

Attachment 10 Impact-Mitigation Table

The Impact-Mitigation Table (IMT) below has been extracted from the MVLWB Land Use Permit Guidance Document. This IMT identifies all proposed activities, potential impacts, and possible mitigations that are relevant to the proposed project. All information provided is presented to reflect the size, scale, and nature of the proposed project.

To address carbon emissions, the following activities have been completed:

- Combined work with other project in Fort Simpson to limit mobilization – work planned to use same drill and staff, reducing the carbon impacts of mobilization by half. Mobilization to Fort Simpson represents the highest carbon emission project footprint;
- Selected closest soil receiving facility to reduce transportation impacts; and
- coupled similar waste streams from multiple sites requiring off-site disposal at KBL in Yellowknife, including drill cuttings and groundwater well purge and development waters in one shipment, reducing transportation carbon emissions.

Worst case scenarios are used for the identified potential impacts. The table describes proposed mitigations, including environmental management systems, treatment systems, and monitoring programs etc.

The highest risk scenario requiring impact mitigation is a fuel (diesel or gasoline) or hydraulic fluid release from heavy equipment overland flow to the Mackenzie River. The primary mitigation measures are:

- 2 x 8" 20' Absorbent booms placed between the heavy equipment and the river, perpendicular to the local topography.
- 4' silt fencing installed along the shoreline of the river during any work with heavy equipment
- Fueling procedures and policies
- Education
- Environmental offsets for heavy equipment and fueling
- Administrative procedures and forms

Refer to Attachment 6 Spill Contingency Plan for specific details.

Land			
Extent of land area to be disturbed (m ² or ha)	Boreholes on 9,300 m ² of the land lot total site area (water lot 15,500 m ³ and land lot 9,300 m ²). The site is largely disturbed beach and storage area. It is estimated that 200 m ² of land is at risk of disturbance from drilling or test pitting.		
Are sensitive land features present? If so, indicate the type(s): karsts, eskers, ice patches, mineral licks, hot and warm springs, glacial refugia, other	<p>Yes – the Mackenzie River. Approximately 450 m of the lot is shoreline along the Mackenzie River. See Attachment 2 Site Location and Layout Figures. The water lot is comprised primarily of a area set back into the Mackenzie River and therefore the areas of work are on the land lot.</p> <p>This mitigation table, Spill Contingency Plan and Waste Management Plan comprise the mitigation measures for the project. Following these plans will reduce the risk of environmental and socioeconomic impacts to an acceptable level and allow safe and effective response to anticipated risks.</p>		
Extent of sensitive land areas to be disturbed (m ² or ha)	0 m ³ no drilling within 5 m of shoreline. Areas on land lot to be drilled are already disturbed and consist primarily of fills and gravel shoreline. Three sediment samples will be collected adjacent to the river shoreline. These will be direct push type probes and will only be app. 30 cm. deep.		
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>
<ul style="list-style-type: none"> • Soil contamination • Soil compaction 	Clearing of timber, brush, or vegetation mat	N/A	The site consists primarily of disturbed lightly land with no shrubs or trees. It is not anticipated that any clearing of vegetation will be required
	Stripping of overburden	x	Stripping of overburden is not anticipated; however should it be determined that contamination is present in shallow soils(< 3 mbgs) then supplemental test pits using a local backhoe will be required. Any test pits completed will be backfilled using the excavated or like material and seeded. The backhoe will require the same interception boom and supplementary spill response boom to be completed and on-site.
	Bulk soil sampling	x	Movement of drill may compact surface soil. Surface likely already packed from former equipment use in the area. To scarify and re-seed any areas disturbed by drill. Small track mounted drill so ground disturbance less than larger drills with support trucks (See Attachment 02)
<ul style="list-style-type: none"> • Destabilization/erosion • Change in soil structure • Inability to support vegetation • Other 	Trenching, diamond drilling, geotechnical borehole drilling	x	Any test pitting will be backfilled and seeded along with soil amendments and fertilizer to allow vegetation and reclamation to occur and to prevent any additional risk of site erosion.
	Cut and fill	N/A	N/A
	Oil and gas exploration well drilling	N/A	N/A
	Directional drilling (underground)	N/A	N/A

