

MARY RIVER PROJECT

Terrestrial Environment

2024 Annual Monitoring Report



Prepared For

BAFFINLAND IRON MINES CORPORATION
2275 Upper Middle Road East, Suite 300
Oakville ON L6H 0G3

Prepared By

EDI ENVIRONMENTAL DYNAMICS INC.
2195 2nd Ave
Whitehorse YT Y1A 3T8

EDI Contact

Michael Setterington | RPBio, CWB
Senior Biologist

EDI Project

25C0127
REV.1
April 2025



Cover photo: Three caribou bulls seen grazing adjacent to the Tote Road at KM 82. Photographed by site environment staff while observing caribou behaviour and response to the Tote Road on June 27, 2024.



உதவி

[illegible][illegible][illegible]

- [illegible]

[illegible][illegible][illegible][illegible][illegible][illegible]

[illegible][illegible][illegible][illegible][illegible][illegible]

[illegible][illegible][illegible][illegible][illegible]

[illegible]

ክፍል አንድ የፍልጋትና የፍጥነት	የፍልጋትና የፍጥነት	የፍልጋትና የፍጥነት	የፍልጋትና የፍጥነት
	<p>የፍልጋትና የፍጥነት</p>	<p>የፍልጋትና የፍጥነት</p>	<p>የፍልጋትና የፍጥነት</p>
<p>የፍልጋትና የፍጥነት</p>	<p>72</p>	<p>የፍልጋትና የፍጥነት</p>	<p>የፍልጋትና የፍጥነት</p>

[illegible]

² ሙያዊ ሥራ ለጥራት የሚጠበቅ የሥራ ምርት ማረጋገጫ (FEIS): የዋናው 6 - ወር የሥራ ምርት ማረጋገጫ (የፌዴራል ሥራ ምርት ማረጋገጫ 2012) ለሙያዊ ሥራ ለጥራት የሚጠበቅ የሥራ ምርት ማረጋገጫ (FEIS): የዋናው 6 - ወር የሥራ ምርት ማረጋገጫ (የፌዴራል ሥራ ምርት ማረጋገጫ 2013)፡

[illegible][illegible]

[illegible][illegible]

[illegible][illegible]



በጠቅላይ ለገጽ 0. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት ለገጽ 0. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት 2024-ፋ

የፋይናንስ ስራዎች	ለፋይናንስ ስራዎች	ለገጽ 0. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት ለገጽ 0. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት	የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት
		2014-ፋ. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት ለገጽ 0. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት ለገጽ 0. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት	የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት
የፋይናንስ ስራዎች (HOL) ጋራ ስራዎች	የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት	2016-ፋ. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት ለገጽ 0. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት ለገጽ 0. የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት	የፋይናንስ ስራዎች ማጠቃለያ ሪፖርት



በበጥናት ሥራው ላይ ለሚሳተፉት ሰራተኞች የሚሰጠው የሥራ ልምድ ለሚከተለው ምሳሌ ነው፡

[illegible]

[illegible][illegible]



SUMMARY

The Mary River Project (the Project) is an iron ore mine in the Qikiqtaaluk Region on North Baffin Island, Nunavut. The Project involves the construction, operation, closure, and reclamation of a 22.2 million tonne per annum (mtpa) open pit mine that will operate for 21 years. In 2024, Baffinland Iron Mines Corporation (Baffinland) hauled roughly 5.9 million tonnes (mt) of iron ore from the Mine Site to the Milne Port stockpile. In 2024, construction-related activities were limited to ongoing development, construction and maintenance of infrastructure and laydowns at the Mine Site and Milne Port to support operations. The total Project footprint was 735 ha at the end of 2024.

The Nunavut Impact Review Board Project Certificate No. 005 includes numerous conditions that require Baffinland to conduct effects monitoring for the terrestrial environment. Work performed for the Terrestrial Environment Monitoring Program is guided by the Terrestrial Environment Mitigation and Monitoring Plan (Baffinland Iron Mines Corporation 2016a). The Terrestrial Environment Monitoring Program is overseen by the Terrestrial Environment Working Group (TEWG), which includes members from Baffinland, the Qikiqtani Inuit Association (QIA), the Government of Nunavut, Environment and Climate Change Canada, the Mittimatalik Hunters and Trappers Organization, the Ikahutit Hunters and Trappers Association, the Nangmautuk Hunters and Trappers Association, the Igloolik Hunters and Trappers Organization, and the Hall Beach Hunters and Trappers Organization. The Terrestrial Environment Monitoring Program began in 2012 and continued through 2024 with adaptations to the program based on results and input from the TEWG.

This report summarizes the data collection and monitoring programs conducted in 2024 for the Project, including the following components (summaries provided in Table 0):

- weather monitoring;
- helicopter flight height analysis;
- Tote Road traffic monitoring;
- dustfall monitoring (passive monitoring & extent imagery analysis);
- exotic invasive vegetation monitoring;
- snow track surveys;
- snowbank height monitoring;
- Height of Land (HOL) caribou surveys;
- remote camera monitoring;
- caribou observations;
- hunter and visitor log summaries;
- Active Migratory Bird Nest Surveys (AMBNS); and,
- wildlife interactions and mortalities.



Inuit Participation — Four Inuit residents assisted with HOL caribou surveys and soil and vegetation monitoring resulting in 663 hours Inuit Participation during the 2024 field season.

Climate — Weather conditions in 2024 were summarized and compared to average conditions. Minimum and maximum temperatures for the Mine Site and Milne Inlet in 2024 were within the recorded historical range. The Mine Site tended to be warmer and wetter than Milne Inlet. In 2024, the Mine Site had a mean annual temperature of -10.4°C and 338.4 mm of precipitation, compared to -10.6°C and 200.4 mm, respectively, at Milne Inlet. Extreme temperatures had a broader range at the Mine Site, possibly due to the moderating effects of ocean proximity on the Milne Port meteorological (MET) station. Wind directions and velocities in 2024 at the Mine Site MET station were consistent with the 2013 to 2023 period. Winds most frequently blew from the northwest or southeast. Winds from the east were uncommon but tended to be the strongest, while winds from the north, west, and southwest were uncommon and weak. During winter, winds blew along a southwest-northeast axis (the orientation of the inlet), predominantly from the southwest. This pattern was clearest from December to March. During summer, winds were primarily from the north-northwest and southwest, with northeast winds becoming less prominent. This pattern was clearest from June to September. These patterns were first described in 2023 and were observed to be the same in 2024.

Helicopter Overflights — The helicopter flight height analysis monitors potential disturbance to birds and other wildlife within the Regional Study Area (RSA) and a designated Snow Geese area. Additional analysis (i.e., accounting for pilot rationale) was incorporated into overflight analysis for the eighth consecutive year in 2024. Notably, categorizing flights as ‘compliant with rationale’ represented 54% of the total flight hours evaluated in the analysis. The most common rationales for flying below the cruising altitude requirements in 2024 were geophysical survey (16% of total flight hours), weather-related circumstances (15% of total flight hours), and short-distance flights (14% of total flight hours). Overall combined compliance was greater than 90% from 2018 to 2023, with non-compliant flights fluctuating between 4% and 8%. The number of transits (204) and flight hours (~25 hrs) within the Snow Geese area during the moulting season was lower in 2024 compared to 2023, but similar to previous years (2019 and 2021). Non-compliant flights within the Snow Geese area during the moulting season increased to 30% in 2024, the highest since 2022, due to geological exploration-related activities and traverses.

Tote Road Traffic — The mean number of combined vehicle transits for 2024 was 281.2 transits per day (ore haul accounted for 246.3 transits per day). These daily means slightly exceeded the predicted value in the Final Environmental Impact Statement Addendum for the Production Increase Proposal (i.e., 236 ore haul transits; Stantec Consulting Ltd. 2018).

Dustfall — The 2024 passive dustfall monitoring program used 43 passive dustfall collectors to measure dust deposition related to Project activities. Thirty-six collectors were sampled monthly; the remaining collectors were sampled during the summer only. The magnitude of annual dustfall deposition at the Mine Site sample locations continued to decrease. Dustfall mitigation along the mine haul road and at the airstrip appears effective. The magnitude of dustfall deposition at Milne Port remained constant or, in some cases, slightly decreased, a trend that began in 2018. The highest dustfall deposition at the Milne Port area was associated with the ore stockpiles, with lesser amounts generated by the sealift staging area. Along the Tote Road, dustfall



in 2024 was consistent at the north crossing location compared to recent years. More extensive use of ‘flake’ calcium chloride was trialled and found to be effective in 2024.

Dustfall extent was also characterized by examining satellite imagery. This analysis was completed to verify Inuit land user reports of observing dust beyond what was predicted in baseline dust modelling and a visual representation of dustfall extent in areas where dustfall is below detection in dust collectors. The 2024 dustfall extent within the Study Area was similar to 2023, with an increase in the Tote Road south extent matched by decreases in other areas. Baffinland uses numerous site-wide dust suppression measures to reduce dust emissions, including water and calcium chloride on roads, continued use of shrouds and coverings on ore crushers, and improved methods of transferring ore onto stockpiles. DustBlockr® was applied to the entire Tote Road in the summer of 2024. DusTreat dust suppressant was applied to ore stockpiles regularly in 2024. DusTreat is a non-toxic, water-based, and long-lasting suppressant that acts as a sealant on the stockpiles to prevent dust. Baffinland plans to apply DusTreat more frequently to stockpiles at Milne Port.

Vegetation — The vegetation monitoring program in 2024 focused on monitoring exotic invasive vegetation within the Potential Development Area (PDA). Targeted surveys of exotic invasive vegetation are completed every three to five years. Previous exotic invasive vegetation surveys only documented one exotic invasive vegetation species (garden tomato) growing at the Mine Site below the sewage/effluent discharge pipe in 2019. No exotic invasive vegetation species were recorded during the 2024 surveys. Monitoring for exotic invasive vegetation is expected to occur again between 2027 and 2029.

Wildlife — Snow track surveys assessed wildlife response to the Tote Road, particularly for caribou. Twelve snow track surveys were completed in 2024. Similar to previous years, most tracks observed were from Arctic foxes, red foxes, Arctic hare, and ptarmigan. No caribou tracks were observed in 2024. Lemming (30%) and fox (11%) tracks were the only species noted to deflect from the Tote Road.

Snowbank height monitoring was conducted to assess compliance with the operational 1 m height, which facilitates wildlife crossings and improves visibility for drivers to avoid wildlife collisions. Snowbank height monitoring surveys were conducted in 2024 during the winter months. In response to a TEWG request, measurement locations have been randomized since 2020 instead of using repeated kilometre markers for measurements. Overall, compliance was at 86%, slightly lower than 2022 (91%) but within range of other years of snowbank height monitoring.

The HOL caribou surveys were conducted to assess distribution and behaviour in the PDA during the calving season. The HOL caribou surveys were completed between May 29 and June 10, 2024. The total observation time was 32 hours and 25 minutes, with an average observation time per station of 40 minutes. Fifteen individual caribou were observed during the HOL caribou surveys in 2024 on June 3, 4, 5, and 8. Before the 2024 HOL caribou surveys, the last time a caribou was observed during a HOL survey was in 2013.

Remote cameras documented a combination of birds (e.g., ptarmigan, raptors, and songbirds), Arctic hare, and Arctic fox between January 1 and December 28, 2024. Fifteen detections of caribou were noted on a single camera (i.e., Baffin-11). No wolves or bears were observed in any reviewed images. This supports the current observation of low caribou numbers and movement in the PDA, despite increased observation during



the monitoring period. An aerial caribou survey was conducted in March 2023, before caribou calving. During the survey, 112 individual caribou and 36 caribou groups were observed. All caribou observations were in the southern subregion of the wildlife RSA, and only two groups (nine individuals total) were in an overlapping portion of the northern subregion. No aerial surveys occurred in 2024.

When caribou are observed on or near the Tote Road, the caribou decision framework comes into effect and guides the action of road users. Fifty-one caribou observations during 22 monitoring events were recorded along the Tote Road in May, June, and October 2024. No adverse behaviour towards the Tote Road and passing vehicles was noted during the 22 monitoring events. Behaviours noted included foraging/feeding, bedded animals, and animals travelling at a 'walking pace'.

Birds — Active Migratory Bird Nest Surveys were completed before any vegetation clearing or surface disturbance at the Project during the breeding bird season (May 17 to August 19). Surveys consisted of observers using a rope-drag method (Rausch 2015) to detect nesting birds before construction. Four surveys were completed in 2024; no nests were detected.

After several years of raptor effects monitoring, occupancy and productivity were deemed to be stable, and no evidence was found of Project-related effects on raptors (Franke et al. 2024). Therefore, raptor occupancy and productivity surveys have been paused since 2021. No future surveys are proposed.

Wildlife Interactions — Ten wildlife mortalities were reported in 2024, all of which were individual losses. Mortalities in 2024 involved six species: Arctic fox (4), Arctic hare (1), loon (1), ptarmigan (2), Snow Bunting (1), and an unknown songbird (1). Vehicle collisions were confirmed or suspected in all mortalities except three—two mortalities were unknown, and one mortality was a result of incidental catch while completing other surveys. Whenever possible, mitigations are implemented to reduce the risk of Project-related wildlife injury or mortality.



Table 0. Summary of environmental effects monitoring and research activities at the Mary River Project in 2024.

Survey	Reason for Survey ¹	Work Completed, Effects Observed, Required Mitigation, and Recommendations for Future Work	Comparison to Impact Predictions ²
Weather monitoring	Supports all other data collection and monitoring programs	Weather conditions were recorded hourly at the Mine Site and Milne Port MET stations. Weather data have been recorded since 2005 (Mine Site) and 2006 (Milne Port). Weather data are used to support other monitoring programs; mitigations are not necessary. Meteorological stations will continue to collect weather data in 2025.	N/A
Helicopter flight height analysis	Addresses Project Conditions 59, 71, and 72	<p>Except for operational purposes, and subject to pilot discretion regarding aircraft and human safety, pilots must maintain a cruising altitude of at least 650 m during point-to-point travel in areas likely to have migratory birds, and 1,100 m vertical and 1,500 m horizontal distance from observed concentrations of migratory birds (e.g., Snow Geese area). Flight corridors are used to avoid areas of significant wildlife importance.</p> <p>Helicopter cruising altitude combined compliance within the Snow Geese area during the moulting season (July to August) was 70.03% in 2024. Outside the Snow Geese area, and in all other areas during non-moulting months (September to May), 2024 combined compliance was 72.42%. Flight height data were cross-referenced for the eighth consecutive year with daily pilot logs to justify low-level flights in 2024. Low-level flights with reasonable rationales were considered “compliant with rationale”. Reasonable rationales included weather, slinging, short-distance flights, search and rescue, inspections, maintenance flights, medivac flights, and geophysical surveys.</p> <p>Helicopter flight height analysis will continue until consistent trends are identified.</p>	<p>It was expected that Project-related activities would displace some Snow Geese but they would relocate to nearby, less disturbed areas. As only a small portion of the Snow Geese area is subject to helicopter flyovers and is mainly located outside the zone of influence (ZOI), effects are expected to be limited. Overall, local disturbance relative to the PDA and Local Study Area extents was expected to cause some sensory disturbance, but not result in significant adverse effects on the Snow Goose population. Direct mortality due to aircraft was deemed unlikely and, thus, expected to have no significant adverse effect.</p> <p>Compliance with minimum helicopter flight heights was moderate in 2024 when considering pilots rationale for low-level flying and flight hours within the Snow Geese area during the moulting season. Flights over the Snow Geese area were limited to the southeastern edge, such that any sensory disturbance was minimal relative to the entire Snow Geese area, consistent with Final Environmental Impact Statement predictions. However, it is not sensible to monitor the potential effects of low-level flying on Snow Geese or other migratory birds directly, as doing so would involve accessing the Snow Goose moulting</p>

¹ Project Conditions and Project Commitments as per the Nunavut Impact Review Board Project Certificate No. 005 (Nunavut Impact Review Board 2014).

² Mary River Project Final Environmental Impact Statement: Volume 6 – Terrestrial Environment (Baffinland Iron Mines Corporation 2012a) and Mary River Project Early Revenue Phase Addendum to Final Environmental Impact Statement: Volume 6 – Terrestrial Environment (Baffinland Iron Mines Corporation 2013a).



Table 0. Summary of environmental effects monitoring and research activities at the Mary River Project in 2024.

Survey	Reason for Survey ¹	Work Completed, Effects Observed, Required Mitigation, and Recommendations for Future Work	Comparison to Impact Predictions ²
			<p>areas by helicopter, thus introducing greater disturbance potential.</p> <p>No direct mortality due to aircraft has been documented, which is consistent with effect predictions.</p>
Tote Road traffic monitoring	Correlate to wildlife disturbance and provide supporting data to the dustfall monitoring program	Annual summary of continual traffic monitoring. No directly observed unexpected effects. Traffic volume monitoring will continue regularly.	The mean number of combined vehicle transits for 2024 was 281.2 transits per day (ore haul accounted for 246.3 transits per day). These daily means slightly exceeded the predicted value in the Final Environmental Impact Statement Addendum for the Production Increase Proposal.
Passive dustfall monitoring	Addresses Project Conditions 36, 50, 54d, and 58c and Project Commitment 60	<p>Dustfall collectors at 43 locations are distributed around the Project area, some further away from the PDA as Reference sites monitoring background levels. Six 'short' monitors were added in 2021 as part of a pilot study (requested by the QIA and the TEWG) to investigate variability between dustfall sampling at the standardized height of 2.0 m and closer to ground level at 0.5 m. Twelve years of monitoring from August 2013 to December 2024 are now complete using the 2.0 m height collectors.</p> <p>Passive dustfall monitoring indicated the areas with the greatest dustfall deposition are restricted mainly to within 1,000 m of the PDA. An investigation of dustfall at monitors outside the PDA, but within a 5,000 m radius, indicated dustfall was generally low throughout 2024.</p> <p>No difference was found in the dustfall measured at the standardized height of 2.0 m and closer to ground level at 0.5 m.</p> <p>To increase the number of samples for the snow sampling pilot study, as recommended by the QIA and Government of Nunavut, improvements to sample collection were implemented, including (1) using satellite acquisition dates and footprints to plan sampling dates and locations, (2) extending the sampling period to late May, (3) sampling on</p>	<p>Annual total suspended particulate deposition levels were predicted to exceed 50 g/m²/year within the PDA, with total suspended particulate deposition levels decreasing to background beyond the PDA. The 2024 dustfall results were consistent with predictions that the highest dustfall would occur within the PDA.</p>



Table 0. Summary of environmental effects monitoring and research activities at the Mary River Project in 2024.

Survey	Reason for Survey ¹	Work Completed, Effects Observed, Required Mitigation, and Recommendations for Future Work	Comparison to Impact Predictions ²
		cloud-free days, and (4) sampling a variety of dust concentrations. Future monitoring will continue to investigate dustfall at the 43 sites through the summer season and a subset of 36 year-round sites.	
Exotic invasive vegetation monitoring	Addresses Project Conditions 32 and 37	Surveys focused on previously disturbed areas within and adjacent to the Project footprint and along Project boundaries where exotic invasive vegetation is most likely to occur (e.g., along Project infrastructure, road margins, and laydown areas). Site surveys considered the level of ground disturbance (i.e., exposed soil can be more prone to the establishment of invasive vegetation) and proximity to Project activities and vehicle traffic (i.e., vehicle traffic is a vector for the proliferation of invasive vegetation). No exotic invasive vegetation species were recorded during the 2024 surveys. The Terrestrial Environment and Mitigation and Monitoring Plan prescribes the survey frequency for monitoring of exotic invasive vegetation (three to five years, pending findings from ongoing incidental monitoring). Monitoring for exotic invasive vegetation is expected to occur again between 2027 and 2029.	N/A
Snow track surveys	Addresses Project Conditions 54dii and 58f Addresses QIA concerns about snowbank heights and effects on wildlife	Twelve snow track surveys were completed along the Tote Road to investigate the movement and behaviour of caribou in February, March, April, May, October, and November 2024. Fox, Arctic hare, lemming, Common Raven, and ptarmigan were the only species detected during the 2024 surveys. No evidence of caribou has been observed near or crossing the Tote Road since January 2020. Wildlife response to the Tote Road was recorded at each location where tracks were seen. Based on discussions during TEWG meetings regarding snow track frequency, Baffinland agreed to implement snow track surveys and will make best efforts to conduct these surveys at a frequency of once per week along the Tote Road. Surveys will occur during snow cover seasons when environmental conditions permit the surveys to be completed effectively and safely. Conditions criteria include	A reduction in caribou movement across Project infrastructure throughout the Operation phase was predicted but not expected to be significant at the scale of the North Baffin Island caribou population. Data from the snow track surveys can be used to investigate the prediction when caribou numbers increase and movement resumes in the RSA. If ground monitoring of caribou suggests barrier effects (e.g., trails approaching but not crossing the road) and anecdotal caribou abundance indices show increasing numbers, then aerial surveys may be used to investigate the potential effects further. Because no caribou tracks were identified during snow track surveys in 2024, it cannot be determined



Table 0. Summary of environmental effects monitoring and research activities at the Mary River Project in 2024.

Survey	Reason for Survey ¹	Work Completed, Effects Observed, Required Mitigation, and Recommendations for Future Work	Comparison to Impact Predictions ²
		fresh snowfall (within the last 48 hours) and suitable light conditions. Snow track monitoring will continue in 2025 when ideal survey conditions and safety considerations are met.	whether Project infrastructure is affecting caribou movement.
Snowbank height monitoring	Addresses Project Conditions 53ai and 53c Addresses QIA concerns about snowbank heights and effects on wildlife	<p>Snowbank height monitoring was conducted monthly from January to December 2024 to assess compliance with the 1 m height threshold, when snow was present. Management of snowbank height facilitates wildlife crossings and increases driver visibility to help reduce wildlife-vehicle collisions. As per the TEWG's request, measurement locations were randomized in 2020.</p> <p>In 2024, the average compliance for snowbank height monitoring was 86%, which was in the range of snowbank height compliance of 66% to 97% since 2014. Snowbanks could not be modified in some areas because of landscape or safety limitations.</p> <p>Snowbank height monitoring will continue during the winter of 2025.</p>	<p>A reduction in caribou movement across Project infrastructure throughout the Operation phase was predicted. Due to mitigations along the Tote Road (e.g., snowbank height management, low embankments), the Tote Road was not expected to be a barrier to caribou movement. A negligible increase in caribou mortality was anticipated due to the Project, and effects were predicted to be not significant at the scale of the North Baffin caribou population.</p> <p>High compliance with snowbank heights minimizes the Tote Road's potential to act as a barrier to caribou movement. However, insufficient observational data (low caribou numbers) exists to quantify the effectiveness of mitigations along the Tote Road on caribou movement. As caribou numbers increase, as predicted by Inuit traditional knowledge, increased monitoring of caribou movement across the roadway will be implemented.</p>
Height of Land caribou surveys	Addresses Project Conditions 53a, 53b, 54b, and 58b	<p>Two EDI Environmental Dynamics Inc. biologists and two local Inuit participants conducted HOL caribou surveys during the calving season (early June 2023). The total observation time was 32 hours and 25 minutes, with an average observation time per station of 40 minutes. Fifteen individual caribou were observed during the HOL surveys in 2024 on June 3, 4, 5, and 8. Before 2024, the last time a caribou was observed during a HOL survey was in 2013.</p> <p>In 2016, viewshed mapping was completed to demonstrate the extent of area surveyors could observe while conducting HOL caribou surveys.</p> <p>The HOL caribou surveys will continue annually during the calving season. The 2024 observations add to a more</p>	<p>The assessment predicted some indirect habitat loss for caribou due to sensory disturbance and dust deposition, leading to reduced habitat effectiveness within the ZOI. However, habitat effectiveness was estimated to be reduced by 2% to 4%. Some disturbances (i.e., traffic) are short duration and caribou may adapt to them, thus limiting potential effects. Many alternate calving sites exist within and outside the ZOI. Indirect habitat loss was predicted to be indistinguishable from natural variation and not significant at the scale of the North Baffin caribou population.</p> <p>Caribou were observed during the HOL surveys in 2024; previous to 2024, caribou had not been</p>



Table 0. Summary of environmental effects monitoring and research activities at the Mary River Project in 2024.

Survey	Reason for Survey ¹	Work Completed, Effects Observed, Required Mitigation, and Recommendations for Future Work	Comparison to Impact Predictions ²
		extensive database as monitoring efforts continue through the Project's life. Twelve remote cameras were deployed in 2021 at six HOL stations, and 15 detections of caribou were noted on a single camera in early June 2024.	observed during HOL surveys since 2013. More caribou observations during HOL surveys are needed to assess any Project-related effects on caribou behaviour or habitat use.
Hunter and visitor log summaries	Addresses Project Condition 54f	Though not compulsory unless using Baffinland facilities, visitors to the site may check in with Baffinland security. In 2024, 469 individuals checked in at either the Mine Site or Milne Port camps. The use of the hunter and visitor log summaries will continue throughout the life of the Project.	Although Project-related effects may interact with land-use activities (e.g., harvesting, travel, camping), the effects are not expected to be significant. Except for 2020 and restrictions associated with the COVID pandemic that continued into 2021, hunter and visitor check-ins have steadily increased from pre-2017 numbers, including numerous hunting and camping trips. During 2022 these numbers increased, similar to trends seen in 2018, and have remained consistent since 2023.
Active Migratory Bird Nest Surveys	Addresses Project Conditions 66 and 70	In 2024, approximately 41,927 m ² (4.2 ha) of land were disturbed for Project infrastructure during the breeding bird window (May 17 to August 19). Four AMBNS were completed; no bird nests were found. Surveys will continue to be conducted whenever vegetation clearing or surface disturbance occurs within the breeding bird window.	By minimizing the Project footprint, conducting AMBNS, and implementing a nest management plan, Project-related effects on nesting birds are expected to be low to nil.
Wildlife interactions and mortalities	Addresses Project Conditions 53a, 53b, and 57d	Any interactions or mortalities involving wildlife within the Project area are reported and investigated year round. If possible, mitigation measures are implemented to reduce future wildlife interactions and mortalities. In 2024, 24 individual wildlife mortality incidents were reported involving six species: Arctic fox (4), Arctic hare (1), loon (1), ptarmigan (2), Snow Bunting (1), and an unknown songbird (1). Baffinland continues to mitigate wildlife interactions in the Project area by training, enforcing, and monitoring waste management practices and guidelines. Wildlife interaction and mortality monitoring will continue in 2025.	Direct wildlife mortality from Project-related activities was predicted to be low to nil for raptors, birds, caribou, and other wildlife. Any mortalities that occur are expected to represent a small fraction of the overall population. Wildlife mortalities in 2024 were all individual losses and did not involve any species at risk. Thus, wildlife mortalities were low overall and represented a very small proportion of overall populations, consistent with effect predictions. The 2024 mortality totals were below the highest range of past mortalities, with 2015 being the lowest (5 mortalities) and 2016 being the highest (25 mortalities).



ACKNOWLEDGEMENTS

The Project team recognizes the contributions of EDI field personnel (Tia Ostberg, Treyton Radcliffe-Grant, Brodie Smith, Bailey Durant), Inuit assistants and participants; and various Baffinland personnel (Site, Environment, Human Resources) in the execution of this Terrestrial Environment Mitigation and Monitoring Program.

