

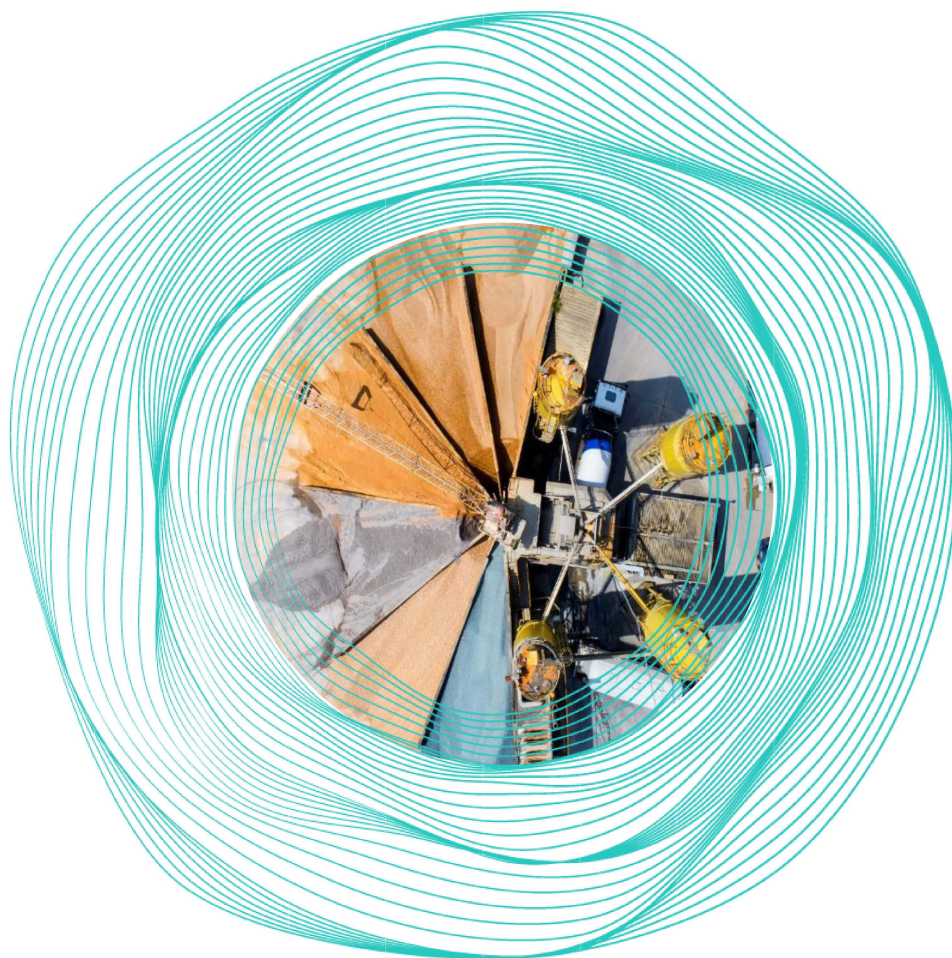


IMPERIAL OIL RESOURCES LTD.

Norman Wells Operations Interim Care & Maintenance (ICM)

Groundwater Management Plan

Document No. Rev. 2: 417085-49223-CA-REP-00002



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PROJECT 417085-49223-CA-REP-00002 : Norman Wells Operations - Interim Care & Maintenance (ICM) - Groundwater Management Plan

Rev	Description	Originator	Reviewer	TRSA Approver	Revision Date
0	Issued as Final	 S. Gibb/L. Glatiotis/ A. Haigh	 M. Brown	 S. Gibb	28 March 2024
1	Re-Issued as Final	 S. Gibb/L. Glatiotis/ A. Haigh	 M. Brown	 S. Gibb	12 August 2025
2	Re-Issued as Final	 S. Gibb/L. Glatiotis/ A. Haigh	 M. Brown	 S. Gibb	20 July 2026



Plain Language Summary

Summary

Imperial has been a member of the Norman Wells community since the early 1900s. During active operations, they took oil and gas from below the ground, treated it at the plant, and then sent it south in Enbridge's pipeline. Cessation of production is planned for August 2026, at which point the site will transition into an Interim Care and Maintenance (ICM) period pending the approval of the final closure and reclamation plan.

What is a Groundwater Management Plan?

Imperial has been given permission to use water from the Mackenzie River by the Sahtu Land and Water Board (SLWB). The licence includes rules about how much water can be taken, the quality of water returned to the environment, and how they monitor to check for potential impacts on surface water and groundwater.

This plan talks about how Imperial will monitor groundwater in and around the former operation to check that their ICM activities are not impacting the surrounding environment. The plan helps community members, Imperial's employees and Imperial's consultants understand how the groundwater monitoring program should work by:

- Describing how Imperial will use existing groundwater wells to test water in the ground.
- It talks about when, where, and how they will collect groundwater samples.
- Describing how the sampling results will be studied so we can figure out if the groundwater is changing because of something unusual, or just because it normally changes with the seasons.
- Talking about how they would do extra work if the groundwater quality is changing more than normal, so they can figure out why and fix it.

