

County of Vermilion River

BLACKFOOT WASTEWATER SYSTEM IMPROVEMENT PROJECT



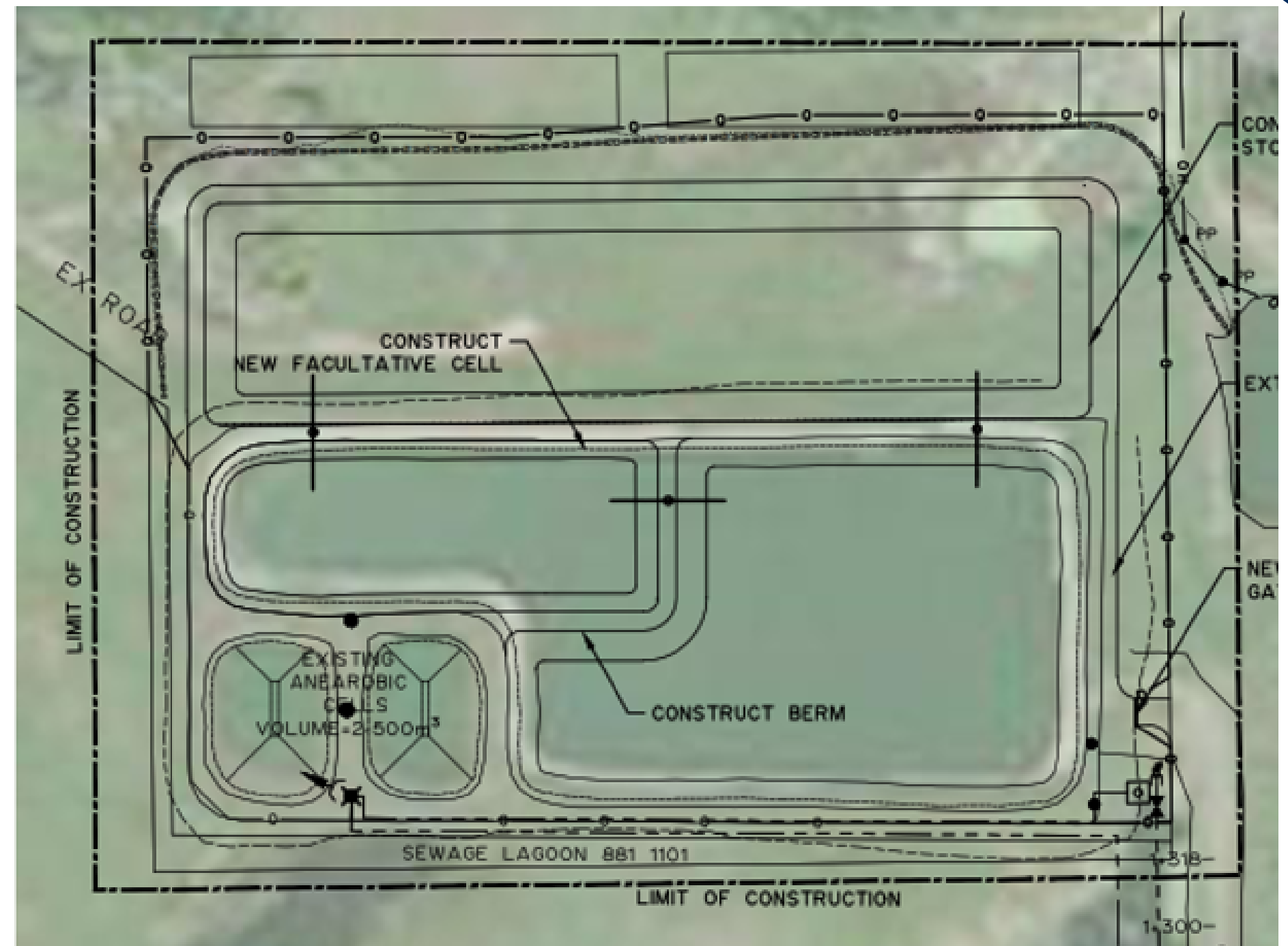


EXISTING LAGOON

A man-made lagoon is created to receive, hold and treat wastewater, ensuring that it is safe before returning to the environment. The County of Vermilion River desires to grow the Hamlet of Blackfoot and has identified the need to upgrade the current lagoon system due to increased wastewater volumes. The upgraded wastewater treatment system is designed to surpass regulatory requirements set by both Federal and Provincial Governments. In all of our projects, the County of Vermilion River remains dedicated to being responsible stewards of the land and environment.

The proposed 44,000³ storage cell, designed for an average sewage flow of 160 to 200 litres per capita per day (lcdc) based on historical data, will discharge treated wastewater. This discharge will adhere to the approved 22 litres per second (l/s) rate for the ditch road right-of-way and drainage channel. The treated wastewater will follow a Southward path within the Blackfoot-Devonia drainage system, passing West of Devonia Lake, and then continuing Southwest within the drainage system before transitioning into Blackfoot Creek.

