in several other regulatory submission documents for the Development, including but not limited to:

- AECOM Canada Ltd., 2011. Request for Alteration to the City of Brandon's Industrial and Municipal Wastewater Treatment Facilities., Prepared for City of Brandon, Project No. 60157796 (403.19.9).
- Earth Tech (Canada) Inc. 2006. Notice of Alteration to the City of Brandon's Wastewater Treatment Facility 2003 Environment Act Proposal, Brandon, Manitoba. Prepared for the City of Brandon. Project No. 97085.
- Earth Tech (Canada) Inc. 2003. Manitoba Environment Act Form and Supporting Documentation for an Operating Licence for the City of Brandon's Expanded Industrial Wastewater Treatment Facility for Maple Leaf Pork's Second Shift, Brandon Manitoba. Prepared for the City of Brandon. Project No. 57730.

5.0 Potential Environmental Effects Assessment and Proposed Mitigation

5.1 Scope of the Assessment

5.1.1 Spatial Boundaries

The Project Study Area (PSA) refers to the area within a 5-kilometre radius of Cell 4 and includes the other wastewater treatment lagoon cells located in Sections 21 and 22-10-18 WPM, a segment of the Assiniboine River south of the lagoon system, and a borrow site which will be the source of material required for cell construction, and clay liner restoration (see Figure 6).

The Project Development Area (PDA) refers to the actual footprint areas where the Project will be implemented, including the immediate vicinity Cell 4, Cell 4A, and Cell 4B along with the staging area and borrow material site.

Considering the proposed alteration, environmental effects are limited to the PDA.

5.1.2 Temporal Boundaries

As outlined in Section 3.3.5, construction is expected to take place over a period of approximately 20 months. Upon completion of the construction of the containment cell and restoration of Cell 4, it is assumed that the restored Cell 4 would be operational during the same period as the remainder of the lagoon system.

For the purposes of this assessment, the Project is considered to be comprised of two phases namely construction and operational phases. The construction phase includes dewatering of Cell 4, treatment of effluent from Cell 4, discharge of treated effluent, sediment drying and removal, containment cell construction, placement of excavated sediments into the Containment Cell, capping of the Containment Cell and vegetation of the cell. The operational phase pertains to the operational lifespan of the Containment Cell.

No decommissioning is currently planned for the rest of the lagoon system components. Following construction, the Containment Cell design life is expected to last at least 100-200 years.

5.2 Project Environmental Interactions, Potential Effects and Mitigation

Interactions between the existing environment and the Project (including construction and operation phases) were considered in determining potential changes that may occur due to the Project. All aspects of the environment – physical, terrestrial, aquatic and human – were considered. Interactions were minimized and avoided through project design and proposed construction methods.

Potential interactions between the Project and surrounding environment as well as the proposed mitigation measures to be implemented to offset potential adverse effects are described below and summarized in Table 5-1.

5.2.1 Air Quality and Noise

Emissions to air due to the Project will occur during both construction and operational phases.

- Road dust from moving vehicles and equipment as well as moving materials and earthworks around the Project Site during construction.
- Vehicle and equipment exhaust.
- Noise from equipment operation and material handling during construction.
- Odour from dewatered sediments

Dust may be generated temporarily during the construction of the Containment Cell due to vehicular and equipment use and excavation of the sediments in the Soil Pile for transfer to the containment cell area. As a mitigation method, water will be applied as required to suppress dust during dry conditions and/or high wind events. The sediments from within Cell 4 are expected to be moist and will not result in dust. After mitigation, adverse effects on air quality from dust are expected to be minor.

Fugitive emissions may occur due to vehicles and heavy equipment being operated at the site. The effects associated with this are considered to be minor and short duration. Proposed mitigation measures include ensuring that equipment operators are not idling equipment unnecessarily and maintaining equipment to ensure proper working condition. The potential adverse effect on the environment associated with fugitive emissions is considered minor.

Elevated ambient noise levels will occur in the vicinity of the project site during construction. The contribution of construction noise will be a short-term impact and will be limited to regular working hours. Further, project activities will occur within a developed area with the nearest residence located across the Assiniboine River at approximately 500 m south of the Project Site.

Given that the effects of operations on air quality or noise levels will be within limits set by Workplace Health and Safety regulations and will be largely limited to the construction period, the effects are considered to be minor.

5.2.2 Soil Quality

Potential adverse effects to soil quality due to the Project will be largely limited to the footprint of the main laydown area northwest of Cell 4 where physical disturbance will occur. This laydown area would be used for temporary storage, site offices, security, health, and safety as well as storage and parking area for equipment. The timing of the use of this area, will depend on the final project schedule. To reduce the potential for effects to soil quality due to compaction and rutting in the laydown area, prior to its use, the laydown area will be stripped of its topsoil and a granular base material would be placed in the area as a temporary base for traffic.

Compaction and rutting of soils adjacent to the laydown area as well as the Soil Pile where sediment will be removed for placement in the Containment Cell will be minimized by creating temporary access and additional smaller laydown areas that will be used consistently throughout the construction period and allowing these areas to revegetate naturally when they are no longer required.