AUTHORSHIP

Team members from EDI Environmental Dynamics Inc. who contributed to preparing this report include:

Primary Authors

Justine Benjamin, BSc RPBio, P.Biol.....Front Matter, Mammals, Birds, and Wildlife

Lyndsay Doetzel, MSc, RPBio.....Tote Road Traffic and Dustfall

Christina Tennant, MSc.....Helicopter Traffic and Dustfall; GIS Support

Bailey Durrant, MSc, AIT.....Vegetation

Alex deBruyn, MSc, RPBio.....Climate

Alex Rolheiser, BA, GIS Dipl.....Helicopter Traffic; GIS Support

Senior Oversight and Ancillary Support

Vicki Smith, BSc, RPBio.....Copy Edit and Production

Kerman Bajina, MSc, RPBio, P.Biol.,.....Biostatistician

Patrick Audet, PhD, RPBio, P.Biol.....Senior and Technical Review

Mike Settrington, MSc, RPBio, CWB.....Senior and Technical Review



TABLE OF CONTENTS

- 1 OVERVIEW 1**
- 2 TERRESTRIAL ENVIRONMENT WORKING GROUP 4**
 - 2.1 TEWG MEETING #31 4
 - 2.2 TEWG MEETING #32 4
- 3 INUIT PARTICIPATION 5**
- 4 CLIMATE 7**
 - 4.1 BACKGROUND 7
 - 4.2 METHOD 7
 - 4.3 AIR TEMPERATURE AND PRECIPITATION 10
 - 4.3.1 *Mine Site* 10
 - 4.3.1.1 Temperature 10
 - 4.3.1.2 Precipitation 10
 - 4.3.2 *Milne Inlet* 12
 - 4.3.2.1 Temperature 12
 - 4.3.2.2 Precipitation 12
 - 4.3.3 *Comparison Between Sites* 14
 - 4.4 WIND SPEED AND DIRECTION 14
 - 4.4.1 *Mine Site* 15
 - 4.4.1.1 2024 Wind 15
 - 4.4.1.2 2013–2023 Wind 15
 - 4.4.2 *Milne Inlet* 16
 - 4.4.2.1 2024 Wind 16
 - 4.4.2.2 2013–2023 Wind 16
 - 4.4.2.3 Seasonal Patterns 17
 - 4.4.2.4 Data Quality 17
- 5 HELICOPTER OVERFLIGHTS 20**
 - 5.1 METHODS 21
 - 5.1.1 *Monitoring History and Changes in Overflight Analysis at the Project* 21
 - 5.1.2 *Data Collection and Analysis* 22
 - 5.2 RESULTS AND DISCUSSION 24
 - 5.2.1 *Compliance* 24
 - 5.2.2 *Compliance Rationale* 32
 - 5.2.3 *Inter-Annual Trends* 34



6	TOTE ROAD TRAFFIC.....	40
6.1	METHOD.....	40
6.2	RESULTS AND DISCUSSION.....	40
7	DUSTFALL.....	44
7.1	HISTORY OF DUSTFALL MONITORING AT THE PROJECT.....	46
7.2	DUSTFALL SUPPRESSION AND MITIGATION.....	47
7.3	PASSIVE DUSTFALL MONITORING.....	48
7.3.1	<i>Methods.....</i>	<i>48</i>
7.3.1.1	Supporting Data Review.....	48
7.3.1.2	Passive Dustfall Sampling.....	49
7.3.1.3	Data Trends and Statistical Analysis.....	56
7.3.2	<i>Results and Discussion.....</i>	<i>58</i>
7.3.2.1	Magnitude and Extent of 2024 Dustfall.....	58
7.3.2.2	Seasonal Comparisons of 2024 Dustfall.....	65
7.3.2.3	2024 Annual Dustfall.....	68
7.3.3	<i>Inter-Annual Trends.....</i>	<i>71</i>
7.3.3.1	Seasonal Dustfall.....	71
7.3.3.2	Total Annual Dustfall.....	76
7.4	DUSTFALL IMAGERY ANALYSIS.....	78
7.4.1	<i>Methods.....</i>	<i>78</i>
7.4.1.1	Study Area.....	78
7.4.1.2	Imagery Acquisition.....	80
7.4.1.3	Image Preprocessing.....	81
7.4.1.4	Image Analysis.....	81
7.4.1.5	Dustfall Extent and Magnitude.....	81
7.4.1.6	Snow Sampling Pilot Study.....	82
7.4.2	<i>Results and Discussion.....</i>	<i>84</i>
7.4.2.1	Scene Distribution.....	84
7.4.2.2	Dustfall Concentration Estimation.....	86
7.4.2.3	Magnitude and Extent of 2024 Dustfall.....	87
7.4.3	<i>Inter-Annual Trends.....</i>	<i>96</i>
7.4.4	<i>Snow Sampling Pilot Study.....</i>	<i>108</i>
8	VEGETATION.....	112
8.1	EXOTIC INVASIVE VEGETATION MONITORING.....	112
8.1.1	<i>Methods.....</i>	<i>112</i>



8.1.1.1	History of Exotic Invasive Vegetation Monitoring at the Project	112
8.1.1.2	Survey Methods and Search Areas	113
8.1.2	<i>Results and Discussion</i>	113
8.1.2.1	Ancillary Observations.....	118
9	MAMMALS	119
9.1	SNOW TRACK SURVEYS.....	120
9.1.1	<i>Methods</i>	121
9.1.2	<i>Results and Discussions</i>	122
9.2	SNOWBANK HEIGHT MONITORING	130
9.2.1	<i>Methods</i>	130
9.2.2	<i>Results and Discussions</i>	131
9.3	HEIGHT OF LAND SURVEYS	134
9.3.1	<i>Methods</i>	135
9.3.1.1	Data Collection.....	135
9.3.1.2	Modifications to Survey Procedures	136
9.3.2	<i>Results and Discussions</i>	138
9.4	REMOTE CAMERAS	139
9.4.1	<i>Methods</i>	140
9.4.2	<i>Results and Discussions</i>	141
9.5	AERIAL CARIBOU SURVEY	146
9.5.1	<i>Methods</i>	147
9.5.1.1	Study Area	147
9.5.1.2	Survey Design and Protocols.....	149
9.5.1.3	Population Estimates	152
9.5.2	<i>Results and Discussion</i>	154
9.5.2.1	Field Observations.....	154
9.5.2.2	Modelling Outcomes	156
9.5.2.3	Caribou Abundance and Density.....	159
9.5.2.4	Summary Findings	160
9.6	INCIDENTAL WILDLIFE OBSERVATIONS	160
9.7	CARIBOU TOTE ROAD OBSERVATIONS	161
9.7.1	<i>Methods</i>	162
9.7.2	<i>Results and Discussions</i>	163
9.8	HUNTER AND VISITOR LOG	166
10	BIRDS.....	169



10.1	ACTIVE MIGRATORY BIRD NEST SURVEYS	170
10.1.1	Methods	170
10.1.2	Results and Discussion.....	171
11	WILDLIFE INTERACTIONS	172
11.1	WILDLIFE INTERACTIONS AND MORTALITIES.....	172
11.2	WILDLIFE INTERACTIONS AND MORTALITY PREVENTION	173
11.3	INTER-ANNUAL TRENDS.....	173
12	REFERENCES	175

LIST OF APPENDICES

Appendix A	2023 TEAMR Commentary and Baffinland Responses	A-1
Appendix B	TEWG Written Requests and Baffinland Responses	B-1
Appendix C	Climate Data.....	C-1
Appendix D	Remote Camera Locations.....	D-1

LIST OF TABLES

Table 1-1.	Overview of Terrestrial Environment Monitoring Program components (2010 to present).	2
Table 4-1.	Beaufort Scale used for wind speed measurements at the Mary River Project.....	14
Table 5-1.	Helicopter overflight compliant categories.....	23
Table 5-2.	The number of transits flown per month with a breakdown of transits (№ and %) flown within and outside the Snow Geese area, May 26 to September 28, 2024.....	25
Table 5-3.	Number of flight hours per month with a breakdown of flight time (hours and %) flown within and outside the Snow Geese area, May 26 to September 28, 2024.....	25
Table 5-4.	Number of flight hours of cruising altitude compliance ($\geq 1,100$ magl) within the Snow Geese area during the moulting season, July 1 to August 31, 2024.....	26
Table 5-5.	Number of flight hours of overall cruising altitude compliance in all areas for all months between May 26 to September 28, 2024.....	26
Table 5-6.	Descriptions of pilot rationales given for low-level flights ^{1,2}	33
Table 5-7.	Helicopter compliant with rationale flight hours summarized according to pilot rationale for flights within the $\geq 1,100$ magl and ≥ 650 magl cruising altitude requirements, May 26 to September 28, 2024.	34
Table 5-8.	Number of transits flown per year with a breakdown of transits (№ and %) within the $\geq 1,100$ magl and ≥ 650 magl cruising altitude requirements, 2015 to 2024.....	35



Table 5-9.	Number of flight hours per year with a breakdown of flight time (hours and %) within the $\geq 1,100$ magl and ≥ 650 magl cruising altitude requirements, 2015 to 2024.....	36
Table 5-10.	Flight hours and percentage of total flight hours for compliant with rationale flights summarized by rationale category, 2017 to 2024.	37
Table 5-11.	Total flight hours and overall cruising altitude compliance by flight hours and percentage, 2015 to 2024.	38
Table 5-12.	Flight hours and overall cruising altitude compliance by flight hours and percentage within the $\geq 1,100$ magl and ≥ 650 magl cruising altitude requirements, 2015 to 2024.....	39
Table 6-1.	Mean and total transits along the Tote Road, including ore haul, non-haul, and all vehicles combined, from 2015 through 2024.	41
Table 6-2.	Mean ore haul and non-haul transits and total monthly transits from January 1 to December 31, 2024.	41
Table 7-1.	Implementation of dustfall monitoring program from 2013 through 2024.	46
Table 7-2.	Summary of dustfall monitoring stations (locations and sampling period), 2024.	50
Table 7-3.	Dustfall monitoring sampling record, 2024 (date shown indicates the day the sample canister was collected).	54
Table 7-4.	Summary of total insoluble dustfall ($\text{mg}/\text{dm}^2 \cdot \text{day}$), 2024.....	61
Table 7-5.	Annual dustfall accumulation for sites sampled throughout 2024. ¹	68
Table 7-6.	Summary of satellite imagery used for dustfall extent imagery analysis.	80
Table 7-7.	Remote sensing sources used for dustfall imagery analysis.	84
Table 7-8.	2024 dustfall area extent (km^2 and %) by concentration classes derived from Landsat and Sentinel-2 imagery.	92
Table 7-9.	Estimated 2024 mean, minimum, and maximum dustfall concentrations in Areas of Community Concern.....	94
Table 7-10.	Estimated mean dustfall concentrations (and standard deviations) in Areas of Community Concern around Milne Inlet, 2004 and 2013 to 2024.	107
Table 7-11.	Estimated mean dustfall concentrations (and standard deviations) in Areas of Community Concern south/southwest of the Mine Site, 2004 and 2013 to 2024.....	107
Table 7-12.	Surface snow samples and corresponding Sentinel-2 Snow Darkening Index values from satellite imagery used in the analysis, 2022 to 2024.	108
Table 7-13.	Surface snow samples and corresponding Landsat Snow Darkening Index values from satellite imagery used in the analysis, 2022 to 2024.	109
Table 8-1.	Summary of the 2024 exotic invasive vegetation monitoring program.	114
Table 9-1.	Weekly snow track compliance tracker, rationale log, and observations.	123
Table 9-2.	Species track response to the Tote Road from February to November 2024.....	126
Table 9-3.	2024 Tote Road snowbank height monitoring.	131
Table 9-4.	2024 remote camera survey summary of remote camera data returns.	142
Table 9-5.	Double observer, full independence mark-recapture (MR) model selection.....	157



Table 9-6.	Double observer, point independence joint mark-recapture (MR) and distance sampling (DS) model selection.....	157
Table 9-7.	Estimated abundance of caribou individuals and groups in the northern and southern subregions.....	160
Table 9-8.	Estimated density of caribou individuals and groups per 1,000 km ² in the northern and southern subregions.....	160
Table 9-9.	2024 incidental wildlife observations in the Potential Development Area (Mine Site, the Tote Road, and Milne Port) and remote areas (based on wildlife logs).....	161
Table 10-1.	Disturbed area in relation to the 2024 Active Migratory Bird Nest Survey (AMBNS) disturbance window.....	171

LIST OF FIGURES

Figure 1-1.	Graphical overview of the Project's Terrestrial Environment Monitoring Program.....	3
Figure 3-1.	Inter-annual trend (2006 to 2024) of Inuit participation in the Terrestrial Environment Monitoring Program.....	6
Figure 4-1.	Mine Site monthly average air temperature (lines) and total precipitation (bars) from 2005–2010, 2013–2023, and 2024.....	11
Figure 4-2.	Mine Site monthly precipitation frequency (number of days experiencing precipitation) from 2005–2010, 2013–2023, and 2024.....	11
Figure 4-3.	Milne Port monthly average air temperature (lines) and total precipitation (bars) from 2006–2010, 2013–2023, and 2024.....	13
Figure 4-4.	Milne Port monthly precipitation frequency (number of days experiencing precipitation) from 2006–2010, 2013–2023, and 2024.....	13
Figure 4-5.	The cumulative proportions of wind speeds and directions at the Mine Site meteorological station in 2024.....	15
Figure 4-6.	The cumulative proportions of wind speeds and directions at the Mine Site meteorological station from 2013 to 2023.....	16
Figure 4-7.	The cumulative proportions of wind speeds and directions at the Milne Port meteorological station in 2024.....	18
Figure 4-8.	The cumulative proportions of wind speeds and directions at the Milne Port meteorological station from 2013 to 2023.....	18
Figure 4-9.	Winter wind patterns at the Milne Port meteorological station from January to March and December 2024.....	19
Figure 4-10.	Summer wind patterns at the Milne Port meteorological station from June to September 2024.....	19
Figure 5-1.	Percent compliance and total flight hours for flights within the Snow Geese area during the moulting season, 2015 to 2024.....	36
Figure 5-2.	Percent compliance and total flight hours for flights outside the Snow Geese area during the moulting season and in all areas in all other months, 2015 to 2024.....	37
Figure 6-1.	Mean ore haul and non-haul vehicle transits per day and total ore hauled between 2015 and 2024.....	42



Figure 6-2.	Vehicle transits per day on the Tote Road, including ore trucks (red) and all other traffic (blue), January 1 to December 31, 2024.	43
Figure 7-1.	Geometric mean daily dustfall (mg/dm ² ·day) for the Mine Site, Milne Port, the Tote Road north crossing (KM 28), and the Tote Road south crossing (KM 78). The Tote Road sites are measured as a function of distance from the Tote Road. Scales are equal for each area to allow comparison of differences between each area.	63
Figure 7-2.	Geometric mean daily dustfall (mg/dm ² ·day) for all sites located 1,000 m from Project infrastructure during the summer season.	64
Figure 7-3.	Geometric mean daily dustfall (mg/dm ² ·day) for all sites located 1,000 m from the Tote Road using year-round data.	64
Figure 7-4.	Geometric mean daily dustfall (mg/dm ² ·day) by site and month (time-series or category) or season (category) for the Mine Site, Milne Port, the Tote Road north crossing (KM 28), and the Tote Road south crossing (KM 78).	66
Figure 7-5.	Geometric mean daily dustfall (mg/dm ² ·day) by site and season (summer and winter) for the Tote Road north (KM 28) and south (KM 78) crossings.	67
Figure 7-6.	Geometric mean daily dustfall (mg/dm ² ·day) by site and month for the Tote Road north (KM 28) and south (KM 78) crossings.	67
Figure 7-7.	Annual dustfall (g/m ² /year) for stations sampled year-round at the Mine Site, Milne Port, the Tote Road north crossing (KM 28), and the Tote Road south crossing (KM 78).	70
Figure 7-8.	Total annual dustfall (g/m ² /year) at the Tote Road sites located 1,000 m distance from the centreline.	71
Figure 7-9.	Inter-annual mean daily dustfall (mg/dm ² ·day) at the Mine Site (2015 to 2023).	73
Figure 7-10.	Inter-annual mean daily dustfall (mg/dm ² ·day) at Milne Port (2015 to 2023).	74
Figure 7-11.	Inter-annual mean daily dustfall (mg/dm ² ·day) at the Tote Road north crossing (KM 28; 2015 to 2023).	75
Figure 7-12.	Inter-annual mean daily dustfall (mg/dm ² ·day) at the Tote Road south crossing (KM 78; 2015 to 2023).	76
Figure 7-13.	Year-over-year annual dustfall (g/m ² /year) in relation to total ore mined and hauled to Milne Port.	77
Figure 7-14.	A) Sentinel-2 and Landsat unique acquisition dates per year for dustfall imagery analysis (March 15 to May 15) and B) the spatial coverage of the 2024 imagery.	85
Figure 7-15.	Relationship between calculated dustfall accumulation from passive dustfall deposition rates and Landsat 8/9 Snow Darkening Index.	86
Figure 7-16.	Relationship between calculated dustfall accumulation from passive dustfall deposition rates and Sentinel-2 Snow Darkening Index.	87
Figure 7-17.	Percent dustfall area by concentration class within the Study Area for 2024.	93
Figure 7-18.	Mean dustfall concentrations within the Potential Development Area and 30 m, 100 m, 1 km, 5 km, and 20 km buffers for 2024.	93
Figure 7-19.	Satellite-derived dustfall extents from 2014 to 2024 with baseline years 2004 and 2013.	97
Figure 7-20.	Satellite-derived mean dustfall concentrations from 2014 to 2024 with baseline years 2004 and 2013.	106
Figure 7-21.	Non-linear regression (rational fit) between Total Suspended Solids and Landsat 8/9 Snow Darkening Index.	111



Figure 9-1.	Various behaviours observed along the Tote Road based on tracks.	122
Figure 9-2.	2024 Tote Road snow track response based on species.	129
Figure 9-3.	2024 inter-annual trends — snow track survey (2014 to 2024).	129
Figure 9-4.	2024 snowbank height monitoring time series and distribution for snowbank heights.	132
Figure 9-5.	2024 inter-annual trends — snowbank height compliance monitoring (2014 to 2024).	134
Figure 9-6.	2024 inter-annual trends — Height of Land surveys (2013 to 2024 – post-baseline).	139
Figure 9-7.	January to December 2024 remote camera survey – total wildlife detections per species.	143
Figure 9-8.	January to December 2024 remote camera survey – minimum number of species observations per camera station (bars) and species richness for each camera station (line).	143
Figure 9-9.	Schematic diagram of double-observer configuration.	150
Figure 9-10.	Schematic diagram of wing strut markings to identify distance bins from the aircraft.	151
Figure 9-11.	Pooled detection probabilities of caribou at increasing distance from the transect line.	158
Figure 9-12.	Conditional detection probabilities of the primary observer detecting caribou at increasing distance from the transect line.	158
Figure 9-13.	The quantile-quantile plot of fitted versus empirical cumulative density functions for the fitted mark-recapture distance sampling detection function.	159
Figure 9-14.	Caribou decision framework specific for the Tote Road as outlined in the Terrestrial Environment Mitigation and Monitoring Plan (2023).	163
Figure 9-15.	Caribou observations along the Tote Road by month in 2024.	164
Figure 9-16.	Mine Site visitor breakdown by month with check-in rationale.	167
Figure 9-17.	Milne Port visitor breakdown by month with check-in rationale.	167
Figure 9-18.	2024 inter-annual trends in visitors recorded in hunter and visitor logs (2010 to 2024).	168
Figure 11-1.	2024 wildlife interactions – inter-annual mortality trends by cause of death (2014 to 2024).	174
Figure 11-2.	2024 wildlife interactions – inter-annual mortality trends by species (2014 to 2024).	174

LIST OF MAPS

Map 5-1.	Overview map of helicopter flight paths for May 2024.	27
Map 5-2.	Overview map of helicopter flight paths for June 2024.	28
Map 5-3.	Overview map of helicopter flight paths for July 2024.	29
Map 5-4.	Overview map of helicopter flight paths for August 2024.	30
Map 5-5.	Overview map of helicopter flight paths for September 2024.	31
Map 7-1.	Dustfall monitoring sites.	53
Map 7-2.	Study area, Areas of Community Concern, and buffers for the 2024 dustfall imagery analysis.	79
Map 7-3.	Overview of satellite-derived dustfall extent and concentration, March 14 to May 16, 2024.	90



Map 7-4.	Satellite-derived dustfall extent and concentration, March 14 to May 16, 2024.	91
Map 7-5.	Satellite-derived dustfall extent and concentration for Areas of Community Concern, March 14 to May 16, 2024.	95
Map 7-6.	Mine Site satellite-derived dustfall extent and concentration, March 15 to May 15, 2014 to 2018.	98
Map 7-7.	Mine Site satellite-derived dustfall extent and concentration, March 15 to May 15, 2019 to 2024.	99
Map 7-8.	Milne Inlet and Port satellite-derived dustfall extent and concentration, March 15 to May 15, 2014 to 2018.	100
Map 7-9.	Milne Inlet and Port satellite-derived dustfall extent and concentration, March 15 to May 15, 2019 to 2024.	101
Map 7-10.	The Tote Road north satellite-derived dustfall extent and concentration, March 15 to May 15, 2014 to 2018.	102
Map 7-11.	The Tote Road north satellite-derived dustfall extent and concentration, March 15 to May 15, 2019 to 2024.	103
Map 7-12.	The Tote Road south satellite-derived dustfall extent and concentration, March 15 to May 15, 2014 to 2018.	104
Map 7-13.	The Tote Road south satellite-derived dustfall extent and concentration, March 15 to May 15, 2019 to 2024.	105
Map 7-14.	Surface snow sampling sites, 2022 to 2024.	110
Map 8-1.	Exotic invasive vegetation survey tracks for the 2024 monitoring program.	117
Map 9-1.	2024 snow track observations along the Tote Road.	127
Map 9-2.	2024 overview of Height of Land monitoring stations and viewsheds.	137
Map 9-3.	Baffinland aerial caribou survey area, with transect lines, expanded to include additions requested by the Government of Nunavut and Mittimatalik Hunters and Trappers Organization.	148
Map 9-4.	Baffinland aerial caribou survey observations, March 24 to 27, 2023.	155

LIST OF PHOTOGRAPHS

Photo 4-1.	Mine Site meteorological weather station.	9
Photo 4-2.	Milne Port meteorological weather station.	9
Photo 7-1.	Dustfall monitoring station DF-P-01.	50
Photo 8-1.	Representative survey areas at the Mine Site.	115
Photo 8-2.	Representative survey areas along the Tote Road and within roadside pullouts/laydowns.	115
Photo 8-3.	Representative survey areas at Milne Inlet.	116
Photo 8-4.	Northern dandelion observed along the perimeter of Sailivik Camp at the Mine Site; July 6, 2024.	118
Photo 8-5.	Arctic chamomile observed along East Beach at Milne Inlet; July 16, 2024.	118
Photo 9-1.	Fox tracks parallel to the Tote Road.	128



Photo 9-2.	Baffinland staff completing track survey and recording old hare tracks.	128
Photo 9-3.	Fresh Arctic hare tracks alongside the Tote Road.	128
Photo 9-4.	Small mammal track deflecting from the Tote Road.	128
Photo 9-5.	Compliant snowbank (40 cm) at KM25.	133
Photo 9-6.	Compliant snowbank (0 cm) with indications of snowbank management (feathering).	133
Photo 9-7.	Snowbank management (in progress) to facilitate wildlife crossing and improve driver visibility.	133
Photo 9-8.	Three caribou foraging near the Tote Road on June 25, 2024. Site enviro truck stationed at the pull out on the left to monitor caribou response to traffic and make sure traffic is slowing down and following correct caribou response procedures.	144
Photo 9-9.	Enlarged image of caribou seen in Photo 9-8 near the Tote Road on June 25, 2024.	144
Photo 9-10.	A group of three caribou seen adjacent to the Tote Road via remote camera. The three caribou were first noted on June 25, 2024 (13:07) and were documented in various locations in the remote camera's field of view until June 26, 2024 (11:27). During the 22-hour window, a minimum of 39 B-Trains, five heavy pieces of equipment, and three light trucks were recorded on the cameras.	145
Photo 9-11.	A group of three caribou seen adjacent to the Tote Road via remote camera. The three caribou were first noted on June 25, 2024 (13:07) and were documented in various locations in the remote camera's field of view until June 26, 2024 (11:27).	145
Photo 9-12.	Aerial caribou survey crew members on March 25, 2023.	151
Photo 9-13.	Caribou observed during the aerial survey.	156
Photo 9-14.	Caribou observed along the Tote Road.	165
Photo 9-15.	Caribou observed along the Tote Road.	165

LIST OF APPENDIX TABLES

Appendix Table C-1.	Mine Site climate data.	C-2
Appendix Table C-2.	Milne Inlet climate data.	C-7



ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
AICc	Akaike's Information Criteria
ΔAIC	Difference in AICc between the given model and the lowest AICc
AMBNS	Active Migratory Bird Nest Surveys
ANOVA	Analysis of variance
Baffinland	Baffinland Iron Mines Corporation
CI	Confidence interval
CWS	Canadian Wildlife Service
DS	Distance sampling
EDI	EDI Environmental Dynamics Inc.
EPP	Environment Protection Plan
GN	Government of Nunavut
GPS	Geographic Positioning System
HOL	Height of Land
magl	Metres above ground level
masl	Metres above sea level
MET	Meteorological
MHTO	Mittimatalik Hunters and Trappers Organization
MR	Mark-recapture
MRDS	Mark-recapture distance sampling
NIRB	Nunavut Impact Review Board
PC	Project Condition
PDA	Potential Development Area
PRISM	Program for Regional and International Shorebird Monitoring
Project	Mary River Project
QIA	Qikiqtani Inuit Association
RSA	Regional Study Area
SDI	Snow Darkening Index
TEAMR	Terrestrial Environment Annual Monitoring Report
TEMMP	Terrestrial Environment Mitigation and Monitoring Plan
TEWG	Terrestrial Environment Working Group
TSP	Total suspended particulates
ZOI	Zone of influence



1 OVERVIEW

The Mary River Project (the Project) is an iron ore mine in the Qikiqtaaluk Region of North Baffin Island, Nunavut. As a condition of Project approval, the Nunavut Impact Review Board Project Certificate No. 005 includes numerous conditions that require Baffinland Iron Mines Corporation (Baffinland) to conduct effects monitoring for the terrestrial environment. Work completed for the Terrestrial Environment Monitoring Program is guided by Inuit Qaujimajatuqangit and the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) (Baffinland Iron Mines Corporation 2016a). The Terrestrial Environment Working Group oversees this work (refer to Section 2), which is comprised of representatives from Baffinland, the Qikiqtani Inuit Association, Government of Nunavut, Environment and Climate Change Canada, Mittimatalik Hunters and Trappers Organization, Clyde River Hunter and Trapper Organization, Arctic Bay Hunter and Trapper Organization, Hall Beach Hunter and Trapper Organization, and Igloolik Hunter and Trapper Organization. The World Wildlife Fund, Nunavut Impact Review Board, Canadian Northern Economic Development Agency, and Natural Resources Canada all participate as observers on the Terrestrial Environment Working Group. Members of the TEWG are invited annually to comment on Annual Monitoring Reports; commentary and responses to the 2023 Annual Monitoring Report are provided in Appendix A. Relevant comments are incorporated into this report. This represents a key mechanism for transparency and continual improvement in the implementation of the TEMMP.

The TEMMP (illustrated in Figure 1-1) comprises the guidance, methods, and standards for assessing potential Project-related effects on multiple (often interrelated) Valued Ecosystem Components. Where possible, monitoring design and data capture facilitate cross-referencing between monitoring components to better determine cause and effect and support more effective corrective actions. For example, dustfall deposition is captured by passive dustfall sampling. Dustfall effects on vegetation are evaluated by vegetation monitoring (including abundance, composition, and health). A regional sampling program for caribou tissue monitors potential bioaccumulation effects in caribou (associated with metal uptake and transfer up the food chain). Table 1-1 summarizes components of the Terrestrial Environment Monitoring Program at the Project (2010 to present). Results and trend summaries from these monitoring programs are presented in each respective Terrestrial Environment Annual Monitoring Report (EDI Environmental Dynamics Inc. 2013–2023). The 2024 Annual Monitoring Report for the Terrestrial Environment Monitoring Program includes the following data collection and monitoring programs in 2024, the results of which are summarized in this report:

- weather monitoring;
- helicopter flight height analysis;
- Tote Road traffic monitoring;
- passive dustfall monitoring;
- dustfall extent imagery analysis;
- vegetation abundance;
- snow track surveys;
- snowbank height monitoring;
- Height of Land caribou surveys;
- remote camera monitoring;
- Active Migratory Bird Nest Surveys;
- hunter and visitor log summaries; and,
- wildlife interactions, incidental observations, and mortalities.



Table 1-1. Overview of Terrestrial Environment Monitoring Program components (2010 to present).

