

# Memo

To:	MGM Energy	From:	James Hymers, Project Manager K'alo-Stantec Ltd.
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File:	123514551	Date:	January 22, 2024

#### Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

The Maunoir E-35 Sump (hereinafter referred to as the "Site") is located in the Sahtu Settlement Area (SSA), Northwest Territories (NT), approximately 230 kilometres (km) northeast of Norman Wells (Attachment A: Figure A.1). The Site consists of a Sump Area containing two sumps; a low, wide sump (Sump 1) and a narrow, more steeply sided sump (Sump 2) (Attachment A: Figure A.2 and Figure A.3). Photos of the Site are provided in Attachment B as Photo B.1 to Photo B.14.

Site	Maunoir E-35 Sump	Coordinates (centre point)	67° 14' 36.540" N and 125° 15' 58.260" W		
Permittee	MGM Energy		Contractor	K'alo-Stantec Ltd.	
Land Use Permit #	S19A-004	Expiry Date June 6, 2026	Water License #	S19L1-003	Expiry Date June 6, 2026
Site Assessors	Lionel Borges, B.Sc.		Monitoring Date	August 29, 2023	
Type of Inspection	⊠ Ground ⊠ Aerial	Current Stage of Remediation/ Reclamation	<ul> <li>☑ In</li> <li>progress</li> <li>☑ Planned</li> <li>☑</li> <li>Complete</li> </ul>	Locations Inspected	<ul> <li>□ Well Site</li> <li>⊠ Sump</li> <li>□ Staging Area</li> </ul>
Summary of Ongoing Work Completed to Date	<ul> <li>Decommissioning</li> <li>Erosion Control</li> <li>Excavation/Cappir</li> <li>Phytoremediation</li> <li>Seeded</li> <li>Planted</li> <li>Other</li> </ul>	ng	Key Issues	<ul> <li>No issues</li> <li>On Site Materials</li> <li>Wastes/Spills</li> <li>Erosion</li> <li>Terrain Conditions</li> <li>Soil Exceedances</li> <li>Water Exceedances</li> <li>Vegetation</li> <li>Wildlife Signs</li> </ul>	Recommended for:         □ Closure         □ No further         environmental         monitoring or         remediation/         reclamation         treatments until         closure         ⊠ Additional         monitoring only         (see Table 3)         □ Additional         treatment and         monitoring

# Table 12023 Site Specifications

Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

# **1** Key Findings and Recommendations

Upon arrival at the Site, the field team conducted an aerial reconnaissance and ground visual assessment of the Site. Observations of on-site conditions were recorded and documented with photographs (Attachment B)

A summary of observed conditions in 2023 are provided in Table 2. Key findings and recommendations are summarized in Table 3.

#### Table 2 Summary of 2023 Environmental Monitoring

	Observation
Parameter	Sump
On-Site Materials	А
Erosion Control/Drainage	А
Terrain Conditions	IP
Soil	IP
Standing Water	IP
Vegetation Cover	А
Invasive Plants/Weeds	А
Wildlife Signs of Use	A

Notes:

'A' = Acceptable - meeting permit/license conditions, no further work required at this time

• Water – at or below Canadian Council of Ministers of the Environment (CCME) Freshwater Guidelines<sup>1</sup>

• Soils – at or below Government of Northwest Territories (GNWT) Environmental Quality Guidelines<sup>2</sup> and Alberta Environment, Salt Contamination Assessment and Remediation Guidelines<sup>3</sup>

• Vegetation - 70% vegetation cover and no weed treatment

'IP'= In Progress - Further work required

'N/A' = Not Applicable

'NI' = Not Inspected, planned for future work

<sup>&</sup>lt;sup>3</sup> Alberta Environment. 2001. *Salt Contamination Assessment and Remediation Guidelines*. Table 2.2. Soil Quality Guidelines for Unrestricted Land Use – Topsoil.