On-site storage or disposal of wastes (domestic garbage, sewage, waste petroleum products, drilling waste and hydraulic flowback fluids, hazardous wastes, etc.)	X	Domestic garbage will be collected and placed in the garbage receptacles at the property or removed to landfill. Refer to Attachment 5 – Waste Management Plan for detailed review of waste management practices and policies.
Transfer, storage, and use of petroleum products and/or chemicals	X	Refer to Spill Contingency Plan. No fuel stored on-site. Equipment fueled from Tidy tanks in pickups as per SWP (Set back in place) to protect Mackenzie River.
Transfer, storage, and use of explosives	N/A	N/A
Use of fertilizers, pesticides, herbicides	N/A	N/A
Use of motorized and heavy equipment	X	Any grass sod compacted by access of equipment will be raked and reseeded to promote revegetation.
Other	N/A	N/A

Groundwater			
Is groundwater present? If so, indicate the type(s): shallow, deep, fresh, saline			
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>
<ul style="list-style-type: none"> • Water table alteration • Infiltration changes • Changes in water quality • Temperature changes • Other 	Withdrawal of groundwater	X	Up to five groundwater wells are planned for installation in 2024 and potentially additional one in future years, depending on iterative results of investigation. These wells will require development, purging and sampling the volume of groundwater removed will not affect the underlying aquifer. See Attachment 5 - Waste Management Plan for disposal of such waters
	Trenching, diamond drilling, geotechnical borehole drilling	X	Test pitting with a small local backhoe is not planned for 2024 season, however, should initial soil sampling results or inspection of the site determine the need, shallow soil test pits may be required. Loosen and revegetate any areas potentially compacted or disturbed
	Installation of groundwater monitoring wells	X	Up to five flush mount groundwater wells are planned for installation in 2024. The groundwater wells will be developed and sampled in the 2024 and future open water seasons. See Waste Management Plan for details on disposing of groundwater well purge and development water.
	Directional drilling (underground)	N/A	N/A
	Oil and gas exploration well drilling	N/A	N/A
	Clearing of timber, brush, or vegetation mat	N/A	No clearing of timer, brush or vegetation is anticipated as the site is already disturbed and is primarily shoreline and built up fills with varying degrees of grasses.
	Stripping of overburden	N/A	No clearing of timer, brush or vegetation is anticipated as the site is already disturbed and is primarily fills with varying degrees of revegetation. No large trees are present.
	Transfer, storage, and use of petroleum products and/or chemicals	X	Refer to spill contingency plan for fueling of equipment from portable tidy tanks in pick up trucks.
	Other	N/A	N/A

Permafrost			
Is permafrost present? If so, indicate the type(s): continuous or discontinuous	Permafrost is not present		
Extent of permafrost area to be disturbed (m ² or ha)	N/A		
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>
<ul style="list-style-type: none"> • Loss or change in extent • Changes in seasonal fluctuations • Change in persistence 	Clearing of timber, brush, or vegetation mat	N/A	N/A
	Stripping of overburden	N/A	N/A
	Construction of structures (buildings, water or waste management facilities, etc.)	N/A	N/A
	Construction (development or alteration: widening, straightening, detours), maintenance, and operation of lines, trails, or rights-of-way	N/A	N/A
	Trenching, diamond drilling, geotechnical borehole drilling	N/A	N/A
	Other	N/A	N/A

Surface Water			
Is surface water present? If so, indicate the type(s): lake, river, stream, wetland (bog, marsh, swamp, fen), seasonal, year-round	The Mackenzie River is located directly adjacent/south of the land parcel and forms part of the water parcel. The Site has approximately 450 m of shoreline along the Mackenzie River. See Site Layout and Location Figures in Attachment 02 to the application.		
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>
<ul style="list-style-type: none"> • Water flow or level changes (permanent, temporary, seasonal) • Drainage pattern changes • Temperature changes • Changes in water quality • Wetland impairment • Changes to aquatic habitat (see Biotic section below) • Other 	Withdrawal of water from a watercourse	N/A	Taking one surface water sample. No negative effects based on very small water volume and not entering river to collect.
	Retaining, storing, or diverting water	N/A	N/A
	Construction and use of a watercourse crossing (bridge, ford)	N/A	N/A
	Watercourse alteration (ditch construction, channeling, training, installation of culvert)	N/A	N/A
	Construction of dams and impoundments	N/A	N/A
	Direct or indirect disposal of waste into water	N/A	All drill cuttings and groundwater well development and purge water will be collected and treated off site at KBL in Yellowknife. This water is to be stored in 45 gallon sealed and labelled drums and is to be removed prior to demobilization from site. See Waste Management Plan
	Clearing of timber, brush, or vegetation mat near a watercourse	N/A	N/A

