2019-10-23

Asit Dey, P.Eng.
Manitoba Sustainable Development
Environmental Approvals
1007 Century Street
Winnipeg, MB R3H 0W4

Dear Sir:

Subject: **Addendum #1 - Environment Act Proposal, RM Gimli Wastewater Biosolids Storage Facility (June 13, 2018)**

Client ref.: File no. 4522.10

The purpose of this addendum is to amend the following sections of the Environment Act Proposal:

3.1 Description

The existing wastewater treatment plant is located in the RM of Gimli Business Park in the west half of Section 18-19-4 EPM. The facility operates under Environment Act Licence No. 2587, originally issued January 20, 2003. The plant utilizes a sequencing batch reactor (SBR) treatment process and supplemental chemical phosphorus removal followed by ultraviolet disinfection. The wastewater treatment plant discharges treated effluent to Lake Winnipeg. A by-product of the plant operation is the generation of a wastewater biosolids. The biosolids are dewatered by centrifuges to approximately 14% solids, as reported by the RM. Therefore, further dewatering is not necessary prior to transport.

The RM wastewater biosolids generation at the end of the 20-year design period is 11.7 cubic meters per day (m^3/d). The following Table 3-1 outlines the 20-year design period estimated sludge generation:

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Table 3-1 – Yearly Average Sludge Production

Year	Average Sludge Production [m^3/yr]	Year	Average Sludge Production [m^3/yr]
1*	2640.0*	11	3400.3
2	2707.5	12	3487.5
3	2776.9	13	3576.9
4	2848.1	14	3668.7
5	2921.1	15	3762.7
6	2996.0	16	3859.2
7	3072.8	17	3958.2
8	3151.3	18	4059.6
9	3232.4	19	4163.7
10	3315.3	20	4270.5

*Estimated 2018 sludge production

No changes are being proposed to the operation of the existing wastewater treatment plant as part of this proposal.

4.1.5 Geotechnical Recommendations

Although the original intent was to excavate the ponds and utilize reworked clay to construct a 1.0 m liner, the Geotechnical Report notes a concern regarding the quantity of clay available. Subsequently, the plan was altered to investigate utilizing the in-situ dense till as the liner along the floor of the ponds and utilize the available clay for the clay core within the dykes only. Knowing the density of the till, it was proposed that the till material be used for a liner foundation and a consolidation test on the till material was completed. Consolidation testing is considered to be the most accurate way to communicate the hydraulic conductivity of a dense till. This type of test has previously been used as a way of determining the suitability of an earthen liner. The laboratory analysis on the till material reported a hydraulic conductivity of 2.99×10^{-8} cm/s.

It is proposed that the clay material used for the clay core within the constructed dykes be sampled with Shelby tubes and its hydraulic conductivity be determined using the falling head permeability test. As previously discussed, the till material is very dense, thus a Shelby tube sample cannot be recovered of this material. A Denison Sampler could theoretically be used to collect an

undisturbed sample of the till, though there is a potential for difficulties of obtaining undisturbed samples in a very dense till containing gravel, cobbles or boulders. Thus, it is proposed that the methodology to sample the till layer remain consistent with what was previously completed, using the standard practice for obtaining intact block samples (ASTM D7015) and using the standard test method for one-dimensional consolidation properties of cohesive soils (ASTM D4186) to determine the material's hydraulic conductivity.

4.2.1 Proposed New Biosolids Storage Facility

The new storage facility will be constructed as illustrated in the EAP design drawings (enclosed) and will be located in the southwest quarter of section 10-21-3 EPM.

Each of the six pond areas will have a capacity of 2,290 m^3, thus the total biosolids capacity is 13,740 m^3 for a three-year period. The anticipated future biosolids generation over three years is 12,812 m^3.

4.2.2 Construction Details

The biosolids storage facility construction is based on the information and recommendations provided in the Geotechnical Report. According to the subsurface profiles in the Geotechnical Reports, the depth of topsoil in the proposed area is approximately 300 - 450 mm. Organic soil from the development area will be stripped, stockpiled and reapplied on the dykes and applicable disturbed areas as shown in the drawings.