Monitoring Programs and Endpoints	Previous Monitoring	Next Anticipated Monitoring
Passive Dustfall	2013–23	2025
Dustfall Extent Imagery Analysis	2020–23	2025
Soil and Vegetation Base Metals Monitoring	2012–17, 2019–22	2025–27
Vegetation Abundance Monitoring	2012–17, 2019, 2023	2026–28
Normalized Difference Vegetation Index Analysis	2020	—
Exotic Invasive Vegetation Monitoring Natural Revegetation	2014, 2019, 2020, 2024	2027
Height of Land Caribou Surveys	2013–24	2025
Snow Track Surveys and Snowbank Height Monitoring	2014–24	2025
Noise Monitoring	2020, 2022	—
Hunter and Visitor Logs	2010–24	2025
Wildlife Observations, Incidents, and Mortality Logs	2020–24	2025
Active Migratory Bird Nest Surveys	2013–24	2025
Helicopter Flight Height Analysis	2015–24	2025
Cliff-nesting Raptor Occupancy and Productivity Surveys	2011–20	—
Caribou Fecal Pellet Collection	2011–14, 2020	—
Caribou Water Crossing Surveys	2014	—
Carnivore Den Survey	2014	—
Communication Tower Surveys	2014–15	—
Roadside Waterfowl Surveys	2012–14	—
Staging Waterfowl Surveys	2015	—
Tundra Breeding Bird PRISM ¹ Plots	2012–13, 2018, 2024	—
Bird Encounter Transects	2013	—
Coastline Nesting and Foraging Habitat Surveys	2012 ² , 2013 ³	—
Red Knot (<i>Calidris canutus</i>) Surveys	2014, 2019	—

¹ PRISM: Program for Regional and International Shorebird Monitoring, led by Environment and Climate Change Canada.

² Steensby Inlet only.

³ Milne Inlet only.

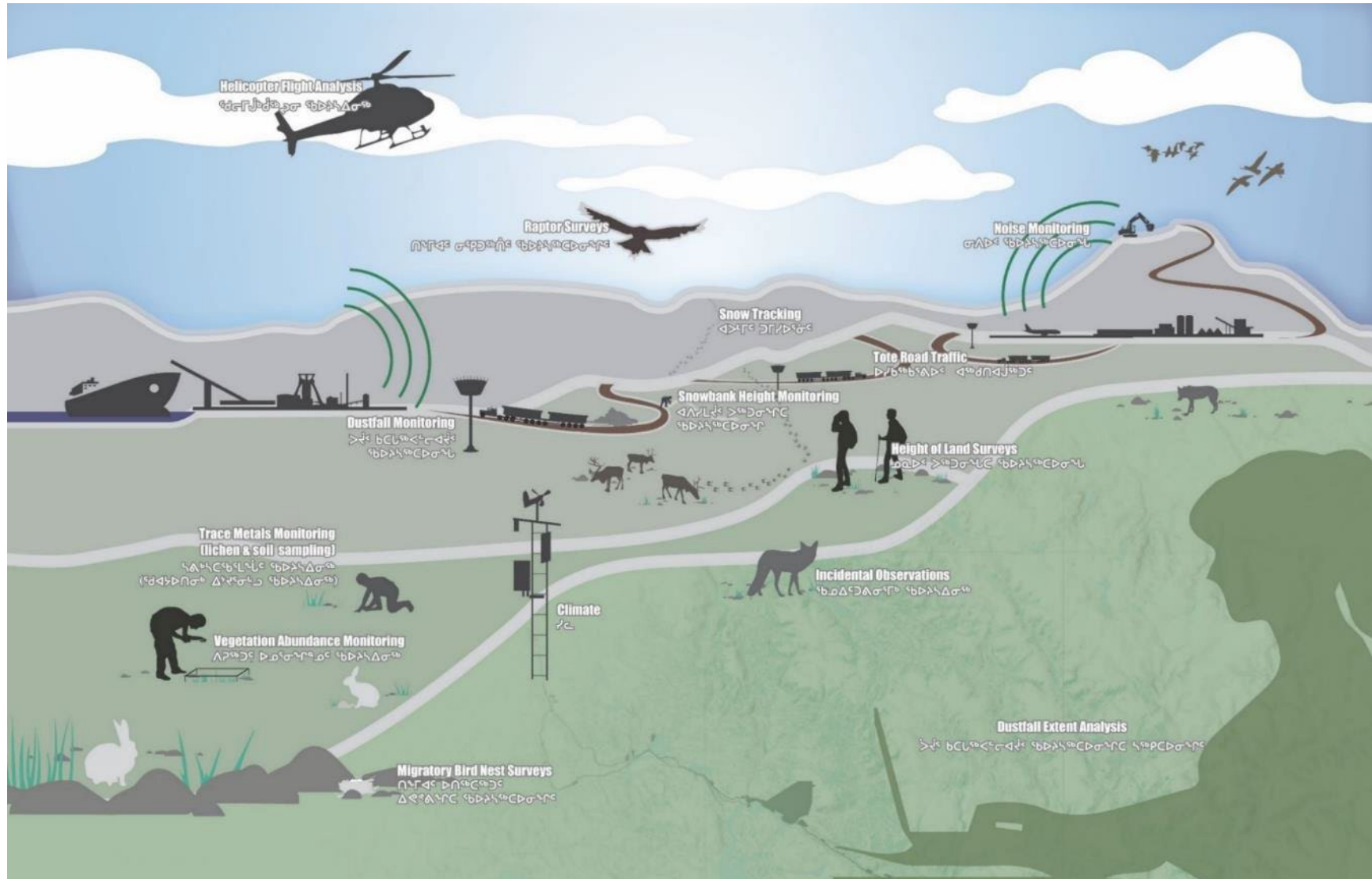


Figure 1-1. Graphical overview of the Project's Terrestrial Environment Monitoring Program.



2 TERRESTRIAL ENVIRONMENT WORKING GROUP

The Terrestrial Environment Working Group (TEWG) was formed in 2012 as a collaborative forum to discuss monitoring approaches and refine procedures based on data trends, local knowledge, and recent advances in science and technology. The TEWG has (at a minimum) convened biannually via in-person or teleconference meetings, typically before and after the summer field monitoring period. If/where possible, annual technical reports and other relevant discussion content are distributed before meetings. Baffinland Iron Mines Corporation (Baffinland) invites commentary from all representatives, reviews all comments and recommendations, and tries to provide meaningful responses to the TEWG. The following headings summarize comments, recommendations and actions from meetings held in 2024.

2.1 TEWG MEETING #31

Baffinland hosted the TEWG meeting #31 on 22 May 2024 via a virtual platform. The meeting agenda included a summary of the 2023 Terrestrial Environment Mitigation and Monitoring Plan findings and a discussion of two formal recommendations (refer to Appendix B) by the Qikiqtani Inuit Association (QIA) submitted to the TEWG:

- **QIA-TE-2(1):** To improve the definition of caribou behaviour in response to the Project (i.e., caribou deflection), and
- **QIA-TE-2(2):** To examine options for wildlife (caribou) monitoring along the Steensby Rail corridor (e.g., caribou collaring, aerial survey, remote wildlife cameras, and mark-recapture fecal pellet sampling).

Baffinland committed to addressing both recommendations and working with the TEWG to advance appropriate outcomes.

2.2 TEWG MEETING #32

Baffinland hosted TEWG meeting #32 on 10 October 2024 via a virtual platform. The meeting agenda focussed on previous actions and commitments. Before the meeting, Baffinland commissioned desktop studies (1) to inform on the value and feasibility of different options for wildlife monitoring at the Project and (2) to improve current operational definitions of caribou deflection. These studies (refer to Appendix B) were distributed to the TEWG; no comments were returned.

Regarding caribou deflection, definitions were drawn from other Projects and available literature sources to develop a behavioural ranking system. Based on the discussion, it was resolved that these definitions should be refined. Regarding the value and feasibility of different options for wildlife monitoring, it was emphasized that caribou collaring is the most robust approach to monitor caribou abundance and distribution, along with aerial surveys. Due to time constraints, this topic was committed to further discussion during TEWG Meeting (#33, held on 13 January 2025).



3 INUIT PARTICIPATION

Baffinland Iron Mines Corporation (Baffinland) actively encourages and facilitates recruitment of Inuit participants at the Mary River Project (the Project) via:

- hiring and training Inuit assistants to work on terrestrial monitoring programs;
- supporting the participation of the Mittimatalik Hunters and Trappers Organization, Ikahutit Hunters and Trappers Association, Nangmautuq Hunters and Trappers Association, Igloodik Hunters and Trappers Organization, and Hall Beach Hunters and Trappers Organization in the Terrestrial Environment Working Group;
- providing funding for four full-time, on-site Environmental Monitors, to be appointed and solely employed by the Qikiqtani Inuit Organization following Article 15.8 of the Inuit Impact and Benefit Agreement (Qikiqtani Inuit Association and Baffinland Iron Mines Corporation 2018); and,
- resourcing community-based programs through the Mary River Inuit Impact and Benefit Agreement (Qikiqtani Inuit Association and Baffinland Iron Mines Corporation 2018).

In their capacity as research assistants and consultants, Inuit participants from numerous communities across the Baffin region have contributed to many components of the Terrestrial Environment Monitoring Program since its inception (e.g., Height of Land caribou surveys, vegetation abundance surveys, vegetation and soil base metals sampling, and raptor monitoring), and have provided strategic support and insight on field programs. Inuit assistants have gained essential skills and training through participation in field programs, such as plant identification, bird identification, Arctic biology, field logistics, Geographic Positioning System (GPS) navigation, data collection methods, and data management.

Four local Inuit residents assisted with Height of Land caribou surveys and soil and vegetation monitoring for 663 hours during the 2024 field season (Figure 3-1). Additionally, Inuit Baffinland staff assisted with components of the 2024 Terrestrial Environment Monitoring Program as on-site Environmental Technicians. All 2024 Inuit assistants reside within Nunavut in Pond Inlet or Hall Beach.

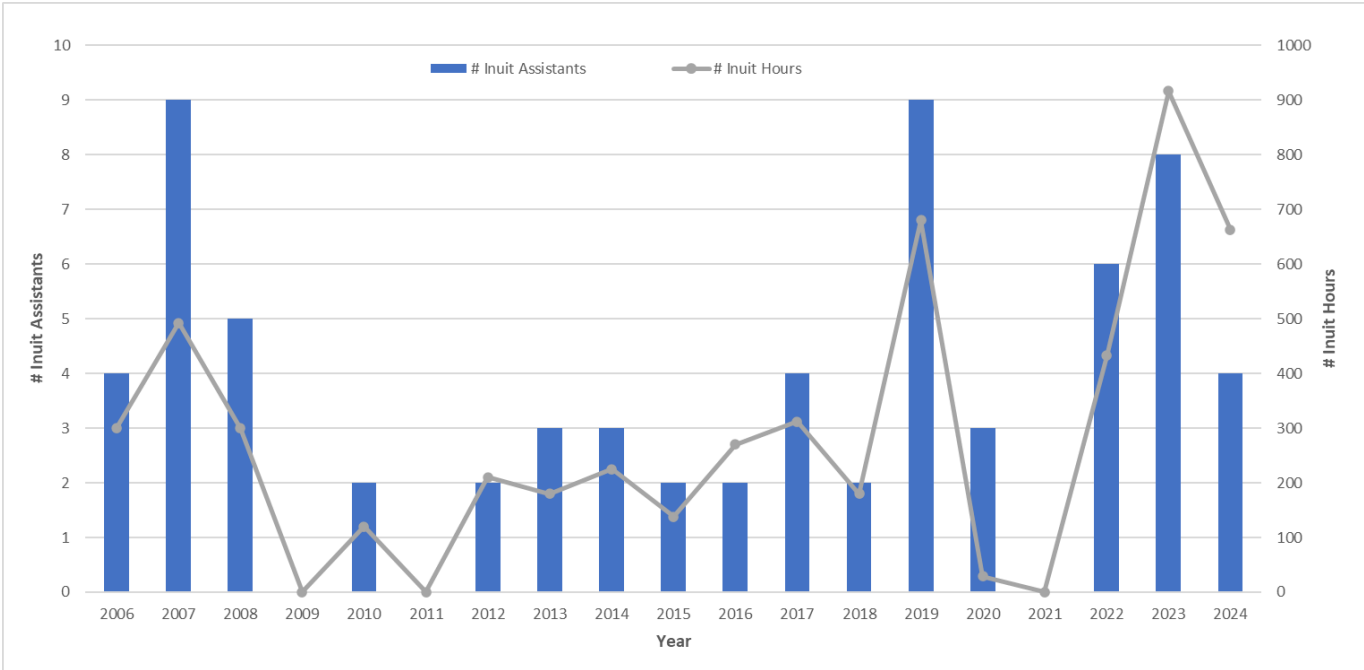


Figure 3-1. Inter-annual trend (2006 to 2024) of Inuit participation in the Terrestrial Environment Monitoring Program.

** The COVID pandemic resulted in little to no Inuit participation in 2020 and 2021.*



4 CLIMATE

Climate Summary

Climate monitoring for the Mary River Project (the Project) can be summarized in the following three points:

- 2024 was a record-breaking rainy year for the Mine Site and Milne Inlet;
- 2024 was a moderately warmer than normal year for the Mine Site and Milne Inlet due to a milder winter and typical summer; and,
- wind patterns have remained stable at the Mine Site and Milne Inlet since continuous monitoring in 2013 began.

4.1 BACKGROUND

Climate data are recorded and summarized for the Project according to Nunavut Impact Review Board Project Certificate No. 005 Project Condition (PC) #57(g) (Nunavut Impact Review Board 2020):

- **PC #57** *“The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the following information: an assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries.”*

Climate data from the reporting year are compared to data collected before Project operations (2005 to 2010) and data collected since the beginning of continuous monitoring (2013 to present). This comparison documents potential changes in climate patterns in the Regional Study Area. Climate data recorded at the Project are also cross-referenced with other datasets and analyses. For example, dustfall dispersion and deposition are strongly related to weather conditions (e.g., dustfall dispersion tends to be higher during dry, windy conditions than rainy conditions). Incorporating observed weather conditions into dustfall analyses can help explain specific patterns and trends in dustfall. Wind data are also used to estimate snow distribution before and during snow tracking surveys.

4.2 METHOD

From 1963 to 1965, Environment Canada operated a meteorological (MET) climate station at Mary River during the summer (Baffinland Iron Mines Corporation 2012b). Baffinland Iron Mines Corporation (Baffinland) established a MET station at Mary River Camp in June 2005 and Milne Port in June 2006. Data from these stations created a dataset from 2005 to 2010, preceding the development of the Project. Baffinland resumed collecting data from the MET stations at the Mine Site (Photo 4-1) and Milne Inlet (Photo 4-2) in August 2013. These MET stations recorded hourly air temperature, precipitation, wind speed (for all recorded periods), and wind direction (from 2013 onwards). The Milne Port wind direction data were found to have an offset error, which was corrected when Baffinland staff realigned the weathervane on June 26, 2021. A correction factor of 180° was applied to all wind vectors at Milne Inlet before this date. No such corrections were required for the Mine Site.



Where relevant, the 2024 weather data were compared with the 2005 to 2010 and 2013 to 2023 periods, and references were made to the 2013 to 2023 averages. Summaries of 2024 weather conditions at the Mine Site and Milne Port included monthly air temperatures (mean, minimum, and maximum), monthly precipitation (quantity and frequency), wind direction, and wind velocity. Temperature and precipitation data were accurate and reliable throughout 2024.

Baseline data were referenced from Appendix 5A of the Mary River Project Final Environmental Impact Statement (Carrière et al. 2010). Mean air temperatures and precipitation (quantity and frequency) were averaged across the years when those data were collected. Cumulative wind speed and direction proportions were calculated based on data across all years within each period. The complete 2024 climate dataset is contained in Appendix C.



Photo 4-1. Mine Site meteorological weather station.



Photo 4-2. Milne Port meteorological weather station.



4.3 AIR TEMPERATURE AND PRECIPITATION

4.3.1 MINE SITE

4.3.1.1 Temperature

In 2024, monthly mean temperatures at the Mine Site were lowest in February (-29.6°C), rose above zero in June (4.3°C), and peaked in July (9.2°C). Monthly means fell back below zero in October (-3.0°C). The largest positive monthly anomaly occurred in January, at -25.9°C, which was 3.9°C warmer than the 2013 to 2023 average. December had the largest negative monthly anomaly at -29.0°C, which was -3.9°C colder than the 2013 to 2023 average. Temperatures in late winter (January to April) of 2023 to 2024 and early winter (September to November) of 2024 to 2025 were warmer than the 2013 to 2023 average. Mean daily temperatures between June 11 and October 7 remained above 0°C (Figure 4-1).

Extreme temperatures in 2024 at the Mine Site were recorded on January 28 (-47.3°C) and July 18 (19.2°C). These temperatures lie within the recorded historical range. The lowest temperature recorded at the Mine Site was -59.1°C in April 2007³. In the post-2013 monitoring period, the coldest recorded temperature was -48.9°C in February⁴. Comparable historical data (1963 to 1965) in winter months are lacking, but the lowest temperature recorded in late winter/spring was -40.6°C in April 1964. The highest temperature previously registered at the Mine Site was 24.5°C in July 2016. The 1963 to 1965 record is 20.6°C, recorded in July 1965. See Appendix Table C-1 for a complete monthly comparison from 2005 to 2010 and 2013 to 2024.

4.3.1.2 Precipitation

June through September tend to be the wettest months for North Baffin Island, as seen in data trends from the Mine Site (Appendix Table C-1). 2024 was the wettest year since the beginning of detailed monitoring, with above-average rainfall from July to October, including a record-breaking 19 days (Figure 4-2) and 155.2 mm of precipitation in September, which broke the previous record of 18 days and 84.6 mm of precipitation in August 2023. Total annual precipitation was 338.4 mm, breaking the previous record of 187.2 mm in 2023. The average annual precipitation at the Mine Site (for years with good data from 2013 to present) is 179.7 mm. The number of days with precipitation continues to be reported to allow for direct comparisons with years when exact precipitation amounts became unclear due to rain gauge failures.

³ Excluding erroneous readings of extreme lows below -60°C, post September 2009.

⁴ Excluding an erroneous low of -73°C in September 2014.

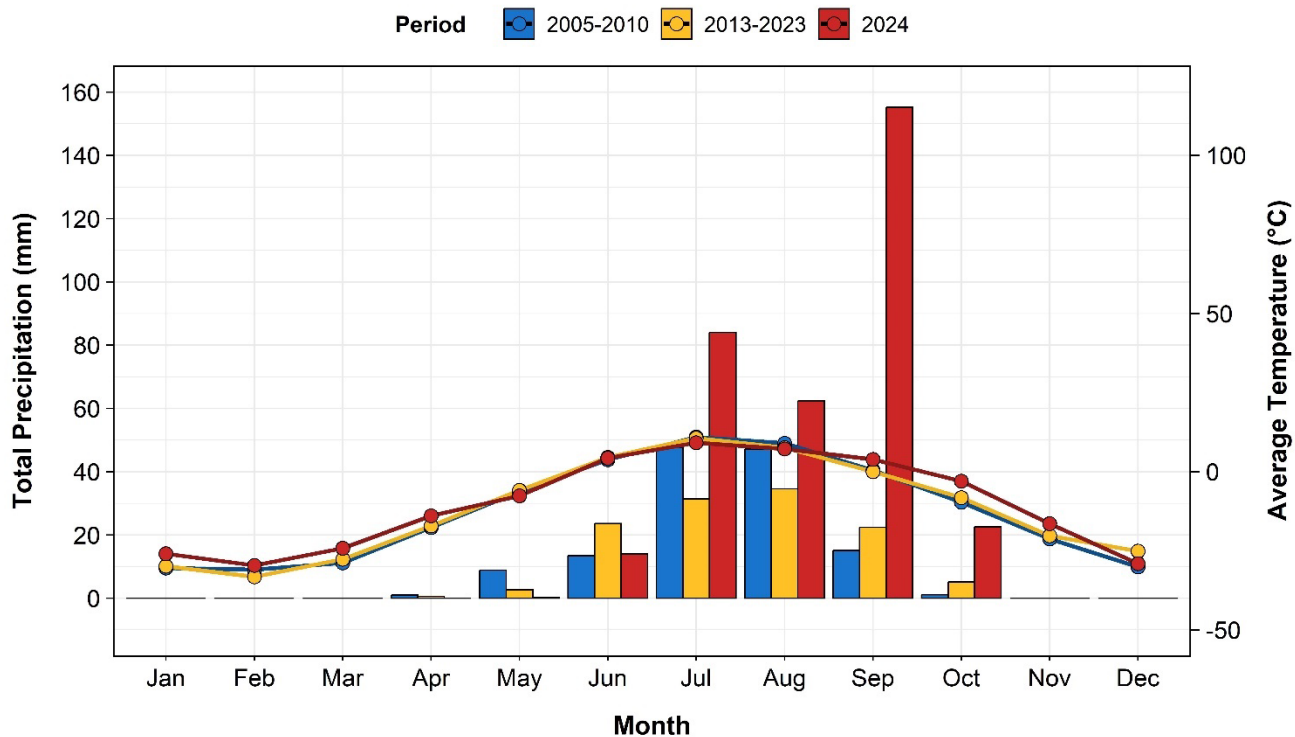


Figure 4-1. Mine Site monthly average air temperature (lines) and total precipitation (bars) from 2005–2010, 2013–2023, and 2024.

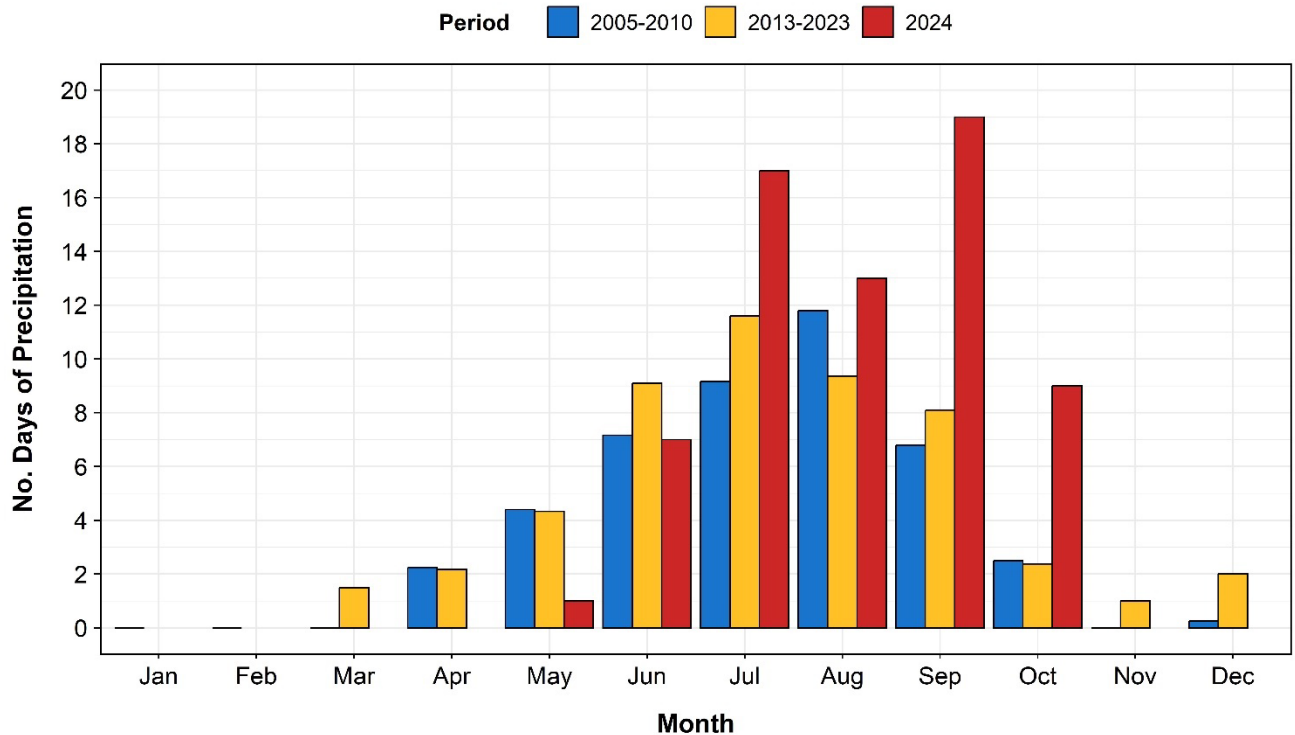


Figure 4-2. Mine Site monthly precipitation frequency (number of days experiencing precipitation) from 2005–2010, 2013–2023, and 2024.



4.3.2 MILNE INLET

4.3.2.1 Temperature

The 2024 trends in temperature and precipitation measured at the Milne Inlet MET station closely reflect the MET station at the Mine Site, but are moderated (warmer in winter, cooler in summer), possibly due to proximity to the ocean. Monthly mean temperatures at Milne Port were at their lowest in February (-27.5°C), rose above freezing in June (2.8°C), and peaked in July (7.7°C) before dropping back below 0°C in October (-2.9°C). The largest positive monthly anomaly occurred in February, 6.4°C warmer than the 2013 to 2023 average. The largest negative monthly anomaly occurred in December, at -27.2°C, which was 0.5°C colder than the 2013 to 2023 average. Temperatures in late winter (January to April) of 2023 to 2024 and fall to early winter (September to November) of 2024 to 2025 were warmer than the 2013 to 2023 average, while all other months were within 1°C of the 2013 to 2023 average. Mean daily temperatures between June 6 and October 7 remained above 0°C (Figure 4-3).

Extreme temperatures in 2024 at Milne Inlet were recorded on January 27 (-41.8°C) and July 19 (18.9°C). These temperatures lie within the recorded historical range. The lowest temperature recorded at Milne Inlet was -50.2°C in January 2019, while the record high of 22.7°C was set in July 2020. See Appendix Table C-2 for a complete monthly comparison from 2006 to 2010 and 2013 to 2024.

4.3.2.2 Precipitation

June through September tend to be the wettest months for North Baffin Island, as seen in data trends from Milne Inlet (Appendix Table C-2). 2024 was the wettest year on record at Milne Inlet, with above-average precipitation from July to October, including a record-breaking 19 days of precipitation in September, which broke the previous record of 17 days of precipitation in August 2023 (Figure 4-4). Total annual precipitation was 200.4 mm, breaking the previous record of 164.8 mm in 2018. The average annual precipitation at Milne Inlet (since 2013) is 88.7 mm. The number of days with precipitation continues to be reported to allow for direct comparisons with years when exact precipitation amounts became unclear due to rain gauge failures.

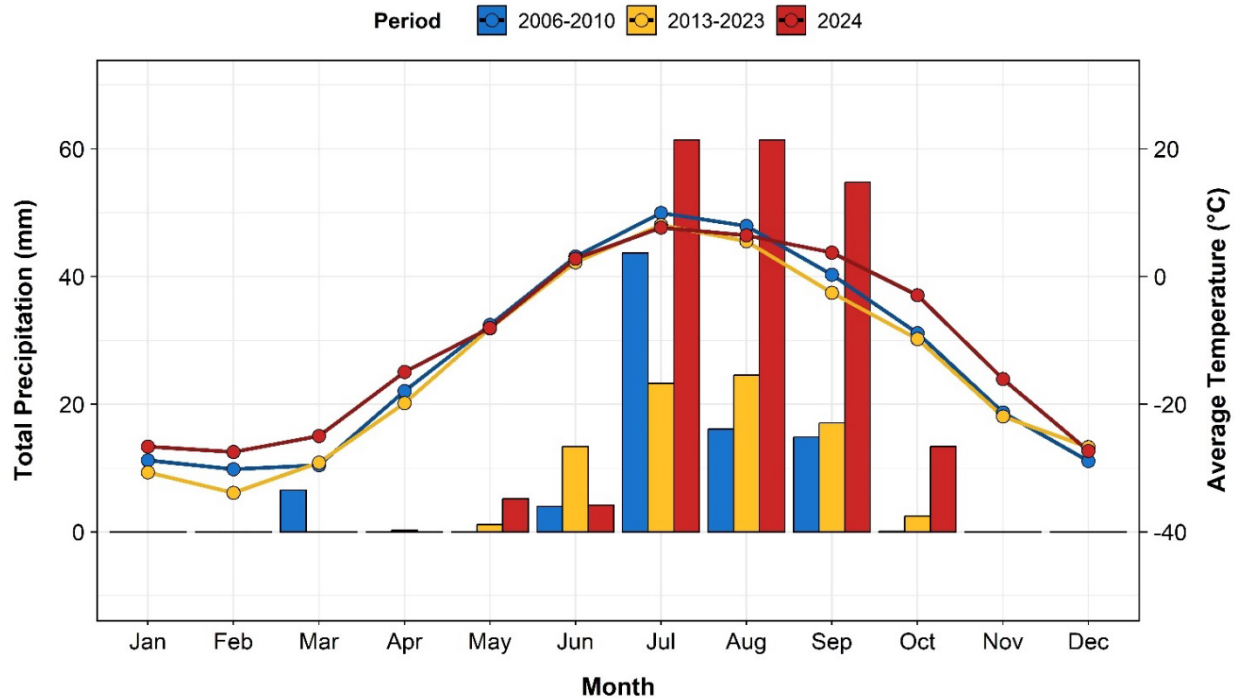


Figure 4-3. Milne Port monthly average air temperature (lines) and total precipitation (bars) from 2006–2010, 2013–2023, and 2024.

