

Reviewer Comments and Proponent Responses

Project: Mackenzie Valley Highway Project
Board: Mackenzie Valley Environmental Impact Review Board
Proponent: GNWT-INF (Infrastructure)

File Number: EA1213-02
Review Comments Due: February 28, 2024
Proponent Responses Due: April 22, 2024

| No. | Topic | Reviewer Comment | Reviewer Recommendation | Proponent Response |
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| Liidlii Kue First Nation (Ft Simpson) (LKFN) - Trieneke Gastmeier | | | | |
| 1 | MVH DAR Volume 1: Introduction and Project Description - 3.0 Traditional Knowledge | LKFN and the Proponent have only recently completed an agreement for the purpose of conducting a project-specific Traditional Knowledge Study. As such, the DAR is not informed by nor does it include any consideration of Traditional Knowledge from LKFN at this time. LKFN's ancestors have used the land of present-day NWT since time immemorial and current members remain active on and knowledgeable of the land. The results of LKFN's forthcoming Traditional Knowledge Study will contain valuable information for consideration during the lifecycle of the Project. | The results of LKFN's forthcoming Project-specific Traditional Knowledge Study should be reviewed by the GNWT against the results of the DAR and considered in the context of the Project in a supplemental report. Additionally, the results of the Traditional Knowledge Study should be considered and incorporated, as appropriate, in all further Project documents and plans, and should inform the lifecycle of the Project. | <p>The GNWT looks forward to receiving the LKFN Project-specific Traditional Knowledge Study and commits to reviewing the study against the results of the Developer's Assessment Report (DAR) according to the methods described in Chapter 3.0 (Traditional Knowledge). The GNWT will produce a written summary referencing specific sections of the DAR where the information provided by LKFN has been incorporated in the assessment. Prior to finalizing this summary, the GNWT will provide a draft to LKFN for verification of use of information from the LKFN Traditional Knowledge Study. The GNWT anticipates submitting the written summary as part of the DAR Addendum. Going forward, GNWT will consider the LKFN Traditional Knowledge Study in regulatory reporting and Project planning as appropriate.</p> <p>New Commitment: The GNWT will review the LKFN project-specific Traditional Knowledge Study and produce a written summary referencing specific sections of the DAR where the information provided by LKFN has been incorporated in the assessment. Prior to finalizing this summary, the GNWT will provide a draft to LKFN for verification of use of information.</p> |
| 2 | MVH DAR Volume 1: Introduction and Project | Any incorporation and analysis of LKFN's Traditional Knowledge into future regulatory documents | LKFN requests that we are provided the opportunity to review the inclusion of our TKLU data into the DAR prior | As stated in response to LKFN-1, the GNWT will review the LKFN project-specific Traditional Knowledge Study and produce a written summary referencing specific sections of the Developer's Assessment Report (DAR) where the information provided by LKFN has been incorporated in the assessment. Prior to finalizing this summary, the |

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| | Description - 3.0 Traditional Knowledge | should be completed in consultation with LKFN. LKFN should be given the opportunity to review this incorporation and analysis prior to any document finalization. | to finalization of the DAR. | GNWT will provide a draft to LKFN for verification of use of information. New Commitment: The GNWT will review the LKFN project-specific Traditional Knowledge Study and produce a written summary referencing specific sections of the DAR where the information provided by LKFN has been incorporated in the assessment. Prior to finalizing this summary, the GNWT will provide a draft to LKFN for verification of use of information. |
| 3 | MVH DAR Volume 2: Assessment of Key Lines of Inquiry - 11.0 Assessment of Potential Effects on Culture and Traditional Land Use, Including Harvesting | The effects assessment concludes that, while effects from the Project on culture and traditional land use, including harvesting, will be adverse, residual effects and cumulative effects within the RAA on these areas will not be significant given a series of proposed mitigation measures. However, no discussion exists of any proposed accommodation processes or measures for impacts to Indigenous rights that may not be adequately mitigated against. While LKFN's Traditional Knowledge Study remains forthcoming for the current Project, LKFN expects that discussions with the Proponent will include appropriate accommodation/benefit measures to address any potential impacts to LKFN's rights that are not adequately mitigated | The proponent and LKFN should restart discussions regarding a the means by which impacts to LKFN Treaty and Aboriginal rights will from the Project will be mitigated and accommodated. Note that LKFN requests to develop a process agreement with the Proponent to lay out the pathway to obtaining LKFN's consent for the Project through identifying mutually agreeable mitigation and accommodation measures. | The GNWT is committed to consulting on any matters Łíídlı Kúę First Nation identifies as being issues that may have the potential to adversely impact the asserted or established Aboriginal and/or Treaty rights of Łíídlı Kúę First Nation members. The GNWT as the Proponent initiated nation-to-nation Consultation for the Project with potentially affected Indigenous Governments and Indigenous Organizations, including Łíídlı Kúę First Nation, in fall of 2023. The GNWT as the proponent notes Łíídlı Kúę First Nation's comment and will follow up directly with Łíídlı Kúę First Nation to schedule further discussions. |

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| | | against. | | |
| 4 | MVH DAR Volume 1: Introduction and Project Description - 2.0 Consultation and Engagement | LKFN is not referred to within this section (or the DAR more broadly). Rather, the Proponent discusses consulting and engaging with DFN. While LKFN is a member of DFN, all member nations including LKFN are autonomous nations with independent sovereignty and jurisdiction. As such, LKFN must evaluate the potential impact of any project on its respective Treaty and Aboriginal rights, independently of DFN. Consultation and engagement for all projects must occur directly with LKFN, on a nation-to-nation basis. It is critical that engagement and consultation happen at this level moving forward. | Ensure LKFN is directly consulted moving forward on the Project, independent of DFN, and develop an associated communication protocol to this effect. Ensure LKFN's individual consultation and engagement experiences are captured in Project-related materials moving forward. | <p>It is unclear which section of the Developer's Assessment Report (DAR) the commenter is referencing regarding consultation and engagement with DFN.</p> <p>The GNWT is committed to consulting and engaging with Indigenous Governments, Indigenous Organizations, and other affected parties in the Sahtu and Dehcho regions and has met with Łíídlı́ Kúę First Nation council and staff independently several times, over the course of developing the Project as proposed in the DAR.</p> <p>During development of the DAR, Łíídlı́ Kúę First Nation participated in community engagement sessions and one-on-one meetings with the GNWT, on the project description, impacts, and proposed environmental mitigation measures. These meetings are referenced in the DAR Appendix 2B Overview of the 2021-2023 Engagement Activities.</p> <p>In early 2024, the GNWT provided capacity funding to Łíídlı́ Kúę First Nation to complete project-specific traditional land and resource use (TLRU) studies for the Project and has been meeting with Łíídlı́ Kúę First Nation staff on a bi-weekly basis in this regard since February 2024. Project consultation and engagement will continue throughout the life of the Project according to the Project's Engagement Plan.</p> <p>In addition to engagement, Consultation was initiated with Łíídlı́ Kúę First Nation in Fall of 2023, and the GNWT intends to continue to consult directly with Łíídlı́ Kúę First Nation on a nation-to-nation basis on issues that may have the potential to adversely impact the asserted or established Aboriginal and/or Treaty rights of Łíídlı́ Kúę First Nation members.</p> |
| 5 | MVH DAR Volume 3: Subjects of Note - 22.0 Assessment of Potential Effects on Heritage Resources | Archaeological work completed to-date does not include consideration of any sites that LKFN may be aware of. | Ensure any future archaeological work includes consideration of the results of LKFN's forthcoming Traditional Knowledge Study for the Project. Ensure LKFN is involved in the consideration of those results as well as appropriate mitigation measures. | Future archaeological work will consider the results of LKFN's forthcoming Traditional Knowledge Study for the Project, including any sites that LKFN becomes aware of. It is expected that additional engagement will occur relative to completion of an archaeological impact assessment (AIA) for the Project, once the construction footprint has been defined. Possible activities include providing opportunities for input from Indigenous Governments and Indigenous Organizations, including LKFN, to guide selection of field assessment target areas, inclusion of Traditional Knowledge holders and/or community members on field crews, and presentation of results of the assessment to Indigenous Governments and Indigenous Organizations to provide guidance for site interpretation and mitigation. |

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| 6 | <p>MVH DAR Volume 3: Subjects of Note - 22.0 Assessment of Potential Effects on Heritage Resources - 22.7 Follow-up and Monitoring</p> | <p>At this time there is no current commitment for follow-up or monitoring relative to Heritage Resources by the Proponent; however, the Proponent notes that they are committed to further engagement with Indigenous Governments, Indigenous Organizations and other affected parties related to this topic. Given the potential for numerous heritage sites throughout the area and the overall dearth of understanding of cultural heritage material/archaeological sites in the north, LKFN is a strong advocate for monitoring related to Heritage Resources and is interested in further consultation regarding this topic.</p> | <p>LKFN would like to discuss ongoing monitoring related to Heritage Resources with the Proponent.</p> | <p>The GNWT has described post-construction monitoring in the draft Heritage and Sites Protection Plan (Volume 5):</p> <p>For heritage resources that are in proximity to the Project, and which were avoided through project redesign and/or fencing/markings during construction, a post-construction monitoring program may be developed in coordination with the territorial heritage regulators and Indigenous Governments, Indigenous Organizations, and select other affected parties, such as renewable resources councils. This will include LKFN. This type of monitoring program would allow for site-specific status updates for sites at potential risk of effect either due to ongoing operations and/or increased access to previously remote areas. The period (e.g., 5 years following completion of construction) and intervals (e.g., annually) for this type of monitoring program also would be developed in coordination with the territorial heritage regulators and Indigenous Governments, Indigenous Organizations, and renewable resources councils.</p> |
| 7 | <p>Section 8.3.2 The Project Will Reduce Boreal Caribou Habitat</p> | <p>Section 8.3.2 summarizes the expected direct and indirect losses of caribou habitat. However, these calculations do not appear to account for increased likelihood of human-caused wildfire due to increased traffic on the road.</p> | <p>The proponent should calculate the increased probability of human-caused wildfires as a result of increased human presence in the area as this will contribute to anthropogenic effects on caribou habitat.</p> | <p>*Figure LKFN-7.1 Fire Ignition Points (1965-2023) attached*</p> <p>The Project is not expected to measurably increase human caused wildfire frequency.</p> <p>Estimating the change in wildfire frequency from increased human use along the road corridor is speculative as there are no readily available statistics on the correlation of wildfire frequency and roads in remote areas. Research by Huberman et al. (2022) suggests that in the NWT more intense human use increases the proportion of human vs. lightning caused fires, with the number of fires overall being heavily influenced by available fuel and weather. Increased human activity also facilitates fire suppression, which has the effect of decreasing fire severity, regardless of cause. Their research</p> |

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| | | | <p>looked at the amount of area in an ecozone subject to human use and did not show evidence of roads alone leading to increased fire activity.</p> <p>The Dempster Highway (Dempster), fully opened in 1979, provides a case study with comparable characteristics. Both the Mackenzie Valley Highway (MVH) and the Dempster are roads intersecting remote areas and have similar climate and environmental conditions. Both have, or are expected to have, comparably low traffic volumes, with the Dempster likely having higher volumes due to tourism in the area. Both roads have, or are expected to have, few dwellings along the road outside of established communities.</p> <p>The Yukon Government has mapped ignition points and causes of wildfires since 1965 (see https://mapservices.gov.yk.ca/GeoYukon/). Figure LKFN-7-1 shows that fire ignition points are not clustered along the Dempster Highway. Table LKFN-7.1 compares the frequency of fire causes within a 10-kilometre (km) buffer on either side of the Dempster and the frequency of fire causes in a remote area of similar size to the east of the Dempster, shown on Figure LKFN-7-1 as a blue box. This latter area serves as a control; i.e., an area with likely no or minimal human occurrence (perhaps at most some renewable resource harvesting), certainly relative to the Dempster found the majority of fires in both areas were caused by lightning, and the number of human caused fires was the same in both areas. The analysis excluded the most southern parts of the Dempster, which sees heavy non-traditional recreational use and where a 10 km buffer would include sections of the North Klondike Highway. In this southern portion, the proportion of human caused fires is higher. The MVH is more comparable to the central and northern sections of the Dempster where there is less non-traditional recreational use.</p> <p>The evidence shows that the frequency of fires and the proportion of human caused fires near the Dempster Highway has not increased in the over 40 years since it opened for the entire distance. Given the similarities between the MVH and the Dempster described above, the use of the MVH is therefore not likely to notably increase fire frequency or the proportion of human caused fires.</p> <p>Reference: Huberman, Y.; Beckers, J.; Brett, R.; Castilla, G.; Errington, R.; Fraser-Reid, E.C.; Goodsman, D.; Hogg, E.H.; Metsaranta, J.; Neilson, E.; Olesinski, J.; Parisien, M.-A.;</p> |
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| | | | | Price, D.; Ramsfield, T.; Shaw, C.; Thompson, D.; Voicu, M.F.; Whitman, E.; Edwards, J. 2022. The state of Northwest Territories forests in the wake of climate change: baseline conditions and observed changes to forest ecosystems. Nat. Resour. Can., Can. For. Serv., North. For. Cent., Edmonton, AB. Inf. Rep. NOR-X-430. |
| 8 | Section 8.3.7 The Risk of Caribou and Moose Mortality from Vehicle Collisions is Expected to be Low | The proponent lists specific mitigation measures to reduce risk of mortality from collisions such as reducing speeds, allowing wildlife passage, and implementing vegetation control. However, none of these mitigation measures have included a defined value such as reduction of speed to a specific speed per hour, quantity of time for allowing wildlife passage, height of vegetation, etc. | The proponent must present the mitigation measures in a quantifiable way that is not subjective. | The mitigation summary provided in Section 8.3.7 is brief to increase the overall readability of the document. The detail of specific mitigation is provided in several sections of the Developer’s Assessment Report (DAR), including Section 10.4.4.2 and the Draft Wildlife Management and Monitoring Plan (WMMP, Volume 5). The WMMP, Section 4.5, describes the mitigations specific to reducing mortality risk from the Project. That section describes the speed limit of 50 km/h on unfinished project road surfaces, and big game species having the right of way on all project infrastructure. Several pre-construction surveys, such as pre-blast surveys for caribou and moose, are described with quantitative measures, within the WMMP. |
| 9 | Table 10.6 Project-Environment Interactions with Caribou and Moose | Table 10.6 indicates that employment and contracted goods and services and the closure and reclamation of the MVWR and temporary borrow sources quarries, camps, and workspaces will not cause a change in mortality risk for caribou and moose. We disagree with this assessment, as closure and remediation will certainly result in increased road traffic, and therefore result in increased likelihood of wildlife-vehicle collisions. | The proponent must acknowledge and account for changes in mortality risks resulting from all sources. | Off-site administrative activities (contracting goods and services) do not interact with caribou or moose. Footnote 1 to Table 10.6 notes, "This category does not refer to on-site activities". In Table 10.6, on-site closure and remediation activities are site-specific activities associated with quarries, camps and workspaces, and, on their own, are not expected to increase mortality risk. Implied in consideration of identifying interactions in Table 10.6 is that the mobilization of equipment for those activities, and the associated mortality risk of wildlife-vehicle collisions was considered a component of the Construction and Operations and Maintenance Phase. Table 10.6 illustrates that all project-related traffic, including summer and winter, is considered a mortality risk. |
| 10 | Section | Section 10.4.1.1 indicates | We request that the extent of | The buffer used for the ZOI is based on the Environment Canada (2011) study that |

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| | 10.4.1.1 Change in Habitat | that indirect change in habitat for Boreal Caribou was evaluated using a 500 m buffer for anthropogenic (human) disturbances. We believe this buffer to be insufficient as scientific literature has shown that some roads can have a a zone of influence impacting caribou up to 15 km (Plante, S., Dussault, C., Richard, J. H., & Côté, S. D. (2018). Human disturbance effects and cumulative habitat loss in endangered migratory caribou. <i>Biological Conservation</i> , 224, 129-143.). | indirect habitat change is evaluated with a range of uncertainty using various avoidance distances. Specifically, indirect change in habitat should be evaluated using a 500 m (low end) up to a 15,000 m (high end) buffer. We believe this analysis will provide a more accurate representation of potential project impacts to boreal caribou. | <p>found nearly 70% of the variation in caribou recruitment rates was explained by anthropogenic disturbances (polygonal and linear) plus a 500 metre (m) buffer (Environment Canada 2011). The study spanned 24 study areas across boreal caribou ranges and tested a range of buffer sizes but found 500 m best explained this demographic parameter. As this approach is accepted by ECCC and the GNWT for management planning, no further assessment has been undertaken.</p> <p>The paper by Plante et al. (2018) was a behavioural study based on data from two herds in Quebec and Newfoundland, which does not indicate demographic consequences. Among ZOI studies, the work completed by Environment Canada (2011) has a strong and applicable line of evidence for this Project due to the greater number of herds included in the study and the link to demographic consequences. Additionally, the Plante et al (2018) paper summarized study results on migratory caribou in the tundra and taiga biomes. Those results are likely not be comparable to the behaviour of non-migratory boreal caribou interacting with the Project.</p> <p>References: Environment Canada. 2011. Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada.2011 Update. Canadian Wildlife Service, Ottawa, Ontario. 102 pp. (http://epe.lac-bac.gc.ca/100/200/301/environment_can/2011/scientific_assessment_inform-ef/CW66-296-2011-eng.pdf)</p> Plante, S., Dussault, C., Richard, J. H., & Côté, S. D. 2018. Human disturbance effects and cumulative habitat loss in endangered migratory caribou. <i>Biological Conservation</i> , 224, 129-143. |
| 11 | Table 18.7 Project-Environmental Interactions with Vegetation and Wetlands | Table 18.7 displays many physical activities as having no effect on changes in species diversity. The rationale for this appears to be a lack of direct interaction with vegetation. However, many of these activities will involve | The proponent must indicate how activities such as operation of maintenance yards, highway maintenance, road work, mobilization of materials, culvert installation, and road work will not have indirect effects on species diversity and plant | <p>In Section 18.3, the GNWT identifies the potential for indirect effects on plant communities and species diversity from the introduction or spread of alien and invasive alien plant species and dust contaminant deposition during the following activities:</p> <ul style="list-style-type: none"> · site preparation of the right-of-way (ROW), access and workspaces · borrow source and quarry development and operations · material haul · embankment and quarry access road construction |

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| | | <p>transporting equipment down the highway, which creates the potential for the spreading of dust and invasive species, therefore affecting species diversity and plant communities.</p> | <p>communities through the spreading of dust and invasive species.</p> | <ul style="list-style-type: none"> · closure and reclamation of the MVWR, temporary borrow sources/quarries, camps, and workspaces · presence and use of the highway <p>Mitigation for the introduction or spread of alien and invasive plant species and dust contaminant deposition is presented in Section 18.4. Effects are not anticipated from mobilization of project equipment and materials, culvert installation, road base, compaction, and surfacing, operation of, and activities at, maintenance yards, and road work, as vegetation will not be present at the locations, or effects are negligible relative to overlapping activities in the vicinity.</p> <p>As discussed in Section 18.3, mobilization and demobilization of project equipment and materials is not expected to interact with vegetation and wetlands as construction materials and equipment will be transported using existing transportation infrastructure to designated staging areas. Vegetation and wetlands will likely not be affected by construction camps and yards because camp and yard locations will be in existing disturbed areas such as existing camp facilities within Norman Wells; dedicated camp locations within municipal boundaries of Norman Wells, Tulita, and/or Wrigley; and one or more borrow sources or quarries to be accessed from the MVWR.</p> <p>Culvert installations, and road base construction, compaction, and surfacing are not expected to interact with vegetation and wetlands because additional interactions with vegetation and wetlands because such work will occur in areas where vegetation has already been removed during the site preparation stage of construction as indicated in the bullet list above.</p> <p>As indicated in Section 18.4, interactions between the Project and vegetation and wetlands will continue during the operations and maintenance phase due to vegetation control along the right-of-way and dust deposition associated with borrow source and quarry operations, material haul and stockpiling, and traffic on the completed highway, to a distance of 40 m adjacent to the highway. Mitigation measures to reduce effects from these activities on vegetation and wetlands include dust control and mowing to control invasive species.</p> |
| 12 | Section 18.8 Follow-up and Monitoring | Section 18.8 describes the invasive plant monitoring plan with monitoring | The proponent must develop a more robust invasive plant monitoring and management | As indicated in Section 18.4, the GNWT is aware of the potential establishment and spread of invasive species which could result from the Project and is committed to invasive alien plant species monitoring and management. |

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| | <p>occurring once per year during construction, one inspection in the year following construction, and one inspection five years into project operations. The plan also indicates that invasive plants will be managed with mowing.</p> <p>We believe this monitoring plan to be very insufficient. Invasive plants such as forbs can have significantly different flowering timeframes, with some flowering in the early spring to others flowering in the fall. With only one inspection occurring a year, there is significant potential for invasive plants to not be detected depending on the flowering of plants during monitoring. Additionally, invasive plant management through mowing is not an adequate strategy for managing invasive plants as invasive plants are often more adapted to disturbance than native plants. As a result, mowing may actually increase the presence of invasive plants and decrease the cover of</p> | <p>plan that accounts for identification timeframes of invasive plants and uses an invasive plant removal strategy that is more effective than mowing.</p> | <p>Periodic monitoring by the GNWT, with community involvement (e.g., Guardians), is proposed to help identify the location and distribution of invasive alien plant species. As was done for the Tłıchǵ Highway, a baseline rare and alien invasive plant survey will be conducted prior to construction of each segment of the highway. Further surveys will be completed at one year, five years and ten years following completion of construction. Monitoring data will be used by the GNWT, with input from appropriate affected parties, to develop appropriate management actions.</p> <p>Mowing is a well-established and effective control method for invasive species along highway embankments in the NWT and throughout Canada (Government of British Columbia 2010; Government of Saskatchewan n.d.). Mowing is the standard practice for invasive species control, woody vegetation control, and maintenance of line of site for highways in the NWT (GNWT 2010). Mowing will be conducted once every three years and as needed during the growing season.</p> <p>Other control options are herbicide application, hand removal of plants, bio-control agents and competitive seeding or planting. Herbicide application can be very effective at invasive species control; however, herbicide can have unintentional effects on desirable plant species, soil and water microorganisms, and wildlife including amphibians and birds (US EPA 2024). Highway embankments are usually sloped, and herbicide may migrate downhill outside of the highway embankment affecting adjacent natural habitats including wetlands, watercourses and riparian areas altering native plant growth or abundance and persisting in the soils. Herbicide migration beyond the highway embankment could also deter Indigenous use and collection of plant material. For these reasons herbicides will not be used for invasive species control for the Project.</p> <p>Hand pulling of invasive species can be an effective control measure; however, it is labour intensive and best used for small easily accessible areas. The control area must be visually searched, and each individual plant completely removed, including above and below ground parts. These actions are not feasible for a Project as large as MVH. In addition, hand pulling invasive species causes soil disturbance which can allow additional invasive species establishment.</p> <p>References: Government of British Columbia. 2010. Best Practices for Managing Invasive Plants on</p> |
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| | | native plants. | | <p>Roadsides. Ministry of Transportation and Infrastructure. GNWT. 2010. Highway Maintenance Manual. Department of Transportation. Available at: https://www.inf.gov.nt.ca/sites/inf/files/resources/highway_maintenance_manual_1.pdf. Accessed March 2024.</p> <p>Government of Saskatchewan. n.d. Right of Way Mowing Fact Sheet. Available at https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/programs-and-services/livestock-programs/ditch-mowing-and-hay-salvage. Accessed March 2024.</p> <p>US EPA (United States Environmental Protection Agency). 2024. Herbicides. On-line resource. Available at: https://www.epa.gov/caddis/herbicides. Accessed March 2024.</p> |
| 13 | Section 20.4.2.3.1.3 Birds of Prey | The proponent has noted that construction activities have the potential to affect important nesting sites within the LAA. These nesting sites include two active peregrine falcon nests and a historical nesting site for golden eagle, all of which are located within or immediately adjacent to proposed quarry sites. One source suggests that human disturbance at peregrine falcon nesting sites can cause nest abandonment and a refusal to breed (Snow, C. (1973). Habitat management series for endangered species (Vol. 171). Department of the Interior, Bureau of Land Management.). Despite the obvious impacts to these nest sites from the | The proponent should explain the rationale for building quarries at sites of active peregrine falcon nests, despite literature showing that human disturbance can cause nest abandonment. | <p>No quarry activity will occur within a recommended setback distance of an active peregrine falcon nest, which will reduce the risk of nest abandonment. As discussed in Section 5.4.5.3 of the Developer’s Assessment Report (DAR), a Quarry Development Plan (QDP) will be developed for each rock quarry/granular borrow source, which will include mitigation measures to reduce potential effects on nesting birds including peregrine falcon in accordance with specific mitigation measures identified in the draft Wildlife Management and Monitoring Plan (WMMP) (Volume 5). As stated in the draft WMMP and Section 20.4, pre-construction surveys will be completed if construction activities are planned during the critical breeding periods for raptors in the Northwest Territories (Shank and Poole 2016). If an active peregrine falcon nest or other bird nest is found, beneficial management practices (GNWT 2020) will be followed, including applying an appropriate setback and timing restriction in consultation with GNWT Department of Environment and Climate Change (GNWT-ECC) and/or Environment and Climate Change Canada (ECCC), as appropriate.</p> <p>The GNWT acknowledges that human activities can result in direct and indirect habitat loss (e.g., sensory disturbance) to peregrine falcon nesting habitat (ECCC 2017). However, the response of peregrine falcons to human disturbance can vary among individuals, stage of breeding cycle, type of activity as well as proximity and frequency of disturbance (SARC 2022, ECCC 2017). The GNWT recognizes that proposed quarry and borrow source development have potential to interact with peregrine falcon nesting habitat in the Local Assessment Area (LAA) and that some of the proposed quarry locations, where the rock and granular material required for construction activities occur, also provide moderate to high suitability nesting habitat (GNWT 2021). For example, during the 2021 aerial raptor survey completed by GNWT-ECC, a</p> |

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| | | <p>development of quarries, the proponent has indicated that there will be a low magnitude of residual effects (Table 20.13) for peregrine falcon during the construction and operations phases.</p> | <p>peregrine falcon was observed exhibiting territorial behaviour, which indicated potential nesting activity near an existing quarry (GNWT 2021). In addition, peregrine falcons have been observed nesting in open pits (pit walls) at the Ekati Diamond Mine (ERM, 2017) and on mine infrastructure at the Diavik Diamond Mine in the NWT (Golder 2019), which also suggests a level of tolerance to human disturbance.</p> <p>Overall, the Project is predicted to result in a direct loss of 18.6 ha or 4% of the estimated available peregrine falcon habitat in the LAA (462.5 ha) (see Section 20, Table 20.12). The Project residual effect on change in habitat for peregrine falcon was assessed overall as low magnitude based on the criteria defined in Table 20.3, which defined a low magnitude change in habitat as a direct loss of less than 5% in the LAA. Site specific, or niche, potentially affected habitat within that 4% will be individually addressed as described above and as appropriate for those specific circumstances.</p> <p>References: ECCC (Environment and Climate Change Canada). 2017. Management Plan for the Peregrine Falcon anatum/tundrius (Falco peregrinus anatum/tundrius) in Canada. Species at Risk Act Management Plan Series. Environment and Climate Change Canada, Ottawa. iv + 28 pp. ERM. 2017. Ekati Diamond Mine: 2016 Wildlife Effects Monitoring Program. Prepared for Dominion Diamond Ekati Corporation by ERM Consultants Canada Ltd.: Yellowknife, Northwest Territories Golder Associates Ltd. 2019. Diavik Diamond Mines (2012) Inc. 2018 Wildlife Monitoring Report. GNWT (Government of Northwest Territories). 2020. Beneficial management practices for migratory birds in the Northwest Territories. Environment and Natural Resources, Government of Northwest Territories, Yellowknife, Northwest Territories. GNWT. 2021. Mackenzie Valley Highway Project Aerial Raptor Survey Results. Department of Environment and Natural Resource, Wildlife Division, Government of the Northwest Territories. Shank, C. and K. Poole. 2016. Critical breeding periods for raptors in the Northwest Territories. Government of Northwest Territories, File Report No. 147. Yellowknife, Northwest Territories. 29 pp. SARC (Species at Risk Committee). 2022. Species Status Report for Peregrine Falcon (Falco peregrinus) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.</p> |
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| 14 | Draft Wildlife Management and Monitoring Plan - Section 5.2.3 Boreal Caribou Collar Analysis | Section 5.2.3 of the Draft Wildlife Management and Monitoring Plan indicates that the proponent currently does not know if caribou are crossing the MVWR. This is of significant concern to us as the effects of the project on caribou seem to be highly dependent on caribou's ability to migrate across the road. The proponent's lack of knowledge regarding caribou's current ability to migrate across the MVWR, leads us to lack trust in the proponent's judgement on the potential effects of the project on caribou. | Given the proponent's current uncertainty regarding caribou migration across the MVWR, how will we build our trust in the proponent's ability to determine project effects on caribou? | <p>Section 5.2.3 of the Draft Wildlife Management and Monitoring Plan was written before completing a formal study of boreal caribou movement in the region. The Government of Northwest Territories (GNWT) outlined a commitment to this study in Section 8.3.5 of the Developer's Assessment Report (DAR) and summarized the general approach in Section 10.4.1.2. On February 29, 2024, a technical report of this study was made available on the MVEIRB Public Registry [PR#163], titled Mackenzie Valley Highway Project: Inferring the Potential Barriers to Boreal Caribou Movement.</p> <p>The report is available at the following location: https://reviewboard.ca/upload/project_document/Cover%20Letter%20-%20DAR%20Caribou%20Movement%20Analysis%20Supplemental%20Filing_with%20CL.pdf</p> <p>The objective of the study was to use GPS locations of collared boreal caribou to assess movement in relation to winter roads: the Mackenzie Valley Winter Road (MVWR), between Wrigley and Norman Wells, and the Déljñę Access Road, between Tulita and Déljñę. Since movement is dependent on habitat and landscape conditions, the study incorporated these factors. The study had three components: (i) describing observed movement patterns, (ii) estimating the influence of winter roads on movement, conditional on other natural and anthropogenic features, and (iii) predicting (or simulating) caribou movements to determine the effects of winter roads on habitat connectivity, i.e., the degree to which caribou can access habitat without impediment. These assessments were conducted for winter and calving to post-calving seasons. Inferences derived from this study were then used to predict the Project's residual effects on caribou movement.</p> <p>Overall, the study provided greater confidence in the conclusions presented in Chapter 12 of the DAR regarding the residual effects on caribou movement. Please refer to this technical report for an in-depth technical discussion of the findings. The key results and conclusions are summarized below:</p> <p>Results</p> <p>Observed movement patterns, including movement rates and turn angles, were mostly unchanged by a caribou's proximity to winter roads, which included the MVWR and the Déljñę Access Road[1]. From 2019 to 2023, none of the 21 individually collared</p> |
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| | | | | <p>caribou that likely interacted with the MVWR crossed the MVWR (Norman Wells to Wrigley) when it was active (i.e., traffic present, winter season) or inactive (i.e., no traffic present, calving to post-calving seasons). Five of the collared caribou crossed the Déljñę Access Road (east of the MVWR) during early to late winter and calving to post-calving.</p> <p>Modelling outcomes, which accounted for habitat conditions when estimating movement patterns, estimated slightly faster movement rates near the winter roads during early to mid-winter and faster movement rates far from the winter roads during calving to post-calving. Turn angles (i.e., the sharpness of turns during movement) were not estimated to be affected by the winter roads in either season. These habitat-dependent movement models were validated for their prediction accuracy relative to observed caribou movements.</p> <p>Habitat-dependent movement models were used to simulate boreal caribou movements on the landscape and assess whether the winter roads reduced habitat connectivity for boreal caribou in the region. Simulations compared two scenarios: (1) one with the estimated effect of winter roads on movement and (2) without the effect of winter roads (i.e., a scenario in which the roads did not exist). If simulated caribou crossed winter roads in scenario #2 but did not cross winter roads in scenario #1, then this would indicate the winter roads to be barriers that reduce habitat connectivity. This analysis yielded two outcomes:</p> <p>The MVWR (Norman Wells to Wrigley) did not reduce habitat connectivity during early to mid-winter and calving to post-calving seasons. Simulated caribou did not cross this portion of a) the MVWR because of natural barriers (i.e., rugged terrain and the Mackenzie River), other existing linear disturbances, and habitat distribution (i.e., lower quality near the MVWR).</p> <p>b) The Déljñę Access Road slightly reduced habitat connectivity during early to mid-winter but not during calving to post-calving. The lack of natural barriers, fewer linear disturbances, and higher quality habitat along this winter road facilitated crossings.</p> <p>Conclusions Caribou were not observed crossing the MVWR (Norman Wells to Wrigley) when the road was active (i.e., traffic present, winter season) or inactive (i.e., little-to-no traffic</p> |
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| | | | | <p>present, calving to post-calving seasons). This suggests that the MVWR's traffic levels had minimal effect on caribou movements.</p> <p>Since the number of observed crossings were limited, movement modelling and simulation approaches were needed to clarify what might be influencing caribou movements and MVWR-related crossings. Ultimately, natural barriers, other linear features, and habitat quality/distribution were the main factors that altered movement and prevented crossings. These factors seemed to discourage caribou from reaching the MVWR when travelling east-west.</p> <p>The combination of empirical and analytical (modelling and simulations) evidence suggests that replacing the MVWR with the Mackenzie Valley Highway is unlikely to influence caribou movements and crossings beyond what is already expected due to exogenous factors (i.e., due to landscape features, as discussed above). The highway is also expected to have similar traffic levels to the MVWR (~50 vehicles/day), yielding a similar magnitude of potential disturbance, which allows inference to be extended from the technical study to predict the effects of the highway. This inference is still applicable even with the continuous (year-round) disturbance posed by the highway because the primary factors influencing movement (discussed above) remain consistent through winter and spring/summer.</p> <p>The Déljñę Access Road poses a semi-permeable barrier to boreal caribou movement (i.e., in which some passage may occur). However, this winter road will not be a part of the proposed Mackenzie Valley Highway.</p> <p>These conclusions are supported by several other lines of evidence that suggest limited east-west movement by caribou across the Mackenzie River, including Traditional Knowledge, previous GPS collar analyses (2002–2011), and GNWT observations of caribou from surveys and collaring. Refer to the technical report for more details.</p> <p>The outcomes of this study have increased the GNWT's knowledge and understanding of boreal caribou movements in the region. Based on this study, there is greater certainty and confidence in the DAR's conclusions of residual effects on caribou from changes in movement.</p> |
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| | | | | <p>[1] The DAR identifies the MVWR as the road segment between Wrigley and Norman Wells (and beyond), which excludes the Déljñę Access Road (between Tulita and Déljñę). However, the technical report on boreal caribou movement refers to both segments of road —(i) Wrigley to Norman Wells and (ii)Tulita to Déljñę — as subsections of the MVWR and identifies them as the MVWR’s north-south axis and east-west axis, respectively.</p> |
| 15 | <p>General Comment about the DAR and the Draft Wildlife Management and Monitoring Plan</p> | <p>In both the DAR and the Draft Wildlife Management and Monitoring Plan, the proponent often states that "closure and reclamation will promote reestablishment of vegetation". However, no indication of how vegetation reestablishment will occur is provided. This wording is vague and does not provide any details about the processes that will be used, or what species will be used.</p> | <p>The proponent must provide indication of all vegetation re-establishment techniques, species, and provide measurable criteria for determining success.</p> | <p>As indicated in Section 18.4, the GNWT is committed to re-establishment of vegetation in portions of the Project Development Area as a mitigation measure for changes in wildlife habitat and vegetation species and community diversity. Vegetation re-establishment will be promoted through facilitated natural revegetation. Facilitated natural revegetation includes the following methods (GNWT 2013):</p> <ul style="list-style-type: none"> · Topsoil salvage and replacement during construction and reclamation to conserve both soil fertility and the natural seedbank · Decompaction of compacted soils and leaving soils rough and loose · Ongoing erosion and sediment control on slopes, embankments and other erodible areas · Erosion and sediment control measures may include erosion control blankets, geotextile fabric, hydroseeding · Shrub planting or willow staking may be done in targeted locations <p>The GNWT will inspect for revegetation success in applicable areas of the Project Development Area and abandoned sections of the Mackenzie Valley Winter Road to identify areas not adequately revegetating in accordance with permit conditions. The Project will implement remedial measures in areas with deficient revegetation, erosion or sedimentation issues. Remedial measures may include one or more additional erosion and sediment control, hydroseeding, or willow staking.</p> <p>Reference: GNWT. 2013. Erosion and Sediment Control Manual. GNWT – Department of Transportation.</p> |
| 16 | <p>Erosion and Sediment control plan Section 2.1</p> | <p>The proponent has stated that they abide by the GNWT Erosion and Sediment Control Manual, including</p> | <p>The proponent should revise the DAR to include the GNWT erosion and sediment control manual as an appendix to the</p> | <p>The GNWT Department of Transportation Erosion and Sediment Control Manual (Government of the Northwest Territories 2013) can be retrieved from the link below. Relevant mitigation from this document has been incorporated in the Erosion and Sedimentation Control Plan for the Project (Volume 5).</p> |

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| | | <p>the 30 best management practices included in the manual. The proponent has not included the GNWT erosion and sediment control manual as an appendix of the plan in the DAR.</p> | <p>erosion and sediment control plan. The proponent should also include a concordance table which shows any proposed deviations in this plan from the 30 best management practices described in the GNWT manual.</p> | <p>Specifically, Best Management Practices from the manual will be implemented as appropriate for the Project and are included in the Erosion and Sedimentation Control Plan. Although facilitated natural revegetation is preferred for the Project, BMP 15 Seeding, BMP 17a Hydroseeding, or other erosion and sediment control measures (e.g., erosion and sediment control blankets and willow staking) will be implemented in areas with erosion or sediment control issues. BMP 19 Soil and Root Mat Replacement (sodding) is not expected as no sod salvage is anticipated for the Project.</p> <p>Reference: Government of Northwest Territories. 2013. Erosion and Sediment Control Manual. Available: https://registry.mvlwb.ca/Documents/G21E001/G21E001%20-%20%20Sediment%20and%20Erosion%20Control%20Manual%20-%20May25_21.pdf</p> |
| 17 | Figure 5.2 (Typical Highway cross section) | <p>LKFN notes that Figure 5.2 is the only one included in the DAR that shows a typical highway cross section for the proposed MVH. This cross section is highly generic and does not include details like stockpiled material that is excavated, approaches to water crossings, wider areas, turnoffs, etc. More details engineering figures and renderings of road sections will be very helpful to help our membership understand the ultimate appearance and design of the road, as well as the implications of potential impacts on our Treaty and Aboriginal rights and impacts from the Project.</p> | <p>The Proponent should prepare a series of detailed cross sections and renderings of typical segments of the road (both overtop the existing winter road and along new ROWs), including stockpiled material, water crossings, quarries and borrow sources and their access roads, staging areas, remediated areas of the existing winter road which will be closed, maintenance areas, road cuts, and pullouts.</p> | <p>Detailed plan and profile drawings cannot be provided until the detailed design stage. The following briefly provides information descriptive of the highway design.</p> <p>Figure 5.2 provides a reasonable representation of the typical cross-section, with other factors noted in the Road and Bridge-Culvert Design Criteria/Standards for the Project (Section 5.2.2; Table 5.1). Note that the overall appearance of the road will be similar to the already constructed Highway 1 entering Wrigley. With respect to water crossings, Section 5.2.2 describes the design approach and relevant design guidelines, parameters and objectives. This includes GNWT standard drawings for culverts.</p> <p>The new alignment is located directly over the existing winter road where practical to minimize ground disturbance. Remediation of the abandoned portions of the winter road will be stabilized with vegetation if required. The extent of potential permanent/temporary quarry/borrow sources are shown in Appendix 5A (Project Map book). As the design progresses, the locations will be finalized, and pit designs will be developed to support regulatory applications, in accordance with the draft Quarry Development Plan Framework (Volume 5). Access to quarry/borrow sources will either be by winter road or by an all-season road. Some quarry access roads may be kept depending on the requirements of the maintenance expectations for the project. The design of these access roads would be similar to existing typical sections provided for the highway, though are likely to be narrower in width. Stockpiles are generally located within quarry/borrow sites and in maintenance yards. There are no stockpiles anticipated as a permanent design feature of the highway construction.</p> |

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| 18 | Section 5.3.3 (Mackenzie Valley Fibre Link) and 5.3.4 (Norman Wells Pipeline) | The Proponent notes that the proposed road is likely to cross the Mackenzie Valley Fibre Link and Line 21 in several locations. The Proponent has not discussed the design implications for these crossings. This is particularly important for Line 21 which would cause significant environmental issues if the road crossing causes a leak in the pipeline. | Please described the design considerations for these crossing and mitigation measures that will be employed to minimize risk of damage to all locations where linear infrastructure corridors intersect. | Pipeline crossing requirements will be determined in consultation with the pipeline and fibre optic owner for each particular crossing at the time of detailed design. All utility crossings, prior to construction at each site, require completion of any relevant regulatory applications (to be determined on a case-by-case basis depending on specific characteristics of the crossing) and subsequent approval from the pipeline and fibre optic owner for any crossing. The application includes the need for a detailed design that must consider environmental and geotechnical issues. This approach minimizes potential for damage to the pipeline or fibre optic cable. |
| 19 | Section 5.4.1 (Construction Schedule) | The Proponent has noted in Section 5.4.1 that construction of the road will take approximately 10 years over a timeframe of up to 20 years. This is an extremely long period to construct the road and has numerous implications for LKFN such as extended periods of time of heightened social risks in our community from the presence of temporary construction workers passing through the community, as well as a generational delay before our community will benefit from the potential positive impacts of the project. | Please provide further information on why the construction of the project is anticipated to take such a long period of time and whether there are any possibilities that could accelerate this timeline. | The schedule used for the assessment is conceptual and assumes the alignment will be constructed in three consecutive segments. The Project is a strategic priority for the GNWT, and the GNWT agrees that there is a need to construct the Project as expeditiously as possible. The GNWT is currently preparing a response to an information request from the Review Board regarding the project's construction schedule and duration. The detailed response will provide additional clarification on the construction schedule and duration. |
| 20 | Section 5.4.14.4 (Procurement) | The proponent has provided extremely limited information on its | The Proponent must develop a conceptual procurement policy for the MVH. LKFN | In section 5.4.14.4 the development of procurement plans are mentioned at a high level. These plans will be developed as we approach the construction phase of the project, when more details pertaining to final design and construction are available. |

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| | Policy) | procurement policy and has indicated that specific procurement plans will be determined closer to the time of tender. Procurement opportunities for the construction and operation of the MVH will be a major potential economic benefit for impacted communities along the ROW and thus should reasonably be considered a potential mitigation/accommodation of impacts to Treaty and Aboriginal rights from the Project. This is particularly true for LKFN which has very substantial capacity to undertake the construction work through our economic development corporation, Nogha Enterprises Inc. To ensure appropriate and commensurate benefits to the Nations impacted by the Project, the Proponent must develop a conceptual procurement policy at this time for review and consideration by impacted Nations. | requests that the proponent work with our Nation and other interested Nations to design the policy in a manner that ensures equitable, commensurate benefits to the Nations impacted by the Project. Note that this policy should include details on hiring practices to ensure that barriers to hiring members of impacted Indigenous Nations are eliminated. | <p>We can confirm that all contracting activities will be conducted in accordance with the Financial Administration Act, Government Contract Regulations, and the GNWT procurement Guidelines. What the GNWT has committed to is the creation of the Mackenzie Valley Highway Corridor Working Group one year prior to the start of construction (Commitment 216). A Training and Employment sub-working group will be formed (Commitment 218) to enhance the positive effects from the Project. The Training and Employment sub-working group will support the implementation of a Contractor Training and Employment Plan (Commitments 219 and 220).</p> <p>Further details on the full breadth of the proposed mitigations to address procurement, training, and employment is detailed in the Community Readiness Strategy (Section 9.16.2.2).</p> |
| 21 | Section 16.6.1 (Significance of Residual Effects - Water | The Proponent has drawn the conclusions in their effects assessment on water and sediment quality that | LKFN requests that the proponent provide a brief summary of the key variables which will determine the | As described in a separate response (LKFN-28), the assessment of potential effects of the Project on water and sediment quality was a qualitative evaluation based on the implementation of standard mitigation measures (Section 16.4) and relevant management plans such as the Erosion and Sedimentation Control Plan (ESCP), |

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| <p>and Sediment Quality)</p> | <p>the residual effects will be "not significant". LKFN notes that this assessment is only accurate under the assumptions made by the Proponent in the DAR around the successful implementation of the project and on many detailed design considerations which will be developed following the approval of the Project's Environmental Assessment. This gap between the assumptions made at the environmental assessment stage and the detailed design stage leave LKFN in a position of being required to provide our support for a project prior to understanding all the details of the potential impacts of the Projects to our Treaty and Aboriginal rights and interests.</p> | <p>success of their water and sediment quality effects assessment, how they plan to mitigate these potential impacts and the role that LKFN can play in monitoring and mitigating potential impacts to water and sediment quality.</p> | <p>Permafrost Protection Plan, and Quarry Development Plans (Volume 5). Many of these proposed mitigation measures are standard conditions included in water licences by regulators in the Mackenzie Valley and are otherwise best management practices reflected in guidelines such as the GNWT Land Use Guidelines Series (GNWT, 2015 a,b) and DFO codes of practice (DFO, 2022 a,b,c). They are not dependent on the status of the application (e.g., environmental assessment vs. detailed design stages), as they are applicable and effective for the protection of freshwater and sediment quality regardless of the design development of the Project. The final design of the highway and watercourse crossings may change the type or location of specific watercourse crossing structures within the parameters described in Chapter 5 (design basis and design criteria), but with high confidence in the effectiveness of mitigations, this will not change the overall conclusions of the assessment.</p> <p>To help confirm the conclusions of the assessment, surface water monitoring will occur throughout the construction phase. Measurements and visual inspections of turbidity will occur upstream and downstream of culvert installations during and after removal of sedimentation control measures. Details pertaining to the monitoring methodology during culvert installation are provided in the ESCP (Volume 5; ESCP Section 3.1).</p> <p>The GNWT is committed to ongoing engagement with Indigenous Governments and Indigenous Organizations, and other affected parties during advancement of project design and planning. Section 2.3 includes commitments relevant to engagement and monitoring, as follows:</p> <ol style="list-style-type: none"> 1. The GNWT is open to and interested in discussing with Indigenous Governments, Indigenous Organizations, and other affected parties how best to integrate community-based monitoring into the Project, including LKFN. 2. The GNWT is open to discussions with Guardian Programs to explore how to best implement them for the Project. Environmental Monitors will be employed as part of the contracting of the Project. <p>References:</p> <p>DFO (Fisheries and Oceans Canada). 2022a. Measures to Protect Fish and Fish Habitat. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html. Accessed March 2024.</p> <p>DFO (Fisheries and Oceans Canada). 2022b. Code of Practice: Culvert Maintenance.</p> |
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| | | | | <p>Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/culvert-maintenance-entretien-ponceaux-eng.html. Accessed March 2024.</p> <p>DFO (Fisheries and Oceans Canada). 2022c. Code of Practice: Ice Bridges and Snow Fills. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/ice-bridges-ponts-glace-eng.html Accessed March 2024.</p> <p>GNWT. 2015a. Northern Land Use Guidelines, Access: Roads and Trails. GNWT Department of Lands, Yellowknife, Northwest Territories.</p> <p>GNWT. 2015b. Northern Land Use Guidelines: Pits and Quarries. GNWT Department of Lands, Yellowknife, Northwest Territories.</p> |
| 22 | General Comment on water quantity | <p>Throughout the DAR the proponent mentions that they intend to employ a fill-only construction approach to building the road with the exception of areas where road cuts will be required. The proponent has noted that they will include culverts along the roadway to maintain natural water flow paths. LKFN notes that the regional groundwater flow path is perpendicular to the road corridor, and that groundwater flow is either above or below the permafrost wherever there is permafrost in the project area. LKFN is concerned with the possibility that the road construction method will significantly alter groundwater flow paths, with dynamics potentially differing between areas with permafrost and areas</p> | <p>LKFN requests that the proponent provide us a summary, with links to appropriate sections in the DAR, to explain how they will avoid the risk of the road impeding groundwater flow in both permafrost and non-permafrost areas.</p> | <p>Experience to date on projects such as Highway 3 and the Tłı̄chǫ Highway, which are also constructed partially on permafrost, show the proposed design approach is not likely to cause groundwater flow path issues or cause flooding and washouts. The Mackenzie Valley Highway will be constructed in a similar permafrost regime, where the road will not cause permafrost to grow into the embankment, which could cut off flow. The sections of the highway located in permafrost (as well as other sections not in permafrost) will use equalization culverts at all low spots to allow passage of groundwater across the road and re-connection to the groundwater regime.</p> |