For pond construction, the proposed bottom of the proposed ponds will be the in-situ dense till and the dykes will be constructed with a 1.2 m thick clay core that ties into the till a minimum of 0.3 m, creating a continuous liner. The proposed development location has limited clay material present but in suitable quantities to be used for the clay core in the perimeter dykes. Testing of the clay core will be based on collecting Shelby tube samples and determining its hydraulic conductivity using the falling head permeability test method. Based on preliminary discussions with Manitoba Sustainable Development we anticipate that if liner testing on the pond bottom floor is required, it proposed that it be completed by obtaining block samples and the hydraulic conductivity be determined using a one-dimensional consolidation test.

The new facility will be constructed as detailed in the drawings. The interior side slopes of the constructed ponds will be 3:1 (horizontal:vertical) while the exterior slopes will be 4:1. The proposed ponds will have a 2.0 metre dyke height as measured from the interior finished pond bottom. The sludge is not to be stored in a pile higher than 1.0 m, allowing for a freeboard of 1.0 m. The dykes will be constructed with in-situ material in 150 mm lifts compacted to 95% Standard Proctor density with a 1.2 m thick clay core that is tied into the till material minimum depth of 0.3 m. The moisture content of the material should be minus two percent to plus 3 percent of optimum moisture as determined by the Standard Proctor test. Any unsuitable material such as coarse gravel and boulders should be removed. The top of the dykes will be 1.2 m wide.

The ponds will be designed with drainage laterals that collect leachate/runoff from the biosolids within the facility. The laterals will connect to a tank that can be pumped out and returned to the WWTP.

A perimeter drainage ditch will be constructed around the new ponds, if required. Other ditching will be located as shown on the drawings. For disturbed areas where sediment or erosion control is deemed necessary, the contractor will be required to employ appropriate measures.

6.1 Operations

Operation of the biosolids storage facility must comply with the specifications, limits, terms and conditions of the existing Environment Act Licences.

The biosolids facility is designed to provide 3 years' worth of storage based on the future design biosolids generation. Within each individual pond are three storage areas (Pond 1a, 1b; Pond 2a, 2b; and Pond 3a, 3b). As such, each storage area (at design loading) will take 6 months to fill after which the biosolids will sit idle for a one-year period before being land applied. The cell will then remain unused for a year before resuming the process. This will allow the RM flexibility to delay the biosolids land application if conditions arise (e.g. wet weather) such that it is not feasible during the land application window.

Figure 6-1 details the fill and storage periods as well as the land applications windows for removal from the ponds.

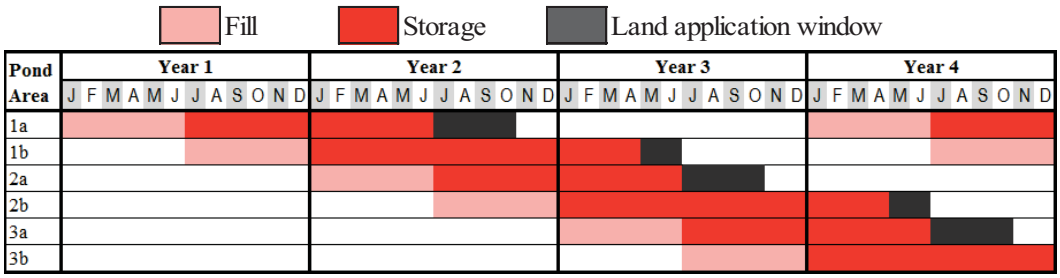

Figure 6-1: Storage Facility Stages: Fill, Storage and Land Application Periods

The design of the storage facility includes perforated laterals enclosed in a drainage stone trench that will serve to collect leachate and runoff from the biosolids. The laterals will connect to a tank which will be pumped out and returned to the WWTP. Pumping out the leachate will be done on an "as required" basis.

Yours sincerely,

WSP Canada Inc.
Dana Bredin, P.Eng.