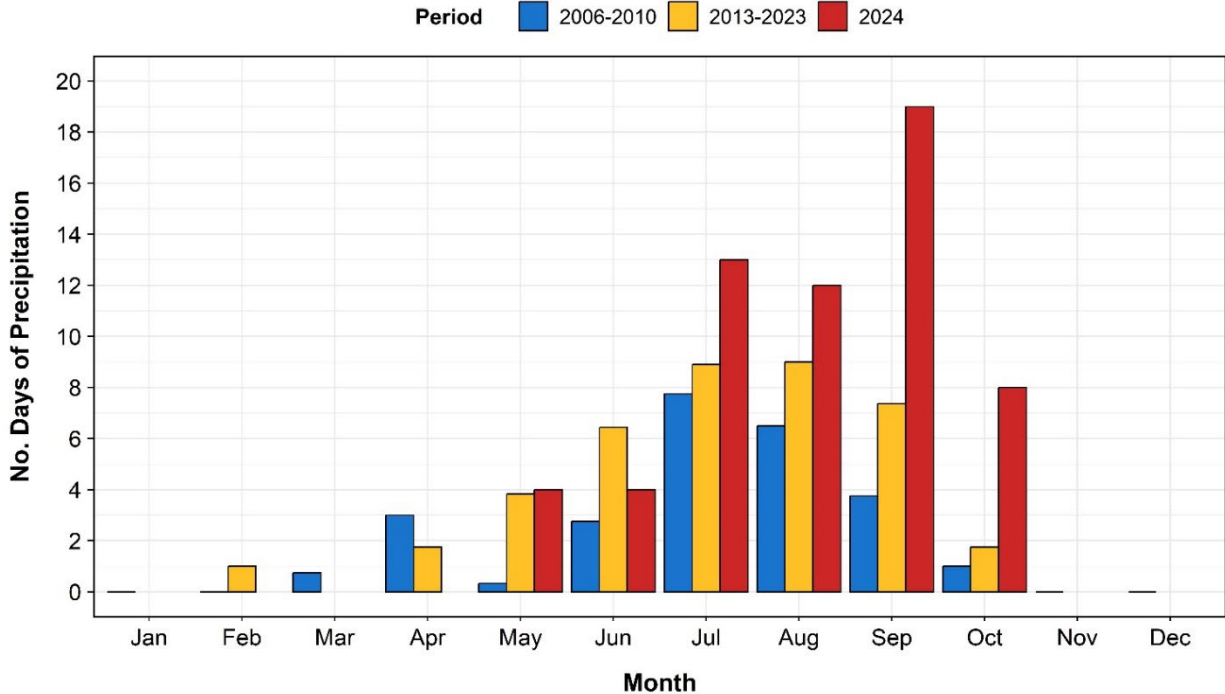


Figure 4-4. Milne Port monthly precipitation frequency (number of days experiencing precipitation) from 2006–2010, 2013–2023, and 2024.



4.3.3 COMPARISON BETWEEN SITES

The Mine Site tends to be warmer and wetter than Milne Inlet. Since the start of continual monitoring in 2013, the Mine Site has had a mean temperature of -11.5°C and annual precipitation of 179.7 mm, while Milne Inlet has had a mean temperature of -13.4°C and annual precipitation of 88.7 mm.

In 2024, the Mine Site had a mean annual temperature of -10.4°C and 338.4 mm of precipitation, compared to -10.6°C and 200.4 mm, respectively, at Milne Inlet. Extreme temperatures had a broader range at the Mine Site, possibly due to the moderating effects of ocean proximity on the Milne Inlet MET station.

Overall, 2024 could be considered a very wet and somewhat warm year at the Mine Site and Milne Inlet. Both sites had record-breaking rainfall frequency and depth, and both sites had seven months with mean temperatures greater than 3°C warmer than the post-2013 average. Observing the change in conditions from year to year, there has been a regional trend towards increased temperatures and rainfall.

4.4 WIND SPEED AND DIRECTION

A comparison of wind conditions between 2024 and the 2013 to 2023 period is provided in this subsection. Data are presented in the form of wind rose plots, which display wind direction, intensity, and frequency. A wind rose contains ‘slices’ pointing in different compass directions, with a longer slice indicating more time with wind blowing from that direction. The coloured bands of each slice correspond to wind velocities as defined by the Beaufort Scale (Table 4-1), with blue bands representing the lightest breezes and red bands representing the heaviest gales. Any average speeds $>20.8\text{ m/s}$ were included in the ‘gale’ category because of their relatively low frequency of occurrence. Wind data with zero values for hourly average wind speed and wind direction were excluded from analyses. Environment Canada did not record wind data at the Mine Site MET station between 1963 and 1965, so no comparison was possible.

Table 4-1. Beaufort Scale used for wind speed measurements at the Mary River Project.

Beaufort Number	Name	Knots	km/h	m/s
0	Calm	<1	<1	<0.3
1	Light Air	1–3	1–5	0.3–1.5
2	Light Breeze	4–6	6–11	1.6–3.3
3	Gentle Breeze	7–10	12–19	3.4–5.5
4	Moderate Breeze	11–16	20–28	5.5–7.9
5	Fresh Breeze	17–21	29–38	8.0–10.7
6	Strong Breeze	22–27	39–49	10.8–13.8
7	Near Gale	28–33	50–61	13.9–17.1
8	Gale	34–40	62–74	17.2–20.7
9	Strong Gale	41–47	75–88	20.8–24.4
10	Storm	48–55	89–102	24.5–28.4
11	Violent Storm	56–63	103–117	28.5–32.6
12	Hurricane	>64	>117	>32.7



4.4.1 MINE SITE

4.4.1.1 2024 Wind

At the Mine Site MET station in 2024, the prevailing wind directions were along a northwest-southeast axis, predominately from the southeast and south-southeast (Figure 4-5). Winds along the northwest-southeast axis were most commonly characterized as ‘gentle breeze’ (3.3 to 5.6 m/s) or ‘moderate breeze’ (5.6 to 8.1 m/s). Winds from the east were less common but tended to be higher intensity, and the heaviest wind in 2024, a 25.1 m/s ‘storm’, was recorded blowing from the east on October 2. Winds from the north, west, and southwest were uncommon and generally weak, with the most common winds from these directions being ‘light air’ (0.3 to 1.7 m/s).

4.4.1.2 2013–2023 Wind

Wind directions and velocities in 2024 at the Mine Site MET station were consistent with the 2013 to 2023 period (Figure 4-6). Winds most frequently blew from the northwest or southeast, winds from the east were uncommon but tended to be the strongest, while winds from the north, west, and southwest were uncommon and weak. The maximum wind velocity recorded during this period at the Mine Site MET station was a ‘violent storm’ of 28.6 m/s from the east on October 23, 2023. A 41.9 m/s ‘hurricane’ was recorded in June 2006 during a period when wind speed was collected without directional information.

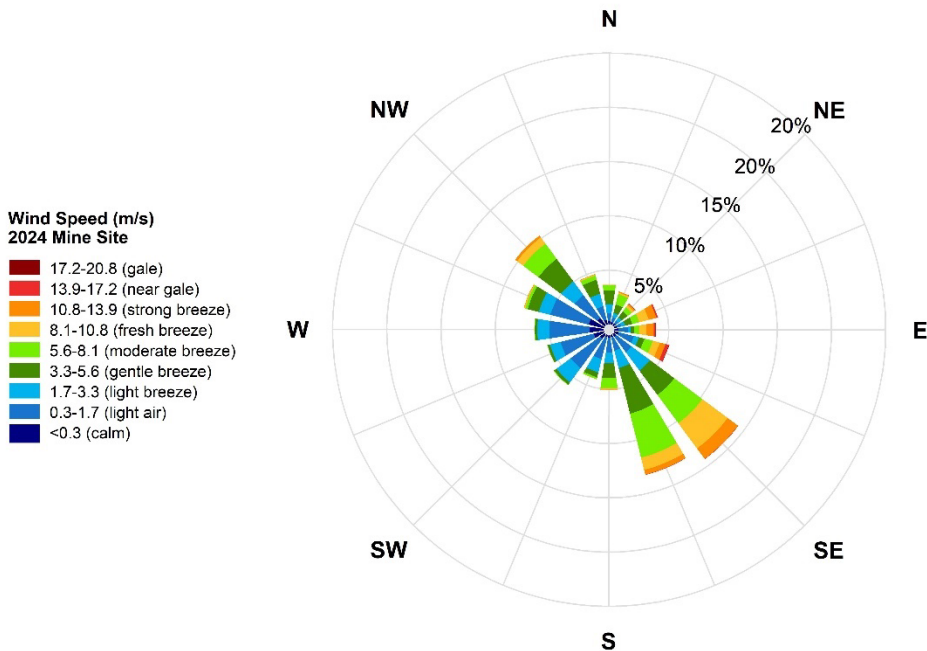


Figure 4-5. The cumulative proportions of wind speeds and directions at the Mine Site meteorological station in 2024.

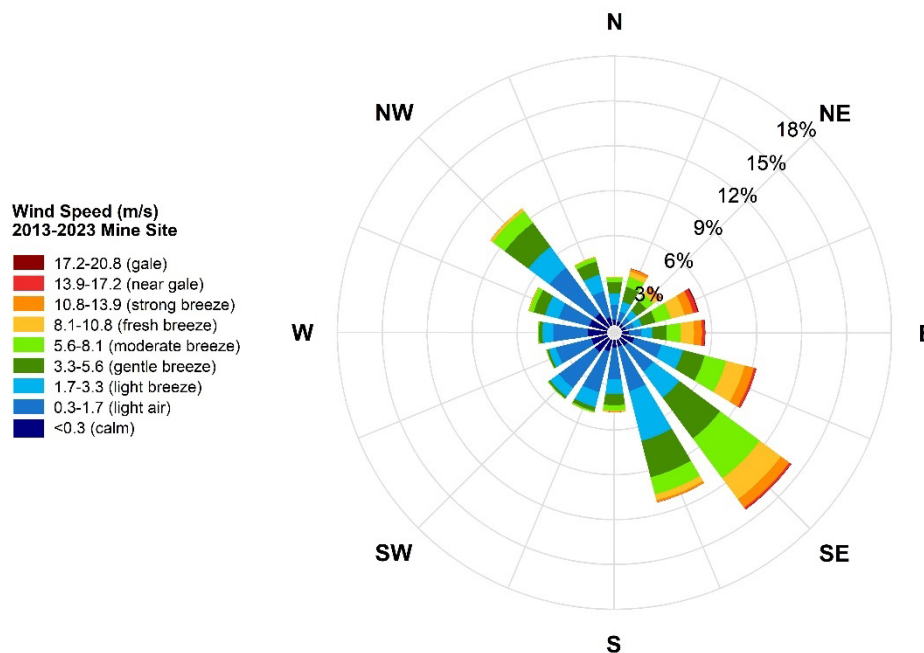


Figure 4-6. The cumulative proportions of wind speeds and directions at the Mine Site meteorological station from 2013 to 2023.

4.4.2 MILNE INLET

4.4.2.1 2024 Wind

Prevailing winds at the Milne Inlet MET station in 2024 came primarily from the southwest and north-northwest (Figure 4-7). The southwest winds are onshore winds (blowing from land to water) that move down Milne Inlet, while the north-northwest winds are offshore winds (blowing from water onto land) that blow perpendicular to the length of Milne Inlet.

The prevailing wind directions at the Milne Inlet MET station received the largest proportions of ‘gale’ (17.2 to 20.8 m/s) or stronger winds. The most common winds from the southwest were ‘fresh breeze’ (8.1 to 10.8 m/s) and ‘strong breeze’ (10.8 to 13.9 m/s), while the most common winds from the north-northwest were ‘moderate breeze’ (5.6 to 8.1 m/s). The heaviest wind in 2024 was a 33.7 m/s ‘hurricane’ on September 21, which blew from the southwest and south-southwest. Winds from the southeast and west were very uncommon and weak when they occurred.

4.4.2.2 2013–2023 Wind

Wind directions and velocities in 2024 at the Milne Inlet MET station were consistent with the 2013 to 2023 period (Figure 4-8). Winds most frequently blew from the southwest and northwest, and tended to be the strongest, while winds from the east and west were less common and weaker. Onshore winds from the



southeast were relatively more common during the 2013 to 2023 period, but were still generally weak. The maximum reliable wind velocity recorded during this period at the Milne Inlet MET station was a 40.35 m/s 'hurricane' from the southwest in April 2016.

4.4.2.3 Seasonal Patterns

A study of individual months of wind identified a seasonal pattern of winds at Milne Inlet. During winter, winds blew along a southwest-northeast axis (the orientation of the inlet), predominately from the southwest. This pattern was clearest from December to March (Figure 4-9). During summer, winds were primarily from the north-northwest and southwest, with northeast winds becoming less prominent (Figure 4-10). This pattern was clearest from June to September. These patterns were first described in 2023, and were observed to be the same in 2024.

4.4.2.4 Data Quality

Recorded wind directions at Milne Inlet before June 26, 2021, were offset by 180° due to an error in installing the weather vane. This error was corrected on that date, but this correction was not immediately communicated to EDI Environmental Dynamics Inc. This caused the long-term dataset to incorrectly indicate a major shift in wind patterns during previous annual climate summaries. In this report, the erroneous wind directions have been corrected, showing that there has been no change in prevailing wind patterns at Milne Inlet since the beginning of monitoring.

Anomalously high wind speeds with a maximum output (100 m/s) were intermittently recorded between January 2018 and February 2019. These wind speed recordings are believed to be an anemometer error. Most occurred during very cold periods, with the mean temperature during these extreme readings being -35.4°C. This correlation does not make clear the mechanism that caused these erroneous and uncorroborated measurements. From March 2019 onwards, no such extreme wind speeds have been recorded.

Instrument failures occasionally interrupted climate data collection between January 2019 and August 2021. No such issues were detected after this period.

Reliable data collection since August 2021 can be attributed to improvements to the meteorology monitoring program. This includes monthly meteorology data quality checks, quarterly reviews by independent subject matter experts, and comparisons against other regional weather monitoring data. When data quality issues arise, the meteorology monitoring equipment is physically checked. Physical checks for the Milne Port MET stations are only possible when a helicopter is available (no helicopter is available during winter).

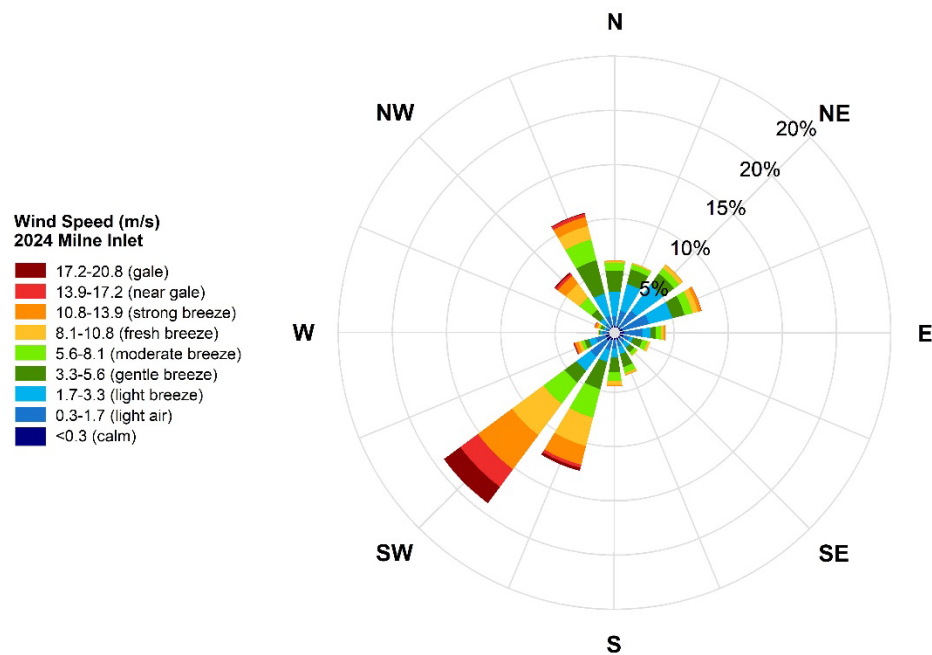


Figure 4-7. The cumulative proportions of wind speeds and directions at the Milne Port meteorological station in 2024.

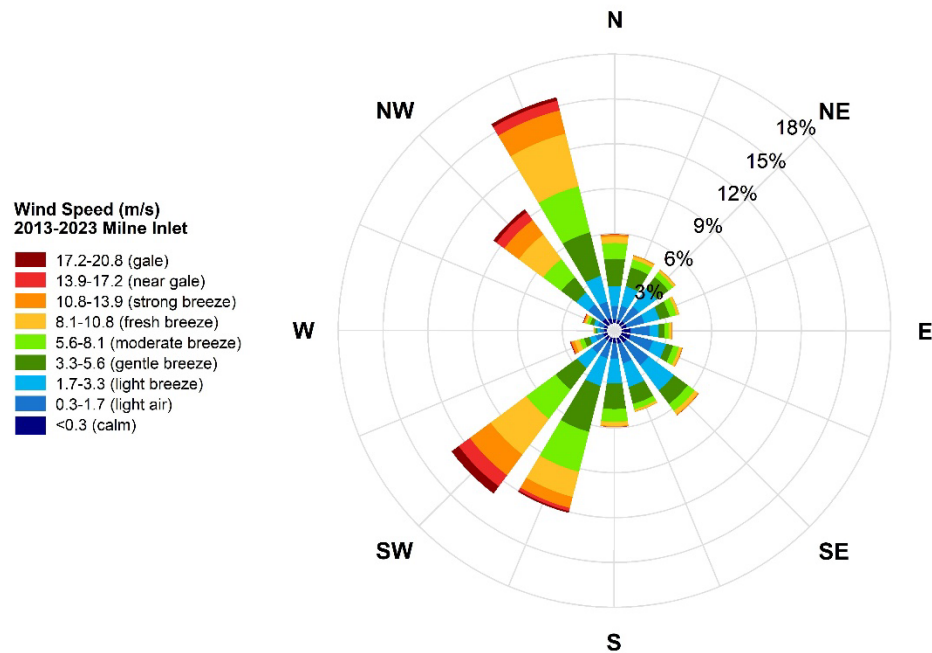


Figure 4-8. The cumulative proportions of wind speeds and directions at the Milne Port meteorological station from 2013 to 2023.

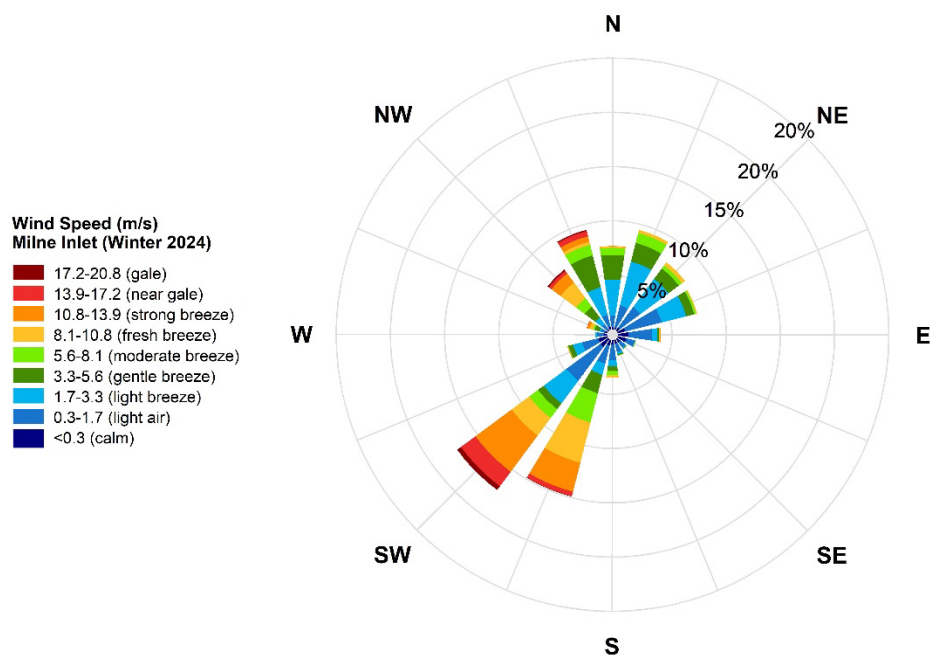


Figure 4-9. Winter wind patterns at the Milne Port meteorological station from January to March and December 2024.

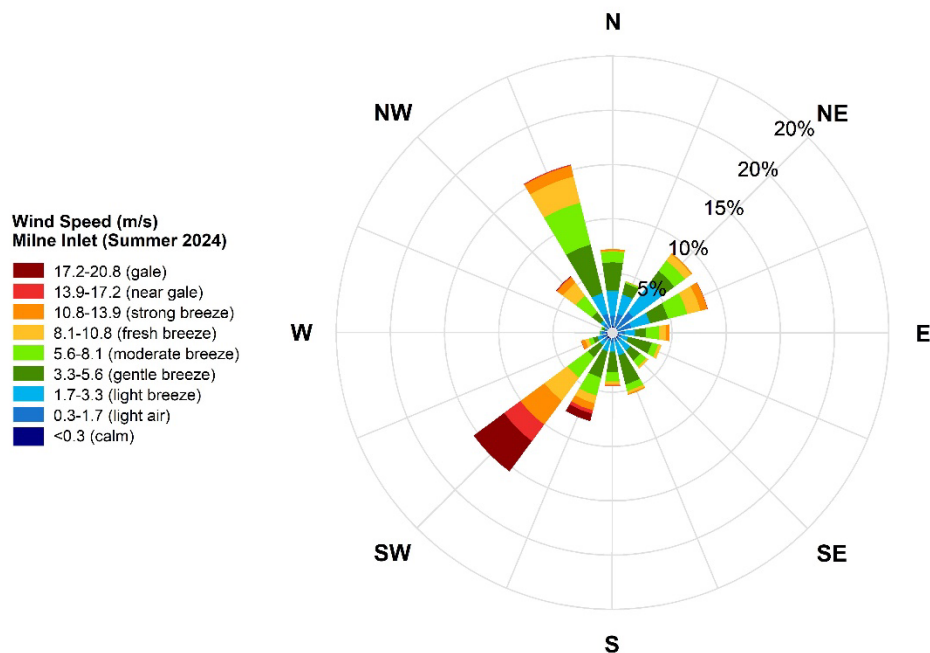


Figure 4-10. Summer wind patterns at the Milne Port meteorological station from June to September 2024.



5 HELICOPTER OVERFLIGHTS

The Nunavut Impact Review Board Project Certificate No. 005 Amendment 3 includes three Project Conditions (PCs) related to helicopter overflight altitudes to reduce disturbance to wildlife (Nunavut Impact Review Board 2020). The conditions include:

- **PC #59** *“The Proponent shall ensure that aircraft maintain, whenever possible (except for specified operational purposes such as drill moves, take offs and landings), and subject to pilot discretion regarding aircraft and human safety, a cruising altitude of at least 610 metres during point-to-point travel when in areas likely to have migratory birds, and 1,000 metres vertical and 1,500 metres horizontal distance from observed concentrations of migratory birds (or as otherwise prescribed by the Terrestrial Environment Working Group) and use flight corridors to avoid areas of significant wildlife importance...”*
- **PC #71** *“Subject to safety requirements, the Proponent shall require all project-related aircraft to maintain a cruising altitude of at least:*
 - *650 m during point-to-point travel when in areas likely to have migratory birds*
 - *1,100 m vertical and 1,50 m horizontal distance from observed concentrations of migratory birds*
 - *1,100 m over the area identified as a key site for moulting Snow Geese during the moulting period (July–August), and if maintaining this altitude is not possible, maintain a lateral distance of at least 1,500 m from the boundary of this site.”*
- **PC #72** *“The Proponent shall ensure that pilots are informed of minimum cruising altitude guidelines and that a daily log or record of flight paths and cruising altitudes of aircraft within all Project Areas is maintained and made available for regulatory authorities such as Transport Canada to monitor adherence and to follow up on complaints.”*

Baffinland Iron Mines Corporation (Baffinland), in collaboration with the Terrestrial Environment Working Group (TEWG), is committed to “specific measures to ensure that employees and subcontractors providing aircraft services to the Project are respectful of wildlife and Inuit harvesting that may occur in and around Project areas” (Qikiqtani Inuit Association and Baffinland Iron Mines Corporation 2014). Data from helicopter flight logs were analyzed to determine compliance with these PCs and Baffinland’s commitments.

Helicopter Overflights Summary

Analysis of flight tracklog data and daily pilot timesheets (with flight details) was used to determine helicopter overflight compliance at the Project.

Compliance — From May 26 through September 26, the total flight time in 2024 was 434.95 hours, less than all previous years. Overall, compliance was 18.64% compliant, 53.64% compliant with rationale (combined compliance of 72.28%), and 27.72% non-compliant. Flights within the Snow Geese area accounted for 24.94 hours (5.73% of total flight hours) and 20.6% of all transits. During the moulting season (July 1 to August 31), compliance in the Snow Geese area was 9.41% compliant, 60.62% compliant with rationale (combined compliance of 70.03%), and 29.97% non-compliant.



Compliance Rationale — Flights with pilot rationale accounted for 53.64% of total flight hours. The most common rationales for flying below the cruising altitude requirements in 2024 were geophysical survey (16.49% of total flight hours), weather-related circumstances (15.12% of total flight hours), and short-distance flights (13.85% of total flight hours). Within the Snow Geese area and the 1,500 m buffer during the moulting season, where the cruising altitude requirement is $\geq 1,100$ metres above ground level (magl), compliant with rationale flights accounted for 60.62% of flight hours (1.68% of total flight hours).

Inter-annual Trends — Overall, combined compliance was greater than 90% from 2018 to 2023, with non-compliant flights fluctuating between 4% and 8%. Combined compliance for 2024 (72.28%) was comparable to that for 2017 (73.39%). The number of transits (204) and flight hours (24.94) within the Snow Geese area during the moulting season was lower in 2024 compared to 2023, but similar to previous years (2019 and 2021). Flight hours (5.73%) within the Snow Geese area during the moulting season were higher than the previous six years, and non-compliant flights increased to 29.97% in 2024, the highest since 2022.

5.1 METHODS

5.1.1 MONITORING HISTORY AND CHANGES IN OVERFLIGHT ANALYSIS AT THE PROJECT

Changes have been made to the helicopter overflight monitoring and analysis program based on data analysis, interpretation, and input from the TEWG. The following information summarizes key milestones and responses to TEWG comments leading up to the 2024 helicopter overflight analysis.

2015 — Start of helicopter overflight analysis. Compliance was determined based on the elevation above the ground of points using data from helicopter flight logs.

2017 — Pilot rationale for low-level flights was included in flight logs and used in compliance evaluation.

2020 — Additional reporting on helicopter pilot rationale and flight time was requested during the 2020 TEWG meeting (Baffinland Iron Mines Corporation 2020). Recommendations led to re-analyzing the 2017 to 2019 helicopter flight data⁵ to align with updated (2020) standards.

2021 — The Government of Nunavut (GN) requested—in commentary on the 2020 Terrestrial Environment Annual Monitoring Report (TEAMR; refer to comment GN AR#02; Nunavut Impact Review Board 2021)—re-analysis of 2015 to 2016 helicopter overflight data⁶ to align with 2020 standards using the methods described in this section.

2023 — The GN requested—in commentary on the 2022 Nunavut Impact Review Board Annual Report (refer to comment GN AR#01; Baffinland Iron Mines Corporation 2023a)—amendments to the helicopter

⁵ 2017 to 2019 data re-analysis provided in Appendix D, 2020 TEAMR (EDI Environmental Dynamics Inc. 2021).

⁶ 2015 to 2016 data re-analysis provided in Appendix B, 2021 TEAMR (EDI Environmental Dynamics Inc. 2022a). Only the flight time portion of the analysis could be conducted (partial analysis given that pilot rationale for non-compliance was not collected).



overflight rationale definitions that were addressed through ancillary consultations and discussions⁷. The 2023 helicopter overflight data were collected using the amended list of rationale. The 2017 to 2022 helicopter data were re-categorized into the new rationale to compare with the 2023 helicopter data.

2024 — The Canadian Digital Elevation Model used in the previous years' analysis was no longer supported by Natural Resources Canada and was replaced by the Medium Resolution Digital Elevation Model for use in the flying height above sea level calculations (Natural Resources Canada 2024).