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| | | without permafrost. LKFN is particularly concerned with the possibility of the MVH blocking groundwater flow, which causes flooding, washouts and other issues impacting both the road and the surrounding environment. | | |
| 23 | Permafrost Monitoring Plan Section 9 | In the Permafrost monitoring plan the Proponent has stated that they will develop a long-term permafrost monitoring plan to "study the thermal regime of the infrastructure and surrounding area". LKFN is concerned with what appears to be limited baseline data collected to this time and a lack of details on what the long-term monitoring plan will look like to ensure that permafrost for the project is protected. | LKFN requests that the proponent provide more details and a firm commitment on their long-term thermal regime monitoring plans for the project. LKFN recommends that continuous monitoring commences as soon as possible. LKFN also recommends that our LKFN guardians are involved in the monitoring of thermistors or other technology used to monitor permafrost conditions along the alignment. | <p>The GNWT's commitment to permafrost monitoring is described in Section 9 of the draft Permafrost Protection Plan. Thermistors will be used at specific locations, representative of key terrain types along the Wrigley to Norman Wells ROW, to provide information such as ground temperature to inform design mitigation measures and identify how the thermal regime changes over time. Ground temperature instrumentation was installed in summer 2020 (Tetra Tech, 2020), and other raw ground temperature data from the region of the ROW, including from the Geological Survey of Canada, will be incorporated in analyses of change. Additional monitoring instrumentation may be identified during final design and potentially installed during construction of the Project.</p> <p>The GNWT will work with LKFN, other Indigenous Governments, and specific other affected parties to provide opportunities for local involvement in project-specific monitoring throughout all phases of the Project, to the extent reasonably practicable.</p> <p>New Commitment: The GNWT will work with LKFN, other Indigenous Governments, and specific other affected parties to provide opportunities for local involvement in project-specific monitoring throughout all phases of the Project, to the extent reasonably practicable.</p> <p>Reference: Tetra Tech. 2020. Prohibition Creek Access Road Thermal Assessment Report, MVWR km 995.3 to km 1009.3, Northwest Territories. Issued for Use report prepared for the Government of the Northwest Territories, Department of Infrastructure by Tetra Tech Canada Inc. June 10, 2021. Tetra Tech File: 704-ENG.YARC03354</p> |
| 24 | Permafrost Monitoring | LKFN notes that limited information is provided on | LKFN requests that the Proponent provide a summary | Appendix 14A (Terrain, Soils and Permafrost Technical Data Report) compiles available Traditional Knowledge and scientific information to characterize permafrost in the |

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| | Plan Section 10 | what western and traditional knowledge the proponent is basing their understanding of permafrost on. | of the western and traditional knowledge that their understanding of road building in permafrost regions is based on and how it has informed their planning for permafrost for the project. | <p>Regional Study Area (RSA) for soils, terrain and permafrost, which is the area within 10 km of the Project Development Area (PDA).</p> <p>The Project will rely on other constructed northern projects and guidelines for working on Arctic projects. There is a sufficient understanding of the permafrost regime in this area for the purposes of engineering design, especially given similar design to other operating northern roads. This area has been mapped in the past and has had numerous boreholes installed throughout the corridor and at potential borrow sources. The permafrost within the area is classified as discontinuous. The permafrost in this area is considered "warm" permafrost. Other roads built in a similar permafrost regime include Highway 3 and the Tłı̄chǫ Highway. These roads incorporated permafrost considerations in all phases of design and construction and continue to provide information about long-term performance. Experience with these design and construction projects have informed all phases of the planning process carried out to date on the Mackenzie Valley Highway. Geotechnical Investigations to be carried out during the design phase will further inform the detailed design process. The approach to building this road will be similar to the embankment designed in similar sections of the Tłı̄chǫ Highway.</p> <p>Information about permafrost conditions and changes obtained from available Traditional Knowledge (e.g., Section 14.2.2.4) and Engagement (Section 14.1.3, Table 14.1) is acknowledged and generally corroborates the selection of mitigation measures, such as those identified in the Permafrost Protection Plan.</p> |
| 25 | Emergency Response Plan | LKFN notes that the emergency response plan for the project is focussed on the construction phase of the project. While this is a necessary document, the Proponent will also maintain responsibility during the operations of the project as well. The project operates in a remote area and the increased accessibility of the road is likely to result in | LKFN requests that the proponent prepare an emergency response plan for the operations phase of the project as well and that it is included as an additional plan in Volume 5 of the DAR. | <p>Effects of the Project on Public Safety are discussed in detail in Section 9.5.9 of the Developer's Assessment Report. This includes discussion of concerns related to increased traffic accidents once the Project is operational. The Emergency Response Plan for the Project is a plan that details responses to emergencies during the construction of the Project. The proposed Community Readiness Strategy, which includes commitments from the GNWT, includes two Plans (the Road Safety Plan and the Safety and Security Plan for Vulnerable Community Members) that have measures applicable to both the construction and operations phases. These plans will be developed collaboratively with communities and are intended to address the adverse socio-economic effects raised by LKFN.</p> <p>As described in Section 9.5.9.2, the Plans will be developed and implemented in collaboration with communities through a Road Safety and Security Sub-Working</p> |

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| | | increased numbers of vehicles stranded along the route, especially during dangerous weather conditions | | <p>Group, which LKFN will be invited to be a member of, and are intended to support safety along the Project by addressing the following needs:</p> <ul style="list-style-type: none"> · Improving communication along the highway · Raising public awareness about highway safety <ul style="list-style-type: none"> o Conducting highway safety information campaigns on topics such as: drinking/drugs and driving, hitchhiking risks, wildlife risks, winter driving risks, speed, and seat belts · Identifying segments of the population that are most at risk on the road (e.g., youth, women, new drivers) to consider their unique circumstances and appropriately target education and awareness efforts and materials · Enforcing highway safety via implementation of standard practice patrols and check stops along the Project once operational <p>Additional details are provided in Section 9.5.9.2 and in Chapter 25 ‘Accidents and Malfunctions’. The proposed Road Safety Plan is intended to mitigate the adverse effects of the Project on Public Safety while taking into account the context of providing emergency services in NWT along operating highways. Should monitoring indicate that additional measures are required, the adaptive management framework will help identify additional resources and programs to be implemented.</p> |
| 26 | Section 27.3.2 (Socio-economic commitments) | The socio-economic commitments the proponent has outlined in the DAR list a number of working groups and sub-working groups tasked with oversight over various aspects of socioeconomic monitoring, oversight and action. It is not clear from the commitment descriptions the role that individual Nations such as LKFN can have within the working groups and sub-working groups. Participation of impacted communities is essential for the working groups to be | LKFN requests that the proponent clarify the role that Indigenous Nations can have in the working groups and sub-working groups discussed in Section 27.3.2 and how our Nation can get involved in the working groups. | <p>LKFN will be one of the Indigenous Governments that will be invited to sit as members of the working groups and sub-working groups described in Section 27.3.2. More information on the proposed structure of the Community Readiness Strategy and the proposed role of the Mackenzie Valley Highway Corridor Working Group is outlined below.</p> <p>Section 9.16.2 of the Developer’s Assessment Report provides a summary of the mitigations and commitments that are part of the Community Readiness Strategy, which will be developed to mitigate the potential negative socio-economic effects of the Project and enhance the potential positive effects. Section 9.16.2 also includes details of the Mackenzie Valley Highway Corridor Working Group (MVHCWG) and Sub-Working Groups, which will develop and oversee the plans that will be part of the Community Readiness Strategy. The work of the MVHCWG and the Sub-Working Groups will use a community-driven approach that involves shared decision-making and collaborative processes. The GNWT recognizes that community input and involvement in decision-making is a critical component of identifying solutions that are appropriately responsive to community needs. The MVHCWG and Sub-Working Groups are proposed to include representatives from GNWT departments, along with:</p> |

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| | | successful. | | <ul style="list-style-type: none"> · Indigenous Governments · Indigenous Organizations · Community governments · Community organizations · Aurora College · Government of Canada · GNWT consultants · Construction contractor(s) <p>The specific roles and responsibilities of the members of the MVHCWG and Sub-Working Groups will be defined through engagement and discussion with communities and other representatives.</p> <p>The GNWT will continue to engage with affected communities throughout 2024 to discuss the proposed socio-economic mitigations and commitments outlined in the Community Readiness Strategy. This will also be an opportunity for Indigenous governments and communities to provide feedback about the proposed structure and functioning of the MVHCWG and sub-working groups and indicate their interest in participating.</p> |
| 27 | Section 27.5 (Engagement and Enhancement Commitments) | Commitment number 277 states that "The GNWT is open to further discussions with the Indigenous Guardians Program to explore how best implement it for the Project." | LKFN intends to utilize our Guardians for the project and requests to work directly with the Proponent and the GNWT on how to best implement this with our Nation. | <p>The GNWT will work with LKFN and other Indigenous Governments, Indigenous Governments and specific other affected parties to provide opportunities for local involvement in project-specific monitoring throughout all phases of the Project, to the extent reasonably practicable.</p> <p>New Commitment: The GNWT will work with LKFN and other Indigenous Governments, Indigenous Governments and specific other affected parties to provide opportunities for local involvement in project-specific monitoring throughout all phases of the Project, to the extent reasonably practicable.</p> |
| 28 | Appendix 16A (Surface Water and Sediment Quality Technical Data Report) | The surface water quality technical report does not include the surface water quality data collected over the years of sampling | Please provide the surface water quality data for LKFN review and consideration. | <p>Sources of historical surface water quality data from several monitoring programs within the Regional Study Area (RSA) area are referenced in the Technical Data Report (Volume 4, Appendix 16A). These data are available from the following sources:</p> <ul style="list-style-type: none"> · GNWT Community-Based Monitoring Program (Mackenzie DataStream, 2024) · Environment and Climate Change Canada (ECCC) National Long-term Water Quality Monitoring Data (ECCC, 2024; Mackenzie DataStream, 2024) · Fisheries and Oceans Canada (DFO): Bioassessment of streams along the Mackenzie |

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| | | | <p>River Valley, Canada, using the Reference Condition Approach: biological, habitat, landscape, and climate data (Rempel and Gill (2011))</p> <ul style="list-style-type: none">· Golder (2015): Central Mackenzie Surface Water and Groundwater Baseline Assessment. Report 1: Technical State of Knowledge· Mackenzie Gas Project Environmental Impact Statement (EIS): Biophysical Baseline Report for Water Quality (EIS Volume 3, Section 6; IORVL, 2004) <p>In addition, compiled water quality data sourced from Water Resources, Indigenous and Northern Affairs Canada (INAC) for the Mackenzie Valley Pipeline were reviewed during the preparation of the TDR. These data may be requested from the GNWT (requests may be sent to Robin Staples, Aquatic Quality Scientist, Environment and Climate Change (ECC), at Robin_Staples@gov.nt.ca, nwtwaterstrategy@gov.nt.ca).</p> <p>The Mackenzie DataStream website is an open access data hub that provides compiled surface water quality data from numerous monitoring programs in the Mackenzie Valley, including the GNWT Community-Based Monitoring Program, long-term ECCC monitoring, and others (Mackenzie DataStream, 2024). Historical GNWT Water Quality Monitoring Data from programs such as Transboundary Rivers, South Slave Regional Network, Yellowknife, Marian and Cameron Rivers Network are also available on Mackenzie DataStream (2024) or upon request to the contact provided above. DataStream may not include all monitoring data from these and other programs in the Mackenzie Valley, so it is recommended that data owners are contacted to confirm the completeness of the datasets on DataStream, or to request the direct sharing of data.</p> <p>As described in a separate response (ECCC-16), the GNWT acknowledges that the characterization of existing conditions is often used in the effects assessment process to evaluate the degree of project-related changes to water resources. This approach is often used when a project involves point source discharges (e.g., mine effluent) which can be modeled to quantitatively predict changes in surface water quality in the aquatic receiving environment. In this case, the project does not involve point source discharges from the highway or its related infrastructure. Because of this, it was determined that the development of a meaningful predictive model to assess potential changes in water quality due to non-point discharges along the highway was not practically feasible (and we are unaware of a precedence for such a model on this type of project). Despite the lack of a model to quantitatively assess changes in water quality from baseline, a review of the available baseline data was performed to</p> |
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| | | | <p>determine if the data could inform the assessment of potential effects in a meaningful way. Ultimately, it was decided that the baseline data were not to be directly used in the effects assessment, and that a qualitative effects assessment was appropriate for the following reasons:</p> <ol style="list-style-type: none">1. Due to a lack of a model for this type of project (i.e., with non-point source discharges), the baseline data could not, in effect, be used to quantitatively inform predictions of potential project-related effects.1. Standard mitigations and best management practices were considered to be sufficient for the protection of water resources during the construction and operation of the highway. The rationale for this is the availability of numerous relevant and established mitigations specific to this type of project. These mitigations have been applied to other comparable projects (i.e., Inuvik to Tuktoyaktuk highway and Tłı̄chǫ Highway; Hamlet of Tuktoyaktuk et al., 2011, MVEIRB 2018). Section 16.4.2.2 outlines standard mitigations proposed for the project and relevant project-specific management plans, such as the Erosion and Sedimentation Control Plan, Permafrost Protection Plan, and Quarry Development Plans. Many of the proposed mitigation measures are standard conditions included in water licenses by regulators in the Mackenzie Valley and are otherwise best management practices reflected in guidelines such as the GNWT Land Use Guidelines Series (GNWT, 2015 a,b) and DFO codes of practice (DFO, 2022 a,b,c).2. Due to the extensive mitigations considered in the assessment, it was determined that the conclusions of the effects assessment would likely not change if historical sampling data within the RSA, or within the Local Study Area (LSA) at site-specific watercourses, were included in the effects assessment. Note the Technical Data Report (TDR) for Surface Water and Sediment Quality (Volume 5) summarizes natural influences on water quality and existing concentrations of TSS within the RSA (Section 3.2.1 of the TDR), as well as anthropogenic influences of water quality within the RSA (Section 3.2.2 of the TDR).3. Water quality monitoring will occur during the construction of the highway to confirm the assumptions made in the effects assessment. Turbidity measurements and visual inspections of water quality will occur upstream and downstream of culvert installations during and after removal of sedimentation control measures. Details |
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| | | | <p>pertaining to the monitoring methodology during culvert installation are provided in the Erosion and Sedimentation Control Plan (Volume 5).</p> <p>The GNWT is committed to ongoing engagement with Indigenous Governments, Indigenous Organizations, and other affected parties during advancement of project design and planning. The GNWT is open to further discussions with the Indigenous Guardians Program to explore water quality monitoring for the Project.</p> <p>Hyperlinks to the above data sources reviewed during the preparation of the DAR are provided in the references listed below.</p> <p>References:</p> <p>DFO (Fisheries and Oceans Canada). 2022a. Measures to Protect Fish and Fish Habitat. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html. Accessed March 2024.</p> <p>DFO (Fisheries and Oceans Canada). 2022b. Code of Practice: Culvert Maintenance. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/culvert-maintenance-entretien-ponceaux-eng.html. Accessed March 2024.</p> <p>DFO (Fisheries and Oceans Canada). 2022c. Code of Practice: Ice Bridges and Snow Fills. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/ice-bridges-ponts-glace-eng.html. Accessed March 2024.</p> <p>ECCC (Environment and Climate Change Canada). 2024. National Long-term Water Quality Monitoring Data. Government of Canada. https://open.canada.ca/data/en/dataset/67b44816-9764-4609-ace1-68dc1764e9ea. Accessed March 2024.</p> <p>GNWT. 2015a. Northern Land Use Guidelines, Access: Roads and Trails. GNWT Department of Lands, Yellowknife, Northwest Territories.</p> <p>GNWT. 2015b. Northern Land Use Guidelines: Pits and Quarries. GNWT Department of Lands, Yellowknife, Northwest Territories.</p> <p>Golder. 2015. Central Mackenzie Surface Water and Groundwater Baseline Assessment. Report 1: Technical State of Knowledge. Report Number: 1401835 Final Report 1. May 21, 2015. Available at : https://www.nwt-esrf.org/sites/nesrf/files/2016-10/Central%20Mackenzie%20Water%20and%20Groundwater%20Baseline%20Assessment%20Report%201%20-%20Technical%20State%20of%20Knowledge.pdf. Accessed March 2024.</p> |
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| | | | | <p>Hamlet of Tuktoyaktuk, Town of Inuvik, and Government of Northwest Territories. 2011. Environmental Impact Statement for Construction of the Inuvik to Tuktoyaktuk Highway, NWT. EIRB File No. 02/10-05; EBA file: V23201322.006.</p> <p>IORVL (Imperial Oil Resources Ventures Limited). 2004. Environmental Impact Statement. Volume 3: Biophysical Impact Assessment. Section 6 Water Quality. Available at: https://apps.cer-rec.gc.ca/REGDOCS/Item/View/3892241. Accessed March 2024.</p> <p>Mackenzie DataStream. 2024. Accessed online March 2024 at: https://mackenziedatastream.ca/en/.</p> <p>MVEIRB (Mackenzie Valley Environmental Impact Review Board). 2018. Report of Environmental Assessment and Reasons for Decision, GNWT Tilcho All-Season Road Project. EA1617.01. March 29, 2018.</p> <p>Rempel, L.L. and G.J. Gill. 2011. Bioassessment of streams along the Mackenzie River Valley, Canada, using the Reference Condition Approach: biological, habitat, landscape, and climate data. Available at https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/344429.pdf. Accessed March 2024.</p> |
| 29 | Appendix 15C (Desktop-Based Assessment of Water Availability) | The study on water availability is desktop based and the data presented is based on a calculation, not on actual measurements. Gathering real-world data is necessary for making informed decisions on water taking for the Project. | LKFN requests that the proponent collect data of water availability in all watercourses and water bodies shown in Summary Table 1 and 2 of Appendix 15C to gather baseline data prior to initiating the project. | <p>As explained in Section 4.2 of Appendix 15C, the estimation of water availability in lakes is based on field data collected from previous studies, and accepted methods (e.g., (DFO, 2010; MVLWB, 2021a; MVLWB, 2021b)). Additional lake data will be collected by GNWT to support permit applications for the applicable construction segment.</p> <p>As explained in Section 4.1 of Appendix 15C, the estimations of flows in ungauged streams are based on published, and publicly available data from gauged streams. For streams, the GNWT will work with the contractor to identify water sources that may be required to support construction for each segment, since not all potential water sources will be required in any given year, and actual flows in any given year can vary considerably. Site-specific stream data will be collected to confirm water availability and withdrawal within regulatory limits (e.g., per DFO, 2013).</p> <p>New Commitment: Site-specific stream and lake data will be collected to confirm water availability and withdrawal within regulatory limits.</p> <p>References: DFO. 2010. Fisheries and Oceans Canada. DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut.</p> |

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| | | | | <p>DFO. 2013. Fisheries and Oceans Canada. Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada. Canadian Science Advisory Secretariat Science Advisory Report 2013/017.</p> <p>MVLWB. 2021a. Land and Water Boards of the Mackenzie Valley. Method for Determining Available Winter Water Use Capacity for Small-Scale Projects April 7.</p> <p>MVLWB. 2021b. Land and Water Boards of the Mackenzie Valley. Technical Reference Document for the Method for Determining Available Winter Water Volumes for Small-Scale Projects.</p> |
| 30 | Appendix 17A Effects of erosion and sedimentation on sensitive species (e.g. Arctic grayling) | GNWT will prepare an Erosion and Sedimentation Control Plan (ESCP) to mitigate the effects of erosion/sedimentation on watercourses from the Project. These mitigation measures are standard protocols that do not account for the specific sensitivities of watercourses in the Project LAA. For example, sensitive species, such as Arctic grayling are found in Prohibition Creek, Four Mile Creek and Twelve Mile Creek (Appendix 17A, Table 4.2). | LKFN requests that the ESCP be updated to prepare specific information on ESC measures to mitigate/manage the risks of sedimentation at these crossings. | <p>A draft Erosion and Sedimentation Control Plan (ESCP) is included in Volume 5 and will be finalized prior to construction. The ESCP provides mitigation measures applicable during project construction and operations and maintenance activities. The mitigation measures in the ESCP are applicable to all watercourses for the protection of all fish species and their habitat from project effects, including sensitive species such as Arctic grayling. The ESCP includes the most current and effective mitigations for erosion and sedimentation and is based on industry best practices and guidelines (e.g., DFO, 2019, 2022; GNWT, 2013; GNWT, 2015a,b,c). Monitoring of the mitigation measures will be conducted to ensure they are operating as planned and corrective measures taken if required. Additional site-specific mitigation may be applied based on recommendations by the environmental monitor or a aquatic environmental specialist.</p> <p>References:</p> <p>DFO (Department of Fisheries and Oceans). 2019. Interim Codes of Practice. Available at: https://www.dfo-mpo.gc.ca/pnw-ppp/practice-pratique-eng.html. Accessed June 2023.</p> <p>DFO. 2022. Standards and Codes of Practice. Available at: https://www.dfo-mpo.gc.ca/pnwppp/practice-pratique-eng.html. Accessed June 2023.</p> <p>GNWT (Government of the Northwest Territories). 2013. Erosion and Sediment Control Manual.</p> <p>GNWT. 2015a. Northern Land Use Guidelines, Camp and Support Facilities. Available at: https://www.lands.gov.nt.ca/sites/lands/files/resources/nlug_camps_2015_english_16_sept_2015.pdf. Accessed June 2023.</p> <p>GNWT. 2015b. Northern Land Use Guidelines: Pits and Quarries. GNWT. Yellowknife, NT. Available at: https://www.lands.gov.nt.ca/sites/lands/files/resources/nlug_-_pits_and_quarries_-_16_september_2015.pdf. Accessed August 2020.</p> |

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| | | | | GNWT. 2015c. Northern Land Use Guidelines: Roads and Trails. GNWT. Yellowknife, NT. Available at: https://www.lands.gov.nt.ca/sites/lands/files/resources/nlug_roadstrails_2015_english_16_sept_2015.pdf . Accessed August 2021. |
| 31 | Section 5.4.7 Watercourse Crossings | GNWT states that there will be at least 85 large culverts (greater than 1.5m diameter) (page 257) and 9 existing bridges (page 296) for construction of the road along the preferred route. However, there is not sufficient details on existing bridges and whether they will require any upgrades to accommodate the all-season road, or if there are at site-specific mitigation measures. Given the potential risk of erosion and sedimentation at these important points, the GNWT must provide additional information on watercourse crossings | LKFN requests additional information on existing crossings and whether there is a need for upgrades or site-specific mitigation measures to limit the effects of sedimentation and erosion. For example, it is not clear whether existing crossings provide adequate freeboard or setback distances to avoid effects to watercourse banks. Furthermore, it is unclear whether existing crossings have adequate width to accommodate the new road. | <p>Design of new culverts and approaches to existing crossings will be site specific to each crossing. Evaluation of existing crossing parameters will be carried out during the detailed design process and will take a similar approach to that which was undertaken when connecting to existing crossings (single lane bridges) for the Prohibition Creek Access Road (PCAR), which will become part of the Mackenzie Valley Highway. For existing single lane bridges along the Mackenzie Valley Winter Road that will be incorporated into the final highway design, the roadway geometrics will be tapered down to one lane far in advance of the water crossing and as a result, will not impact the water crossing.</p> <p>Erosion and sedimentation is a potential concern when designing new water crossing structures or connecting to existing water crossing structures. The GNWT will implement an Erosion and Sediment Control Plan (ESCP) based on industry best management practices for erosion prevention and sediment control (see draft ESCP in Volume 5; and GNWT, 2013).</p> <p>Reference: GNWT (Government of the Northwest Territories). 2013. Erosion and Sediment Control Manual.</p> |
| 32 | Section 17.1.3 Potential Effects, Pathways and Measurable Parameters Altered hydrology as a pathway of effect on fish habitat | In evaluating the pathways of effect on fish and fish habitat, GNWT has considered loss of habitat and change in health. Haven't considered the pathway of altered hydrology (Table 17.2) In construction of the road, there is a potential risk that there could be altered hydrology, resulting in | LKFN requests that GNWT include an assessment of altered hydrology as a effect pathway on fish and fish habitat. | Changes to fish and fish habitat due to altered hydrology are not anticipated and if they occur would be related to inadequate culvert design. Effects related to culvert design are assessed in sections 17.4.2.3 and 17.4.3.4. Culverts for watercourse crossings will be designed to maintain water flow and fish passage, taking into account hydrological and fish and fish habitat information specific to each crossing. Water flow will be maintained during the construction of the watercourse crossings. Design criteria are included in Section 5.2.2, Table 5.1 (Road and Bridge-Culvert Design Criteria/Standards for the Project). Routine monitoring of each crossing will be conducted to evaluate whether culvert crossings are working as designed. If issues with a crossing are identified, corrective actions will be undertaken. |

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| | | ponding, constricted culverts, and/or changes to upstream and downstream flows. Such altered hydrology could result in a change to fish habitat, scour and erosion. | | |
| 33 | Section 17.4 Assessment of Residual Effects on Fish and Fish Habitat Culvert flow velocity | GNWT states that flow velocity (m/s) in culverts will meet fish passage requirements for fish species present (Table 17.8). However, it is not clear on what basis the determination of species present at each crossing will be made. If it is based exclusively on baseline sampling, that would likely not represent a comprehensive list of possible species present, as that sampling was limited to a single sampling event during later summer 2020 (for Dehcho) and fall 2021 (for Sahtu). | LKFN requests that GNWT provide a summary table for all crossings that includes the list of potential species present, and the minimum/maximum flow velocities that will be required. | Hydrotechnical assessments for watercourses in the Dehcho Region and Sahtu Region have been conducted along the preliminary highway alignment route (Tetra Tech 2021; Tetra Tech 2022) (Volume 3, Section 17.2.2). The referenced reports are provided with this response (Attachments LKFN-33A and LKFN-33B). Results of these assessments will be used to inform culvert design and sizing. Fisheries and Oceans Canada has developed Swim Performance Online Tools (DFO 2023) to provide guidance for fish passage requirements for different fish species and size categories. Culverts will be designed to provide fish passage for the fish species and size category with the weakest swimming performance using the hydrotechnical data collected in the field and DFO's Swim Performance Online Tools. If fish species are not known for a watercourse or if the list of fish species in a watercourse cannot be determined, fish passage requirements will be based on the list of potential fish species which may occur based on professional judgement (using habitat information, stream size, and position in watershed) and the precautionary principle. References: DFO (Fisheries and Oceans Canada. 2023. Fish Performance Online Tools (SPOT). Available at https://fishprotectiontools.ca/ . Tetra Tech. 2021. Mackenzie Valley Highway Dehcho Segment Hydrotechnical Assessments Prepared for the Government of the Northwest Territories, Department of Infrastructure. Tetra Tech. 2022. Mackenzie Valley Highway Sahtu South Segment Hydrotechnical Assessments. Prepared for the Government of the Northwest Territories, Department of Infrastructure. |
| 34 | Section 17.4 Assessment of Residual Effects on Fish and Fish | GNWT states that excavated spoil materials and material stockpiles will be kept at a minimum distance of 30m from watercourses (Table | LKFN requests that mitigation measures be updates to ensure that excavated materials and stockpiles be placed at a minimum distance | The GNWT has committed to applying appropriate erosion and sedimentation control mitigation measures to prevent sediment from entering a watercourse or waterbody, and that these mitigation measures apply to spoil and material stockpiles. Best practices are included in the draft Erosion and Sedimentation Control Plan (Volume 5), including those in the GNWT's Erosion and Sedimentation Control Manual (2013). The |

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| | Habitat Erosion and sedimentation of stockpiles | 17.8). This distance is not sufficient to prevent potential erosion and sedimentation, especially during periods of high rainfall and/or melting snow. | of 100m from watercourses. Furthermore, efforts should be made to ensure that stockpiles are covered, revegetated, or otherwise stabilized prior to spring freshet. | <p>GNWT agrees that most stockpiles will be located more than 100 m from watercourses, such as stockpiles of quarried or granular material used for construction of roadway embankment. However, limiting certain excavated spoil materials and material stockpiles to outside of 100 m is not always practicable, particularly since some watercourse crossings will require excavation and placement of material to install culverts. Material stockpiles used to support watercourse crossings will be located more than 30 m from watercourses. These specific spoil and material stockpiles will be temporary (during culvert installation), limited in size, and short-term in duration.</p> <p>Reference: GNWT (Government of the Northwest Territories). 2013. Erosion and Sediment Control Manual. Available at: https://www.inf.gov.nt.ca/sites/inf/files/resources/dot_erosion_and_sediment_control_manual_-_mar_31_16.pdf</p> |
| 35 | Appendix 17A Pacific salmon | LKFN has an interest in the presence and distribution of salmon species in the Mackenzie River basin. In recent years, Pacific salmon, which were not historically part of the fish community of the Mackenzie River and its tributaries, have been observed and captured. This includes chinook, coho, and sockeye salmon, in varying numbers. While there are some small native populations of chum and pink salmon, it appears that these species are also increasing in number. The reason that Pacific salmon are being observed in these areas is not well understood, | LKFN requests additional information from the GNWT on any records of pacific salmon species at any of the proposed crossings, in the LAA, or RAA. | <p>The GNWT recognizes the interest in the increased occurrence of Pacific salmon in the Mackenzie River system. Captures of Pacific salmon have mainly occurred in the Mackenzie River or its larger tributaries such as the Peel and Liard Rivers (Irvine et al. 2009; Stephenson 2005; ARI, 2013; Dunmall and McNicholl, 2019). Due to the small size of the watercourses to be crossed by the Project, Pacific salmon are not expected to access these watercourses, and therefore effect on salmon are not anticipated. No additional project-specific fish and fish habitat assessments are planned except for watercourses that may require assessment due to changes in the location of the alignment.</p> <p>Ongoing collaborative research, led by DFO, on Pacific salmon in the Mackenzie River system is being supported by the NWT Cumulative Impact Monitoring Program. For more information on studies of salmon in the Arctic, please visit: https://www.arcticsalmon.ca/.</p> <p>References: Aurora Research Institute (ARI). 2013. Catch Locations of Pacific Salmon in the Canadian Arctic. First Edition. Yellowknife. (https://nwtdiscoveryportal.enr.gov.nt.ca/geoportal/documents/AllSpeciesLocations.jpg) Dunmall, K. and D.McNicholl. 2019. Arctic Salmon: Community monitoring initiatives</p> |

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| | | <p>although it is hypothesized that these salmon are migrating from the Arctic Ocean, a process that is being facilitated by climate change and warming water temperatures (Dunmall, et al., 2013).</p> <p>Dunmall, K. M., Reist, J. D., Carmack, E. D., Babaluk, J. A., Heide-Jorgensen, M. P., & Docker, M. F. (2013). Pacific Salmon in the Arctic: Harbingers of Change. In D. M. Mueter, H. P. Dickson, J. R. Huntington, E. A. Irvine, S. A. Logerwell, L. T. MacLean, . . . C. Rosa, Responses of Arctic Marine Ecosystems to Climate Change. University of Alaska Fairbanks.</p> | | <p>find increasing salmon in the NWT. https://www.gov.nt.ca/ecc/sites/ecc/files/resources/nerb_-_issue_17_-_arctic_salmon.pdf. Irvine, J.R., E. Linn, K. Gillespie, C. Mcleod and J.D. Reist. 2009. Pacific salmon in Canada's Arctic draining rivers, with emphasis on those in British Columbia and the Yukon. Prepared for Pacific Fisheries Resource Conservation Council. 23 p. Stephenson, S.A. 2005. The distribution of Pacific salmon (<i>Oncorhynchus</i> spp.) in the Canadian Western Arctic. Can. Manuscr. Rep. Fish. Aquat. Sci. 2737: vi + 29 p.</p> |
| 36 | Section 17.2 Existing Conditions for Fish and Fish Habitat Baseline sampling | GNWT has only completed one season of field sampling at each watercourse. This includes field sampling in the Dehcho Region Sept 16 - 24, 2020 and the Sahtu Region Sept 30-Oct 11, 2021. This level of effort is far below what is considered best practice. It is important to conduct multi-season multi-year baseline studies to adequately characterize natural variability and the | LKFN requests additional baseline sampling to adequately characterize the aquatic habitat within the LAA. | Single season baseline data collection is the standard approach for fish and fish habitat assessments for road construction projects. This approach is appropriate because pathways of effects are well-known, and applicable design standards and guidelines, standard mitigations, best management practices and a precautionary approach are effective at mitigating effects on fish and fish habitat. Field baseline assessment of watercourses takes into account known and potential fish species presence, their life stages (e.g., spawning, rearing, overwintering), and habitat requirements for their different life stages with the understanding that habitat may be used by fish differently during different seasons and life stages. The quality of that habitat is then assessed as none, poor, moderate or good for the different life history stages. Fish and fish habitat baseline data provided in Appendix 17A (Fish and Fish Habitat Technical Data Report) was augmented by past studies in the Project area (including 5658 NWT Ltd. and GNWT, 2011; Dessau 2012; IORVL 2004) and Traditional Knowledge (Dessau 2012; TRRC 2022) which provided multi-year and season data for some of the |

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| | | habitat use by different species based on their unique life histories. | | <p>watercourse crossings. This information provided improved understanding and confidence in the assessment, especially given that most of the watercourses have similar characteristics. No multi-season and multi-year field sampling is planned.</p> <p>References: 5658 NWT Ltd. and GNWT (5658 NWT Ltd. and the Government of the Northwest Territories).2011. Project Description Report For Construction of the Mackenzie Valley Highway Tulita District, Sahtú Settlement Area. Available at: https://www.inf.gov.nt.ca/sites/inf/files/resources/project_description_report_for_construction_of_the_mvh_tulita_district.pdf. Accessed February 2023. Dessau. 2012. Mackenzie Valley Highway Extension Pehdzeh Ki Ndeh – Dehcho Region. Project Description Report. Prepared for the Government of the Northwest Territories, Department of Transport. IORVL (Imperial Oil Resources Ventures Limited). 2004. Environmental Impact Statement for the Mackenzie Gas Project. Volume 3: Biophysical Baseline, Part C – Aquatic Resources, Section 7: Fish and Fish Habitat. TRRC. 2022. Tulita Renewable Resources Council Traditional Land and Resource Use Study for Tulita District Mackenzie Highway Project. Prepared by K’alo-Stantec Limited. Prepared for Tulita Renewable Resources Council.</p> |
| 37 | Section 17.2 Existing Conditions for Fish and Fish Habitat Benthic Invertebrate Monitoring | Benthic invertebrates are good candidates for long-term monitoring of water and sediment quality and as an indicator of aquatic health. The presence of sensitive families of invertebrates has a strong relationship to water quality and provides information on the suitability of habitat. Benthic invertebrates also represent an important prey species that provide a link between the base of the food chain and valued fish species. Despite the value of | GNWT must provide an explanation of why benthic invertebrate monitoring was not conducted. Furthermore, it is recommended that benthic invertebrate sampling be conducted prior to construction so that the information can be relied upon during subsequent monitoring programs. | <p>Benthic invertebrate sampling is outside the scope of the Mackenzie Valley Review Board Terms of Reference for this Project and is typically not conducted for road construction projects in the Northwest Territories or elsewhere in Canada. The assessment of potential effects of the Project on fish and fish habitat included: the implementation of standard mitigations as outlined in Section 17.4 and for water quality in Section 16.4; and relevant management plans, such as the Erosion and Sedimentation Control Plan, Permafrost Protection Plan, and Quarry Development Plans which contain mitigation measures anticipated to be effective at mitigating the effects of the Project on fish and fish habitat, including benthic invertebrates. Many of these proposed mitigation measures are standard conditions included in water licences by regulators in the Mackenzie Valley and are otherwise best management practices reflected in guidelines applicable to the construction of all-season roads in the Northwest Territories, such as the GNWT Land Use Guidelines Series (GNWT, 2015 a,b) and DFO code of practice (DFO 2022) and standard (DFO 2023).</p> <p>Benthic invertebrate populations should not be negatively impacted by the Project. As such, and in consideration of the afore-mentioned management measures, benthic</p> |

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| | | benthic invertebrates, there has been no baseline assessment of benthic invertebrates. | | <p>sampling is not planned.</p> <p>References: DFO (Fisheries and Oceans Canada). 2022. Code of Practice for temporary fords. Available at: https://www.dfo-mpo.gc.ca/pnwppe/codes/temporary-fords-traversees-temporaires-eng.html DFO, 2023. Interim standard: in-water site isolation. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/interim-provisoire/site-isolation-confinement-aire-travail-eng.html GNWT. 2015a. Northern Land Use Guidelines, Access: Roads and Trails. GNWT Department of Lands, Yellowknife, Northwest Territories. GNWT. 2015b. Northern Land Use Guidelines: Pits and Quarries. GNWT Department of Lands, Yellowknife, Northwest Territories.</p> |
| 38 | Section 17.2 Existing Conditions for Fish and Fish Habitat Invasive Species | The Project area is currently devoid of any known aquatic invasive species (e.g., zebra mussels, quagga mussels, whirling disease). These could be transported to watersheds in the Project Area by heavy equipment during construction or operations (e.g., by equipment being used for maintenance). We feel that the potential impact of introducing these invasive species must not be underestimated. Invasive species can dramatically alter the ecology of aquatic habitats, causing irreversible harm. | GNWT must prepare and evaluate the potential risks of aquatic invasive species and provide details on how they plan to prevent the accidental introduction of invasive species through all phases of the Project. GNWT should share this plan with the LKFN for review and comment prior to finalization or approval. | <p>Mitigation measures that will be implemented to reduce the risk of introducing aquatic invasive species were provided in Section 17.4, Table 17.8, which states "Machinery will arrive on-site and will be maintained in a clean condition and free of invasive species and noxious weeds". Decontamination of equipment can vary depending on where the equipment is sourced from. Also, the Province of Alberta has decontamination instructions for industrial and construction activities in Appendix D of Decontamination Protocol for Work in or Near Water (AEP 2020), which will be provided to contractors for construction of the proposed Mackenzie Valley Highway. These instructions will also be effective in the prevention of the spread of Zebra mussels.</p> <p>Reference: AEP (Alberta Environment and Parks). 2020. Decontamination Protocol for Work in or Near Water. Available at: https://open.alberta.ca/dataset/9b126cfd-b637-4dd2-838e-b43d12c8993a/resource/d89b106e-af61-4858-a991-12caadd0869d/download/aep-decontamination-protocol-for-work-in-or-near-water.pdf. Accessed, March 2024.</p> |
| 39 | General Comment on Caribou | In several instances the Proponent has noted that they are not certain about | LKFN requests that the Proponent provide information on how they will | GNWT's response to LKFN-14 summarizes the results from a technical study on boreal caribou movement in the region. A technical report of this study was made available on the MVEIRB Public Registry [PR#163] on February 29, 2024, titled Mackenzie Valley |

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| | Crossing the road | whether or not Caribou will be able to cross the road or not. The road will be elevated above the surrounding terrain and may present a major impediment to caribou and other wildlife for the entire extent of the road. | monitor whether caribou are able to cross the road and any design features they are including to increase the ability of caribou to cross the road. | <p>Highway Project: Inferring the Potential Barriers to Boreal Caribou Movement. The report is available at the following location:</p> <p>https://reviewboard.ca/upload/project_document/Cover%20Letter%20-%20DAR%20Caribou%20Movement%20Analysis%20Supplemental%20Filing_with%20CL.pdf</p> <p>The study concluded that, currently, boreal caribou do not regularly attempt to cross the Mackenzie Valley Winter Road (MVWR, Norman Wells to Wrigley) where the Project will be located. The low potential for crossings is primarily due to natural barriers, other existing linear disturbances, and habitat conditions, but not the MVWR itself. Thus, the Project, which will follow the MVWR as much as possible is not anticipated to pose a barrier to boreal caribou movement (i.e., because caribou are not moving in this direction anyway).</p> <p>The Project's design further minimizes the potential for impeding caribou crossings, including:</p> <ul style="list-style-type: none"> · Gradually sloped embankments (i.e., 1 vertical unit for every 3 horizontal units), approximately 1.4–1.8 m above the ground surface. · Snowbanks will be maintained at <1 m height when snow clearing occurs. <p>Several monitoring approaches will be taken to assess the effectiveness of the Project's design features, including incidental observation/reporting, wildlife-vehicle collision monitoring, and a collaring program. The primary mode of monitoring is intended to be a collar-based data collection program, which will continue through the Project's construction and operation. This monitoring is intended to assess changes in the distribution, movement, and habitat use of boreal caribou during and after road construction. Potential barriers will continue to be assessed via movement analysis of collar data, and the results will be compared to the technical study involving winter roads (discussed above). The comparison will help verify the conclusions and predictions made in the technical study.</p> |
| 40 | General Comment on comparison to similar roads | LKFN notes that there are other roads in the North which provide a reasonable basis for comparison to the MVH in terms of potential | LKFN requests that the Proponent provide a summary of similar roads in Canada's north that have informed the design of the MVH, with a | The GNWT and its design team for the Mackenzie Valley Highway project have been involved in designing more than 2000 km of northern and Arctic highways. These include: The Tłı̄chǫ Highway the Inuvik to Tuktoyaktuk Highway, significant segments of the Dempster Highway in both NWT and Yukon, and of NWT Highways 1, 3, and 5. Broad lessons have been learned from these and many other similar Arctic projects, |

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| | | impacts to the environment. LKFN wishes to understand what lessons the Proponent has learned from other projects, and what projects the Proponents has drawn on to base these lessons learned. | focus on lessons learned. | with direct application to the Mackenzie Valley Highway Project. These lessons learned are incorporated directly into the DAR and many are stated in Section 5.2.1 Design Basis and Section 5.2.2 Design Parameters and Objectives. |
| No. | Topic | Reviewer Comment | Reviewer Recommendation | Proponent Response |
| Acho Dene Koe First Nation (ADKFN) - Chief Gene Hope | | | | |
| 1 | Section 5.5.9.1 Traffic Volumes | <p>For the purposes of the assessment, the Developer anticipates an average traffic volume of 50 vehicles per day (of various sizes) and will include: Local traffic travelling between communities, commercial traffic needed for community operations and resupply, traffic associated with operating small businesses, such as tourism, and industrial traffic to support exploration, development, operations and/or closure and reclamation of natural resource developments, such as oil and gas or forestry.</p> <p>We are concerned that the Developer does not appear to provide any rationale for</p> | <p>We request that the Developer provide a baseline characterization of traffic on roadways reasonably considered to be leading to/from the future Mackenzie Valley Highway (specifically, Highway 1, 5, and 7). Additionally, as part of the effects assessment, we request that the Developer provide predicted traffic flows (broken down seasonally) for the Mackenzie Valley Highway as well as Highway 1, 5, and 7 leading to/from it.</p> <p>Estimates of traffic flow should be substantiated by existing or foreseeable development, migration, tourism, and/or other factors, or draw on comparable examples elsewhere in the Northwest Territories/Canada.</p> | <p>The GNWT's assessment of potential effects on the environment is based on best available information. The GNWT collects traffic data using permanent traffic counters installed along highways and winter roads throughout the Northwest Territories. Based on the GNWT's traffic count information, the average annual daily traffic (AADT) on the Mackenzie Valley Winter Road (MVWR) over the last 5 years of record-keeping (2019-2023) is 52 vehicles (see Table ADKFN-1.1). That means that on average, over the operating period of the winter road (generally January to March), there is an average of approximately 50 vehicles per day using the road (total vehicle traffic over this period is not reported). Opening the Mackenzie Valley Highway to year-round traffic (subject to Mackenzie River crossing at N'Dulee being open) is not expected to increase AADT because at least some of the vehicles currently using the winter road (e.g., resupply trucks) will use the all-season highway to supply communities at other times of the year. So, while total vehicle use of the highway over the year will increase (because there is no current vehicle use from April to December), this will not necessarily lead to an increase of AADT. As an illustration of this, the average daily traffic recorded using the Mackenzie River Ferry at the N'Dulee crossing (Highway 1 between Fort Simpson and Wrigley), between May and November, for the past 5 reporting years (2018-2022) was 20 vehicles (GNWT, 2022), which is less than the 52 AADT recorded on the MVWR.</p> <p>Average annual daily traffic for the MVWR is based on historical data from the traffic counter located at the junction of the MVWR and Délı̄nę Winter Road (Counter ID 1-914). This location provides the most appropriate record of traffic for planning purposes, since it is more likely to be representative of transient traffic on a highway than other traffic counters on the MVWR, because this location captures traffic en</p> |