To ensure consistency along the approved drainage channel, initial water samples have been taken at specified locations indicated on the Piped Discharge Route map.



PROPOSED LAGOON EXPANSION

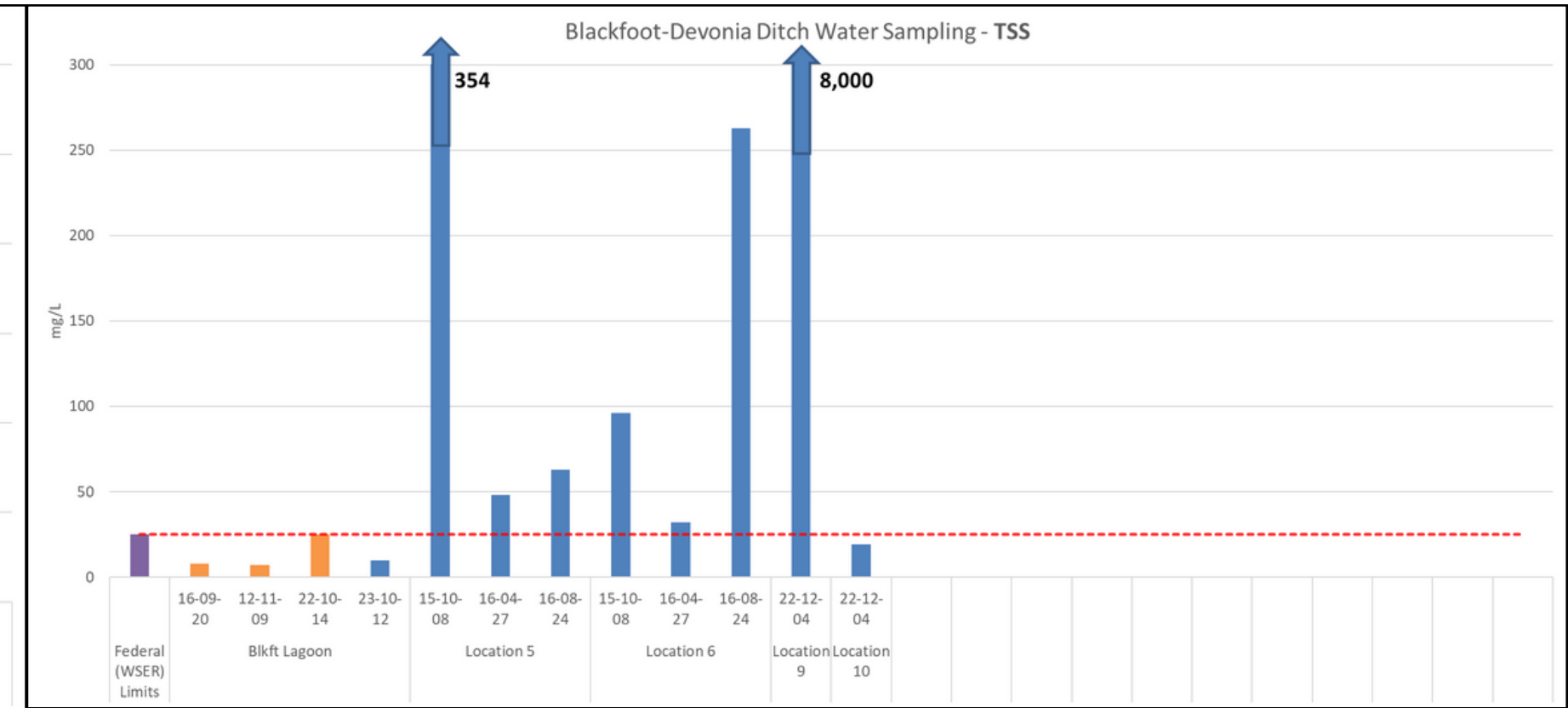
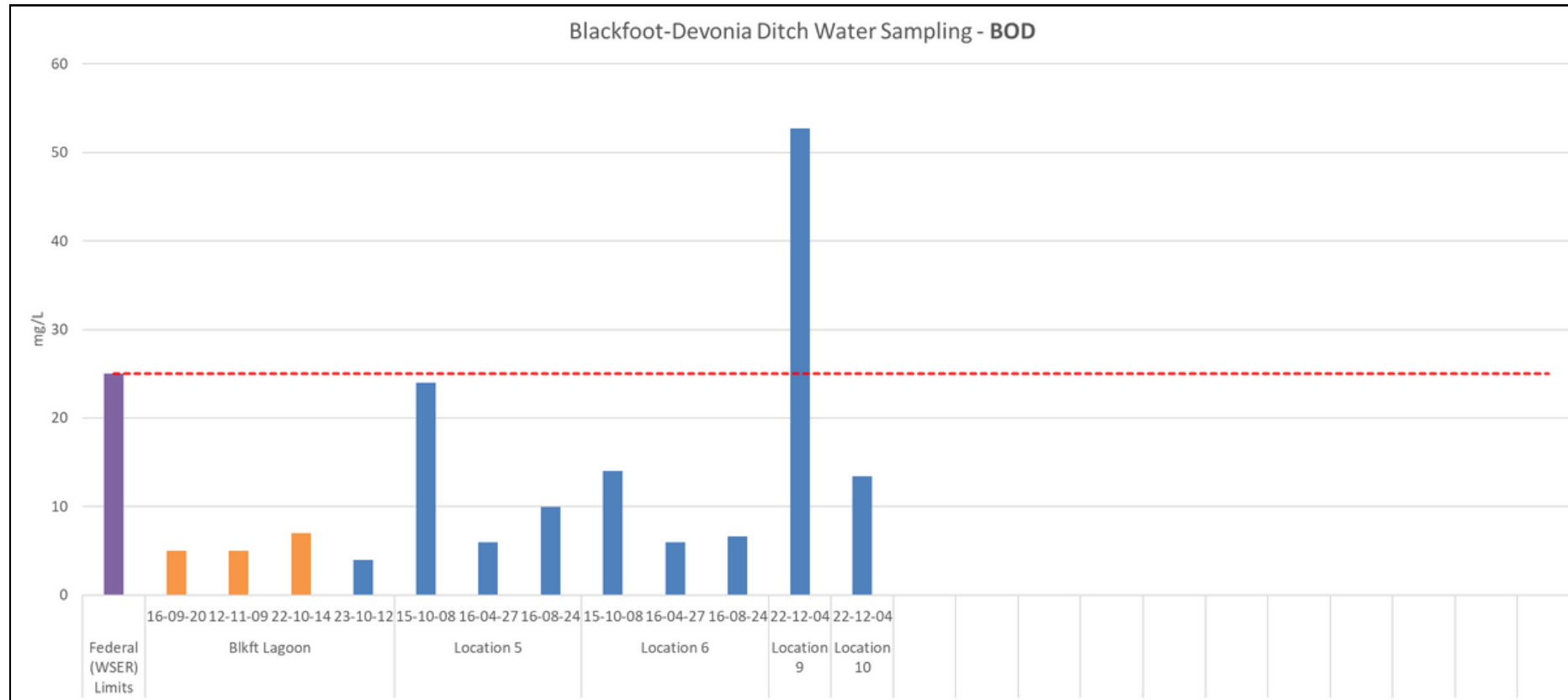
PROJECT REVIEW