5.1.2 DATA COLLECTION AND ANALYSIS

A discrepancy exists between PC #59 (i.e., which prescribes a cruising altitude requirement of 610 magl in areas likely to have migratory birds) and PC #71 (i.e., which prescribes a cruising altitude requirement of 650 magl in areas likely to have migratory birds). Considering that most (if not all) areas where Baffinland operated from May through September 2024 were likely to have migratory birds present, the default minimum cruising altitude for the analysis was 650 magl.

As per PC #71, the analysis included the following aircraft cruising altitudes in consideration of migratory birds during specific periods:

- 1,100 magl while travelling within the key moulting area for Snow Geese during the moulting season (July and August) or maintaining 1,500 m horizontal distance from the boundary of the key moulting area (the combined areas hereafter referred to as the Snow Geese area);
- 650 magl during point-to-point travel in areas outside the Snow Geese area during the moulting season, and in all areas in all other months; and,
- 1,100 magl and 1,500 m horizontal distance from observed concentrations of migratory birds year round (i.e., all months).

Canadian Helicopters supplied flight tracklog data and daily pilot timesheets (with flight details) to provide context and further explain the need for transits that did not meet cruising altitude requirements. Point data were provided in feet above sea level and converted to metres above sea level (masl). A digital elevation model was used to estimate ground-level elevation above sea level, which provided elevation data to calculate the helicopter tracklog's altitude above ground level. To calculate the elevation above ground level in metres (i.e., magl) at each tracklog point, the masl from the digital elevation model was subtracted from the masl from the helicopter tracklog.

Quality assurance/quality control procedures were completed by comparing calculated values in relation to the status field of the flight tracklog data. It was assumed that when the helicopter status was 'TakeOff', 'Landing Time', or 'OnGround', the elevation would be at or close to 0 magl. With a sample size of 3,005

⁷ "Baffinland met with Brad Pirie, John Ringrose, and Agnes Simonfalvy from the GN Department of Environment at 10:00 am EST on January 5, 2023, via ZOOM to discuss the current list of acceptable rationale for low-level helicopter flights. Baffinland jointly developed a revised list of acceptable rationale for low-level helicopter flights with the GN to aid with raising compliance, which is included as Table 4.22 in PC # 59 of the NIRB Annual Report" (from the TEWG No. 30 meeting minutes Action ID T-28042022-2; Baffinland Iron Mines Corporation 2023).



points, the average elevation above ground level was 16.96 m. The standard deviation in 2024 indicated accuracy was approximately ± 7.52 m.

The flight tracklog points were joined with the pilot rationale from daily timesheets and converted to flight line segments for analysis. Each line segment represented a straight line between two consecutive flight tracklog points within the same transit. Tracklog points were recorded approximately every two minutes during flight, resulting in line segments with a duration of two minutes and variable lengths depending on the flight speed. The flight time and minimum cruising altitude were calculated for each flight line segment. Flight time was calculated for each pilot rationale stated in the daily timesheets.

Data were split into two categories: (1) data within the Snow Geese area during the moulting season (July and August) in relation to the 1,100 magl cruising altitude and 1,500 m horizontal distance requirement; and (2) data outside the Snow Geese area during the moulting season, and in all areas during all other months, in relation to the 650 magl cruising altitude requirement. The datasets were then analyzed separately to assess specific cruising altitude allowances using the different areas and minimum requirements. The first and last flight line segments of a flight as the helicopter takes off or lands were considered compliant, despite being below the cruising altitude requirement. Flight data with rationale for flying at lower elevations than required were deemed ‘compliant with rationale’. Based on these criteria, flight data were organized into six categories described in Table 5-1.

Pilots were given the spatial boundaries of any identified concentrations of migratory birds to comply with the horizontal guidelines, which were buffered by the required 1,500 m horizontal avoidance distance. The boundaries were programmed into the helicopter Geographic Positioning System (GPS) and pilots were directed to avoid flying in these areas as specified in the *Canadian Helicopters Instructions Local Operating Procedures* checklist. The only area provided for horizontal avoidance and analysis in 2024 was the key moulting area for Snow Geese provided by Environment and Climate Change Canada.

Table 5-1. Helicopter overflight compliant categories.

Compliant Category	Description
Compliant	Data within the Snow Geese area in July and August where the 1,100 magl cruising altitude requirement was achieved.
Compliant	Data outside the Snow Geese area in July and August, and in all areas during all other months, where the 650 magl cruising altitude requirement was achieved.
Compliant with rationale	Data within the Snow Geese area in July and August where the 1,100 magl cruising altitude requirement was not achieved, but a rationale for low-level flying was given.
Compliant with rationale	Data outside the Snow Geese area in July and August, and in all areas during all other months, where the 650 magl cruising altitude requirement was not achieved, but a rationale for low-level flying was given.
Non-compliant	Data within the Snow Geese area in July and August where the 1,100 magl cruising altitude requirement was not achieved and no rationale for low-level flying was given.
Non-compliant	Data outside the Snow Geese area in July and August, and in all areas during all other months, where the 650 magl cruising altitude requirement was not achieved and no rationale for low-level flying was given.



5.2 RESULTS AND DISCUSSION

5.2.1 COMPLIANCE

Only the key moulting area for Snow Geese was identified for helicopter avoidance in 2024. No locations or boundaries of areas prescribed explicitly by the TEWG or areas of observed concentrations of other migratory birds were identified in 2024. As a result, except for the Snow Geese area, no analysis was required to determine compliance with the 1,100 m vertical and 1,500 m horizontal distances for any other location. No known public complaints were recorded in 2024 regarding helicopter overflights that required specific follow-up actions.

In 2024, Canadian Helicopters operated three helicopters during the summer season, one less than in 2023. The helicopters arrived on site May 26, June 2, and June 3. They were in operation for the entire season, then departed August 31, September 5, and September 28.

A total of 992 transits were flown from May to September 2024; 204 transits (20.6%) intersected the Snow Geese area (key moulting area plus the 1,500 m horizontal buffer) during the moulting season (July and August) and 788 transits (79.4%) were outside the Snow Geese area and in all areas during all other months (Table 5-2). The total flight time was 434.95 hours, accounting for 14.5% of available hours from May 26 to September 28 (3,000 hours). During the moulting season, 24.94 hours (5.73%) were flown within the Snow Geese area. Out of the Snow Geese area and in all areas during all other months, 410.02 hours (94.27%) were flown (Table 5-3).

The number of flights and flight hours within the Snow Geese area during the 2024 moulting season (July and August) decreased compared to 2023, but the percentage increased due to the reduced number of total flights and hours. These flight hours accounted for 1.68% of the total available hours during the two months of the moulting period (1,488 hours). Cruising altitude compliance within the Snow Geese area during the moulting season was 9.41% compliant, 60.62% compliant with rationale, and 29.97% non-compliant (Table 5-4, Map 5-3, Map 5-4). Combined compliance (compliant plus compliant with rationale) was 70.03%. Most flights within the Snow Geese area during the moulting season were transits along the edges, away from the core of the Snow Geese area, identified as having higher concentrations of geese⁸ (Map 5-3, Map 5-4).

⁸ Flights within the Snow Geese area are considered non-compliant if they do not meet the altitude requirements or are not provided rationale in the pilot daily timesheets. Pilots maintain a 1,100 m vertical distance above ground level when flying within the Snow Geese area during the moulting season whenever possible. If this cruising altitude is not possible for safety or operational reasons, pilots maintain a 1,500 m horizontal distance if the flight path allows. However, this 1,500 m horizontal buffer is not always practical as it results in longer flight times and prolongs potential disturbance. Alternatively, pilots occasionally fly over the eastern edge of the Snow Geese area to reduce flight time and minimize potential disturbance. Baffinland understands that Snow Geese are typically concentrated in the core of the moulting area and are seldom present along its periphery. Disturbance to birds under flight paths along this periphery is expected to be minimal.



Overall, compliance in all areas between May and September 2024 was 18.64% compliant, 53.64% compliant with rationale, and 27.72% non-compliant (Table 5-5, Map 5-1 to Map 5-5). Combined compliance (compliant plus compliant with rationale) varied across the reporting period, ranging from 18.51% in May to 79.28% in August, with June, July, and September falling within the 51.71% to 73.21% range. Non-compliant flights followed defined flight corridors to work areas and monitoring sites such as Brucehead, Steensby Inlet, surrounding lakes, and survey sites (Map 5-1 to Map 5-5).

Table 5-2. The number of transits flown per month with a breakdown of transits (Nº and %) flown within and outside the Snow Geese area, May 26 to September 28, 2024.

Month	Total Nº of Transits	Within Snow Geese Area During Moulting Season (July and August)		Outside Snow Geese Area During Moulting Season and All Areas in Other Months	
		Nº of Transits	% Transits	Nº of Transits	% Transits
May	10	-	-	10	100.0
June	137	-	-	137	100.0
July	365	114	31.2	251	68.8
August	359	90	25.1	269	74.9
September	121	-	-	121	100.0
Total	992	204	20.6	788	79.4

Note: Total values may be off from row/column sums by 0.01 due to rounding.

Table 5-3. Number of flight hours per month with a breakdown of flight time (hours and %) flown within and outside the Snow Geese area, May 26 to September 28, 2024.

Month	Total Hours per Month	Total Flight Hours	Within Snow Geese Area During Moulting Season (July and August)		Outside Snow Geese Area During Moulting Season and All Areas in Other Months	
			Flight Hours	% Flight Time	Flight Hours	% Flight Time
May	120	3.32	-	-	3.32	100.00
June	720	43.80	-	-	43.80	100.00
July	744	176.80	12.77	7.22	164.03	92.78
August	744	172.70	12.17	7.05	160.53	92.95
September	672	38.34	-	-	38.34	100.00
Total	3,000	434.95	24.94	5.73	410.02	94.27

Note: Total values may be off from row/column sums by 0.01 due to rounding.



Table 5-4. Number of flight hours of cruising altitude compliance ($\geq 1,100$ magl) within the Snow Geese area during the moulting season, July 1 to August 31, 2024.

Month	Area	Total Hours per Month	Total Flight Hours	Compliant		Compliant with Rationale		Combined Compliance	Non-compliant	
				hrs	%	hrs	%		hrs	%
July	Within SNGO ¹ Area	744	12.77	1.39	10.87	7.22	56.56	67.43	4.16	32.57
August	Within SNGO ¹ Area	744	12.17	0.96	7.88	7.90	64.89	72.77	3.31	27.23
Total		1,488	24.94	2.35	9.41	15.12	60.62	70.03	7.47	29.97

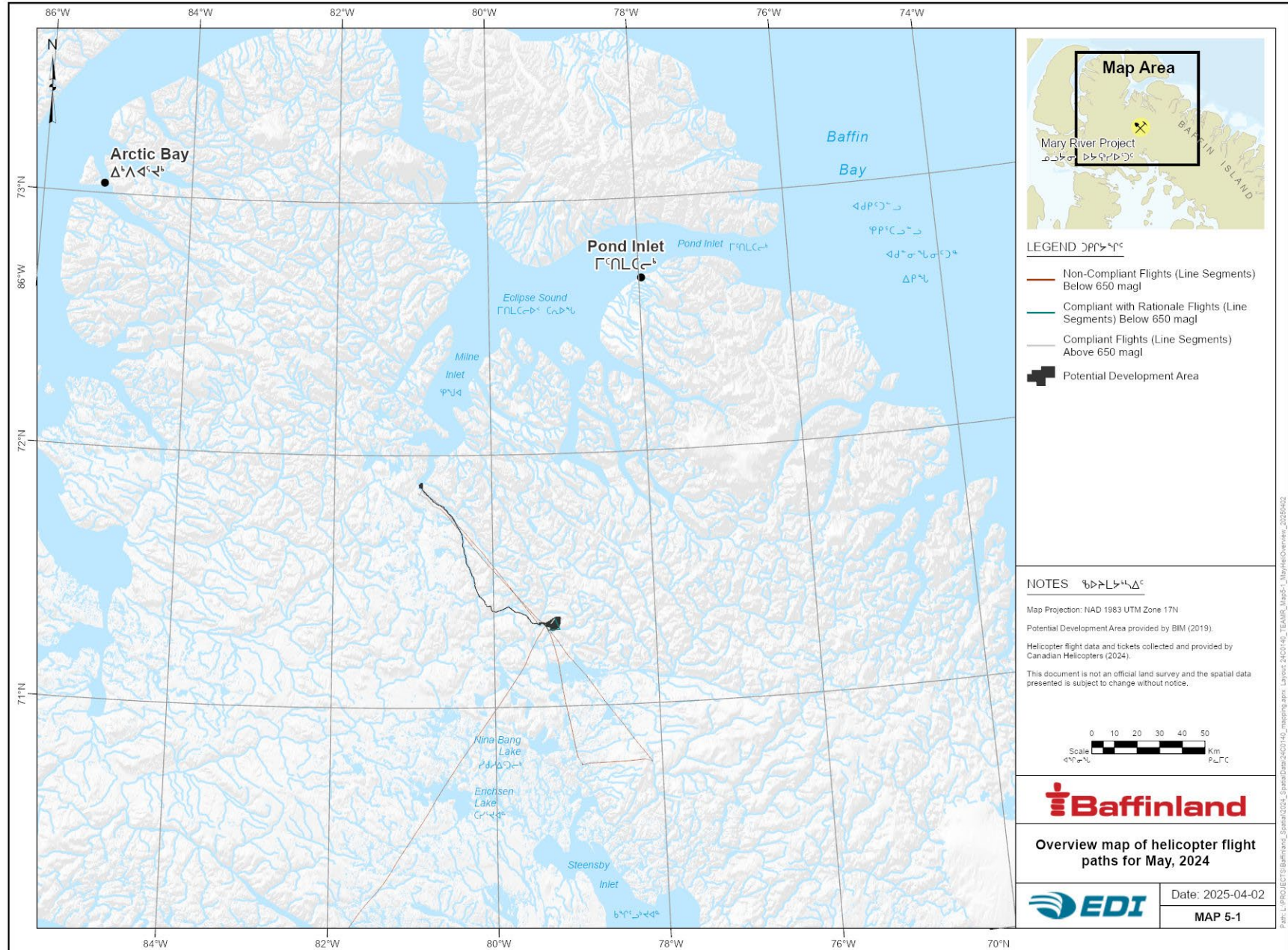
¹ SNGO = Snow Geese.

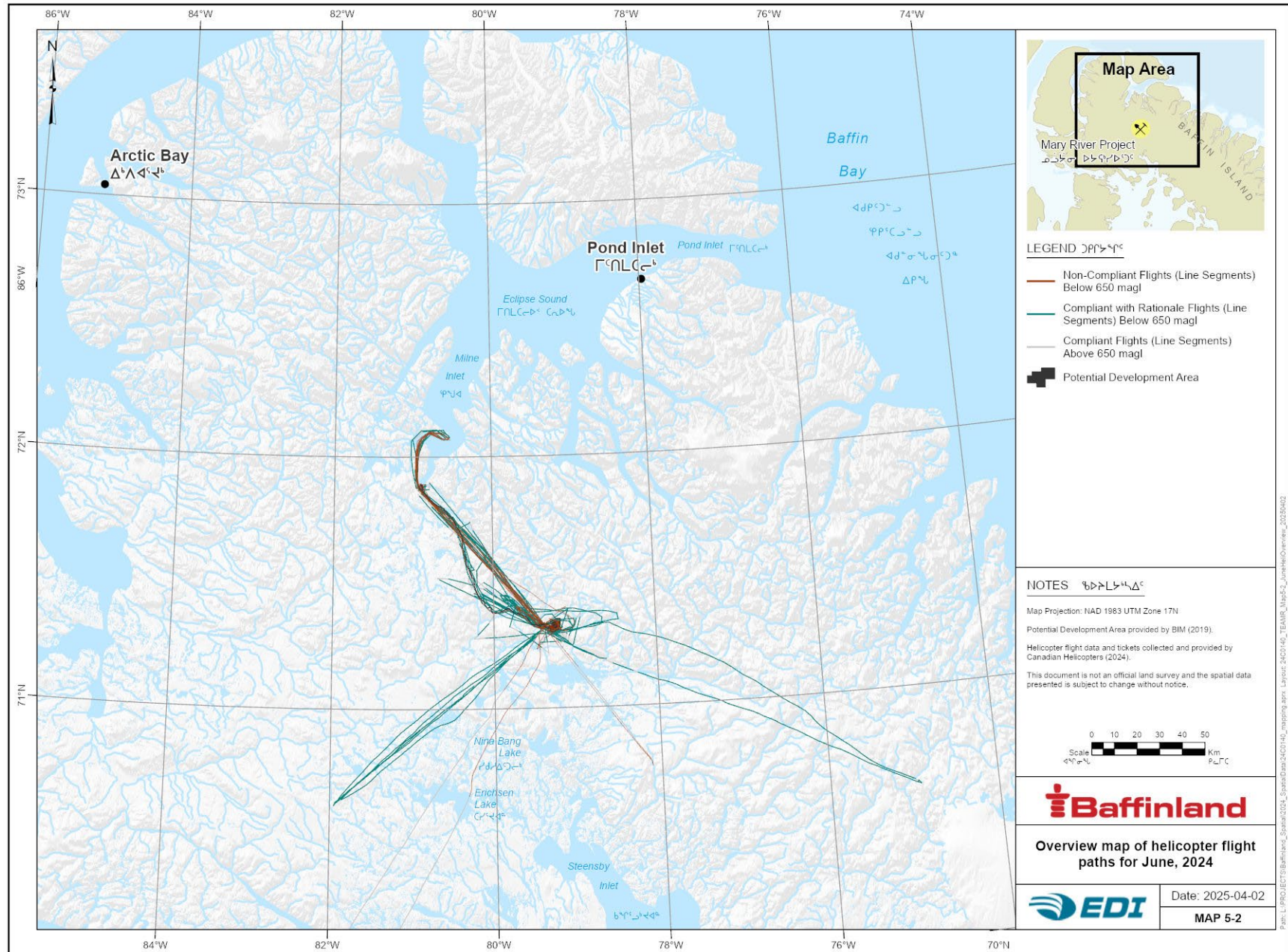
Note: Total values may be off from row/column sums by 0.01 due to rounding.

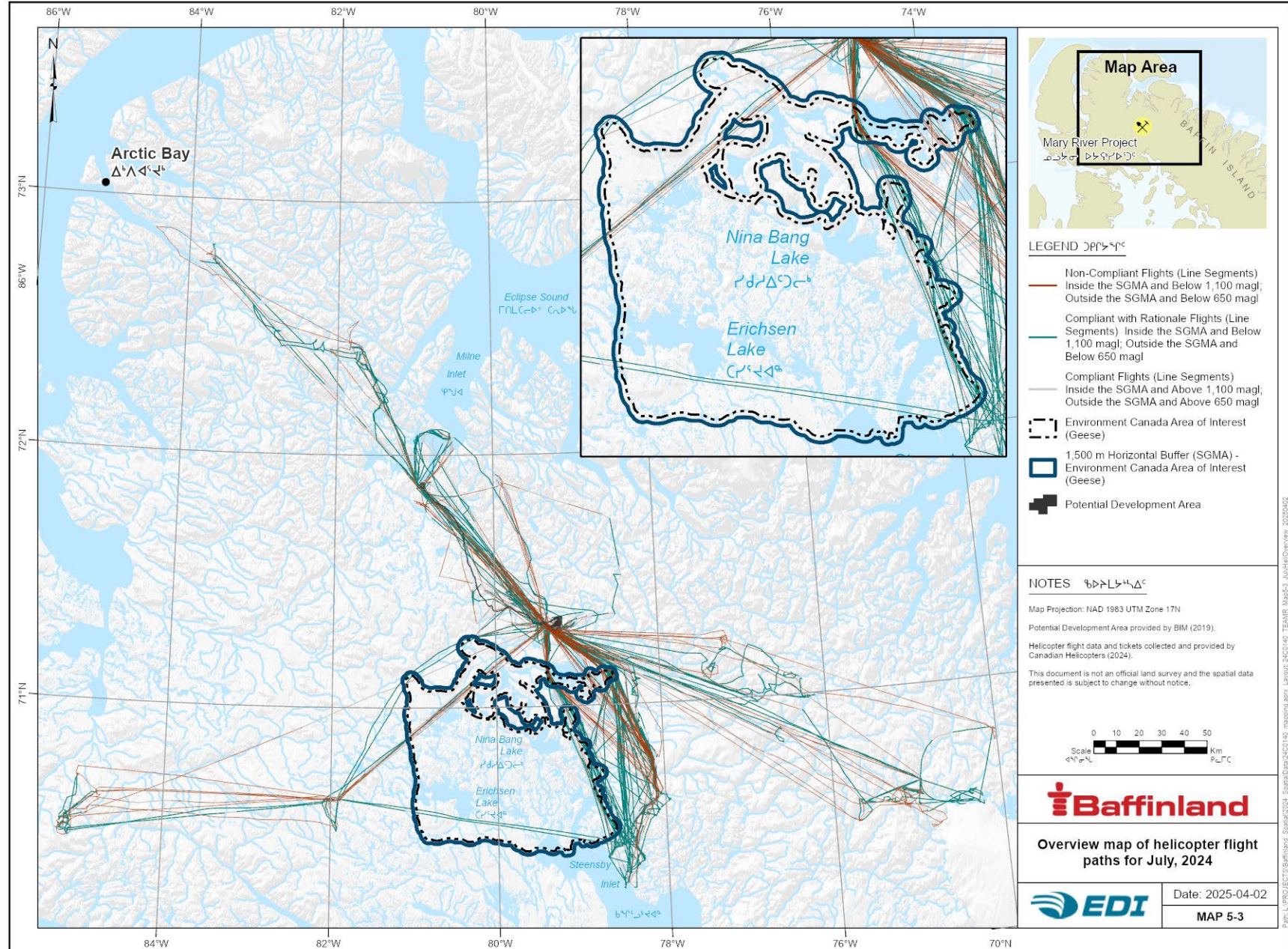
Table 5-5. Number of flight hours of overall cruising altitude compliance in all areas for all months between May 26 to September 28, 2024.

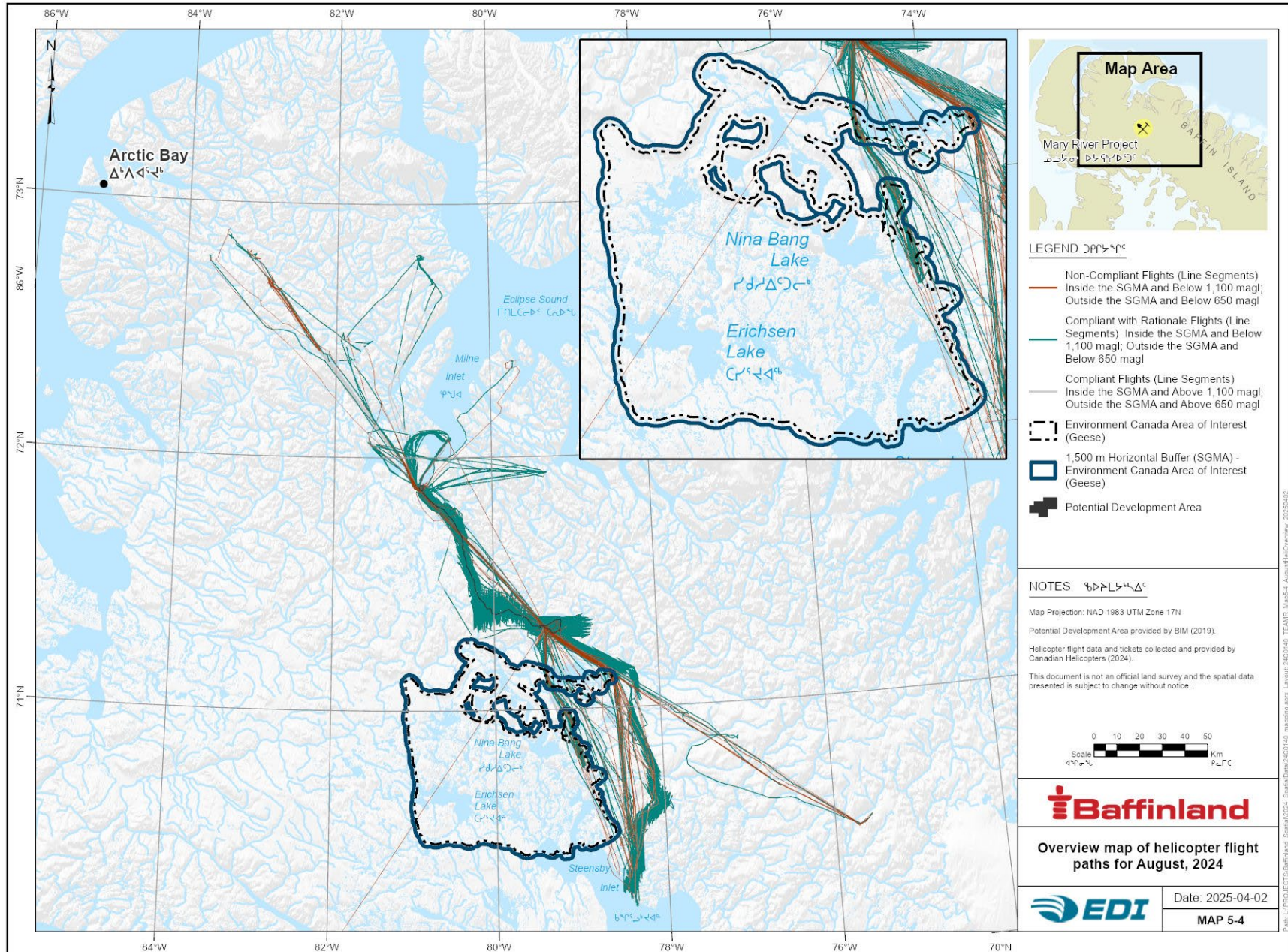
Month	Area	Total Hours per Month	Total Flight Hours	Compliant		Compliant with Rationale		Combined Compliance	Non-compliant	
				hrs	%	hrs	%		hrs	%
May	All Areas	120	3.32	0.51	15.49	0.10	3.02	18.51	2.70	81.49
June	All Areas	720	43.80	9.42	21.50	22.65	51.71	73.21	11.74	26.79
July	All Areas	744	176.80	35.41	20.03	84.77	47.95	67.98	56.61	32.02
August	All Areas	744	172.70	28.43	16.46	108.47	62.81	79.28	35.79	20.72
September	All Areas	672	38.34	7.30	19.04	17.34	45.21	64.25	13.71	35.75
Total		3,000	434.95	81.08	18.64	233.33	53.64	72.28	120.55	27.72

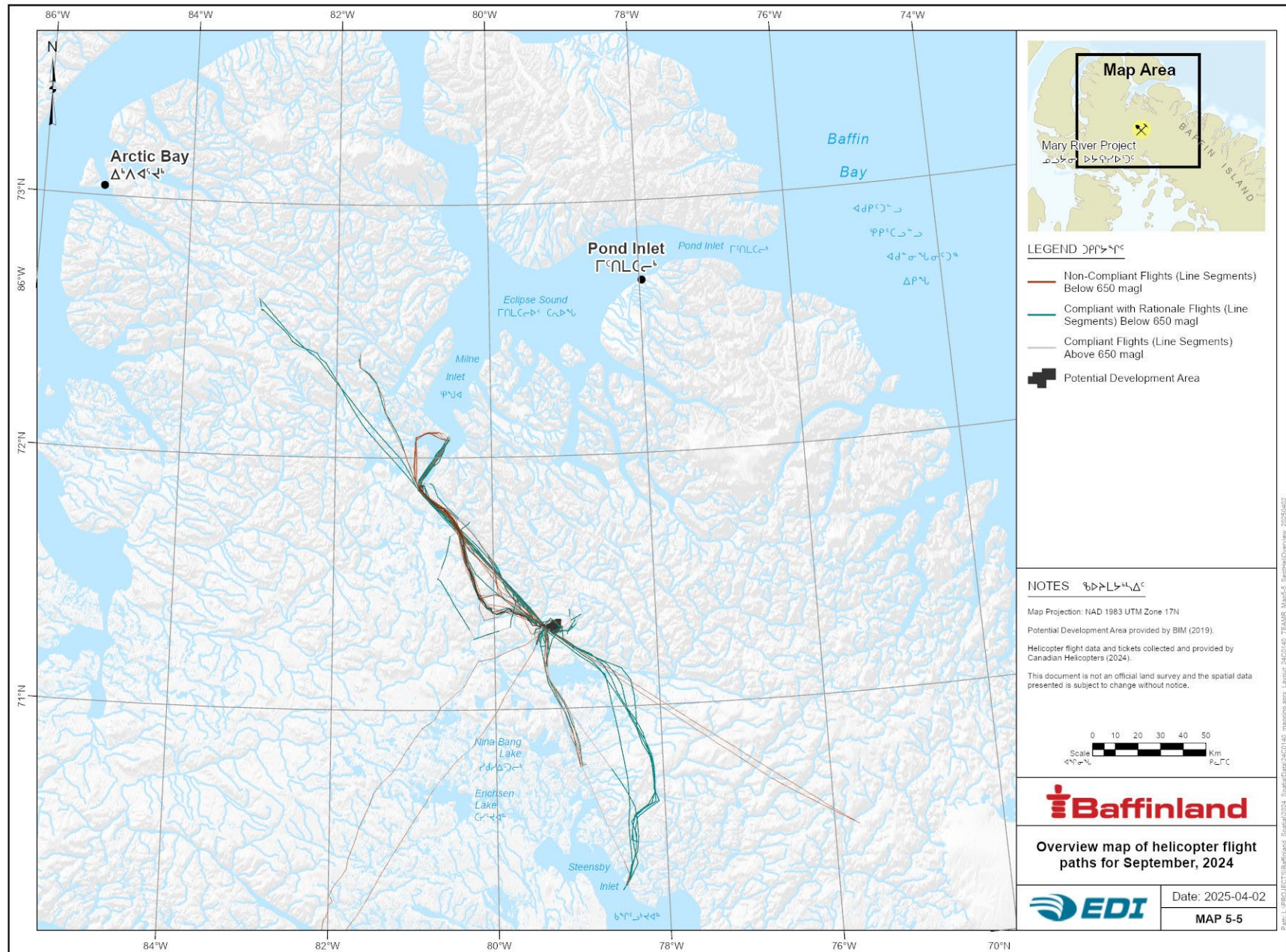
Note: Total values may be off from row/column sums by 0.01 due to rounding.