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| | <p>why the number 50 vehicles per day was selected, nor is there a detailed breakdown of estimates of the point of origin or destination of the vehicles (i.e., an elaboration of the composition of anticipated traffic). Without this information, it is difficult to understand the broader impacts of this project beyond the limited extent of the highway corridor/RAA.</p> <p>We anticipate that the impact will be significantly higher than 50 vehicles, especially at the lower ends of the highway, including the connecting roads such as Highway 7, which passes through our Traditional Territory. In this case, and as a result of the increased noise, traffic, and general activity, animals, including the boreal caribou, on which we traditionally rely and have Indigenous rights to hunt and trap, will invariably go even further afield to escape the increased commotion of the roadway. This is particularly concerning given the sensitive nature of many of</p> | <p>When considering the disturbance to animal habitat, impacts, including increased traffic upstream and downstream of the development area, must be taken into account.</p> | <p>route to communities further north, rather than local community traffic (e.g., traffic counter 1-1022 which is located only 1.4 kilometres south of Norman Wells).</p> <p>As stated earlier in this response, once the Mackenzie Valley Highway is open, industrial and community resupply will occur throughout the year instead of being concentrated during the months when the winter road is open. For example, although based on limited data, when the Tłı̄chǫ Highway opened in 2021, the AADT decreased from an average of approximately 161 vehicles (2017-2021 average), to 37 (2022, and 2023 for months of January to October). Table ADKFN-1.1 provides statistics for the noted traffic counters. Methods for the GNWT's traffic counting are provided in GNWT (2022).</p> <p>The potential effects of the Project on valued components (VCs) in the Developer's Assessment Report are assessed within Local Assessment Areas (LAAs), which do not extend to NWT Highways 2, 3, 5, 7, or 1 (beyond Source 10.043) because there are no direct effects on VCs predicted at this distance from the Project. Similarly, the Regional Assessment Areas (RAAs) do not extend to Highways 2, 3, 5, 7 or 1 because the Project's contribution to changes in VCs over such a large area would be so small as to be not measurable, and indistinguishable from other influences on those VCs.</p> <p>The Project may use some or all of existing NWT Highways 1, 2, 3, 5, and 7 for equipment mobilization and re-supply during construction, and once built, some or all of these highways may be used to some degree to access the constructed highway. All of these existing connecting highways have variability in their traffic use from year-to-year. Changes to daily and annual traffic volume along NWT Highways can be influenced by many factors, including seasonality, natural factors (e.g., forest fires, COVID-19), industrial user needs (e.g., forestry, oil and gas, mining), highway maintenance (e.g., gravel haul) and local use (e.g., gatherings). The Project's contribution to total traffic volume on NWT Highways is likely to be within this variability, and the Project's contribution to AADT on these existing highways would not be measurable.</p> <p>References: GNWT. 2022. Northwest Territories Highway Traffic Report. Available at: https://www.inf.gov.nt.ca/sites/inf/files/resources/2022_highway_traffic.pdf. Accessed March 2024.</p> |
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| | | <p>these animals, including their endangered or threatened statuses. We surmise that the 0.03% disturbance estimation in the DAR is significantly too low and fails to account for the cumulative effects of the development. The impacts of the project, upstream and downstream, cannot be overstated and must be properly considered by way of this assessment.</p> | | <p>GNWT. 2024. Northwest Territories Highway Traffic Data. Provisional. Internal data not yet published. Obtained from GNWT Headquarters – Department of Infrastructure, Policy, Planning & Communications</p> |
| 2 | Section 8.2.1 Assessment Areas | <p>The Regional Assessment Area (RAA) is defined as areas where potential direct, indirect, and induced effects of the Project may occur, which includes the communities in the Sahtu Region that are outside of the LAA, as well as the communities of Fort Simpson, Fort Good Hope Delin and Colville Lake.</p> <p>We recognize the inherent difficulty of establishing an RAA for a project of this nature, especially given the unique context of the Northwest Territories and the population centres that exist.</p> <p>Indirect or induced effects</p> | <p>We recommend that elements of the RAA be extended to consider impacts on all communities along the Highway 1 and 7 corridors to the borders with Alberta and British Columbia. This extension should consider the potential impacts of the project through construction and operation on public safety and social pressures (e.g., drugs, alcohol, crime, gender-based violence, and the spread of infectious diseases such as sexually transmitted infections (STIs)).</p> | <p>Once the Project becomes operational, it is anticipated that there would be the potential for increased flow of residents between communities within the Local Assessment Area (LAA) and to a limited extent within communities in the Regional Assessment Area (RAA). There is also a potential for an increase in non-residents and visitors coming to the LAA and RAA communities from multiple locations across a large area beyond the RAA.</p> <p>It is anticipated that a potential increase or change in the flow of visitors or non-residents could have a number of potential adverse socio-economic effects, as well as potential positive socio-economic effects on LAA and RAA communities. These socio-economic effects are not anticipated to extend to communities along the NWT highways 1, 2, 3, 5, 7 as the Project's contributions to any changes over such a large area would be so small as not to be measurable, and indistinguishable from other influences.</p> <p>The potential increase in traffic flow within the LAA and RAA may be reflected in changes in traffic volume compared to what is currently seen on the Mackenzie Valley Winter Road (MVWR) and the existing all-season road between Fort Simpson and Wrigley. This is typically measured in the form of Annual Average Daily Traffic (AADT) counts, which reflect the average daily vehicle traffic at a particular location, averaged over a year. The estimates of the AADT for the highway once it is operational are not anticipated to be higher than the current AADT for the MVWR, which over the last five</p> |

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| | | <p>may extend along the Highway 1 and Highway 7 corridors all the way to the respective borders with Alberta and British Columbia, as a result of increased traffic and flow of goods from more southern Canada.</p> | | <p>years of record-keeping is 52 vehicles. As the highway will be all-season, the anticipated traffic volume may represent an increase in overall traffic volume over the course of a year compared to current total traffic volume on the MVWR. However, this may not result in an increase of the AADT. As an illustration of this, the average daily traffic recorded using the Mackenzie River Ferry at the N'Dulee crossing (Highway 1 between Fort Simpson and Wrigley), between May and November, for the past 5 reporting years (2018-2022) was 20 vehicles (GNWT, 2022), which is less than the 52 AADT recorded on the MVWR.</p> <p>Additionally, industrial and community resupply, as well as travel to and from communities by residents and visitors will occur throughout the year instead of being concentrated during the months when the winter road is open. For example, although based on limited data, when the Tłı̄chǫ Highway opened in 2021, the AADT decreased from an average of approximately 161 vehicles on the winter road (2017-2021 average), to 37 vehicles on the Tłı̄chǫ Highway (2022, and 2023 for months of January to October).</p> <p>Socio-economic effects of the Project are intended to be mitigated through commitments made by GNWT to work with affected communities in the LAA and RAA to develop and implement a Community Readiness Strategy (more details are outlined in Section 9.16.2). The Mackenzie Valley Highway Corridor Working Group (MVHCWG) will be responsible to develop and oversee the Community Readiness Strategy and associated plans and GNWT commitments. However, although the Community Readiness Strategy will be implemented within the LAA and RAA, the MVHCWG will also act as a forum to discuss issues and concerns that may be identified as being associated with socio-economic effects of the Project, including any potential effects that may be identified outside of the RAA. Should monitoring indicate that additional measures are required to address socio-economic effects of the Project, the adaptive management framework will help identify additional resources and programs to be implemented if and as appropriate.</p> |
| 3 | Section 8.2.2 The Project Will Affect the Availability of Drugs and Alcohol | The Developer proposes, as a mitigation measure to anticipated social pressures during construction and operations and maintenance, a commitment | We acknowledge this Plan as an important step but are concerned that this plan has not been developed and, therefore, is not available for review and comment. There is | The GNWT recognizes that community input and involvement in decision-making is a critical component of identifying solutions that are appropriately responsive to community needs. The Mackenzie Valley Highway Corridor Working Group (MVHCWG), and associated Sub-Working Groups, will develop and oversee the plans that are part of the Strategy using a community-driven approach that involves shared decision-making and collaborative and participatory processes to address existing |

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| | | <p>to establish a Mackenzie Valley Highway Well-Being and Adaptive Management Plan that includes measures to address the project's effects on community wellness and substance abuse and bootlegging</p> | <p>a serious concern that it will not be a satisfactory form of mitigation. The intended methodology to be used is ambiguous, and it is unclear whether it will appropriately address all effects associated with community well-being (for instance, human trafficking and violent crimes - which may exist as co-morbidities with increased drug and alcohol availabilities, are not described).</p> <p>This Plan must be co-developed with affected communities and be developed before final approval of this project.</p> | <p>conditions and improve programs and services.</p> <p>The work of the MVHCWG and Sub-Working Groups will begin one year prior to construction and will continue through construction and for a period of five years during operations. It is anticipated that there will be considerable time and effort required by the GNWT and communities in advance to develop plans to ensure that work can commence on the anticipated timelines. The timeframe for this advance work to begin has not yet been determined. GNWT is planning to engage with affected Indigenous governments and communities in the LAA and RAA throughout 2024. While the Strategy and associated plans are not intended to be finalized as part of the environmental assessment (EA) process, any updates to the proposed approach and components of the Community Readiness Strategy that may be appropriate or required as a result of community engagement over 2024 will be reflected in updated material filed with the Review Board at the appropriate time before the EA process concludes.</p> <p>Section 9.16.2 of the Developer's Assessment Report provides more information, including a summary of the mitigations and commitments that are part of the Community Readiness Strategy, which will be developed to mitigate the potential negative socio-economic effects of the Project and enhance the potential positive effects. The Community Readiness Strategy will be led by a Mackenzie Valley Highway Corridor Working Group (MVHCWG) and will involve the work of several Sub-Working Groups focused on specific subject areas under the Strategy, each with associated specific plans. This includes proposed plans that are intended to put mitigation measures in place to address potential adverse effects of the Project on public safety, community well-being and social pressures. As part of the Follow-up and Monitoring approach outlined in Section 9.15 of the DAR, the mitigation measures and plans will be subject to monitoring and ongoing engagement with communities. This monitoring and engagement will be undertaken to ensure that adaptive management in response to changing social and economic conditions will be implemented by the MVHCWG and associated sub-working groups.</p> <p>The work of the MVHCWG and Sub-Working Groups to develop and implement plans will begin one year prior to construction and will continue through construction and for a period of five years during operations. The plans that are part of the Community Readiness Strategy are intended to support adaptive management measures in</p> |
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| | | | | <p>response to the results of changes in community well-being indicators and the socio-economic effects of the Project. The plans include the focus areas associated with community safety, community wellness, community services and substance abuse and bootlegging outlined in the proposed Well-Being Adaptive Management Plan. These focus areas have been identified in this Plan given the importance of the potential adverse socio-economic effects of the Project identified in these areas and the serious concerns that exist in communities today, particularly in the area of alcohol and drug use and abuse.</p> |
| 4 | <p>Section 8.2.3 The Project Will Affect Public Safety</p> | <p>The Developer acknowledges that coinciding with the highway construction, operation, and maintenance will lead to an increase in the number of traffic accidents that will lead to serious injury or death. We agree with this, as well as the assessment that there are significant gaps in the ability for aid to be rendered in the event of accidents as a result of limited communication and emergency infrastructure.</p> <p>We want to highlight that in addition to those identified gaps, even in situations where an incident occurs near a population centre, existing health and emergency resources are very limited in most instances along Highway 1 and 7, leading to the proposed MVH. As a result,</p> | <p>The Developer must consider the potential impacts on emergency and health resources in established population centres along the entirety of the Highway 1 and 7 corridors leading to (in addition to those found along) the proposed MVH.</p> <p>ADKFN foresees instances in which increased traffic entering the Northwest Territories from British Columbia may tax the already limited resources in Fort Liard as it is one of only a few population centres between Fort Nelson, British Columbia and Fort Simpson en route to the MVH.</p> | <p>Once Project becomes operational, it is anticipated that there would be the potential for increased flow of residents between communities within the Local Assessment Area (LAA) and to a limited extent within communities in the Regional Assessment Area (RAA). There is also a potential for an increase in non-residents and visitors coming to the LAA and RAA communities from multiple locations across a large area beyond the RAA.</p> <p>It is anticipated that a potential increase or change in the flow of visitors or non-residents could have a number of potential adverse socio-economic effects, as well as potential positive socio-economic effects on LAA and RAA communities. This includes potential increases in demand for emergency, protective or health services within the LAA and RAA. These socio-economic effects are not anticipated to extend to communities along the NWT highways 1, 2, 3, 5, 7 as the Project's contributions to any changes over such a large area would be so small as not to be measurable, and indistinguishable from other influences.</p> <p>The potential increase in traffic flow within the LAA and RAA may be reflected in changes in traffic volume compared to what is currently seen on the Mackenzie Valley Winter Road (MVWR) and the existing all-season road between Fort Simpson and Wrigley. This is typically measured in the form of Annual Average Daily Traffic (AADT) counts, which reflect the average daily vehicle traffic at a particular location, averaged over a year. The estimates of the AADT for the highway once it is operational are not anticipated to be higher than the current AADT for the MVWR, which over the last five years of record-keeping is 52 vehicles. As the highway will be all-season, the anticipated traffic volume may represent an increase in overall traffic volume over the course of a year compared to current total traffic volume on the MVWR. However, this may not result in an increase of the AADT. As an illustration of this, the average daily traffic recorded using the Mackenzie River Ferry at the N'Dulee crossing (Highway</p> |

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| | | existing health and emergency resources may be easily overwhelmed by both surges and patients due to serious incidents, or generally by the increase in volume due to increased flow of traffic. | | <p>1 between Fort Simpson and Wrigley), between May and November, for the past 5 reporting years (2018-2022) was 20 vehicles (GNWT, 2022), which is less than the 52 AADT recorded on the MVWR.</p> <p>Additionally, industrial and community resupply, as well as travel to and from communities by residents and visitors will occur throughout the year instead of being concentrated during the months when the winter road is open. For example, although based on limited data, when the Tłıchq Highway opened in 2021, the AADT decreased from an average of approximately 161 vehicles on the winter road (2017-2021 average), to 37 vehicles on the Tłıchq Highway (2022, and 2023 for months of January to October).</p> <p>Socio-economic effects of the Project are intended to be mitigated through commitments made by GNWT to work with affected communities in the LAA and RAA to develop and implement a Community Readiness Strategy (more details are outlined in Section 9.16.2). The Mackenzie Valley Highway Corridor Working Group (MVHCWG) will be responsible to develop and oversee the Community Readiness Strategy and associated plans and GNWT commitments. However, although the Community Readiness Strategy will be implemented within the LAA and RAA, the MVHCWG will also act as a forum to discuss issues and concerns that may be identified as being associated with socio-economic effects of the Project, including any potential effects that may be identified outside of the RAA. Should monitoring indicate that additional measures are required to address socio-economic effects of the Project, the adaptive management framework will help identify additional resources and programs to be implemented if and as appropriate.</p> |
| 5 | Section 8.2.4 The Project is Likely to Result in Change in Demands for Social Infrastructure and Services | The Developer concludes that the effects of the project on changes in demands for social infrastructure and services (including policing and crime, health services, and social services) during all phases are expected to be adverse but of low magnitude, irregular, | We request that the Developer recognize that existing social resources may not be positioned effectively to handle increased demand volume or surge events and that these effects, although may be irregular, may be seasonal, locally of higher magnitude, and in some if not many instances irreversible | <p>Once the Project becomes operational, it is anticipated that there would be the potential for increased flow of residents between communities within the Local Assessment Area (LAA) and to a limited extent within communities in the Regional Assessment Area (RAA). There is also a potential for an increase in non-residents and visitors coming to the LAA and RAA communities from multiple locations across a large area beyond the RAA.</p> <p>It is anticipated that a potential increase or change in the flow of visitors or non-residents could have a number of potential adverse socio-economic effects, as well as potential positive socio-economic effects on LAA and RAA communities. This includes potential increases in demand for social resources and services within the LAA and</p> |

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| | | <p>infrequent and reversible, therefore not significant.</p> <p>We disagree with this finding, as it overlooks much of the findings of the previous two subsections that note significant adverse effects on public safety and the availability of drugs and alcohol. We generally agree that incidents themselves may be irregular, as they may correspond with the presence of people, goods, or substances in a given location; however, given the severely limited resources in nearly all population centres in the Northwest Territories (excluding Yellowknife), a surge event in crime or demand on health services, may have lasting effects on the health and well-being of others in the community or general public</p> | <p>through the life of the project. As a result, these effects may result in adverse impacts to communities that may be locally if not globally significant.</p> <p>Further analysis must be conducted on additional resource needs along the Highway 1 and 7 corridors as well as in communities along the proposed MVH project.</p> | <p>RAA. These socio-economic effects are not anticipated to extend to communities along the NWT highways 1, 2, 3, 5, 7 as the Project's contributions to any changes over such a large area would be so small as not to be measurable, and indistinguishable from other influences.</p> <p>The potential increase in traffic flow within the LAA and RAA may be reflected in changes in traffic volume compared to what is currently seen on the Mackenzie Valley Winter Road (MVWR) and the existing all-season road between Fort Simpson and Wrigley. This is typically measured in the form of Annual Average Daily Traffic (AADT) counts, which reflect the average daily vehicle traffic at a particular location, averaged over a year. The estimates of the AADT for the highway once it is operational are not anticipated to be higher than the current AADT for the MVWR, which over the last five years of record-keeping is 52 vehicles. As the highway will be all-season, the anticipated traffic volume may represent an increase in overall traffic volume over the course of a year compared to current total traffic volume on the MVWR. However, this may not result in an increase of the AADT. As an illustration of this, the average daily traffic recorded using the Mackenzie River Ferry at the N'Dulee crossing (Highway 1 between Fort Simpson and Wrigley), between May and November, for the past 5 reporting years (2018-2022) was 20 vehicles (GNWT, 2022), which is less than the 52 AADT recorded on the MVWR.</p> <p>Additionally, industrial and community resupply, as well as travel to and from communities by residents and visitors will occur throughout the year instead of being concentrated during the months when the winter road is open. For example, although based on limited data, when the Tłı̄ch̄q Highway opened in 2021, the AADT decreased from an average of approximately 161 vehicles on the winter road (2017-2021 average), to 37 vehicles on the Tłı̄ch̄q Highway (2022, and 2023 for months of January to October).</p> <p>Socio-economic effects of the Project are intended to be mitigated through commitments made by GNWT to work with affected communities in the LAA and RAA to develop and implement a Community Readiness Strategy (more details are outlined in Section 9.16.2). The Mackenzie Valley Highway Corridor Working Group (MVHCWG) will be responsible to develop and oversee the Community Readiness Strategy and associated plans and GNWT commitments. However, although the Community Readiness Strategy will be implemented within the LAA and RAA, the MVHCWG will</p> |
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| | | | | also act as a forum to discuss issues and concerns that may be identified as being associated with socio-economic effects of the Project, including any potential effects that may be identified outside of the RAA. Should monitoring indicate that additional measures are required to address socio-economic effects of the Project, the adaptive management framework will help identify additional resources and programs to be implemented if and as appropriate. |
| 6 | Section 8.2.6.1 The Project Will Positively Affect Local Employment and GDP, and there will be Measures to Maximize Local and Indigenous Employment | <p>The Developer states that it is anticipated that 50% of the 200-330 person contractor workforce will be from the Sahtu and Dehcho communities or elsewhere in the NWT, with the remaining coming from outside of the NWT. Additionally, in addressing concerns that southerners (those from outside of the NWT) will be hired for positions unless NWT residents are prioritized, an MVH Contractor Training and Employment Plan will be developed.</p> <p>Unfortunately, commitments to develop an employment plan fall short of explicitly making commitments to ensure that a specific proportion of Indigenous persons and/or NWT residents will be hired/contracted for this project. As a result, without firm commitments, we</p> | <p>We request that the Developer, make firm minimum benefit goals for Indigenous members and NWT residents, as well as other commitments regarding training and contracting NWT-owned businesses. These goals must be made clear and binding as part of the evaluation process such that it can feed into an overall assessment of net-project effects.</p> | <p>At this time, the GNWT is unable to make commitments regarding minimum benefit goals related to training and contracting NWT-owned or Indigenous-owned businesses. However, the GNWT will commit that there will be a northern and Indigenous hiring priority required for the Project, aligned with existing GNWT procurement and hiring processes. Additionally, and in keeping with this commitment, the GNWT has committed to developing the Community Readiness Strategy (summarized in Section 9.16.2) which includes a Training and Employment Sub-Working Group. The Sub-Working Group (Section 9.16.2.2) will develop and implement a Contractor Training and Employment Plan (Section 9.16.2.2.1) in collaboration with communities that will further detail the overall approach to education, training, and employment readiness for communities in the Local Assessment Area (LAA) and Regional Assessment Area (RAA) that are intended to increase local and regional employment opportunities during construction and operations. The GNWT has also made commitments (Section 9.16.2.2) to include conditions in construction contracts that are intended to maximize local employment and economic benefits:</p> <ul style="list-style-type: none"> · Outline how contractors will increase on-the-job training for LAA and RAA residents. · Demonstrate through reporting that LAA and RAA residents and Indigenous people are being trained. · Demonstrate how local and Indigenous labour and businesses will be sourced. · Commits to cultural awareness and anti-racism training to mitigate potential adverse effects associated with presence of non-NWT/non-LAA/RAA workers. · Detail how contractors will communicate and collaborate with LAA and RAA community governments and Indigenous organizations regarding their involvement in construction and operation. <p>The GNWT has committed to verifying that community-based cultural awareness and anti-racism training is part of the Plan for non-NWT and non-Indigenous workers.</p> |

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| | | cannot consider this benefit realized. | | <p>The Social Monitoring and Adaptive Management Sub-Working Group (Section 9.16.2.3) will work to monitor all plans and commitments that are part of the Community Readiness Strategy. This will involve the development of appropriate socio-economic indicators that will allow monitoring of socio-economic effects of the Project.</p> <p>Should monitoring indicate that additional measures are required, the adaptive management framework will help identify additional resources and programs to be implemented to better support communities and maximize positive benefits for Indigenous community members, businesses and residents in the LAA, RAA and NWT.</p> |
| 7 | 8.2.7 The Project Will have Several Positive Effects and Minimal Adverse Effects on Local Businesses | We generally agree with the Developer that local businesses will largely experience neutral or positive effects as a result of this project. Further, as part of the MVH Contractor Training and Employment Plan, there will be measures to support local hiring and business to support the realization of benefits for local businesses. | As part of the MVH Contractor Training and Employment Plan, the Developer, with support from relevant organizations and agencies within the Northwest Territories, should outline robust measures that can ensure local businesses maximize benefits, including but not limited to opportunities supporting marketing, capital growth, and diversification, that may have both direct and indirect benefits for communities as they may be able to better service increased traffic in the territory, generate wealth, and serve the communities in which they are located it. | <p>The GNWT agrees that local businesses should benefit from the construction and operation of the MVH. In order to help local businesses realize this benefit, the GNWT has proposed a Contractor Training and Employment Plan as part of the Community Readiness Strategy (see Section 9.16.2.2.1 for details). This proposed Plan outlines the overall approach to education, training, and employment readiness for Local Assessment Area (LAA) and Regional Assessment Area (RAA) residents to increase employment opportunities during construction and operations. The Plan will leverage existing programs and augment them through adaptive management as identified through monitoring. This Plan, as with all component plans of the Community Readiness Strategy, is intended to be developed collaboratively between the GNWT and partners. The Training and Employment Sub-Working Group will involve representation from GNWT departments, education and industry partners and community leadership and organizations working together to make decisions and develop measures and solutions to address socio-economic effects of the Project that are responsive to community needs and conditions.</p> <p>Should monitoring indicate that additional employment, training or education related measures are required, the adaptive management framework will help identify additional resources and programs to be implemented to better support communities and maximize positive benefits for Indigenous community members, businesses and residents in the LAA, RAA, and NWT.</p> |
| 8 | 8.2.9 The Project Will Have Minimal Effects on | The Developer concludes that this project will have minimal effects on harvesting and the | In considering the impacts this project will have on harvesting and traditional practice, it is important that the local | Once the Project becomes operational, it is anticipated that there would be the potential for increased flow of residents between communities within the Local Assessment Area (LAA) and to a limited extent within communities in the Regional Assessment Area (RAA). There is also a potential for an increase in non-residents and |

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| <p>Harvesting and the Traditional Economy</p> | <p>traditional economy. Acho Dene Koe First Nation, like many other communities in the Northwest Territories, relies heavily on traditional and rights-based harvest, as well as economies that are derived from those practices. We anticipate that our community will benefit to an extent from commercial aspects of these practices as increased traffic through our community en route to the MVH will result in increased sales of crafts which use natural products such as fur, bark, stones, etc., however, we caution that the adverse impacts of increased traffic along Highway 7 should not be understated. Specifically, with the construction of Highway 7, our Traditional Territory was bisected. This changed how our community was able to access our lands, shifting away from water-based access to road-based access. With this shift, many of our members shifted to areas where they practiced traditional activities (e.g., hunting, fishing, and</p> | <p>context be considered along the major transport routes connecting to the MVH. This includes assessing the potential direct impacts of the increased presence and occupation of non-members/non-residents on perceptions or use of the land.</p> | <p>visitors coming to the LAA and RAA communities from multiple locations across a large area beyond the RAA.</p> <p>It is anticipated that a potential increase or change in the flow of visitors or non-residents could have a number of potential adverse socio-economic effects, as well as potential positive socio-economic effects on LAA and RAA communities. This includes the potential impacts on non-traditional land and resource use. These socio-economic effects are not anticipated to extend to communities along the NWT highways 1, 2, 3, 5, 7 as the Project's contributions to any changes over such a large area would be so small as not to be measurable, and indistinguishable from other influences.</p> <p>The potential increase in traffic flow within the LAA and RAA may be reflected in changes in traffic volume compared to what is currently seen on the Mackenzie Valley Winter Road (MVWR) and the existing all-season road between Fort Simpson and Wrigley. This is typically measured in the form of Annual Average Daily Traffic (AADT) counts, which reflect the average daily vehicle traffic at a particular location, averaged over a year. The estimates of the AADT for the highway once it is operational are not anticipated to be higher than the current AADT for the MVWR, which over the last five years of record-keeping is 52 vehicles. As the highway will be all-season, the anticipated traffic volume may represent an increase in overall traffic volume over the course of a year compared to current total traffic volume on the MVWR. However, this may not result in an increase of the AADT. As an illustration of this, the average daily traffic recorded using the Mackenzie River Ferry at the N'Dulee crossing (Highway 1 between Fort Simpson and Wrigley), between May and November, for the past 5 reporting years (2018-2022) was 20 vehicles (GNWT, 2022), which is less than the 52 AADT recorded on the MVWR.</p> <p>Additionally, industrial and community resupply, as well as travel to and from communities by residents and visitors will occur throughout the year instead of being concentrated during the months when the winter road is open. For example, although based on limited data, when the Tłı̄chų Highway opened in 2021, the AADT decreased from an average of approximately 161 vehicles on the winter road (2017-2021 average), to 37 vehicles on the Tłı̄chų Highway (2022, and 2023 for months of January to October).</p> <p>Socio-economic effects of the Project are intended to be mitigated through</p> |
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| | <p>trapping) and erected temporary or permanent structures along the highway corridor.</p> <p>With the increase in traffic entering the Northwest Territories through British Columbia along Highway 7, we are concerned that lands used for cabins, staging and lands used for the exercise of rights may be disturbed, or adversely affected by increased traffic, and the presence of non-members. We can foresee the possibility of increased resource harvest pressures, as well as increases in transient occupation of lands and, in some instances, vandalism or unauthorized occupation of member- owned dwellings that occur along the Highway 7 corridor. These instances may, in turn, result in conflicts or modifications in behaviour among our members to avoid certain areas, resulting in shifts or reductions in traditional practices. As made clear by the aforesaid, there are serious</p> | | <p>commitments made by GNWT to work with affected communities in the LAA and RAA to develop and implement a Community Readiness Strategy (more details are outlined in Section 9.16.2). The Mackenzie Valley Highway Corridor Working Group (MVHCWG) will be responsible to develop and oversee the Community Readiness Strategy and associated plans and GNWT commitments. However, although the Community Readiness Strategy will be implemented within the LAA and RAA, the MVHCWG will also act as a forum to discuss issues and concerns that may be identified as being associated with socio-economic effects of the Project, including any potential effects that may be identified outside of the RAA. Should monitoring indicate that additional measures are required to address socio-economic effects of the Project, the adaptive management framework will help identify additional resources and programs to be implemented if and as appropriate.</p> |
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| | | cumulative adverse impact concerns that will affect various elements of our traditional way of life and our Treaty and Indigenous rights. | | |
| 9 | Section 9.1.1 Summary of Assessment | <p>The Developer elaborates on their determination that the Project's adverse effects are not significant even though residual effects on public safety and social pressures are identified as specific. Specifically, they rationalized this determination by citing the many other effects that are identified as not significant, as well by noting that the Government of Northwest Territories will develop and implement follow-up and monitoring activities, including the development of a well-being adaptive management plan that will support the development of measures to address the adverse effects of the Project.</p> <p>We take issue with this determination and are concerned that the Developer has not fully considered the potential</p> | <p>Impacts on public safety and social pressures are inherent in a project such as this but must be considered more so given their disproportionate impact. As a result, we believe that the Developer must take additional measures to work with communities to flesh out meaningful strategies to anticipate and react to impacts on public safety and social pressures on a near territory-wide basis. We believe that this effort must be taken as part of the Environmental Impact Assessment process to consider the overall impacts and effects rather than simply establishing commitments to act on it at a later date.</p> | <p>The GNWT recognizes that community input and involvement in decision-making is a critical component of identifying solutions that are appropriately responsive to community needs. The Mackenzie Valley Highway Corridor Working Group (MVHCWG), and associated Sub-Working Groups, will develop and oversee the plans that are part of the Strategy using a community-driven approach that involves shared decision-making and collaborative and participatory processes to address existing conditions and improve programs and services.</p> <p>The work of the MVHCWG and Sub-Working Groups will begin one year prior to construction and will continue through construction and for a period of five years during operations. It is anticipated that there will be considerable time and effort required by the GNWT and communities in advance to develop plans to ensure that work can commence on the anticipated timelines. The timeframe for this advance work to begin has not yet been determined. However, the GNWT is planning to engage with affected Indigenous governments and communities in the LAA and RAA throughout 2024. While the Strategy and associated plans are not intended to be finalized as part of the environmental assessment (EA) process, any updates to the proposed approach and components of the Community Readiness Strategy that may be appropriate or required as a result of community engagement over 2024 will be reflected in updated material filed with the Review Board at the appropriate time before the EA process concludes.</p> <p>The Community Readiness Strategy will be developed to mitigate the adverse socio-economic effects of the project, including those significant adverse effects anticipated for social pressures and public safety. The Community Readiness Strategy includes the development and implementation of associated plans, including three plans that are specifically responsive to concerns that have been raised by affected communities related to the effects of the Project on social pressures and public safety. These include:</p> <ul style="list-style-type: none"> · Road Safety Plan |

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| | <p>effectiveness of monitoring and follow- up measures. Within the Canadian context, substance abuse (especially those related to opioids such as fentanyl), alcoholism, and gender-based/intimate partner violence in Indigenous communities and vulnerable populations are considered at epidemic levels. To an extent communities within the Northwest Territories have been shielded where strict controls on availabilities of drugs and alcohol can be implemented (such as in remote communities), however, in other communities such as ours we have seen the impacts of substance abuse and violence adversely alter our community fabric. This is echoed elsewhere in Canada, especially in Indigenous communities and among vulnerable populations.</p> <p>We are concerned that many communities, including the Government of Northwest Territories as a whole, are not effectively</p> | | <ul style="list-style-type: none"> · Safety and Security Plan for Vulnerable Community Members · Well-Being Adaptive Management Plan <p>The Community Readiness Strategy will be led by a Mackenzie Valley Highway Corridor Working Group (MVHCWG) and will involve the work of several sub-working groups focused on specific subject areas under the strategy, each with associated specific plans. The MVHCWG will also act as a forum to discuss issues and concerns that may be identified as being associated with socio-economic effects of the Project, including potential effects identified outside of the RAA.</p> |
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| | | <p>positioned or supported to deal with the societal changes that will accompany the increased flow of people and traffic (along with societal pressures that accompany them). As a result, while public safety and social pressures are indeed identified as significant adverse effects, the ability of the Developer (with the backing of the entire territorial government) may be understating the potential adverse impacts and overstating the collective ability of communities and Government of Northwest Territories to mitigate these impacts.</p> | | |
| 10 | Section 9.5.3.2 Mitigation | <p>The Developer notes that community members and leadership in Norman Wells and Tulita indicated there was a need to address existing health needs and service issues before the project is operational. In response, GNWT has committed to developing a Community Readiness Strategy that will include a Well-Being Adaptive</p> | <p>We recommend that GNWT provide additional information in the form of a draft plan, terms of reference, or plan framework that allows ADKFN and other parties to review the efficacy of the plan.</p> <p>Further, we request that GNWT provide additional information about the temporal and geographic extent of the plan, as well as</p> | <p>The Community Readiness Strategy and associated plans (including the Well-Being Adaptive Management Plan and others) will be developed to mitigate the potential adverse socio-economic effects of the Project and maximize the potential positive effects of the Project on affected communities. As such, the geographic scope of the Strategy is the affected communities identified as being within the Local Assessment Area (LAA) and the Regional Assessment Area (RAA).</p> <p>The GNWT recognizes that community input and involvement in decision-making is a critical component of identifying solutions that are appropriately responsive to community needs. The Mackenzie Valley Highway Corridor Working Group (MVHCWG), and associated Sub-Working Groups, will develop and oversee the plans that are part of the Strategy using a community-driven approach that involves shared decision-making and collaborative and participatory processes to address existing</p> |

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| | | <p>Management Plan to address these concerns.</p> <p>This commitment has not been fleshed out into a plan that can be evaluated for effectiveness, and therefore, we raise concerns about whether it is indeed a suitable mitigation measure.</p> <p>Additionally, no information is provided about the implementation timeline or the geographic extent that will be covered by this plan.</p> | <p>associated monitoring and adaptive management efforts. This information is critical to ensure that project- related effects in the PDA, LAA, RAA and beyond are appropriately identified, mitigated and responded to.</p> | <p>conditions and improve programs and services.</p> <p>The GNWT is planning to engage with affected Indigenous governments and communities in the LAA and RAA throughout 2024 to discuss the proposed Community Readiness Strategy and associated plans. While the Strategy and associated plans are not intended to be finalized as part of the environmental assessment (EA) process, any updates to the proposed approach and components of the Community Readiness Strategy that may be appropriate or required as a result of community engagement over 2024 will be reflected in updated material filed with the Review Board at the appropriate time before the EA process concludes.</p> <p>Section 9.15 and 9.16.2 of the Developer’s Assessment Report provide more information, include a summary of the Follow-up and Monitoring framework and the Community Readiness Strategy, respectively. Both the Follow-up and Monitoring framework and the Community Readiness Strategy are intended to work together to support adaptive management of the socio-economic effects of the Project over time in the communities that are in the Local Assessment Area (LAA) communities and the Regional Assessment Area (RAA).</p> |
| 11 | Section 13.1.1 Regulatory and Policy Setting | <p>Section 13.1.1 outlines the Developer’s approach to set thresholds for the acoustic environment. We find this approach flawed as it does not consider the full extent of the relationship Indigenous persons exercising their rights may have within the environment of their respective territory as they relate to the holistic experience.</p> | <p>Nuisance noise is far more nuanced and personal than the Guidelines and thresholds propose. Specifically, in areas such as the Northwest Territories, the soundscape is largely dominated by natural sounds. Any anthropogenically derived sounds may be viewed as an intrusion and may cause Acho Dene Koe First Nation members and animals on which we rely to exercise our inherent Indigenous rights to avoid areas. Therefore, we recommend the threshold for vehicular traffic</p> | <p>The GNWT acknowledges Acho Dene Koe First Nation’s concerns.</p> <p>However, the GNWT is not aware of alternative basis, to that provided in the DAR, to assess potential effects on noise in the context of a regulatory application.</p> <p>The operation and maintenance of the highway will cause noise, as would any highway. It will not be possible to entirely avoid that noise and any impact it causes to wildlife and ADKFN members who are harvesting in the vicinity of the highway after it opens to the public. Section 13.4.2.3, summarizes the residual effects on studied receptors (residences), following established practice for the assessment of potential effects on noise in regulatory applications, which includes assessment of specific types of “receptors.” The GNWT recognizes that this approach may however not be viewed as representative of human response to noise by other users of the land.</p> <p>The closest studied receptor is 350 metres (m) from the Project. Section 13.4.2.3 concludes that noise effects at this receptor during the Operations and Maintenance Phase of the Project are as follows:</p> <ul style="list-style-type: none"> · Long-Term Community Annoyance (%HA; Highly Annoyed): The highest predicted |

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| | | | <p>be considered a long-term community annoyance, or one that is considered an annoyance at any point it is observed outside of the highway right-of-way.</p> <p>We further request additional analysis of increases in road traffic throughout the Highway 7 corridors, recommending applicable mitigation measures to minimize impacts on those exercising rights within the nearby Highway corridor.</p> | <p>change in %HA result, 0.0%, is below the threshold of 6.5%. The result indicates that operations and maintenance activities are not expected to cause long-term community annoyance at this receptor. Per Health Canada Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (Health Canada, 2017), this parameter only applies to receptors within communities, and therefore would not apply to other locations within or outside of the highway right-of-way.</p> <ul style="list-style-type: none"> · Low-Frequency Noise (Ld; daytime sound level): The predicted noise level, 33 dBZ (Z-weighted or unweighted decibels) Ld, is below the threshold of 70 dBZ Ld. Operations and maintenance activities are not predicted to result in low frequency "rattle" noise at this receptor. · Traffic Noise (Leq-24hr; 24-hour equivalent sound level): The highest predicted level at the closest receptor (350 m from the Project), 19 dBA (A-weighted decibels) Leq-24hr, is below the threshold of 65 dBA Leq-24hr where consideration of noise control barriers or berms is warranted. <p>Land users practising activities beyond this assessed receptor distance would experience lower magnitude effects, and land users within 350 m of the highway would experience increased traffic noise similar to that of the Mackenzie Valley Winter Road, which was estimated at 50 dBA Leq-24hr at 25 m distance from the road (Dessau, 2012).</p> <p>As discussed in the response to ADKFN-1, Highway 7 is outside of the LAA and RAA for noise. The Project may use some or all of existing NWT Highways 1, 2, 3, 5, and 7 for equipment mobilization and re-supply during construction, and once built, some or all of these highways may be used to access the constructed highway. All of these existing connecting highways have variability in their traffic use from year-to-year, and the Project's contribution to total traffic volume on NWT Highways is likely to be within this variability. The Project's contribution to average annual daily traffic (AADT) on these existing highways is expected to be not measurable.</p> <p>References: Dessau. 2012. Mackenzie Valley Highway Extension Pehdzeh Ki Ndeh – Dehcho Region. Project Description Report. [PR#13] Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. Available at: https://www.ceaa.gc.ca/050/documents/p80054/119378E.pdf.</p> |
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| Canadian Northern Economic Development Agency (CanNor) - Ms. Shannon Allerston | | | | |
| 1 | DFO 19: Bull Trout/SARA - Volume 3, Sub-section 17.2.2 and Appendix 17A, Sub-section 4.2.1.5 | <p>Please note that Bull Trout (Western and Arctic populations) are currently under reassessment by COSEWIC and may be listed as Threatened after the assessment (potentially as early as 2025).</p> <p>If the listing of Bull Trout is changed, species at risk permits and a reassessment of fish and fish habitat would be required for the project.</p> <p>Bull Trout populations have declined in Alberta and become threatened due to anthropogenic impacts of linear development (i.e., roads, pipelines, etc.). Bull Trout protections must be implemented early to insure Bull Trout populations do not decline in the Mackenzie Valley. In addition, DFO must consider the application of a precautionary approach when making a decision under the Fisheries Act. The precautionary principle recognizes that in the</p> | DFO recommends the proponent use a precautionary approach in regards to Bull Trout to ensure their protection. This could include increased monitoring and protections in the absence of definitive baseline studies. | <p>The GNWT thanks the reviewer for the information regarding the current reassessment of bull trout (Western and Arctic Population) by COSEWIC. It is understood that if bull trout becomes listed as Threatened on Schedule 1 of the Species at Risk Act by the Government of Canada, a SARA permit will be required prior to construction at watercourses which may be utilized by bull trout.</p> <p>The GNWT is taking a precautionary approach to construction of the Project at streams that have the potential to support bull trout. In doing so, the GNWT will assume that any watercourse that has habitat suitable for bull trout, is within the known distribution range of bull trout, and is not separated from known bull trout habitat by impassable barriers, could support bull trout. Mitigation measures that will be implemented during Project construction and operation are intended to avoid or reduce potential harm to fish and fish habitat, including bull trout. These mitigation measures, and an overview of monitoring activities that would be conducted during and after project construction, are provided in Section 17.9, draft Fish and Fish Habitat Protection Plan (Volume 5), and in Sections 2 and 3 of the draft Erosion and Sedimentation Control Plan (Volume 5). Additional monitoring requirements specific to bull trout, if identified as part of the Project's approval and permitting, will be incorporated into a project-specific monitoring plan.</p> |

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| | | absence of scientific certainty, conservation measures can and should be taken when there is knowledge of a risk of serious or irreversible harm to the environment and/or resources using best available information. | | |
| 2 | DFO 20: Bull Trout - Volume 3, Sub-section 17.2.2 and Appendix 17A, Sub-section 4.2.1.5 | <p>It is stated in the DAR that “it has been suggested bull trout in the eastern tributaries of the Mackenzie River, such as those within the RSA are individuals from tributaries on the west side of the Mackenzie River in search of feeding or overwintering areas.” However, the DAR also states that “Bull Trout are not expected to occur in the watercourses assessed during this study due to the lack of suitable habitat.”</p> <p>No rationale was provided to support the statement that watercourses are not expected to support Bull Trout.</p> <p>All life-stages of Bull Trout and/or potential habitat should be protected unless current local evidence</p> | <p>DFO recommends the proponent provide information on why the habitat at the proposed crossings is unsuitable for Bull Trout, including for feeding and cover.</p> <p>DFO recommends the proponent use a precautionary approach and not exclude the possibility that some of these streams may support Bull Trout.</p> | <p>Habitat at the proposed stream crossings is considered unsuitable for bull trout for the following reasons:</p> <ol style="list-style-type: none"> 1. Most of the watercourses that may be crossed by the Project are small second or third order streams of low gradient that drain directly into the Mackenzie River, a river with relatively turbid water. In contrast, bull trout prefer higher gradient watercourses connected to larger relatively clear downstream rivers such as the Keele and South Nahanni Rivers (Mochnacz et al. 2013). 2. Most of the watercourses that may be crossed by the Project have substrates dominated by fines and organics. In contrast, adult bull trout (the life stage most likely to access watercourses on the eastern side of the Mackenzie River), prefer habitat with cobble to boulder substrates (Mochnacz et al. 2004). Juveniles are less likely to make the long migration from western headwater streams of the Mackenzie River to eastern tributaries of the Mackenzie River due to the increased risk in predation and energy cost. 3. Most of the watercourses that may be crossed by the Project are shallow and lack deep pools suitable for bull trout overwintering; most watercourses that may be crossed by the Project freeze to the bottom in winter. <p>In Alberta, bull trout appear to return to the same overwintering habitat with high fidelity (Alberta Sustainable Resource Development and Alberta Conservation Association. 2009). Although similar overwintering habitat fidelity in the Northwest Territories has not been confirmed, data showing that bull trout overwinter in watercourses and lakes on the western side of the Mackenzie River suggests that similar overwintering site fidelity may also exist in the Mackenzie River watershed.</p> |

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| | | <p>confirms the absence of the species. This should include smaller streams and tributaries that may provide rearing habitat for smaller fish and cover for fish during higher flows in the Mackenzie River. A precautionary approach should provide protection for habitats that may not have robust sampling to determine the use by fish that may be present.</p> | | <p>It is recognized that some bull trout may utilize larger watercourses crossed by the Project, which already have bridges installed. However, the likelihood is low because studies conducted in watercourses along the eastern side of the Mackenzie River (Mochnacz et al. 2013) and for the current Project have not captured bull trout. The exceptions are in the lower reach of the Great Bear River and two locations in the eastern Mackenzie River in the Sahtu Region (Reist et al. 2002), all of which are outside the Local Assessment Area.</p> <p>References: Alberta Sustainable Resource Development and Alberta Conservation Association. 2009. Status of Bull Trout (<i>Salvelinus confluentus</i>) in Alberta. Update 2009. Alberta Sustainable Resource Development. Wildlife Status Report No. 39 (Update 2009). Edmonton, AB. 48 pp. Mochnacz, N.J., R. Bajno, J.D. Reist, G. Low and J.A. Babaluk. 2013. Distribution and biology of Bull Trout (<i>Salvelinus confluentus</i>) in the Mackenzie Valley, Northwest Territories, with notes on sympatry with Dolly Varden (<i>Salvelinus malma</i>). <i>Arctic</i> 66: 79-93. Mochnacz, N. J., J. D. Reist, P. Cott, G. Low, et R. Wastle. 2004. Biological and habitat data for bull trout (<i>Salvelinus confluentus</i>) and associated species from stream surveys conducted in the southern and central Mackenzie River Valley, Northwest Territories, 2000-2001. <i>Can. Data Rep. Fish. Aquat. Sci.</i> 1131: iv + 38p. Reist, J.D., Low, G., Johnson, J.D., and McDowell, D. 2002. Range extension of bull trout, <i>Salvelinus confluentus</i>, to the central Northwest Territories, with notes on identification and distribution of Dolly Varden, <i>Salvelinus malma</i>, in the Western Canadian Arctic. <i>Arctic</i> 55(1):70 – 76.</p> |
| 3 | DFO 21: Existing Structures - Volume 1, Sub-section 5.1 | <p>The project description states “Operations and maintenance of the Mackenzie Valley Winter Road (MVWR) as required for public safety, including repair or upgrades of existing watercourse crossing structures, until such time that segments of the Mackenzie Valley</p> | <p>DFO recommends the proponent provide information on existing structures, including photographs, construction dates, crossing width, and when maintenance/upgrades are expected to be required.</p> | <p>See attachment DFO21 for a detailed spreadsheet and photos of existing structures along the Mackenzie Valley Winter Road.</p> |

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| | | <p>Highway (the Project) are opened to traffic and replace the MVWR. All existing watercourse crossing structures (bridges and culverts) along the MVWR as well as the Great Bear River Bridge (after it is constructed) will be integrated into the operations and maintenance of the Project”.</p> <p>As the operation and maintenance of the existing crossing structures will eventually be integrated into the current scope, information on the existing crossing structures should be provided in the DAR. At a minimum, photographs, crossing width, construction dates, and expected maintenance/upgrades should be provided.</p> | | |
| 4 | DFO 22: Community Engagement - Volume 3, Sub-section 17.9, Table 17.1 | <p>Community engagement participants reported that erosion and sedimentation are changing the water, which is affecting fish, including fish migration; participants reported that Arctic grayling are declining because there is a lack of silt fencing.</p> | <p>Please provide information on whether these concerns were investigated, and any result from this investigation.</p> | <p>The GNWT acknowledges the community’s concern regarding erosion and sedimentation and its effect on water and fish, including fish migration. During the project-specific engagement program, no specific locations of inadequate sedimentation control were identified. The GNWT will implement an Erosion and Sediment Control Plan (ESCP) based on industry best management practices for erosion prevention and sediment control (see draft ESCP in Volume 5; and GNWT, 2013). Many of these proposed mitigation measures are standard conditions included in water licences by regulators in the Mackenzie Valley and are otherwise best management practices reflected in guidelines such as the GNWT Land Use Guidelines Series (GNWT, 2015a,b) and DFO codes of practice (DFO, 2022 a,b,c). Mitigation</p> |

