

County of Vermilion River
P.O. Box 69
4912 – 50 Avenue
Kitscoty, AB T0B 2P0

October 9, 2024
File: N:\5205\003\01\L35R1

Attention: Ben McPhee
General Manager – Public Works Operations

Dear Ben:

**Re: County of Vermilion River Hamlet of Blackfoot Wastewater System Upgrades
Treated Effluent Disposal on SE12-50-02-4 – Draft Executive Summary Review**

1.0 Introduction

In June 2024, MPE a division of Englobe (MPE), Environmental Management Consultants (EnviroMak), and Soil and Forestry (S&F) determined that disposal of treated effluent from the Hamlet of Blackfoot's (Hamlet's) wastewater treatment facility would be feasible on SE12-50-02-4 either via an evaporation pond (Option A) or by treated effluent irrigation (Option B).

Further field investigations were completed, and they are:

1. EnviroMak completed a field assessment and has provided a draft report entitled "Draft Environmental Screening and Delineation of Wetlands to Inform Evaluation of Feasibility of Blackfoot Wastewater Treatment Effluent Disposal in Parts of SE12-50-2-W4M." A copy of the report is provided separately.
2. Soils and Forestry completed a field assessment and has provided a report entitled "Agricultural Feasibility Report" and includes the "Level II Land Irritability Classification Report". A copy of the report is provided separately

The following provides a summary review of the outcomes of the above two reports and presents a comparison of the two options.

2.0 Option A: Effluent Disposal via Evaporation Pond

2.1 Regulatory Review

2.1.1 Water Act

A few wetlands would be impacted by the evaporative lagoon and therefore regulatory approval and/or permitting under the Alberta Water Act would be required. EnviroMak's preliminary review determined that the wetlands within the area are classified as either C or D. Classes range from A to D, with A being

the highest valued wetlands and D being the lowest. For this draft report, we are estimating the impacted wetlands as Class C, pending the final report from EnviroMak.

2.1.2 Alberta Environment and Parks

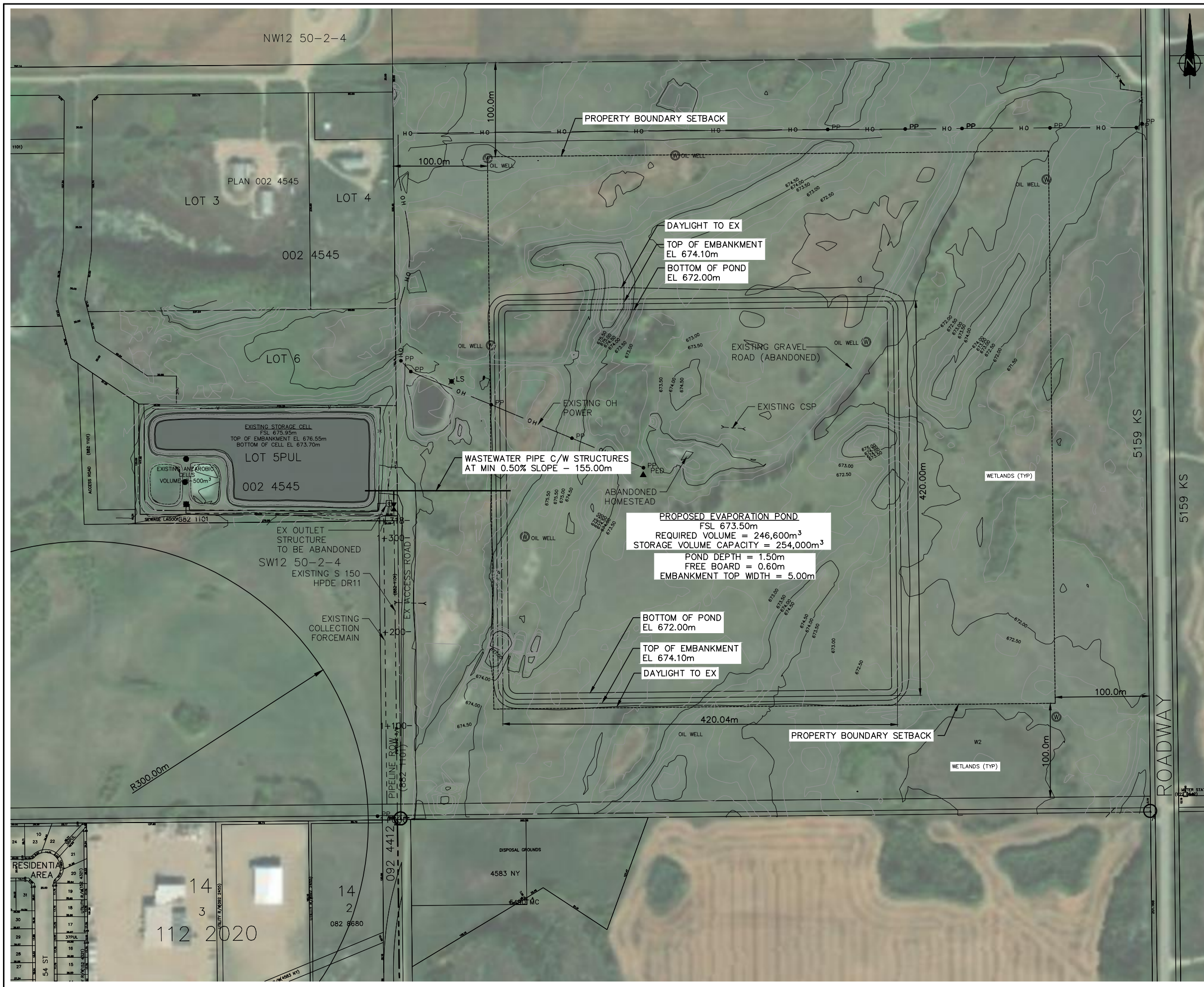
AEP Standards stipulate that wastewater systems with average daily design flows of less than 250 m³/d only require one evaporation cell with provisions at the inlet to the cell for settlement. For systems with flows larger than 250 m³/d, the evaporation cell shall be preceded by two anaerobic or two facultative cells.