5.2.2 COMPLIANCE RATIONALE

Cruising altitude data were cross-referenced with pilot rationale from daily timesheets for the eighth consecutive year in 2024. Flight data were collected following the amended rationale descriptions in Table 5-6. For analytical purposes, flight line segments were designated as either:

- **compliant** — if/when cruising altitude requirements were followed;
- **compliant with rationale** — if/when cruising altitude requirements were not met, but pilot discretionary rationale was provided (refer to Table 5-6 for rationale categories and descriptors); or,
- **non-compliant** — if/when cruising altitude requirements were not met, and explanation and/or rationale were not provided.

A breakdown of primary low-level flight hours with rationale for 2024 is provided in Table 5-7. Flights with justification from pilot daily timesheets accounted for 53.64% of total flight hours, lower than in 2023 (67.99%). Within the Snow Geese area during the moulting season, where the cruising altitude requirement is $\geq 1,100$ magl, compliant with rationale flights accounted for 3.48% of total flight hours. Outside the Snow Geese area and in all areas in all other months where the cruising altitude requirement is ≥ 650 magl, compliant with rationale flights accounted for 50.17% of total flight hours.

Low-level flights with rationale are expected to continue in future due to safety requirements, operations, assessment activities (e.g., slinging, surveys), and/or because of multiple short-distance flights whereby helicopters are unable to reach the required elevations between take-off and landing sites (e.g., sampling, drop-offs/pickups). In 2024, the four most common reasons for flying below the cruising altitude requirements included geophysical survey (16.49% of total flight hours), weather-related circumstances (15.12% of total flight hours), short-distance flights (13.85% of total flight hours), and slinging (7.25% of total flight hours) (Table 5-7). In 2024, low-level flights within the Snow Geese area during the moulting season associated with weather-related circumstances accounted for 2.87 hours, a decrease of 3.71 hours compared to 2023. This decrease aligns with the mitigation protocol implemented in 2021 (summarized in EDI Environmental Dynamics Inc. 2022), which requires helicopters to travel around the Snow Geese area during the moulting season on days with poor weather.

Overall, 2024 cruising altitude combined compliance was 72.28%, similar to 2017 (73.39%). Non-compliant flight line segments included those that did not achieve cruising altitude requirements and where no rationale for low-level flying was provided. Some non-compliant flight line segments included ferrying flights to and from the Project at the start and end of the season, as well as approaches and departures. Some non-compliant flight line segments included traverses not visited in previous years (Map 5-3). Only the first and last flight segments can be identified as take-off or landing segments because the time and distance to reach the required cruising altitude (if reached at all) varies between flights. However, it may take multiple flight segments for a helicopter to reach or land from the required cruising altitude, resulting in non-compliant or compliant with rationale intermediary flight segments. Baffinland will continue to work with Canadian Helicopters to



document cruising altitude compliance and communicate elevation requirements and protocols to pilots throughout the flying season.

Table 5-6. Descriptions of pilot rationales given for low-level flights^{1,2}.

Rationale	Description
Slingsing	Helicopters slingsing external loads fly low for safety purposes. If issues occur, the load can be quickly lowered to the ground in a controlled manner or dropped while maintaining a visual reference of the landing location.
Short Distance	At the discretion of the pilot operating the aircraft during the flight. Considers the distance travelled during a flight as well as other contributing factors, which may result in a determination that gaining an altitude of 650 magl is unreasonable, unsafe, or impractical. These types of trips are generally associated with specific monitoring programs that are MANDATORY with no other practical ways of completing them (e.g., water sampling locations not accessible by foot or boat, dustfall sampling, wildlife observations, noise sampling, prospecting).
Weather	Poor visibility associated with low cloud restricts pilots to flying below the cloud line, which is under 650 magl. High winds and/or flat light conditions (reduces a pilot's depth-of-field, causing poor ground reference) can make it difficult to maintain a consistent 650 magl flight height. Even if pilots have enough ceiling to reach the required altitude at take-off, there could be poor weather conditions along the route or later in the day. Flights returning staff from remote work areas to camp are required regardless of the ceiling.
Search and Rescue	Flying the aircraft at low levels where Search and Rescue members have sufficient visual detail of the ground.
Inspection	Visual inspection of features on the ground (e.g., waterbodies, site infrastructure) where low-level flying is required for personnel to have sufficient visual detail.
Maintenance Flight	Flying the aircraft at low levels for purposes related to maintenance of the aircraft.
Medical Evacuation / Emergency Response	Flying the aircraft at low levels for purposes related to medical evacuation and/or emergency response where efficiency and/or other factors are of utmost importance.
Geophysical Survey	Low-level flying is required as part of the survey methodology (e.g., flying a low-level grid pattern for a geophysical survey, keeping a sensor at a constant elevation relative to the ground). The length of the survey is dependent on the size of the area to be surveyed. These surveys, if required, are conducted outside of the bird nesting or moulting windows.

¹ Descriptions are stated with a cruising altitude requirement of 650 magl and apply to a cruising altitude requirement of 1,100 magl in the Snow Geese area during the moulting season (July and August).

² The pilot will have final authority for the disposition of the aircraft during the time in which they are in command.



Table 5-7. Helicopter compliant with rationale flight hours summarized according to pilot rationale for flights within the $\geq 1,100$ magl and ≥ 650 magl cruising altitude requirements, May 26 to September 28, 2024.

Rationale	Total Hours	Flight Hours	% of Total Flight Hours ¹	$\geq 1,100$ magl Cruising Altitude Requirement		≥ 650 magl Cruising Altitude Requirement	
				Flight Hours	% of Total Flight Hours ¹	Flight Hours	% of Total Flight Hours ¹
Slingsing	3,000	31.51	7.25	1.20	0.28	30.32	6.97
Short Distance	3,000	60.25	13.85	5.41	1.24	54.84	12.61
Weather	3,000	65.78	15.12	2.87	0.66	62.90	14.46
Search and Rescue	3,000	-	-	-	-	-	-
Inspection	3,000	2.90	0.67	0.00	0.00	2.90	0.67
Maintenance Flight	3,000	1.17	0.27	0.00	0.00	1.17	0.27
Medical Evacuation / Emergency Response	3,000	-	-	-	-	-	-
Geophysical Survey	3,000	71.72	16.49	5.64	1.30	66.09	15.19
Total	3,000	233.33	53.64	15.12	3.48	218.21	50.17

¹ Percentages are calculated from the rationale flight hours divided by the total annual flight hours.

Note: Total values may be off from row/column sums by 0.01 due to rounding.

5.2.3 INTER-ANNUAL TRENDS

Flights within the Snow Geese area during the 2024 moulting season decreased to 204 transits compared to 2023 (335 transits), but were similar to flights in 2017, 2018, 2019, and 2021 (Table 5-8). This represents the highest proportion (20.60%) of transits above $\geq 1,100$ magl compared to all previous years due to the lower number of total flights (992). Before 2023, the percentage of transits within the Snow Geese area was 4.1% to 16.5%, and the total number of transits was primarily above 1,500 magl.

In 2024, 5.73% of total flight hours occurred within the Snow Geese area, a slight increase from 4.61% in 2023 (Table 5-9). This percentage is comparable to values recorded between 2015 and 2017, which ranged from 5.69% to 5.94%. The percentage of total disturbance hours in 2024 was the lowest compared to all previous years at 14.50%. This percentage was 8.04% lower than the next lowest recorded value (22.54% in 2016).

Helicopter cruising altitude combined compliance within the Snow Geese area during the moulting season was 70.03% in 2024 (Figure 5-1). This percentage comprised 19.20% compliant flights and 53.22% flights compliant with rationale. Compared to previous years, 2024 compliance was lower than 2023 (93.37%), higher than 2022 (60.06%), and similar to 2021 (71.76%). The total flight hours within the Snow Geese area in 2024 were 24.94, which was lower than 2023 (48.05), higher than 2022 (15.82), and similar to 2021 (22.06).

Outside the Snow Geese area, and in all other areas during non-moulting months, 2024 combined compliance was 72.42%. This percentage was lower than the past six years, which were above 90%, but similar to 2017 at 72.91% (Figure 5-2). The most common pilot rationale for low-level flights in 2024 was geophysical survey,



accounting for 16.49% of all rationale provided. A Light Detection and Ranging (LiDAR) survey of the Potential Development Area and route to Steensby Inlet was flown in August (Table 5-10 and Map 5-4). This percentage was higher than all previous years, which ranged from 0 to 14.6%. Weather-related circumstances were also a main factor, accounting for 15.12% of rationale, higher than in previous years (1.52% to 9.34%). Short-distance flights accounted for 13.85% of rationale, lower than all previous years (14.16% to 37.00%).

Total flight hours in 2024 were the lowest compared to all previous years at 434.95 (Table 5-11). Compliant flight hours decreased from 27.47% in 2023 to 18.64% in 2024. Similarly, compliant with rationale flight hours decreased from 67.99% in 2023 to 53.64% in 2024, and were lower than the past six years (59.60% to 72.89%). Non-compliant flights increased to 27.72% in 2024, higher than the past six years (3.78% to 8.41%) but comparable to 2017 (26.61%).

Within the Snow Geese area during the moulting season, compliant flight hours were 9.41% in 2024, which was lower compared to 2023 (19.12%) and all previous years (10.10% to 49.13%) (Table 5-12). Compliant with rationale flight hours decreased from 74.26% in 2023 to 60.62% in 2024. Non-compliant flights increased from 6.63% in 2023 to 29.97% in 2024, increasing from 3.18 hours to 7.47 hours. Compliant with rationale flight hour percentages fluctuated in previous years, but 2024 had similar compliance to 2017. Total flight hours in 2024 within the $\geq 1,100$ magl requirement were 24.94, the lowest number of total flight hours since 2021 (22.06).

Table 5-8. Number of transits flown per year with a breakdown of transits (№ and %) within the $\geq 1,100$ magl and ≥ 650 magl cruising altitude requirements, 2015 to 2024.

Year	Total № of Transits	$\geq 1,100$ magl Cruising Altitude Requirement		≥ 650 magl Cruising Altitude Requirement	
		№ of Transits	% Transits	№ of Transits	% Transits
2015	919	134	14.6	785	85.4
2016	1,063	175	16.5	888	83.5
2017	1,350	204	15.1	1,146	84.9
2018	2,489	198	8.0	2,291	92.0
2019	3,110	207	6.7	2,903	93.3
2020	1,863	77	4.1	1,786	95.9
2021	2,565	178	6.9	2,387	93.1
2022	2,715	117	4.3	2,598	95.7
2023	1,797	335	18.6	1,462	81.4
2024	992	204	20.60	788	79.40



Table 5-9. Number of flight hours per year with a breakdown of flight time (hours and %) within the $\geq 1,100$ magl and ≥ 650 magl cruising altitude requirements, 2015 to 2024.

Year	Total Hours	Total Flight Hours	% Disturbance Hours	$\geq 1,100$ magl Cruising Altitude Requirement		≥ 650 magl Cruising Altitude Requirement	
				Flight Hours	% Flight Hours	Flight Hours	% Flight Hours
2015	3,192	893.07	27.98	50.84	5.69	842.23	94.31
2016	2,616	589.52	22.54	34.05	5.78	555.47	94.22
2017	3,096	719.62	23.24	42.72	5.94	676.90	94.06
2018	3,360	1,583.71	47.13	35.13	2.22	1,548.59	97.78
2019	3,120	1,340.33	42.96	26.41	1.97	1,313.92	98.03
2020	3,168	804.56	25.40	14.38	1.79	790.18	98.21
2021	3,024	1,271.45	42.05	22.06	1.74	1,249.39	98.26
2022	3,480	1,295.45	37.23	15.82	1.22	1,279.64	98.78
2023	3,672	1,041.89	28.37	48.05	4.61	993.84	95.39
2024	3,000	434.95	14.50	24.94	5.73	410.02	94.27

Note: Total values may be off from row/column sums by 0.01 due to rounding.

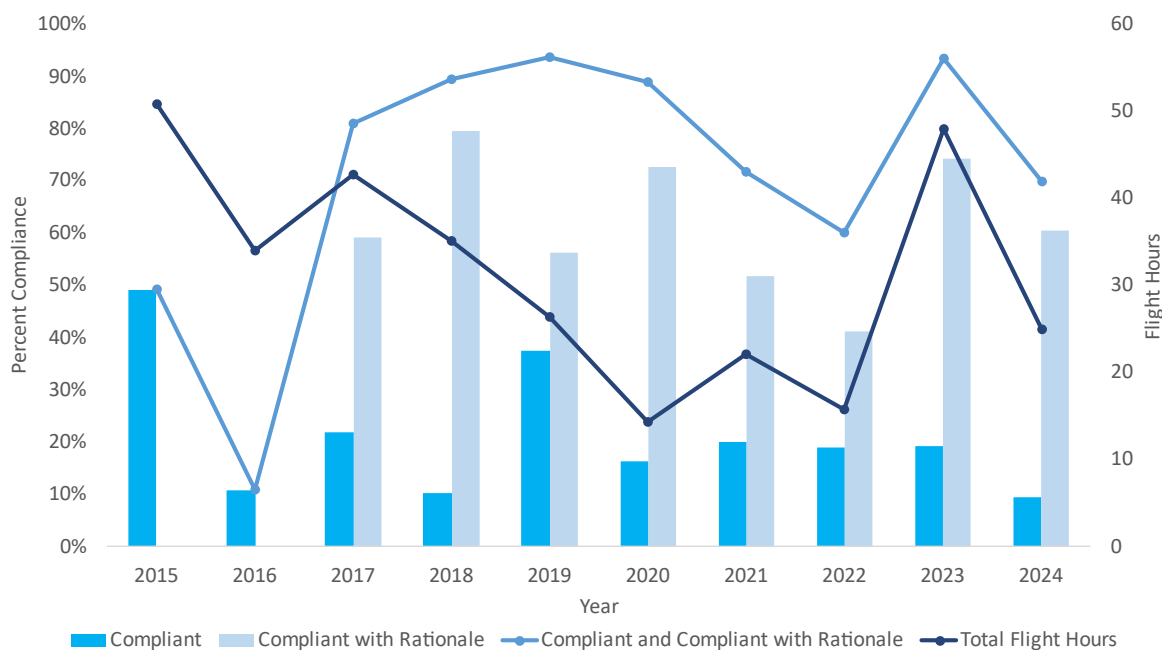


Figure 5-1. Percent compliance and total flight hours for flights within the Snow Geese area during the moulting season, 2015 to 2024.

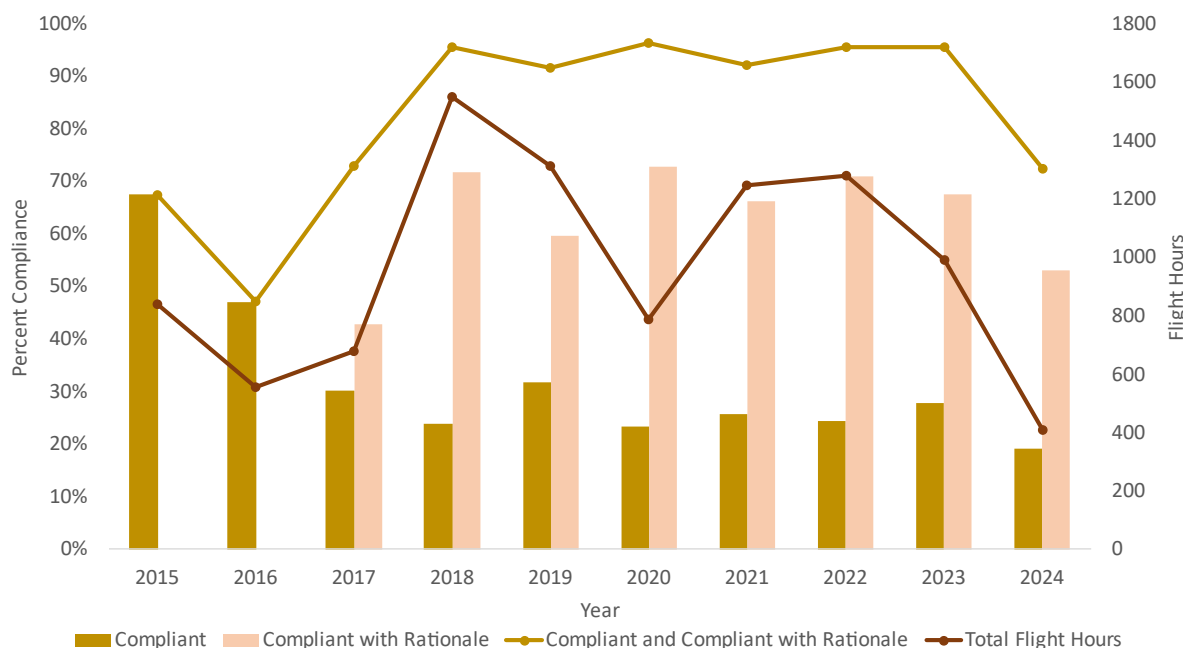


Figure 5-2. Percent compliance and total flight hours for flights outside the Snow Geese area during the moulting season and in all areas in all other months, 2015 to 2024.

Table 5-10. Flight hours and percentage of total flight hours for compliant with rationale flights summarized by rationale category, 2017 to 2024.

Rationale		Slingshot	Short Distance	Weather	Search and Rescue	Inspection	Maintenance Flight	Medical Evacuation / Emergency Response	Geophysical Survey	Total
2017	hrs	121.79	133.87	57.75	-	-	-	1.37	-	314.77
	% ¹	16.92	18.60	8.03	-	-	-	0.19	-	43.74
2018	hrs	511.84	299.86	64.17	0.20	30.10	-	2.44	231.27	1,139.89
	% ¹	32.32	18.93	4.05	0.01	1.90	-	0.15	14.60	71.98
2019	hrs	248.07	495.88	23.00	-	29.08	-	2.80	-	798.84
	% ¹	18.51	37.00	1.72	-	2.17	-	0.21	-	59.60
2020	hrs	293.91	240.65	37.35	-	11.48	-	3.04	-	586.43
	% ¹	36.53	29.91	4.64	-	1.43	-	0.38	-	72.89
2021	hrs	521.73	180.00	35.62	2.74	11.62	0.40	0.67	86.63	839.41
	% ¹	41.03	14.16	2.80	0.22	0.91	0.03	0.05	6.81	66.02
2022	hrs	609.68	279.45	19.65	-	6.14	-	0.13	-	915.05
	% ¹	47.06	21.57	1.52	-	0.47	-	0.01	-	70.64
2023	hrs	397.40	199.29	97.29	-	12.56	-	1.84	-	708.38
	% ¹	38.14	19.13	9.34	-	1.21	-	0.18	-	67.99



Table 5-10. Flight hours and percentage of total flight hours for compliant with rationale flights summarized by rationale category, 2017 to 2024.

Rationale		Slingsing	Short Distance	Weather	Search and Rescue	Inspection	Maintenance Flight	Medical Evacuation / Emergency Response	Geophysical Survey	Total
2024	hrs	31.51	60.25	65.78	-	2.90	1.17	-	71.72	233.33
	% ¹	7.25	13.85	15.12	-	0.67	0.27	-	16.49	53.64

¹ Percentages are calculated from rationale flight hours divided by total annual flight hours.

Note: Total values may be off from row/column sums by 0.01 due to rounding.

Table 5-11. Total flight hours and overall cruising altitude compliance by flight hours and percentage, 2015 to 2024.

Year	Total Flight Hours	Compliant		Compliant with Rationale		Combined Compliance	Non-compliant	
		hr	%	hr	%	%	hr	%
2015	893.07	593.38	66.44	n/a	n/a	66.44	299.69	33.56
2016	589.52	265.18	44.98	n/a	n/a	44.98	324.33	55.02
2017	719.62	213.34	29.65	314.77	43.74	73.39	191.50	26.61
2018	1583.71	372.32	23.51	1139.89	71.98	95.49	71.50	4.51
2019	1340.33	428.72	31.99	798.84	59.60	91.59	112.77	8.41
2020	804.56	187.74	23.33	586.43	72.89	96.22	30.39	3.78
2021	1271.45	326.74	25.70	839.41	66.02	91.72	105.30	8.28
2022	1295.45	316.72	24.45	915.05	70.64	95.08	63.68	4.92
2023	1041.89	286.25	27.47	708.38	67.99	95.46	47.26	4.54
2024	434.95	81.08	18.64	233.33	53.64	72.28	120.55	27.72

Note: Total values may be off from row/column sums by 0.01 due to rounding.



Table 5-12. Flight hours and overall cruising altitude compliance by flight hours and percentage within the $\geq 1,100$ magl and ≥ 650 magl cruising altitude requirements, 2015 to 2024.

Year	$\geq 1,100$ magl Cruising Altitude Requirement							≥ 650 magl Cruising Altitude Requirement						
	Flight Hours	Compliant		Compliant with Rationale		Non-compliant		Flight Hours	Compliant		Compliant with Rationale		Non-compliant	
		hr	%	hr	%	hr	%		hr	%	hr	%	hr	%
2015	50.84	24.98	49.13	n/a	n/a	25.86	50.87	842.23	568.40	67.49	n/a	n/a	273.83	32.51
2016	34.05	3.68	10.81	n/a	n/a	30.37	89.19	555.47	261.50	47.08	n/a	n/a	293.96	52.92
2017	42.72	9.30	21.77	25.27	59.16	8.15	19.07	676.90	204.04	30.14	289.50	42.77	183.36	27.09
2018	35.13	3.55	10.10	27.90	79.44	3.67	10.46	1,548.59	368.78	23.81	1,111.98	71.81	67.83	4.38
2019	26.41	9.90	37.49	14.84	56.22	1.66	6.30	1,313.92	418.82	31.88	783.99	59.67	111.11	8.46
2020	14.38	2.34	16.26	10.46	72.74	1.58	11.00	790.18	185.40	23.46	575.97	72.89	28.81	3.65
2021	22.06	4.42	20.01	11.42	51.75	6.23	28.24	1,249.39	322.32	25.80	827.99	66.27	99.07	7.93
2022	15.82	3.00	18.96	6.50	41.10	6.32	39.94	1,279.64	313.72	24.52	908.55	71.00	57.36	4.48
2023	48.05	9.19	19.12	35.68	74.26	3.18	6.63	993.84	277.06	27.88	672.71	67.69	44.08	4.44
2024	24.94	2.35	9.41	15.12	60.62	7.47	29.97	410.02	78.73	19.20	218.21	53.22	113.08	27.58

Note: Total values may be off from row/column sums by 0.01 due to rounding.



6 TOTE ROAD TRAFFIC

Tote Road Traffic Summary

The mean number of combined vehicle transits for 2024 was 281.2 transits per day (ore haul accounted for 246.3 transits per day). These daily means slightly exceeded the predicted value in the Final Environmental Impact Statement Addendum for the Production Increase Proposal (i.e., 236 ore haul transits; Stantec Consulting Ltd. 2018).

6.1 METHOD

Site Security at the Mary River Project (the Project) monitors and records traffic along the Tote Road and records non-haul vehicle traffic (e.g., transits related to personnel transfer, equipment, and fuel). Ore haul traffic is managed and recorded by Mine Operations staff. The Tote Road traffic data are compiled and compared with projected ore haul and non-haul vehicle transits. Not all vehicle travel on the Tote Road comprises return/round-trip travel between the Mine Site and Milne Port. Therefore, traffic is tracked in terms of 'vehicle transits' accounting for one-way trips (i.e., return/round-trip travel comprises two transits).

6.2 RESULTS AND DISCUSSION

The mean number of combined ore haul and non-haul vehicle transits from January 1 to December 31, 2024, was 281.2 transits per day (Table 6-1, Figure 6-1). The mean number of ore haul transits from January 1 to December 31, 2024, was 246.3 transits per day (Table 6-1, Figure 6-2). These daily means slightly exceeded the predicted value in the Final Environmental Impact Statement Addendum for the Production Increase Proposal (i.e., 236 ore haul transits; Stantec Consulting Ltd. 2018). The mean number of non-haul vehicle transits from January 1 to December 31, 2024, was 34.9 transits per day, which was less than predicted in the Final Environmental Impact Statement Addendum (i.e., 40 non-haul vehicle transits; Stantec Consulting Ltd. 2018). The monthly mean number of all vehicle transits combined varied from a low of 148 transits in September to a high of 350 transits in March (Table 6-1, Table 6-2, Figure 6-2).

Weather-related closures of the Tote Road in 2024, which resulted in multi-day stoppages of ore haul transits, occurred repeatedly in September. Heavy rainstorms closed the Tote Road from September 8 to 10, September 13 and 14, and September 21 through October 2. These events are visually displayed in Figure 6-2.



Table 6-1. Mean and total transits along the Tote Road, including ore haul, non-haul, and all vehicles combined, from 2015 through 2024.

Sample Year	Ore Haul Transits		Non-haul Vehicle Transits		Combined Vehicle Transits	
	Daily Mean	Total	Daily Mean	Total	Daily Mean	Total
2015	73.0	26,662	53.9	19,668	126.9	46,330
2016	151.2	55,354	27.7	10,150	179.0	65,504
2017	195.9	71,516	32.3	11,777	228.2	83,293
2018	219.5	80,118	37.3	13,616	256.8	93,734
2019	238.0	86,860	43.0	15,678	280.9	102,538
2020	243.3	88,807	28.4	10,361	271.7	99,168
2021	227.2	82,911	28.6	10,440	255.8	93,351
2022	243.6	88,908	26.7	9,749	269.7	98,443
2023	234.2	85,144	24.4	8,921	258.7	94,065
2024	246.3	90,190	34.9	12,750	281.2	102,940

Table 6-2. Mean ore haul and non-haul transits and total monthly transits from January 1 to December 31, 2024.