The wastewater treatment facility has been designed to surpass the regulations established by the Federal Government and the *Alberta Environment and Parks Standards and Guidelines*. The facility will comply with or exceed the maximum allowable concentrations stated in the Wastewater Systems Effluent Regulations (WSER), which includes biochemical oxygen demand (BOD), total suspended solids (TSS), and ammonia.

To verify the quality of the treated wastewater, the County of Vermilion River conducted preliminary testing at seven (7) different locations along the proposed discharge route in three (3) different seasons; fall, spring and summer during the period between 2016 to 2023. The results of the surface water sampling showed that the lagoon designs and the treated wastewater proposed to be discharged meet a higher quality and standard than the WSER requirements.

Discharging the treated water into the Blackfoot-Devonia ditch system is expected to enhance the overall water quality of the existing run-off in the ditch system

BLACKFOOT-DEVONIA DITCH WATER SAMPLING



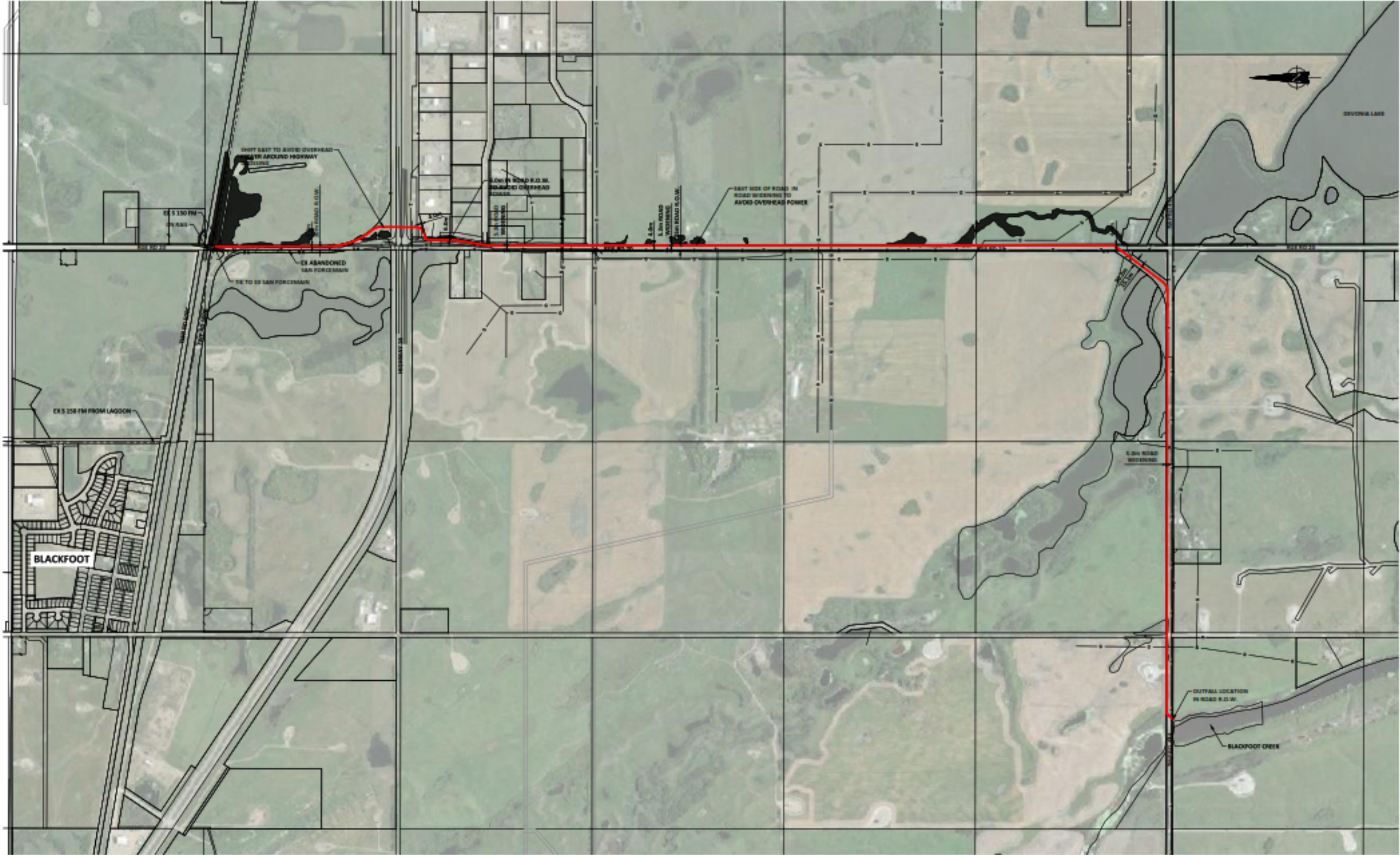
Blackfoot Drainage Ditch - Baseline Water Quality Test