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| | | There is no information on whether these concerns were investigated. | | <p>measures will be inspected regularly during and after construction, and corrective measures will be taken if these measures are not working as intended. The environmental monitor or aquatic environmental specialist will advise if additional mitigation is required. Monitoring as part of the ESCP will also include turbidity monitoring during instream works.</p> <p>References DFO (Fisheries and Oceans Canada). 2022a. Measures to Protect Fish and Fish Habitat. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html. Accessed March 2024. DFO (Fisheries and Oceans Canada). 2022b. Code of Practice: Culvert Maintenance. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/culvert-maintenance-entretien-ponceaux-eng.html. Accessed March 2024. DFO (Fisheries and Oceans Canada). 2022c. Code of Practice: Ice Bridges and Snow Fills. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/ice-bridges-ponts-glace-eng.html. Accessed March 2024. GNWT (Government of the Northwest Territories). 2013. Erosion and Sediment Control Manual. Available at: inf.gov.nt.ca/sites/inf/files/resources/dot_erosion_and_sediment_control_manual_-_mar_31_16.pdf GNWT. 2015a. Northern Land Use Guidelines, Access: Roads and Trails. GNWT Department of Lands, Yellowknife, Northwest Territories. Available at: https://www.gov.nt.ca/sites/ecc/files/resources/nlug_roadstrails_2015_english_16_sept_2015.pdf. GNWT. 2015b. Northern Land Use Guidelines: Pits and Quarries. GNWT Department of Lands, Yellowknife, Northwest Territories. Available at: https://www.lands.gov.nt.ca/sites/lands/files/resources/nlug_-_pits_and_quarries_-_16_september_2015.pdf</p> |
| 5 | DFO 23: Culvert Inspections - Volume 3, Section 17 and Volume 5, Section 3. | The section notes “During operations, monitoring will include routine periodic inspection of culverts to determine if they are functioning as per design (e.g., allow fish passage) and for evidence of erosion | DFO recommends inspections/monitoring be conducted periodically pre-freshet, and also during freshet, low flows, and in frozen conditions. | Culverts are inspected as part of routine highway inspections by the GNWT Department of Infrastructure. These are generally conducted prior to spring freshet, after spring freshet and throughout the year to observe for obstructions such as ice or debris. Observations that suggest issues with fish passage will prompt a more detailed inspection by an Engineer, who may recommend corrective measures, if required. |

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| | | and sedimentation.” In the Fish and Fish Habitat Protection Plan, post-construction monitoring is only proposed pre-freshet. To determine if culverts are functioning as designed, inspections/monitoring should also be conducted periodically during freshet, during low flows, and in frozen conditions. | | |
| 6 | DFO 24: Sahtu crossings numbers - Volume 3, Section 17 and Appendix 17A. | Section 17 states that there are 41 crossings in Sahtu Region while 43 are stated in Appendix 17A. Please confirm how many crossings are expected in the Sahtu Region. | Please confirm how many crossings are expected in the Sahtu Region. | There are potentially 43 watercourse crossings in the Sahtu Region. Section 17 should state 43 crossings, the number 41 is incorrect. Final design of the Project may change the location of some sections of the highway alignment which may affect the number of watercourse crossings. The number of watercourse crossings will be reassessed once the location of the final alignment has been determined as part of detailed design. |
| 7 | DFO 25: Mitigations - Volume 3, Sub-section 17.4.4.3 | Permafrost protection is not included as key mitigation measures used to avoid or reduce potential effects on fish and fish habitat. Permafrost degradation at the culverts can impact structural integrity. | Include permafrost protection as key mitigation measure used to avoid or reduce potential effects on fish and fish habitat. | The design for watercourse crossings will consider permafrost protection (where applicable) in accordance with the Permafrost Protection Plan (Volume 5). The GNWT has committed to designing and constructing culverts to maintain water flow and fish passage. By applying best management practices and design mitigations, no residual effects are anticipated. Should performance issues be identified through monitoring – such as a barrier to fish passage - this would be considered an event for which appropriate corrective actions will be evaluated and implemented. |
| 8 | DFO 26: Baseline Sampling - Volume 3, Section 17 and Appendix 17 | Field sampling was conducted in September 2021. Habitat and fish use can change during higher flows. Please advise if sampling will be conducted in spring to inform culvert designs and improve | Please confirm if fish sampling will be conducted in spring to inform culvert designs and improve knowledge of fish use/presence. | The GNWT does not intend on conducting fish sampling in the spring to inform the culvert designs or to improve knowledge of fish use/presence for the following reasons: Culverts for watercourse crossings will be designed to maintain flow and fish passage, taking into account hydrological and fish habitat information specific to each crossing, including consideration for spring flows. Criteria for fish passage will be based on fish species potentially present in a watercourse and their size. Culvert design will use the |

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| | | knowledge of fish use/presence. | | <p>fish species with the weakest swimming performance as determined by using DFO's Swim Performance Online Tools and hydrotechnical data collected in the field. If fish species are not known for a watercourse, fish passage requirements will be based on the list of potential fish species which may occur based on professional judgement (using habitat information, stream size, and position in watershed). Design criteria are included in Section 5.2.2, Table 5.1 (Road and Bridge-Culvert Design Criteria/Standards for the Project). As a result, culvert designs will meet fish passage requirements for all fish species potentially present in each watercourse.</p> <p>In consideration of above, the GNWT has taken a precautionary approach by assuming which stream crossings are fish-bearing and the fish species that may be present in a stream crossed by the Project.</p> |
| 9 | DFO 27: Sahtu Crossings photographs - Volume 3, Appendix 17 | No photographs were provided of the 2021 assessment of the Sahtu Region crossings. | Please provide photographs of the Sahtu Region crossings assessed in 2021. | Photographs of the 2021 assessments of watercourse crossings in the Sahtu Region are provided in a memo entitled "Mackenzie Valley Highway Alignment, Sahtu Region – Fish Assessments by Tetra Tech" dated December 2021. This memo is attached to this response (Attachment CANNOR-45A). Photographs are not available for those watercourses assessed only by 5658 NWT Ltd. and GNWT (2011). |
| 10 | DFO 28: Photographs - Volume 3, Appendix 17 | Only photographs of the Dehcho Region crossings assessed in 2021 are provided. DFO would appreciate photographs of every crossing, even the ones not assessed in 2021. | Please provide photographs of every proposed crossing. | <p>Photographs are not available for all watercourse crossings. However, photographs are available from the following sources:</p> <ol style="list-style-type: none"> 1. aerial photographs were taken of some watercourse crossings in 2011 (Dessau 2012) EA1213-02_Project_Description_Report__Pehdzeh_Ki_Ndeh_-_Dehcho_Region.PDF (reviewboard.ca) 2. photos taken during hydrotechnical assessments conducted in 2020 are provided in the response to LKFN-33; 3. photographs from the 2020 assessment of watercourse crossings in the Dehcho Region are provided in Volume 3, Appendix 17; 4. photographs from the 2021 assessment of stream crossings within the Sahtu Region are provided in a memo entitled "Mackenzie Valley Highway Alignment, Sahtu Region – Fish Assessments" prepared by Tetra Tech in December 2021. This memo is provided as an attachment to the response for DFO27. <p>References: Dessau. 2012. Mackenzie Valley Highway Extension Pehdzeh Ki Ndeh – Dehcho Region: Project Description Report (PDR). Tetra Tech. 2021. Mackenzie Valley Highway Alignment, Sahtu Region-Fish Assessments. A report prepared for Stantec by Tetra Tech,</p> |

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| 11 | DFO 29: Table change - Volume 3, Appendix 17, Table 4.2 | In addition to stream width (As requested in Round 1 of comments), DFO would appreciate a column be added in this table that identifies what year/month assessments were conducted at each crossing. | Please add a column in this table that identifies what year/month assessments were conducted at each crossing. | Month and year of watercourse crossing assessments are included in habitat assessment cards for each crossing, located in Volume 3, Appendix 17A (Fish and Fish Habitat Technical Data Report, Appendix A). Dates of assessments conducted and reported in Dessau (2012) are provided in that report. |
| 12 | ECCC 14: Mitigation of Nitrogen Loading Due to Use of Explosives - Volume 3: Section 16, Sub-section 16.4.2.2.4 | Sub-section 16.4.2.2.4 of Volume 3 in the Assessment Report highlights four pathways through which nitrogen compounds from blast residue can enter waterbodies and the fourth is “by leaching of undetonated explosive from the blast rubble and quarry materials.” Given that the quarried material will be spread over the length of the proposed highway, preventing nitrogen-rich runoff into the environment and water will be critical and proposed mitigation measures must be effective over extended areas. The list of mitigation measures proposed focus on activities at the quarry, with the exception of a proposed Explosive Management Plan, of unknown content since it has yet to be developed. | ECCC recommends the Proponent discuss proposed mitigation measures to prevent leaching of undetonated explosives from quarried materials that would be effective over the extended area over which the materials will be spread. | <p>The use of ammonium nitrate fuel oil (ANFO) explosives is anticipated for the development of quarries and highway materials. The undetonated nitrogen component of the explosives, AN, is highly water-soluble. The use of ANFO explosives may result in releases of nitrogen (which can be detected as nitrate, nitrite, and ammonia) from quarries and quarry materials to the aquatic environment. Although these nitrogen compounds are naturally occurring nutrients, elevated concentrations of these compounds can potentially lead to adverse effects such as eutrophication in aquatic habitats. Following blasting, the amount of remaining, leachable nitrogen species in quarried materials depends on several factors such as the handling of explosives (including spillages during handling), and the blast efficiency. In some cases, blast holes do not detonate so the explosives remain in the rock for later leaching.</p> <p>As noted in Section 16.4.2.2.4, an explosive management plan (ExMP) will be developed and will include control measures to prevent or minimize the mobilization of nitrogen compounds to the aquatic environment.</p> <p>The ExMP will include mitigations and best management practices to reduce spillage of explosives, improve blast efficiency, and reduce or eliminate the risk of nitrogen mobilization to the aquatic environment from quarries, stockpiles, and road cuts. One of the focuses of the ExMP will be to reduce the levels of explosive residue from ammonia-based explosives (e.g., ANFO) to the lowest practical levels possible. Mitigation measures include those listed in Section 16.4.2.2.4 of the DAR, including:</p> <ul style="list-style-type: none"> · Storage of explosives will be controlled and runoff from storage areas will be contained. · To the extent possible, blasting activities will be completed during winter months to avoid freshet runoff. · Blast holes will be kept free of water, where possible, to avoid the incomplete |

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| | | | | <p>combustion of ANFO.</p> <ul style="list-style-type: none"> · Explosives will be sealed and kept dry to prevent the incomplete combustion of ANFO. · The handling and transport of explosives will be carried out by the supplier and blasting contractor under a licence to conduct such work and according to the requirements of applicable regulations including the Explosives Act, Transport of Dangerous Goods Act, and National Fire Code of Canada. <p>In addition, mitigations previously applied to the Tlicho Highway (GNWT and NSI 2019) may be relevant, and include:</p> <ul style="list-style-type: none"> · Blast designs to include measures to ensure complete detonation of all explosives. Examples include the consideration of number of delays, charge size, type of primers, spacing of holes and timing between delays to avoid cut-offs. · Use explosive type that is suitable for the site conditions. For example, use packaged type explosives in “wet” holes where emulsion or liquid explosive could migrate to water. · No use of ANFO or bulk emulsions for blast within 30 m of water courses. · Careful handling to prevent spillage of explosives and clean-up of any material prior to blast. · Minimize time from when holes are loaded to time of blasting to avoid any leakage of material. <p>Regulatory guidance to prevent or minimize nitrogen leaching from quarried materials spread across the length of a highway construction project was not identified in the literature. However, the potential for adverse nitrogen-related effects (e.g., eutrophication) in receiving waterbodies is considered to be negligible. This is because (1) the amount of leachable nitrogen compounds on quarried materials will be minimized at the source, and (2) the amount of quarried material used near a single watercourse along the highway will represent a very small portion of the overall quarried material. Therefore, the amount of blasting-related nitrogen compounds that could leach into a given waterbody along the highway is not anticipated to result in measurable nitrogen-related effects to aquatic receptors.</p> <p>With the implementation of mitigation measures such as those listed above for the use of explosives, potential effects due to nitrogen leaching are not anticipated to result in adverse or long-term changes to water and sediment quality.</p> <p>Reference:</p> |
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| | | | | GNWT and NSI (Government of the Northwest Territories and North Star Infrastructure). 2019. Quarry Operations Plan - Tłjchq All-Season Road Project. Prepared for Wek'èezhì Land and Water Board by the GWNT Department of Infrastructure and North Star Infrastructure. January 2019 |
| 13 | ECCC 15: Water Quality Boundaries - Volume 3: Section 16, Sub-sections 16.1.4.1, 16.2.3, and 16.4.3.1.1 | <p>Sub-section 16.1.4.1 of Volume 3 in the Assessment Report defines assessment area spatial boundaries for both water and sediment quality, and groundwater quality. The area boundaries are smaller for groundwater than for water quality. It is not clear how and why these restricted boundaries were chosen for groundwater.</p> <p>Possible influences of excavations with groundwater chemistry are discussed in sub-section 16.4.3.1.1 and "Borrow source excavations target glaciofluvial and fluvial materials for construction fill that also tend to be high permeability and well drained." Groundwater flow velocity in high permeability materials can be high under sufficient hydrological gradient, so impacts of excavations on groundwater could potentially be further reaching.</p> | ECCC recommends the Proponent explain how they determined 0.5 and 5 km buffers from the road were appropriate local and regional assessment areas for groundwater quality. | <p>The Local Assessment Area (LAA) for groundwater quality is the area within a 0.5-kilometre (km) buffer of the preliminary alignment route centerline, quarries and borrow sources and associated access roads. The groundwater quality Regional Assessment Area (RAA) is the area within approximately 5 km of the PDA or the mainstem of the Mackenzie River, whichever is closer. The 0.5 km buffer was selected by considering which project-environment interactions may result in potential effects to groundwater quality furthest from the PDA. In general, LAA buffers tend to be smaller for groundwater quality than surface water quality because of the slower flow rates of groundwater relative to surface water.</p> <p>The interactions that may result in measurable effects to groundwater quality furthest from the PDA are borrow source and quarry operations, which may indirectly affect groundwater quality by causing groundwater levels (groundwater quantity) to decline in the vicinity of the operations (Section 16.4.3.1.1). The radius of effect to groundwater levels outwards from these operations is expected to be limited to less than 0.5 km in consideration of the following:</p> <ul style="list-style-type: none"> · Borrow pits and quarries are generally shallow excavations that extend a limited depth below the groundwater table (if at all). A relatively shallow depth of excavation below the groundwater table will limit the potential change in groundwater levels (i.e., the hydraulic gradient) relative to deeper excavations which, in turn, will limit the anticipated radius of effect to groundwater levels outwards from the excavation. · The Project will avoid advancing excavations in areas where the groundwater table is close to ground surface, if practical, to reduce the potential change in groundwater levels (i.e., the hydraulic gradient) and, in turn, limit the anticipated radius of effect to groundwater levels outwards from the excavation. · Permafrost, where present, will further limit the radius of effect to groundwater levels outwards from excavations. <p>Given the above, and further based on professional judgement for roads and similar disturbances in such northern regions, an LAA of 0.5 km is viewed as adequately representative of the spatial extent of potential project effects on groundwater</p> |

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| | | | | <p>quality.</p> <p>The RAA buffer (5 km) was selected to provide context for determining the significance of project effects on groundwater quality, and to assess potential cumulative effects from other projects (Section 16.5.3). There are no known past, present, or reasonably foreseeable future projects (Table 16.8) farther than 5 km from the PDA that may reasonably interact with residual project effects on groundwater quality.</p> |
| 14 | <p>ECCC 16: Water Quantity, Water and Sediment Quality - Volume 3: Section 15 and Section 16</p> | <p>Several places in the document note insufficient data to characterize existing conditions, which makes it impossible to estimate the potential impact of the project or monitor for changes to reference conditions caused by the project. Water is a dynamic component of the environment with important seasonal and interannual changes, which means that elements like active layer thickness, water flow and levels, and water chemistry need to be monitored over extended periods. The long timelines of this project suggest that there is sufficient time to collect the missing data.</p> <p>In some of the instances where insufficient data was documented, collection of further data was included as an activity, though there are</p> | <p>ECCC recommends the Proponent explain how they will address the current shortage of data necessary to establish existing conditions for quality of water, groundwater and sediment, and quantity of water and groundwater.</p> | <p>Water and Sediment Quality</p> <p>As described in a separate response (LKFN-28), the GNWT acknowledges that the characterization of existing conditions is often part of the effects assessment process to evaluate the degree of project-related changes to water resources (e.g., surface water and groundwater quality). This approach is often used when a project involves point source discharges (e.g., mine effluent) which can be modeled to quantitatively predict changes in water quality in the aquatic receiving environment. In this case, the project does not involve point source discharges from the highway or its related infrastructure. Because of this, it was determined that the development of a meaningful predictive model to assess potential changes in water quality due to non-point discharges along the highway was not practically feasible (and we are unaware of a precedent for such a model on this type of project). Despite the lack of a model to quantitatively assess changes in water quality (or sediment quality) from baseline, a review of the available baseline data was performed to determine if the data could inform the assessment of potential effects in a meaningful way. Ultimately, it was decided that the baseline data were not to be directly used in the effects assessment, and that a qualitative effects assessment was appropriate for the following reasons:</p> <ol style="list-style-type: none"> 1. Due to a lack of a model for this type of project (i.e., with non-point source discharges), the baseline data could not, in effect, be used to quantitatively inform predictions of potential project-related effects. 2. Standard mitigations and best management practices were considered to be sufficient for the protection of water resources during the construction and operation of the highway. The rationale for this is the availability of numerous relevant and established mitigations specific to this type of project. These mitigations have been applied to other comparable projects (i.e., Inuvik to Tuktoyaktuk Highway and Tłı̄chǫ Highway; Hamlet of Tuktoyaktuk et al., 2011, MVEIRB 2018). Section 16.4.2.2 outlines standard mitigations proposed for the project and relevant project-specific |

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| | | <p>few details. The timing proposed is not always appropriate, since data need to be collected prior to construction activities in order to establish reference conditions. A strategy to collect the missing data would help the proponent plan the work and allow reviewers evaluate if all important elements were included. Elements for which more data is necessary include water quality (sub-sections 16.2.2, 16.6.3 & 16.7.2), groundwater quality (sub-section 16.5.3.3), sediment quality (sub-section 16.6.3), water quantity (sub-sections 15.2.2 & 15.7.2) and groundwater quantity (sub-section 15.5.4.3).</p> <p>Without knowing the existing conditions, effects cannot be assessed. Data is required to establish the existing conditions and assess effects of the project, but also to identify changes to the environment in the future.</p> | | <p>management plans, such as the Erosion and Sedimentation Control Plan, Permafrost Protection Plan, and Quarry Development Plans. Many of the proposed mitigation measures are standard conditions included in water licenses by regulators in the Mackenzie Valley and are otherwise best management practices reflected in guidelines such as the GNWT Land Use Guidelines Series (GNWT, 2015 a,b) and DFO codes of practice (DFO, 2022 a,b,c).</p> <p>3. Due to the extensive mitigations considered in the assessment, it was determined that the conclusions of the effects assessment would likely not change if historical sampling data within the RSA, or within the Local Study Area (LSA) at site-specific watercourses, were included in the effects assessment. Note the Technical Data Report (TDR) for Surface Water and Sediment Quality (Volume 5) summarizes natural influences on water quality and existing concentrations of total suspended solids (TSS) within the RSA (Section 3.2.1 of the TDR), as well as existing anthropogenic influences of water quality within the RSA (Section 3.2.2 of the TDR).</p> <p>4. Water quality monitoring will occur during the construction of the highway to confirm the assumptions made in the effects assessment. Turbidity measurements and visual inspections of water quality will occur upstream and downstream of culvert installations during and after removal of sedimentation control measures. Details pertaining to the monitoring methodology during culvert installation are provided in the Erosion and Sedimentation Control Plan (Volume 5).</p> <p>The GNWT is committed to ongoing engagement with Indigenous Governments, Indigenous Organizations, and other affected parties during advancement of project design and planning. The GNWT is open to further discussions with the Indigenous Guardians Program to explore water quality monitoring for the Project. The GNWT will be conducting additional geotechnical investigations along the alignment, at crossings, borrow pits, and quarries to inform design. These geotechnical programs may identify locations where groundwater quantity and, in turn groundwater quality, monitoring may be required to meet the mitigation commitments in the Permafrost Protection Plan and Quarry Development Plans (Volume 5).</p> <p>Water Quantity The GNWT has conducted the assessment of potential effects on water quantity based</p> |
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| | | | | <p>on field data and calculated estimations, which are appropriate for environmental assessment. For lakes, as explained in Section 4.2 of Appendix 15C, current estimation of water availability in lakes is based on field data collected from previous studies, and accepted methods (e.g., (DFO, 2010; MVLWB, 2021a; MVLWB, 2021b)). As explained in Section 4.1 of Appendix 15C, the estimations of flows in ungauged streams are based on published, and publicly available data from gauged streams. The GNWT has stated that “additional data will need to be collected to support applications for authorization to use water sources for withdrawal to demonstrate availability of water at time of withdrawal in accordance with applicable guidelines (e.g., DFO, 2010, 2013).” (Section 15.2.2). Water withdrawal from all approved sources (major streams and lakes) will be within the limits of water licenses and in accordance with the DFO measures to protect fish and fish habitat (e.g., DFO, 2010, 2013).</p> <p>Table 5.3 of Appendix 15C [Flow Summary Statistics for Flow and Water Availability at Potential Water Withdrawal Locations Along the Proposed Mackenzie Valley Highway Alignment], Table 5.6 of Appendix 15D [Prohibition Creek Bridge: Average Flow Predictions and Statistics]), and Section 15.2.2, Table 15.6 [Summary of Estimates of Available Under-Ice Volume of Lakes Preliminarily Assessed for Water Withdrawal]) provide estimations of water availability in streams and lakes potentially to be used for water withdrawal based on available data and relevant guidance. The use of this information, and additional data required to be collected during construction to maintain water withdrawals within regulatory limits, is discussed in DFO11.</p> <p>The GNWT will be conducting additional geotechnical investigations along the alignment, at crossings, borrow pits, and quarries to inform design. These geotechnical programs may identify locations where groundwater quantity monitoring may be required to meet the mitigation commitments in the Permafrost Protection Plan and Quarry Development Plans (Volume 5).</p> <p>References: DFO (Fisheries and Oceans Canada). 2010. DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut. DFO (Fisheries and Oceans Canada). 2013. Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada. Canadian Science Advisory Secretariat Science Advisory Report 2013/017. DFO (Fisheries and Oceans Canada). 2022a. Measures to Protect Fish and Fish Habitat.</p> |
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| | | | | <p>Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/measure-mesures-eng.html. Accessed March 2024.</p> <p>DFO (Fisheries and Oceans Canada). 2022b. Code of Practice: Culvert Maintenance. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/culvert-maintenance-entretien-ponceaux-eng.html. Accessed March 2024.</p> <p>DFO (Fisheries and Oceans Canada). 2022c. Code of Practice: Ice Bridges and Snow Fills. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/ice-bridges-ponts-glace-eng.html Accessed March 2024.</p> <p>GNWT. 2015a. Northern Land Use Guidelines, Access: Roads and Trails. GNWT Department of Lands, Yellowknife, Northwest Territories.</p> <p>GNWT. 2015b. Northern Land Use Guidelines: Pits and Quarries. GNWT Department of Lands, Yellowknife, Northwest Territories.</p> <p>Hamlet of Tuktoyaktuk, Town of Inuvik, and Government of Northwest Territories. 2011. Environmental Impact Statement for Construction of the Inuvik to Tuktoyaktuk Highway, NWT. EIRB File No. 02/10-05; EBA file: V23201322.006.</p> <p>MVEIRB (Mackenzie Valley Environmental Impact Review Board). 2018. Report of Environmental Assessment and Reasons for Decision, GNWT Tlicho All-Season Road Project. EA1617.01. March 29, 2018.</p> <p>MVLWB (Land and Water Boards of the Mackenzie Valley). 2021a. Method for Determining Available Winter Water Use Capacity for Small-Scale Projects April 7.</p> <p>MVLWB (Land and Water Boards of the Mackenzie Valley). 2021b. Technical Reference Document for the Method for Determining Available Winter Water Volumes for Small-Scale Projects.</p> |
| 15 | ECCC 17: Construction Timing and Potential Effects on Air Quality - Volume 3: Section 12.0, Table 12.6, Table 12.7, and Sub-section 12.5.1 | Table 12.6 explains the timing of physical activities and indicates borrow source and quarry development and operations, as well as material haul, is planned to take place year-round. Table 12.7 shows mitigation measures planned for air quality, and ECCC appreciates the inclusion of these measures. However, there is strong seasonality | ECCC recommends that additional mitigation measures be adopted that take into account seasonal variability of construction impacts being mindful of technical and logistical limitations as well as other environmental impacts. This may include focusing construction activities during the winter months on sections of the highway that will be | It is impractical to apply seasonal geographical limitations to construction (which would result in gaps along the route). While GNWT recognizes the potential for such atmospheric dynamics as ECCC identifies, optimized constructability is strongly correlated to seasonal (winter) conditions and the continuous nature of advancement along the route segments. Due to the sensitivity of soils, construction of embankment will primarily occur in winter (December to March) when the ground is frozen (Section 5.4.6; Volume 5: Draft Permafrost Protection Plan). Embankment construction will advance by end-dumping material off previously placed embankment. This placement will need to advance progressively in winter to lay the road foundation for summer construction activities, which will include placing and compacting additional lifts of material. Construction equipment will need to use the embankment as a travel surface regardless of where ongoing activities such as compaction, quarry and borrow source activities are occurring. The GNWT's commitments to reducing emissions, as identified |

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| | <p>for the impacts of project emissions. During the late autumn and early winter, frequent strong surface-based temperature inversions occur throughout the region that vertically trap emissions, and diurnal variations are very weak due to brief and minimal solar insolation. The inversion is deepest over the valley bottom where the coldest temperatures occur. Additionally, the sides of the valley inhibit lateral dispersion of emissions, and the along-river elevation gradient is too weak for dispersion by drainage. Furthermore, sub-section 12.5.1 indicates additional emissions from traffic using the Mackenzie Valley Winter Road commencing in mid-winter. The impact of construction emissions near the river is lessened during the warmer months when vertical dispersion is improved. Conversely, construction-related fugitive dust emissions near communities is likely to be greater during the warmer months owing to drier</p> | <p>located away from the river and higher up the valley sides, and focusing construction activities during the summer months away from communities thereby reducing fugitive dust impacts on residents.</p> | <p>in Table 12.7 will be applied throughout the Project.</p> |
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| | | conditions. Mitigation measures should consider seasonal variability to reduce impacts of project emissions on the various receptors. | | |
| 16 | ECCC 18: Proactive Air Quality Monitoring - Volume 3: Section 12.0, Sub-section 12.4.2.3 | The proponent mentions that "monitoring will also be initiated on a case-by-case basis should any complaints related to air quality occur from Indigenous Governments, Indigenous Organizations or other affected parties as a result of project activities." Given that construction activities are expected to extend for up to 10 years and that sensitive receptors may be in close proximity to these activities, proactive monitoring could prove to be prudent. | ECCC recommends that, where feasible, suitable proactive monitoring of impactful criteria air contaminants be performed near sensitive receptors during the construction phase to enable prompt adjustments in mitigation measures. | <p>As described in Section 12.1.4.1, the distance at which the Criteria Air Contaminants (CAC) emitted from the Project construction and transportation sources disperse or settle is conservatively estimated to be 1 km. This estimate is based on professional experience and is explained by the fact that construction and transportation sources are mostly mobile, intermittent, and the emissions intensity is relatively low compared to large stationary sources such as municipal or industrial diesel power plants. Further, according to the United States Environmental Protection Agency (US EPA), dust particles are likely to settle within a few hundred feet (tens of metres) from the road (US EPA, 1995).</p> <p>Some receptors in the community of Wrigley are located within 1 km of the Project Development Area. The nearest receptor is located approximately 350 m south of the southernmost Project segment (Wrigley). Based on the estimated construction progress rate northward along the MVH alignment (approximately 115 m per day), the highway construction activities are expected to move beyond the 1 km dispersion limit after 7 days. Given this short duration of construction activities within 1 km of residences, CAC monitoring for the construction activities along the highway alignment is not warranted. As such, characterization in the request of 10 years of operation is not reasonably representative of construction practice as planned. Also, characterization in the request of sensitive receptors in close proximity to the highway is not fully representative of the dominantly remote nature of the highway from receptors as conventionally identified in such assessments.</p> <p>CAC monitoring near the quarries would be feasible and may be beneficial for any receptors located within 1 km of quarries or borrow sources. Based on currently available information, there is a single residence located approximately 980 m northwest of borrow source 10.043. This temporary borrow source will be active during the construction period only. Source 10.043 is an existing borrow source currently in use, which means its effects on air quality are part of the baseline conditions. Given the fact that the quarry already exists, that its activities for the</p> |

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| | | | | <p>Project will be temporary, that quarry activities are generally intermittent, and that the distance to the nearest receptor is close to the 1 km dispersion limit, the effect on air quality from project activities at Source 10.043, south of Wrigley, would likely not be measurable above baseline. Therefore, CAC monitoring at the closest residence near that quarry is not being considered at this time.</p> <p>Reference: US EPA (United States Environmental Protection Agency). 1995. AP 42, Fifth Edition: Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources.</p> |
| 17 | ECCC 19: Government Department Roles - General Comment | The Government of the Northwest Territories (GNWT) department of Infrastructure is the proponent for the project and has received guidance and advice from various other internal departments on the development of the Mackenzie Valley Highway Project Developers Assessment Report. Expert departments like Environment and Climate Change hold regional data and expertise that may be important in determining the impacts of the project on various Valued Components. | ECCC recommends the proponent clarify the roles of both the department of Infrastructure as well as the expert departments at GNWT, including how these expert departments will participate in the EA, such as providing advice and information within their possession and oversight. | The GNWT will be providing a letter to the Review Board in the near future with additional information regarding the GNWT approach to participation in the EA moving forward as well as the roles and responsibilities of GNWT departments and how these departments will participate in the EA. |
| 18 | ECCC 20: Application of SARA - Volume 2: Sub-section 8.3 and Section 10; Volume 3: Section 20, | Based on ECCC's review of the proposed route, it is unclear if the proposed route crosses federal lands, or just passes close to them. A permit may be required from ECCC (section 73 of the | ECCC recommends that the Proponent: - identify if any federal lands fall within or close to the current project routing, and if present, where they are located; | <p>The Project will include activities on Territorial Lands and Commissioner's Land (public) and Sahtu Settlement Lands as identified in the Sahtu Dene and Métis Comprehensive Land Claim Agreement. There are no works or activities on federal lands. Section 6.1 identifies the authorizations and approvals applicable to the Project.</p> <p>The current project highway alignment route, as indicated in the map book included in Appendix 5A, is at approximately 25% design definition. The alignment may change as</p> |

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| <p>Appendix 20A, and 20C</p> | <p>Species at Risk Act [SARA]) for activities that affect a listed terrestrial wildlife species, the residences of its individuals or any part of its critical habitat where those prohibitions are in place. Such permits may only be issued: if all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted; all feasible measures will be taken to minimize the impact of the activity on the species, the residences of its individuals or its critical habitat; and if the activity will not jeopardize the survival or recovery of the species.</p> <p>SARA prohibits against the killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading of individuals of endangered, threatened and extirpated species listed in Schedule 1 of the Act. The Act also contains a prohibition against the damage or destruction of their</p> | <ul style="list-style-type: none"> - provide information on any associated SARA permit application that may be required; and - provide a timeline for finalizing the routing. | <p>design progresses but is planned remain within an approximately 1 km wide alignment routing corridor. The conceptual project schedule (Section 5.4.1) identifies completion of detailed design following the environmental assessment decision. The final highway design (for the segment to be constructed) will be submitted to support regulatory authorizations and approvals to construct. The final design will not change any components of the Project such that they occur on federal lands.</p> |
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| | <p>residences (e.g. nest or den). These prohibitions apply to:</p> <ul style="list-style-type: none">• all endangered, threatened and extirpated species listed in Schedule 1 of SARA when found on federal lands in a province, or lands under the authority of the Minister of the Environment or the Parks Canada Agency in a territory• all endangered, threatened and extirpated migratory birds listed in Schedule 1 of SARA and protected by the Migratory Birds Convention Act, 1994, anywhere they occur, including private lands, provincial lands and lands within a territory; and• all endangered, threatened and extirpated aquatic species listed in Schedule 1 of SARA, anywhere they occur, including private lands, provincial lands and lands within a territory. <p>SARA also prohibits destroying any part of critical habitat. Critical habitat is identified in species recovery strategies and/or action plans. The Act requires that critical habitat on federal lands, or for</p> | | |
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| | <p>aquatic species anywhere, be legally protected by stewardship agreements under SARA, by other legal means under SARA, by other federal legislation or by the SARA prohibition within six months after it is identified.</p> <p>Furthermore, prohibitions may be in force on land other than federal land pursuant to other orders or regulations under SARA. It is possible that additional prohibitions may come into force in the future through Orders in Council for individuals, residences, and critical habitat on non-federal lands and/or through a Ministerial Order for critical habitat on federal lands. It is also possible that, over the course of the assessment or after the assessment, additional species could be listed under SARA; permits may be required for project activities that affect these additional species. Proponents are advised to monitor for such developments on the SARA Registry</p> | | |
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| | | <p>https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html</p> <p>Further information on permits under SARA is available here: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/permits-agreements-exceptions.html</p> <p>It is the Proponent's responsibility to identify any land under federal responsibility within the project routing.</p> | | |
| 19 | <p>ECCC 21: Guiding Principles for Mitigation approaches, Including Offsetting - Volume 2: Sub-section 8.3 and Section 10; Volume 3: Section 20 and Section 21</p> | <p>In mitigation of potential impacts to biodiversity and species at risk, ECCC has outlined guiding principles for mitigation approaches, including offsetting. Refer to the Operational Framework for Use of Conservation Allowances for further details https://www.canada.ca/en/environment-climate-change/services/sustainable-development/publications/operational-framework-use-conservation-</p> | <p>ECCC recommends that the Proponent describe if the Operational Framework for Use of Conservation Allowances and general principles were considered during the development of the DAR. If so, provide details on how they were used or why the framework's principles were not incorporated in the DAR.</p> | <p>Although the Developer's Assessment Report (DAR) does not explicitly follow the Operational Framework for Use of Conservation Allowances (ECCC, 2012), the DAR provides mitigation measures that align with the principles and approach described in the framework by following the mitigation hierarchy (i.e., avoid, reduce, restore) where potential Project effects are identified, and mitigation is proposed. Examples for this Project include the following mitigation measures to avoid or reduce potential adverse effects and where necessary restore (revegetate) disturbed areas after construction:</p> <ul style="list-style-type: none"> · Adaptive project design such as the incorporation of route alternatives based on Community Recommendations (Table 5.2 of DAR) · Vegetation clearing will be completed outside the migratory bird nesting period, which extends from May 1 to August 31. This considers Nesting Zone B8 (May 4 to August 22 for Zone B8; ECCC, 2018) and potential species at risk. Vegetation clearing will also consider the Critical Breeding Periods for Raptor Species of the Northwest Territories (Shank and Poole, 2016) to avoid disturbing species that breed prior to the migratory bird nesting period. |

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| | | allowances.html. | | <ul style="list-style-type: none"> · Direct habitat loss will be reduced by following the existing Mackenzie Valley Winter Road (MVWR) alignment to the extent possible. · Temporary access roads, quarries, and workspaces not needed after construction will be closed and reclaimed. <p>The GNWT recognizes that conservation allowances (offsets) are the final step in a mitigation hierarchy that can be implemented to compensate for remaining residual effects due to a project (ECCC, 2012; GNWT 2021). As discussed in Section 10.4.2.2, the GNWT, particularly GNWT-ECC, is interested in developing guidance documents concerning offsetting for caribou. The GNWT-ECC is currently reviewing internal draft documents that could form the basis for the GNWT's policies for offsetting. The GNWT will apply relevant policies for offsetting caribou to the Project if/when such policies are in effect.</p> <p>References: ECCC (Environment and Climate Change Canada). 2018. General nesting periods of migratory birds. Available at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html Accessed May 2022. Environment Canada. 2012. Operational Framework for Use of Conservation Allowances. Available at: https://publications.gc.ca/collections/collection_2012/ec/En14-77-2012-eng.pdf GNWT. 2021. Wildlife Management and Monitoring Plan (WMMP) Process and Content Guidelines Available at: https://www.gov.nt.ca/ecc/sites/ecc/files/resources/wmmp_process_and_content_guidelines_jun_2021_complete_002.pdf Shank, C. and K. Poole. 2016. Critical breeding periods for raptors in the Northwest Territories. Government of Northwest Territories, File Report No. 147. Yellowknife, Northwest Territories. 29 pp.</p> |
| 20 | ECCC 22: Migratory Bird Data - Volume 2: Section 20, Appendix 20A, and 20C | ECCC-Canadian Wildlife Service (CWS) has access to more recent data collected from the Mackenzie Valley Winter Road corridor on migratory birds than what appears to be | ECCC recommends that the Proponent: - incorporate the most up-to-date and available migratory bird data into the assessment of the proposed project, to increase confidence in their | <p>The GNWT considers the data and information collected (field based and otherwise) as sufficient to support assessment of potential Project effects on birds and bird habitat, and as such additional information is not likely to change effects conclusions or proposed effects management measures for the assessment related to birds and bird habitat.</p> <p>The GNWT (departments of Infrastructure [INF] and Environment and Climate Change</p> |

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| | | <p>present/referenced in the DAR. There may also be more recent data available from other management authorities (such as the Sahtu Renewable Resources Board).</p> | <p>conclusions on residual impacts to migratory bird species.</p> <ul style="list-style-type: none"> - clarify which data sets were used and when that data was collected. If the most up-to-date data was not used, the Proponent should provide details on how the data will be obtained and incorporated in the revised DAR. - include a list of parties engaged and what data will be incorporated. | <p>[ECC] have engaged with ECCC-CWS throughout the preparation of the Developer's Assessment Report (DAR) to obtain existing information and identify potential concerns related to migratory birds including species at risk. The assessment presented in Chapter 20.0 (birds and bird habitat) was based on migratory bird data collected by ECCC-CWS and the GNWT-ECC (see below) prior to preparation of the DAR in summer 2023. In February 2024, ECCC-CWS informed GNWT-INF and GNWT-ECC of additional migratory bird data collected using autonomous recording units (ARUs) within the Mackenzie Valley Winter Road (MVWR) corridor. The GNWT-INF and GNWT-ECC understand that this ARU data is in raw format and has not been processed to identify bird species detections. Based on the timing and status of the additional migratory bird data, the GNWT does not plan on using this information to update the DAR. However, if ECCC-CWS provides an analysis of the data, GNWT will consider it as it relates to any future monitoring programs.</p> <p>The information presented in Section 20.0 and Appendix 20A (Birds and Bird Habitat Technical Data Report [TDR]) was prepared using existing databases including Traditional Knowledge and traditional land and resource use information available at the time of submission. The review incorporated relevant bird literature, and the following databases as described in Appendix 20A:</p> <ul style="list-style-type: none"> · North American Breeding Bird Survey databases: Data from annual surveys of breeding birds in North America used to monitor trends in species abundance and distribution (Pardieck et al., 2019; Smith et al., 2019) were used to identify potential species at risk in the study areas and assess local population trends. · IBA Canada: A national database describing the location and characteristics of important bird areas in Canada (IBA Canada, 2020b). · eBird: A database of locational data for bird species within the Regional Study Area (RSA) (including from past projects [e.g., Mackenzie Valley Pipeline Project]; eBird, 2021). · ECCC breeding bird survey data: A dataset of breeding bird observations from 118 locations along the existing MVWR (i.e., within the [Local Study Area] LSA) and within the RSA using two survey methods (ECCC, 2020a): <ol style="list-style-type: none"> 1. ARU surveys completed at 53 locations (50 in the LSA) in 2017, primarily along the existing winter road, using multiple 3-minute listening periods over several days between June 1-30. Automated audio recognizers were used to identify common |
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| | | | | <p>nighthawk (<i>Chordeiles minor</i>) and olive-sided flycatcher (<i>Contopus cooperi</i>) at all sites and yellow rail (<i>Coturnicops noveboracensis</i>) at six sites where preferred habitat was present. The data were also summarized to identify the presence, habitat associations, and relative abundance of breeding migratory birds within the LSA.</p> <p>2. In-field surveys completed by human observers at 65 locations (34 in the LSA) in 2004 and 2006 using a single 10-minute point count survey method. Clustered sampling with point 1. count locations 100-150 m apart. Data was examined for species at risk and species of conservation concern detections and used to characterize the breeding bird community in the LSA.</p> <p>A supplementary avian survey, focused on species at risk, was completed in 2022. Appendix 20C (2022 Avian Survey Report) provides a description and analysis of field survey data collected using ARUs deployed by ECCC-CWS in 2017 (n=53) and by GNWT-INF consultants (K'alo-Stantec) during 2022 (n=23). Appendix 20C also details species at risk surveys for bank swallow (<i>Riparia riparia</i>) and barn swallow (<i>Hirundo rustica</i>) nests completed in the LSA during May 2022. The results of the literature review and field surveys were used to characterize the existing conditions for birds and bird habitat within the LSA and RSA.</p> <p>Additional relevant bird data made available to the GNWT would be reviewed and considered in the design of any future monitoring programs.</p> <p>References: eBird. 2021. Species map. Available at: https://ebird.org/map. Accessed September 2021. ECCC. 2020a. Breeding bird survey data along the Mackenzie Valley winter road. Data request November 23, 2020. Environment and Climate Change Canada, Yellowknife, NT. IBA Canada. 2020b. IBA site summary: Middle Mackenzie River Islands. Available at: https://www.ibacanada.com/site.jsp?siteID=NT081. Accessed September 2020. Pardieck, K.L., D.J. Ziolkowski Jr., M. Lutmerding, V. Aponte and M-A.R. Hudson. 2019. North American Breeding Bird Survey Dataset 1966 - 2018, version 2018.0 (summary data for survey route 43012 [Norman Wells] and 43013 [Bear River]). U.S. Geological Survey, Patuxent Wildlife Research Center. Smith, A., M-A. Hudson, V. Aponte and C. Francis. 2019. North American breeding bird</p> |
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| | | | | survey - Canadian trends, Data-version 2017 (trend results for Northwest Territories and Boreal Taiga Plains [BCR6]). Environment and Climate Change Canada, Gatineau, QC. |
| 21 | <p>HC 5: Baseline air quality information - Volume 3, Sub-section 12.1.3.1, p. 12-7 and Table 12.2; Volume 3, Appendix 12A, Sub-section 4.1, p.9; Volume 3, Sub-section 12.4, Table 12.7, p. 12-19.</p> | <p>The selection of contaminants of potential concern (COPCs) provided in the air quality baseline technical data report (Appendix 12A) appears to be based on the COPCs included in the Northwest Territories Ambient Air Quality Standards (NWT AAQS).</p> <p>A more expansive consideration of COPCs may be warranted as diesel heavy equipment will be used during all phases of the project, diesel powered generators will be used on-site, and vehicle traffic will likely contribute to diesel emissions. Considering carcinogenic COPCs such as diesel particulate matter (DPM) and polycyclic aromatic hydrocarbons (PAHs) for all phases of the project could also serve to address concerns raised by community members about dust, including "how far it will spread and whether there will be chemicals and</p> | <p>Health Canada (HC) recommends to:</p> <p>1) Include an inventory of all emissions and COPCs resulting from the proposed project (including, but not limited to, DPM and PAHs) in an air quality assessment. Consider all sources, including project-related processes, on-site vehicle usage, fugitive emissions, and the potential incinerator for all phases of the proposed project (e.g., construction, operation, and modification).</p> <p>2) Provide, an evidence-based rationale for the exclusion of the COPC when a specific COPC is not carried forward for further assessment (e.g., VOCs). Note that the absence of an applicable screening guideline is not sufficient rationale for excluding a COPC from further assessment.</p> | <p>Contaminants of Potential Concern (COPCs):</p> <p>The effects from changes to air quality have been evaluated using an emission-based methodology of predicting and comparing the Project total criteria air contaminants (CAC) emissions against the National Pollutant Release Inventory (NPRI) reporting thresholds, as explained in HC-6.</p> <p>The list of criteria air contaminants (CACs) as described by Environment and Climate Change Canada's (ECCC) NPRI (ECCC 2022a) is presented below.</p> <ul style="list-style-type: none"> · Sulphur dioxide (SO₂) · Carbon monoxide (CO) · Nitrogen dioxide (NO_x) · Particulate matter (PM₁₀ and PM_{2.5}) · Volatile organic compounds (VOCs) · Ammonia (NH₃) · Ground level ozone (O₃) <p>Effects on air quality from changes to CACs SO₂, CO, NO_x, PM₁₀, and PM_{2.5} have been assessed in Section 12.0. The NH₃, O₃, VOCs, diesel particulate matter (DPM) and polycyclic aromatic hydrocarbons (PAHs) are assessed or discussed below.</p> <p>Ammonia is excluded from the assessment because most of the ammonia emitted is generated from livestock waste management and fertilizer production (ECCC, 2022a), and these activities do not apply to the Project.</p> <p>Ground level ozone is excluded from the assessment because it is a secondary pollutant produced from two primary pollutants, NO_x and VOCs (ECCC, 2022a), and since the effect of NO_x and VOCs from the Project activities are not expected to be significant (as detailed in Section 12.0 for NO_x and in the section below for VOCs), then the effect of O₃ is also not expected to be significant. Further, as ground level ozone is not on the list of substances tracked by NPRI (ECCC, 2022b), there is no threshold to determine its impact.</p> |

