

Memo

To:	MGM Energy	From:	James Hymers, Project Manager K'alo-Stantec Ltd.
	2800, 421 - 7 Avenue SW Calgary, AB T2P 4K9		Tulita, NT, Canada, X0E 0T0
File:	123514551	Date:	January 22, 2024

Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area

The Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area, collectively referred to as the "Site", are located in the Sahtu Settlement Area (SSA), Northwest Territories (NT), approximately 243 kilometres (km) north of Norman Wells (Attachment A: Figure A.1). The Wellsite Area is approximately 1.4 hectares (ha) in size and contains the former wellhead location. The Drilling Sump Area is 0.09 ha and contains the drilling sump. The Camp Sump Area is approximately 0.05 ha and contains the camp sump (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.9.

Site	Maunoir L-80 Wellsite, and Drilling and Camp Sumps	Coordinates (centre point)	67° 19' 43.160)" N and 124° 59' 56.58(D" 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	☑ Inprogress☑ Planned☑ Complete	Locations Inspected	☑ Well Site☑ Sump☑ Staging Area
Summary of Ongoing Work Completed to Date	 Decommiss Erosion Cor Excavation/ Phytoremed Seeded Planted Other 	ioning htrol Capping Jiation	Key Issues	 No issues On Site Materials Wastes/Spills Erosion Terrain Conditions Soil Exceedances Water Exceedances Vegetation Wildlife Signs 	Recommended for: □ Closure □ No further environmental monitoring or remediation/ reclamation treatments until closure □ Additional monitoring only ⊠ Additional treatment and monitoring (see Table 3)

Table 12023 Site Specifications

Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area and Camp Sump Area

1 Key Findings and Recommendations

In 2023, an aerial reconnaissance of the Site was conducted. Upon arrival, the field team visually assessed the Site and took photographs (Attachment B) to document site conditions as the helicopter circled above the Wellsite Area and Sump Area.

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

Table 2 Summary of 2023 Environmental Monitoring

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

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 Guidelines¹
- Soils at or below Government of Northwest Territories (GNWT) Environmental Quality Guidelines² and Alberta Environment, Salt Contamination Assessment and Remediation Guidelines³
- 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

* No standing water data

³ Alberta Environment. 2001. *Salt Contamination Assessment and Remediation Guidelines*. Table 2.2. Soil Quality Guidelines for Unrestricted Land Use – Topsoil.



¹ 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.

² Government of Northwest Territories (GNWT), 2003. *Environmental Guideline for Contaminated Site Remediation*. November 2003.

Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area and Camp Sump Area

Parameters	Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
On-Site Materials	 A steel well marker post and sign at the Former Wellhead Location were the only structures observed at the Site during the 2023 site visit (Attachment A: Figure A.2 and Figure A.3; Attachment B: Photo B.3). No other surface structures, materials, or waste were observed within the Site during the site visit. 	 Not applicable for this parameter. 	No further work related to on-site materials recommended at this time.
Terrain	 No erosion issues were observed at the Site during the 2023 site visit. The two sumps (drilling sump and camp sump) were observed to have the same irregular profiles as previously observed^{4,5,6}. The uneven topography is assumed to be related to the settlement/subsidence of the sump cap. This process is expected to have occurred prior to the beginning of the site monitoring by Stantec in 2017. Drilling Sump and Camp Sump depressions and edges/perimeters remained unchanged from previous monitoring observations. No new tension cracks and no evidence of additional subsidence were observed (Attachment B: Photo B.4 and Photo B.5). 	Not applicable for this parameter.	 Continue visual monitoring for potential signs of stress and/or ground movement during a future site visit. As the Drilling Sump does not contain waste materials, topography has not changed, and it has been revegetated; therefore, recommend no additional monitoring or decommissioning/reclamation treatments. Undertaking treatments would create new disturbances and would set back vegetation establishment. Recommend MGM Energy to discuss adjusting the permit requirements for the sump with the regulator.

Table 32023 Summary of Key Findings and Recommendations

⁶ K'alo-Stantec, 2019. 2019 Environmental Site Monitoring Report: Maunoir L-80 Wellsite, Drilling and Camp Sumps. Prepared for MGM Energy, November 2019, File No. 123513162.



⁴ K'alo-Stantec, 2017. 2017 Environmental Site Monitoring Report: Maunoir L-80 Wellsite, Drilling and Camp Sumps. Prepared for MGM Energy, November 2017, File No. 123512383.