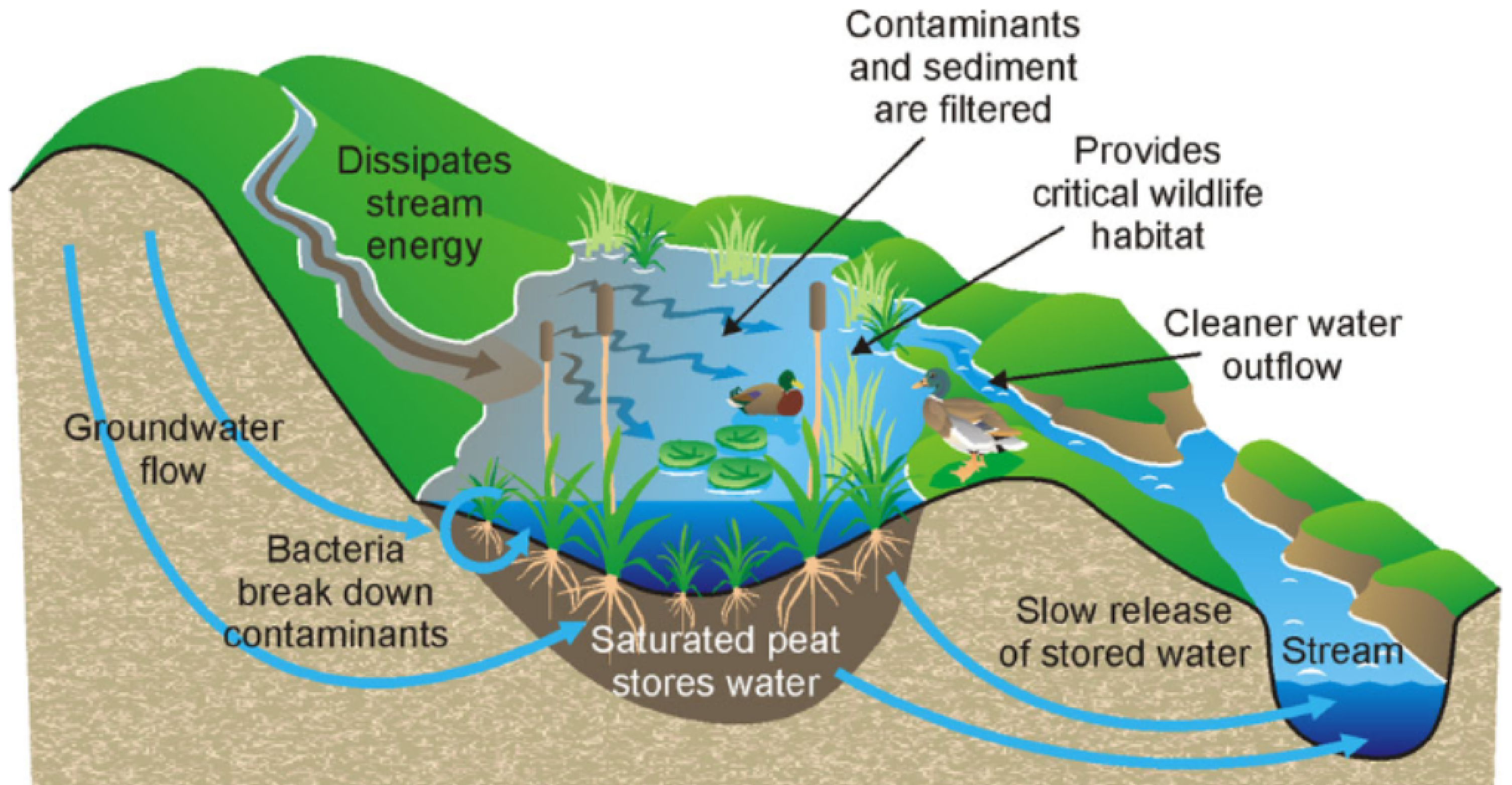
Parameter	Units	Federal (WSER) Limits	Blkft Lagoon				Location 5			Location 6			Location 9	Location 10
			16-09-20	12-11-09	22-10-14	23-10-12	15-10-08	16-04-27	16-08-24	15-10-08	16-04-27	16-08-24	22-12-04	22-12-04
BOD	mg/L	25	5	5	7	4	24	6	10	14	6	7	53	13
TSS	mg/L	25	8	7	25	10	354	48	63	96	32	263	8,000	19
Ammonia-N (un-ionized)	mg/L	1.25	-	-	-	0	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.004	0.001

SAMPLE LOCATIONS MAP



PIPED DISCHARGE ROUTE



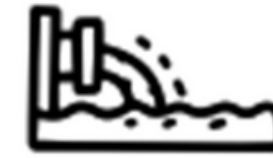


WASTEWATER TREATMENT PROCESS

IS WASTEWATER SAFE TO BE DISCHARGED INTO THE ENVIRONMENT?

Yes. A sewage lagoon system works to restore the natural aerobic ecosystem. Wastewater flows to a facultative lagoon, which provides both aerobic (at the surface) and anaerobic (at the bottom) conditions required for treatment. The algae plays an important role in the process to treat the wastewater. The algae uses the sun's energy, wind and carbon dioxide to produce oxygen that is used by aerobic/facultative bacteria in the wastewater to stabilize the organic matter in the upper layer of the lagoon. The solids, or sludge, settle to the bottom of the cell. This bottom layer of sludge decomposes anaerobically. This process uses microorganisms to breakdown the sludge, grease and other solids that are in the lagoon. Wastewater is annually dispelled from the lagoon and tested multiple times before being returned to the environment. Additionally, the lagoon cells are lined to prevent sludge from entering the ground and a fence is secured around the lagoon area to prevent people and animals from entering.

How does the Wastewater System currently work?



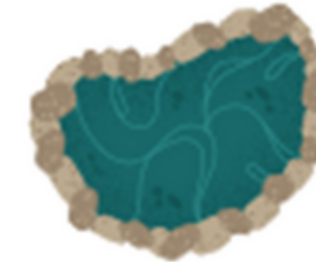
Wastewater flows through pipes and it delivered to the lagoon into a facultative cell



The wastewater treated and regularly tested before it is returned to the environment. Wastewater is discharged annually.



The wastewater is treated by the combination of algae, sun, wind and carbon dioxide to provide conducive conditions for treatment. The sludge settles to the bottom and is broken down.



Wastewater remains in the lagoon undergoing to biochemical process.