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| | | <p>carcinogens in the dust”(Table 12.2).</p> <p>Emissions from a potential incinerator mentioned in Table 12.7 have not been included in the assessment.</p> <p>Volatile organic compounds (VOCs) were excluded from the list of criteria air contaminants considered for the project because the “Project is not expected to generate substantial amounts of VOCs (p. 12-7).” Additional rationale to support this exclusion would strengthen the conclusions of the assessment.</p> | | <p>DPM is not part of the list of common CACs described in the NPRI (ECCC, 2022a); however, DPM is accounted for in the assessment of PM10 and PM2.5 in the MVH DAR Section 12.0. The emission factors used for the MVH DAR for PM10 and PM2.5 are from the US EPA NONROAD model and are specific to primary exhaust from NONROAD diesel engines. Those are the engine types assumed to be used for MVH. Therefore, the emission rates presented in the DAR for PM10 and PM2.5 are diesel PM10 and diesel PM2.5. The emission rates for PM10 and PM2.5 presented in the DAR are exclusively for diesel exhaust and do not include any contributions from fugitive dust sources, which are assessed qualitatively in Section 12.0.</p> <p>PAHs are not part of the list of common CACs described in the NPRI (ECCC, 2022a). The most common sources of PAH emitted into the environment are forest fires, residential wood heating, and aluminum smelters. Major sources of PAHs to the aquatic and soil environments include creosote-treated products, spills of petroleum products, metallurgical and coking plants and deposition of atmospheric PAHs (ECCC, 2024). As these activities do not apply to the Project, PAHs are excluded from the assessment.</p> <p>Volatile Organic Compounds (VOCs) Emissions:</p> <p>This section presents the methodology and results of the volatile organic compounds (VOCs) emissions for the Project activities.</p> <p>The VOC emissions for each activity were assessed for the total VOCs as opposed to assessing the individual VOC species. The VOC emissions are calculated for each piece of diesel heavy equipment by multiplying the VOC emission factor (EF) with the equipment load factor, power, operating hour, or fuel consumption volume, as relevant given the EF units.</p> <p>The Project equipment inventory is provided in ECCC-8.</p> <p>Table HC5a presents the VOC emission factors for each type of diesel heavy equipment and activity, along with the source of information.</p> <p>The resulting VOC emissions for each phase of the Project are presented in Table</p> |
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| | | | | <p>HC5b. The total VOC emissions include the contribution from an incinerator, as detailed in the next section. The results show that the predicted VOC emissions are below the NPRI reporting thresholds for each phase of the Project; and therefore, the change in VOC emissions is not significant.</p> <p>Incinerator CAC Emissions: Camp incinerator CAC emissions are based on previously assessed emissions from a camp incinerator for a proposed northern mine project. Assuming a constant rate of waste per person (which is assumed), incinerator CAC emissions for the Project are scaled from the mine incinerator based on the number of workers anticipated in camp. The northern mine camp incinerator was designed to accommodate approximately 1,600 workers. The Project camps plan to accommodate approximately 326 workers (divided into two work camps with one incinerator per work camp), as per the Project description in Chapter 5. The resulting CAC emissions at the MVH incinerators are presented in Table HC5c, along with the total emissions for the road construction activities. The results show that the revised emissions for the road construction activities with the inclusion of the incinerator emissions are less than the 2018 to 2020 average NWT facility emissions which is the significance threshold as described in Chapter 12 Section 12.1.6.1. Therefore, the change in CAC from the road construction activities with the inclusion of the incinerator emissions is not significant.</p> <p>References: ECCC (Environment and Climate Change Canada). 2022a. Common air contaminants. Available at: https://www.canada.ca/en/environment-climate-change/services/air-pollution/pollutants/common-contaminants.html. Accessed February 2022. ECCC. 2022b. National Pollutant Release Inventory (NPRI). Available at: https://www.canada.ca/en/services/environment/pollution-waste-management/national-pollutant-release-inventory.html. Accessed March 2022. ECCC. 2024. Toxic substances list: Polycyclic aromatic hydrocarbons (PAHs). Available at: https://www.canada.ca/en/environment-climate-change/services/management-toxic-substances/list-canadian-environmental-protection-act/polycyclic-aromatic-hydrocarbons.html. Accessed March 2024. EPA (United States Environmental Protection Agency). 2024a. Air Emissions Factors and Quantification - AP-42: Compilation of Air Emissions Factors. Available at: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors</p> |
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| 22 | HC 6: Air quality assessment for human health impacts - Volume 3, Sub-section 12.1.5, p. 12-12; Volume 2, Sub-section 9.5, Table 9.10, p. 9-61; Volume 3, Sub-section 12.4.2.3, p.12-24 | <p>HC does not support the methodology used to assess changes in air quality and potential health impacts. This is based on quantifying air quality emissions for each project activity for each phase and summing up for the period of one calendar year. The total yearly emissions for each phase were then compared against the National Pollutant Release Inventory (NPRI) reporting thresholds (tonnes/year).</p> <p>HC cannot comment on potential health effects due to project-related changes in air quality with the information provided.</p> <p>To estimate changes in air quality and assess the risks to human health, refer to HC's Guidance for Evaluating Human Health Effects in Impact Assessment: Air Quality.</p> | <p>To assess changes in air quality and potential health impacts, HC recommends to:</p> <ol style="list-style-type: none"> 1) Provide the predicted or estimated COPC concentrations: <ol style="list-style-type: none"> a) for the maximally exposed population, b) for the most sensitive receptors, and, c) at the point of maximum impingement. 2) Report data in concentrations ($\mu\text{g}/\text{m}^3$) that are determined or predicted for time periods corresponding to the applicable health-based standards, guidelines, or objectives (e.g., 30- minute, 8-hour, 24- hour, and annual intervals). 3) Compare baseline concentrations with the predicted concentrations as a screening step to assess health effects. | <p>The GNWT is aware of Health Canada's Guidance for Evaluating Human Health Effects in Impact Assessment: Air Quality (2023) and of precedents nationally regarding air quality and human health assessments for projects subject to federal and other environmental impact assessment regimes. It is the GNWT's view that considering the context of a proposed project is always warranted to assist with identification of pragmatic and meaningful approaches to such assessments. The majority of such guidance and assessment is reflective of a context dominated by point and non-mobile emission sources in relatively urban or otherwise consistently occupied landscapes over extended periods of time. The activities of the Project however include mobile sources over temporary periods of time within a landscape of irregular human use and minimal to no habitation in a remote and relatively pristine environment of northern Canada. As such, the GNWT believes that such context provides opportunity to adequately assess effects on air and human health through different but adequate methods. The following discusses this further.</p> <p>The current methodology of predicting and comparing the Project total criteria air contaminants (CAC) emissions against the National Pollutant Release Inventory (NPRI) reporting thresholds is deemed to be appropriate and sufficient to determine the effect from changes to air quality for the Project, for the following reasons:</p> <ol style="list-style-type: none"> 1. As a highway construction project, most of the CAC sources are mobile, transient, and temporary as the construction site moves along the project alignment. 2. The CAC emissions from project activities is relatively low compared to large stationary sources such as municipal or industrial diesel power plants. This can be seen in Section 12.4.2.3, Table 12.8 (Criteria Air Contaminant Emission Calculation Results) by comparing the Project emissions against the NPRI threshold "2018 to 2020 Average NWT Facility Emissions". <p>As described in Chapter 12, Section 12.1.4.1, the maximum distance at which the CACs emitted from project construction and transportation sources disperse or settle is</p> |

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| | | <p>If predicted concentrations or levels of COPCs and particulate matter remain well below the CAAQS or applicable criteria or guidelines, then generally no further assessment is necessary, but it should be clearly documented in the DAR.</p> <p>HC relies on the expertise of Environment and Climate Change Canada (ECCC) in the areas of emissions, dispersion and atmospheric modelling.</p> | <p>Where professional judgment is used, HC recommends providing data that support assumptions and inform that judgment (e.g., reference to assessments of similar projects).</p> | <p>conservatively estimated to be 1 km; and most of the human receptors are located well beyond 1 km from most of the project activities for most of the construction period. For the receptors located within 1 km of the MVH alignment, based on the estimated rate of construction progress (approximately 115 m per day), the highway construction activities are expected to move beyond 1 km from these receptors after 7 days. See ECCC-18 for the assessment of receptors located within 1 km of the highway alignment and quarries.</p> |
| 23 | <p>HC 7: Adaptive management plan for air quality - Volume 3, Sub-section 12.8, p. 12-44</p> | <p>The DAR refers to an adaptive management plan for follow-up and monitoring mitigation measures, but the plan is not provided for air quality. Providing the adaptive management plan for air quality during the technical review of the DAR will allow HC to review and provide comments on the mitigation measures proposed to reduce project-related changes and/or health impacts.</p> | <p>HC recommends providing the adaptive management plan for air quality at this stage of the assessment.</p> | <p>Although there is no air quality specific adaptive management plan, mitigation and monitoring measures associated with air quality have been identified, based on visual monitoring for dust plumes, as follows:</p> <ul style="list-style-type: none"> · Increase the frequency or location of dust suppression as necessary to reduce dust · Avoid or reduce dust generating activities when wind speeds and wind direction will cause a safety concern due to reduced visibility. · Surfaces of granular material stockpiles may be stabilized during extended periods between usage, by means of covering the exposed surfaces, as feasible. · Reduce vehicle speed near sensitive receptors. |
| 24 | <p>HC 8: Evaluation of residual health</p> | <p>The DAR discusses Potential Effects on Human Health in sub-section 9.5. To</p> | <p>HC recommends evaluating the potential residual effects on health from changes to air</p> | <p>For the effects from changes to air quality, the evaluation approach is discussed in HC 6.</p> |

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| | <p>effects - Volume 2, Sub-section 9.5.7.3, p. 9-109 to 9-110</p> | <p>characterize residual effects associated with changes to air and noise, the following parameters are considered: Direction, Likelihood, Magnitude, Geographic Extent, Timing, Duration, Frequency, and Reversibility.</p> <p>The characterization of Residual Effects on Air and Noise (as physical components) cannot be directly transposed to a health impact assessment. Here are some reasons:</p> <ul style="list-style-type: none"> • Health-based criteria may already have considered some of these parameters in their derivation; • Magnitude assessment as it is presented in the DAR does not take into consideration substances with threshold vs non-threshold effects; and • The reversibility of a health impact and its intensity is not associated with the project duration. E.g., even if sound levels or concentrations of air quality COPCs return to baseline levels, health effects can have occurred. | <p>and noise using health-based parameters and considerations.</p> <p>To estimate changes in air quality and noise and assess the risks to human health using health-based parameters, refer to HC's Guidance for Evaluating Human Health Effects in Impact Assessment: Air Quality and Guidelines for Evaluating Human Health Effects in Impact Assessment: Noise.</p> | <p>The effects from changes to noise have been evaluated using health-based parameters (e.g., percent highly annoyed [%HA], and Mitigation Noise Level) because these are based on the Health Canada Guidance for Evaluating Human Health Effects in Impact Assessment: Noise, as described in Section 13.1.1.1.</p> |
| 25 | HC 9: Clarify | The DAR concludes that "For | HC recommends providing | As described in separate responses to LKFN-28 and ECCC-16, the potential for project- |

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| <p>project effects on drinking water quality - Volume 2, Sub-section 9.5.8.1.1, p.9-111; Volume 3, Sub-section 16.1.1.1, p.16-2; Volume 3, Sub-section 16.4.1, p.16-25.</p> | <p>both changes in surface water and sediment quality and groundwater quality, the residual effects of the Project are anticipated to be not significant. It is therefore anticipated that the Project effects will also be minimal on drinking water and recreational water quality” (sub-section 9.5.8.1.1).</p> <p>Sub-section 16.1.1.1 presents a list of water quality guidelines (standards) that “have been applied” but no comparative tables (predicted concentrations vs. guidelines) seem to have been provided. Sub-section 16.4.1 mentions that “residual effects followed a qualitative approach that relies on professional judgement to evaluate potential project-related changes to water and sediment quality.”</p> <p>Further information is needed to understand how the above lines of evidence were used to conclude that there would be no significant effects of the</p> | <p>more information on how the guidelines in sub-section 16.1.1.1 were applied (e.g., identify locations and present results in a comparative table).</p> <p>Where professional judgment is used, HC recommends providing data that support assumptions and inform that judgment (e.g., reference to assessments of similar projects), and documenting any rationale in the reports for transparency.</p> | <p>related effects to water quality were assessed in consideration of standard mitigations and best management practices which are considered and accepted to be sufficient for the protection of water resources during the construction and operation of the highway. The rationale for this is the availability of numerous relevant and established mitigations specific to this type of project. As described in greater detail below, these mitigations have been applied to other comparable projects (i.e., Inuvik to Tuktoyaktuk highway and Tłı̄ch̄q Highway; Hamlet of Tuktoyaktuk et al., 2011, MVEIRB 2018). A quantitative assessment (e.g., the use of a water quality model to predict project-related changes to surface water quality) was not undertaken because the highway will not have point source discharges. Therefore, it was determined that numerical water quality standards would not directly inform the assessment for potential effects.</p> <p>The water quality guidelines listed in Section 16.1.1.1 of the DAR were referenced to demonstrate that elevated concentrations of water quality parameters (e.g., total and dissolved metals, nutrients, major anions, etc.) have the potential to cause adverse effects to aquatic life, wildlife, and humans. Because anthropogenic activities such as construction in and around watercourses can cause increased concentrations of various water quality parameters, the potential for project-related changes to surface water quality was assessed in Section 16.4. As previously noted, the conclusions of the effects assessment were based on the implementation of numerous mitigations and best management practices for the protection of water and sediment quality.</p> <p>Section 16.4.2.2 outlines standard mitigations proposed for the project and relevant project-specific management plans, such as the Erosion and Sedimentation Control Plan, Permafrost Protection Plan, and Quarry Development Plans. Many of the proposed mitigation measures are standard conditions included in water licenses by regulators in the Mackenzie Valley and are otherwise best management practices reflected in guidelines such as the GNWT Land Use Guidelines Series (GNWT, 2015 a,b) and DFO codes of practice (DFO, 2022 a,b,c).</p> <p>The use of standard mitigations as the basis of the effects assessment in Section 16.4 is similar to the Environmental Impact Statement for the Inuvik to Tuktoyaktuk highway, which was based on the implementation of mitigations for the protection of surface water quality during construction, operation, and maintenance of the highway (Hamlet of Tuktoyaktuk et al., 2011). In addition, the assessment of effects on fish and</p> |
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| | | <p>project on drinking water and recreational water quality (sub-section 9.5.8.1.1).</p> | | <p>water for the Tłıchǫ Highway project also used a qualitative approach to assess potential changes in water quality based on the implementation of numerous standard mitigation measures. The standard mitigations proposed for the Mackenzie Valley Highway Project are consistent with the mitigations applied to these and other highway projects. In an evaluation of the Tłıchǫ Highway assessment, the Mackenzie Valley Environmental Impact Review Board (MVEIRB) determined that the overall proposed mitigations were sufficient to protect water quality, fish, and fish habitat. However, the MVEIRB stressed the importance of water quality monitoring for the protection of surface water quality and fish habitat during highway construction (MVEIRB 2018).</p> <p>To help confirm the conclusions of the surface water and sediment quality effects assessment, surface water monitoring will occur throughout the construction of the highway. Turbidity measurements and visual inspections of water quality will occur upstream and downstream of culvert installations during and after removal of sedimentation control measures. Details pertaining to the monitoring methodology during culvert installation are provided in the Erosion and Sedimentation Control Plan (DAR Volume 5).</p> <p>References: DFO (Fisheries and Oceans Canada). 2022a. Measures to Protect Fish and Fish Habitat. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/measure-mesures-eng.html. Accessed March 2024. DFO (Fisheries and Oceans Canada). 2022b. Code of Practice: Culvert Maintenance. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/culvert-maintenance-entretien-ponceaux-eng.html. Accessed March 2024. DFO (Fisheries and Oceans Canada). 2022c. Code of Practice: Ice Bridges and Snow Fills. Government of Canada. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/ice-bridges-ponts-glace-eng.html. Accessed March 2024. GNWT. 2015a. Northern Land Use Guidelines, Access: Roads and Trails. GNWT Department of Lands, Yellowknife, Northwest Territories. GNWT. 2015b. Northern Land Use Guidelines: Pits and Quarries. GNWT Department of Lands, Yellowknife, Northwest Territories. Hamlet of Tuktoyaktuk, Town of Inuvik, and Government of Northwest Territories. 2011. Environmental Impact Statement for Construction of the Inuvik to Tuktoyaktuk Highway, NWT. EIRB File No. 02/10-05; EBA file: V23201322.006.</p> |
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| 26 | HC 10: General – Sensitive populations - General | <p>In addition to HC-02-Air comment submitted for the Online Review System (ORS) Phase/Round 1 (human receptors) on Jan 19, 2024, HC recommends identifying all sensitive people (e.g., in schools, hospitals, retirement complexes or assisted care homes).</p> <p>For HC, “sensitive people” means individuals that are more susceptible to contamination exposure due to the following:</p> <ul style="list-style-type: none"> · Physiology (e.g., newborns, children, pregnant or breastfeeding people, elderly people); · Health status (e.g., immune-compromised persons, and persons suffering from heart disease, respiratory conditions or allergies); · Behaviour (e.g., amount of time spent outdoors); and · Lifestyle (e.g., smoking, Body Mass Index (BMI), and exercise status). | HC recommends providing maps showing the location of potential permanent, temporary, and seasonal human receptors (including sensitive people) and their distance from project components that could affect them. | <p>The effects from changes to air quality have been evaluated using an emission-based methodology of predicting and comparing the Project total criteria air contaminants (CAC) emissions against the National Pollutant Release Inventory (NPRI) reporting thresholds, as explained in HC-6. An emissions-based approach to the assessment of effects on air quality is appropriate, since the activities of the Project include mobile air emission sources over temporary periods of time within a local assessment area (LAA) of irregular human use, and minimal to no habitation. Since the methodology is emission-based and not receptor-based, changes to air quality are not assessed relative to the specific receptor locations. A map of the LAA is included in Section 12.1.4.2, Figure 12.1.</p> <p>Further, as described in Section 12.1.4.1, the maximum distance at which the CACs emitted from the Project construction and transportation sources disperse or settle is conservatively estimated to be 1 km. All of the human receptors in communities (residences) in Norman Wells and Tulita are located well beyond 1 km from project activities, though several Wrigley residences and offices will be within 1 km of project activities for 1 – 2 weeks as construction advances northward (for reference, a map of Wrigley in relation to the Project was provided to support the noise assessment in Section 13.1.4, Figure 13.2). Outside of community boundaries, there are no territorial recreational leases within the LAA. See ECC-18 for the assessment of changes to air quality on receptors located within 1 km of the PDA.</p> |
| 27 | HC 11: Consultation | The DAR Volume 1, sub-section 2.1.1 refers to “local | HC recommends providing more specific information | As stated in the Engagement and Consultation Plan (Appendix 2a of the DAR), the GNWT documented engagement activities with affected parties in accordance with the |

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| <p>and engagement - Volume 1, Sub-section 2.1.1, p. 2-3; Volume 2, Sub-section 9.4, p. 9-56</p> | <p>residents” in a footnote, defining the term as “community members in Tulita (Tulít’a), hereafter referred to as Tulita; Déljñę; Fort Good Hope (K’asho Got’ine), hereafter referred to as Fort Good Hope; Colville Lake (K’áhbamítúé), hereafter referred to as Colville Lake; Norman Wells (Tłęgó hłı), hereafter referred to as Norman Wells; Fort Simpson (łíıdlı Kųę), hereafter referred to as Fort Simpson; and Wrigley (Pehdzéh Kı N’deh), hereafter referred to as Wrigley.”</p> <p>The DAR includes these “local residents” in the broader term “affected parties” which is the term used throughout the entire document. It is not clear if local residents are considered in the same way in the consultation and engagement process as other affected parties. For example, sub-section 9.4 mentions that communities without access to the all-season road and not located on the proposed route of</p> | <p>when referring to “affected parties” throughout the document. This could include community-specific information throughout sub-section 9.4 about potential effects of the Project, particularly for Déline, K’asho Got’ine, and K’áhbamítúé.</p> | <p>GNWT’s engagement guidance. This included documenting meeting dates, parties that were present, and a summary of the discussion and outcomes. As noted in Section 2.1.6, the GNWT has not attributed feedback received during public engagement activities (e.g., community meetings, open houses, workshops) to individuals to respect the privacy of participants per the Access to Information and Protection of Privacy Act (ATIPP 1996). Due to the small size of some communities or other affected parties, there is potential that individuals could be identified through the provision of more specific information, such as the name of the community or Indigenous Government or Indigenous Organization to which individuals belong. Therefore, the affected party(ies) is unspecified as public individuals. Feedback has been integrated into the DAR from an Indigenous Government, Indigenous Organization, or other affected parties (e.g., Royal Canadian Mounted Police, renewable resources councils), as shared by participants on behalf of the entity they were representing. Some examples of this include Section 2.1.6, Table 2.6, which states “Support was received from Tulita Elders and Tulita Renewable Resource Council on a proposed Bear Rock Alignment Option, new quarry access location, and material utilization from development of a road cut to lessen quarry development needs” and Section 9.2.2, Table 9.2, which states “Information was provided by MACA, JUS, Department of (HSS, Department of EIA, Housing Northwest Territories (Housing NWT), and RCMP regarding the possible increased pressure on health and social services due to increased local population use of drugs and alcohol.”</p> <p>Section 9.4 provides an overview of the anticipated project interactions with each valued component (VC) and indicates at a high level the different nature of the socio-economic effects of the Project. Each individual effects assessment section includes a summary of how engagement with affected parties informed the assessment (Sections 9.5.1, 9.6.1, 9.7.1, 9.8.1, 9.9.1) and, throughout each assessment, more detailed findings from assessment at the community-level are provided if, and as, appropriate.</p> <p>Additional details about the influence of engagement with affected parties on the effects assessment is also presented in Section 9.2.2 and is consistent with the definitions and overall engagement efforts related to the Project that are included in Section 2.0 (Consultation and Engagement).</p> |
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| | | the Project may have different effects that occur as a result of the Project. | | |
| 28 | HC 12: General - Updated HC guidance documents - General | <p>HC has updated its series of guidance documents for assessing risks to human health from major resource and infrastructure projects in Canada. These documents present the principles, current practices, and information HC looks for when it reviews the environmental impact statement or other reports submitted by project proponents.</p> <p>HC's guidance has been prepared for the benefit of proponents and their consultants and to support an efficient and transparent project review process.</p> <ol style="list-style-type: none"> 1. Guidance for Evaluating Human Health Effects in Impact Assessment: Air Quality. 2. Guidance for Evaluating Human Health Effects in Impact Assessment: Noise. 3. Guidance for Evaluating Human Health Effects in Impact Assessment: Country Foods. | <p>HC recommends that the updated guidance documents (2023) be used to assess the potential health effects due to Project activities for any modifications to the DAR during technical review and when implementing future monitoring and adaptive management plans.</p> | <p>Section 9.15 and 9.16.2 of the Developer's Assessment Report provide a summary of the Follow-up and Monitoring framework and the Community Readiness Strategy, respectively. Both the Follow-up and Monitoring framework and the Community Readiness Strategy are intended to work together to support adaptive management of the socio-economic effects of the Project over time in the communities that are in the Local Assessment Area (LAA) and the Regional Assessment Area (RAA).</p> <p>As part of the development and implementation of plans that are part of the Community Readiness Strategy and the implementation of monitoring and adaptive management, GNWT has committed to sharing information and sharing expert knowledge and advice on components of the plans where applicable and appropriate. The updated guidance material highlighted by Health Canada may be used to inform the work of the Mackenzie Valley Highway Corridor Working Group and sub-working groups that are responsible for the development, implementation and oversight of the plans that are part of the Community Readiness Strategy.</p> |

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| | | <p>4. Guidance for Evaluating Human Health Effects in Impact Assessment: Drinking and Recreational Water Quality.</p> <p>5. Guidance for Evaluating Human Health Effects in Impact Assessment: Human Health Risk Assessment.</p> | | |
| 29 | Submission and Cover Letter | To support the Review Board's intentions to allow back and forth comments and questions that all parties can benefit from, the Government of Canada is providing this second set of comments and recommendations on the Government of the Northwest Territories (GNWT) Department of Infrastructure's (INF) Mackenzie Valley Highway (MVH) Project Developer's Assessment Report (DAR). | It is understood that there will continue to be opportunities to provide comments and recommendations on the proposed project as the environmental assessment (EA) proceeds. The Government of Canada appreciates the opportunity to provide these early comments on the DAR. | N/A |
| 30 | DFO 1: Shapefiles - General | DFO received a shapefile for the proposed right of way, existing bridges and proposed borrow locations and would like to thank the proponent. Additional shapefile information would be very useful for our review. | Please provide a shapefile for expected crossings (Figure 17.1), potential water withdrawal locations (Tables 5.7, 5.8), and the presence/absence of fish at those locations. | <p>The attached file titled "ORS001_assessed_watercourses_fish.xlsx" provides the locations of project watercourses and other locations assessed to date, as listed Table 4.2 and 4.3 of Appendix 17A (Fish and Fish Habitat Technical Data Report). The location of final watercourse crossings may change as design advances.</p> <p>Fish and fish habitat assessment sheets for assessed locations are provided in Appendix B and Appendix C of the Fish and Fish Habitat Technical Data Report (Appendix 17A).</p> <p>To obtain shapefiles of potential water withdrawal locations, please contact the</p> |

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| | | | | <p>MVEIRB. Potential lake water withdrawal locations are identified in a file package named "Water_Sources.zip". Potential watercourse withdrawal locations are identified in the file package named "Bridge_Locations.zip".</p> <p>Attachment: ORS001_assessed_watercourses_fish.xls</p> |
| 31 | DFO 2: Edit - Volume 3: Section 17.1.1.1 last sentence | Please note that what was referred to as the "Fisheries Protection Program" of DFO is called "Fish and Fish Habitat Protection Program." | For future editing, as applicable. | Noted. |
| 32 | DFO 3: Permafrost at culverts, insulation - Volume 3: Section 14, Table 14.5 | Changes to terrain, soils, and permafrost are expected due to construction of borrow, quarries and culverts. Uneven temperatures can lead to decreased structural integrity. Table 14.5 notes that culvert design will include requirements for bedding materials and geotextile to protect surrounding permafrost from thaw. DFO would appreciate some additional information on whether this mitigation measure has proved to be effective in similar conditions, and whether other types of isolation (e.g., polystyrene) were considered. | Provide information (e.g., literature or lessons-learned from other roads) on the effectiveness of the use of geotextile membranes at culverts to maintain structural integrity, thus preventing fish passage issues. Provide information on whether other types of isolation (e.g., polystyrene) were considered and why they were not chosen. | Culverts in roadway embankments in permafrost areas can have impact on permafrost, causing either permafrost thaw or in some cases permafrost growth. Where permafrost is encountered, an engineered foundation is required, per Design Criteria (Section 5.2.2, Table 5.1). Culvert foundation design will take into account ground conditions at each particular culvert at the time of detailed design. This will include consideration of the need to use insulative materials. Geotextiles can be used to provide embankment stability and separation of granular materials and rip rap from native materials. |
| 33 | DFO 4: Culvert Ice Blockages - | Mitigation measures to prevent barriers to fish | Provide more information on how steaming will be | Steaming has been shown to be an effective method of thawing ice blockages in culverts. Steaming is typically done during freshet on NWT all-weather roads. |

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| | Volume 3: Section 15.4.2.2 and Table 17.8 | passage due to ice blockages include thawing the ice by steaming, where needed to maintain flow. | conducted (e.g., will steam pipes be installed in the culverts?), and if steaming has been shown to be an effective method in other northern roads. | <p>For culverts less than 1.5 m in diameter, steam pipes are installed where the need is identified from associated hydrological studies. Watercourses where culverts of this size are used are normally not fish bearing.</p> <p>For culverts greater than 1.5 m in diameter, careful design that considers factors such as climate change, ice jams, 100-year floods, high water levels, etc. is used for appropriate sizing to prevent ice buildup. However, steam pipes can be installed to provide additional support for ice thawing if they do not negatively impact the environment.</p> |
| 34 | DFO 5: Permafrost at borrow locations - Volume 3: Section 15, Table 15.8 | Table 15.8 notes that quarry operations will be located a minimum of 100 m from the ordinary high-water mark of any waterbody. | Provide information on whether quarry proximity to streams may impact permafrost at culvert locations and impact culvert integrity. | It is unlikely that quarry operations will impact streams at culvert locations because GNWT will not locate quarries within 100 m of watercourses and waterbodies. Direct effects on permafrost from quarry operations are not expected to extend beyond a few metres from the quarry site. Excavations and developed borrow sources will be visually monitored throughout the summer and fall to verify that there is no physical erosion resulting from the degradation of permafrost. |
| 35 | DFO 6: Fish passage issues due to permafrost thawing - Volume 3: Section 17, Table 17.12 | Table 17.12. Thawing of permafrost was not included as an effect pathway and can lead to fish passage issues by impacting structure integrity. | DFO recognizes the proponent is aware of the potential impacts of thawing permafrost on culverts/fish passage, as they were included in Chapter 14, in the draft Permafrost Protection Plan, and mitigation measures (i.e., isolation with geotextile) are proposed to be put in place. DFO recommends the Fish Section (Chapter 17) and Fish and Fish Habitat Protection Plan clearly note that permafrost degradation may impact fish migration, and include any baseline data on permafrost, mitigation measures to prevent thawing | Design of culverts and other crossings will be site specific to each particular crossing and will consider permafrost protection (where applicable) in accordance with the Permafrost Protection Plan (Volume 5). The GNWT has committed to designing and constructing culverts to maintain water flow and fish passage. By applying best management practices and design mitigations, no residual effects are anticipated. Should performance issues be identified through monitoring – such as a barrier to fish passage - this would be considered an unanticipated event, and appropriate corrective actions will be evaluated (see response to DFO-9). |

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| | | | of permafrost, monitoring of permafrost and culvert structural integrity, and responses if permafrost thawing is observed at the stream crossing locations. | |
| 36 | DFO 7: Geotechnical information - Volume 3: Section 14.4.1 | The document states “As the design does not yet incorporate site-specific geotechnical information, the assessment of effects is based on the best available information. Additional geotechnical information to inform design will be collected once there is certainty of the alignment routing corridor (upon completion of the environmental assessment).” | Provide information on whether geotechnical information will be collected at crossings to inform culvert designs, and if not, then information on why. | Large diameter culverts (greater than 1.5 metre diameter) will probably require a single geotechnical drill hole at the crossing location to inform foundation design. This requirement will be determined for each particular culvert at the time of detailed design, depending on culvert size, geometry and other conditions. |
| 37 | DFO 8: Permafrost monitoring at culvert locations - Volume 3: Section 14.8 and Volume 5: Draft Permafrost Protection Plan | No information on permafrost monitoring at culverts was provided. | DFO suggests that temperature monitoring at culverts be conducted in stream crossings that are shown to comprise permafrost. | The requirement for monitoring of permafrost at culverts and other crossings will be site-specific to the particular crossing, as based on ground conditions at the time of detailed design. If determined to be necessary, it will be completed in accordance with the Permafrost Protection Plan (Volume 5). |
| 38 | DFO 9: Culvert inspections and response - Volume 3: | GNWT responded to community concerns about culverts that “Culverts will be periodically inspected to | Provide examples of which corrective measures would be implemented for different types of scenarios when | In the event that a culvert is found to not be performing acceptably, mitigative measures will be evaluated and considered in consultation with DFO and other affected parties. These measures would be site- and situation- specific. Mitigative measures could include installation of downstream weirs or riffles to provide an outlet |

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| | Section 17, Table 17.1 and Volume 5: Draft Fish and Fish Habitat Protection Plan | determine if they are functioning as per design (e.g., allow fish passage) and for evidence of erosion and sedimentation. If a barrier to fish passage or erosion and sedimentation issues are observed, corrective actions would be implemented to correct the problem." | culverts are found to not be functioning as intended (e.g., perched culvert). | pool at the culvert, or removal and reinstallation of all or parts of the culvert. |
| 39 | DFO 10: Water withdrawal - Volume 3: Section 15.4.2.2 and Volume 3: Section 17, Table 17.2 | DFO appreciates that the Proponent is committing to following DFO's under-ice and watercourse guidance for water withdrawal: -Cumulative water withdrawal shall not exceed 10% of the under-ice volume. -Cumulative flow alterations of less than +/- 10% of the magnitude of actual (instantaneous) flow in the river relative to a natural flow regime have a low probability of detectable negative effects on ecosystems. -Cumulative flow alterations that result in instantaneous flows less than 30% of the Mean Annual Discharge (MAD) have a heightened risk of effects on ecosystems that support fisheries 'highest risk'. | Provide information on how flows will be measured in-situ prior to water withdrawal to ensure <10% of available flow is withdrawn and that withdrawal does not result in flows <30% MAD. | Most streams are likely to provide adequate flow from April to October to support withdrawal (Section 5.4.11, Table 5.8 [Estimated Water Availability in Major Streams Intersected by the Project per DFO (2013) criteria]; and, Table 5.3 of Appendix 15C [Flow Summary Statistics for Flow and Water Availability at Potential Water Withdrawal Locations Along the Proposed Mackenzie Valley Highway Alignment]), but the actual flows in any given year can vary considerably. The GNWT will work with the contractor to identify water sources that may be required to support construction for each segment, since not all potential water sources will be required in any given year. Several streams in the (Local Assessment Area (LAA) and (Regional Assessment Area (RAA) are gauged by Water Survey of Canada (WSC). By observing the WSC data from the appropriate (i.e., closest) gauged streams, GNWT and its contractor will be able to determine whether flows are generally >34% (Mean Annual Discharge) MAD regionally, and therefore flows at ungauged streams are expected to be >34%MAD, too. With flows being >34%MAD, if 10% of instantaneous flow rate is withdrawn, remaining flow in the stream would still be >30% MAD. That is, water withdrawal may be supported such that natural flows plus needs of the project are not less than 30% MAD (per DFO, 2013). On a site-specific basis, water needs for camp operations (20 m3 daily) are negligible (<1%) compared to daily mean flows (Appendix 15C). No flow monitoring is proposed at streams used only for camp operations. However, water withdrawal for compaction and dust control (from May to September) may exceed 300 m3/day (Table 5.6). To meet the +/- 10% of the magnitude of actual (instantaneous) flow criterion, flow measurements will be taken prior to, and daily during water withdrawal for compaction and dust control to confirm that water withdrawal is <10% of |

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| | | Water availability data was calculated but there is no information on how flow data will be collected in-situ to determine how much water is available for collection. | | instantaneous streamflow rate, unless otherwise approved by the regulator. Reference: DFO. 2013. Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada. Accessed February 10, 2024 at: https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/348881.pdf |
| 40 | DFO 11: Water withdrawal guidelines - Volume 3: Section 17, Table 17.2 | Table 17.2 states that "Water withdrawal for camp use and dust suppression from streams with low flow or withdrawal above 10% instantaneous flow or when below 30% mean annual discharge (MAD) may affect fish health or lead to stranding. DFO would like to clarify that the guidance is not to avoid withdrawing water when flows are <30% MAD, but when water withdrawal may result in flows <30% MAD (e.g., sometimes withdrawing when close to, but above 30% MAD can lead to impacts to fish). | Confirm water withdrawal guidelines were understood. | The DFO (2013) guidance is understood as "cumulative flow alterations that result in instantaneous flows less than 30% of the Mean Annual Discharge (MAD) have a heightened risk of impacts to ecosystems that support fisheries." For planning and identification of potential water sources (Table 5.3 of Appendix 15C [Flow Summary Statistics for Flow and Water Availability at Potential Water Withdrawal Locations Along the Proposed Mackenzie Valley Highway Alignment], and Table 5.6 of Appendix 15D [Prohibition Creek Bridge: Average Flow Predictions and Statistics]), it is appropriate to use 30% MAD as a benchmark to identify periods where flows are likely to be below 30% MAD. To implement the guidance during construction, GNWT commits that water withdrawal will be within the limits of water licences and in accordance with the DFO measures to protect fish and fish habitat (e.g., DFO, 2013) as noted in mitigation measures in Table 17.8 and Table 15.8. See also response to DFO-10. Reference: DFO. 2013. Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada. Accessed February 10, 2024 at: https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/348881.pdf |
| 41 | DFO 12: Water withdrawal – changes to fish habitat - Volume 3: Section 17, Table 17.2 | Table 17.2 notes that winter water withdrawal from lakes and watercourses may impact fish habitat. DFO would like to add that water withdrawal year-round (not only in winter) can cause changes to fish habitat. Spawning, nesting, cover, | Confirm that under measured parameters for fish habitat changes, water withdrawal from watercourses (year-round, not only in winter) shall be based on instantaneous flow (m ³ /s) and mean annual discharge (MAD)(m ³ /s). | The clarification is confirmed (Section 17.4, Table 17.8 [Potential Effects and Mitigation Measures for Fish and Fish Habitat]; Section 27.2, Commitment #129). This edit will also be applied to the Draft Fish and Fish Habitat Protection Plan. |

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| | | migration, feeding can be impacted by inadequate flows. | | |
| 42 | DFO 13: Water withdrawal - monitoring - Volume 3: Section 15.4.2.2 and Volume 3: Section 17 | DFO did not see in the DAR if any monitoring of water withdrawal locations is planned. Monitoring is recommended to ensure downstream habitat, littoral habitat and inlets/outlets of lakes are not affected by water withdrawal. | DFO recommends including monitoring of water withdrawal locations in the Fish and Fish Habitat Protection Plan. | Water withdrawal is anticipated to be regulated by the Sahtu Land and Water Board (SLWB) and/or Mackenzie Valley Land and Water Board (MVLWB) in a water licence. Section 23.5.5 describes the monitoring anticipated to be required for water quantity. The GNWT anticipates the SLWB's and/or MVLWB's requirements for monitoring will be specified within a Surveillance Network Program. |
| 43 | DFO 14: Culvert crossings rationale - Volume 3: Section 17 and Appendix 17A | Watercourse crossing widths seem to range from <1 m to more than 37 m (Site 919.9) Bridges generally are more protective of fish and their habitat. Culverts, even if initially installed properly, are more at risk of shifting and causing fish passage issues. | Provide a rationale on why bridges are not proposed to be installed, especially in larger watercourses. | Bridges impose many more constraints on road geometry than culverts, such as: road width, longitudinal and transverse slopes and corner radius. These constraints negatively affect road safety for bridges more than for culverts. Therefore, culvert crossings are often safer than bridge crossings for the type of highway proposed. |
| 44 | DFO 15: Culvert crossings number - Volume 3: Section 17, Figure 17.1 and Appendix 5A | A total of 92 crossings have been identified along the project alignment. It is unclear if culverts will be used during access road construction, and if their number has been included in the calculation. | Confirm that the total number of culvert crossings includes those potentially needed during access road (to borrow pit/quarries) construction. | The number of large diameter culvert crossings required along the highway alignment is currently an estimate and will be updated as design advances. Potential crossings along access roads to quarries have not been evaluated, as the routes are currently conceptual within a one-kilometre-wide corridor. The requirement for any such additional crossings will be identified as design advances. |
| 45 | DFO 16: Fish and Fish Habitat Baseline - Volume 3: Section 17.2.2 | Four watercourses were not assessed for fish and fish habitat and another 22 watercourses were determined to be unlikely to provide fish habitat due to | Clarify if the fish and fish habitat baseline data from the 4 missing water courses will be collected, and that fish sampling will be conducted to confirm lack of presence of | Fish and fish habitat information will be collected for previously unassessed watercourse crossings as design advances. Mitigation measures for reducing potential effects on fish and fish habitat will apply to all watercourse crossings where fish habitat has been identified. |

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| | and Appendix 17A: Sections 4.3.1 and 4.3.2 | no defined channels and lack of presence or only isolated ponding of water. A non-defined channel can be fish habitat if it is used by fish at any point during their life history (e.g., if it provides food or shelter). For Example, Northern Pike spawn in flooded vegetation, sometimes outside of defined waterbodies. | fish. | |
| 46 | DFO 17: Loss or Alteration of Riparian Vegetation - Volume 3: Section 17.4.2.1 | Section 17.4.2.1 discusses the alteration or loss of riparian vegetation due to the development activity during all project phases. The information is difficult to follow and visualize without a diagram. The following mitigation measure (Table 17.8) is also difficult to understand: "a buffer strip of undisturbed vegetation of at least 30 m wide will be maintained between the highway ROW and other areas to be cleared." | Provide clarity of the alteration or loss of riparian vegetation during all project phases, and what the 30 m buffer zone entails. DFO suggests the use of a visual diagram of the alteration or loss of riparian vegetation. | The description in Section 17.4.2.1 is illustrated in Figure DFO-17.1, which applies to watercourse crossings. It shows areas cleared for the right-of-way (ROW) and 30 m wide area of riparian vegetation trimmed at watercourse crossings. Vegetation management within the ROW is required to maintain sight lines for driver safety. In riparian areas, vegetation is cut more than 10 centimeters above the ground surface to retain root structure. In other areas of new clearing, such as camps or workspaces, a minimum of 30 m buffer of undisturbed vegetation between this area and the highway ROW can mitigate for potential effects on water quality and provide a visual barrier. For quarries and borrow sources, this is extended to 100 m, consistent with northern development guidelines (e.g., GNWT 2015). See Figure DFO-17.2. Reference: GNWT. 2015. Northern Land Use Guidelines: Pits and Quarries. GNWT Department of Lands, Yellowknife, Northwest Territories. https://www.gov.nt.ca/ecc/sites/ecc/files/resources/nlug_-_pits_and_quarries_-_16_september_2015.pdf Attachment: Figure_DFO-17.1 and DFO-17.2 |
| 47 | DFO 18: Watercourse crossing details - Volume 3, | Tables are appreciated but additional information is needed to help with our review. | Please provide modified Appendix Tables 7A: 4.2 and 4.3 that include channel width and wetted width for each | The GNWT assumes a typo, and that the topic refers to Appendix 17A. Data sheets for each assessed crossing are provided in Appendix B and Appendix C of Appendix 17A. These data sheets include tables which report channel width and wetted width (and other physical data) at each measured transect. |

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| | Appendix 7A: Tables 4.2 & 4.3 | | watercourse crossing. This will help us visualize the size of culverts that will be needed. If multiple culverts may be necessary, provide this information as well. | |
| 48 | ECCC 1: Assessment of Residual Effects on Air Quality - Volume 3: Section 12.4 | The Proponent has provided information on greenhouse gas (GHG) emissions in Section 12.4, however they are included in the section on air quality. Climate change and GHG emissions should be considered separately from air quality. | Environment and Climate Change Canada (ECCC) recommends the Proponent consider GHGs and climate change in a separate section from air quality. In doing so, ECCC recommends the Proponent follow the Strategic Assessment of Climate Change (SACC, www.strategicassessmentclimatechange.ca) for guidance on the consideration of climate change and GHG emissions. The SACC provides guidance on the quantification of GHG emissions, consideration of carbon sinks, mitigation measures (Best Available Technologies [BAT] / Best Environmental Practices [BEP]) and net-zero plans. | As described in the Mackenzie Valley Environmental Impact Review Board's Terms of Reference (ToR) for the Developer's Assessment Report (2015), the consideration of carbon emissions is to be included within the assessment of potential effects of the project on air quality (section 7.3.2), and there is no requirement to conduct a separate assessment for the greenhouse gas (GHG) emissions effects. Furthermore, as per the Government of Canada Strategic Assessment of Climate Change (SACC) website (Government of Canada, 2020), a SACC assessment only applies to projects designated under the Impact Assessment Act (IAA) or to projects regulated by the Canada Energy Regulator (CER). Since the Project is not subject to the IAA or CER, a SACC assessment is not required. The mitigation measures listed in Section 12.4, Table 12.7 (Potential Effects and Mitigation Measures for Air Quality) are similar to best environmental practices to reduce GHG emissions that would result from a BAT/BEP determination process under the SACC. Reference: Government of Canada. 2020. Strategic Assessment of Climate Change. Revised, October 2020. Available at: https://www.canada.ca/en/services/environment/conservation/assessments/strategic-assessments/climate-change.html |
| 49 | ECCC 2: Residual Effects - Volume 3: Section 12.4.3.3 | The Proponent has provided a GHG emission estimate in Table 12.9, however the Proponent has not provided details, methods, or assumptions associated with these GHG emission values. | Please include details for the GHG emission calculations, including all data, methods, and assumptions associated with the GHG emission calculation. | This response is provided in ECCC-8. |
| 50 | ECCC 3: | There are discrepancies | Can the Proponent confirm | The greenhouse gas (GHG) emissions presented in the Developers Assessment Report |

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| | Residual Effects and Climate Resilience Assessment - Volume 3: Section 12.4.3.3 and Appendix 24A | between GHG emissions presented in Section 12.4.3.3 and those in the Climate Resilience Assessment (Appendix 24A). Table 12.9 states GHG emissions during operations will be 3,633 t/yr., while Appendix 24A states emissions will be 3,809 t/y. | which of the GHG emission estimates are accurate and ensure that GHG emissions presented in the report are consistent? | (DAR) Section 12.4.3.3 are the most up to date compared to the Appendix 24A Climate Lens Assessment (CLA), which was prepared in 2021. The main differences between the two assessments are listed below. <ul style="list-style-type: none"> - The Mackenzie Valley Highway length changed from 321 km to 281 km to allow for various community capacity building projects to occur and prepare local companies for construction operations of the larger MVH. - The CLA included emissions from transportation equipment consisting of vessels, airplanes, and transport trucks. These were no longer part of the equipment inventory for the DAR. - The highway right-of-way was corrected from 30 m wide in the CLA to 60 m wide in the DAR. This affects the GHG emissions reduction from the carbon sink removal. - The CLA did not include the footprint and activities from the permanent borrow pits. - For the construction phase, the construction equipment inventory was updated for the DAR and hence the GHG emissions for the construction activity were updated. |
| 51 | ECCC 4: Residual Effects and Climate Resilience Assessment - Volume 3: Section 12.4.3.3 and Appendix 24A | It does not appear that the Proponent included the GHG emissions from land use change in their GHG emissions calculation. This would result in an underestimation of GHG emissions for both construction and operational emissions. The project activities will result in land use change, so this GHG emission source should be included. | ECCC recommends the Proponent include an estimate of the GHG emissions from land use change for construction and operational activities including the clearing and burning of vegetation. | See attachment |
| 52 | ECCC 5: Effects Pathways and Climate Resilience Assessment - Volume 3: Section | Carbon sink impacts should be evaluated separately from land use change GHG emissions. Land use change impacts result in immediate emissions (ie. from land clearing and burning), while | ECCC recommends the Proponent perform a qualitative and quantitative assessment of the project's impacts on carbon sinks. ECCC recommends the Proponent calculate the natural carbon | The greenhouse gas (GHG) emissions resulting from the removal of carbon sinks is already included in the total GHG emissions shown in Section 12.4.3.3, Table 12.9 (GHG Emission Calculation Results), although its contributions are not presented separately. The response to ECCC-8 provides a summary of the GHG emissions resulting from the removal of carbon sinks. |

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| | 12.4.2.1 and Appendix 24A | carbon sinks represent a loss in carbon storage. These should be two separate evaluations. The Proponent did not evaluate the project's impacts on carbon sinks, despite having a Project Development Area of 2315.2 ha. Appendix 24A mentions the consideration of carbon sink emissions, however this value is included only for operations and not for construction. | sink capacity of the project footprint, and calculate the sum of this lost carbon sink capacity, measured as carbon emissions or removals. The Proponent should include the methods used, data, and all assumptions made for both construction and operations. | |
| 53 | ECCC 6: Assessment of Residual Air Quality, Climate Resilience Assessment, and GHG Mitigation Actions - Volume 3: Section 12.4 Table 12.7 and Appendix 24A Section 3.5 | Section 12.4 Table 12.7 and Appendix 24A Section 3.5 lists mitigation measures for GHG emissions, however the Proponent did not evaluate the impact these potential mitigation measures would have on GHG emissions. | ECCC recommends the Proponent perform a BAT/BEP determination for the project, by evaluating the mitigation measures and determining their impact on the Project's GHG emissions. | As described in ECCC-1, a Strategic Assessment of Climate Change (SACC) (Best Available Technologies [BAT] / Best Environmental Practices [BEP]) determination process is not required and was not a requirement identified in the Mackenzie Valley Environmental Impact Review Board's Terms of Reference for the Developer's Assessment Report (2015). The mitigation measures listed in Section 12.4, Table 12.7 (Potential Effects and Mitigation Measures for Air Quality) are typical BEPs that are generally implemented as part of the greenhouse gas (GHG) effect considerations for construction projects and are mainly qualitative in nature. Those BEPs are in wide use and are recognized as effective mitigation measures to reduce criteria air contaminant (CAC) and GHG emissions. |
| 54 | ECCC 7: Assessment of Potential Effects on Air Quality, and Use of Tier 4 off-road | In reference to Table 12.7 of Section 12 of the Developer's Assessment Report, ECCC supports the mitigation measures for dust control, regular maintenance of vehicles and | ECCC strongly recommends that the Proponent uses Tier 4 off-road engines. | The project is not at a stage where the construction contractor is known. As per the Guidance document on Off-Road Compression-Ignition Engine Emission Regulations, Tier 4 engine emission standards have been slowly introduced since 2012. The GNWT will work with construction contractors to encourage the use of newer equipment that meets these emission standards. Reference: |