<sup>&</sup>lt;sup>1</sup> CCME, 2022. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Available from <u>http://ceqg-rcqe.ccme.ca/</u>. Last checked on May 2023

<sup>&</sup>lt;sup>2</sup> Government of Northwest Territories (GNWT), 2003. *Environmental Guideline for Contaminated Site Remediation*. November 2003

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Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Parameters	Qualitative Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
	Sumn Area:	Not applicable for this parameter	Sump Area:
Materials	<ul> <li>As part of the 2022 site visit<sup>4</sup>, a thermistor cable, protective casing, and associated data logger were installed at Sump 1 (Attachment A: Figure A.3, Attachment B: Photo B.2 and Photo B.3).</li> </ul>		<ul> <li>Conduct a maintenance check on the thermistor equipment, replace batteries and download temperature data.</li> </ul>
	<ul> <li>The thermistor was intact and operational at the time of the 2023 site visit.</li> </ul>		• Check on the condition of the grid deterrent structures on Bare Areas 2,
	• Four polyvinyl chloride grid deterrent structures were present on Bare Areas 2, 3 and 4 on Sump 2. The grids were covered and overgrown by seeded native grasses (Attachment B: Photo B.4). They were installed as part of reclamation treatments conducted during the 2019 site visit and left in place for long-term protection of the bare areas.		<ul> <li>3 and 4 and carry out maintenance or repair tasks, if required.</li> <li>No other actions related to on-site materials are recommended at this time.</li> </ul>
	<ul> <li>No other surface structures, materials or wastes were observed at the Site during the 2023 site visit.</li> </ul>		
Terrain	<ul> <li>Sump Area:</li> <li>Visual observations and site photographs indicated that Sump 1 was stable, with no signs of stress, erosion, or subsidence (Attachment B: Photo B.5).</li> <li>Localized depressions were observed along the south side of Sump 1 (Attachment B: Photo B.5), as well as the east and the west sides of Sump 2 (Attachment B: Photo B.6). These depressions appeared similar to the last observation</li> </ul>	Not applicable for this parameter.	<ul> <li>Continue visual monitoring for potential signs of stress and/or ground movement during a future site visit.</li> <li>Backfilled and/or recontour tension cracks.</li> </ul>
	during the 2022 site visit.		

# Table 32023 Summary of Key Findings and Recommendations

<sup>&</sup>lt;sup>4</sup> Kãlo-Stantec, 2023. *MGM Energy – 2022 Environmental Site Monitoring Report: Maunoir E-35 Sump*. Prepared for MGM Energy, May 2023, File No. 123513945



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Parameters	Qualitative Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
Terrain (cont'd)	• Tension cracks were visible at the surface of Sump 2 (Attachment B: Photo B.7). Cracks were first observed at the surface of Sump 2 during the 2016 visit, then backfilled as part of the 2019 site visit. No cracks were observed during the 2020 site visit (although cracks were potentially obscured by vegetation). The observation of tension cracks during the 2023 site visit suggests that some settlement occurred after the cracks were backfilled.	See above	See above
	• Ground temperature readings were collected from a thermistor installed in Sump 1. The data recorded during the August 2022 to August 2023 period is indicative of the presence of frozen ground within the sump. This includes buried drilling mud where depth is expected to range from 1.5 m to 3 m below ground surface. Refer to the temperature graphs (Attachment C: Graph C.1 and Graph C.2) for an overview of the ground temperatures recorded at Sump 1.		