	Stripping of overburden adjacent to a watercourse	N/A	N/A
	Excavation or stockpiling of earth or gravel adjacent to a watercourse	x	Any stockpiles of soil from potential future soil test pits will be placed back in the test pit following excavation and sampling. Booms will be placed along with silt fencing between the equipment/work area and the River. See Spill Contingency Plan
	Use of motorized or heavy equipment adjacent to, within, or through a watercourse	x	A tracked drill will advance boreholes and install groundwater wells and a small backhoe or excavator may dig up small amount of soil/test pits. No heavy equipment is to work within 5 m offset from the Mackenzie Valley River shore-line and silt fencing and absorbent 8" berms to be in place prior to the use of any heavy equipment or work that will or could result in silting of the river water.
	Transfer, storage, and use of petroleum products and/or chemicals near a watercourse	N/A	A minimum 20 m offset for fueling from Mackenzie River. Equipment to be moved to parking area by road and spill trays to be used. Refer to Spill Contingency Plan
	Use of fertilizers, pesticides, or herbicides	N/A	N/A
	Other	N/A	N/A

Air			
If applicable, indicate the type(s) of air pollutants: aerosols, particulate matter, noxious gases, volatile organic carbons, hazardous air pollutants, dust, other	Small amounts of dust related to excavation/equipment movement of soil and travel of equipment on property. Dust to be minimized by the use of dust suppression water during excavation and back fill works and avoiding abrupt changes in direction by heavy equipment that damage to soils from rutting		
Indicate the estimated maximum dispersal distance	A few meters within the work zone for limited periods. To be suppressed with on-site water		
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>
<ul style="list-style-type: none"> • Changes in air quality • Harm to living things • Increased greenhouse gases • Other 	Burning of fossil fuels	x	The diesel and gasoline burned to complete the project will not have a significant effect on the local air quality. No idling of vehicles will be allowed to minimize CO and CO2 emissions.
	Mobilization and operation of equipment for construction and operational activities	x	The diesel and gasoline burned to mobilize equipment for the project will not have a significant effect on the local air quality.
	Release of underground gases	N/A	N/A
	Increased road traffic	x	Moderate in extent and short in duration. Highest congestion will be when heavy equipment is mobilized by tractor and trailer to site. All such equipment shall be guided by a pilot truck when travelling in residential areas.
	Other	N/A	N/A

Vegetation				
If vegetation will be removed or compacted, indicate type(s): trees, shrubs, thickets, muskeg, Species at Risk plants, may-be-at-risk plant species, other	Vegetation at the Site comprises disturbed fill with some re-established grasses. No at risk plant species have been identified or are anticipated to be identified on-Site. Vegetation removal is not anticipated, however, if needed it will comprise grasses and the area will be backfilled like for like and re-seeded with amendments to promote regrowth.			
Extent of vegetation to be removed or compacted (m ³ or ha)	0 m ² most likely. 5 to to 10 m ² potentially			
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>	X	
<ul style="list-style-type: none"> • Direct loss of vegetation • Loss of Species at Risk or may-be-at-risk plants. • Change in species composition/ • Introduction of non-native (invasive) species • Effects on plant health (dust, metals, toxins) • Increased risk of fire • Compaction of vegetation • Other 	Clearing of timber, brush, or vegetation mat	x	Vegetation removal is not anticipated, however, if needed it will comprise grasses and the area will be backfilled like for like and re-seeded with amendments to promote regrowth.	
	Stripping of overburden	x	Overburden removal is not anticipated, however, if needed it will comprise grasses and the area will be backfilled like for like and re-seeded with amendments to promote regrowth.	
	Construction (development or alteration: widening, straightening, detours), maintenance, and operation of lines, trail, or rights-of-way	N/A	N/A	
	Construction of structures (buildings, water or waste management facilities, etc.)	N/A	N/A	
	Reclamation activities (levelling, contouring, placement of fines or woody debris, re-vegetation, fertilization)	x	Reclamation activities will primarily comprise re-seeding grasses and the area will be backfilled like for like and bulked with amendments to promote regrowth.	
	Use of motorized and heavy equipment	x	Equipment is to be clean prior to mobilization to site to prevent potential introduction of invasive species.	
	Burning of fossil fuels	x	Will not have an effect on Vegetation	
	Increased road traffic	x	Minor increase for small period of time for traffic not to affect vegetation	
	Transfer, storage, and use of petroleum products and/or chemicals	x	Refer to Spill Contingency Plan	

Excavation or stockpiling of earth and/or gravel	x	Excavating limited to small test pits. The stockpiled soil will be placed back as soon as sampling complete and revegetation will be completed prior to demobilization
Other	N/A	N/A