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| | engines to lower CAC emissions - Volume 3: Section 12, and Table 12.7 | equipment, and limiting of equipment idling to reduce GHG and criteria air contaminants (CAC) emissions. ECCC also supports the mitigation measure of encouraging the contractor to use modern equipment that has lower GHG emissions, and ECCC would appreciate a similar mitigation measure targeting CAC emissions. For example, the use of off-road engines certified to the Tier 4 emission standard reduces emissions of particulate matter (PM) and nitrogen oxides (NOx) by 90% relative to older engines. | | Government of Canada. 2024. Environment and Natural Resources. Guidance document on Off-Road Compression-Ignition Engine Emission Regulations. Accessed March 17, 2024: Canadian Environmental Protection Act Registry https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/publications/guidance-document-engine-emission-regulations.html |
| 55 | ECCC 8: Assessment of Potential Effects on Air Quality, GHG and CAC emissions estimates - Volume 3: Section 12, Table 12.8 and Table 12.9 | ECCC appreciates that the Proponent has provided CAC emission estimates (Section 12, Table 12.8) and GHG emission estimates (Section 12, Table 12.9) for each project phase or activity, as well as overall annual Project GHG emission estimates (Appendix 24A, Table 4). However, the calculations performed to obtain these emissions estimates are unclear. The calculations used and how | ECCC recommends the Proponent provide more information on the calculations performed to obtain the CAC and GHG emissions estimates. ECCC also recommends the Proponent provide emissions estimates for machines and engines to be used in the project. | See attachment |

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| | | they were used will have an effect on the accuracy of the GHG and CAC predictions for each project component and the project as a whole. | | |
| 56 | ECCC 9: Assessment of Potential Effects on Air Quality, Inventories of final machines and engines - Volume 3: Section 12 and Appendix 24A, Table 7 to Table 14 | In reference to Tables 7 to 14 of Appendix 24A of the Developer's Assessment Report, ECCC appreciates that the Proponent has provided inventories of potential machines and engines to be used in the Project. Once finalized, updated inventories of the final machines and engines to be used in the project should be provided and, accordingly, GHG and CAC emissions estimates updated (e.g., in Section 12, Tables 12.8 and 12.9; in Appendix 24A, Table 4). | ECCC requests that the Proponent provides updated inventories of the final machines and engines to be used in the project and as requested in ECCC 8 updated GHG and CAC emissions estimates. | The GNWT will provide information in accordance with project regulatory reporting requirements for GHC and CAC emissions as applicable. |
| 57 | ECCC 10: Analytical Assessment Techniques, CAC and GHG emission factors - Volume 3: Section 12.4.1 | Although the Proponent has provided the sources of CAC and GHG emission factors (Section 12.4.1), the values of the emission factors that have been used to calculate the CAC and GHG emissions estimates in the Developer's Assessment Report are unclear. | ECCC recommends that the Proponent list the values of the emission factors that have been used to calculate the CAC and GHG emissions estimates. | See ECCC-8 |
| 58 | ECCC 11: Quarrying - Volume 1: | The Proponent indicated that approximately nine of the borrow sources and | ECCC recommends that the Proponent develop a monitoring program to | The development and operation of each quarry and borrow source will be set out in Quarry Development Plans (see Draft Quarry Development Plan framework in Volume 5). The GNWT has committed to using only material with low acid rock drainage (ARD) |

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| | <p>Section 5.5.5</p> | <p>quarries used for construction will remain open as material sources for maintenance of the highway. The candidate permanent borrow and quarry sources are listed in Table 5.10. These borrow sources and quarries will have permanent access roads and may be operated year-round, or intermittently. Activities to occur at these locations include annual blasting, crushing, sorting, and stockpiling of granular material, primarily during summer.</p> <p>Despite the rock geochemical investigations at borrow/quarry sources to prove material volumes, quality, and acid rock drainage (ARD)/metal leaching (ML) potential (sections: 5.4.5.1 Material Requirements and 5.4.5.2 Material Geochemistry – Acid-Rock Drainage and Metal Leaching Potential), ECCC noted that there is no indication that the Proponent has any plan to monitor seepage from the stockpile in the permanent</p> | <p>monitor seepage from the stockpiles in the permanent borrow and quarries that will be operated year-round to ensure that any seepage from the stockpiles does not contain deleterious substances.</p> | <p>and metal leaching (ML) potential (as defined in section 5.4.5.2) for the Project. As noted in Volume 4, Section 23.5.6, to confirm the suitability of quarries for use, additional samples of potential quarry material will be collected and analyzed for ARD/ML potential during the selection and characterization of potential material sources in general accordance with methods in the Mine Environmental Neutral Drainage (MEND) Prediction Manual (Price, 2009), or other Northwest Territories (NWT) guidance as may be applicable at the time. As only material with low ARD/ML potential will be used for the Project, no seepage monitoring is proposed at quarries during operations.</p> <p>Reference: Price, WA. 2009. Acid Rock Drainage Prediction Manual: A Manual of Chemical Evaluation Procedures for the Prediction of Acid Generation from Mine Wastes. Prepared by CANMET Mining and Mineral Sciences Laboratories for the Mine Environment Neutral Drainage (MEND) Program.</p> |
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| | | <p>borrow and quarries that will have borrow material stockpiled. The monitoring is to ensure that any seepage from the stockpile does not cause adverse effects to the environment.</p> | | |
| 59 | <p>ECCC 12: Project-Environment Interactions with Air Quality, and Residual Effects Likely to Interact Cumulatively - Volume 3: Section 12, Table 12.6, Table 12.7, and Section 12.5.1</p> | <p>Table 12.6 explains the timing of physical activities and indicates borrow source and quarry development and operations, as well as material haul, is planned to take place year-round. Table 12.7 shows mitigation measures planned for air quality, and ECCC appreciates the inclusion of these measures. However, there is strong seasonality for the impacts of project emissions, especially for sections of the road in the valley near the river. During the late autumn and early winter, frequent strong surface-based temperature inversions occur throughout the region that vertically trap emissions, and diurnal variations are very weak due to brief and minimal solar insolation. The inversion is deepest over the valley bottom where the coldest</p> | <p>Mindful of technical and logistical limitations as well as other environmental impacts, ECCC recommends that an additional mitigation measure be adopted whereby construction activities during the winter months be focused on sections of the highway that will be located away from the river and higher up the valley sides. This would result in improved dispersion of project emissions, and would not impact users of the winter road.</p> | <p>The GNWT appreciates the recommendation; however, due to the sensitivity of soils, construction of embankment will primarily occur in winter (December to March) when the ground is frozen (Section 5.4.6; Volume 5: Draft Permafrost Protection Plan). The need to advance embankment linearly in winter and to support such construction with quarry and borrow source activities, makes it impractical to apply ECCC's recommendation.</p> |

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| | | <p>temperatures occur. Additionally, the sides of the valley inhibit lateral dispersion of emissions, and the along-river elevation gradient is too weak for dispersion by drainage. Furthermore, Section 12.5.1 indicates additional emissions from traffic using the Mackenzie Valley Winter Road commencing in mid-winter.</p> | | |
| 60 | <p>ECCC 13: Assessment of Potential Effects of Accidents or Malfunctions - Volume 4: Section 25</p> | <p>The Proponent states "To reduce the chance of accidents happening, and to then reduce potential harm if they do happen, the GNWT will have several important management plans like a Spill Contingency Plan and Emergency Response Plan in place." This does not address what will be included in those plans. Providing this information will allow ECCC and other parties to understand the contingencies in place and any potential gaps that might exist. Risk assessment, especially in relation to the chemical and physical properties of toxic and hazardous</p> | <p>ECCC recommends that the Proponent consider worst-case and alternative accident scenarios that could be caused by the Project.</p> <p>ECCC recommends proponents document their complete inventory lists of emergency spill response equipment, including their strategic locations relative to likely accident and malfunction sites and/or to likely pathways to sensitive environmental receptors such as aquatic areas and waters frequented by fish and migratory birds. Detailed spill response strategies for each spill scenario type are also recommended.</p> | <p>Regarding accident scenarios, the GNWT has assessed four accident or malfunction types, and eight resulting scenarios to address the Terms of Reference, as summarized in Section 25.5. Each of these scenarios includes description of several plausible events that would result in adverse effects on VCs.</p> <p>The residual effects of the worst probable case of a hazardous material spill are discussed in Section 25.8.1. The residual effects of the worst probable case of fire or explosion are discussed in Section 25.8.2. The residual effects of different spill or explosion events related to storage, transportation and use of explosives are discussed in Section 25.8.1. Residual effects of transportation accidents are presented in Section 25.8.4. A transportation accident resulting in injury or fatality would be considered the worst case for this type of accident type.</p> <p>The GNWT has provided a draft Spill Contingency Plan (SCP) and draft Emergency Response Plan Framework in Volume 5 (Management Plans). Section 3 of the draft SCP describes spill response responsibilities, procedures, potential discharge events, and equipment. As noted in Section 1 of the draft SCP, the draft SCP in its current form is not intended to support applications to regulatory agencies such as the Mackenzie Valley Land and Water Board (MVLWB) and/or Sahtu Land and Water Board (SLWB). Once the GNWT is ready to proceed to construction, and has selected a contractor to construct the Project, site specific information such as fuel and other hazardous materials storage locations, fuel transfer operating procedures, and locations of spill kits will be included in the SCP for approval by the MVLWB and/or SLWB. The draft SCP</p> |

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| | | substances, plays an integral part in the development of ECCC's recommendations to proponents. Within this area of expertise, ECCC scientists analyze worst-case and alternative accident scenarios, which allows them to formulate comments and recommendations with the view to minimizing unlikely but still possible environmental and human health risks." | | <p>was developed in accordance with applicable guidelines and best practices in the NWT (Section 1.5), such as the Guidelines for Spill Contingency Planning (Indian and Northern Affairs Canada [INAC, 2007] and the Spill Contingency Planning and Reporting Regulations issued under the Environmental Protection Act, and is consistent with the contents of other approved SCPs in effect for similar road construction projects in NWT.</p> <p>Reference: INAC (Indian and Northern Affairs Canada). 2007. Guidelines for Spill Contingency Planning. Accessed from: https://www.enr.gov.nt.ca/sites/enr/files/guidelines_for_spill_contingency_planning_2007.pdf.</p> |
| 61 | HC 1: Clarifying references to seasons and timing of activities - General Volume 3: Section 12.3, Table 12.6, Section 13.3, Table 13.4, and Section 15.3, Table 15.7 | Several occurrences in the Developer's Assessment Report (DAR; e.g., Tables 12.6, 13.4, and 15.7) describe the timing of physical activities using seasons (e.g., summer and winter). Given the Project location, the local seasons and seasonal conditions do not necessarily align with calendar definitions for each. Use of calendar months instead could help ensure a shared understanding of specific timing of potential interactions between the planned physical activities and valued environmental components. | Health Canada (HC) recommends that the DAR specify the approximate months during which physical activities (construction and operation/maintenance) are planned. | In Section 5.4.1 (Construction Schedule), "summer" is defined as the months of April to November, and "winter" is defined as the months of December to March. These terms have consistent meaning throughout the assessment. Where more specificity is needed in the assessment, specific months have been used. |

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| 62 | <p>HC 2: Human receptors and potential effects on air quality, noise, and human health; - Volume 1: Section 1.4.4, Volume 3: Section 12.1, Figure 12.1.4.1, Figure 12.1, Section 13.1.4.1, Figures 13.1 to 13.4, Section 12.4, Section 14.2.2, and Section 12.1..</p> | <p>In the DAR, locations of communities are presented on maps of the Project Area and study areas, but it is unclear whether there are other specific locations where human receptors might be present within the Local Assessment Area (LAA) or Regional Assessment Area (RAA). For example, on pg. 12 of the "What We Heard Report", there is mention of local cabins, but it is unclear where those are located. Also, the DAR concluded low potential for adverse residual effects from dust emissions due to sufficient distance separating dust sources from nearby residential receptors, but it is unclear whether this conclusion holds for all human receptors. For HC to understand how the Project might impact human health, it is necessary to understand where people are located in the area and how they might interact with the Project during different project phases.</p> | <p>HC recommends that the DAR includes information about any additional potential locations for human receptors, including cabin or traditional land use locations. The characterization of potential receptors would typically include the distance to the project's LAA and RAA for each receptor, information about the type of receptor (e.g., permanent or seasonal residence, traditional land user), and any associated assumptions or limitations.</p> | <p>Section 11.2.5.3, Table 11.15 of the Developer's Assessment Report (DAR) identifies known habitation sites within the local assessment area (LAA). Tulita Renewable Resources Council (TRRC) indicated that cabins are located along the Mackenzie Valley Winter Road but did not provide exact locations. Cabins were also identified in the LAA through the Project-specific engagement program. The exact location of these cabins as well as annual occupancy rate (percent of time occupied) of these sites were not disclosed. The GNWT will investigate additional 'known and suspected sites', including cabins, as identified by: Indigenous Governments and Indigenous Organizations during consultation; affected parties during engagement; and/or through traditional land and resource use (TLRU) studies to determine if additional mitigations are required. As stated in response to ADKFN-11 and detailed in Section 13.4.2.3 of the DAR, the residual effects on noise at studied receptors (full time occupied residences in communities) follows established practice for the assessment of potential effects on noise in regulatory applications. The GNWT is aware that operation and maintenance activities will cause noise, as would any highway, and the GNWT acknowledges that it will not be possible to entirely avoid noise and potential impacts to intermittent country food harvesters near the highway after it opens to the public. Residual effects on receptors based on proximity to project activities are presented in Section 13.4.2.3.</p> <p>Residual effects on air quality from criteria air contaminant (CAC) emissions within the LAA are presented in Section 12.4.2.3. For CAC effects, the LAA is approximately a 1-kilometre (km) buffer around the project development area (PDA), which represents the distance at which the CACs emitted from construction and transportation sources are expected to disperse or settle. Dust particles specifically, are likely to settle within a few hundred feet (tens of metres) from the road (US EPA, 1995) (Section 12.1.4.1). Most human receptors (residences in communities) are located well beyond 1 km from most of the project activities for the majority of the construction period. As discussed in HC-6 and HC-10, activities of the Project include mobile sources over temporary periods of time within a landscape of irregular human use (i.e., temporary cabins, intermittent harvesting activities). For other receptors which may be located within 1 km of the MVH alignment, highway construction activities are expected to move beyond 1 km from these receptors after one week, reflecting the mobile and transient nature of the construction site as it moves along the project alignment. As such, effects on land users outside of communities would be similarly expected to be transient and temporary, particularly if land users move</p> |
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| | | | | <p>across the landscape in pursuit of traditional resources. The GNWT believes that such context provides opportunity to adequately assess effects on air quality and human health without using a receptor-based approach.</p> <p>Reference: US EPA (United States Environmental Protection Agency). 1995. AP 42, Fifth Edition: Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources</p> |
| 63 | <p>HC 3: Noise assessment for all potentially impacted communities, and Assessment of Potential Effects on Noise - Volume 3: Section 13.4.2.2, Figure 13.5, and Section 13.4.2.3, Table 13.6.</p> | <p>In Figure 13.5 and Table 13.6, the location and noise exposure levels are depicted for the most impacted receptors in Wrigley for the construction and operations/maintenance phases. It is not clear whether the noise assessment also considered other receptors/communities along the linear infrastructure pathway (e.g., Tulita) which could also be exposed to project-related noise.</p> | <p>HC recommends confirming whether receptors in communities other than Wrigley were considered for the noise assessment. If so, HC recommends that modelled noise levels from the project at these receptor locations be presented in a table or on a map. If not, provide a justification as to how the selected receptors shown in Figure 13.5 would be representative and protective of all local receptors.</p> | <p>See attachment</p> |
| 64 | <p>HC 4: Noise complaint tracking and response system, Assessment of Potential Effects on Noise, and Follow-up and Monitoring -</p> | <p>Section 13.8 indicates that a system to track complaints and responses to public feedback regarding noise will be developed. HC supports this approach and provides recommendations in the next column for development of the noise complaint resolution plan. Once a complaint resolution</p> | <p>HC recommends that the complaint resolution plan include:</p> <ol style="list-style-type: none"> 1. A description of the noise complaint resolution process for all project phases, including how information related to the complaint investigation process will be provided to potentially impacted residents and | <p>The noise complaint resolution plan will include the following elements.</p> <ol style="list-style-type: none"> 1. Types and locations of noise emitting activities will be grouped. Noise complaints may be grouped by types or locations and addressed together for each noise complaint group, or addressed individually, as deemed appropriate. 2. A description of the noise complaint investigation and, if applicable, resolution process for all project phases, including how information related to the complaint investigation process will be provided to potentially impacted residents and communities. |

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| | Volume 3: Section 13.8 | program has been developed, HC could provide further comments. | communities; 2. A commitment to address Project impacts on a case-by-case basis through community consultation, including possible additional noise monitoring; and 3. A commitment to implement noise mitigation measures at specific receptor locations, if all other forms of mitigation have proven ineffective. | 3. Noise effects exceeding predictions will be addressed on a case-by-case basis through community consultation and may include noise monitoring. 4. Potential noise mitigation measures that could be employed at specific receptor locations will be identified if all other forms of mitigation have proven ineffective. |
| 65 | Submission and Cover Letter | To support the Review Board's intentions to allow back and forth comments and questions that all parties can benefit from, the Government of Canada is providing this initial set of comments and recommendations on the Government of the Northwest Territories (GNWT) Department of Infrastructure's (INF) Mackenzie Valley Highway (MVH) Project Developer's Assessment Report (DAR). | It is understood that there will continue to be opportunities to provide comments and recommendations on the proposed project as the environmental assessment (EA) proceeds. The Government of Canada appreciates the opportunity to provide these early comments on the DAR. | N/A |
| No. | Topic | Reviewer Comment | Reviewer Recommendation | Proponent Response |
| Mackenzie Valley Environmental Impact Review Board - Catherine Fairbairn | | | | |
| 1 | Chapter 2 Consultation and Engagement | Table 2.7, Section 2.3 lists commitments to communication and engagement. One | Please confirm if the community readiness strategy has been developed, and if so, submit to the public registry. | Section 9.16.2 of the Developer's Assessment Report provides a summary of the mitigations and commitments that are part of the Community Readiness Strategy. The Community Readiness Strategy has intentionally not been completed at this time; it is intended to be developed collaboratively between the GNWT and partners to mitigate |

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| | Commitments | commitment states that "A Community Readiness Strategy has been developed to mitigate the potential negative socio-economic effects of the Project on affected communities and to maximize the potential positive effects." | | <p>the potential negative socio-economic effects of the Project and enhance the potential positive effects. The section also includes details of the Mackenzie Valley Highway Corridor Working Group (MVHCWG) and Sub-Working Groups and the plans that they will develop and implement as part of the Community Readiness Strategy. The GNWT recognizes that community input and involvement in decision-making is a critical component of identifying solutions that are appropriately responsive to community needs. To that end, the Community Readiness Strategy and the associated plans are intended to be developed collaboratively between GNWT Departments and representatives from:</p> <ul style="list-style-type: none"> - Indigenous Governments - Indigenous Organizations - Community governments - Community organizations - Aurora College - Government of Canada - Construction contractor(s) <p>GNWT is planning to engage with affected communities throughout 2024. This will also be an opportunity for Indigenous governments and Indigenous organizations and communities to provide feedback about the proposed structure and functioning of the MVHCWG and sub-working groups and indicate their interest in participating.</p> |
| 2 | Chapter 5 Project Description - DAR Volume 1 (Introduction and Project Description) (2 of 3); Project Description | The Project description suggests the MVH is necessary to support oil and gas development and long-term employment in the resource sector. This rationale seems to contradict the economic realities of current opportunities for oil and gas in the MV and with the global shift away from fossil fuels because of climate change. The assumption | Does GNWT believe there is economically viable oil and gas potential in the Central Mackenzie Valley? If not, please provide the reasons for including regional oil and gas development as part of the rationale for building the MVH, and provide evidence of potential long-term employment related to new oil and gas opportunities. | <p>The Central Mackenzie Valley (CMV) of the NWT is known to contain significant quantities of marketable oil and natural gas. The Mackenzie Valley Highway (MVH) would establish lower cost access to these resources, therefore making their development more likely.</p> <p>In 2014, the National Energy Board (NEB – now Canada Energy Regulator (CER)¹) concluded that the NWT mainland contains 529 million barrels of conventional oil and 7.6 trillion cubic feet (TcF) of conventional natural gas. A significant proportion of these finds lie in the CMV, including 336.7 million barrels of conventional oil as well as approximately 0.6 TcF of conventional natural gas. The geology of the CMV suggests there are more conventional resources to find in the CMV.</p> <p>In 2015, the National Energy Board and the Northwest Territories Geological Survey released a report assessing the unconventional petroleum resources in the Canol and</p> |

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| | | <p>dates from the Mackenzie Gas Project, and might reflect interest in a potential Sahtu hydraulic fracturing play from around 2010.</p> | | <p>Bluefish shale deposits of the CMV (2). This report estimates a total of 191 billion barrels (bbls) of oil (144.8 bbls – Canol, 46.3 bbls – Bluefish). The data to estimate what percentage of the resource that would be recoverable is not known. Past recoverable resource estimates are in the 2 – 5% range. If just 1% of these resources are recoverable it could produce just under 2 bbls from these fields. If produced at a cost of \$50.00 per barrel the field is worth ~\$100 billion. Current global oil prices based on the West Texas Intermediate benchmark are around \$US77/barrel.</p> <p>Public investments in roads and other infrastructure are known to stimulate economic activity in the natural resource sector. As an example, the Inuvialuit Energy Security Project (IESP) is now moving towards completion of associated regulatory processes. The project is planning to develop natural gas south of Tuktoyaktuk for consumption in Inuvik and Tuktoyaktuk. The \$300M project would not have been possible without the construction of the Inuvik to Tuktoyaktuk Highway (ITH).</p> <p>The development of oil and gas resources are considered by companies on a global scale. The International Energy Agency estimates that global upstream investment in oil and gas exploration, extraction and production was \$US 528 billion in 2023. As the world has begun to take steps to try to wean itself off hydrocarbons it has been demonstrated that hydrocarbon energy will need to remain a significant portion of the globe’s energy mix for many decades (3,4,5,6). Given the high Environmental, Social, Governance, and Indigenous (ESG-I) standards have evolved as the preferred mechanism by the financial sector to ensure confidence in ethical resource development investment, and that the NWT’s regulatory environment highly complements this preference towards ESG-I investing GNWT believes that NWT petroleum resources could reasonably be considered for investment by oil and gas companies if the MVH is constructed. Should this be the case, proposed projects will require legislated assessments and regulatory approvals.</p> <p>The GNWT and the Sahtu Secretariat Incorporated (SSI) require that work related to oil and gas exploration and development be conducted with northern firms and workers as much as possible. The petroleum industry is aware of these requirements and does its best to meet northern work-related goals and associated benefits to Northerners. In the early 2000s, CMV resources were the subject of a small oil exploration boom in the Norman Wells area, resulting in the establishment of Significant Discovery Licenses and over \$500M CDN in related exploration expenditures. The magnitude of future employment opportunities would be dependent on the scale and number of</p> |
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| | | | | <p>projects.</p> <p>1 https://www.cer-rec.gc.ca/en/about/north-offshore/archive/publications/2014-petroleum-resource/index.html</p> <p>2 https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/crude-oil-petroleum-products/report/archive/2015-shale-nwt/2015shInt-eng.pdf</p> <p>3 https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf</p> <p>4 https://www.kindermorgan.com/Pages/Energy-Delivered/Energy-Reality-Hydrocarbons-will-fuel-the-world-for-a-long-time</p> <p>5 https://www.canadianenergycentre.ca/oil-and-gas-demand-to-stay-strong-through-2050-a-building-block-of-our-world/</p> <p>6 https://www.shell.com/energy-and-innovation/natural-gas/liquefied-natural-gas-lng/lng-outlook-2024.html</p> |
| 3 | Chapter 5 Project Description - DAR Volume 1 (Introduction and Project Description) (2 of 3); Appendix 4 | The DAR includes a draft version (Feb 2014) of the Economic Study of the Mackenzie Valley All-Weather Highway by Nichols Management Consultants but not a final, updated version. The Project Description Reference includes mention of Nichols (Nichols Applied Management Inc.). Economic Study of the Mackenzie Valley All-Weather Highway (2017), which was not made available for review. | Please provide the referenced Nichols Applied Management Inc.'s Economic Study of the Mackenzie Valley All-Weather Highway (2017). | Report provided as an attachment. |
| 4 | Chapter 5 Project Description - DAR Volume 1 | Table 4.3 of the Nichols report (Appendix 4) shows the direct effect on GDP from Project construction is expected to be \$183 million. | Please confirm that the numbers are correct. Does the GDP only include labour income, or is there more data missing in that calculation? | The final version of the Nichols (2017) report has slightly different numbers for Table 4.3 Total Construction Effect on GDP - Direct effect on Gross Domestic Product (\$ 181 million) and Table 4.5 Total Construction Effect on Income Direct effect on Job type (\$181 million). |

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| | (Introduction and Project Description) (2 of 3); Appendix 4 | Table 4.5 of that report shows the direct effect on labour income will also be \$183 million. | | <p>As of writing of the report it is stated that, 'The direct, indirect, and induced effects of the MVH upgrade on GDP, employment, income, and government revenue was estimated using the Statistics Canada Inter-Provincial Input-Output model.' Nichols (2017).</p> <p>Gross Domestic Product calculations for indirect and induced effects includes more than labour income. The direct effect on GDP from Project construction includes only wages and salaries paid directly to workers.</p> <p>These numbers will be updated as the Business Case is updated once design advances.</p> |
| 5 | Chapter 5 Project Description - DAR Volume 1 (Introduction and Project Description) (2 of 3); Appendix 4 | Table 4.8 of the Nichols report (Appendix 4) indicates the employment effect of maintenance will be 15. This contradicts the 160 jobs cited in the DAR. | Please confirm which of these is your employment expectation of the economic effects of MVH maintenance. | <p>Section 5.5.8 – Maintenance Employment and Contracting, provides an estimate of workforce requirements, per highway segment supported by a maintenance yard.</p> <p>As two to three Maintenance Yards are estimated (Section 5.5.6) for the project, each highway segment will employ:</p> <ul style="list-style-type: none"> - Three to four heavy equipment operators and one supervisor during summer and winter - Three to four casual labourers during summer <p>These are employment expectations for MVH maintenance.</p> <p>To clarify, the 161 long-term jobs referenced in the DAR (section 1.2.1) comes from Appendix 1A (Business Case (2015)) and is an estimate on the expected jobs to be created for the operations and maintenance phase of an all-weather road that originates in Wrigley and continues on to Tuktoyaktuk.</p> <p>Upon completion of the detailed design for the Project, the Business Case and associated cost estimates and employment projections will be updated.</p> |
| 6 | Chapter 5 Project Description - DAR Volume 1 (Introduction and Project | The Nichols report (Appendix 4) assumes 149 passenger movements per day, in 92 vehicles. This does not match the estimate of 50 used in the DAR. | Please reconcile and confirm which of these is your best estimate of MVH usage and how you reached that estimate. | <p>The estimate of 50 vehicles per day is based on the current traffic volume on the Mackenzie Valley Winter Road during its seasonal operation.</p> <p>The GNWT collects traffic data using permanent traffic counters installed along highways and winter roads throughout the Northwest Territories. Based on the GNWT's traffic count information, the average annual daily traffic (AADT) on the Mackenzie Valley Winter Road (MVWR) over the last five years of record-keeping</p> |

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| | Description) (2 of 3); Appendix 4 | | | <p>(2019-2023) is 52 vehicles.</p> <p>Opening a road to year-round traffic is not expected to increase AADT because at least some of the vehicles using the winter road currently (e.g., resupply trucks) will use the all-season highway to supply communities at other times of the year. Total vehicle use of the highway over the year will increase (e.g., there is no current vehicle use from April to December), but that does not necessarily lead to an increase of AADT.</p> <p>Average annual daily traffic for the MVWR is based on historical data from the traffic counter located at the junction of the MVWR and Délı̄nę Winter Road (Counter ID 1-914). This location provides the most appropriate record of traffic for planning purposes, since it is more likely to be representative of transient traffic on a highway than other traffic counters on the MVWR, because this location captures traffic en route to communities further north, rather than local community traffic (e.g., traffic counter 1-1022 which is located only 1.4 kilometres south of Norman Wells).</p> |
| 7 | Chapter 9 Socio-economic impacts - Food Security | The effect of the project on food security is described as "neutral" in one section (p.9-95) and "adverse" in another (p.9-92+93). | Please reconcile and clarify whether the effect on food security on will be neutral or adverse. | <p>The way that the Project's effects on food security are described is related to the effects pathways identified in Section (9.5.5.1).</p> <p>The effects assessment for Food Security (Section 9.5.5) outlines four potential effects pathways that describe how the Project might affect food security. Three of the pathways are related to access to, or the availability of traditional foods (i.e., foods obtained via hunting, gathering or other traditional practices). One of the pathways is related to access to groceries (i.e., store-bought foods). The Project is anticipated to have different effects on food security through the effects pathways which are described in detail in the effects assessment outlined in Section 9.5.5.1):</p> <ol style="list-style-type: none"> 1. Two of the effects pathways related to access to and availability of traditional foods indicate that the Project's effects on access to and availability of traditional foods is anticipated to be adverse (Section 9.5.5.1.1 and Section 9.5.5.1.2, pages 9-89 to 9-91) as a result of wildlife disturbances associated with construction and operation of the Project. 2. The Project effects on improved food security as a result of all-season access to a greater variety of groceries are anticipated to be neutral (Section 9.5.5.1.2, pages 9-91 to 9-93) and also notes that the cost of groceries is unlikely to drop due to the removal of the Nutrition North subsidy for communities connected to an all-season |

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| | | | | <p>road.</p> <p>3. The effects pathway related to improved access to traditional food sources and harvesting areas as a result of operation of the Project (Section 9.5.5.1.2, page 9-93) indicates that there may be positive effects on access to an availability of traditional foods because of easier access to harvesting and hunting areas.</p> <p>The effects assessment describes the assessment results for all pathways and indicates which set of effects are anticipated to be positive, neutral or adverse. The effects assessment notes that the increased access to areas during operations (outlined in number 3 above) may mitigate the adverse effects of the Project on food security associated with wildlife disturbances during operations (outlined in number 1), the adverse effects may be larger than the positive effect, leading to a net adverse effect related to effects pathways associated with access to and availability of traditional foods. As indicated in number 2 above, the effects of the Project on food security associated with all-season access to groceries is anticipated to be neutral and so does not have an anticipated influence on overall food security.</p> <p>Following from this assessment, the mitigation measures and characterization of residual effects is limited to those adverse effects on food security (i.e., the effects associated with access to, or availability of traditional foods as described in number 1 above).</p> <p>The GNWT notes that due to the way the Nutrition North program works, removal of communities from access to the subsidy upon being connected to an all-season road is suboptimal for NWT communities. The GNWT suggests that discussions between Health Canada (and other appropriate Government of Canada departments), GNWT and Indigenous Governments take place on issues related to the Nutrition North program and broader issues of responsibility to food security and socio-economic issues as part of the environmental assessment process. This includes discussions and collaborative work envisioned for the Mackenzie Valley Highway Corridor Working Group and associated Sub-Working Groups to develop and implement the Community Readiness Strategy and associated plans.</p> |
| 8 | Chapter 9 Socio-economic Impacts | The DAR considers effects on social ties, social pressures, and public safety to be reversible during both | Please reconcile and provide more detail on why these effects are considered reversible if they are also | Addressing the Project adverse effects on social ties, social pressures and public safety through mitigation is anticipated to take time and require a collaborative approach with the affected communities, governments, and stakeholders. The adverse effects of the Project on social pressures and public safety are assessed as significant, given the |

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| | - Reversible effects during operations | construction and operation (p.9-228). However, the highway will be operational for perpetuity (p.5-52). Even with mitigation measures, there will be permanent changes (p.26-27). | permanent. | nature of existing conditions in communities regarding drug and alcohol use and abuse and the serious consequences associated with decreased public safety (especially for vulnerable populations). It is anticipated that mitigation measures, as well as the use of adaptive management to adjust mitigations to respond to Project effects, will support addressing issues over time by helping to support community capacity to respond to adverse effects. It is not appropriate to refer to these effects as being irreversible by virtue of the road being permanent, given that mitigations and adaptive management are anticipated to decrease adverse effects over time. It is more appropriate to characterize them as reversible. The GNWT's assessment is bound by the language of environmental assessment and parameters of the TOR. Therefore, while the highway is expected to exist in perpetuity, the GNWT believes that adverse effects can be mitigated through targeted, collaborative, and project specific interventions in combination with the continued government programs and services that would be responding to changes throughout the territory overall. |
| 9 | Chapter 9 Socio-economic impacts - Community labour plans | DAR mentions that "communities will be encouraged to develop community labour market plans" (p.9-74). The DAR lacks information as to if and how the GNWT will support the creation of these plans. | Please clarify the GNWT's role in supporting the development of community labour market plans created by communities. | The GNWT Department of Education, Culture and Employment (ECE) currently offers several programs and resources (e.g., Career Development Officers) that support training and employment initiatives, including community labour market plans. The purpose of community labour market plans is to identify and create a forecast for priorities and opportunities for training and employment to assist in focusing on where resources are needed at the community level. This includes labour market opportunities and supporting local training and education initiatives with partners to help communities prepare. For communities that may not have the resources or are experiencing difficulties in developing a community labour plan, the GNWT provides labour market funding through its Strategic Workforce Initiative to assist the designated community authorities in developing their plan. The GNWT Small Community Employment Strategy includes goals related to labour market planning. ECE also offers funding programs to communities to support initiatives related to labour market planning, including the Strategic Workforce Initiative and Community Training Partnerships. Applications for funding are accepted at any time and must be done through regional ECE Service Centres. While not necessary, it is recommended that applications be made early in the fiscal year, as available funding is based on annual budgets available from Employment Services Development Canada funds received through Labour Market Transfer Agreements. By working together to identify timelines, the GNWT and designated community authorities can ensure that these projects go ahead smoothly and align with potential project timelines in their region. Each region also has Career Development Officers who are responsible to deliver and |

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| | | | | <p>promote career development, labour market, employment and training programs and services to maximize regional employment and education opportunities.</p> <p>Should monitoring indicate that additional supports for labour market planning be required, the adaptive management framework will help identify additional resources and programs to be implemented to better support communities.</p> |
| 10 | <p>Chapter 9 Socio-economic impacts - Cost of living</p> | <p>The DAR lacks a conclusion on whether the effects on the cost of living will be positive or neutral. The DAR mentions that the effects are expected to be "characterized as positive" (p.9-164) but "may not be noticeable" (p.9-164).</p> | <p>Please reconcile, and provide details on whether the effects on the cost of living in communities will be positive or neutral.</p> | <p>Assessment of the cost of living includes a number of different goods and services. As the effects assessment notes, consumer prices reflect costs for a number of items including building supplies, fuel, food, and personal travel. It is anticipated that as a result of the Project, the cost of some goods such as building supplies, and fuel may decrease, which could have associated positive spin-off effects as well. However, not all goods and supplies may experience a decrease in price as a result of the Project. For example, the food security section of the effects assessment (Section 9.5.5) provides additional detail and information that indicates that the price of groceries (which is one item contributing to cost-of-living pressures) is not anticipated to show a clear decrease as a result of the operation of the Project, in particular should the Nutrition North subsidy be removed. Although some components of cost of living may not show a decrease in costs or a noticeable decrease in costs, the effects are described as positive overall.</p> <p>The GNWT will establish a Mackenzie Valley Highway Corridor Working Group (MVHCWG) that will develop and oversee a Community Readiness Strategy (described in Section 9.16). The Strategy will be developed collaboratively between the GNWT and communities. The Strategy would also include a Well-Being Adaptive Management Plan that identifies additional activities and measures to be put in place as indicated by monitoring results. Should monitoring indicate that the operation of the Project is having adverse effects on cost of living, the MVHCWG would provide a forum for discussion.</p> |
| 11 | <p>Chapter 9 Socio-economic impacts - Health indicators</p> | <p>Table 9.1 lists preliminary Socio-Economic Valued Components and Indicators.</p> | <p>Please describe how the Human Health and Community Wellness Indicators were determined/selected.</p> | <p>Preliminary Human Health and Community Wellness Indicators were developed through an issue scoping exercise that identified key aspects of the socio-economic environment that are considered important from a scientific, social, cultural, economic, historical, archaeological, or aesthetic perspective. This was informed by the 2015 TOR, in particular the Key Lines of Inquiry and Subjects of Note related to the valued socio-economic components that were included in the TOR, and which were discussed with communities during engagement during 2021. Further refinement was based on the team's experience with socio-economic assessment for major</p> |

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| | | | | development projects, determinations of available community-level data that could be used to inform indicators, and information from other similar projects (E.g., the Tłıchǝ All Season Road, Inuvik-Tuktoyaktuk Highway). Discussions with the GNWT's Socio-Economic Impact Assessment (SEIA) Working Group and staff from the Department of Health and Social Services of the Government of Northwest Territories also informed the development and refinement of preliminary indicators. |
| 12 | Chapter 9 Socio-economic Impacts - Employment and Economy (p.9-142) - DAR Volume 1 (Introduction and Project Description) (2 of 3); Appendix 5 | The developer has included as Appendix 5 the Mackenzie Valley All Weather Road, Economic Analysis. This report was published in 2009, and provides an analysis of road construction from Wrigley to Tuktoyaktuk, including bridge construction at a cost of \$1.67 billion. It is not clear why this report was included because there is no reference to it in the DAR. If it was used in the evaluation then the developer needs to explain how and why. | Please explain how the Terra-Firma report was used in the analysis of the DAR. | The Terra Firma report is an appendix to the Business Case. The Business Case is referenced in Chapter 1, Section 1.2.1, and Section 1.2.2. The Business Case was included to respond to the ToR 6.2 (overall capital cost of the highway), and ToR 6.3 (operational life of the highway and how it fits within the overall goals, objectives, and long-term planning of the GNWT for territorial highways). As outlined in Section 1.2.1, the Business Case and associated cost estimates will be updated upon completion of the detailed design for the Project. The GNWT anticipates that project costs will have escalated considerably since the 2015 estimate. |
| 13 | Chapter 9 Socio-economic Impacts - 9.2.5.1 | The spatial boundaries for non-traditional land use and infrastructure and services appear to be restricted to communities and are otherwise not clearly defined. It is acknowledged in the assessment that potential effects from the project are possible outside of communities, such as to non-traditional land use, but the spatial boundaries do | Please reconcile, and clarify the spatial boundaries for non-traditional land use and infrastructure and services. | There is no direct correspondence/correlation of the subject matter and effects pathways/potential effects of the Project between the 'Infrastructure, Services and Institutional Capacity' Valued Socio-Economic Component (VSEC) and the 'Non-Traditional Land and Resource Use' VSEC. Therefore, the response to the request to reconcile and clarify the spatial boundaries will discuss the spatial boundary definitions in relation to each of these two VSECs individually, as opposed to reconciling the two VSECs with each other. General – Application to Both VSECs As outlined in the spatial boundaries' definition section (S 9.2.5.1), the potential effects of the Project are not bound by or limited to a localized spatial location. Instead, spatial boundaries are more appropriately determined at a community level. While the potential socio-economic effects may occur at spatial locations outside of |

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| | | <p>not seem to include lands and waters outside of communities.</p> | <p>the PDA/LAA/RAA, it is community members (who generally reside within the LAA and RAA communities) who will experience the effects. A community lens is used to assess potential Project effects on the 'Infrastructure, Services and Institutional Capacity' VSEC and the 'Non-Traditional Land and Resource Use' VSEC.</p> <p>Non-Traditional Land and Resource Use (NTRLU) VSEC As noted in the DAR, non-traditional land and resource uses such as tourism, recreation, non-Indigenous hunting/fishing, and resource use (e.g., aggregate, granular, minerals, forest resources, oil and gas) typically occur outside the communities included within the LAA or RAA boundaries. The assessments of each of the potential effects includes discussion of the types of non-traditional land and resource uses or features located beyond the PDA/ LAA/RAA. Some examples include recreational uses or access like hiking or fishing. As well, the potential Project effects on non-traditional land uses largely relate to 'changes in access to' rather than physical displacement or disruption of land uses by the Project.</p> <p>The specific locations of non-traditional land and resource uses in the area beyond community boundaries may not always be known and may or may not be affected with any future change in access associated with the Project. The assessment considers the potential effects on non-traditional land and resource use at a general level rather than taking site-specific approach over a vast geographical area where current and future land and resource uses may not be documented in a detailed way. Mitigation, monitoring, and adaptive management approaches will be used to verify if key assumptions or baseline conditions have changed during the life of the project and to understand any potential adverse effects on non-traditional land use located beyond the PDA, LAA and RAA. In this way, it is appropriate for the assessment of effects for the Non-Traditional Land and Resource Use VSEC to be beyond the PDA, LAA, and RAA. In this way, it is appropriate for the spatial boundaries assessment of effects for the Non-Traditional Land and Resource Use VSEC to be beyond the PDA, LAA, and RAA.</p> <p>Infrastructure, Services, and Institutional Capacity VSEC The majority of potential Project effects on the Infrastructure, Services and Institutional Capacity VSEC will occur within communities (i.e., in the LAA or RAA, as that is where most infrastructure/services are located) and the boundary of their service areas. For this reason, it is appropriate for the assessment of effects of the</p> |
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| | | | | <p>Infrastructure, Services, and Institutional Capacity VSEC to be limited to the LAA and RAA. Protective (e.g., RCMP) and emergency (e.g., fire) services are one exception in that some Project effects may involve incidents outside of LAA and RAA (e.g., traffic accidents on the ROW [which is defined as being part of the PDA]) between communities once the Project is operational.</p> <p>The effects assessment for operations and maintenance phases for Medical and Fire Emergency Services (Section 9.8.3.1.2) notes that determining whether and how community services may need be extended beyond municipal borders will involve planning and coordination between GNWT and communities) given that the services themselves are based within communities, the spatial boundary definitions for the PDA/LAA/RAA are appropriate.</p> |
| 14 | Chapter 9 Socio-economic Impacts - Employment and Economy (9.7.2.2) | The mitigation to "develop plans for employment and local opportunity catchment to reduce a surge in the required labour force during construction, reducing the potential for in-migration to the region" suggests in-migration is to be avoided during the 20 years of construction. | Please clarify whether in-migration is predicted after construction, and if so, please describe the resulting effects. | <p>The effects assessment for Population Composition and Migration notes that the construction phase of the Project may result in higher numbers of non-resident construction workers being present in communities on a time-limited or short-term basis. It further notes that in-migration during construction beyond non-resident construction workers may occur but will not involve large numbers of new residents (see Section 9.5.2.1.1 for detailed discussion on change in population composition and migration during the construction phase, and Section 9.5.2.1.2 for the operations and maintenance phase).</p> <p>The effects pathway identified for changes to Population Composition during operations is related to the potential for reduced out-migration of residents as a result of increased business or employment opportunities associated with the operations of the Project. As outlined in Section 9.5.2.1.2, while some increase in business and employment opportunities are anticipated as a result of the Project providing all-season access, it is not anticipated that there will be a measurable effect on migration levels or community population levels as a result of the Project.</p> |
| 15 | Chapter 9 Socio-economic Impacts - Employment and Economy (9.7.3.1.1) | The developer predicts the direct effect on GDP from the construction phase is \$512 million (p.9-154) based on construction expenditures of \$700 million. This estimate appears to exaggerate what | Please provide greater clarity on the methodology used to establish economic estimates. | The economic estimate produced for Section 9.7.3.1.1 estimated a median direct employment level based on the total estimated workforce provided in Sec. 5.4.14.1 (Estimated Workforce and Seasonal Timing) and 5.4.14.2 (Workforce Arrangements) of the Developer's Assessment Report, over the 10 years of anticipated construction. Direct salary costs were estimated and based on hourly rates for transportation engineering construction in the NWT as described by Statistics Canada in Table 36-10-0489-06, (Compensation per hour, by NCAIS industry), with a 2% annual increase to reflect inflation. |

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| | | <p>would typically be the direct economic effect of road construction. The economic evaluation has been made difficult because the developer has not provided sufficient detail regarding the methodology for making the estimates apart from referencing other estimates (not actuals) in the 2011 study for the Inuvik-Tuk Highway.</p> <p>Note: This number (\$512 million) also appears to contradict the Nichols report number of \$183 million of direct effect on GDP (Table 4.3, Appendix 4).</p> | | <p>The ratio of direct employment to indirect and induced employment levels was based on the Input-Output Model developed by the NWT Bureau of Statistics for the Inuvik to Tuktoyaktuk All-Weather Road as outlined in the Environmental Impact Statement, Section 4.3.2.1 (Contribution to Gross Domestic Product and Direct Taxes).</p> |
| 16 | <p>Chapter 10 Caribou and Moose - Section 10.1.4 (p. 10-10) and 10.1.6 (p. 10- 16) Caribou and moose Local Assessment Area discrepancy in spatial boundaries between the two sections</p> | <p>The units used to describe the caribou and moose study areas are inconsistent throughout the report.</p> <p>Spatial Boundaries (p. 10-10) Caribou and Moose LAA: The Caribou and Moose LAA is the area within 15 kilometres (km) of the PDA. The Caribou and Moose LAA is 1,010,983.4 ha, with 359,038 ha in the Dehcho Region and 651,945.4 ha in the Sahtu Region.</p> | <p>Please confirm the total area in km2 for the caribou and moose LAA, and the respective areas within the Dehcho and Sahtu Regions. (In the future, please use km2 for measuring area throughout the EA).</p> | <p>The total area of the Caribou and Moose LAA is 10,109 km2 based on the Universal Transverse Mercator (UTM) Zone 10 projection. The Caribou and Moose LAA includes a 15 km buffer around the preliminary road alignment route centerline</p> <ul style="list-style-type: none"> - Dehcho Caribou and Moose LAA: 3,590 km2 - Sahtu Caribou and Moose LAA: 6,519 km2 |

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| | | 10.1.6 Significance Definition (p. 10-16): Using the mid-points (4 moose/100 km ² at low density and 5.5 moose/100 km ² at high density), and the areas of each region in the Caribou and Moose LAA (Sahtu: 6,188 km ² ; Dehcho: 3,326 km ²). | | |
| 17 | Chapter 10 Caribou and Moose - Section 10.1.6 - p10-16 Caribou and Moose Estimates of caribou and moose in Local Assessment Area | On p. 10-16, the DAR states: "As above, using the simplistic area calculation that is based on the proportion of the Caribou and Moose LAA to the total regional areas, 37 caribou in the Sahtu and 50 caribou in the Dehcho regions are accounted for in the Caribou and Moose LAA." However, it is unclear what input values were used. An updated estimate of caribou and moose in the confirmed area of the LAA would be useful. | Based on the confirmed area (from the answer in the question above), please provide a table that shows input assumptions used to derive estimates of caribou and moose within the LAA, and reflects current knowledge of expected regional ungulate densities (as per ENR 2012, ENR 2018, and Gau et al. 2020). | See attachment. |
| 18 | Chapter 10 Caribou and moose - Referenced documents | Please submit the following documents referenced in Chapter 10. | Please submit the following three documents, which are referenced in the DAR: Dehcho First Nations. 2011. Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region. Prepared by Dehcho | - Dehcho First Nations. 2011 and McDonald. 2010 are Part 1 and Part 3 of Reports available on Government of Canada website: Woodland Caribou (Rangifer tarandus caribou) aboriginal traditional knowledge summary report: part I - Canada.ca. Document not suitable for pdf transmittal. - Dehcho First Nations. 2011. Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region. Prepared by Dehcho First Nations, Fort Simpson, NWT, for the Canadian Wildlife Service, Environment Canada. 16 pp. (Woodland Caribou (Rangifer tarandus caribou) aboriginal traditional knowledge summary |