⁵ K'alo-Stantec, 2018. 2018 Environmental Site Monitoring Report: Maunoir L-80 Wellsite, Drilling and Camp Sumps. Prepared for MGM Energy, November 2018, File No. 123512896.

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Parameters	Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
Terrain (cont'd)	• The Drilling Sump was excavated but not used to contain drilling wastes (i.e., they were hauled off-site for disposal at a waste facility in Northern Alberta - Rainbow Lake) ⁷ . As such, there were no concerns for sump stability and integrity to maintain containment of sump material. The sump has remained unchanged in topography since the beginning of the site monitoring by Kalo-Stantec in 2017 and has revegetated well with seeded and naturally established vegetation.	See above	See above
	• As the camp sump was used to contain grey water, there were no concerns with the potential contaminant release.		
	• The 2022 electromagnetic (EM) survey for the L-80 Wellsite Area and Drilling Sump Area indicated no apparent anomalies at the Drilling Sump ⁸ . The Drilling Sump is located in an area showing low background apparent EC in both data sets (i.e., EM31 and EM38). Considering that this sump was not used and was backfilled, the occurrence of low apparent EC values was expected.		

⁸ K'alo-Stantec, 2022. 2022 Environmental Site Monitoring Report: Maunoir L-80 Wellsite, Drilling and Camp Sumps. Prepared for MGM Energy, June 2023, File No. 123513945.



⁷ MGM Energy, 2005. *Well file records, Drilling Waste Disposal Notification (D-50)*

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Parameters	Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
Standing Water	 Wellsite Area and Drilling Sump: No standing water was sampled during the site visit. No standing water was observed in the Wellsite Area and Drilling Sump during the site visit. Camp Sump: No further standing water sampling was recommended in 2023 as per the 2017 report⁴. No standing water was sampled during the site visit. Standing water was observed on the Camp Sump during the site visit (Attachment B: Photo B.5). 	• Water samples were not collected in this area during the 2023 site visit.	 No sampling of standing water recommended, unless visible evidence⁹ triggers sample collection during a future site visit.
Soils	 Wellsite Area and Drilling Sump: Soil was not sampled during the 2023 site visit. No visible signs of contaminated surface soils such as sheen, odours, surface staining or surface crusts were observed within the Wellsite Area and Drilling Sump during the 2023 site visit. The North Bare Area and South Bare Area lacked vegetation cover mainly due to wildlife impacts (muskox overgrazing, wallowing, trampling and hoof traffic) and elevated apparent conductivity reported in the soil around the former wellhead. Soils were noted to be highly admixed with organic material. 2019 and 2022 soil sampling reported elevated inorganics (i.e., chloride, sodium, and sulphate) when compared with referenced background chemistry. Previous results from 2017 and 2019 soil samples collected within the North Bare Area had reported petroleum hydrocarbon (PHC) and salinity exceedances around the former wellhead^{2.6}. 	Soil samples were not collected in this area during the 2023 site visit.	 Wellsite Area and Drilling Sump Recommend sampling in the area of elevated apparent conductivity reported in the 2022 EM survey around the former wellhead associated with the North and South Bare Areas to determine potential salinity/sodicity impacts that may inhibit reclamation efforts. Anticipate up to 15 sample locations. Submit two samples from each sample location from near surface (0.25-0.5 m) and at 0.5-0.75 m or at auger refusal for detailed salinity analysis. Results will be used to support soil and vegetation reclamation.

⁹ Evidence that would trigger the collection of soil and/or standing water samples may include: crust formation on exposed soil surfaces, vegetation changes (discoloration, decline in health, or lack of vegetation), discolored soil surfaces (e.g., staining), presence of a hydrocarbon-like sheen on the surface of standing water, standing water on the sump top or slopes, or reasonable proximity to the sump and perceived to be possibly related to sump changes.