The Hamlet of Blackfoot's wastewater design flow is 101 m³/day but the existing anaerobic and facultative cells would be maintained upstream of the proposed evaporation pond to provide preliminary treatment. This exceeds AEP requirements.

2.2 Proposed Upgrades

MPE completed an evaporation pond sizing memorandum which determined the evaporation pond size requirement of 246.6 ML and a footprint of approximately 20.25 ha. The pond water depth would be 1.27m and side slopes of 5H:1V. Figure 2.1 shows a simplified concept of the pond in square shape placed at a setback limit of 100m from the west and south property lines. The scope for an evaporative pond would include.

- Installation of interconnecting piping from the existing facultative lagoon cell to provide gravity flow to the evaporative lagoon.
- Construction of a 246.6 ML capacity pond including structures and piping.
- Removal of all existing infrastructure including homesteads, roads, and overhead powerline.
- Construct an access road.
- Removal / Decommission of abandoned oil wells.



- NOTES:
1. BOLD ITEMS INDICATE WORK TO BE COMPLETED AND LIGHT ITEMS INDICATE EXISTING CONDITIONS.
 2. BOREHOLE LOCATIONS ARE APPROXIMATE ONLY.
 3. THE CONTRACTOR SHALL CALL ALBERTA ONE-CALL AT 1-800-242-3447 AT LEAST THREE (3) WORKING DAYS PRIOR TO BEGINNING ANY EXCAVATION OR REMOVALS.
 4. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL GAS LINE CROSSINGS WITH UTILITY COMPANY.
 5. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADEQUATE BARRICADES, CONSTRUCTION SIGNAGE, TRAFFIC CONTROL, AND FLAGPERSONS.
 6. THE CONTRACTOR IS RESPONSIBLE FOR MEETING OCCUPATIONAL HEALTH AND SAFETY REGULATIONS.
 7. MAINTAIN SEPARATE STOCKPILE OF SELECT CLAY MATERIAL TO BE LATER USED FOR CONSTRUCTION OF STRUCTURAL EARTHWORK FILL EMBANKMENTS FOR LAGOON CONSTRUCTION AND FOR BACKFILL AND LANDSCAPING AROUND LAGOON SITE.
 8. DESLUDGE EXISTING FACULTATIVE CELL.

THIS DRAWING MAY HAVE BEEN MODIFIED FROM ITS ORIGINAL SIZE. ALL SCALE NOTATIONS INDICATED (i.e. 1:1000 etc) ARE BASED ON 11"x17" FORMAT DRAWINGS

ISSUE	YY-MM-DD	REVISION



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COUNTY OF VERMILLION RIVER

HAMLET OF BLACKFOOT
 WASTEWATER SYSTEM UPGRADES
 OPTION A – EVAPORATION LAGOON
 EXPANSION

CIVIL
 EXISTING AND PROPOSED LAGOON
 CONCEPT SITE PLAN

DESIGNED	R.S., I.K.	JOB	5205-003-03
DRAWN	A.E.	SCALE	1:2000
DATE	SEPTEMBER 2024	FIGURE	2.1

3.0 Option B: Effluent Disposal via Irrigation

3.1 Regulatory Review

3.1.1 Water Act

It is not anticipated that any wetlands would be impacted with this option. However, if it is determined that wetland a few wetlands need to be disturbed to allow for proper irrigation. regulatory approval and/or permitting under the Alberta Water Act would be required.