This groundwater program takes samples from groundwater wells to check them for changes that might indicate a problem with the way the site currently operates.

Imperial will also continue to work on their Closure and Reclamation (C&R) Program that separately monitors a larger network of groundwater wells and does cleanup work in areas where they already know there have been historical impacts that have come in contact with the groundwater. They will continue to work with the SLWB on these sites and continue to send them a report on this work each year. The C&R report is also available on the SLWB's public registry [<https://mvlwb.com/registry/S13L1-007>] so community members can look at it any time.



What, where, and when will groundwater be measured?

There are 47 monitoring wells in this program, including 19 older wells and 28 new locations. This represents an increase in the number and location of many monitoring wells in the program, from what is listed on their water licence from the SLWB as being part of the formal Surveillance Network Program (SNP). The program includes wells that are close to the previously active oil and gas facilities, the Mackenzie River, Bosworth Creek and on the natural islands. Areas where there are known natural seeps were avoided because this would make it more difficult to be sure if what is measured in the water samples was natural or from the oil and gas operations. Imperial will collect samples between July and September each year when the shallow groundwater is not frozen in most wells.

Maps of the sampling well locations and nearby facilities are in the back end of this document.

How does the warning system work?

Samples of the groundwater will be collected and sent to a lab for testing. Once the groundwater has been measured in the lab, the results will be sent to Imperial. They will check parameters in the groundwater that would be expected to change if fluids from the oil and gas operations touch them, called "indicator parameters". Many of these parameters also occur naturally in groundwater, so Imperial will have to look at changes over time to see if they are increasing, decreasing, or staying the same and whether those changes are normal or unusual. For some of the wells, Imperial already knows what normal changes for a specific well look like, because they have been measuring them for quite some time already. For others wells that are newer installations, it will take a few years before it is known how much change is normal. Understanding what is normal at each well is called the "baseline".

The indicator parameter results will be assessed using a statistical analysis, called Mann-Kendall analysis. The indicator parameter results will also be put on graphs to help visualize what is changing. If an increase or upward trend is identified, Imperial will take a deeper look to see why there is an increase. These changes (usually increases) are sometimes useful as a warning to help identify a potential issue, such as a leaking pipe or tank. In other cases, the increasing or decreasing trends may be natural occurrences.

What will Imperial do if a warning sign shows up?

The first thing Imperial will do if the lab reports an unusual result is check it. Sometimes samples can be contaminated on their way to the lab, or lab instruments are not working properly, or something gets entered into the computer incorrectly. The first step is therefore to confirm that these issues are not the cause of the unusual result. If the data quality review indicates that there are no errors with data entry or management, Imperial, and their consultants, would also check the result in comparison to the next sampling event to verify whether the warning sign is repeated. They would look at the sampled well to make sure it is not broken or otherwise compromised. Imperial might also check to see if a natural seep in the area may have caused the result. This process is called "verification".



Depending on the indicator parameter and the size of the change noted, it might be required to evaluate changes over several sampling seasons to determine if there is a significant trend.

If it turns out an unusual sample result is correct, then Imperial will start an investigation to determine what has happened and what is causing it. The key steps in an investigation may include:

- Quantification & Evaluation: to fully understand how big the change is and what is causing it.
- Delineation: to determine the size and shape of the change in water quality.

If Imperial's oil and gas activities are found to be causing the impact and are of concern, a remediation plan to fix it will be developed. Investigation and remediation work might include increased sampling, installing more wells, cleanup activities or changes to how the facility operates.

Does Imperial do all this alone?

Imperial hires third-party environmental consultants to install and maintain the groundwater wells, collect the groundwater samples, assess the data and prepare the annual reports to summarize and interpret all the information. Imperial also engages a third-party environmental analytical laboratory to complete the sample analysis and provide results to the consultants. The consultants and laboratories are independent, professional organizations who must adhere to professional standards of practice and follow established, industry and government recognized procedures.

How are the data shared?

Imperial will share all of the data, the trends and graphs, whether there are any warning signs, and how the warning signs are being dealt with. This information will be shared in the Annual Water Use Report that Imperial sends to the SLWB each year in March. It will be posted on the SLWB's public registry [<https://mvlwb.com/registry/S13L1-007>]. Imperial is also committed to sharing these data in meaningful and accessible ways, determined in consultation with the SLWB and the communities.

What has changed from previous versions of this program?

Imperial has been working with the SLWB to improve the overall understanding of groundwater conditions since the issuance of the Water Licence in 2015. Several studies have been completed to determine which parameters are most relevant to the operation and, therefore, which ones require the most focus. This plan incorporates the findings of those studies.

In addition, this plan broadly expands the monitoring network to 47 wells located between the main former operating areas and the main potential receptors (i.e., Mackenzie River and Bosworth Creek). The plan was reviewed once the intent to cease operations was announced, in order to ensure that it would remain suitable for continued monitoring as the site enters into ICM.



This plan also further defines the process of how data will be analyzed to look for potential changes related to the former operation.