Month	Daily Mean Ore Haul Transits	Daily Mean Non-haul Transits	Daily Mean Total Transits
January	317	32	349
February	288	43	331
March	302	48	350
April	234	57	291
May	252	39	291
June	281	27	308
July	222	28	250
August	219	39	258
September	115	33	148
October	194	33	227
November	242	19	261
December	291	20	311

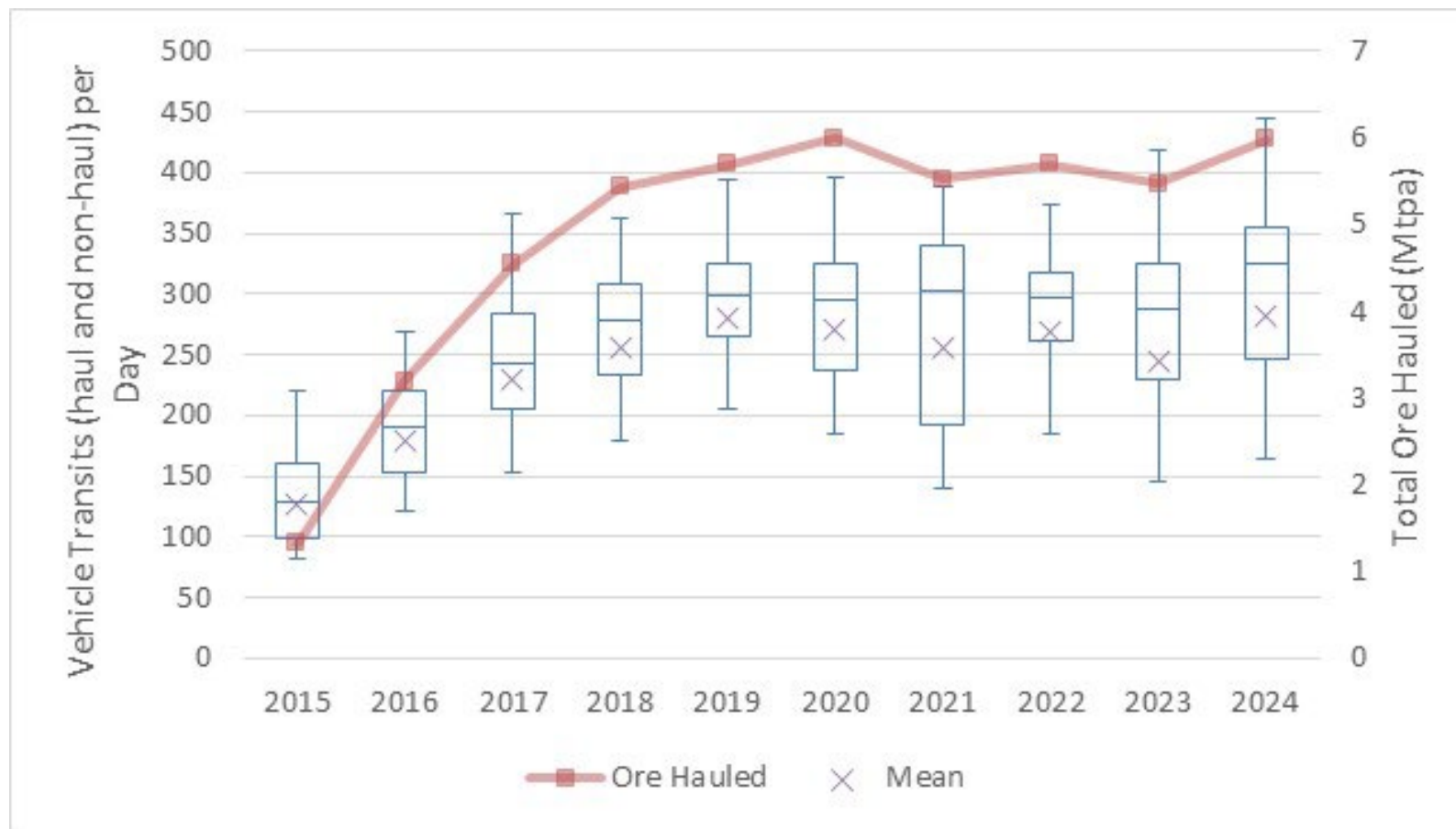


Figure 6-1. Mean ore haul and non-haul vehicle transits per day and total ore hauled between 2015 and 2024.

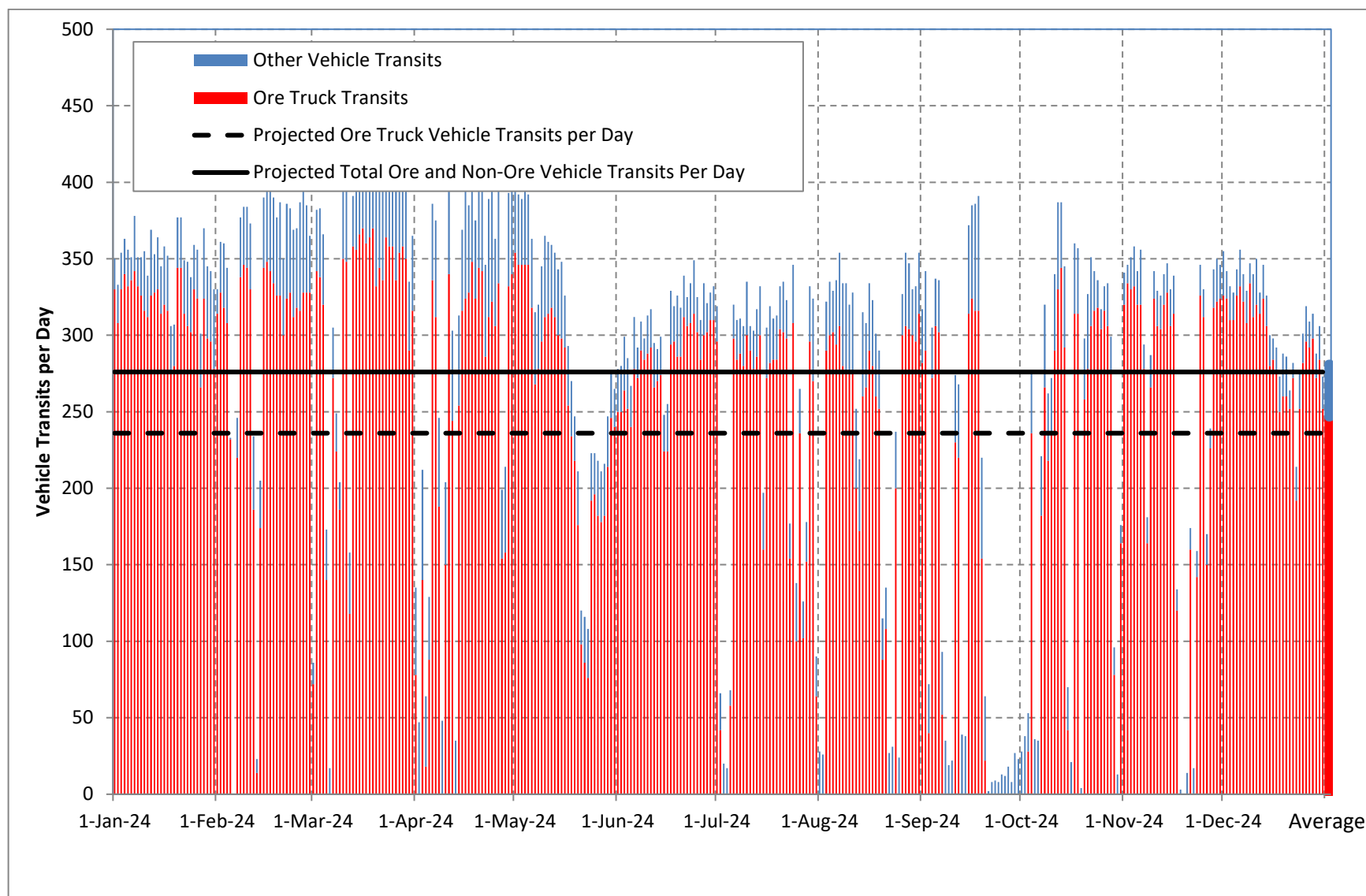


Figure 6-2. Vehicle transits per day on the Tote Road, including ore trucks (red) and all other traffic (blue), January 1 to December 31, 2024.

Also included are the projected maximum number of vehicle transits per day and the projected maximum number of ore haul trucks per day on the Tote Road.



7 DUSTFALL

Project Conditions #36, 50, 54d, 58c, 187, and 188 relate to the effects of dustfall and dustfall monitoring at the Mary River Project (the Project; Nunavut Impact Review Board 2020). Since the summer of 2013, the Project has implemented a dustfall monitoring program intended to meet these conditions, the objectives of which are to:

- quantify the volume and extent of dustfall generated by Project activities;
- determine seasonal variations in dustfall; and,
- determine if annual dustfall volume and extent exceed the ranges predicted by the dustfall dispersion models (Baffinland Iron Mines Corporation 2013b).

The following subsections summarize the study design, methods, results, and discussion of the dustfall monitoring program.

Note: PC# 57g—referring to the requirements for “*an assessment and presentation of annual environmental conditions including timing of snowmelt, green-up and standard weather summaries*”—is considered ancillary to the dustfall monitoring program. Supporting information about these topics is presented in Section 4.

Dustfall Summary

Passive Dustfall Monitoring

Dustfall deposition decreased across the Project area in 2024. Ongoing dustfall suppression efforts at the crusher location and along the Tote Road appear to be behind these decreases.

Dustfall Scene Distributions and Magnitudes — The magnitude of annual dustfall deposition at the Mine Site sample locations continues to decrease. DusTreat is now applied to all ore at Crushers B and C, decreasing the dustfall generated at this site. Dustfall mitigation along the mine haul road and the airstrip also appears effective.

The magnitude of dustfall deposition at Milne Port has remained constant or, in some cases, has slightly decreased, a trend that began in 2018. The highest deposition was associated with the ore stockpiles, with lesser amounts generated by the sealift staging area.

Dustfall deposition along the Tote Road was consistent or decreasing at the north and south crossings compared with recent years. More extensive use of ‘flake’ calcium chloride was trialled and found to be effective in 2024. Continued monitoring in the coming years will confirm the effectiveness of this dust suppression mitigation.

Dustfall deposition at 1,000 m from the Potential Development Area (PDA) was measured year-round at 12 sites. Dustfall deposition remained low but measurable at these sites across all sampling years, including 2024. The geometric mean daily dustfall across all sites was consistently less than 0.5 mg/dm²·day.



Interannual Trends — Despite increased production from 2016 to 2021, and steady production from 2021 through 2024, dustfall deposition is decreasing across all Project areas. Post-2016 decreases in dustfall deposition are likely associated with extensive dustfall mitigation strategies implemented across all Project areas.

Dustfall Imagery Analysis

Satellite-estimated dustfall concentrations were derived from a relationship between the dustfall accumulation calculated from passive dustfall monitor deposition rates and the Snow Darkening Index (SDI).

Dustfall Scene Distribution, Magnitudes, and Extents — Sixty-three Sentinel-2 images and 26 Landsat 8/9 images were acquired from March 14 to May 16, which was a decrease in the number of images acquired compared to 2023.

The 2023 dustfall extent covered 12.71% of the Study Area, with lower dustfall concentration classes ($<4.5 \text{ g/m}^2$) accounting for the largest dustfall area. The Tote Road south and the Mine Site had the largest percentage of dustfall extent (28.20% and 19.86%, respectively), followed by Milne Port at 16.33% and the Tote Road north and Milne Inlet at $<10\%$.

Mean dustfall concentrations were highest near the PDA and decreased with distance. The pattern of dustfall on the landscape, particularly along Milne Inlet and around the Mine Site, reflected the direction of prevailing and strong winds. The mean dustfall concentrations at the Areas of Community Concern were less than (0.50 g/m^2) except for the Eastern Channel and Ridge West sites.

Inter-Annual Trends — The 2024 dustfall extent within the Study Area was similar to 2023, with an increase in the Tote Road south extent matched by decreases in the other areas.

Satellite-derived mean dustfall concentrations across all areas generally increased from 2014 to 2020, which aligns with increased ore production. Mean dustfall concentrations decreased in 2024 after increasing since 2021. Most Areas of Community Concern had mean dustfall concentrations $<1 \text{ g/m}^2$ for all years, similar to the Reference site, except for 2019. The Quarnak, Ridge West, and Eastern Channel sites had mean dustfall concentrations between 1 and 5.5 g/m^2 in three to five of the post-baseline years.

The overall trends between the satellite-derived late winter mean dustfall concentrations and the annual dustfall from the passive dustfall monitors were similar for the Tote Road and Mine Site, capturing most of the same fluctuations, but the trends were different for Milne Port.

Snow Sampling Pilot Study — Improved alignment of 2024 snow sampling with satellite acquisition and an extended sampling period (into late May) resulted in all 10 surface snow sample sites matching Landsat and Sentinel-2 images. The samples also spanned a wide range of concentrations. A non-linear regression model was fit to the Landsat data with significant coefficients but not to the Sentinel-2 data.



7.1 HISTORY OF DUSTFALL MONITORING AT THE PROJECT

The dustfall monitoring program has evolved based on data analysis, interpretation, and input from the Terrestrial Environment Working Group (Table 7-1).

Table 7-1. Implementation of dustfall monitoring program from 2013 through 2024.

Program Year	Dustfall Program Updates
2013	<ul style="list-style-type: none"> The dustfall monitoring program was initiated in August 2013. Twenty-six passive monitoring stations were established near Project infrastructure (Mine Site, Milne Port, the Tote Road, and reference sites).
2014	<ul style="list-style-type: none"> The dustfall monitoring program was expanded in September 2014 to increase the number of monitoring stations at the Mine Site and Milne Port to improve understanding of 'how dustfall patterns may change with distance from Project infrastructure'. Three sites were added at the Mine Site and four sites were added at Milne Port. One site at Milne Port was removed because Project infrastructure rendered it inaccessible. The total number of monitoring stations at the end of 2014 was 32.
2015	<ul style="list-style-type: none"> First full year of dustfall monitoring during mine operations. One additional monitoring site was added at the Mine Site to address a gap in the dustfall monitoring program associated with dustfall at distances greater than 1,000 m. Site DF-M-08 was established 4,000 m from the PDA. The total number of monitoring stations at the end of 2015 was 33.
2019	<ul style="list-style-type: none"> Data collection at 1,000 m from the Tote Road was increased in response to a request from the Qikiqtani Inuit Organization and the Mittimatalik Hunters and Trappers Organization. Six additional dustfall monitors were installed (three paired monitoring stations, one of each on the east and west sides of the Tote Road at KM 25, KM 56, and KM 75). Dustfall data collection at other 1,000 m distant sites was increased to year round (only collected during the summer months from 2013 to 2018). This brought the total number of dustfall monitors at the 1,000 m PDA boundary to 12. One monitor at Milne Port (DF-P-01) was relocated and renamed (DF-P-08) to allow for the expansion of an ore stockpile. The total number of monitoring stations at the end of 2019 was 39.
2020	<ul style="list-style-type: none"> Satellite imagery analysis of dustfall extent was conducted in 2020 to address concerns from the Mittimatalik Hunters and Trappers Organization that the past dustfall monitoring data and analyses did not reflect what hunters saw on the ground. The analysis included Landsat and Sentinel-2 imagery from 2004 to 2020 between March 15 and May 15.
2021	<ul style="list-style-type: none"> Quantitative measurements from the dustfall satellite imagery analysis were reported as requested by the Nunavut Impact Review Board, including dustfall concentrations and area using the SDI, a measure of mineral dust on snow. Data from Steensby Inlet were included as a reference area for comparison. Fourteen new dustfall monitoring stations were installed, including: four additional monitors at Milne Port to better characterize dustfall moving off the Milne Port site; four additional monitors along the section of the proposed Phase 2 railway that departs from the Tote Road right-of-way to define baseline conditions; and six additional monitors installed to collect dust at a height of 0.5 m. These non-standard monitors are part of a pilot study investigating variability between dustfall sampling at the standardized height of 2.0 m and closer to ground level. This monitoring trial was implemented in response to specific requests from the Government of Nunavut (GN) and the Qikiqtani Inuit Organization (QIA). The total number of monitoring stations at the end of 2021 was 53, including the six 'short' monitors installed as part of the monitoring trial.



Table 7-1. Implementation of dustfall monitoring program from 2013 through 2024.

Program Year	Dustfall Program Updates
2022	<ul style="list-style-type: none"> Sampling at the four dustfall monitors along the section of the proposed Phase 2 railway that departs from the Tote Road right-of-way were discontinued in October 2022 (i.e., following the Ministerial decision that Phase 2 expansion would not proceed at this time). The total number of monitoring stations at the end of 2022 was 49, including the six ‘short’ monitors installed as part of the monitoring trial in 2021. These 49 monitors were located across 43 monitoring stations. The dustfall imagery analysis study area was expanded to account for additional areas of interest identified in consultation with the Terrestrial Environment Working Group or highlighted in supplementary information requests (cf. Response to the Qikiqtani Inuit Association in 2022 Production Increase Proposal Renewal [QIA-09; Baffinland Iron Mines Corporation 2022a) and ancillary reports (cf. 2021 Dust Investigation; Hutchinson Environmental Sciences Ltd. 2022). The 2022 baseline imagery were processed for the expanded study area.
2023	<ul style="list-style-type: none"> The pilot study to investigate dustfall monitoring closer to ground level was concluded in 2023. The results of the study indicated no difference in dustfall levels at the standardized sampling height of 2.0 m compared to the non-standardized sampling height of 0.5 m (EDI Environmental Dynamics Inc. 2023a). The total number of monitoring stations at the end of 2023 was 43. A terrain correction (Teillet et al. 1982, Hantson and Chuvieco 2011) was applied to the imagery to reduce the effects of bright south-facing slopes on the SDI. Imagery from all years were reprocessed for the expanded dustfall imagery analysis study area from 2022 and the terrain correction.
2024	<ul style="list-style-type: none"> To increase the number of samples for the snow sampling pilot study, as recommended by the QIA and the GN (QIA DF #11 and GN AR #5; Baffinland Iron Mines Corporation 2024), improvements to sample collection were implemented, including (1) using satellite acquisition dates and footprints to plan sampling dates and locations, (2) extending the sampling period to late May, (3) sampling on cloud-free days, and (4) sampling a variety of dust concentrations.

7.2 DUSTFALL SUPPRESSION AND MITIGATION

Baffinland Iron Mines Corporation (Baffinland) worked throughout 2024 to revise and improve dustfall suppression measures to mitigate dustfall from all Project areas.

Dustfall Suppression Along the Tote Road — Vehicle transits along the Tote Road result in Project-related dust generated from wheel entrainment with the road surface. Dust suppression along the Tote Road in 2024 consisted of seasonal water and calcium chloride application along the road surface. Suppression activities occurred from late June through early September when non-freezing conditions allowed for the safe use of dust suppressants on the road. Calcium chloride was applied to the road following industry-standard methodology that included spreading calcium chloride flake on the road surface and incorporating it into the top few inches of road aggregate, rather than application as a brine sprayed on the road, as has been done in the past. Trials found this method significantly more effective at mitigating dust and maintaining the road running surface through varying weather conditions.

In 2024, 609,000 kg of calcium chloride were applied to Project roadways for dust suppression. The industry standard and recommended application rate for calcium chloride is 1.69 pounds/square yard, which equates to 14,040 kg/km when applied to the Tote Road (assuming an average width of 13 m). Baffinland has taken



a conservative approach and applied calcium chloride at an average rate of approximately 1,000 kg/km, or less than one-tenth of the industry-standard application rate.

Visible and measurable dust (from anecdotal statements of operators and discrete measurements) were lower in 2024 than in previous years. Periodic additions of water to the Tote Road were required to re-activate the effectiveness of the calcium chloride at controlling dust; however, the required water use for dust suppression where calcium chloride was in use was far reduced compared to using water alone as a dust suppressant.

Dust Suppression at the Airport — Airplane landings and takeoffs can generate dust when the airstrip bed materials are dry. From June through early September, water was applied as a dust suppressant to the airstrip and apron before the arrival and departure of most aircraft. Water was also used as needed when dry conditions were observed.

Dust Suppression at the Crusher — Baffinland is implementing mitigations to decrease dust associated with ore crushing and loading activities. Following successful testing trials in early 2024, applying DusTreat to ore before crushing at Crusher C has been used full-time since November 2024. Since February 2025, a second DusTreat application system has been deployed full-time at Crusher B.

Dust Suppression at the Ore Stockpiles (Milne Port) — The ore stockpiles at Milne Port are a source of Project-related dustfall. Dust is generated when ore is stacked onto the stockpiles and from the stockpiles via wind action, particularly during the non-shipping season when ore stockpiles grow in height.

Similar to 2023, the ore stockpiles were treated with DusTreat in 2024. The product was sprayed directly onto the surface of the stockpiles to create a crust, decreasing wind-generated dust. DusTreat was applied to the ore stockpiles in December 2024 and January 2025.

7.3 PASSIVE DUSTFALL MONITORING

7.3.1 METHODS

7.3.1.1 Supporting Data Review

The dustfall monitoring program incorporated a review of supporting data to characterize the Project setting and identify factors that could influence the volume and extent of dustfall during 2024. These supporting data comprise an overview of weather conditions at the Mine Site and Milne Port meteorological stations and vehicle traffic on the Tote Road.

- Climate data (including a summary of air temperature and precipitation data) are presented in Section 4.
- Traffic data (including the number of ore haul truck transits and other vehicle transits on the Tote Road) are presented in Section 6.



7.3.1.2 Passive Dustfall Sampling

The 2024 dustfall monitoring program comprised deploying passive dustfall samplers across the Project area for collecting and measuring dustfall following standard test methods (ASTM International 2010). Each dustfall sampler comprised a dust collection canister within a bowl-shaped terminal holder affixed to an approximately 2-m tall post that was anchored to solid ground. The terminal bowl was crowned with 'bird spikes' to prevent birds from perching and contaminating samples with feces (Photo 7-1). Dust collection canisters were pre-charged with 250 mL of algacide in summer and 250 mL of isopropyl alcohol in winter. The percentage of isopropyl alcohol in the canisters was increased from 40% to 75% solution in 2021 to prevent freezing of the liquid media. Collection vessels were changed once per month and shipped to ALS Environmental Laboratory in Waterloo, Ontario, to analyze total insoluble dustfall and a suite of metals. Dustfall samples were also analyzed for total metal concentrations to characterize contaminants of potential concern and inform other monitoring endpoints (refer to Section 8).

The Regional Study Area (RSA) was divided into four areas to review dustfall data (Table 7-2):

- the Mine Site;
- Milne Port;
- the Tote Road north crossing (KM 28); and,
- the Tote Road south crossing (KM 78).

In 2024, the study design comprised 43 monitoring locations distributed across the Project area (Map 7-1).

- Nine dustfall monitors were located at the Mine Site: three within the Mine Site, four outside the mine footprint within low to moderate isopleth areas, and two reference sites (one to the northeast and one to the south) located at least 14,000 m from any Project infrastructure, outside of the extent of expected dustfall.
- Ten dustfall monitors were located at Milne Port: four active sites on the Port Site footprint, five active sites at the PDA boundary, and one reference site on a ridge approximately 3,000 m northeast (upwind), outside of the predicted extent of dustfall.
- Twenty-two dustfall monitors were located along the Tote Road.
 - Sixteen dustfall monitors were divided between two sites along the Tote Road (north and south sites). These two sites were organized into transects, each composed of eight dustfall monitors distributed perpendicular to the Tote Road centreline at 30 m, 100 m, 1,000 m, and 5,000 m on either side of the road.
 - Six additional dustfall monitors organized as three pairs, all located at a 1,000 m distance from the Tote Road.
- Two reference dustfall monitors located 14,000 m southwest of the Tote Road (one at the north sites and one at the south sites). These monitoring stations were established outside the 14 km caribou zone of influence as defined by Boulanger et al. (2012).



Dustfall sampling occurred year-round at 36 of 43 monitoring stations in 2024. These year-round stations are distributed within 1,000 m of the PDA and tend to experience higher dustfall levels. The remaining 11 monitoring stations are situated at, or greater than, 1,000 m from the PDA. For these 11 monitoring stations, sampling occurred monthly from May to October and was paused during winter (i.e., November to April) due to remote locations and inaccessibility without helicopter support. The sampling categories were delineated for data analysis as ‘year-round’ and ‘summer.’

The 2024 dustfall monitoring program included data collected for a full calendar year from early January 2024 through early January 2025 (Table 7-3).



Photo 7-1. Dustfall monitoring station DF-P-01.

Table 7-2. Summary of dustfall monitoring stations (locations and sampling period), 2024.

Site ID	Monitor Height (m)	Location	Sample Period	Distance to PDA ¹ (m)	Expected Dustfall Exposure ²	Latitude	Longitude
DF-M-01	2.0	Mine Site	year-round	Within PDA	High	71.3243	-79.3747
DF-M-02	2.0	Mine Site	year-round	Within PDA	High	71.3085	-79.2906
DF-M-03	2.0	Mine Site	year-round	Within PDA	High	71.3072	-79.2433
DF-M-04	2.0	Mine Site	summer ³	9,000	Nil	71.2197	-79.3277
DF-M-05	2.0	Mine Site	summer ³	9,000	Nil	71.3731	-78.923
DF-M-06	2.0	Mine Site	summer ³	1,000	Moderate	71.3196	-79.156
DF-M-07	2.0	Mine Site	summer ³	1,000	Moderate	71.3	-79.1953



Table 7-2. Summary of dustfall monitoring stations (locations and sampling period), 2024.

Site ID	Monitor Height (m)	Location	Sample Period	Distance to PDA ¹ (m)	Expected Dustfall Exposure ²	Latitude	Longitude
DF-M-08	2.0	Mine Site	summer ³	4,000	Moderate	71.2945	-79.1002
DF-M-09	2.0	Mine Site	summer ³	2,500	Low	71.2936	-79.4127
DF-RS-01	2.0	Tote Road – south, KM 78	summer ³	5,000	Nil	71.3275	-79.8001
DF-RS-02	2.0	Tote Road – south, KM 78	year-round	1,000	Low	71.3893	-79.8324
DF-RS-03	2.0	Tote Road – south, KM 78	year-round	Within PDA, 100 m from Tote Road	Moderate	71.3967	-79.8228
DF-RS-04	2.0	Tote Road – south, KM 78	year-round	Within PDA, 30 m from Tote Road	Moderate	71.3975	-79.8222
DF-RS-05	2.0	Tote Road – south, KM 78	year-round	Within PDA, 30 m from Tote Road	Moderate	71.398	-79.8228
DF-RS-06	2.0	Tote Road – south, KM 78	year-round	Within PDA, 100 m from Tote Road	Moderate	71.3986	-79.8234
DF-RS-07	2.0	Tote Road – south, KM 78	year-round	1,000	Nil	71.4077	-79.8182
DF-RS-08	2.0	Tote Road – south, KM 78	summer ³	5,000	Nil	71.4489	-79.7106
DF-RN-01	2.0	Tote Road – north, KM 27	summer ³	5,000	Nil	71.6883	-80.5363
DF-RN-02	2.0	Tote Road – north, KM 27	year-round	1,000	Low	71.7145	-80.4704
DF-RN-03	2.0	Tote Road – north, KM 27	year-round	Within PDA, 100 m from Tote Road	Moderate	71.7186	-80.4473
DF-RN-04	2.0	Tote Road – north, KM 27	year-round	Within PDA, 30 m from Tote Road	Moderate	71.7189	-80.4456
DF-RN-05	2.0	Tote Road – north, KM 27	year-round	Within PDA, 30 m from Tote Road	Moderate	71.7185	-80.4414
DF-RN-06	2.0	Tote Road – north, KM 27	year-round	Within PDA, 100 m from Tote Road	Moderate	71.7189	-80.4397
DF-RN-07	2.0	Tote Road – north, KM 27	year-round	1,000	Nil	71.7226	-80.4165
DF-RN-08	2.0	Tote Road – north, KM 27	summer ³	5,000	Nil	71.7435	-80.2898
DF-P-03	2.0	Milne Port	summer ³	3,000	Nil	71.8996	-80.7884
DF-P-04	2.0	Milne Port	year-round	Within PDA	Low	71.871	-80.8828
DF-P-05	2.0	Milne Port	year-round	Within PDA	Moderate	71.8843	-80.8945
DF-P-06	2.0	Milne Port	year-round	Within PDA	Low	71.8858	-80.879



Table 7-2. Summary of dustfall monitoring stations (locations and sampling period), 2024.

Site ID	Monitor Height (m)	Location	Sample Period	Distance to PDA ¹ (m)	Expected Dustfall Exposure ²	Latitude	Longitude
DF-P-07	2.0	Milne Port	year-round	Within PDA	Moderate	71.8838	-80.916
DF-P-08	2.0	Milne Port	year-round	1,000	Moderate	71.8722	-80.9126
DF-P-09	2.0	Milne Port	year-round	1,000	Moderate	71.855286	-80.893269
DF-P-10	2.0	Milne Port	year-round	Within PDA	Moderate	71.876033	-80.919739
DF-P-11	2.0	Milne Port	year-round	1,000	Moderate	71.875471	-80.95393
DF-P-12	2.0	Milne Port	year-round	1,000	Moderate	71.86558	-80.951059
DF-RR-01	2.0	Reference – Road	summer ³	14,000	Nil	71.2805	-80.245
DF-RR-02	2.0	Reference – Road	summer ³	14,000	Nil	71.5189	-80.6923
DF-TR-25E	2.0	Tote Road	year-round	1,000	Nil	71.7425	-80.4394
DF-TR-25W	2.0	Tote Road	year-round	1,000	Low	71.7395	-80.5068
DF-TR-56E	2.0	Tote Road	year-round	1,000	Nil	71.5097	-80.2109
DF-TR-56W	2.0	Tote Road	year-round	1,000	Low	71.4944	-80.2685
DF-TR-75E	2.0	Tote Road	year-round	1,000	Nil	71.3902	-79.9917
DF-TR-75W	2.0	Tote Road	year-round	1,000	Low	71.3709	-80.0007

¹ PDA = Potential Development Area.