Terrestrial Wildlife Habitat				
If sensitive wildlife habitat is present, indicate type(s): Species at Risk (SAR), Canadian Important Bird Areas, migratory birds, keystone species, wildlife corridor	Refer to Attachment 11 Species at Risk Desktop Assessment. Impacts to SAR are not anticipated. Work will be stopped if any such wildlife are identified and the proper authorities will be contacted.			
Extent of sensitive wildlife habitat to be removed or disturbed (m ³ or ha)	No wildlife habitat is to be removed.			
If wildlife habitat will be removed or disturbed, indicate type(s): ungulates, furbearers, carnivores, small mammals, birds, insects, sensitive wildlife habitat (as noted above)	No wildlife habitat is to be removed.			
Extent of wildlife habitat to be removed or disturbed (m ³ or ha)	No wildlife habitat is to be removed.			
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>	
<ul style="list-style-type: none"> • Direct loss or removal of habitat, dens, or nests • Loss or removal of keystone species and/or SAR habitat • Fragmentation of wildlife corridor • Direct injury or mortality • Disturbances to key lifecycle stages: breeding, feeding, nesting, staging • Effects on population abundance 	Clearing of timber, brush, or vegetation mat	x	No impacts anticipated to wildlife.	
	Stripping of overburden	x	Stripping of residential lawn will not pose a risk to wildlife.	
	Construction of structures (buildings, water or waste management facilities, etc.)	N/A	N/A	
	Construction (development or alteration: widening, straightening, detours), maintenance and operation of lines, trails, or rights-of-way	N/A	N/A	
	Increased traffic risk to wildlife	x		Traffic increase is very minimal and limited to existing roads and developed areas. Not anticipated to affect wildlife
	Increased human presence	x		Traffic human presence is very minimal and limited to existing roads and developed areas. Not anticipated to affect wildlife

- Change in species diversity
- Effects on wildlife health (toxins, metals, etc.)
- Changes to migratory movement patterns
- Changes to predator-prey relationships
- Human-wildlife conflicts
- Other

Noise (use of heavy equipment, blasting, crushing, drilling)	x	Noise is created in an existing urban area. And is short in duration. Not anticipated to affect local wildlife.
Transfer, storage, and use of petroleum products and/or chemicals	x	Refer to spill contingency plan
On-site storage or disposal of wastes (domestic garbage, sewage, waste petroleum products, drilling waste and hydraulic flowback fluids, hazardous wastes, etc.)	x	Refer to waste management plan. Garbage will not be left so as to cause an animal attractant.
On-site disposal of domestic wastes (burning, burying)	N/A	N/A
Other	N/A	N/A

Aquatic Habitat			
Indicate types of aquatic species: Species at Risk, fish, mammals (furbearers), amphibians, aquatic macroinvertebrates, insects, aquatic macrophytes	The Mackenzie Valley River is located directly adjacent to the Site. Implementation of this mitigation table, the spill contingency plan and the waste management plan for measure to protect the river from any impacts associated from the proposed works		
Extent of aquatic habitat removed or disturbed for breeding, feeding, nesting, staging (m ³ or ha)	The work is not expected to affect the Mackenzie River aquatic habitat		
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>
<ul style="list-style-type: none"> Breeding disturbances Change in species diversity Effects on health (toxins, metals, sediment, etc.) Changes to migratory movement patterns Changes to predator-prey relationships Effects on population abundance Change in species diversity Other 	Clearing of timber, brush, or vegetation mat near a watercourse	x	Very limited potential removal of grasses in disturbed fills. No impacts to aquatic habitat is anticipated
	Stripping of overburden adjacent to a watercourse	x	Removal of sod on residential property
	Blasting near a watercourse	N/A	N/A
	Construction and use of a watercourse crossing (bridge, ford)	N/A	N/A
	Watercourse alteration (ditch construction, channeling, training, installation of culvert)	N/A	N/A
	Use of motorized or heavy equipment adjacent to, within, or through a watercourse	N/A	N/A
	Withdrawal of water from a watercourse	N/A	N/A
	Retaining, storing, or diverting water	N/A	N/A
	Construction of dams and impoundments	N/A	N/A
	Direct or indirect disposal of waste into water	N/A	N/A
	Other	N/A	N/A