The topsoil from the laydown area will be stored in a stockpile for use in restoration once construction is complete. Colour change will be used as guide for topsoil stripping depths to prevent admixing, and the footprint of disturbed/exposed areas will be kept to a minimum with site restoration occurring as soon as practical where required. During storage of the stripped topsoil (i.e., construction phase), erosion control

will be implemented for the stockpiled topsoil per the Project-specific Erosion and Sediment Control Plan (ESCP) which will be developed in line with other City projects. Some erosion controls that may be implemented for the Project include use of tackifiers, mulching, erosion control blankets and matting, and use of cover crops. The selection of appropriate erosion control measures will be influenced by the size of the stockpile, the soil type, timing of soil stripping, and duration of the construction phase. The reported soils for the laydown area and vicinity of the lagoon system include coarse loamy to fine loamy soils of the Levine soil series, dominantly clayey soils of the Manson soil series, and loamy soils of the Basker soil series (Manitoba AgriMaps). The soil stockpiles would be stabilized and adequately protected from erosion with good vegetation establishment, with appropriate erosion and sediment control measures implemented and maintained until spreading of topsoil is complete. After construction is complete, the contractor will be responsible for the appropriate repair of any areas where equipment would have compacted soils with the repairs including appropriate grading and site restoration, as required. Traffic would be limited as much as possible during smoothing and levelling of soils to prevent further compaction and smoothing and levelling would also be avoided if soils are near saturation. Areas with vehicle ruts would be decompacted and regraded so that the previously disturbed area would be compatible with the surrounding landscape and ensure natural drainage is maintained.

Considering that the potential for effects to soil quality would be limited to the construction phase and the adoption of the above-mentioned mitigation measures, the potential effects to soil quality due to the Project are considered to be minor.

5.2.3 Wildlife and Aquatic Life

Potential impacts to wildlife and aquatic life due to the Project will occur during the construction and operational phases and include the following:

- Disruption to waterfowl including migratory birds' use of Cell 4 and PDA.
- Effluent discharge into the Assiniboine River which is a habitat to fish and other aquatic organisms.

A reduction in waterfowl habitat may occur temporarily during the construction phase of the Project. Given the developed nature of the PDA, waterfowl use of Cell 4 is limited. However, dewatering and sediment consolidation activities during construction will temporarily preclude the use of Cell 4 by the waterfowl that use it. As the other lagoon cells will remain available for such waterfowl use, it is anticipated that waterfowl will make use of the other cells once Cell 4 is temporarily unavailable.

Mitigation measures may include:

- Sequencing construction activities to avoid or minimize potential impacts to wildlife during critical life stages (i.e., bird breeding timing windows).
- To the extent practical, the planning of construction activities will consider the general nesting period for the Project area (i.e., Mid-April to Late August).
- Use of bird deterrent systems prior to commencement of construction, in order to discourage the use of the PDA for nesting.
- The completion of nest surveys by a qualified wildlife biologist in the immediate vicinity of the PDA prior to commencement of Project activities to check for the presence of nests. Should migratory birds' nests be found within the PDA, considerations for adjusting Project activities shall be made and include the use of buffer zones, or project schedule modifications.

- Environmental monitoring by a qualified wildlife biologist during active portions of the construction phase of the Project to reduce the potential for impacts to waterfowl and other wildlife.

As the duration of construction is anticipated to be 20 months (see Section 3.3.6), and it is anticipated that Cell 4 will be restored back to a lagoon cell for the City's use, Cell 4's unavailability for waterfowl use will be temporary and the other lagoon cells will continue to be available for waterfowl use during construction. Consequently, the potential for adverse effects to aquatic life from disrupted waterfowl use of Cell 4 are expected to be minor during construction, with a marginal reduction in potential habitat quantity during Cell 4's restored operation, and an increase in habitat quality due to reduced exposure to impacted sediments post-Cell 4 restoration.

There is a potential for environmental impacts to aquatic life in the Assiniboine River during the construction phase of the Project as a result of effluent discharge. The Province of Manitoba developed criteria for mitigating impact to the aquatic life within the Assiniboine River as a part of the current Licence for the Development. Per Appendix C of the Licence and for discharge into the Assiniboine River through the final discharge point of the wastewater treatment lagoon system, i.e., manhole MH 12 of Cell 5, treated effluent discharges will be monitored for compliance with Clauses 46 to 49 of the Licence.

Considering that the wastewater in Cell 4 will undergo treatment prior to discharge, with the resulting effluent monitored for compliance prior to discharge as outlined in Section 3.2.1 and 3.3.2, in order to meet the Licence requirements, the potential for adverse effects on aquatic life in the Assiniboine River is deemed minor.

5.2.4 Surface Water Quality

There is potential for adverse surface water quality effects in the Assiniboine River due to the effluent discharges. However, considering that the wastewater in Cell 4 will undergo treatment prior to discharge, and that the resulting effluent will be monitored for compliance prior to discharge, the potential for adverse effects on surface water quality in the Assiniboine River is considered minor.

5.2.5 Groundwater Quality

Potential impacts to groundwater due to the Project will occur primarily during the operation phase and relate to the leaching of effluent from the restored Cell 4, or leachate generated from the Containment Cell with possible migration of contaminants from the Containment Cell to the underlying groundwater. Future use of Cell 4 for City wastewater storage could also potentially impact underlying groundwater should effluent seep from the lagoon. Mitigation for potential impacts to groundwater will largely be through engineering design and includes an assessment of the remaining Cell 4 liner through appropriate inspection and testing and its planned restoration following sediment removal as well as the inclusion of a leachate collection system and liner for the Containment Cell. The use of mechanical drying processes to reduce the potential for leachate generation from the contained sediment will reduce the potential for leachate generation once the sediments are placed in the Containment Cell. As well, per Section 3.2.2, additional measures will be considered (solidification) as part of the process. Proposed mitigation measures will include the use of mechanical drying processes to reduce the potential for leachate generation from the contained sediment. This will include drying the sediment prior to placement within the Containment Cell. As well, additional measures will be considered (solidification) have been considered as part of the process.

The Containment Cell design includes the use of double liner system, including a (HDPE) geomembrane

and GCL liner as well as a leachate collection system. These systems, as well as a network of groundwater monitoring around the containment cell, will be used for mitigating leachate migration to groundwater. After mitigation, adverse effects on groundwater from seepage from the restored Cell 4 are expected to be minor.