BEST WASTEWATER TREATMENT METHOD

There are more than 7,000 municipal lagoons in North America. Biological lagoon treatment is one of the most common wastewater treatment methods used due to its low operating and maintenance costs. Typically done using natural processes (gravity, oxygen)

Lagoon Treatment System

Municipal Lagoons - Treatment of Wastewater

BASIC PROCESS

1. Anaerobic Cells

Pretreatment of wastewater to promote sedimentation of suspended solids

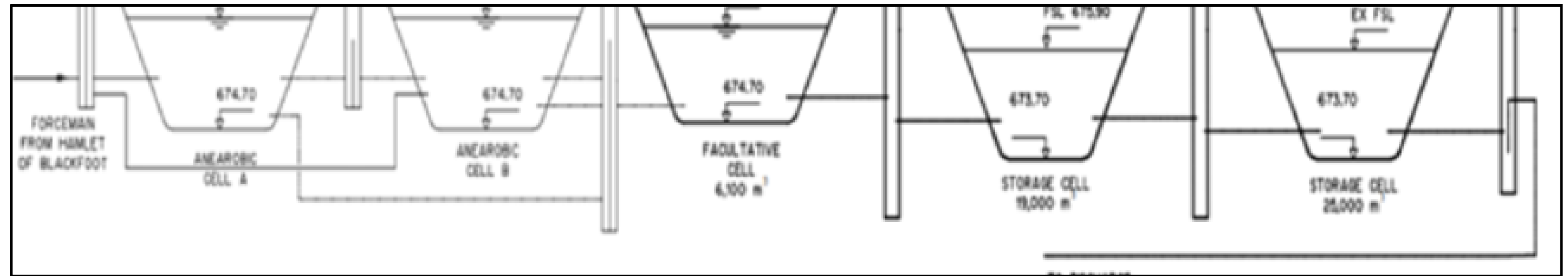
2. Facultative Cells

Treatment of wastewater using predominantly aerobic conditions

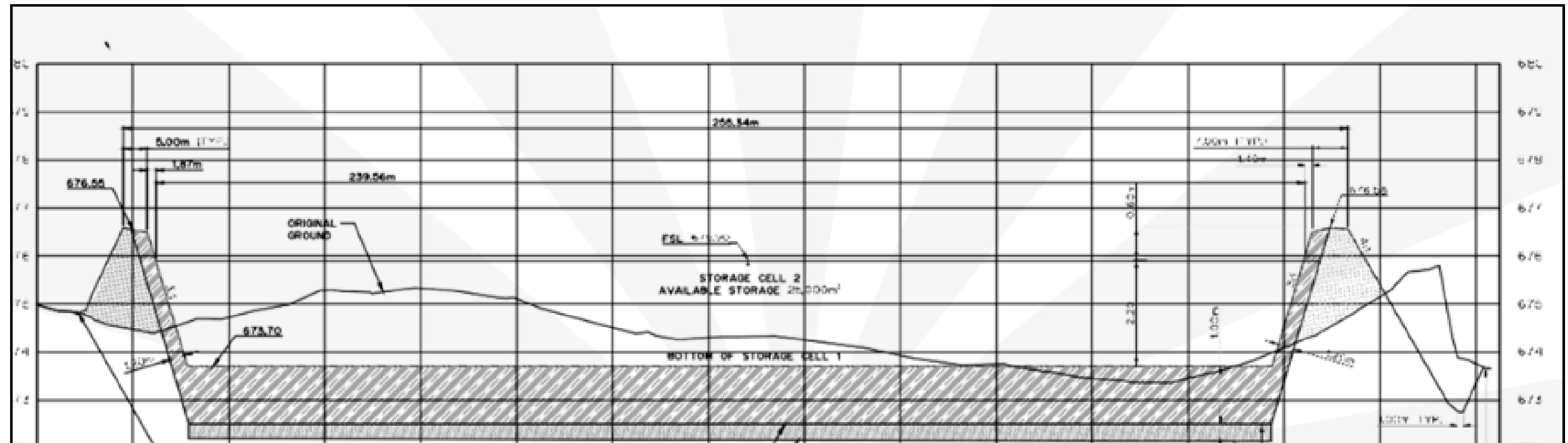
3. Storage Cells

Provide additional treatment including nutrient removal under facultative conditions