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Parameters	Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
Soils	Camp Sump:	See above	Camp Sump
(cont'd)	 Soil samples were not collected during the site visit. Soil sampling at the Camp Sump Area has not been completed during the annual monitoring programs to date. 		 No soil sampling in the Camp Sump Area is recommended unless field observations trigger sample collection during a future site visit⁶.
Vegetation	Wellsite Area (Attachment A: Figure A.3):	Not applicable for this parameter.	Wellsite Area:
	 Vegetation cover on most of the Wellsite Area, less the bare areas, met the land use permit requirements for >70% vegetation cover and in healthy condition (Attachment B: Photo B.6). The Wellsite Area had naturally revegetated with trees, shrubs. 		• No reclamation treatments required for the Wellsite Area outside of the North and South Bare Areas at this time. Reconnaissance level vegetation monitoring recommended
	and forbs around the Former Wellhead Location, North Bare Area, South Bare Area, and Recovered West Bare Area		only in this portion of the Wellsite Area.
	(Attachment B: Photo B.6).		Reconnaissance level vegetation monitoring recommended at North
	 The North Bare Area, South Bare Area, and West Bare Area underwent reclamation treatments in 2017 (organic mulch pellet application, ground tilling, application of native grass 		Bare Area, South Bare Area, and Recovered West Bare Area.
	seed and fertilizer).		Soil remediation/phytoremediation tractmenta recommended for North
	 The North and South Bare Areas subsequently were extremely grazed (>80% of plants grazed), the ground compacted and left bare due to suspected muskox (<i>Ovibos moschatus</i>) use. 		Bare Area and South Bare Area to address soil salinity and sodicity exceedances.
	requirements for percent cover and health condition (i.e., had <70% cover and in unhealthy condition).		 This treatment would be carried out based on the results of soil
	 North Bare Area: Overall vegetation cover was approximately 10% to 20% (Attachment B: Photo B.7). 		samples collected from the North and South Bare Areas
			 If treatments are carried out, they will include ground scarification
	• Although not visible from the air in 2023, it is suspected that the invasive plant prostrate knotweed (<i>Polygonum aviculare</i>) was still present in the area based on 2022 site visit ground observations. This species is indicative of overgrazed and heavily compacted ground.		application of amendment materials to address soil salinity and drainage, and application of native grass/legume/forb seed mix and fertilizer.



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Parameters	Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
Parameters Vegetation (cont'd)	 Monitoring Observations and Results South Bare Area: Overall vegetation cover was approximately 30% to 35%, (Attachment B: Photo B.7). Although not visible from the air in 2023, it is suspected that the invasive plant prostrate knotweed (<i>Polygonum aviculare</i>) was still present in the area based on 2022 site visit ground observations This species is indicative of overgrazed and heavily compacted ground. Recovered West Bare Area (Vegetation Assessment: Vegetation was well established. Overall vegetation cover was approximately 75% to 80% consisting of seeded native grasses and naturally established vegetation (Attachment B: Photo B.7). Vegetation cover was meeting permit requirements of greater than 70% vegetation cover and in healthy condition at the time of the 2023 site visit. 	Soil and Water Analytical Results (if exceedances) See above	 Future Recommended Work Treatments must also include installation of grid deterrent structures and coarse wood debris to protect treated areas from muskox damage. Reconnaissance level monitoring for invasive plants whenever a site visit is carried out, particularly at the North Bare Area and South Bare Area. 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
	Sump Areas (Attachment A, Figure A.3):		
•	 Vegetation cover on the Drilling Sump Area and Camp Sump Area met the land use permit requirements for >70% vegetation cover and in healthy condition. The Drilling Sump Area and Camp Sump Area had revegetated 		 No reclamation treatments recommended for Drilling Sump Area and Camp Sump Area at this
	with seeded grasses and naturally established tree, shrub, and forb species (Attachment B: Photo B.8 and Photo B.9).		time. Reconnaissance level vegetation
	 No invasive plants/weeds were observed within the Sump Areas during the 2023 site visit. 		issues arise.



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Parameters	Monitoring Observations and Results	Soil and Water Analytical Results (if exceedances)	Future Recommended Work
Wildlife Signs	 Muskox hoof prints were observed on the bare ground in the North Bare Area and South Bare Area. 	Not applicable for this parameter.	 Install grid deterrent structures and coarse wood debris in the North Bare Area and South Bare Area in conjunction with recommended reclamation/phytoremediation treatments to prevent muskox use and damage to the areas.
	 Vegetation at the North Bare Area and South Bare Area was extremely grazed (> 80% of plants grazed) and the ground was very compacted and bare. No other wildlife signs of use were observed within the Site during the visit. 		
	auring the site visit.		Continue monitoring for wildlife use whenever at the Site.



Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area and Camp Sump Area

2 Limitations and Closure

This document entitled 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area and Camp 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 L-80 Wellsite Area, Drilling Sump Area and Camp 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 and in the contract between K'alo-Stantec and the Client. The information and conclusions in the document are based on the conditions existing at the time the document was published and does not take into account any subsequent changes. In preparing 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.