After mitigation, the potential for adverse effects on groundwater from seepage of leachate from the restored Cell 4 and Containment Cell is considered minor.

5.2.6 Waste Generation

As outlined in Section 3.2.6, buildings and equipment not retained by the City will be demolished, loaded, and transported offsite for final disposal at an appropriate waste disposal facility. Debris generated during construction would also be disposed at the waste facility located in Brandon. To reduce the potential for waste generation due to the Project, repurposing of buildings and equipment will be done as practical. Waste materials will be salvaged for reuse where applicable, with salvage materials kept separate from refuse. The remaining refuse and debris from demolition will be hauled off-site to a licenced and operational landfill. Relevant guidance, regulatory requirements, and industry best practices for demolition will be followed, e.g., the Manitoba Guideline for Construction and Demolition Waste Management (Guideline 2002-01E).

5.3 Residual and Cumulative Effects

Residual environmental effects of the project are those effects which will remain after all preventive and mitigative measures have been applied. When undergoing environmental assessment, the proponent of a project is typically required to determine the significance of adverse residual environmental effects and to provide rationale for the characterization of effects as such. In determining significance for this Project, the following criteria were used:

- Likelihood
- Nature of effect - positive, neutral, or adverse
- Magnitude – Small (not measurable), moderate (measurable only with well-designed monitoring program), and large (noticeable effect)
- Duration – short-term or long-term
- Frequency – how often
- Geographical extent – project site, local study area, or region
- Reversibility – Pertains to whether the valued component can return to its existing condition after the project activity ceases.

Based on the application of the proposed mitigation measures, the application of best management practices and compliance with applicable regulations and guidelines, the decommissioning of Cell 4 will not result in significant adverse residual effects (see Table 5-1).

Table 5-1: Summary of Potential Interactions, Mitigation Measures, and Potential Resulting Residual Effect

Environmental Component/ Issue	Type of Interaction	Project Phase	Proposed Mitigation	Residual Effects
Air Quality	Emissions from equipment	Construction/operation	•Construction activities will be limited to 07:00 to 19:00 from Monday to Friday. •Keep equipment in good working order and maintained throughout project. •Avoid unnecessary idling of vehicles and/or heavy machinery. •Enforce posted construction speed limits.	Negligible
	Dust	Construction/operation	•Topsoil stripped from the laydown/staging area will be stockpiled with appropriate erosion control implemented. •Employ non-toxic dust control measures (e.g., spraying water) as required. •If necessary, cover stockpiles or spray with water to prevent wind erosion and airborne dust. •Avoid excavation activities during extremely windy periods. •Re-vegetate site where possible.	Negligible
	Release of gases from the capped sediments	Operation	•Inclusion of gas vents as part of the Containment Cell's design	Negligible

Environmental Component/ Issue	Type of Interaction	Project Phase	Proposed Mitigation	Residual Effects
Soils	Compaction and rutting	Construction	•Vehicles/machinery should use designated access roads/trails to avoid unnecessary compaction and rutting. •For the staging area, keep the footprint of disturbed/exposed areas to a minimum with site restoration occurring as soon as practical following construction. •Use colour change as guide for topsoil stripping depths to prevent admixing. •The soil stripped from the staging area will be stored in a stockpile for use in restoration. The soil stockpiles should be stabilized and adequately protected from erosion with good vegetation establishment. •Appropriate erosion and sediment control measures should be implemented and maintained until spreading of topsoil is complete. •The contractor will be responsible for the appropriate repair of any areas where equipment has compacted soils with the repairs including appropriate grading and site restoration (if required). •Traffic should be limited as much as possible during smoothing and levelling of soils to prevent further compaction. Smoothing and levelling should also be avoided if soils are near saturation. •Areas with vehicle ruts should be de-compacted and regraded. •Level and grade the project area to be compatible with the surrounding landscape and ensure natural drainage is maintained.	Negligible
	Wind or soil erosion	Construction		
Wildlife and Aquatic Life	Disrupted waterfowl usage of Cell 4	Construction/Operation	•Schedule Cell 4 dewatering to reduce impacts on waterfowl. •Availability of other adjacent lagoon cells for use by waterfowl.	Negligible
	Effluent discharge into the Assiniboine River	Construction	•On-site treatment of effluent prior to discharge •Ensure effluent quality meets with MCC requirements prior to release.	Negligible

Environmental Component/ Issue	Type of Interaction	Project Phase	Proposed Mitigation	Residual Effects
Surface Water Quality	Effluent discharge into the Assiniboine River	Construction	•On-site treatment of effluent prior to discharge •Ensure effluent quality meets with MCC requirements prior to release.	Negligible
Groundwater Quality	Leaching of effluent	Operation	•Cell 4 liner restoration. •Containment Cell has been designed to minimize leachate generation. •The Containment Cell will be furnished with composite liner and a dedicated leachate collection system to prevent leachate migration to groundwater.	Negligible
Waste Generation	Waste generation from Cell 4 related infrastructure	Construction	•Salvage materials for reuse where possible. Salvage materials should be kept separate from refuse. •All refuse and debris from demolition will be hauled off site to a licensed and operational landfill. On site burning of materials is prohibited. •Follow the guidelines in the Manitoba Guideline for Construction and Demolition Waste Management (Guideline 2002-01E) and consult other best practice or regulatory guidance and requirements.	Negligible

6.0 Accidents and Malfunctions

The potential for accidents and malfunctions is largely associated with the construction phase of the Project, and related to failure of mechanical systems, fuel releases, chemical spills, and transportation accidents. Contractors will adhere to a Project-specific health and safety plan developed as appropriate and Project site employees will be kept aware of safety requirements and on-site construction works to ensure worker safety. Access to the Project Site will also be limited to relevant City personnel and contractors.