Wildlife Harvesting			
Are harvesting areas present? If so, indicate type(s): Community Harvesting Areas, Special Harvesting Areas, Group Trapping Areas, etc.	No Harvesting areas are present.		
Extent of overlap of Project area with harvesting areas identified above (fish lakes, trapping or hunting areas) (m ³ or ha)	No overlap		
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>
<ul style="list-style-type: none"> Loss or reduction in game species populations Effects on traditional land use, subsistence, and harvesting rights Other 	Clearing of timber, brush, or vegetation mat	x	No anticipated to have any affect on Wildlife harvesting
	Stripping of overburden	N/A	N/A
	Noise (use of heavy equipment, blasting, crushing, drilling)	x	Noise not anticipated to have any affects on Wildlife harvesting
	Oil and gas exploration well drilling	N/A	N/A
	Construction (development or alteration: widening, straightening, detours), maintenance and operation of lines, trails, or rights-of-way	N/A	N/A
	Increased traffic risk to wildlife	x	Traffic human presence is very minimal and limited to existing roads and developed areas. Not anticipated to affect wildlife
	Withdrawal of water from a watercourse	N/A	N/A
	Direct or indirect disposal of waste into water	N/A	N/A
	Other	N/A	N/A

Cultural Integrity and Heritage Resources

<p>If present, indicate types: places of significant cultural or spiritual value, heritage sites, important subsistence and harvesting areas (group trapping areas, camps and, log and timber harvesting areas, berry picking and medicine plant gathering areas), traditional trails, burial sites, sacred sites, archaeological or historic sites, artifacts and other objects of historical, cultural, or religious significance, historical or cultural records</p>	<p>No such areas. Some residents of the Fort Simpson appear to use the property for storage and access to boats. The activities are not expected to affect any of these activities as the work areas are small in extent and silt fencing can be temporarily removed to allow access if necessary.</p>			
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>	
<ul style="list-style-type: none"> • Change to or loss of cultural integrity • Change to or loss of traditional lifestyle • Change to or loss of heritage resources • Other 	Clearing of timber, brush, or vegetation mat	x	Clearing of timber, brush or vegetation mat will not have an effect on Cultural Integrity and Heritage Resources	
	Noise (use of heavy equipment, blasting, crushing, drilling)	x	Noise is not expected to affect Cultural Integrity and Heritage Resources.	
	Construction of structures (buildings, water or waste management facilities, etc.)	N/A	N/A	
	Construction (development or alteration: widening, straightening, detours), maintenance and operation of lines, trails, or rights-of-way	N/A	N/A	
	Increased human presence	x		Increased human presence is minimal and not expected to affect cultural integrity or heritage
	Withdrawal of water from a watercourse	N/A	N/A	

Retaining, storing, or diverting water	N/A	N/A
Construction of dams and impoundments	N/A	N/A
Direct or indirect deposit of waste into water	N/A	N/A
Other	N/A	N/A

Social and Economic Well-being				
Potential Impacts	Activity <i>Use an "x" to indicate which apply</i>	X	Potential Project Impacts and Proposed Mitigations <i>Using the list at left, describe the potential impact(s) of each identified Project activity and the proposed measure(s) to reduce each of these impacts.</i>	
<ul style="list-style-type: none"> Increased human health hazard and risk Economic opportunities or losses (employment, training) Change in ecological, cultural, social, or economic values identified for protection in approved Land Use Plans Impairment of the recreational or traditional uses of the land or water Impairment of the aesthetic quality of the land or water Changes to the use of the area by other non-Indigenous people (e.g., trappers, outfitters, residents, hunters, forest harvesters, other authorized projects) Other 	Noise (use of heavy equipment, blasting, crushing, drilling)	x	Limited noise not expected to affect social and economic wellbeing. Limit work to hours allowed by municipality	
	Transfer, storage, and use of petroleum products and/or chemicals	x	Fueling equipment from a tidy tank not expected to affect social and economic wellbeing. Limit work to hours allowed by municipality	
	On-site storage or disposal of wastes (domestic garbage, sewage, waste petroleum products, drilling waste and hydraulic flowback fluids, hazardous wastes, etc.)	x	Proper storage of domestic waste not expected to affect social and economic wellbeing. Limit work to hours allowed by municipality	
	Construction (development or alteration: widening, straightening, detours), maintenance and operation of lines, trails, or rights-of-way	N/A	N/A	
	Construction of structures (buildings, water or waste management facilities, etc.)	N/A	N/A	
	Increased human access and presence	x	Limited and short term increased human access and presence is not expected to affect social and economic wellbeing. Limit work to hours allowed by municipality	
	Operating in a remote location inaccessible or not easily accessible by emergency aid	N/A	N/A	
	Withdrawal of water from a watercourse	N/A	N/A	
	Retaining, storing, or diverting water	N/A	N/A	
	Construction of dams and impoundments	N/A	N/A	
	Direct or indirect deposit of waste into water	N/A	N/A	
	Other	N/A	N/A	