Encl. Drawings CL101, CL102 & CL301, Issue 2

cc: Dick Menon, P.Eng., RM of Gimli

WSP ref.: 181-03988-00

N

NOTES:

1. LOCATION OF UNDERGROUND STRUCTURES AS SHOWN IS BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE CONSULTANT OF ANY ERROR OR OMISSION IN THE LOCATION OF ALL EXISTING UTILITIES SHOWN ON THE DRAWING.
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4. MANITOBA GOVERNMENT HELIX PIPE BENCHMARK ALONG CAMP NEUSTADT ROAD, NEAR NORTHEAST CORNER OF SECTION 36-20-03 EPM, 14.8 KM NORTH AND 1.6 KM WEST OF JUNCTION OF HIGHWAYS NOS 8 AND 231, ON NORTH SIDE OF ROAD ALLOWANCE, 30.0M NORTH OF EAST-WEST POWERLINE, ABOUT 23M WEST OF CENTRE OF GRAVEL ROAD ALLOWANCE, 12.3 M WEST OF MANITOBA GOVERNMENT MARKER POST, 50 CM BELOW GROUND LEVEL. ELEV= 230.524.

EXISTING	LEGEND	PROPOSED
	WATERMAIN	
WWS	WASTEWATER	WWS
LPS	LOW PRESSURE SEWER	LPS
FM	FORCEMAIN	FM
⊗	GATE VALVE	
○	MANHOLE	●
◇	HYDRANT	●
•	UTILITY POLE	
⟵	GUY WIRE	
□	CATCH BASIN	■
△	CURB INLET	▲
⊠	HYDRO TOWER	
▾	SIGN	
⊠	MTS PEDESTAL	
⊕	SURVEY BAR	
◆	TEST HOLE/TEST PIT	
	CLEAN OUT	CO
	CULVERT	
	DITCH / SWALE	
	TREE OR SHRUB LINE	
	FENCE LINE	
	HYDRO	
	GAS MAIN	
	MTS	
	DIRECTION OF FLOW	
	WICK DRAIN	
	RIP RAP	
	GROUND ELEVATION	99.000
99.000	DITCH ELEVATION	99.000
99.000	ROAD/DYKE ELEVATION	99.000
	DYKE	

IS	RE	DATE	DESCRIPTION
2	0	2019-10-18	APPROVALS SUBMISSION
1	0	2018-06-13	APPROVALS SUBMISSION

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ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
WSP Canada Inc.
No. 5750 Date: OCTOBER 18, 2019