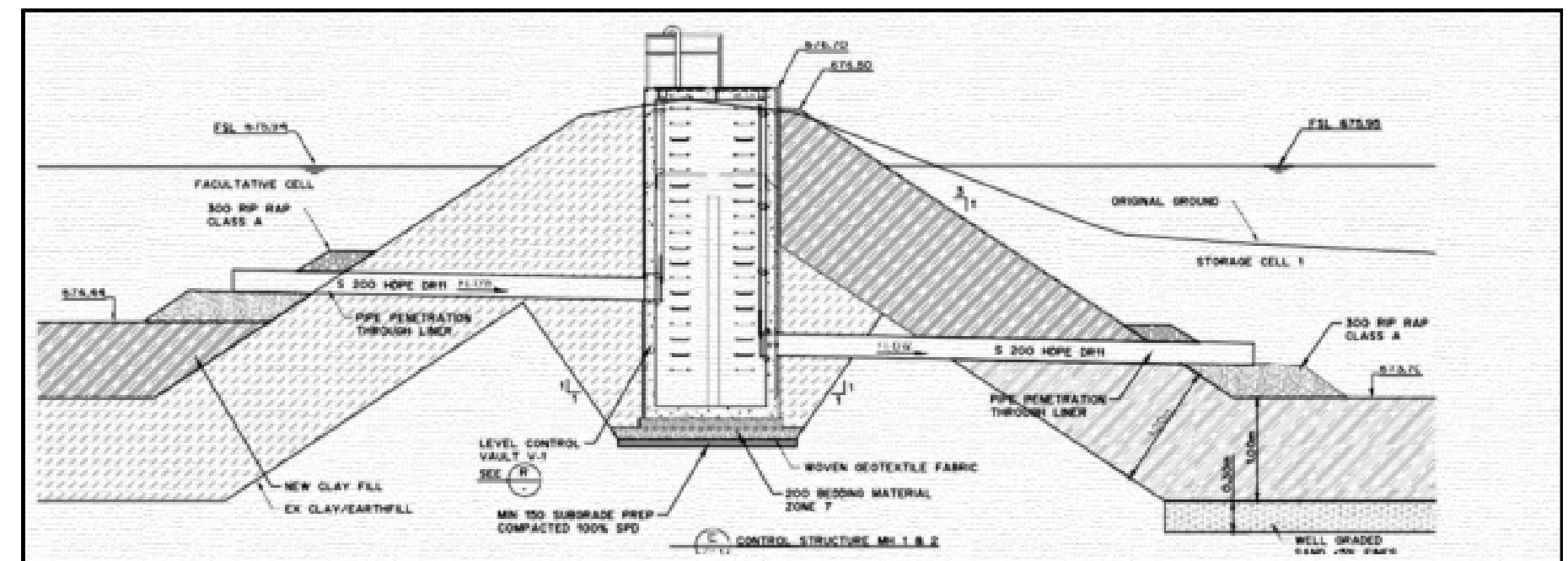
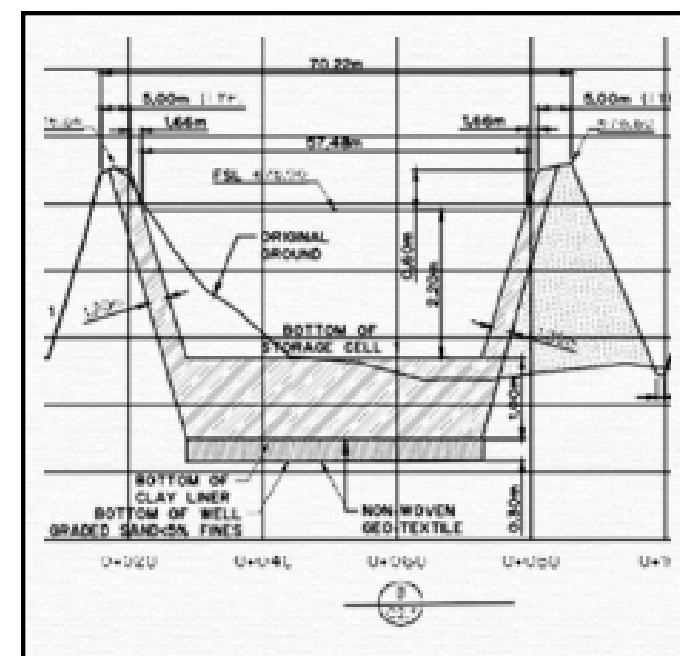
HYDRAULIC PROFILE