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| | | | <p>First Nations for the Canadian Wildlife Service. Published by the Dehcho First Nations, Fort Simpson, Northwest Territories.</p> <p>IMG-Golder Corporation 2006. Draft Report of the Renewable Resource Assessment of the Pehdzeh Ki Ndeh Area of Interest. Prepared for Canadian Parks and Wilderness Society (CPAWS), Northwest Territories Chapter. Inuvik, Northwest Territories.</p> <p>McDonald, R. 2010. Boreal Caribou Traditional Knowledge Collection Study: The Sahtu Settlement Area. Edited by Andrea Hrynkiw, Glen Guthrie, and McDonald. For the Canadian Wildlife Service, Environment Canada.</p> | <p>report: part I - Canada.ca) Document not suitable for pdf transmittal.</p> <p>- IMG-Golder Corporation 2006 report is provided as an attachment. See “MVEIRB 18 – IMG Golder Corporation – 2006 -Draft Report on Renewable Resource Assessment of the Pehdzeh Ki Ndeh Area of Interest.”</p> <p>- McDonald, R. 2010. Boreal Caribou Traditional Knowledge Collection Study: The Sahtu Settlement Area. Prepared by Rhea McDonald for the Canadian Wildlife Service, Environment Canada. 9 pp. (https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/publications/woodland-caribou-aboriginal-knowledge-summary-report/part-1.html#_doc035) Document not suitable for pdf transmittal.</p> |
| 19 | Chapter 11 Culture, Traditional Land Use, Harvesting - 11.2.1 Methods, Appendix 11A Chapter 3 Traditional Knowledge - 3.2.2, 3.4 | The Terms of Reference (4.1) requires a description of where Traditional Knowledge was used when describing impacts and describing cause and effects. The Tulita Renewable Resources Council (TRRC) and the Norman Wells Renewable Resources Council (NWRRC) have completed and submitted Traditional Land | Please provide additional information on how Traditional Knowledge was incorporated, both the publicly available Traditional Knowledge and the TLRU studies specific to this project. Specifically, please describe whether the Indigenous groups were provided the opportunity to review and validate the incorporated | <p>Relevant Traditional Knowledge (TK) information obtained by GNWT through the literature review or traditional land and resource use (TLRU) studies was validated by Indigenous Governments and Indigenous Organizations prior to incorporation into the Developer’s Assessment Report (DAR). Additional details about publicly available information incorporated into Section 11.0, including a reference list and annotated bibliography is provided in Appendix 11A. As stated in Section 11.1.2.1, project-specific information obtained through engagement activities, including TLRU studies completed by NWRRC and TRRC has been incorporated into the DAR. The NWRRC TLRU study was received by GNWT-INF on May 12, 2023, and TRRC was received December 14, 2023, prior to the submission of the DAR on October 12, 2023.</p> <p>The GNWT understands that TLRU information in both the NWRRC and TRRC studies</p> |

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| | | <p>and Resource Use studies. The methods section of the DAR makes reference to the incorporation of Traditional Knowledge but provides no details on the approach to how the incorporation was completed. The DAR states that the GNWT is confident that the information obtained through the publicly available sources is valid, reliable and adequate for the purposes of this assessment but acknowledges gaps and uncertainties.</p> | <p>information.</p> | <p>was reviewed and validated by community members, the RRC study coordinators, and leadership, before integration into the DAR. The GNWT acknowledges that TK is the intellectual property of Indigenous Governments and Indigenous Organizations, and knowledge holders. The TK information obtained through the literature review and TLRU studies was accepted as factual observations by the GNWT and used in good faith in the DAR; no additional interpretation, evaluation, or appraisal of TK results occurred.</p> <p>The GNWT has employed a systematic approach for considering TK shared by Indigenous Governments and Indigenous Organizations, and renewable resource councils in consideration of the Project ToR (MVEIRB, 2015 [PR#66]) and the MVEIRB's Guidelines for Incorporating Traditional Knowledge into the Environmental Impact Assessment Process (MVEIRB, 2005). Traditional Knowledge gathered by the GNWT was reviewed and summarized into tabular format organized into the categories that reflect the subjects of note and key lines of inquiry (KLOI) outlined in the terms of reference (MVEIRB, 2015 [PR#66]). See Section 3.4 of the DAR for further detail on methods for incorporation of TK into the DAR. Table 3.1 in Section 3.0 provides an overview of TK integration throughout the DAR, including Tables, and Sections where TK has been incorporated. The use of TK in the DAR reflects the information available at the time of submission.</p> <p>TK and TLRU information from both public sources and TLRU studies has been attributed directly to each Indigenous Government, Indigenous Organization, or other affected party, such as renewable resource councils, and each assessment chapter (chapters 10-22) includes a section at the beginning that summarizes how engagement and TLRU information has been considered in the assessment of each of the valued components.</p> <p>Information provided by NWRRC and TRRC about traditionally harvested wildlife and wildlife habitat, as well as information about wildlife hunting, trapping and harvesting and locations of interest (within the vicinity of the Project) have been incorporated into Sections 11.2.3.1 (Wildlife), 11.2.3.2 (Caribou), 11.2.4.3 (Moose), 11.2.3.4 (Furbearers), 11.4.2 (Change in Availability of Traditional Resources), 11.5.2.1 (Cumulative Effects Pathways), and 11.4.2.1 (Project Pathways). Information provided by NWRRC and TRRC about fish and habitat, as well as information about fishing and fishing locations (within the vicinity of the Project) have been incorporated into</p> |
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| | | | | <p>Sections 11.2.3.7 (Fish), 11.4.2 (Change in Availability of Traditional Resources), 11.5.2.1 (Cumulative Effects Pathways), and 11.4.2.1 (Project Pathways). Information provided by NWRRC and TRRC about traditionally harvested plants and habitat, as well as information about plant harvesting and harvesting locations (within the vicinity of the Project) have been incorporated into Sections 11.2.3.6 (Plants), 11.4.2 (Change in Availability of Traditional Resources), 11.5.2.1 (Cumulative Effects Pathways), and 11.4.2.1 (Project Pathways). Information provided by NWRRC and TRRC about important cultural areas (including spiritual sites, archaeological sites, heritage sites, and cultural use sites, i.e., cabins, campsites) have been incorporated into Sections 11.2.5 (Cultural and Heritage Use Sites or Areas) and 11.4.4 (Changes in Sites or Areas for Cultural Use). Information provided by NWRRC and TRRC about trails, travel and access ways have been incorporated into Sections 11.2.4 (Access to Traditional Resources or Areas) and 11.4.3 (Changes in Access to Resources and Areas for Cultural Use). Recommendations provided by NWRRC and TRRC to avoid or reduce the project effects on wildlife and wildlife harvesting, fish and fishing, plants, plant harvesting, the use of trails and travel routes, as well as important sites and areas have been incorporated into Sections 11.4.2.2 (Mitigation Measures for Availability of Resources), 11.4.3.2 (Mitigation Measures for Access to Resources and Areas), and 11.4.4.2 (Mitigation Measures for Sites or Areas for Cultural Use).</p> <p>Where TRRC and NWRCC shared information about species harvested, harvesting locations and practices, sites of cultural importance, and cultural values that may be affected by the Project, this information was also included in applicable sections of the DAR, where appropriate. For example, TLRU activities associated with wildlife have also been included in Section 19.0 (Wildlife and Wildlife Habitat, subsections 19.1.2, 19.2.2.1), and information provided about moose and caribou was incorporated into Section 10.0 (Caribou and Moose, subsections 10.1.2, 10.2.2). Similarly, information provided by NWRRC and TRRC about plants, fish and fish habitat, as well as water quality and important sites and areas have been incorporated into Section 18.0 (Vegetation and Wetlands, subsections 18.1.2, 18.2.2.4), Section 17.0 (Fish and Fish Habitat, subsections 17.1.2 and 17.2.2), Section 15.0 (Water Quality, subsections 15.1.2, and 15.2.2), and Section 22.0 (Heritage Resources, subsections 22.1.2 and 22.2.2.1) of the DAR.</p> |
| 20 | Chapter 11 Culture, Traditional | The developer is expecting Pehdzéh Kǰ and Łíídlǰ Kúé First Nation to submit their | Please provide an update on the Pehdzéh Kǰ, Łíídlǰ Kúé and any other TLRUs and when | The GNWT-INF provided capacity funding for Pehdzéh Kǰ First Nation and Łíídlǰ Kúé First Nation to complete project-specific traditional land and resource use (TLRU) studies for the Project. No TLRU reports have been received from Pehdzéh Kǰ First |

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| | <p>Land Use, Harvesting - 11.2.1 Methods, Appendix 11A Chapter 3 Traditional Knowledge - 3.2.2, 3.4</p> | <p>Traditional Land and Resource Use studies, but there are no details on how the developer plans to incorporate the findings of the study into the DAR in the same manner as the other Traditional Land Use Studies.</p> | <p>they can be expected for consideration. When the GNWT receives these studies, how does it plan to meaningfully and respectfully integrate the findings into the effects assessment? Will the GNWT validate its correct use of the information with Indigenous groups?</p> | <p>Nation as of March 2024. Łíídlı́ Kúé First Nation's TLRU study report is anticipated in summer 2024.</p> <p>As additional Project-specific TLRU studies become available, they will be reviewed against the results of the DAR to determine whether new potential effects have been identified or whether additional mitigation measures may be warranted.</p> <p>As with the results of other traditional land use or traditional knowledge studies for the Project, GNWT will use the findings in a manner that respects Łíídlı́ Kúé First Nation's and Pehdzéh Ki First Nation's respective requests for confidentiality.</p> |
| 21 | <p>Chapter 11 Culture, Traditional Land Use, Harvesting - 11.2.5.2.2</p> | <p>The DAR notes that the Norman Wells Renewable Resources Council advised that there are no known archaeological sites in the study area, but "[s]tudy participants also noted that previous archaeological excavations occurred behind Bear Rock (Petını́ah), but it is unknown if any artifacts or resources were recovered (NWRRC, 2023)."</p> | <p>Considering the whole of government approach, the GNWT should be able to check with Prince of Wales Heritage Center to confirm whether there were any archaeological finds. Please confirm if any artifacts or sites were found. If anything was found, please clarify if these required rerouting, and describe how GNWT will ensure that this area is protected.</p> | <p>Several archaeological impact assessments (AIAs) have been conducted in the Bear Rock (Petını́ah) area, which has been consistently identified as an area of high archaeological site potential and where there are currently known archaeological sites. Artifacts from some of the sites are located in the Prince of Wales Northern Heritage Centre (PWNHC).</p> <p>AIA studies are conducted within footprints defined by the limits of the developments. The MVH route has not yet been finalized in this area. As a result, a project-specific AIA has not yet been completed in this area. A project-specific AIA will be completed once the route around Bear Rock (Petını́ah) has been confirmed and the final alignment has been designed.</p> <p>The AIA will include a revisit of previously recorded archaeological sites that lie within the final project footprint and survey for archaeological sites not yet recorded. A Class 2 Archaeology Permit will be required. A number of borrow sources that are still under consideration for the MVH are associated with known sites and several sites located during the Mackenzie Valley Fibre Optic Line Project are likely close to the MVH ROW. These will be taken into consideration during the AIA.</p> <p>If sites are identified during the AIA, recommendations will be made for each site regarding mitigation of project effects. These recommendations will be presented in the AIA final permit report(s) for submission to and review by the territorial heritage regulators (GNWT Department of Education, Culture and Employment [ECE], Culture and Heritage Division/Prince of Wales Northern Heritage Centre). Requirements regarding mitigation of project effects on each site will be issued by GNWT-ECE. Final permit report(s) are distributed to communities, as per standard GNWT-ECE process.</p> |

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| | | | | <p>Typical approaches to the mitigation of project effects at each identified site-specific mitigation are provided in Section 22.4.2.2. Mitigation measures are developed in cooperation between the GNWT-ECE regulators, Indigenous Governments and Indigenous Organizations, and/or families (in the case of known or suspected burials). The final mitigation measure is the development and application of a chance find protocol for cultural materials, features, and sites encountered during project construction. Chance finds may result in additional requirements issued by the GNWT-ECE territorial regulators.</p> |
| 22 | Chapter 11 Culture, Traditional Land Use, Harvesting - 11.9 | Not all the hyperlinks to documents in the Reference section are still valid. | For all non-functioning hyperlinks, please provide either a working hyperlink or the document on the public record. | See attachment |
| 23 | Chapter 14 Terrain, Soils, Permafrost - Table 14,7 | The Little Bear River Quarry is mentioned but not assessed in table 14.7. | Please provide more information regarding the Little Bear River Quarry (Table 14.7, p.14-33). | Little Bear River Quarry (also known as Source 7.155A in Table 5.5 (Alternate Material Sources) is an existing material source on the west side of the Mackenzie River. As it is outside of the Regional Assessment Area for Terrain Soils and Permafrost, it should not have been included in Table 14.7. There are no changes to the conclusions of the assessment of residual cumulative effects, as there are no potential cumulative interactions between the Project and the Little Bear River Quarry identified in Table 14.7 (i.e., no check marks). |
| 24 | Chapter 15 Water Quantity - Sections 15.1.5. and 15.1.6 - Section 2 of APP 15C desk- top assessment of water availability | Section 2 of Appendix 15C identified limitations in the desktop-based assessment of water availability, and excluded flow changes in floods and changes in flows due to climate changes. The Appendix indicates that these topics are talked about in the four cited studies. These four studies include APP 15A, which does not characterize flow changes during flood or due to | <p>Please provide copies of, or a summary of, relative findings from the four studies cited in "flows during floods and changes in flow due to climate change have been evaluated elsewhere".</p> <p>Please specify how the DAR (e.g. s.15.1.5. and 15.1.6.) considers flow changes related to flooding and climate change when characterizing the regional</p> | <p>The other three studies cited in Appendix 15C are hydrotechnical assessment and design studies (Tetra Tech 2020, 2021, 2022) are attached to this response. These studies are examples of how climate change effects are considered in the assessment of stream crossings. Particularly, these studies considered climate change effects on peak flows at stream crossings. Flow changes (via different pathways) were considered as a potential effect on surface quantity in Section 15.1.3 and were carried to Section 15.1.5 (definition of the magnitude flow change in Table 15.3) and Section 15.1.6 (translating the magnitude of flow change into significance definition). However, as described in Section 15.4.2.2 and 15.4.2.3, design-based mitigation measures (listed in Table 15.8) are expected to eliminate the effects for all pathways, except the water withdrawal pathway. That is, the design of crossings (which as explained above considers climate change effects) will eliminate the other potential effect pathways, including "changes to surface drainage patterns" (e.g., effects that would occur if crossings could not convey peak flows).</p> |

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| | | climate change in the RSA. MVEIRB could not locate the other three studies in the DAR. | hydroclimatic variability for the RSA. | <p>References:</p> <p>Tetra Tech. 2020. Mount Gaudet Access Road Hydrotechnical Assessment. Presented to Government of the Northwest Territories, Department of Infrastructure, Issued for Review, Nov 10, 2020. [updated to: April 26, 2021, Issued for Use]</p> <p>Tetra Tech. 2021. Mackenzie Valley Highway Prohibition Creek Access Road Hydrotechnical Assessment.</p> <p>Tetra Tech. 2022. Mackenzie Valley Highway Prohibition Creek Access Road Hydrotechnical Design GNWT Service Contract SC-5078.</p> |
| 25 | Chapter 15 Water Quantity - Section 15.2.2, section 3.2.4 of Appendix 15A, section 7 of Appendix 15C | During construction, early winter is anticipated to be the most intense period for water use due to winter road construction, and this will be primarily from lakes. However, the identified lakes are far away from segments of the alignment, e.g. potential lake sources near Tulita during ice cover periods (Figure 3.2 in Appendix 15A and Table 5.4 in Appendix 15C). Although the amount and timing of water withdrawals are not yet known (Appendix 15C), streams will have no free flows for withdrawals in the winter months (Appendix 15A). The description of potential water use from lakes identified the available winter volumes but did not | Please identify what water sources (lakes or streams) will be available and in what amount for each segment's construction and operation use during summer and winter months. | <p>The GNWT did not conclude that water use for winter road construction will be primarily from lakes. The GNWT stated that “additional data will need to be collected to support applications for authorization to use water sources for withdrawal to demonstrate availability of water at time of withdrawal in accordance with applicable guidelines (e.g., DFO, 2010, 2013).” (Section 15.2.2). Water withdrawal from all approved sources (major streams and lakes) will be within the limits of water licences and in accordance with the DFO measures to protect fish and fish habitat (e.g., DFO, 2010, 2013).</p> <p>The GNWT suggests that Appendix 5A (Project Map book) provides better visualization of potential water sources (major streams and lakes) in relation to the alignment routing corridor. These have been selected as they are reasonably located to support construction in summer and winter. The GNWT disagrees that the lakes are far from the alignment. For clarification, Table 5.4 of Appendix 15C identifies all waterbodies studied along the Mackenzie Valley Highway alignment; whereas the potential water sources used in the assessment is a smaller subset of this list (e.g., Section 15.2.2, Table 15.6).</p> <p>Larger streams are expected to have “free flows” during the winter. If winter water withdrawal from streams is warranted, additional data/analysis will be collected/conducted to confirm accordance with the DFO measures to protect fish and fish habitat (e.g., DFO, 2010, 2013) as part of water licence applications.</p> <p>References:</p> |

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| | | provide winter or summer estimates for streams, citing additional data will be provided in the licensing phase (Section 15.2.2). | | <p>DFO (Fisheries and Oceans Canada). 2010. DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut.</p> <p>DFO. 2013. Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada.</p> |
| 26 | Chapter 16 Water and Sediment Quality - Section 16.1.2, Table 16.1 - Dust Suppression | The summary of engagement feedback table (16.1) notes that water will be used for dust suppression except as provided for in the GNWT Guideline for Dust Suppression. Dust suppression has been an issue in the early operations phase of the Tlicho Highway. | Please submit the GNWT Guideline for Dust Suppression, and specify the conditions that would require GNWT to use a dust suppressant other than water. | <p>In accordance with s. 2.2(c) of the Environmental Protection Act, the GNWT Guideline for Dust Suppression (i.e., the Guideline; GNWT 2013) was developed by the GNWT Department of Environment and Natural Resources (now the Department of Environment and Climate Change; ECC). The Guideline allows for the use of dust-suppressant additives (e.g., calcium chloride and DL10) on Commissioner’s Lands in the Northwest Territories based on approval by GNWT-ECC.</p> <p>The GNWT will apply dust suppression as necessary to mitigate potential project-related effects on air quality, water and sediment quality, vegetation and wetlands, caribou and moose, wildlife and wildlife habitat, and birds and bird habitat.</p> <p>The GNWT proposes that roadway watering will be the primary method for dust suppression and road compaction during construction. For dust suppression during operations and maintenance, a calcium chloride treatment (25%-35% solution) will be applied as needed on sections of the road depending on traffic volume and weather conditions. This treatment is typically effective for one to two years, compared to water which may only be effective for a few days.</p> <p>Reference:</p> <p>GNWT (Government of the Northwest Territories). 2013. Guideline for Dust Suppression. Environment Division, Department of Environment and Natural Resources. Yellowknife, NT. Available online at https://www.gov.nt.ca/ecc/sites/ecc/files/guidelines/dustsuppression.pdf</p> |
| 27 | Chapter 16 Water and Sediment Quality - Section 16.2.1, Section | Please submit the following document. | Please submit the following referenced document: K'alo Stantec (K'alo Stantec Limited). 2021. Mackenzie Valley Highway - Assessment of Prospective Borrow | See attachment |

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| 16.4.2.2.3 - Reports on Road source material screened for ARD/ML potential | | Sources: Preliminary Acid Rock Drainage/ Metal Leaching Assessment. Prepared for the Government of the Northwest Territories, Department of Infrastructure. 2021 | |
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Catherine Fairbairn
Senior Environmental Assessment Advisor
Mackenzie Valley Environmental Impact Review Board
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PO BOX 938
YELLOWKNIFE NT X1A 2N7

DELIVERED VIA EMAIL

April 19, 2024

Dear Ms. Fairbairn:

Submission of Online Review System Comment Responses

The Government of the Northwest Territories (GNWT) Department of Infrastructure is submitting this letter to provide an update on the status of the Online Review System (ORS) Comment responses. The GNWT is in the process of uploading responses to the ORS. The GNWT anticipates that the responses will be fully uploaded by April 22, 2024.

Should you have any questions or if you would like further information, please contact me at (867) 767-9082 ext. 31035, or by email at Seth.Bohnet@gov.nt.ca. Alternatively, you can reach out to Patricia Coyne, Manager MVH Environmental Affairs at (867) 767-9082 ext. 31033, or by email at Patricia.Coyne@gov.nt.ca.

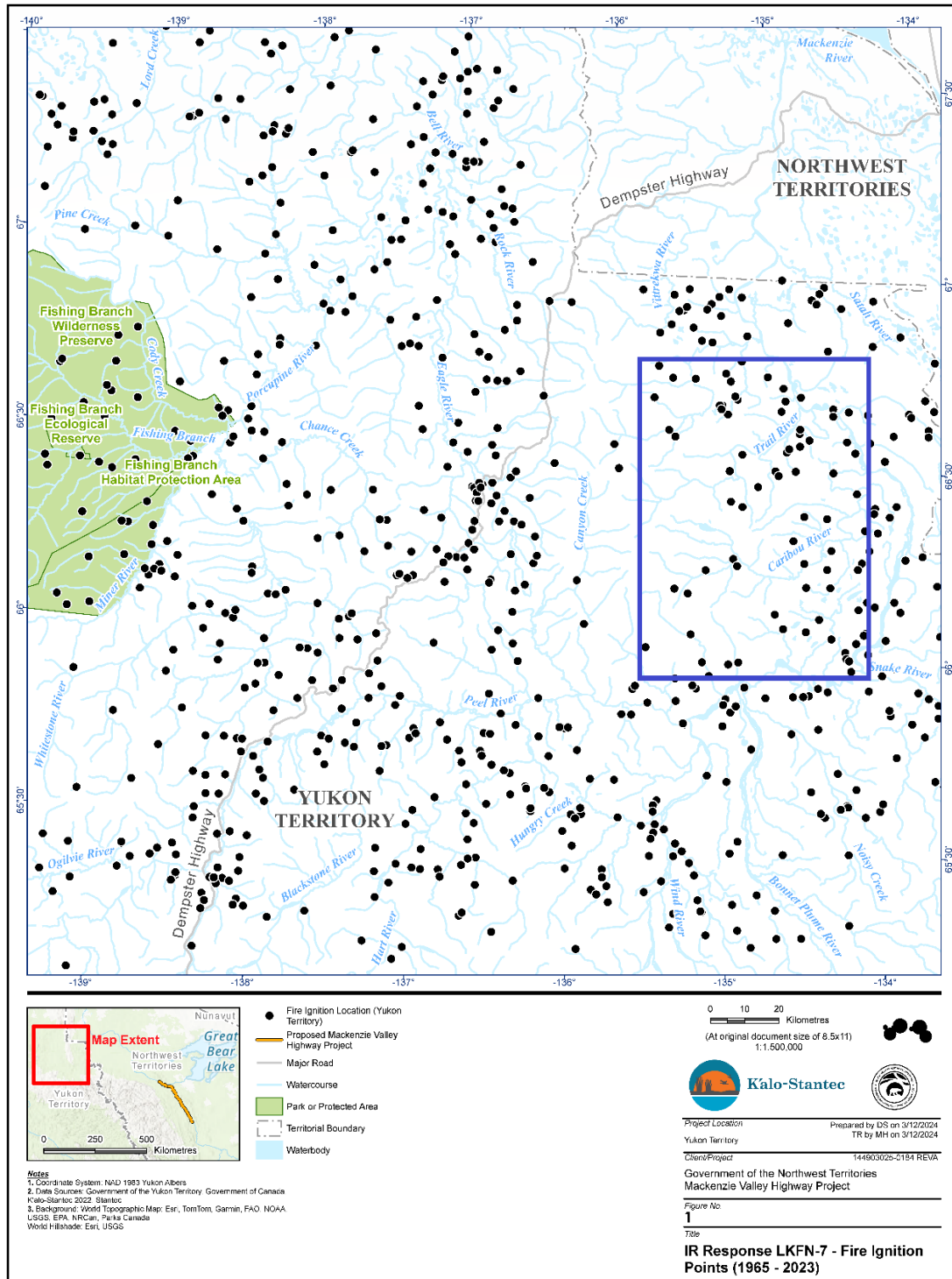
Sincerely,

Seth Bohnet
Director, Strategic Infrastructure
Infrastructure

Table LKFN-7.1 Fire Cause Comparison (1965 to 2023)

| Dempster 10 km buffer | # fires | % | Remote Area | # fires | % |
|------------------------------|----------------|----------|----------------------------|----------------|----------|
| human | 1 | 1.1 | human | 1 | 0.8 |
| lightning | 87 | 92.5 | lightning | 101 | 81.5 |
| undetermined/not specified | 5 | 5.3 | undetermined/not specified | 22 | 17.7 |
| hold over | 1 | 1.1 | | | |
| total | 94 | 100.0 | total | 124 | 100.0 |

Figure LKFN-7.1 Fire Ignition Points (1965 - 2023)



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 responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Table ADKFN-1.1

Traffic Data on Mackenzie Valley Winter Road and Tłıchq Roads

| Counter ID | Location Description | AADT by Reporting Year | | | | | | | 5-year Average AADT |
|------------|---|------------------------|------|------|------|------|------|------|---------------------|
| | | 2023 | 2022 | 2021 | 2020 | 2019 | 2018 | 2017 | |
| 1-914 | Highway No. 1 (winter road; Deline Junction) | 50 | 58 | 51 | 49 | 52 | | | 52 |
| 9-18 | Tłıchq Highway 18 km north of Hwy 3 | 37 | 37 | | | | | | |
| Tłıchq | Tłıchq winter road 1.5 km north of Junction with Hwy 3 | | | 125 | 123 | 103 | 108 | 345 | 161 |

DFO 21: Table DFO21

| Structure ID | Asset ID | Asset Name | Structure Type | Year Constructed | Age | Span (m) | Width (m) | Lanes | Traffic Width (m) |
|--------------|------------------|------------------------|----------------|------------------|-----|----------|-----------|-------|-------------------|
| 01B014 | HWY001-KM00691.4 | Hodgson Creek | Bridge | 1988 | 36 | 24.4 | 4.30 | 1 | 4.30 |
| 01B015 | HWY001-KM00722.4 | Ochre River | Bridge | 2001 | 23 | 103.0 | 4.4 | 1 | 4.00 |
| 01B016 | HWY001-KM00731.0 | Whitesand Creek | Bridge | 2001 | 23 | 88.5 | 5.0 | 1 | 4.27 |
| 01C107 | HWY001-KM00747.6 | Big Strawberry Creek | Arch Culvert | 2014 | 10 | 14.0 | 44.5 | 2 | 8.00 |
| 01C110 | HWY001-KM00747.6 | Small Strawberry Creek | Arch Culvert | 2014 | 10 | 6.0 | 22.9 | 2 | 8.00 |
| 01B017 | HWY001-KM00750.1 | Vermillion Creek South | Bridge | 2001 | 23 | 116.0 | 5.03 | 1 | 4.27 |
| 01C108 | HWY001-KM00753.5 | Bob's Canyon Creek | Arch Culvert | 2014 | 10 | 6.0 | 50.48 | 2 | 8.00 |
| 01P018 | HWY001-KM00764.4 | Dam Creek | Bridge | 1996 | 28 | 18.3 | 4.0 | 1 | 4.00 |
| 01B019 | HWY001-Km00784.1 | Blackwater | Bridge | 2010 | 14 | 297.0 | 6.00 | 1 | 5.20 |
| 01B020 | HWY001-KM00815.8 | Steep Creek | Bridge | 2001 | 23 | 64.0 | 5.05 | 1 | 4.27 |
| 01P021 | HWY001-KM00828.4 | Devil's Canyon | Bridge | 1989 | 35 | 29.4 | 4.1 | 1 | 4.00 |
| 01B022 | HWY001-KM00832.4 | Saline River | Bridge | 2001 | 23 | 128.0 | 5.0 | 1 | 4.27 |
| 01B023 | HWY001-KM00844.9 | Seagrams Creek | Bridge | 1986 | 38 | 18.3 | 4.9 | 1 | 4.31 |
| 01B024 | HWY001-Km00853.8 | Little Smith Creek | Bridge | 2008 | 16 | 78.0 | 6.5 | 1 | 5.50 |
| 01B025 | HWY001-KM00871.1 | Big Smith Creek | Bridge | 2009 | 15 | 66.0 | 5.05 | 1 | 4.27 |
| 01P026 | HWY001-KM00913.7 | Gotcha Creek | Bridge | 1996 | 28 | 24.4 | 4.2 | 1 | 4.00 |
| 01B055 | HWY001-KM00921.0 | Twelve Mile Creek | Bridge | 2017 | 7 | 24.0 | 4.15 | 1 | 4.00 |
| 01C109 | HWY001-KM00932.2 | Four Mile Creek | Arch Culvert | 2014 | 10 | 12.0 | 33.68 | 2 | 8.00 |
| 01P029 | HWY001-KM00944.0 | No Name Creek | Bridge | 1997 | 27 | 24.0 | 4.2 | 1 | 4.00 |
| 01B030 | HWY001-KM00978.5 | Jungle Ridge Creek | Bridge | 2004 | 20 | 18.0 | 5.1 | 1 | 4.30 |
| 01B031 | HWY001-KM00982.3 | Notta Creek | Bridge | 2004 | 20 | 24.0 | 5.1 | 1 | 4.30 |
| 01B032 | HWY001-KM00984.4 | Vermillion Creek North | Bridge | 1999 | 25 | 48.3 | 4.2 | 1 | 4.00 |
| 01B033 | HWY001-KM00995.3 | Prohibition Creek | Bridge | 2014 | 10 | 108.05 | 7.32 | 1 | 6.32 |
| 01B036 | HWY001-KM01001.7 | Christina Creek | Bridge | 2004 | 20 | 18.0 | 5.05 | 1 | 4.30 |
| 01B037 | HWY001-KM01002.7 | Hellava Creek | Bridge | 2005 | 19 | 18.0 | 5.05 | 1 | 4.30 |
| 01B038 | HWY001-KM01005.0 | Francis Creek | Bridge | 2005 | 19 | 24.0 | 5.1 | 1 | 4.30 |
| 01B039 | HWY001-KM01009.3 | Canyon Creek | Bridge | 1999 | 25 | 42.3 | 4.3 | 1 | 4.10 |
| 01B040 | HWY001-KM01033.4 | Billy Creek | Bridge | 2004 | 20 | 24.0 | 5.1 | 1 | 4.30 |
| 01B041 | HWY001-KM01054.4 | Oscar Creek | Bridge | 2005 | 19 | 66.0 | 5.05 | 1 | 4.27 |
| 01B042 | HWY001-KM01072.4 | Elliot Creek | Bridge | 2005 | 19 | 24.0 | 5.1 | 1 | 4.30 |
| 01B043 | HWY001-KM01084.4 | Hanna Creek | Bridge | 2005 | 19 | 30.0 | 5.05 | 1 | 4.30 |
| 01B044 | HWY001-KM01088.1 | Gibson's Creek South | Bridge | 2005 | 19 | 24.0 | 5.1 | 1 | 4.30 |
| 01B045 | HWY001-KM01088.5 | Gibson's Creek North | Bridge | 2005 | 19 | 18.0 | 5.1 | 1 | 4.30 |
| 01P046 | HWY001-KM01108.4 | Overflow Creek | Bridge | 2001 | 23 | 18.0 | 4.2 | 1 | 4.00 |
| 01B047 | HWY001-KM01118.4 | Donnelly River | Bridge | 2005 | 19 | 42.0 | 5.05 | 1 | 4.30 |
| 01B048 | HWY001-KM01124.0 | Denise (Snafu) Creek | Bridge | 2005 | 19 | 24.0 | 5.1 | 1 | 4.30 |
| 01B049 | HWY001-KM01135.4 | Rachelle (Snafu) Creek | Bridge | 2005 | 19 | 24.0 | 5.1 | 1 | 4.30 |
| 01B050 | HWY001-KM01154.4 | Tsintu Creek | Bridge | 2005 | 19 | 30.0 | 5.1 | 1 | 4.30 |
| 01B051 | HWY001-KM01158.2 | Lynn Creek | Bridge | 2005 | 19 | 18.0 | 5.1 | 1 | 4.30 |

Table HC5a VOC Emission Factors

| Equipment type | VOC Emission Factor | Data Source |
|--|----------------------------|--|
| Diesel Engine (<=600 hp) | 0.404 g/hp-hr | EPA AP-42 (EPA, 2024a) |
| Marine Diesel | 1,482.210 g/m ³ | EPA AP-42 (EPA, 2024a) |
| Propane Heaters/Boilers | 0.004 g/hp-hr | EPA AP-42 (EPA, 2024a) |
| On-road vehicles - diesel commercial vehicle exhaust emissions (bus) | 1.2 kg/m ³ | National Pollutant Inventory (NPI, 2024) |
| On-road vehicles - diesel vehicle exhaust emissions (LGV) | 0.42 kg/m ³ | National Pollutant Inventory (NPI, 2024) |
| On-road vehicles - diesel vehicle exhaust emissions (HGV) | 1.8 kg/m ³ | National Pollutant Inventory (NPI, 2024) |
| Non-road transportation equipment | 0.251 g/hp-hr | EPA MOVES3 (EPA, 2024b) |

Table HC5b VOC Emission Calculation Results (Annual)

| Project Phase or Activity | VOC Emissions (t/year) |
|--|-------------------------------|
| Construction Phase | |
| Mobilization and Demobilization Activities | 0.37 |
| Road Construction Activities | 3.59 |
| Operations and Maintenance Phase | |
| Operations and Maintenance Activities | 0.83 |
| VOC Thresholds from NPRI | |
| NPRI Reporting Thresholds ¹ | 10.00 |
| 2018 to 2020 Average NWT Facility Emissions ² | 57.49 |

Notes:

Bold values indicate that the emission level exceeds the reporting threshold.

¹ The level at which the substances begin to pose a risk to the environment or to health.

² The average of each individual facility VOC emissions reported for the NWT for the past 3 years.

Table HC5c

**Construction Incinerator Criteria Air Contaminant Emission Calculation Results
(Annual)**

| Project Phase or Activity | CAC Emissions (t/year) | | | | | |
|--|---------------------------|-----------------|-----------------|------------------|-------------------|-------|
| | CO | NO _x | SO ₂ | PM ₁₀ | PM _{2.5} | VOC |
| Construction Phase | | | | | | |
| Original Total for Road Construction Activities | 22.39 | 27.95 | 0.45 | 4.81 | 1.68 | 3.21 |
| Campsite Incinerators | 0.46 | 2.28 | 0.64 | 0.16 | 0.16 | 0.38 |
| Revised Total Road Construction Activities | 22.85 | 30.22 | 1.09 | 4.98 | 1.84 | 3.59 |
| CAC Thresholds from NPRI | | | | | | |
| NPRI Reporting Thresholds ¹ | 20.00 | 20.00 | 20.00 | 0.50 | 0.30 | 10.00 |
| 2018 to 2020 Average NWT Facility Emissions ² | 176.82 | 258.55 | 69.23 | 24.26 | 8.75 | 57.49 |

Notes:

Bold values indicate that the emission level exceeds the reporting threshold.

¹ The level at which the substances begin to pose a risk to the environment or to health.

² The average of each individual facility CAC emissions reported for the NWT for the past 3 years.

DFO 1 - ORS001_assessed_watercourses_fish.xlsx

Assessed Project Watercourses Table 4.2 and Table 4.3 per Appendix 17A (Fish and Fish Habitat Technical Data Report)

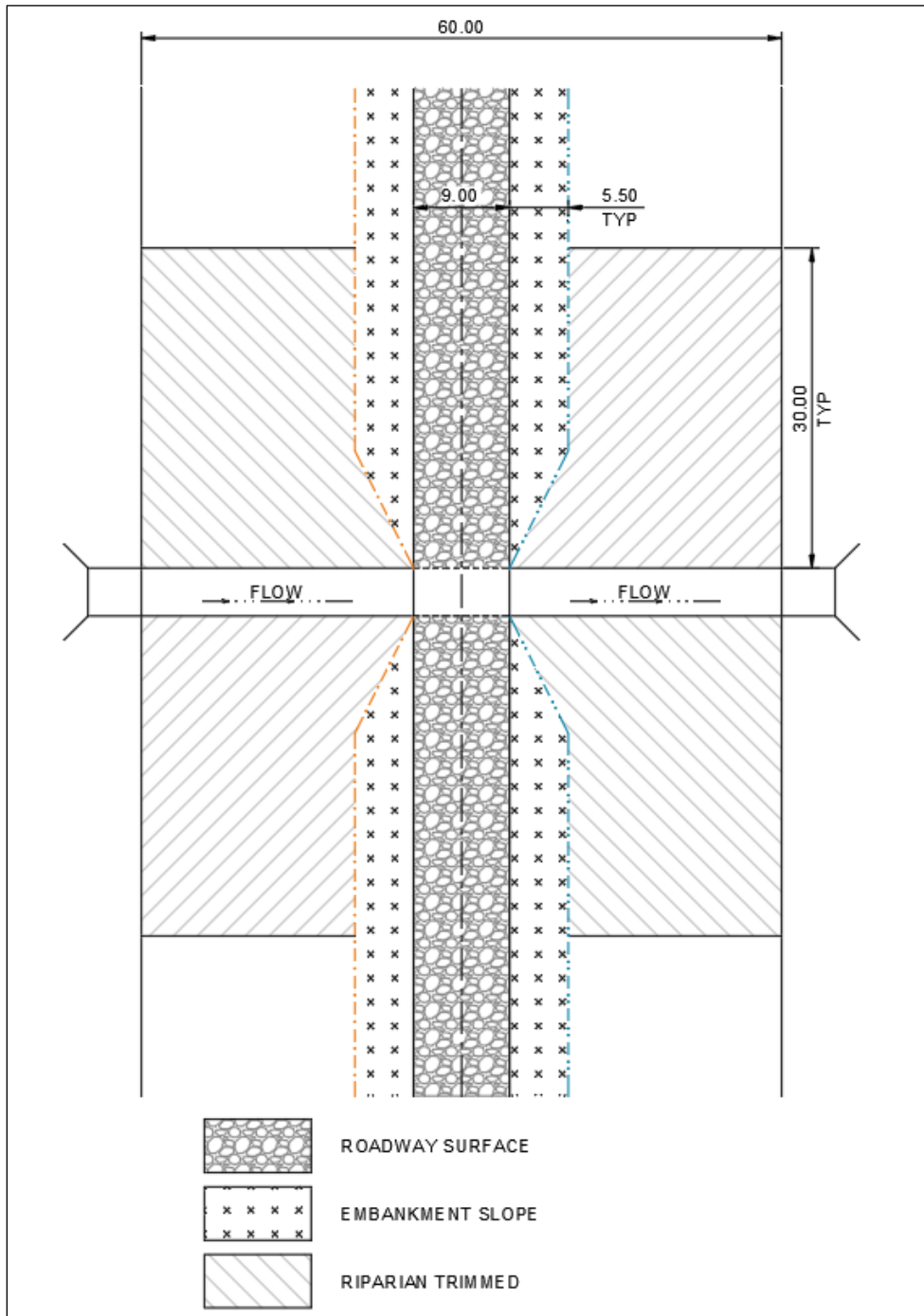
| Assessed Location | KM Reference | Centerline UTM | | |
|---------------------|--------------|----------------|---------|----------|
| | | Zone (W) | Easting | Northing |
| Unnamed Watercourse | 696.8 | 10 | 473317 | 7015384 |
| Drainage | 699.1 | 10 | 473070 | 7015812 |
| Wetland Area | 699.3 | 10 | 472880 | 7015938 |
| Wetland Area | 700.3 | 10 | 472322 | 7016741 |
| Wetland Area | 701.7 | 10 | 471421 | 7017918 |
| Wetland Area | 702.2 | 10 | 471183 | 7018318 |
| Wetland Area | 702.9 | 10 | 470932 | 7019008 |
| Wetland Area | 704.7 | 10 | 470653 | 7020732 |
| Unnamed Watercourse | 705.4 | 10 | 470824 | 7023125 |
| Wetland Area | 710.4 | 10 | 471528 | 7027742 |
| Wetland Area | 715.6 | 10 | 469827 | 7031105 |
| Drainage | 718.8 | 10 | 467959 | 7035544 |
| Wetland Area | 719.9 | 10 | 468244 | 7035072 |
| Unnamed watercourse | 721.6 | 10 | 465977 | 7037399 |
| Unnamed Watercourse | 724.5 | 10 | 465535 | 7039921 |
| Unnamed Watercourse | 727.4 | 10 | 465248 | 7042571 |
| Unnamed Watercourse | 732.7 | 10 | 463008 | 7047414 |
| Bonnie Creek | 733.7 | 10 | 462586 | 7048307 |
| Unnamed Watercourse | 736.5 | 10 | 462082 | 7050913 |
| Unnamed Watercourse | 738.7 | 10 | 462013 | 7051561 |
| Unnamed Watercourse | 737.4 | 10 | 461944 | 7051827 |
| Unnamed Watercourse | 739.6 | 10 | 461404 | 7053882 |
| Unnamed Watercourse | 740.8 | 10 | 461135 | 7055011 |
| Unnamed Watercourse | 741.7 | 10 | 460915 | 7055927 |
| Unnamed Watercourse | 742.7 | 10 | 460641 | 7057047 |
| Strawberry Creek | 745.7 | 10 | 459359 | 7059422 |
| Unnamed Watercourse | 747.6 | 10 | 458952 | 7061042 |
| Unnamed Watercourse | 748 | 10 | 458839 | 7061453 |
| Drainage | 752.8 | 10 | 456629 | 7065715 |
| Unnamed Watercourse | 765.5 | 10 | 451513 | 7076541 |
| Unnamed Watercourse | 767.2 | 10 | 451279 | 7078183 |
| Unnamed Watercourse | 767.8 | 10 | 451423 | 7076769 |
| Wetland Area | 768.2 | 10 | 451373 | 7077141 |
| Drainage | 768.9 | 10 | 451297 | 7077881 |
| Drainage | 769.7 | 10 | 450566 | 7080565 |
| Wetland Area | 769.7 | 10 | 451333 | 7078638 |
| Wetland Area | 770 | 10 | 451254 | 7079001 |
| Wetland Area | 770.6 | 10 | 451104 | 7079480 |
| Drainage | 772.8 | 10 | 449199 | 7083419 |
| Unnamed Watercourse | 774.1 | 10 | 448523 | 7084338 |
| Drainage | 780.9 | 10 | 444236 | 7089533 |
| Wetland Area | 789 | 10 | 441775 | 7094706 |
| Wetland Area | 789.4 | 10 | 441568 | 7095152 |
| Wetland Area | 791.2 | 10 | 440409 | 7096395 |
| Wetland Area | 791.8 | 10 | 439719 | 7096318 |
| Wetland Area | 793.1 | 10 | 438820 | 7097394 |
| Unnamed watercourse | 797.9 | 10 | 437740 | 7101829 |
| Unnamed watercourse | 805.5 | 10 | 435589 | 7108255 |
| Unnamed watercourse | 812.7 | 10 | 434329 | 7115337 |
| Unnamed watercourse | 815 | 10 | 432721 | 7117031 |
| Unnamed watercourse | 820.7 | 10 | 433131 | 7121799 |
| Unnamed watercourse | 821.9 | 10 | 432580 | 7123103 |
| Unnamed watercourse | 823 | 10 | 431979 | 7123968 |
| Unnamed watercourse | 824.5 | 10 | 431072 | 7126467 |
| Unnamed watercourse | 826 | 10 | 431007 | 7126834 |
| Unnamed watercourse | 826.3 | 10 | 430947 | 7126834 |
| Unnamed watercourse | 828.6 | 10 | 429991 | 7129070 |
| Unnamed watercourse | 834.1 | 10 | 425724 | 7132189 |
| Unnamed watercourse | 835 | 10 | 425405 | 7132988 |
| Unnamed watercourse | 837.1 | 10 | 424624 | 7135022 |
| Unnamed watercourse | 843.3 | 10 | 422310 | 7140408 |
| Unnamed watercourse | 846.4 | 10 | 419947 | 7142715 |
| Unnamed watercourse | 857.4 | 10 | 415860 | 7151196 |
| Unnamed watercourse | 872.9 | 10 | 412679 | 7164554 |
| Drainage | 874 | 10 | 410998 | 7166150 |
| Drainage | 875.5 | 10 | 410938 | 7167644 |
| Unnamed watercourse | 876.6 | 10 | 410947 | 7168766 |
| Unnamed watercourse | 877.8 | 10 | 411245 | 7169818 |
| Unnamed watercourse | 879.1 | 10 | 411064 | 7169505 |
| Unnamed watercourse | 878.8 | 10 | 411627 | 7170638 |
| Unnamed watercourse | 879.4 | 10 | 411209 | 7168580 |
| Unnamed watercourse | 880.2 | 10 | 411595 | 7170626 |
| Unnamed watercourse | 880.6 | 10 | 411800 | 7171054 |
| Unnamed watercourse | 881 | 10 | 411798 | 7171042 |
| Unnamed watercourse | 883.6 | 10 | 411615 | 7173282 |
| Unnamed watercourse | 884.3 | 10 | 411435 | 7174830 |
| Unnamed watercourse | 884.8 | 10 | 411300 | 7174635 |
| Unnamed watercourse | 889 | 10 | 408491 | 7178378 |
| Unnamed watercourse | 891.4 | 10 | 406839 | 7178354 |
| Unnamed watercourse | 891.7 | 10 | 406854 | 7178332 |
| Unnamed watercourse | 892 | 10 | 407102 | 7180445 |
| Unnamed watercourse | 915.6 | 10 | 397368 | 7198303 |
| Unnamed watercourse | 918 | 10 | 394969 | 7198798 |
| Unnamed watercourse | 919.9 | 10 | 394956 | 7198775 |
| Unnamed watercourse | 940.1 | 10 | 375325 | 7203625 |
| Unnamed watercourse | 980.3 | 9 | 629551 | 7227955 |
| Unnamed watercourse | 981.2 | 10 | 629352 | 7227768 |
| Unnamed watercourse | 987.2 | 9 | 623577 | 7230276 |

Table provided for information purposes in response to ORS Comment CANNOR-1. Data to be read in conjunction with this report.