PROVINCE OF MANITOBA
D.T.G. BREDIN
Member
33864
OCT 18, 2019
REGISTERED PROFESSIONAL ENGINEER

CLIENT:
PRELIMINARY
NOT FOR CONSTRUCTION
CLIENT REF. #: -

PROJECT:
RM OF GIMLI BIOSOLIDS STORAGE FACILITY
PROJECT NO: 181-03988-00
DATE: 2018-06-13

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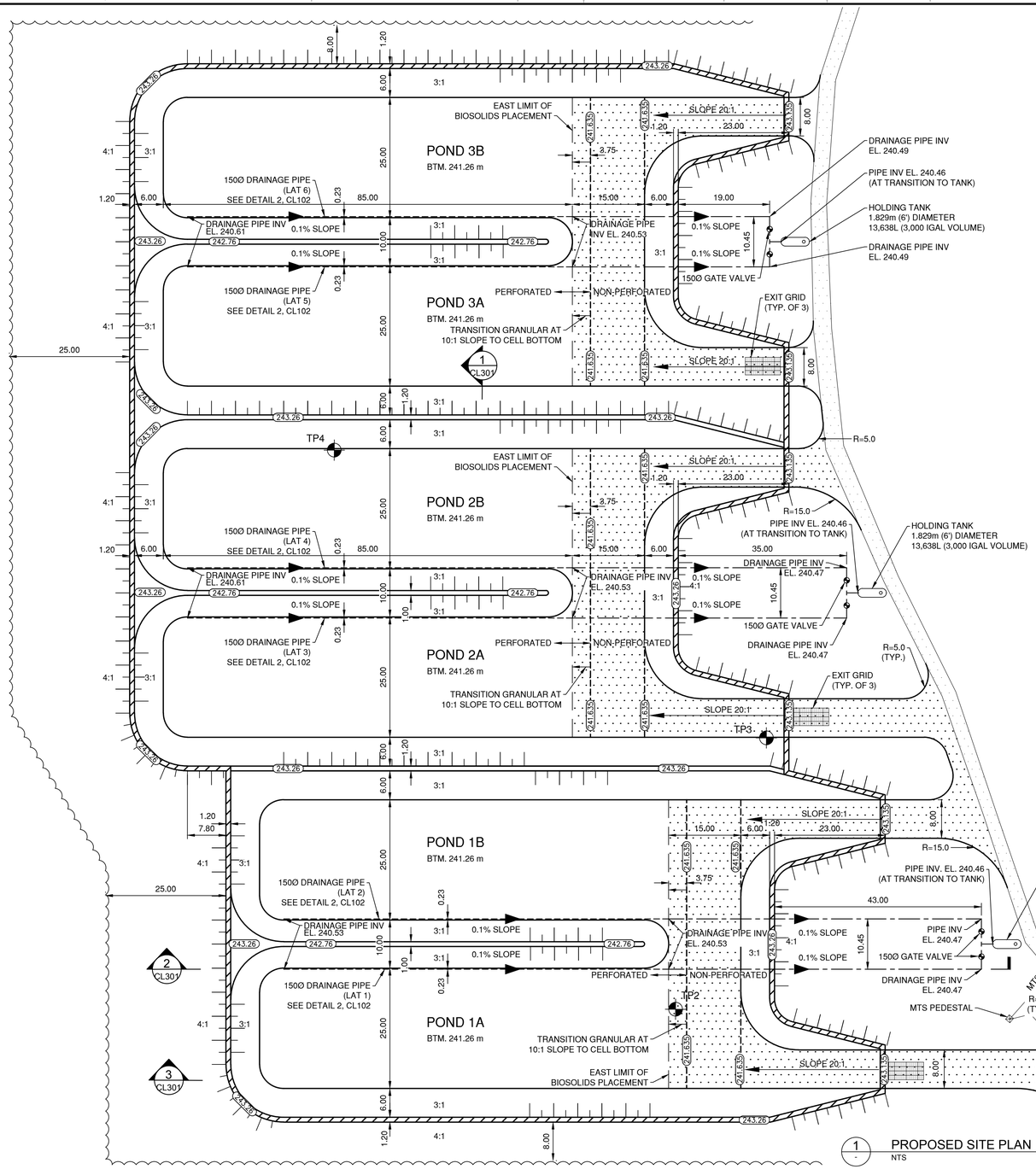

1 PROPOSED SITE PLAN
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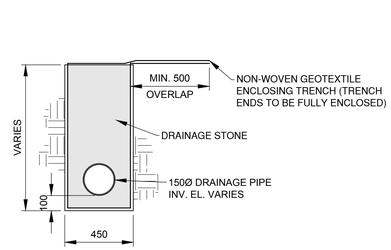

2 TRENCH DETAIL
NTS

CLAY CORE

COMPACTED GRANULAR MATERIAL

EXISTING ROAD

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⟵	GUY WIRE	
□	CATCH BASIN	■
△	CURB INLET	▲
⊠	HYDRO TOWER	
▾	SIGN	
⊠	MTS PEDESTAL	
⊕	SURVEY BAR	
◆	TEST HOLE/TEST PIT	
	CLEAN OUT	CO
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	DITCH / SWALE	
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	FENCE LINE	
	HYDRO	
	GAS MAIN	
	MTS	
	DIRECTION OF FLOW	
	WICK DRAIN	
	RIP RAP	
99.000	GROUND ELEVATION	99.000
99.000	DITCH ELEVATION	99.000
99.000	ROAD/DYKE ELEVATION	99.000
	DYKE	