To mitigate the potential adverse effects of spills and leaks during construction, the contractor, Pfizer, and the City will:

- Keep equipment in good working order, is free of fluid leaks, and well maintained.
- Equip storage containers for hazardous goods with secondary containment.
- Develop a Project and site-specific emergency response plan (ERP), including spill response procedures, and emergency response measures for spill clean-up and remediation. The Project's ERP will complement the lagoon system's overall ERP and Licence requirements.
- Keep emergency spill kits on-site and train operators properly on their use so that any spills can be contained and cleaned up.
- Report relevant spills and leaks to the MCC Emergency Response Team at 204-944-4888.
- Comply with all permit conditions issued by MCC or other authority.
- Store water treatment chemicals and equipment in Cell 4B for containment in case of leaks or spills.
- Environmental monitoring by a qualified wildlife biologist will be implemented during the Project to assist with protection measures should waterfowl or other wildlife be affected during the Project.

During the operational phase, accidents and malfunctions will pertain to the potential failure of the Containment Cell as well as maintenance-related activities. To mitigate operational-phase related malfunctions that could cause effluent leaching and adversely affect groundwater quality:

- The City will develop a management agreement for long term management and monitoring of the Containment Cell.
- Regular maintenance and repair of the Containment Cell cover and leachate collection system during the operational phase, as appropriate, will be implemented.
- Monitoring wells will be installed around the perimeter of the Containment Cell and a groundwater monitoring program will be implemented prior to construction and over the operational phase of the Project.

Mitigation measures to avoid or lessen effects on the environment resulting from the project were described in Section 5 with follow up activities indicated, where required.

7.0 Summary and Conclusion

Wood has prepared this NoA report on behalf of the City and Pfizer in support of the City's application for a proposed alteration to their *Environment Act* Licence No. 2991 which was issued in February 2012.

The potential interactions of the proposed Project and environment were evaluated with likely interactions examined to assess residual effects. Those interactions deemed to potentially generate adverse effects were described and evaluated with the assumption of typical mitigation measures representative of best

practices associated with the components of the Project.

Based on the desktop studies undertaken, site observations and information available to date as presented in this report, the proposed decommissioning of Cell 4 of the wastewater lagoon system from industrial use is not expected to create significant adverse effects to the biophysical and socio-economic environment. It is anticipated that upon completion of the Project, Cell 4 will provide additional wet weather capacity to the wastewater lagoon system and be a net benefit for the City in managing wastewater.

8.0 References

AECOM Canada Ltd., 2011. Request for Alteration to the City of Brandon's Industrial and Municipal Wastewater Treatment Facilities., Prepared for City of Brandon, Project No. 60157796 (403.19.9).

Earth Tech (Canada) Inc. 2006. Notice of Alteration to the City of Brandon's Wastewater Treatment Facility 2003 Environment Act Proposal, Brandon, Manitoba. Prepared for the City of Brandon. Project No. 97085.

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Golder Associates. 2014. Decommissioning Plan, City of Brandon Waste Water Treatment Lagoon – Cell 4, Report Number 13-1380-0026,

Manitoba AgriMaps. Available online at: https://agrimaps.gov.mb.ca/agrimaps/ (accessed on 16 December 2020).

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Manitoba Sustainable Development (MSD). 2016. Information Bulletin – Alterations to Developments with Environment Act Licences. Available at: http://www.gov.mb.ca/sd/eal/publs/alteration_guidelines2016.pdf. Accessed September 15, 2017.

9.0 Closure

This report has been prepared for the exclusive use of Pfizer and the City of Brandon. This report is based on, and limited by, the interpretation of data, circumstances, and conditions available at the time of completion of the work as referenced throughout the report. It has been prepared in accordance with generally accepted engineering practices. No other warranty, expressed or implied, is made. Further general limitations are provided in Appendix C.

Yours truly,

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Ltd.

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Figures

NOTES: IMAGES FROM TOPO MAPS AND MLI WEBSITE.

LEGEND:

REVISION	BY	DATE
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CLIENT:

PFIZER INC.

wood.

440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

DWN BY: MD
CHK'D BY: KB
DATUM: ---
PROJECTION: ---
SCALE: AS SHOWN

BRANDON LAGOONS
CELL 4 DECOMMISSIONING
SW 22-10-18 W1 & SE 22-10-18 W1
BRANDON, MANITOBA

SITE LOCATION PLAN

DATE: DECEMBER 2020
PROJECT NO: WX17989
REV. NO.: ----
FIGURE NO: FIGURE 1

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NOTES: IMAGES FROM TOPO MAPS AND MLI WEBSITE.

LEGEND:

REVISION	BY	DATE
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CLIENT:

PFIZER INC.

wood.