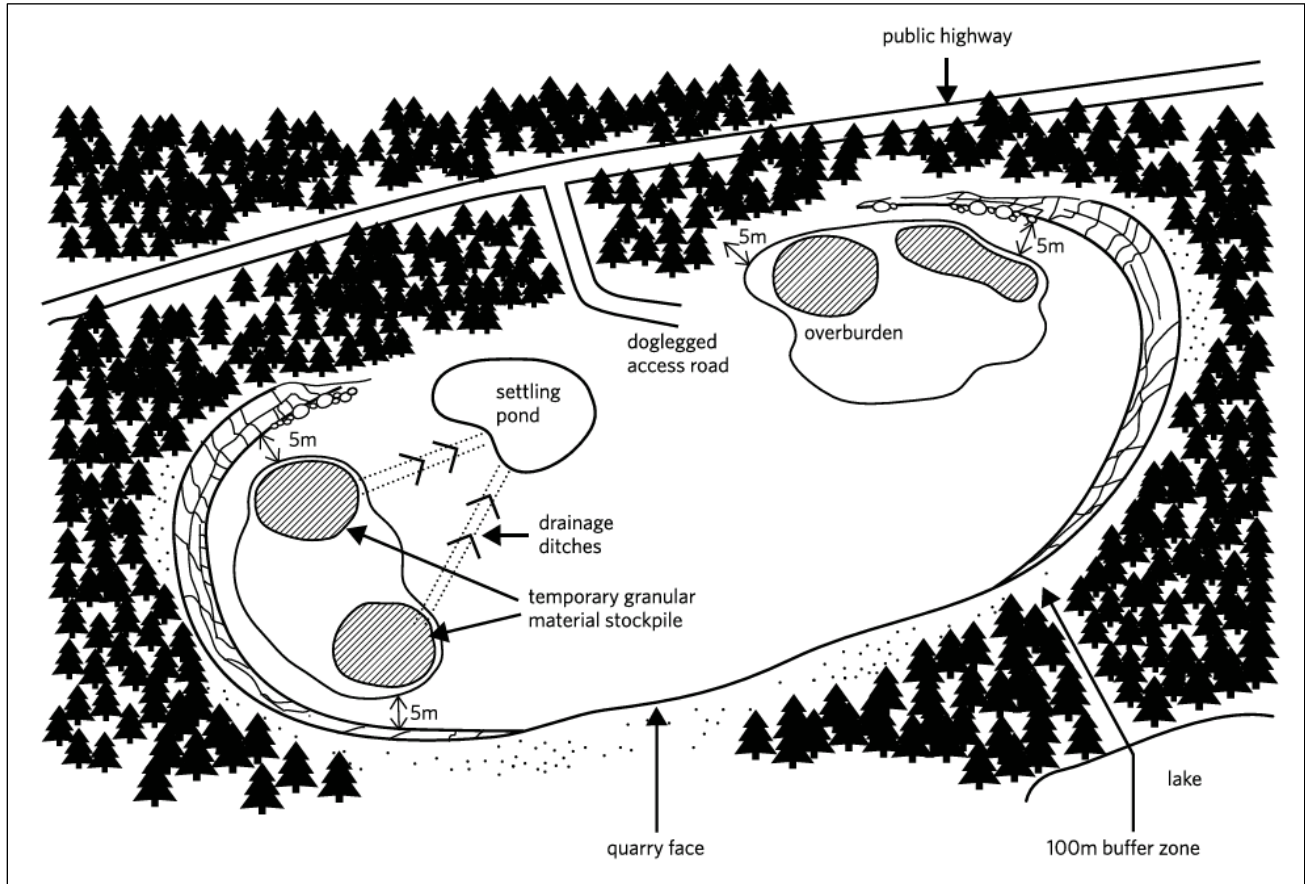
CANNOR-17 Attachment

Figure CANNOR-17.1 Illustration of Typical ROW at Watercourse Crossings, Including Area of Vegetation Trimming (Section 17.4.2.1)



Reference: MVEIRB ORS Comment Responses CANNOR 1-36 - Part 2
CANNOR-17 Attachment

Figure CANNOR-17.2 Illustration of Use of Vegetation Buffers (from GNWT, 2015)



Appendix CANNOR22

Topic: ECCC 4: Residual Effects and Climate Resilience Assessment - Volume 3: Section 12.4.3.3 and Appendix 24A

Comment: It does not appear that the Proponent included the GHG emissions from land-use change in their GHG emissions calculation. This would result in an underestimation of GHG emissions for both construction and operational emissions. The project activities will result in land-use change, so this GHG emission source should be included.

Recommendation: ECCC recommends the Proponent include an estimate of the GHG emissions from land-use change for construction and operational activities including the clearing and burning of vegetation.

Response: The greenhouse gas (GHG) emissions from land-use change were missed in the GHG effect assessment in Chapter 12. For background information, the Climate Lens Assessment report (Appendix 24A) did not include this emission source because it was assumed at the time that the road construction would involve the use of woven geotextile placed on the existing ground which would result in minimal ecological disturbance (i.e. no land residual decay would occur). The GHG assessment in Chapter 12 then followed a similar methodology. We now know that the construction equipment inventory includes tree harvesters and mulchers, which would result in GHG emissions from land-use change.

The land-use change assessment, including the methodology and GHG emission results, is presented below. It is an amendment to the assessment of the potential effects on air quality presented in Chapter 12.

Land-use Change

The total area disturbed due to the Project was classified as 71 hectares (ha) of coniferous forest, 101 ha of broadleaf forest, 707 ha of grassland (including sparsely treed areas), 110 ha of treed wetlands, and 190 ha of non-treed wetlands, based on area information presented in Chapter 18, Table 18.11. The forests, grassland, and wetlands function as carbon pools that can temporarily sequester carbon from the atmosphere. The land-use change activities are described in Section 5.4.4. To prepare the land for project activities, areas will be cleared, grubbed, and stripped as needed. Part of the organic topsoil on the highway right-of-way (ROW) will be stripped and salvaged for reclamation purposes. Some cleared vegetation will be salvaged, and the rest may be mulched and spread across the ROW. Merchantable timber will be limbed and decked and made available for holders of a timber permit. Non-merchantable trees will be stacked for community salvage where possible, likely to be used for wood burning. During operations, parts of the cleared areas in the local assessment area (LAA) will be reclaimed (equivalent to approximately 50% of the disturbed area).

To quantify these emissions from land-use change, K'alo-Stantec applied the guidance section in the draft Technical Guide to the Strategic Assessment of Climate Change (SACC, ECCC 2021) regarding quantification of direct emissions from land-use changes. The effects of project-related land-use change on three carbon pools are assessed: living biomass, dead organic matter (DOM), and soil organic carbon (SOC).

The SACC requires proponents to select the tier of quantification approach based on the project component area (in hectares) and proportion of the project component area on carbon dense lands (i.e., forests, wetlands). Figure 3.1 of the draft Technical Guide (ECCC 2021) shows a decision tree to determine the appropriate tier for land-use change calculations. Based on area information presented in Chapter 18 Table 18.11, the total project component disturbance area is expected to be up to 1,178 ha with the majority of this area as carbon dense lands; therefore, the SACC requires that the Tier 2 methodology be used to calculate changes in carbon stock. The Tier 2 approach

uses site-specific or regional-specific data to calculate changes in carbon stock. The Project is within the Taiga Plains ecozone of the Northwest Territories. K'alo-Stantec applied the Tier 2 approach where possible (living biomass) and the Tier 1 approach where insufficient information was available (DOM, SOC). The SACC follows the guidance of the International Panel on Climate Change (IPCC) for the calculation of the change in the three carbon pools.

GHG emissions from land-use change have been calculated for the construction phase. Even though some of the GHG emissions from land-use change are released over multiple years (e.g., some emissions from SOC are typically released over a 20-year period), the total GHG emissions are assigned to the construction phase because they result from land disturbance activities occurring during the construction phase. This approach is accepted under the SACC (ECCC, 2021).

The GHG effects from the removal of carbon sinks is a separate assessment from the GHG effects from land-use change. The carbon sink assessment is covered in Section 12.4.3 and CANNOR-26.

Change In Living Biomass

The relevant equation for change in carbon within the living biomass pool is:

$$\Delta C_B = \Delta C_G + \Delta C_{conversion} - \Delta C_L$$

Where,

ΔC_B is the change in the living biomass stock and measured (t C/y)

ΔC_G is the change due to growth in living biomass (t C/y)

$\Delta C_{conversion}$ is the change due to land-use change (t C/y), and

ΔC_L is the change due to losses of living biomass from harvesting, fuel wood gathering and disturbances (t C/y).

For the estimate of land-use change emissions, ΔC_G is set to zero. However, over time, the affected areas will be allowed to regrow vegetation.

The calculation of $\Delta C_{conversion}$ uses this equation:

$$\Delta C_{conversion} = \{(B_{After} - B_{Before}) \times Area_{disturbed}\} \times CF$$

Where,

B_{After} is the amount of biomass (dry basis, t/ha) that exists immediately after the disturbance

B_{Before} is the amount of biomass (dry basis, t/ha) that exists before the disturbance,

$Area_{disturbed}$ is the land area that is disturbed (ha), and

CF is the carbon fraction of dry matter (t C/t dry matter).

The B_{After} can be set to 0 with the assumption that all living biomass will be cleared for construction. The B_{Before} values for forest and grassland were obtained from Natural Resources Canada Inventory (NRCAN, 1997).

ΔC_L is set to 0 because no harvesting, fuel wood gathering, and other disturbance are expected in the reclaimed areas following the Project construction phase.

The specific parameters used for estimating the change in carbon stock in living biomass are presented in Table 22.1.

Table 22.1 Living Biomass Parameters

| Parameter | $Area_{disturbed}$ (ha) | B_{Before} (t dry matter/ha) | B_{After} (t dry matter/ha) | CF |
|----------------------|----------------------------|-----------------------------------|----------------------------------|------|
| Coniferous | 71.2 | 26 | 0 | 0.51 |
| Broadleaf | 101 | 1 | 0 | 0.48 |
| Grassland/Shrubland | 707 | 8.5 | 0 | 0.40 |
| Wetlands - Treed | 110 | 26 | 0 | 0.45 |
| Wetlands – Not Treed | 190 | 8.5 | 0 | 0.45 |

Note:

NR not relevant

Sources:

Area metrics are based on data from the DAR Chapter 18 Table 18.11

IPCC (2006a, 2006b, 2006d)

Change In Dead Organic Matter

Dead organic matter (DOM) includes dead wood and litter. The relevant equation from the IPCC is:

$$\Delta C_{DOM} = \{(C_n - C_o) \times A\} \div T_{on}$$

Where,

ΔC_{DOM} is the total annual change in carbon stocks in DOM in land converted to another land-use category (t C/y)

C_n is the dead wood/litter present post-disturbance (t C/ha)

C_o is the dead wood/litter present prior to the disturbance (t C/ha)

A is the area undergoing conversion (ha), and

T_{on} is the time period of the transition from pre- to post-disturbance.

To estimate the total change in the dead organic matter carbon pool, T_{on} has been set to 1, assuming that all DOM will be removed in the first year. Similar to the calculation for living biomass, the value of C_n is set to zero with the assumption that all carbon will be removed during disturbance. As per IPCC (2006b), Grasslands can be assumed to exist in equilibrium between DOM and living biomass, and hence a change in DOM is not estimated for Grasslands.

The values of C_o for Forest Land were obtained from IPCC because project-specific or region-specific values were not available. The values of C_o and C_n are provided in Table 22.2.

Table 22.2 DOM Biomass Parameters

| Biomass Type | C_o (t C/ha) | C_n (t C/ha) | A (ha) |
|-------------------------------|-------------------|-------------------|-----------|
| Coniferous Forest | 62.5 | 0 | 71.2 |
| Broadleaf Forest | 35.5 | 0 | 101 |
| Wetlands - Treed ¹ | 49.0 | 0 | 110 |

Note:

¹ Wetlands - Treed dead wood/litter parameters were obtained from the average of coniferous forest and broadleaf forest parameters.

Sources:

Area metrics are based on data from the DAR Chapter 5 Table 5.3 and Chapter 18 Table 18.11 IPCC (2019)

Change In Soil Organic Carbon

An estimate of the change in the soil organic carbon is needed where the soil is planned to be disturbed. The relevant equation is:

$$\Delta C_{Soils} = \Delta C_{Mineral} - L_{Organic} + \Delta C_{Inorganic}$$

Where,

$\Delta C_{Mineral}$ is the annual change in organic carbon stocks in mineral soils (t C/y)

$L_{Organic}$ is the annual loss of carbon from drained organic soils (t C/y), and

$\Delta C_{Inorganic}$ is the annual change in inorganic carbon stocks from soils (t C/y).

Soil may contain both organic and inorganic carbon. The contribution from inorganic carbon can be set to zero when following Tier 2.

The equation for $\Delta C_{Mineral}$ is:

$$\Delta C_{Mineral} = \frac{SOC_0 - SOC_{0-T}}{D}$$

Where,

SOC_0 is the soil organic carbon stock at the last year of the inventory time period (default is 20 years) (t C)

SOC_{0-T} is the soil organic carbon stock in the beginning of the inventory time period (t C)

T is the number of years over the inventory time period, and

D is the time dependence which usually equals T (default is 20 years).

The equation to calculate SOC is:

$$SOC = \sum_{c,s,i} SOC_{REF_{c,s,i}} \times F_{LU_{c,s,i}} \times F_{MG_{c,s,i}} \times F_{I_{c,s,i}} \times A_{c,s,i}$$

Where,

SOC_{REF} is the reference carbon stock (t C/ha)

$F_{LU_{c,s,i}}$ is the stock change factor for land-use systems

$F_{MG_{c,s,i}}$ is the stock change factor for management regime

$F_{I_{c,s,i}}$ is the stock change factor for input of organic matter and

$A_{c,s,i}$ is the land area.

The subscripts c, s, and i represent climate zone, soil type, and set of management systems, respectively. The reference SOC can be found in the IPCC Guidelines (IPCC 2006c). These factors are applicable when stripping to a depth of 30 cm. Factors for other depths could not be located for the Northwest Territories; however, a depth of 30 cm is appropriate for most of the activities for road construction projects.

The equation for $L_{Organic}$ is:

$$L_{Organic} = Area * EF$$

Where,

$Area$ is the land area of drained organic soils in climate type c (ha), and

EF is the emission factor for climate type c (t C/ha/y)

The values for the emission factor EF are obtained from IPCC (IPCC, 2013).

The specific parameters used for estimating the change in carbon stock in soil organic carbon are presented in Table 22.3.

Table 22.3 Soil Organic Carbon Parameters

| Land Type | SOC_{REF} (t C/ha) | EF (kg _{CH4} /ha/y) | $F_{MG_{c,s,i}}$ ¹ | $F_{LU_{c,s,i}}$ and $F_{I_{c,s,i}}$ ¹ |
|----------------------|-------------------------|-----------------------------------|-------------------------------|---|
| Coniferous | 63 | NR | 0.8 | 1 |
| Broadleaf | 63 | NR | 0.8 | 1 |
| Grassland/Shrubland | 63 | NR | 0.8 | 1 |
| Wetlands - Treed | 116 | 0.93 | 0.8 | 1 |
| Wetlands – Not Treed | 116 | 5.7 | 0.8 | 1 |

Notes:

NR not relevant

¹ An overall 20% reduction among the three stock change factors was used for ground disturbance activities, as suggested by IPCC. As such, $F_{MG_{c,s,i}}$ was set to 0.8 and the remaining factors $F_{LU_{c,s,i}}$ and $F_{I_{c,s,i}}$ were set to 1.

Source: IPCC (2013)

Change In CH₄ and N₂O Emissions from Drained Inland Wetland

Drained organic soils in wetlands may emit significant amounts of CH₄ and N₂O emissions. The relevant equations are:

$$CH_{4_organic} = \sum (Area * (1 - Frac_{ditch}) * EF_{CH_4_land} + Frac_{ditch} * EF_{CH_4_ditch})$$

Where,

Area is the land area of drained organic soils in a land-use category in climate zone c, nutrient status n and soil type p (ha)

Frac_{ditch} is the fraction of the total area of drained organic soil which is occupied by ditches (t C)

EF_{CH₄_land} is the emission factors for direct CH₄ emissions from drained organic soils, by climate zone c and nutrient status n (kg_{CH₄}/ha/y), and

EF_{CH₄_ditch} is the emission factors for CH₄ emissions from drainage ditches, by climate zone c and soil type p (kg_{CH₄}/ha/y).

$$N_2O = Area * EF_{N_2O}$$

Where,

Area is the land area of drained organic soils in a land-use category in climate zone c, nutrient status n and soil type p (ha)

EF Emission factor for N₂O emissions from drained/managed organic soils (kg N₂O/ha/y)

The values of the CH₄ and N₂O parameters were obtained from IPCC (IPCC, 2006d) because project-specific and region-specific values were not available. These are provided in Table 22.4.

Table 22.4 DOM Biomass Parameters

| Land Type | <i>Frac_{ditch}</i> (t C) | <i>EF_{CH₄_land}</i> (kg CH ₄ /ha/y) | <i>EF_{CH₄_ditch}</i> (kg CH ₄ /ha/y) | <i>EF_{N₂O}</i> (kg N ₂ O/ha/y) |
|---------------------|--------------------------------------|---|--|--|
| Wetland - Treed | 0.03 | 2 | 0.192 | 3.2 |
| Wetland – Not Treed | 0.03 | 1.4 | 0.192 | 9.5 |

Source: IPCC (2006d)

Calculation of CO₂, CH₄, and N₂O Emissions

The amount of carbon in the living biomass and dead organic matter that is converted to CO₂ depends on the fate of the materials. As described in Section 5.4.4, non-merchantable trees will be stacked for community salvage where possible, likely to be used for wood burning. An article on boreal forests (Repola, 2006) reports that approximately 50% of tree stems from boreal forests is estimated to be small trees (i.e. ≤14 cm diameter at breast height), and K’alo-Stantec has assumed that small trees have 50% less carbon than larger trees. Therefore,

approximately 25% of the carbon in living biomass will be burned by nearby communities. Since wood burning is not planned by the GNWT, but may be done by the community users, the estimated GHG emissions from wood burning are provided below for information purposes only.

As described in the DAR Chapter 5 Section 5.4.4, merchantable timber (i.e. >14 cm diameter at breast height) will be limbed and decked and made available for use in reclamation of other areas. As such, it is expected that the carbon in these trees are not oxidized to CO₂.

During combustion, the carbon in the biomass may become CO₂ or CH₄; in addition, N₂O can be generated during the combustion. For GHG emissions estimation, ECCC assumes that 90% of carbon becomes CO₂ and 1% becomes CH₄ (ECCC 2021). As such, the calculation of CO₂ emissions is:

$$\text{Mass of } CO_2 = (\Delta C_B \times 0.9) \times 3.664$$

Where 3.664 represents the ratio between the molecular weights of CO₂ and carbon.

The mass of CH₄ is calculated as:

$$\text{Mass of } CH_4 = (\Delta C_B \times 0.01) \times 1.336$$

Where 1.336 represents the ration between the molecular weights of CH₄ and carbon.

The N₂O emissions from biomass burning is calculated as:

$$\text{Mass of } N_2O = 0.00017 \times CO_2$$

Where N_2O is the mass of N₂O and CO_2 is the mass of CO₂.

Biomass Growth

Following construction, some areas will be reclaimed. The methodology to estimate the amount of carbon in biomass growth is described in this section.

The calculation of ΔC_G uses this equation:

$$\Delta C_G = Area_{reclaimed} * \Delta C_{total} * CF$$

Where,

$Area_{reclaimed}$ is the area of land remaining in the same land-use category (ha)

ΔC_{total} is the mean annual biomass growth (t dry matter/ha/y), and

CF is the carbon fraction of dry matter (t C/t dry matter)

The area of land remaining $Area_{reclaimed}$ is estimated based area information from the Project DAR Chapter 5 Table 5.3 and Chapter 18 Table 18.11. The CF varies depending on the type of biomass; values were obtained from IPCC (IPCC 2006a, IPCC 2006b).

The calculation of G_{total} uses this equation:

$$G_{total} = G_W * (1 + R)$$

Where,

G_W is the average annual above-ground biomass growth for a specific woody vegetation type (t dry matter/ha/y), and

R is the ratio of below-ground biomass to above-ground biomass for a specific vegetation type (unitless)

Both G_W and R are obtained from IPCC (IPCC 2006a, 2006b). The biomass growth parameters are provided in Table 22.5.

Table 22.5 Biomass Growth Parameters

| Land Type | $Area_{reclaimed}$ (ha) | CF | G_W (t dry matter/ha/y) | R |
|----------------------|----------------------------|------|------------------------------|------|
| Coniferous | 35.5 | 0.51 | 1.1 | 0.24 |
| Broadleaf | 50.1 | 0.48 | 1.1 | 0.24 |
| Grassland/Shrubland | 352 | 0.40 | 0 | 4 |
| Wetlands - Treed | 54.8 | 0.45 | 1.1 | 0.24 |
| Wetlands – Not Treed | 94.7 | 0.45 | 0 | 0 |

Sources:

Area metrics are based on data from Chapter 5, Table 5.3 and Chapter 18, Table 18.11 IPCC (2006a, 2006b, 2006d)

Carbon and GHG Emission Results

The changes in carbon stock from land-use change activities are presented in Table 22.6.

Table 22.6 Total Land-Use Change Carbon Emissions

| Land-use | Carbon Stock | Total Change in Carbon Stock (t C) |
|--------------------------|---------------------|---------------------------------------|
| Forest Land – Coniferous | Living Biomass | -944 |
| | Dead Organic Matter | -4,450 |
| | Soil Organic Carbon | -897 |
| Forest Land – Broadleaf | Living Biomass | -48 |
| | Dead Organic Matter | -3,571 |
| | Soil Organic Carbon | -1,268 |
| Grassland | Living Biomass | -2,822 |
| | Dead Organic Matter | 0 |
| | Soil Organic Carbon | -8,902 |
| Wetlands – Treed | Living Biomass | -1,286 |

| Land-use | Carbon Stock | Total Change in Carbon Stock (t C) |
|---|---------------------|------------------------------------|
| | Dead Organic Matter | -5,385 |
| | Soil Organic Carbon | -4,594 |
| Wetlands – not treed | Living Biomass | -727 |
| | Dead Organic Matter | 0 |
| | Soil Organic Carbon | -26,068 |
| Subtotal (over the 10-year construction period) | | -60,962 |

The final GHG emissions from land-use change are presented in Table 22.7 for the 10-year construction period and for a 1-year average.

As described in the ECCC Output-Based Pricing System Regulations (ECCC, 2024), sections 22(1), 17(5) and 20(6), CO₂ from biomass is not quantified and is not included in the quantity of CO₂ when quantifying the facility's total quantity of GHGs; and CH₄ and N₂O generated from stationary devices that combust biomass for the purpose of producing useful heat must be quantified but are not to be included in the quantity of GHGs. As described in the DAR Chapter 5 Section 5.4.4, since wood burning is not planned by the GNWT, but may be done by the community users, the estimated GHG emissions for wood burning are provided for information purposes only.

Table 22.7 GHG Emissions from Land-Use Change

| Carbon Stock | Affected Carbon (t C) | CO ₂ Emissions (t CO ₂) | CH ₄ Emissions (t CH ₄) | N ₂ O Emissions (t N ₂ O) | CO ₂ e Emissions (t CO ₂ e) |
|--|-----------------------|--|--|---|---|
| Living Biomass – Wood Burning | 248 | 818 | 33 | 0 | 1,688 |
| Living Biomass – Decay | 4,835 | 17,729 | - | - | 17,729 |
| Dead Organic Matter – Decay | 13,406 | 49,157 | - | - | 49,157 |
| Soil Organic Carbon (Including CH ₄ and N ₂ O Emissions from Drained Inland Organic Soils) | 41,728 | 153,004 | 0.47 | 2.16 | 153,659 |
| Total (over the 10-year construction period) | 59,970 | 219,889 | 0.47 | 2.16 | 220,544 |
| Total (averaged for 1 year) | 5,997 | 21,989 | 0.05 | 0.22 | 22,054 |

For the purpose of comparing the GHG emissions from land-use change to the threshold of 10,000 t CO₂e used in Chapter 12 to assess the significance of the Project's GHG emissions, the total annual average GHG emissions for the construction phase from the land-use change combined with the other construction activities (e.g., mobile combustion) are presented in Table 22.8.

Table 22.8 Total Annual GHG Emission Calculation Results for the Construction Phase

| Activities during the construction Phase | GHG Emissions without land-use change (t CO ₂ e/year) ¹ | GHG Emissions with land-use change (t CO ₂ e/year) | Contribution to the NWT Total Emissions ² |
|--|---|---|--|
|--|---|---|--|

| | | | |
|--|-------|--------|------|
| Mobilization and Demobilization Activities | 1,845 | 24,068 | 1.7% |
| Road Construction Activities | 6,436 | 28,659 | 2.0% |

Notes:

¹ From the DAR Chapter 12 Table 12.9.

² Based on 2020 data (ECCC, 2020), the NWT total emissions for 2020 were 1,400,000 t CO₂e.

The emissions presented in Table 22.8 are above the threshold of 10,000 t CO₂e for annual emissions reporting. As indicated in Section 12.1.6.2, territorial and federal policies and regulations relevant to GHG do not identify specific thresholds or standards that can be used to determine significance of effects. No additional mitigation is proposed other than those listed in Sections 12.4.2.2 and 12.4.3.2.

Biomass Growth Results

The GHG emission results from biomass growth are presented in Table 22.9. These emissions do not affect the GHG emissions calculation from land-use and are presented for informational purposes only.

Table 22.9 Biomass Growth GHG Emission Results

| Land Type | ΔC_G (t C/y) | GHG Emissions (t CO ₂ e) |
|----------------------|-------------------------|--|
| Coniferous | 24.7 | 90 |
| Broadleaf | 32.8 | 120 |
| Grassland/Shrubland | 0.0 | 0 |
| Wetlands - Treed | 33.6 | 123 |
| Wetlands – Not Treed | 0.0 | 0 |

References:

ECCC (Environment and Climate Change Canada). 2020. National Inventory Report 1990-2020: Greenhouse Gas Sources and Sinks in Canada. Available at: https://publications.gc.ca/collections/collection_2022/eccc/En81-4-2020-3-eng.pdf. Accessed February 2023.

- ECCC. 2021. Strategic Assessment of Climate Change (SACC) Technical Guide. Guidance on quantification of net GHG emissions, impact on carbon sinks, mitigation measures, net-zero plan and upstream GHG assessment. Revision August 2021. Available at: https://ehq-production-canada.s3.ca-central-1.amazonaws.com/8dc74ea5473aab4741945b51354ec34c91c90d15/original/1628696659/c94bd77e711ab39e596c5cf785673443_Strategic_Assessment_of_Climate_Change_Technical_Guide_EN_-_Final_PDF.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA4KKNQAKIOR7VAOP4%2F20240219%2Fca-central-1%2Fs3%2Faws4_request&X-Amz-Date=20240219T185332Z&X-Amz-Expires=300&X-Amz-SignedHeaders=host&X-Amz-Signature=ff2bfdc1d80720058eaf9562db60306b5e834916abd30d4b41e186762db3a86b
- ECCC. 2024. Output-Based Pricing System Regulations. SOR/2019-266. Last amended on January 1, 2024. Accessed on February 19, 2024. Available at: <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2019-266/FullText.html>
- IPCC (Intergovernmental Panel on Climate Change). 2006a. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4: Agriculture, Forestry and Other Land-use. Chapter 4: Forest Land. Last updated July 2023.
- IPCC. 2006b. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4: Agriculture, Forestry and Other Land-use. Chapter 6: Grassland. Last updated July 2023.
- IPCC. 2006c. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4: Agriculture, Forestry and Other Land-use. Chapter 2: Generic Methodologies Applicable to Multiple Land-use Categories. Last updated July 2023.
- IPCC. 2006d. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4: Agriculture, Forestry and Other Land-use. Chapter 7: Wetlands. Last updated August 2011.
- IPCC. 2013. 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands, chapter 2: Drained Inland Organic Soils. Updated June 2, 2014.
- IPCC. 2019. Generic Methodologies Applicable to Multiple Land-use Categories. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4, chapter 2.
- NRCan (Natural Resources Canada). 1997. Canada's Forest Biomass Resources: Deriving Estimates from Canada's Forest Inventory. Available at: <https://cfs.nrcan.gc.ca/pubwarehouse/pdfs/4775.pdf>
- Repola, J. 2006. Models for vertical wood density of Scots pine, Norway spruce and birch stems, and their application to determine average wood density. *Silva Fennica* 40(4): 673–685. Accessed February 2024. Available at: https://www.researchgate.net/figure/The-diameter-distribution-of-the-sample-trees-by-tree-species_fig2_267917603

Appendix CANNOR26

Topic: ECCC 8: Assessment of Potential Effects on Air Quality, GHG and CAC emissions estimates – Volume 3:
Section 12, Table 12.8 and Table 12.9

Comment: ECCC appreciates that the Proponent has provided CAC emission estimates (Section 12, Table 12.8) and GHG emission estimates (Section 12, Table 12.9) for each project phase or activity, as well as overall annual Project GHG emission estimates (Appendix 24A, Table 4). However, the calculations performed to obtain these emissions estimates are unclear. The calculations used and how they were used will have an effect on the accuracy of the GHG and CAC predictions for each project component and the project as a whole.

Recommendation: ECCC recommends the Proponent provide more information on the calculations performed to obtain the CAC and GHG emissions estimates. ECCC also recommends the Proponent provide emissions estimates for machines and engines to be used in the project.

Response: This response provides the methodology, assumptions, emission factors and other factors used to calculate the criteria air contaminant (CAC) emissions, greenhouse gas (GHG) emissions from machinery, and GHG emissions from the removal of carbon sink. It covers the comments from CANNOR-20, CANNOR-23, CANNOR-26, and CANNOR-28. It does not cover the GHG emissions from land-use change, which is addressed in CANNOR-22.

CAC Emissions Methodology:

The methodology for calculating CAC emissions follows the National Pollutant Release Inventory (NPRI) guidelines (ECCC, 2023).

CAC emissions calculations for construction equipment and vehicles:

- Determine the Project equipment inventory. The information comes from Section 5.4.10 and is presented in Section 12.4.2.1.
- For each equipment type in the inventory, calculate the annual fuel consumption or operating hours. These are obtained from the equipment's daily operating hours and fuel consumption rate based on hours or travelling distance. The operating hours and fuel consumption rates are obtained from experience on previous similar road construction projects.
- Determine the emission factors (EF) and load factor (LF) for each CAC type, as shown in Table 26.1 below. These are based on the equipment category and equipment rated power (estimated from research on the general equipment types).
- Calculate the CAC emissions for each CAC type for each equipment by multiplying the EF with the load factor, and power, operating hour, or fuel consumption volume, as relevant given the EF units.

CAC emissions calculations for blasting activities at the quarry/borrow sources:

- Determine the total estimated number of blasts per year. This is based on the number of active quarry/borrow sources, the number of annual operation days, and the expectation that there would be a maximum of 1 blast per day per quarry/borrow source (based on previous consulting experience).
- Estimate the total amount of explosives required at the quarry/borrow sources:

- Estimate the volume of rock required for the Project construction and maintenance phases, based on the road length, and a ratio of 500,000 m³ of rock estimated to be needed for every 13 km (based on previous consulting experience).
- Calculate the amount of explosives by multiplying the rock volume with the Powder Factor for Blasting shown in Table 26.2 below.
- Calculate the CAC emissions for each CAC type for each equipment by multiplying the EF shown in Table 26.1 with the number of blasts or the amount of explosives.

GHG Emissions Methodology:

The methodology followed to calculate the GHG emissions were the accounting and reporting principles of the GHG Protocol developed by the World Resource Institute (WRI) and the World Business Council for Sustainable Development (WRI, 2015). This protocol is an internationally accepted accounting and reporting standard for quantifying and reporting GHG emissions.

GHG emissions calculations for construction equipment and vehicles:

- Determine the Project equipment inventory. The information comes from Section 5.4.10 and is presented in Sections 12.4.2.1 and 12.4.3.1.
- For each equipment type in the inventory, estimate the annual fuel consumption. This is based on equipment type, fuel consumption rate, and estimated operation hours or travelling distance.
- Determine the emissions factor (EF).
 - For road transportation equipment and vehicles, the EFs are shown in Table 26.3 below, based on the equipment classification.
 - For other equipment such as barges, generators, incinerators, and heaters, the EFs are shown in Table 26.4 below.
- Calculate the GHG emissions for each GHG type for each equipment by multiplying the annual fuel consumption with the EF.
- Calculate the overall GHG emissions in tonnes of carbon dioxide equivalent (t CO₂e) by multiplying the GHG emissions for each GHG type with their associated global warming potentials (GWP) shown in Table 26.5 below.

GHG emissions calculations for blasting activities:

- Estimate the total amount of explosives required at the quarry/borrow sources:
 - Estimate the volume of rock required for project construction and maintenance phases, based on the road length, and a ratio of 500,000 m³ of rock estimated to be needed for every 13 km (based on previous consulting experience).
 - Multiply the rock volume with the Powder Factor for Blasting shown in Table 26.2 below.
- Calculate the GHG emissions by multiplying the explosive amount with the Blasting EF shown in Table 26.2 below.

Carbon Sinks Methodology:

The GHG emissions calculations for the removal of carbon sinks is as follows:

- Estimate the area of ground disturbance for the highway, quarry/borrow sources, and temporary access roads, based on the Project footprint described in Section 5.4.4.
- Calculate the GHG emissions reduction by multiplying the area of ground disturbance with the EF shown in Table 26.6 below.

Table 26.1 CAC Emission Factors and Load Factors

| Equipment Category | HP Range | Load Factor | EF CO | EF NO _x | EF SO ₂ | EF PM ₁₀ | EF PM _{2.5} | EF Units |
|---|-------------------|-------------|--------|--------------------|--------------------|---------------------|----------------------|--------------------|
| Graders | 175 < hp ≤ 300 | 59% | 0.511 | 1.521 | 0.003 | 0.096 | 0.093 | g/hp-hr per day |
| Rubber Tire Loaders | 100 < hp ≤ 175 | 59% | 0.845 | 2.040 | 0.003 | 0.196 | 0.191 | g/hp-hr per day |
| Diesel vehicle exhaust emissions (HGV) | 300 < hp ≤ 600 | 59% | 6.800 | 23.000 | 0.017 | 1.800 | 1.700 | kg/m ³ |
| Diesel vehicle exhaust emissions (LGV) | 300 < hp ≤ 600 | 59% | 19.000 | 8.900 | 0.017 | 2.400 | 2.300 | kg/m ³ |
| Excavators | 300 < hp ≤ 600 | 59% | 0.770 | 1.899 | 0.003 | 0.117 | 0.113 | g/hp-hr per day |
| Crawler Tractor/Dozers | 300 < hp ≤ 600 | 59% | 0.890 | 2.221 | 0.003 | 0.128 | 0.124 | g/hp-hr per day |
| Bore/Drill Rigs | 175 < hp ≤ 300 | 43% | 1.027 | 3.967 | 0.003 | 0.205 | 0.199 | g/hp-hr per day |
| Rubber Tire Loaders | 300 < hp ≤ 600 | 59% | 1.081 | 2.676 | 0.003 | 0.148 | 0.144 | g/hp-hr per day |
| Rollers | 100 < hp ≤ 175 | 59% | 0.845 | 2.041 | 0.003 | 0.196 | 0.191 | g/hp-hr per day |
| Marine Diesel | N/A | 59% | 13,998 | 52,701 | 4,776. | 1,647 | 1,647 | g/m ³ |
| Off-highway Trucks | 300 < hp ≤ 600 | 59% | 0.499 | 1.330 | 0.003 | 0.078 | 0.075 | g/hp-hr per day |
| Diesel commercial vehicle exhaust emissions (bus) | N/A | 59% | 9.100 | 30.000 | 0.017 | 2.100 | 2.100 | kg/m ³ |
| Generator Sets | 75 < hp ≤ 100 | 43% | 2.329 | 4.238 | 0.004 | 0.410 | 0.398 | g/hp-hr per day |
| Propane Heaters/Boilers | 75 < hp ≤ 100 | 43% | 0.024 | 0.178 | 0.000 | 0.005 | 0.005 | g/hp-hr |
| Crushing/Proc. Equipment | 100 < hp ≤ 175 | 43% | 0.590 | 2.229 | 0.003 | 0.143 | 0.138 | g/hp-hr per day |
| Explosive Detonation | N/A | N/A | 34 | 8 | 1 | N/A | N/A | kg/Mg |
| Blasting | N/A | N/A | N/A | N/A | N/A | 7.253 | 0.418 | kg/blast |

Sources:

For EFs in kg/m³:

Australian Government – Department of Climate Change, Energy, the Environment and Water – National Pollutant Inventory. Available at: <https://www.dcceew.gov.au/environment/protection/npi> (NPI, 2022).

For all other EFs:

Air Emissions Factors and Quantification - AP-42: Compilation of Air Emissions Factors. Available at: <https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-Compilation-air-emissions-factors> (US EPA, 2022).

Table 26.2 Blasting Factors

| Classification | Units | Amount |
|----------------------------|---|--------|
| Powder Factor for Blasting | kg of explosive / m ³ rock | 0.3500 |
| Blasting Emission Factor | t CO ₂ e/ tonne of explosive | 0.1890 |

Sources:

Powder factor from https://www.leg.mn.gov/docs/2015/other/150681/PFEISref_1/Dyno%20Nobel%202010.pdf (Dyno Nobel, 2010).

Blasting EF from https://iaac-aeic.gc.ca/050/documents_staticpost/49262/89281/13_Chapter_6_Greenhouse_Gas_Emissions_Climate_Change.pdf (Rescan, 2013)

Table 26.3 Emission Factors for On and Off-Road Equipment and Vehicles

| Classification | CO ₂ (g/L) | CH ₄ (g/L) | N ₂ O (g/L) |
|---------------------------------|--------------------------|--------------------------|---------------------------|
| Off Road Diesel >= 19kW, Tier 4 | 2680.5 | 0.073 | 0.227 |
| Off Road Diesel < 19kW | 2680.5 | 0.073 | 0.022 |
| On Road Diesel, HDV | 2680.5 | 0.14 | 0.082 |
| On Road Diesel, LDT | 2680.5 | 0.051 | 0.22 |

Source: National Inventory Report 1990–2021: Greenhouse Gas Sources and Sinks in Canada, Part 2, Table A6.1-14 (ECCC, 2021)

Table 26.4 Emission Factors for Other Equipment

| Equipment and fuel type | CO ₂ (g/L) | CH ₄ (g/L) | N ₂ O (g/L) |
|--------------------------------|--------------------------|--------------------------|---------------------------|
| Marine - Diesel | 2680.5 | 0.25193 | 0.07198 |
| Propane - All Other Uses | 1515 | 0.024 | 0.108 |
| Diesel – Refineries and Others | 2681 | 0.078 | 0.022 |

Source: National Inventory Report 1990–2021: Greenhouse Gas Sources and Sinks In Canada, Part 2, Tables A6.1-4 and A6.1-5 and A6.1-14 (ECCC, 2021).

Table 26.5 Global Warming Potentials

| CO ₂ | CH ₄ | N ₂ O |
|-----------------|-----------------|------------------|
| 1 | 25 | 298 |

Source: Intergovernmental Panel on Climate Change Fourth Assessment Report (AR4) (IPCC, 2007).

Table 26.6 Carbon Sink Emissions Factor

| Classification | Units | Amount |
|------------------------------------|-------------------------|---------------|
| Boreal Forest Annual Sequestration | t CO ₂ e/ ha | 0.3802 |

Source: Boreal Forest Annual Sequestration EF from <http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/35301.pdf> (Kurtz et al 2013).

Assumptions: The assumptions are provided in Sections 12.4.2.1, 12.4.3.1, and 12.7.1.

CAC and GHG Emissions

The CAC and GHG emissions estimates are presented in Table 26.7. The sum total of the CAC and GHG emissions are presented in the Tables 12.8 and 12.9 of Section 12.4.2 and Section 12.4.3.

CANNOR34

The main geographical factor that impacts noise levels at receptors is the receptor distance from the noise sources. Due to sound propagation effects and ground absorption effects, sound level attenuates over distance. All other geographical factors in the model, such as meteorological parameters and ground absorption, are similar for all the receptors.

The receptors assessed in the DAR, R1, R2, and R3 in the community of Wrigley, are the closest receptors to the noise sources, as shown in the table below. As such, these receptors are expected to be the most affected by the project's noise effects. The next closest communities along the Project are Tulita and Norman Wells. Receptors at these communities are located at further distance from the Project in comparison to R1 and R2; and therefore, the noise effects at these receptors are expected to be less. Since the selected receptors (i.e., R1 and R2) in the assessment meet the applicable threshold; the receptors along the Project at further distance are also expected to meet the threshold. Therefore, the selected receptors would be representative and protective of all local receptors. The mitigation measures listed in the Residual Effects report serve to protect all the receptors/communities along the linear infrastructure pathway, as applicable.

| Receptor Community | Receptor Description | Distance to Nearest Project Road Section (km) | Distance to Nearest Project Borrow Source (km) |
|---------------------------|---|--|---|
| Wrigley | R1, northernmost residence in Wrigley | 0.36 | 7.8 |
| Wrigley | R2, north of Wrigley, most impacted by construction mobilization activities | 0.63 | 7.5 |
| Tulita | Easternmost residence in Tulita | 3.8 | 13.8 |
| Tulita | Westernmost residence in Tulita | 2.5 | 11.9 |
| Norman Wells | Easternmost residence in Norman Wells | 21.1 | 7.1 |

Appendix MVEIRB17

Topic: Chapter 10 Caribou and Moose - Section 10.1.6 - p10-16 Caribou and Moose Estimates of caribou and moose in Local Assessment Area

Comment: On p. 10-16, the DAR states: “As above, using the simplistic area calculation that is based on the proportion of the Caribou and Moose LAA to the total regional areas, 37 caribou in the Sahtu and 50 caribou in the Dehcho regions are accounted for in the Caribou and Moose LAA.” However, it is unclear what input values were used. An updated estimate of caribou and moose in the confirmed area of the LAA would be useful.

Recommendation: Based on the confirmed area (from the answer in the question above), please provide a table that shows input assumptions used to derive estimates of caribou and moose within the LAA and reflects current knowledge of expected regional ungulate densities (as per ENR 2012, ENR 2018, and Gau et al. 2020).

Response: A table of the calculations used to derive the estimated number of caribou and moose within the Caribou and Moose Local Assessment Area (LAA) is provided in Table MVEIRB-17.1.

The calculations are based on caribou density estimates from the Species Status Report of Boreal Caribou in the Northwest Territories (SARC 2022) and the area of the Caribou and Moose LAA presented in MVEIRB-16. Table MVEIRB-17.2 shows the revised estimates of the number of caribou and moose within the Caribou and Moose LAA. To our knowledge, the SARC (2022) report provides the best available information.

Moose densities and caribou populations for the Sahtu and Dehcho regions were summarized in the Caribou and Moose TDR (Appendix 10A; EDI, 2023, [with an updated moose survey by (Pathmanathan and Chan 2024)]). Moose densities are 1–7 moose/100 km² at low density (summarized in EDI, 2023) and 17 moose/100 km² [changed from 4–7 moose/100 km²] at high density (Pathmanathan and Chan 2024). Moose densities are believed to be high in the Dehcho region (Dehcho First Nations, 2011). Using the mid-point for low (4 moose/100 km² at low density) and 17 moose [changed from 5.5 moose/100 km²] at high density), and the areas of each region in the Caribou and Moose LAA (Sahtu: 6,519 km²; Dehcho: 3,590 km²) the estimated number of moose present, based on area alone, ranges from 261–1,108 [changed from 248] moose in the Sahtu and 144–610 [changed from 183] moose in the Dehcho portions of the Caribou and Moose LAA.

There are an estimated 1,677 caribou in the Sahtu Region and 2,318 caribou in the Dehcho Region (SARC 2022). As above, using the simplistic area calculation that is based on the proportion of the Caribou and Moose LAA to the total regional areas and the amount of caribou range in the regions, the estimated number of caribou is 98 [changed from 37] caribou in the Sahtu Region and 72 [changed from 50] in the Dehcho Region in the Caribou and Moose LAA.

References:

Pathmanathan, H. and Chan, K. 2024. Mackenzie Valley Highway Project Aerial Moose Survey Report. Department of Environment and Climate Change, Wildlife Division Government of the Northwest Territories. 17 pp.

SARC. 2022. Species Status Report: Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories. Species at Risk Committee, Yellowknife, Northwest Territories, Canada. 176 pp.

Table MVEIRB 17.Error! No text of specified style in document.1. **Detailed area values for the calculation of the estimated number of moose and caribou in the MVH Caribou and Moose LAA**

| Region | Region (km ²) | | LAA (km ²) | Moose/100 km ² ¹ | | Estimated no. moose in LAA | | No. caribou in region ² | Caribou | Estimated no. |
|--------|---------------------------|---------------|------------------------|--|--------------|----------------------------|--------------|------------------------------------|----------------------|-------------------|
| | Total Area | Caribou Range | | Low density | High density | Low density | High density | | /100 km ² | caribou in LAA |
| | | | | | | | | | SARC 2022 Fig. 20 | SARC 2022 Fig. 20 |
| Sahtu | 282,773 | 145,212 | 6,519 | 4 | 17 | 261 | 1,108 | 1,677 | 1.5 | 98 |
| Dehcho | 159,094 | 115,888 | 3,590 | 4 | 17 | 144 | 610 | 2,318 | 2.00 | 72 |

¹ Moose density derived from literature review presented in Appendix 10A; EDI, 2023 (for low density) and updated high density estimate from (Pathmanathan and Chan 2024).

² Values derived from Figure 20 of SARC. 2022. Species Status Report: Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories. Species at Risk Committee, Yellowknife, Northwest Territories, Canada. 176 pp.

Appendix MVEIRB 22

Topic: Chapter 11 Culture, Traditional Land Use, Harvesting - 11.9

Comment: Not all the hyperlinks to documents in the Reference section are still valid.

Recommendation: For all non-functioning hyperlinks, please provide either a working hyperlink or the document on the public record.

Response:

The hyperlinks have been updated for all references in Section 11.9 (References). Updated hyperlinks are provided below, and are active as of February 2024:

5658 NWT Ltd. and GNWT (5658 NWT Ltd. and the Government of the Northwest Territories). 2011. Project Description Report for Construction of the Mackenzie Valley Highway Tulita District, Sahtú Settlement Area. Available at:
https://reviewboard.ca/upload/project_document/EA1213-02_Project_Description_Report_for_the_Tulita_district_of_the_Sahtu_Settlement_Area.PDF
Accessed June 2022. PR#16.

Auld, J. and R. Kershaw. 2005. The Sahtú Atlas. Available at: <https://www.srrb.nt.ca/document-repository/public/sahtu-atlas/115-sahtu-atlas-complete-document/file> Accessed November 2022.

Délıne ʔekwé Working Group. 2016. Belare Wıle Gots'é ʔekwé - Caribou for All Time: A Délıne Got'ıne Plan of Action. Available at:
https://dehcholands.org/sites/default/files/documents/final_draft_dehcho_land_use_plan_june_2-06.pdf /file. Accessed May 2022.

DLUPC (Dehcho Land Use Planning Committee). 2006. Dehcho Land Use Plan Final Draft. Available at: . https://dehcholands.org/sites/default/files/final_draft_background_report_-_june_2-06_-_with_maps.pdf Accessed November 2022.

Government of Canada. 2018. Action Plan for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada: Federal actions 2018: Available at:
https://publications.gc.ca/collections/collection_2018/eccc/CW69-21-51-2018-eng.pdf .
Accessed November 2022.

GNWT. 2018. Official Languages of the Northwest Territories – PWNHC. Available at:
<https://www.pwnhc.ca/official-languages-of-the-northwest-territories/>. Accessed May 2022.
Accessed June 2022.

GNWT. 2018a. 2030 NWT Climate Change Strategic Framework. Available at:
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