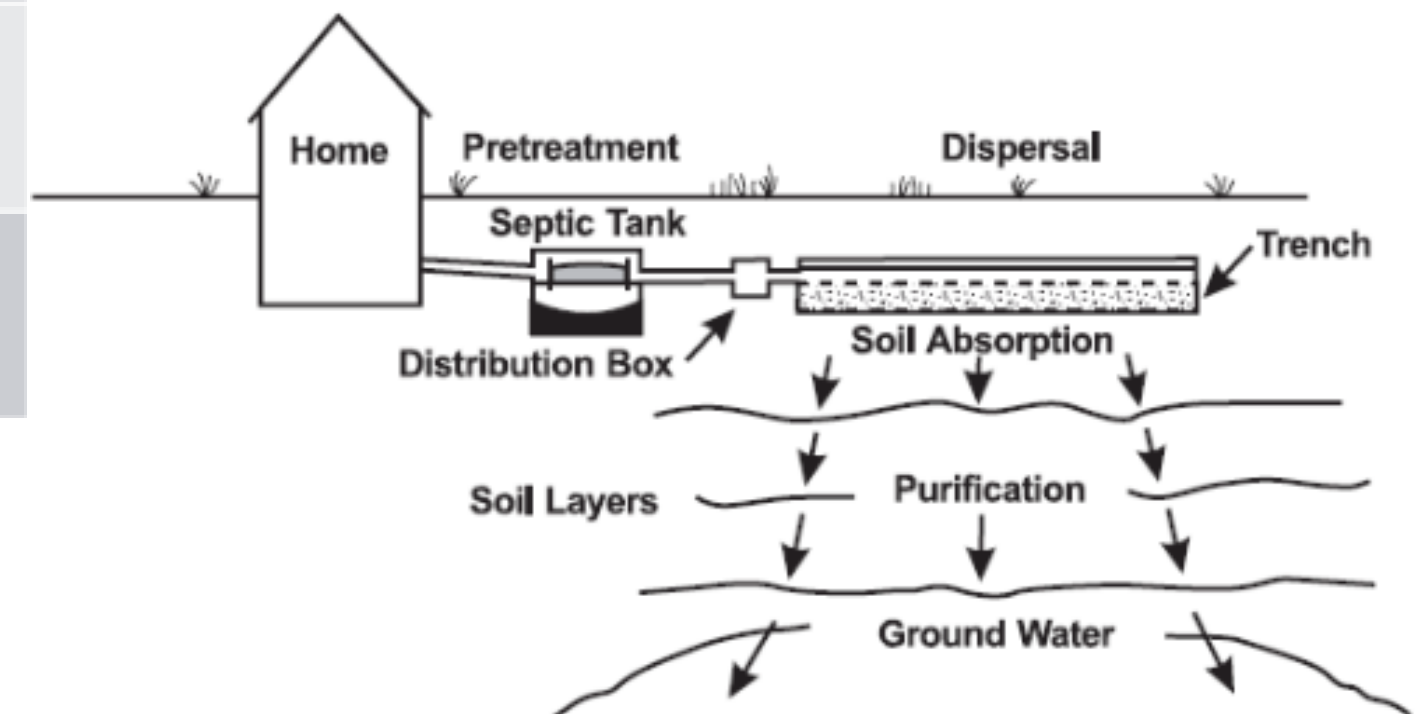
STORAGE CELL - CROSS-SECTION



LAGOON STRUCTURES - CROSS-SECTIONS



	PRIVATE SEPTIC SYSTEM	PUBLIC SEWER SYSTEM
Where does wastewater go?	Into the holding tank – Then trucked, pumped to a treatment field or discharged to ground surface.	Sewer lines carry it to your local treatment facility - Lagoon
How does it work?	Bacteria breaks down the organic waste and the liquid is released into or onto a drain field.	The facility treats the effluent and then sends them back to the local water supply.
What is the cost?	The cost of installation of tank and treatment system or discharge line, plus additional costs to have tank pumped out.	Monthly sewage costs on your utility bill.
What type of maintenance is needed?	The homeowner is responsible for the maintenance	Your local municipality is responsible for maintenance.
	The tank(s) need to be pumped out at least every couple of years.	Monitoring of system and very little maintenance



LAGOON ODOR	DESCRIPTION
Faint pond smell when nearby	Indicating low lagoon dissolved oxygen (DO) - SYSTEM IS HEALTHY
Earthy odor / brownish water	Mild earthy odor and minimal algae blooms - SYSTEM IS GOOD
Earthy or gassy odor / green water	Excessive algae bloom occurs in spring and summer - MONITOR SYSTEM for excessive algae growth
Fishy odor	Blue-green algae can create strong fishy odor - SYSTEM IS UNHEALTHY
Sulfurous odor	Rotten egg smell due to lack of oxygen - SYSTEM IS STRESSED
Septic sewage odor	Raw sewage odor - SYSTEM FAILURE

WHY DO WE RETURN WATER TO THE ENVIRONMENT RATHER THAN RELEASING WATER OUTSIDE THE COUNTY?

The County of Vermilion River recognizes the importance of providing a sustainable wastewater system to the Hamlet of Blackfoot. The proposed upgrades are being considered to enhance the systems' capabilities and benefit the surrounding areas.

To preserve the environment, the quality of treatment will be constantly monitored and analyzed.

It is important to treat wastewater with the same responsibility as drinking water. No one would drink water from an untested source without analyzing its quality, so it is crucial to apply the same attitude towards cleaning wastewater before returning it to nature.

The County of Vermilion River supports sustainable environmental management and builds upon the Government of Alberta's strategies and goals to safeguard water resources within the County.