440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

DWN BY: MD
CHK'D BY: KB
DATUM: NAD83
PROJECTION: UTM Zone 14 U
SCALE: AS SHOWN

BRANDON LAGOONS
CELL 4 DECOMMISSIONING
SW 22-10-18 W1 & SE 22-10-18 W1
BRANDON, MANITOBA

CELL 4 LAGOON SITE PLAN

DATE: DECEMBER 2020
PROJECT NO: WX17989
REV. NO.: ----
FIGURE NO: FIGURE 2

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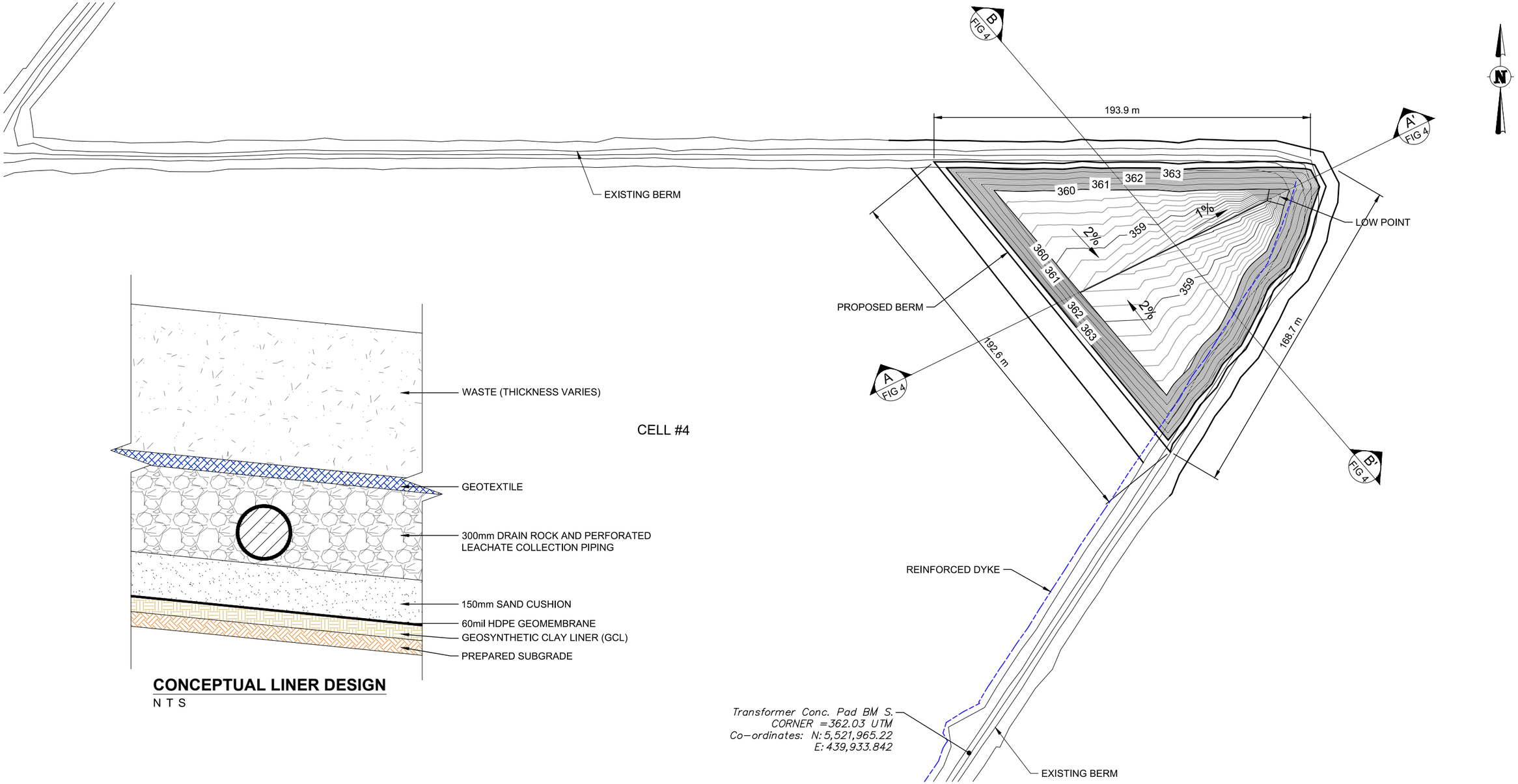

CELL #4

CONCEPTUAL LINER DESIGN
N T S

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NOTES:
- FINAL DIMENSIONS TO BE CONFIRMED BASED ON TOTAL SEDIMENT AMOUNTS.

PFIZER INC.

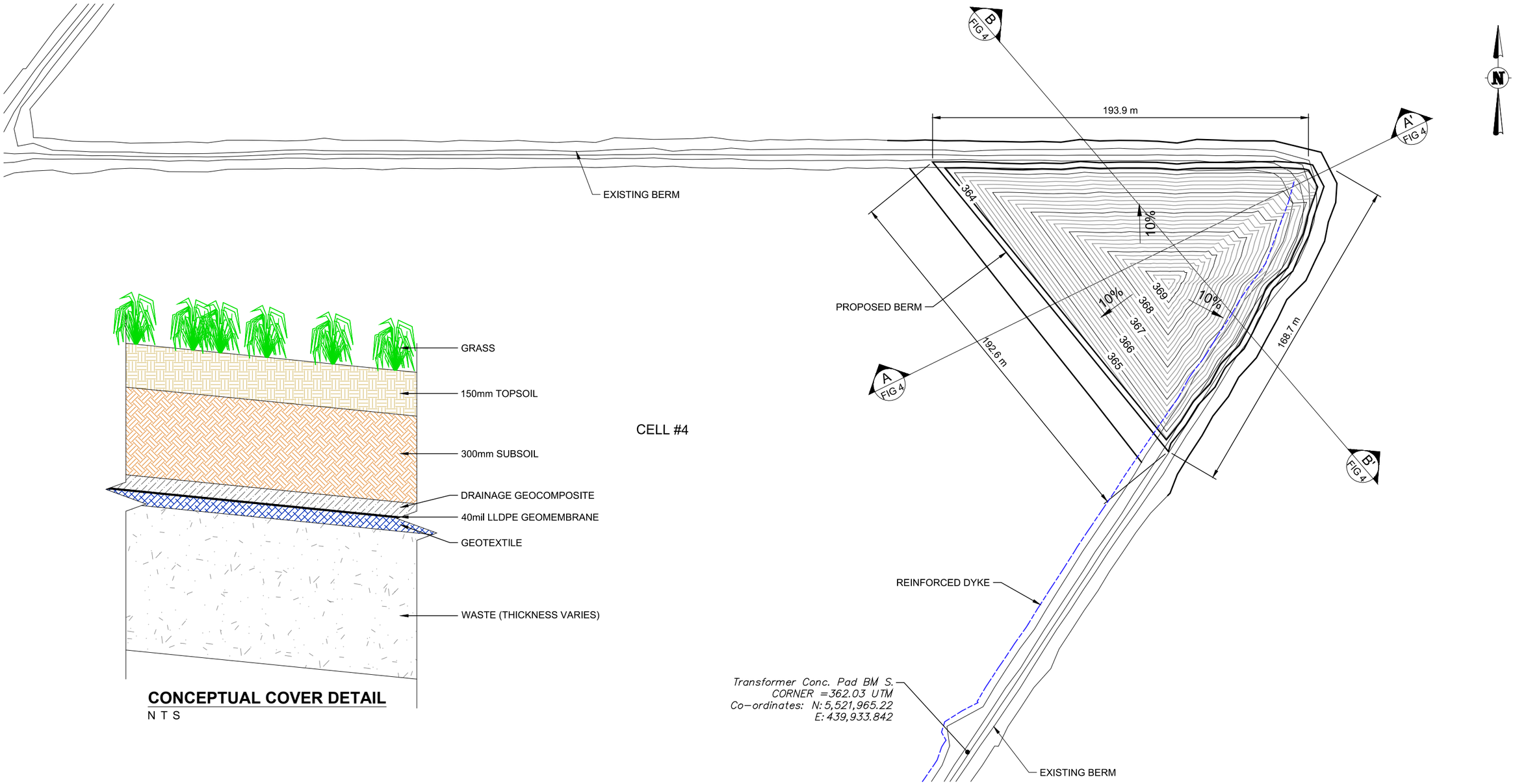
wood.
440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