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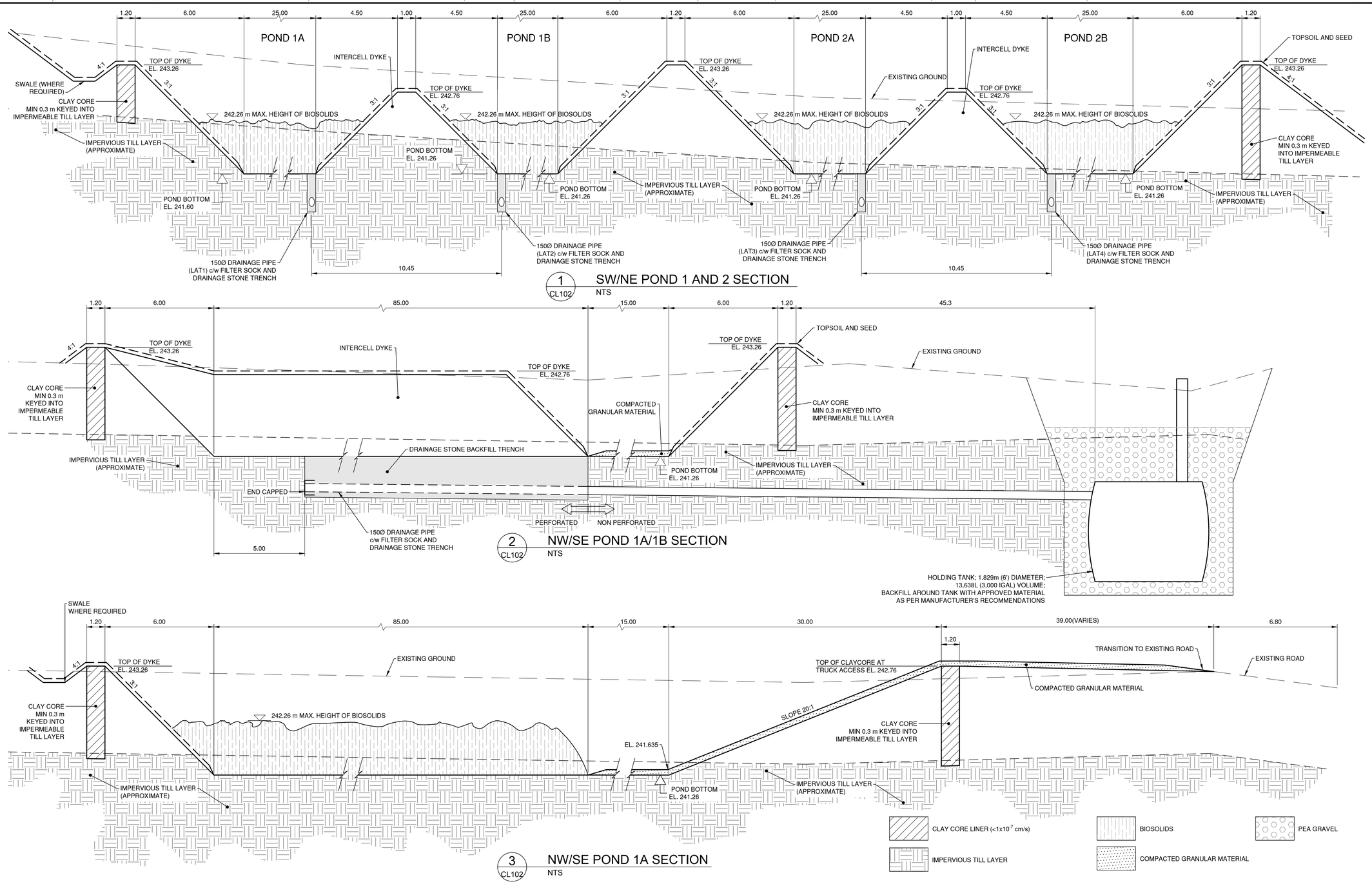

1 CL102 **SW/NE POND 1 AND 2 SECTION**
NTS

2 CL102 **NW/SE POND 1A/1B SECTION**
NTS

3 CL102 **NW/SE POND 1A SECTION**
NTS

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