Tamara Tiessen, M.Sc. Environmental Scientist **Olivier Piraux,** M.Sc. Terrain Scientist

Lionel Borges, B.Sc. Senior Biologist / Reclamation Specialist



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Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area and Camp Sump Area

This report was reviewed and approved for transmittal by:

 Lindsay van Noortwyk, P.Geo.
 Amin Kassam, B.Sc.

 Environmental Geoscientist
 Senior Principal, Environmental Scientist

 Attachments:
 Attachment A: Figures

 Figure A.1
 MGM Energy Wellsite, Sump and Staging Area Locations within the Sahtu Settlement Area

 Figure A.2
 Maunoir L-80 Wellsite Area and Sump Area – Soil and Water Sample Locations

 Figure A.3
 Maunoir L-80 Wellsite Area and Sump Area – Reclamation Assessment

Attachment B: Site Photographs



Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area

Attachment A Figures





Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsibility for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for ada supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and/or completeness of the data.



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YT

BC

NT

AB

MB

SK



permit requirements

native grass species that meets land use permit

requirements

Wellsite Area

Revegetation with seeded

Drilling Sump Area

Further Treatment Required



Maunoir L-80 Wellsite Area and Sump Area - Reclamation Assessment

Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area

Attachment B Site Photographs



Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area



Photo B.1 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: Overview

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



Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area



Photo B.2 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: Overview

Note: Overview facing southwest showing the Wellsite Area, Drilling Sump Area, Camp Sump Area, Former Wellhead Location, the North Bare Area, South Bare Area, and Recovered West Bare Area (August 29, 2023).



Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area



Photo B.3 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: On-Site Materials

Note: View facing north and looking at on-site materials showing Former Wellhead Location post and sign (August 29, 2023).



- Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area
- <text>
- Photo B.4 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: Terrain- Drilling Sump

Note: View facing northwest toward the Drilling Sump. The uneven topography is assumed related to the settlement/subsidence of the sump cap (August 29, 2023). No evidence of recent instability or ground movement was observed and no standing water was observed within the footprint of the sump during the 2023 site visit.



- Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area
- Carp surp
- Photo B.5 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: Terrain- Camp Sump

Note: View facing northwest toward the Camp Sump. The uneven topography is assumed related to the settlement/subsidence of the sump cap (August 29, 2023). During the 2023 site visit, there was no evidence of recent instability or ground movement and standing water was observed within the footprint of the sump.



- Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area
- Photo B.6 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: Vegetation Cover-Wellsite Area



Note: View facing northwest and looking at ground and vegetation conditions in the Wellsite Area. Majority of Wellsite Area was undisturbed and has revegetated with naturally established trees, 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 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area
- Photo B.7 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: Vegetation Cover-Wellsite Area- North Bare Area, South Bare Area, and Recovered West Bare Area



Note: View facing north and looking at ground and vegetation conditions in the North and South Bare Areas, and the Recovered West Bare Area (August 29, 2023). The three areas underwent reclamation treatments in July 2017. In North and South Bare Areas, vegetation was extremely grazed (>80% utilization) and ground was very heavily trampled and compacted by hoof traffic. Vegetation cover was approximately 10% to 35%, appeared unhealthy, and was not meeting permit requirements (i.e., had <70% cover and unhealthy condition). In the Recovered West Bare Area, vegetation had re-established well and did not appear grazed and the ground did not appear impacted by hoof traffic. Vegetation cover was approximately 75% to 80%, appeared healthy, and met the permit requirements (i.e., >70% cover and healthy condition).



- Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area
- Photo B.8 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: Vegetation Cover-Drilling Sump Area



Note: View facing west and looking at ground and vegetation conditions in the Drilling Sump Area which has revegetated with seeded grasses, and naturally established tree, shrub, and forb species. Vegetation cover met the permit requirements (i.e., >70% cover and healthy condition) (August 29, 2023).



- Reference: 2023 Environmental Site Monitoring Report: Maunoir L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area
- Photo B.9 L-80 Wellsite Area, Drilling Sump Area, and Camp Sump Area: Vegetation Cover- Camp Sump Area



Note: View facing north and looking at the ground and vegetation conditions in the Camp Sump Area which has revegetated with seeded grasses, and naturally established tree, shrub, and forb species. Vegetation cover met the permit requirements (i.e., >70% cover and healthy condition) (August 29, 2023).