DWN BY:	MD
CHK'D BY:	KB
DATUM:	-
PROJECTION:	-
SCALE:	1:2000

BRANDON LAGOONS
CELL 4 DECOMMISSIONING
SW 22-10-18 W1 & SE 22-10-18 W1
BRANDON, MANITOBA

CONCEPTUAL CONTAINMENT CELL DESIGN
(BASE GRADING AND CONCEPTUAL LINING SYSTEM)

DATE:	DECEMBER 2020
PROJECT No.:	WX17989
REV. No.:	C
FIGURE No.:	FIGURE 3



CELL #4

CONCEPTUAL COVER DETAIL
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NOTES:
- FINAL DIMENSIONS TO BE CONFIRMED BASED ON TOTAL SEDIMENT AMOUNTS.

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PROJECTION:	-
SCALE:	1:2000

BRANDON LAGOONS
CELL 4 DECOMMISSIONING
SW 22-10-18 W1 & SE 22-10-18 W1
BRANDON, MANITOBA

CONCEPTUAL CONTAINMENT CELL DESIGN
(FINAL GRADES AND CONCEPTUAL COVER SYSTEM)

DATE:	DECEMBER 2020
PROJECT No.:	WX17989
REV. No.:	C
FIGURE No.:	FIGURE 4

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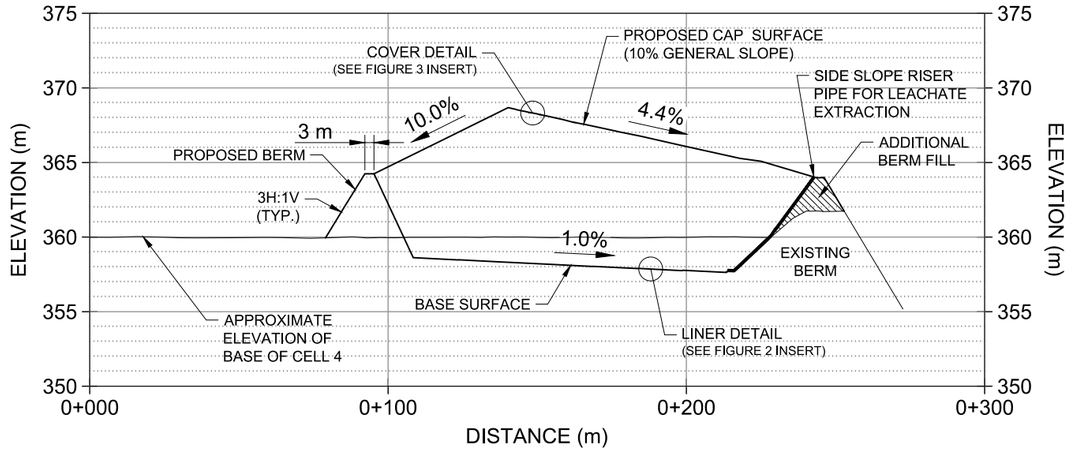
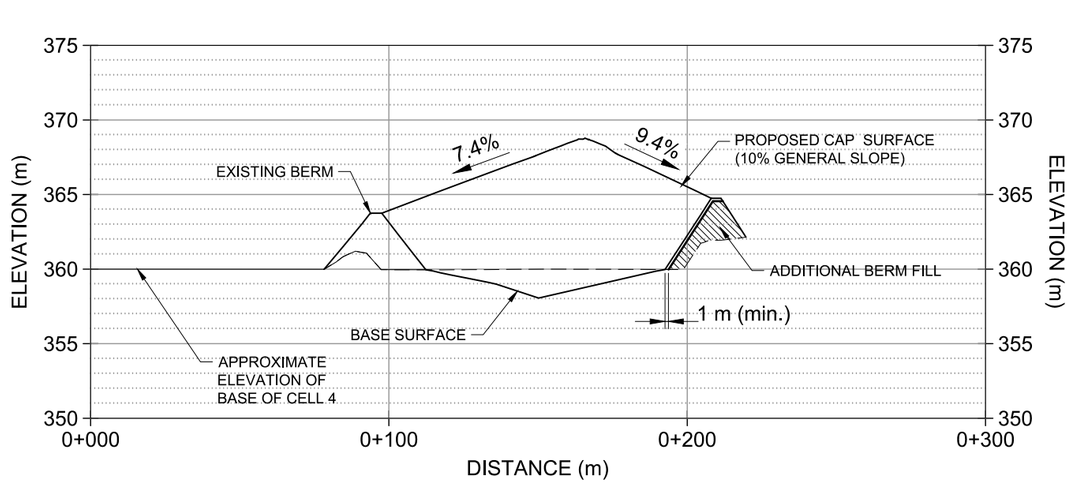