3.1.2 Alberta Environment and Parks

The minimum treatment requirement for treated wastewater irrigation is primary treatment (anaerobic cells in series or facultative cells) followed by at least seven months storage. The County completed sampling of their wastewater prior to discharge on April 02, 2024, while S&F did sampling on August 29, 2024. The lab results are summarized in Table 3.1 on the following page against the AEP standards and for treated effluent quality for wastewater irrigation.

Table 3.1 – Hamlet of Blackfoot Wastewater Characterization and AEP Treated Effluent Quality Standards for Wastewater Irrigation

Parameter	Results		Standard	Type of Sample	Comments
	2024/08/29	2024/04/02			
Total Coliform*	2100	-	<1000/100 mL	Grab	Geometric mean of weekly samples (if storage is provided as part of the treatment) or daily samples (if storage is not provided) in a calendar month.
Fecal Coliform*	610	-	<200/100 m	Grab	
(BOD)	6	6	<100 mg/L	Grab/Composite**	Samples collected twice annually prior to and on completion of a major application event.
(COD)	40	-	<150 mg/L	Grab/Composite**	
TSS	4	-	<100 mg/L	Grab/Composite**	
EC	1.79	0.249	<2.5 ds/m	Grab/Composite**	
SAR	3.5	1.1	<9	Grab/Composite**	
pH	7.85	7.66	6.5 – 9.5	Grab/Composite**	

* For golf courses and parks only.

** Grab sample would suffice if storage were provided; Composite sample is required if storage is not provided.

The isolated grab samples show that the lagoon’s treated effluent meets AEP’s requirements for all constituents except for Total and Fecal Coliform. As these were grab samples, they are not representative of the 30-day geometric mean of weekly samples. Nevertheless, fecal and total coliform are regulated only if the treated wastewater is used for golf courses or parks, which is not the case here.

For irrigation on SE12 for the purposes of native pasture and forbs used to graze cattle, the Hamlet’s wastewater would be considered environmentally acceptable and agriculturally beneficial.

Irrigation would be scheduled so that wastewater discharge does not occur 30 days prior to harvesting of crops or grazing by dairy cattle, or seven days prior to pasturing by other livestock other.

3.2 Proposed Upgrades

Upgrades to the existing lagoon would still be required to expand the treatment and storage capacity to meet the future wastewater demands. Proposed upgrades for this option would include but not be limited to

- Existing Lagoon upgrades including expanding the storage capacity to 40,000m³
- Installation of an irrigation system which would include.
 - A supply pipeline from the lagoon to the SE12-50-15-4
 - An irrigation pumping station i.e. manhole equipped with a vertical turbine exterior rated pump.
 - Power supply to the pump station
 - Irrigation piping and volume gun systems.

4.0 Options Comparison

Two alternatives have been investigated for upgrading the Hamlet of Blackfoot’s wastewater treatment system, in particular wastewater disposal. These upgrades build on the existing infrastructure with modifications that meet the Hamlet’s current and future needs and regulatory requirements.

Table 4.1 – Comparison of Alternatives

Option	Option A – Evaporation Pond	Option B – Irrigation
Capital Cost	High	Low
Maintenance Costs	Low	Medium
Net Present Worth	High	Low
Ease to Operate	Low	Medium
Footprint Requirement	High	Low

Option A presents much lower operational and maintenance costs however the capital costs are about 5 times higher than Option B. Option A also presents a requirement of significant amount of land.

5.0 Closure

MPE is still completing a conceptual design of the irrigation system in conjunction with Soils and Forestry and with EnviroMak as they finalise their report. Hence this report is presented as a draft and shall be finalised together with preliminary comments from the Town.

We thank you for the opportunity to be of service and to have prepared the reports on your behalf and look forward to assisting you in implementing your plans for the future. If you have any inquiries regarding any of the submitted reports or if clarification is required, please contact Ryan Sharpe or the undersigned.

Yours truly,

MPE a division of Englobe



Ivan Kagoro, P.Eng.
Project Engineer