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		Soil and Water Analytical Results	
Parameters	Qualitative Monitoring Observations and Results	(if exceedances)	Future Recommended Work
Standing Water	<ul> <li>Standing water was observed on the south side of Sump 1 and the east and west ends of Sump 2 (Attachment B: Photo B.2, Photo B.5, and Photo B.6).</li> <li>Water samples were not collected from standing water at the sumps or surrounding areas during the 2023 site visit.</li> </ul>	<ul> <li>Not applicable, no water samples were collected during 2023.</li> </ul>	• Three additional water samples from upgradient standing water should be collected to update 2015 and 2016 reference chemistry <sup>4</sup> . Samples should be collected and analyzed for routine chemistry and total metals parameters.
			<ul> <li>Collect up to three standing water samples from the Sump Areas during 2024 to monitor water chemistry within areas identified during previous EM survey<sup>5</sup> with anomalous apparent conductivity.</li> </ul>
			<ul> <li>Samples of standing water at the Sump Areas, if observed, should be collected, and analyzed for routine chemistry and total metal parameters to monitor trends in water quality.</li> </ul>
Soils	<ul> <li>Soil samples were not collected during the site visit.</li> <li>No evidence of visible surface soil contaminants such as petrogenic sheen, surface staining, or surface crusts were observed within the Sump Area.</li> </ul>	<ul> <li>Not applicable, soil samples were not collected during the 2023 site visit.</li> </ul>	Collect soil samples from the Sump Areas to monitor soil acidity and salinity parameters in areas with reported elevated EC identified
	<ul> <li>Historical soil sample analysis conducted from 2012 to 2017 reported elevated soluble conductivity values in the bare areas on Sump 2 due to elevated inorganics (calcium, magnesium, and sulfate) when compared with reference data. Revegetation treatments were completed in 2019 to improve the soil conditions and support vegetation establishment<sup>6</sup>.</li> </ul>		previous soil sampling programs and electromagnetic surveys conducted during 2018 and 2022 <sup>5,4</sup> .

<sup>&</sup>lt;sup>5</sup> Kãlo-Stantec, 2018. *MGM Energy – 2018 Environmental Site Monitoring Report: Maunoir E-35 Sump*. Prepared for MGM Energy, November 2018, File No. 123512896

<sup>&</sup>lt;sup>6</sup> Kãlo-Stantec, 2019. *MGM Energy – 2019 Environmental Site Monitoring Report: Maunoir E-35 Sump*. Prepared for MGM Energy, November 2019, File No. 123513162



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Parameters Qualitative Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
<ul> <li>Vegetation</li> <li>Sump Area: <ul> <li>Vegetation cover on most of the Site, including all of Sump 1, Sump 2, and Recovered Bare Area 5, met the land use permit requirements for &gt;70% vegetation cover and in healthy condition (Attachment B: Photo B.2, Photo B.5, Photo B.6, Photo B.8, and Photo B.9).</li> <li>Sump 2- Bare Areas 1, 2, 3, 4 (Attachment A: Figure A.3; Attachment B: Photo B.10 to Photo B.14):</li> <li>Revegetation/phytoremediation treatments were carried out in July 2019 (organic mulch pellet application, ground tilling, application of native grass seed and fertilizer, and installation of grid deterrent structures).</li> <li>Vegetation has become well established on the bare areas since treatments. Vegetation cover ranged from 65% to 100%, consisting predominantly of seeded native grasses and appeared healthy at the time of the 2023 site visit (see details in notes below). Vegetation in the bare areas met the land use permit requirements for &gt;70% vegetation cover and in healthy condition.</li> <li>Bare Area 1: 70% to 75% cover (Attachment B: Photo B.11)</li> <li>Bare Area 3: 90% to 95% cover (Attachment B: Photo B.12)</li> <li>Bare Area 4: 95% to 100% cover (Attachment B: Photo B.13)</li> <li>Bare Area 4: 95% to 100% cover (Attachment B: Photo B.14)</li> </ul> </li> </ul>	• Not applicable for this parameter.	<ul> <li>Sump Area:</li> <li>Carry out reconnaissance level vegetation monitoring on Bare Areas 1 to 4 on Sump 2 to continue documenting vegetation establishment and growth and grid deterrent structures effectiveness.</li> <li>Carry out reconnaissance level vegetation monitoring on the remaining Sump Area to note overall vegetation conditions.</li> <li>Carry out detailed vegetation monitoring at locations proposed for soil and water sampling.</li> <li>Monitor for invasive plant species whenever a site visit is conducted, particularly at Bare Areas 1 to 4.</li> <li>Carry out invasive plant/weed control treatments if infestations reach a density that prohibits vegetation establishment and growth, including pulling plants, storing in garbage bags, and disposing off-site at an approved facility.</li> </ul>