PROFILE A - A'



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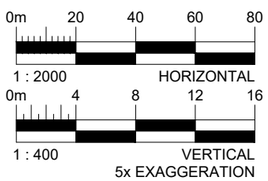

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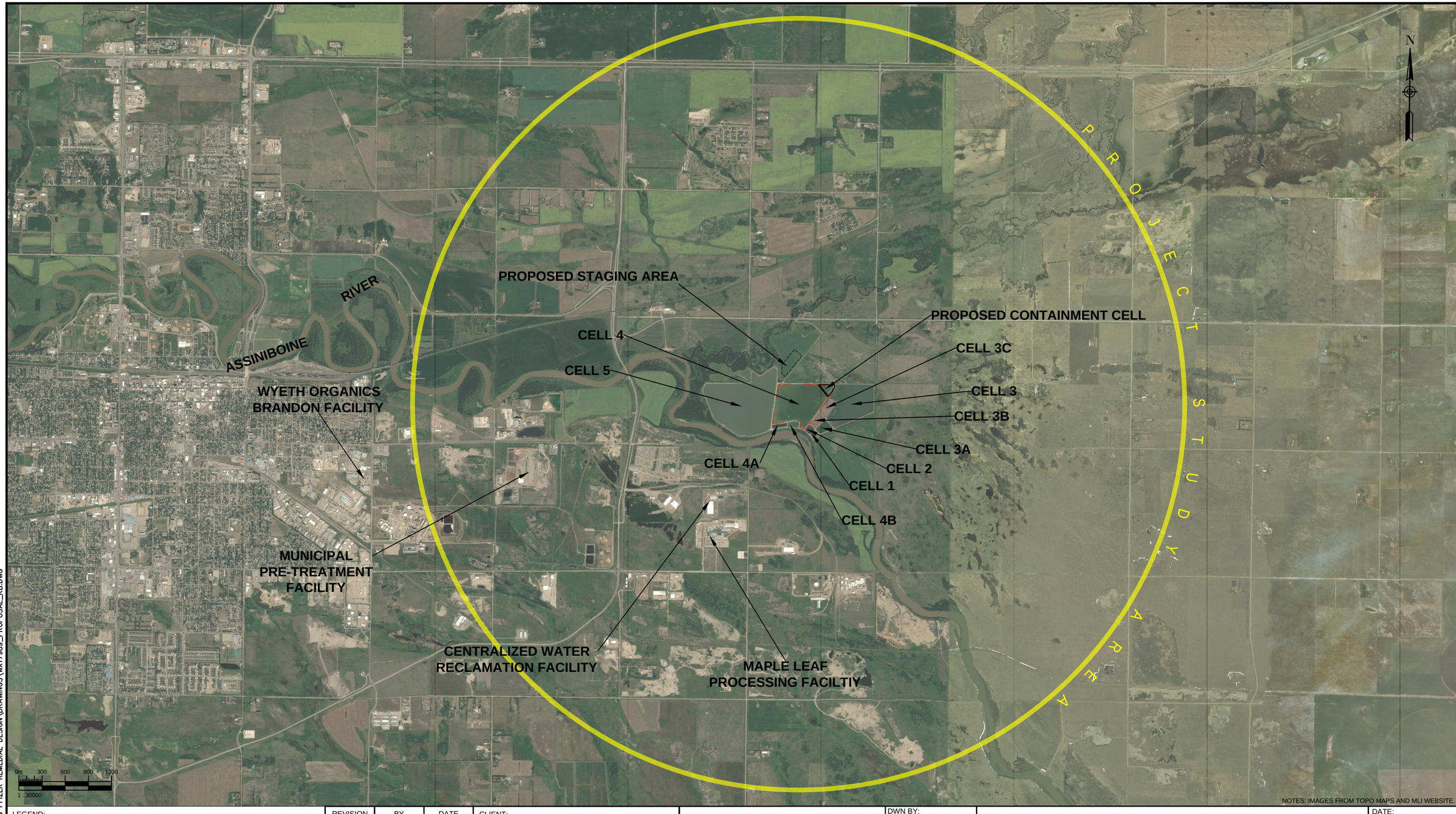
DATUM:	-
PROJECTION:	-
SCALE:	AS SHOWN

BRANDON LAGOONS
CELL 4 DECOMMISSIONING
SW 22-10-18 W1 & SE 22-10-18 W1
BRANDON, MANITOBA

CONCEPTUAL CONTAINMENT CELL
DESIGN CROSS SECTION

DATE:	DECEMBER 2020
PROJECT No.:	WX17989
REV. No.:	C
FIGURE No.:	FIGURE 5



NOTES: IMAGES FROM TOPO MAPS AND MLI WEBSITE.

LEGEND:

REVISION	BY	DATE
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CLIENT:

PFIZER INC.