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Parameters	Qualitative Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
Wildlife Signs	<ul> <li>Sump Area:</li> <li>A small number of muskox (<i>Ovibos moschatus</i>) droppings were observed in the Sump Area.</li> <li>There was no evidence of muskox grazing or trampling of the vegetation growing in Bare Areas 1 to 4.</li> <li>Grid deterrent structures (grids) appeared to have reduced muskox grazing and damage.</li> <li>Grids remained in place, were stable and were overgrown by seeded native grasses (Attachment B: Photo B.4).</li> <li>Lemming (<i>Lemmus</i> sp.) or vole (<i>Microtus</i> sp.) tunnels were observed in sections of soft peaty ground adjacent to Sump 2.</li> <li>No other wildlife signs of use were observed within the Sump Area during the site visit.</li> </ul>	Not applicable for this parameter.	<ul> <li>Sump Area:</li> <li>Continue to assess effectiveness of grid deterrent structures in Bare Areas 2, 3, and 4 for protection of vegetation overgrazing and ground trampling/compaction.</li> <li>Continue monitoring for wildlife use whenever at the Site, particularly at Bare Areas 1 to 4.</li> </ul>



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

# 2 Limitations and Closure

This document entitled 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area was prepared by K'alo-Stantec Ltd. (K'alo-Stantec) for the account of MGM Energy (the "Client") to support the regulatory review process for its Annual Site Monitoring Report (the "Report") for the Maunoir E-35 Sump Area (the "Site"). In connection therewith, this document may be reviewed and used by the Government of Northwest Territories participating in the review process in the normal course of its duties. Except as set forth in the previous sentence, any reliance on this document by any other party or use of it for any other purpose is strictly prohibited. The material in it reflects K'alo-Stantec's professional judgment in light of the limited scope, schedule and other limitations stated in the document are based on the conditions existing at the time the document, K'alo-Stantec did not verify information supplied to it by the Client or others, unless expressly stated otherwise in the document. Any uses which another party makes of this document is the responsibility and risk of such party. Such party agrees that K'alo-Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other party as a result of decisions made or actions taken based on this document.

K'alo-Stantec Ltd.

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#### Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

This report was reviewed and approved for transmittal by:

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# Attachments: Attachment A: Figures

Figure A.1 MGM Energy Wellsite, Sump, and Staging Area Locations within the Sahtu Settlement Area
Figure A.2 Maunoir E-35 Sump Area – Soil and Water Sample Locations
Figure A.3 Maunoir E-35 Sump Area – Reclamation Assessment
Attachment B: Site Photographs
Attachment C: Graphs
Graph C.1 Summary of Thermistor Data
Graph C.2 Ground Temperature Profile recorded at Thermistor 2



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Attachment A Figures





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Prepared by NFORRESTER on 20230328 QR by LVANNOORTWYK on 20231217 IR by DALBERTI on 20231218 Project Location Sahtu Settlement Area NT Client/Project 1235 Client: MGM Energy Project: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area 123514551 Figure No. A.3 Maunoir E-35 Sump Area - Reclamation

Assessment

Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Attachment B

Site Photographs



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



# Photo B.1 E-35 Sump Area: Overview



Note: Overview of the Sump Areas and surrounding area (facing northeast) showing overall terrain and vegetation conditions (August 29, 2023).

Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



#### Photo B.2 E-35 Sump Area: Overview

Note: Overview of the Sump Areas facing northeast showing locations of Sump 1 and Sump 2, standing water locations, and thermistor location (August 29, 2023).



Photo B.3 E-35 Sump Area: On-Site Materials



Note: Northwest facing view of on-site materials showing thermistor located on the north side of Sump 1 (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



## Photo B.4 E-35 Sump Area: On-Site Materials

Note: On-site materials showing grid deterrent structure located in Bare Area 3. Grid has become overgrown and covered by seeded native grasses (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



## Photo B.5 E-35 Sump Area: Overview of Sump 1

Note: Overview of Sump 1 facing northeast showing terrain, standing water, and vegetation conditions. (August 29, 2023). Approximate sump footprint denoted with white dashed line.



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



## Photo B.6 E-35 Sump Area: Overview of Sump 2

Note: Overview of Sump 2 facing northeast showing terrain, standing water, and vegetation conditions. Approximate sump footprint displayed with white dashed line (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



# Photo B.7 E-35 Sump Area: Tension cracks at the surface of Sump 2

Note: View of a tension crack observed on the surface of Sump 2 (facing southeast) (August 29, 2023). Cracks were first observed at the surface of Sump 2 during the 2016 site visit then backfilled during the 2019 site visit. No cracks were observed during the 2020 site visit (although cracks were potentially obscured by vegetation). The observation of tension cracks as part of the 2022 and 2023 site visits suggests that some additional settlement has occurred after the cracks were backfilled.



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Photo B.8 E-35 Sump Area: Vegetation Cover - Sump 1



Note: View facing northwest looking at the ground and vegetation conditions on Sump 1. Sump 1 revegetated with agronomic and native grasses and naturally established shrubs and forbs. Vegetation cover met the permit requirements (i.e., >70% cover and healthy condition) (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Photo B.9 E-35 Sump Area: Vegetation Cover - Sump 2



Note: View facing northeast looking at the ground and vegetation conditions on Sump 2. Sump 2 revegetated with agronomic and native grasses and naturally established shrubs and forbs. Vegetation cover met the permit requirements (i.e., >70% cover and healthy condition) (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



Photo B.10 E-35 Sump Area: Vegetation Cover - Sump 2 - Bare Areas 1, 2, 3, and 4

Note: View facing northeast at the Bare Areas 1 to 4 on Sump 2. Revegetation/phytoremediation treatments were carried out in bare areas in July 2019 (organic mulch pellet application, ground tilling, native grass seed and fertilizer application, grid deterrent structures installation). Vegetation has become well established and appeared healthy. Vegetation cover in the bare areas ranged from 65% to 100% cover (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Photo B.11 E-35 Sump Area: Vegetation Cover - Sump 2 (Bare Area 1)



Note: View facing south toward Bare Area 1 showing ground and vegetation conditions. Vegetation cover was approximately 70% to 75% cover. Vegetation appeared healthy and met the permit requirements (i.e., >70% cover and healthy condition) (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Photo B.12 E-35 Sump Area: Vegetation Cover - Sump 2 (Bare Area 2)



Note: View facing west toward Bare Area 2 showing ground and vegetation conditions. Vegetation cover was approximately 90% to 95% cover, appeared healthy and met the permit requirements (i.e., >70% cover and healthy condition) (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Photo B.13 E-35 Sump Area: Vegetation Cover - Sump 2 (Bare Area 3)



Note: View facing northeast toward Bare Area 3 showing ground and vegetation conditions. Vegetation cover was approximately 90% to 95% cover. Vegetation appeared healthy and met the permit requirements (i.e., >70% cover and healthy condition) (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Photo B.14 E-35 Sump Area: Vegetation Cover - Sump 2 (Bare Area 4)



Note: View facing southeast toward Bare Area 4 showing ground and vegetation conditions. Vegetation cover was approximately 95% to 100% cover. Vegetation appeared healthy and met the permit requirements (i.e., >70% cover and healthy condition) (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area

Attachment C Graphs



# Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



Graph C.1 Summary of Thermistor Data

Depth — 1.0m — 1.5m — 2.0m — 3.0m — 3.7m



Reference: 2023 Environmental Site Monitoring Report: Maunoir E-35 Sump Area



# Graph C.2 Ground Temperature Profile recorded at Thermistor 2

Statistic — Minimum — Mean — Maximum