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PHONE: 204.488.2997 FAX:204.489.8261

DWN BY:	MD
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DATUM:	---
PROJECTION:	---
SCALE:	AS SHOWN

BRANDON LAGOONS
CELL 4 DECOMMISSIONING
SW 22-10-18 W1 & SE 22-10-18 W1
BRANDON, MANITOBA

PROJECT STUDY AREA

DATE:	FEBRUARY 2021
PROJECT NO:	WX17989
REV. NO.:	----
FIGURE NO:	FIGURE 6

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Appendix A

Photos

wood.	**Photo 1** – View of the wastewater lagoon system facing southwest, with Cell 4 in the foreground and Cell 5 in the background.	DATE: September 2020
	City of Brandon Decommissioning Plan for Cell 4 of the Wastewater Treatment Lagoon System	PROJECT No.: WX17989
		Appendix A

wood.	**Photo 2** – View of Cell 4 facing southeast.	DATE: 29 September 2020
	City of Brandon Decommissioning Plan for Cell 4 of the Wastewater Treatment Lagoon System	PROJECT No.: WX17989
		Appendix A

wood.	**Photo 3** – View of Cell 4 facing south, with a building associated with the wastewater lagoon system in the background.	DATE: 29 September 2020
	City of Brandon Decommissioning Plan for Cell 4 of the Wastewater Treatment Lagoon System	PROJECT No.: WX17989
		Appendix A

wood.	**Photo 4** – Western edge of Cell 4 facing south.	DATE: 29 September 2020
	City of Brandon Decommissioning Plan for Cell 4 of the Wastewater Treatment Lagoon System	PROJECT No.: WX17989
		Appendix A

wood.	**Photo 5** – View of the wastewater treatment lagoon system facing north, with Cell 4A in the foreground, Cell 4 in the background, and Cell 5 across the access road, to the west.	DATE: 29 September 2020
	City of Brandon Decommissioning Plan for Cell 4 of the Wastewater Treatment Lagoon System	PROJECT No.: WX17989 Appendix A

wood.	**Photo 6** – Wastewater treatment lagoon system-associated building located south of Cell 4A, facing south.	DATE: 29 September 2020
	City of Brandon Decommissioning Plan for Cell 4 of the Wastewater Treatment Lagoon System	PROJECT No.: WX17989
		Appendix A

wood.	**Photo 7** – View of the Assiniboine River segment located south of the wastewater treatment lagoon system-associated building, facing southeast.	DATE: 29 September 2020
	City of Brandon Decommissioning Plan for Cell 4 of the Wastewater Treatment Lagoon System	PROJECT No.: WX17989 Appendix A

Appendix B

Lagoon Characteristics Summary

Summary of Average Layer A Chemical Characteristics

Parameter	Units	Average Result	Effluent Target
TSS	mg/L	30	25
VSS/TSS	%	83%	none
NH_3-N	mg/L	2.03	3
TKN	mg/L	24	15
TP	mg/L	18	1
Faecal Coliforms	MPN/100 mL	4	200
Total Coliforms	MPN/100 mL	7	1500
BOD	mg/L	34	25
Total Alkalinity	mg/L as $CaCO_3$	3039	none

Summary of Average Layer B Characteristics

Parameter	Units	Average Result*	Effluent Target
TSS	mg/L	722	25
VSS/TSS	%	42%	none
NH_3-N	mg/L	3.84	3
TKN	mg/L	46	15
TP	mg/L	21	1
Faecal Coliforms	MPN/100 mL	17	200
Total Coliforms	MPN/100 mL	49	1500
BOD	mg/L	68	25
Total Alkalinity	mg/L as $CaCO_3$	3165	none

*Excluding Site 12

Summary of Average Layer C Characteristics

Parameter	Units	Average Result[1]	Composite[2]	Effluent Target
TSS[3]	mg/L	205,509	106,128	25
TS	%	19%	10%	
VSS/TSS	%	17%	21%	none
TKN[3]	mg/L	7,636	11,685	15
TP[3]	mg/L	240	2	1
Faecal Coliforms	MPN/100 mL	<2		200
Total Coliforms	MPN/100 mL	39		1500
Total Alkalinity	mg/L as $CaCO_3$	2,855		none

Notes:

[1]Average of samples collected in the field (10 locations) and the lab (2 locations)

[2]Composite of samples collected in the lab (12 locations)

[3]Samples measured as soil mg/kg were converted to mg/L using a sludge density of 1.07 kg/L.

Summary of Average Layer D Characteristics

Parameter	Units	Average Result[1]	Composite[2]	Effluent Target
TSS[3]	mg/L	468,359	487,296	25
TS	%	37%	38%	
VSS/TSS	%	12%	9%	none
TKN[3]	mg/L	6,993	5,799	15
TP[3]	mg/L	629	1.9	1
Faecal Coliforms	MPN/100 mL	<2		200
Total Coliforms	MPN/100 mL	181		1500
Total Alkalinity	mg/L as $CaCO_3$	2,302		none

Notes:

[1]Average of samples collected in the field (10 locations) and the lab (3 locations). Site 13 included in average.

[2]Composite of samples collected in the lab (12 locations). Sample location 13 not included in composite.

[3]Samples measured as soil mg/kg were converted to mg/L using a sludge density of 1.27 kg/L.

Appendix C

Limitations

LIMITATIONS

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
   (a) The Standard Terms and Conditions which form a part of our Professional Services Contract;
   (b) The Scope of Services;
   (c) Time and Budgetary limitations as described in our Contract; and
   (d) The Limitations stated herein.
2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The conclusions presented in this report were based, in part, on visual observations of the Site and attendant structures. Our conclusions cannot and are not extended to include those portions of the Site or structures, which are not reasonably available, in Wood's opinion, for direct observation.
4. The environmental conditions at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the Site with any applicable local, provincial or federal by-laws, orders-in-council, legislative enactments and regulations was not performed.
5. The Site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.
6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on Site and may be revealed by different or other testing not provided for in our contract.
7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, Wood must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
8. The utilization of Wood's services during the implementation of any remedial measures will allow Wood to observe compliance with the conclusions and recommendations contained in the report. Wood's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. Wood accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.
10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of Wood.

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