² Low (1 to 4.5 g/m²/year), Moderate (4.6 to 50 g/m²/year), and High (≥50 g/m²/year).

³ Summer sampling includes data collection from June, July, August, and September.

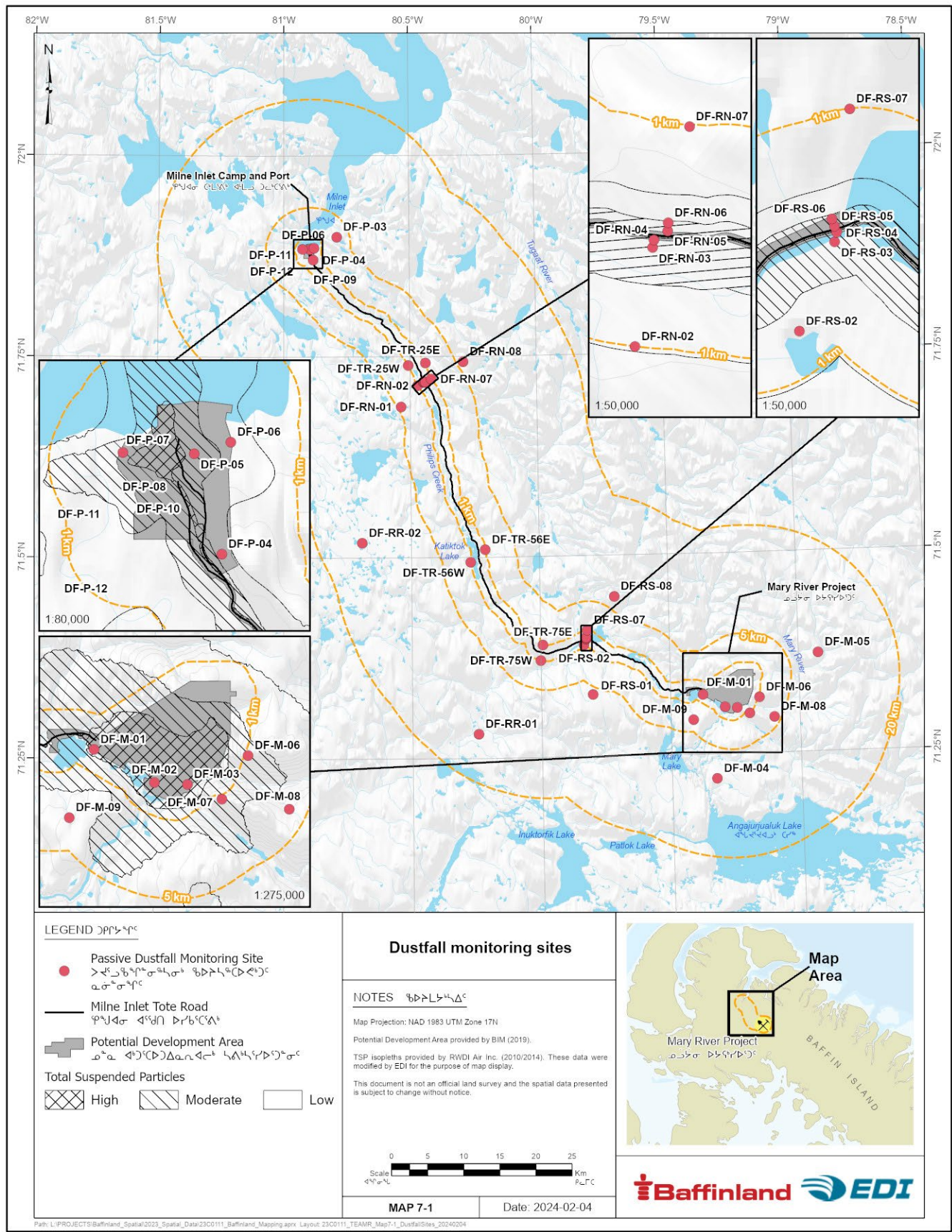




Table 7-3. Dustfall monitoring sampling record, 2024 (date shown indicates the day the sample canister was collected).

Site ID	January	February	March	April	May	June	July	August	September	October	November	December
DF-M-01	23-Jan	22-Feb	22-Mar	07-May	23-May	26-Jun	24-Jul	21-Aug	20-Sep	20-Oct	17-Nov	15-Dec
DF-M-02	23-Jan	22-Feb	22-Mar	07-May	23-May	26-Jun	24-Jul	21-Aug	20-Sep	20-Oct	17-Nov	15-Dec
DF-M-03	23-Jan	22-Feb	22-Mar	07-May	23-May	26-Jun	24-Jul	21-Aug	20-Sep	20-Oct	17-Nov	15-Dec
DF-M-04	-	-	-	-	-	-	17-Jul	18-Aug	17-Sep	-	-	-
DF-M-05	-	-	-	-	-	-	16-Jul	16-Aug	16-Sep	-	-	-
DF-M-06	-	-	-	-	-	-	16-Jul	16-Aug	16-Sep	-	-	-
DF-M-07	-	-	-	-	-	-	16-Jul	16-Aug	16-Sep	-	-	-
DF-M-08	-	-	-	-	-	-	16-Jul	16-Aug	16-Sep	-	-	-
DF-M-09	-	-	-	-	-	-	17-Jul	18-Aug	17-Sep	-	-	-
DF-P-03	-	-	-	-	-	-	18-Jul	31-Aug	17-Sep	-	-	-
DF-P-04	08-Feb	07-Mar	05-Apr	03-May	31-May	28-Jun	28-Jul	26-Aug	25-Sep	23-Oct	21-Nov	21-Dec
DF-P-05	07-Feb	07-Mar	05-Apr	03-May	31-May	28-Jun	28-Jul	26-Aug	25-Sep	23-Oct	21-Nov	21-Dec
DF-P-06	07-Feb	07-Mar	05-Apr	03-May	31-May	28-Jun	28-Jul	26-Aug	25-Sep	23-Oct	21-Nov	21-Dec
DF-P-07	08-Feb	07-Mar	05-Apr	03-May	31-May	28-Jun	28-Jul	26-Aug	25-Sep	23-Oct	21-Nov	21-Dec
DF-P-08	08-Feb	07-Mar	05-Apr	03-May	31-May	28-Jun	28-Jul	26-Aug	25-Sep	23-Oct	21-Nov	21-Dec
DF-P-09	09-Feb	10-Mar	07-Apr	-	-	-	18-Jul	31-Aug	-	-	-	22-Jan
DF-P-10	07-Feb	07-Mar	05-Apr	03-May	31-May	28-Jun	28-Jul	26-Aug	25-Sep	23-Oct	21-Nov	21-Dec
DF-P-11	09-Feb	10-Mar	07-Apr	-	-	17-Jun	18-Jul	31-Aug	-	-	-	-
DF-P-12	09-Feb	10-Mar	07-Apr	-	-	17-Jun	18-Jul	31-Aug	-	-	-	22-Jan
DF-RN-01	-	-	-	-	-	-	19-Jul	31-Aug	17-Sep	-	-	-
DF-RN-02	15-Feb	11-Mar	07-Apr	-	-	17-Jun	19-Jul	31-Aug	-	-	29-Nov	23-Jan
DF-RN-03	08-Feb	08-Mar	05-Apr	03-May	31-May	29-Jun	27-Jul	25-Aug	24-Sep	24-Oct	-	22-Dec
DF-RN-04	08-Feb	08-Mar	05-Apr	03-May	31-May	29-Jun	27-Jul	25-Aug	24-Sep	24-Oct	24-Nov	22-Dec
DF-RN-05	08-Feb	08-Mar	05-Apr	03-May	31-May	29-Jun	27-Jul	25-Aug	24-Sep	24-Oct	-	22-Dec
DF-RN-06	08-Feb	08-Mar	05-Apr	03-May	31-May	29-Jun	27-Jul	25-Aug	24-Sep	24-Oct	-	22-Dec
DF-RN-07	12-Feb	11-Mar	07-Apr	-	-	17-Jun	18-Jul	31-Aug	-	-	29-Nov	23-Jan
DF-RN-08	-	-	-	-	-	-	18-Jul	31-Aug	17-Sep	-	-	-



Table 7-3. Dustfall monitoring sampling record, 2024 (date shown indicates the day the sample canister was collected).

Site ID	January	February	March	April	May	June	July	August	September	October	November	December
DF-RS-01	-	-	-	-	-	-	17-Jul	31-Aug	17-Sep	-	-	-
DF-RS-02	10-Feb	10-Mar	07-Apr	07-May	-	18-Jun	17-Jul	18-Aug	-	-	-	16-Dec
DF-RS-03	08-Feb	08-Mar	06-Apr	03-May	31-May	29-Jun	27-Jul	25-Aug	26-Sep	24-Oct	24-Nov	22-Dec
DF-RS-04	08-Feb	08-Mar	06-Apr	03-May	31-May	29-Jun	27-Jul	25-Aug	26-Sep	24-Oct	24-Nov	22-Dec
DF-RS-05	08-Feb	08-Mar	06-Apr	03-May	31-May	29-Jun	27-Jul	25-Aug	26-Sep	24-Oct	24-Nov	22-Dec
DF-RS-06	08-Feb	08-Mar	06-Apr	03-May	31-May	29-Jun	27-Jul	25-Aug	26-Sep	24-Oct	24-Nov	22-Dec
DF-RS-07	10-Feb	10-Mar	07-Apr	07-May	-	18-Jun	17-Jul	18-Aug	-	-	-	16-Dec
DF-RS-08	-	-	-	-	-	-	20-Jul	18-Aug	17-Sep	-	-	-
DF-RR-01	-	-	-	-	-	-	17-Jul	31-Aug	17-Sep	-	-	-
DF-RR-02	-	-	-	-	-	-	19-Jul	31-Aug	17-Sep	-	-	-
DF-TR-25E	12-Feb	11-Mar	07-Apr	08-May	-	17-Jun	18-Jul	31-Aug	-	-	29-Nov	23-Jan
DF-TR-25W	12-Feb	11-Mar	07-Apr	08-May	-	17-Jun	18-Jul	31-Aug	-	-	29-Nov	23-Jan
DF-TR-56E	15-Feb	10-Mar	07-Apr	08-May	-	18-Jun	19-Jul	18-Aug	-	-	-	24-Jan
DF-TR-56W	15-Feb	10-Mar	07-Apr	08-May	-	18-Jun	19-Jul	18-Aug	-	-	-	24-Jan
DF-TR-75E	10-Feb	10-Mar	07-Apr	07-May	-	18-Jun	17-Jul	18-Aug	-	-	-	25-Jan
DF-TR-75W	10-Feb	10-Mar	07-Apr	07-May	-	18-Jun	17-Jul	18-Aug	-	-	-	25-Jan



7.3.1.3 Data Trends and Statistical Analysis

Extent and Magnitude of Dustfall at Various Sites — Dustfall deposition rates (as total suspended particulates [TSP]) for each site were compiled for the 2024 monitoring season. Data were grouped according to the four study areas within the RSA. Data were reviewed to determine which sites in each sampling area were most affected by dustfall relative to reference sites.

Daily dustfall data from the summer sampling period (June to September) were used to evaluate the relationship between dustfall and distance from the road for the Mine Site and Tote Road. Mixed-effects models were used to test the relationship between distance from Project infrastructure and daily dustfall.

- Sites were treated as the random effect.
- Distance from the Mine Site was treated as a categorical variable with three classes: Near (within footprint), Far (1,000 to 5,000 m), and Reference (>5,000 m).
- Distance from the road was treated as a categorical variable with four classes: 30 m, 100 m, 1,000 m, and 5,000 m.

Data for daily dustfall as a function of distance from Project infrastructure did not always meet the assumptions of normality (Shapiro-Wilk test) or equality of variance (Levene's test) in the residuals required for a linear model. In such cases, differences in the distribution of dustfall were tested by distance class using non-parametric Kruskal-Wallis tests, with data stratified by sampling month. Pairwise Wilcoxon tests were performed to determine which distance classes were different. Ninety-five percent bias-corrected and accelerated confidence intervals (CIs) were calculated for each estimate by bootstrapping datasets and testing mixed-effects models 1,000 times. A Holm's p-value correction was applied when conducting pairwise comparisons. Medians and inter-quartile ranges were reported to summarize dustfall within distance classes. Statistical analyses were conducted using R version 4.4.2 (R Core Team 2024).

Seasonal Variation in Dustfall — Daily dustfall was assessed at year-round sites within all Project areas (i.e., the Mine Site, Milne Port, and the Tote Road crossings) to determine whether discrete seasonal/monthly patterns or continuous temporal patterns were evident. The month of dustfall collection was identified from the time between consecutive sample dates (e.g., samples collected early [≤ 15] in December were associated with dustfall in November. In contrast, samples collected later [> 15] in December were associated with dustfall in December). Generalized least-squares regressions were used to test for effects of season (summer and winter) or time (month time series) and sample site on daily dustfall accumulation. Seasonal models were used to test the main effects of season and sample site and the interaction between them. Time-series models were used to test the main effects of sample site and cosinusoidal functions of month and the interaction between them. All dustfall data were \log_e transformed before analysis and results were back-transformed to the original scale. Models included a first-order autocorrelation structure, based on sampling period within a site, to account for the possibility that dustfall in one sampling period was most similar to samples from the preceding period (Zuur et al. 2009). Fixed model weights based on the number of days in each sampling period were used to give more weight to dust samples collected over a longer time (Zuur et al. 2009). Model selection procedures followed an information theoretic approach using corrected Akaike's Information



Criteria (AICc; Burnham and Anderson 2002). Models with the lowest scores were identified as the best trade-off between parsimony and explained variance.

Residual diagnostic plots were examined, and formal tests (Shapiro-Wilk and Levene's tests) were conducted to confirm assumptions of normality and homogeneity of variance in the residuals. Bootstrap resampling (1,000 times) was conducted if these assumptions were violated to develop 95% bias-corrected and accelerated CIs for each estimate. If evidence of an effect of season or month on daily dustfall was detected, estimated marginal means were used to determine the geometric mean effect after accounting for the effect of the sample site (Lenth et al. 2018). Statistical analyses were conducted using R version 4.4.2 (R Core Team 2024).

Annual Dustfall — Annual dustfall model predictions for large parts of the PDA were most recently developed by Nunami Stantec (Nunami Stantec Ltd. 2023). The 2024 passive dustfall monitoring program results for monitoring sites with year-round data collection were converted from mg/dm²·day units to g/m²/year, and data for each month were converted to g/m²/day and then summed to add up to one year. Any data gaps were filled in using predicted dustfall, calculated as presented in Doetzel and Bajina (2023). Measured dustfall from the passive monitoring program was compared with the modelled annual dustfall for all sites for which modelled data were available.

Inter-annual Trends — Linear mixed-effects models were used to test for effects of year and season (summer and winter), month, or time (month time series) on daily dustfall accumulation for each Project area (i.e., the Mine Site, Milne Port, and the Tote Road crossings). Only sites that were sampled throughout the year were included in analyses. The month of dustfall collection was identified from the time between consecutive sample dates (e.g., samples collected early [≤ 15] in December were associated with dustfall in November, whereas samples collected later [> 15] in December were associated with dustfall in December). Monthly models were used to test the main effects of month and year and the interaction between them. Time-series models were used to test the main effects of year and sine/cosine functions of month and the interaction between them. The sample site was included as a random effect to account for lack of independence in samples collected from the same location over time. All dustfall data were log_e transformed before analysis, and results were back-transformed to the original scale. A variance structure was parameterized on the number of sampling days per month in a given year for all models (Zuur et al. 2009).

Residual diagnostic plots were examined, and formal tests (Shapiro Wilk and Leven's tests) were conducted to confirm assumptions of normality and equality of variance in the residuals. If these assumptions were violated, pairwise Wilcoxon tests were performed for factorial (categorical) designs and bootstrap resampling (1,000 times) was used to develop 95% bias-corrected and accelerated CIs for each estimate. If evidence of an effect of month on daily dustfall was detected, estimated marginal means were used to determine the geometric mean effect (Lenth et al. 2018). Model selection procedures followed an information theoretic approach using corrected AICc (Burnham and Anderson 2002). Models with the lowest scores were identified as the best trade-off between parsimony and explained variance. Statistical analyses were conducted using R version 4.4.2 (R Core Team 2024).



7.3.2 RESULTS AND DISCUSSION

7.3.2.1 Magnitude and Extent of 2024 Dustfall

Mine Site — The 2024 monitoring program included nine dustfall monitors at the Mine Site: three within the mine footprint (Near sites), four outside the mine footprint but within the 5,000 m buffer (Far sites), and two Reference sites located greater than 5,000 m from the Mine Site (Table 7-2). Within the mine footprint, dustfall deposition rates at DF-M-01, near the airstrip, were consistent all year round, save for a short-lived spike in May when spring melt conditions can make dust mitigations difficult (Table 7-4). At DF-M-02, located nearest to the crusher, dustfall deposition rates were highest during the winter months until early May, and were then consistently lower from late May through December. At DF-M-03, south of the mine haul road near the ore deposit, dustfall deposition rates varied throughout 2024.

Sites DF-M-06, DF-M-07, DF-M-08, and DF-M-09, located outside the mine footprint but within the 5,000 m buffer, were sampled during summer (July to September). Dustfall deposition rates at these stations were below detection during all sampling events (Table 7-4). Dustfall deposition rates at DF-M-04 and DF-M-05, greater than 5,000 m from the PDA and only sampled during summer, were below detection during all sampling events.

Dustfall deposition rates were significantly higher at Near sites versus Far and Reference sites ($\chi^2_2 = 34.51$, $P < 0.0001$; Figure 7-1). Geometric mean daily dustfall was highest in the Near distance class at 1.43 (95% CI = 1.10–1.92) mg/dm²·day, which was significantly higher than the other two distance classes (all $P < 0.002$). No statistically significant difference in mean daily dustfall occurred between the Far and Reference distance classes ($P = 0.85$). No samples in the Far distance class were above the laboratory detection limit; the geometric mean daily dustfall recorded at the Far distance class was 0.19 (95% CI = 0.15–0.29) mg/dm²·day. No samples in the Reference distance class were above the laboratory detection limit.

Milne Port — Ten dustfall monitors were associated with Milne Port in 2024 (Table 7-2, Map 7-1): five active sites within the Milne Port footprint and five active sites outside the PDA. The two main sources of dustfall at Milne Port are the sealift staging area and the ore stockpile area.

Dustfall deposition rates at Milne Port were highest at DF-P-05, located centrally in the camp area east of the sealift staging pad, and ranged from 0.46 mg/dm²·day in November to 7.30 mg/dm²·day in May (Table 7-4). Dustfall deposition rates at DF-P-06, located nearest to the sealift staging pad on the west side, ranged from 0.16 to 0.55 mg/dm²·day (Table 7-4). Dustfall deposition rates at DF-P-08, located nearest the ore pad, ranged from 0.23 to 2.48 mg/dm²·day, while dustfall deposition rates at DF-P-10, located in the same direction but further out near the PDA boundary, ranged from 0.21 to 2.32 mg/dm²·day. Dustfall deposition rates at DF-P-07, located near the ore pad but further to the north, ranged from below the laboratory detection limit (0.10 mg/dm²·day) to 0.39 mg/dm²·day in August. Dustfall deposition rates at DF-P-04, primarily associated with the Tote Road and quarry operations, ranged from below the laboratory detection limit to 1.22 mg/dm²·day. Dustfall deposition rates at DF-P-11 and DF-P-12, located west of the PDA at approximately 1,000 m distance, ranged from below the laboratory detection limit to a high of 0.12 mg/dm²·day and 0.15 mg/dm²·day, respectively. Dustfall deposition rates at DF-P-03, sampled only



during summer months, were below the laboratory detection limit during all sampling events (July to September).

No evidence was present to indicate that Near and Far distance classes were statistically different in their geometric mean daily dustfall ($\chi^2_1 = 0.83$, $P = 0.41$; Figure 7-1). However, geometric mean daily dustfall was highest in the Near distance class at 0.47 (95% CI = 0.18–1.23), followed by the Far distance class at 0.19 (95% CI = 0.02–2.38). Forty-five samples (75%) in the Near distance class and no samples in the Reference distance class were above the laboratory detection limit.

Tote Road Dustfall — Twenty-four dustfall monitors were associated with the Tote Road in 2024: eight at each of two transects perpendicular to the road (the north crossing site at KM 28 of the Tote Road and the south crossing site at KM 78 of the Tote Road), two Reference monitors located approximately 14,000 m from the road, and three pairs of two sites located 1,000 m from each side of the road at KM 25, KM 56, and KM 75 of the Tote Road.

North Crossing, Tote Road KM 28 — Dustfall deposition rates were highest at the monitors nearest the centerline on both sides of the Tote Road (DF-RN-04 and DF-RN-05), with dustfall ranging from 0.62 to 17.20 mg/dm²·day at DF-RN-04 and from 0.39 to 12.80 mg/dm²·day at DF-RN-05. Dustfall deposition rates decreased with distance from the centerline. Dustfall deposition rates at DF-RN-03 and DF-RN-06 ranged from 0.31 to 5.48 mg/dm²·day and from 0.22 to 8.14 mg/dm²·day, respectively. Dustfall deposition rates at two monitors located 1,000 m from the PDA (DF-RN-02 and DF-RN-07) generally ranged below the laboratory detection limit. Dustfall deposition data collected during the summer season at the farthest sites (DF-RN-01 and DF-RN-08) were below the laboratory detection limit in all samples (Table 7-4).

An effect of distance from the north crossing on daily dustfall was evident ($\chi^2_3 = 41.45$, $P < 0.0001$; Figure 7-1). Geometric mean daily dustfall was higher in the 30 m distance class, 2.31 mg/dm²·day (95% CI = 1.66–3.59), compared to the 1,000 m and 5,000 m distance classes (all $P \leq 0.001$). The evidence suggested that daily dustfall in the 30 m distance class was statistically different from the 100 m distance class ($P = 0.05$). Geometric mean daily dustfall in the 100 m distance class was 1.18 (95% CI = 0.83–1.74) mg/dm²·day, which was significantly higher than the two farther distance classes (all $P < 0.002$). The evidence suggested a difference in dustfall between the 1,000 m and 5,000 m distance classes ($P = 0.05$). Geometric mean daily dustfall in the 1,000 m distance class was 0.14 (95% CI = 0.11–0.21) mg/dm²·day, and 21% of all samples were above the laboratory detection limit. Geometric mean daily dustfall in the 5,000 m distance class was 0.24 (95% CI = 0.16–0.39), but none of the samples were above the laboratory detection limit of 0.1 mg/dm²·day.

South Crossing, Tote Road KM 78 — The south crossing monitors are in a wide valley where high winds are common, generally blowing north to south. The south crossing monitors are also just north of a bridge crossing—as vehicles exit the bridge, they accelerate, increasing dust production. The winds then blow toward the south of the Tote Road. Dustfall at the south crossing generally represents the ‘worst-case scenario’ for dustfall along the Tote Road. Dustfall deposition rates were highest at monitors nearest the centerline on the south side of the Tote Road (DF-RS-04), where dustfall ranged from 1.46 to 25.80 mg/dm²·day. On the north side of the Tote Road (DF-RS-05), dustfall deposition rates ranged from 0.99 to 17.90 mg/dm²·day. Dustfall



deposition rates decreased with distance from the centerline. Dustfall deposition rates at DF-RS-03 and DF-RS-06 ranged from 0.38 to 10.60 mg/dm²·day and from 0.29 to 8.20 mg/dm²·day, respectively. Dustfall deposition rates in collectors at 1,000 m from the PDA (DF-RS-02 and DF-RS-07) ranged from below the laboratory detection limit to 0.96 mg/dm²·day and from below the laboratory detection limit to 0.34 mg/dm²·day, respectively. Dustfall deposition data collected during the summer season at the farthest sites (DF-RN-01 and DF-RN-08) were below the laboratory detection limit in all samples (Table 7-4).

An effect of distance from the south crossing was evident on daily dustfall ($\chi^2_3 = 41.94$, $P < 0.0001$; Figure 7-1). Geometric mean daily dustfall was highest in the 30 m distance class at 3.00 (95% CI = 2.15–4.27) mg/dm²·day, which was significantly higher than the 1,000 m and 5,000 m distance classes (all $P < 0.0008$) but was not statistically different from the 100 m distance class ($P = 0.12$). Geometric mean dustfall in the 100 m distance class was 1.40 (95% CI = 0.84–3.01) mg/dm²·day; evidence was present that this amount was higher than the 1,000 m and 5,000 m distance classes (all $P < 0.007$). No difference in geometric mean dustfall was evident between the 1,000 m (0.18 [95% CI = 0.14–0.24] mg/dm²·day) and 5,000 m (0.19 [95% CI = 0.12–0.33] mg/dm²·day) distances classes ($P = 0.97$). Six samples (38%) in the 1,000 m distance class and no samples in the 5,000 m distance class were above the laboratory detection limit.

Reference Sites — Dustfall deposition rates at the two Tote Road Reference sites (DF-RR-01 and DF-RR-02), which are sampled only during summer months, were (like all other years) below the laboratory detection limit in all samples (Table 7-4).

Dustfall at Sites 1,000 m from the PDA — Twelve dustfall monitoring sites were located 1,000 m from the PDA: two at the Mine Site and 10 at various locations along the Tote Road. The two Mine Site collectors were sampled only during the summer, whereas the Tote Road sites were sampled throughout the year. Monitoring data from previous years indicate that across the Project areas, 1,00 m from the PDA is where dustfall deposition rates approach the laboratory detection limit. Additional data from sites located 1,000 m from the PDA were meant to indicate if dustfall deposition rates are consistent at this distance, or if variability occurs across the Project.

Daily dustfall deposition rates at all sites 1,000 m from mine infrastructure were consistently less than 1.0 mg/dm²·day when reviewing both year-round and summer-only data. Although statistical differences in dustfall were evident among the sites located 1,000 m from Project infrastructure during summer ($\chi^2_{11} = 5.04$, $P = 0.0007$; Figure 7-2) and year-round ($\chi^2_{11} = 5.53$, $P < 0.0001$; Figure 7-3), this variation appears to be site specific rather than Project area specific. For example, the sites with both the highest and lowest geometric mean daily dustfall were associated with the Tote Road. The geometric mean daily dustfall for sites with summer-only data was highest for DF-RS-02 (0.53 [95% CI = 0.18–1.52] mg/dm²·day) and lowest for DF-RN-02 (0.14 [95% CI = 0.05–0.43] mg/dm²·day) (Difference = 0.39 mg/dm²·day, $P = 0.002$). Geometric mean daily dustfall for sites with year-round data was highest for DF-RS-02 (0.27 [95% CI = 0.18–0.40] mg/dm²·day) and lowest for DF-TR-75E (0.12 [95% CI = 0.08–0.18] mg/dm²·day) (Difference = 0.15 mg/dm²·day, $P = 0.0002$).

Table 7-4. Summary of total insoluble dustfall (mg/dm²·day), 2024.

Site ID	January	February	March	April	May	June	July	August	September	October	November	December
DF-M-01	1.89	1.92	1.46	0.99	2.95	1.35	0.49	0.49	<0.34	1.17	1.70	0.41
DF-M-02	3.97	5.45	6.24	1.62	1.88	1.31	0.60	0.52	<0.40	0.34	0.61	0.99
DF-M-03	3.31	3.01	4.77	1.57	5.68	3.40	1.93	4.44	<0.50	1.06	0.47	0.48
DF-M-04	-	-	-	-	-	-	<0.15	<0.14	<0.34	-	-	
DF-M-05	-	-	-	-	-	-	<0.16	<0.14	<0.33	-	-	
DF-M-06	-	-	-	-	-	-	<0.16	<0.19	<0.44	-	-	
DF-M-07	-	-	-	-	-	-	<0.16	<0.10	<0.29	-	-	
DF-M-08	-	-	-	-	-	-	<0.16	<0.19	<0.44	-	-	
DF-M-09	-	-	-	-	-	-	<0.11	<0.10	<0.25	-	-	
DF-P-03	-	-	-	-	-	-	<0.14	<0.14	<0.35	-	-	
DF-P-04	<0.15	0.16	0.99	0.74	1.22	0.95	0.33	0.29	<0.20	<0.16	0.13	<0.15
DF-P-05	1.80	1.59	3.32	5.73	7.30	1.91	1.26	1.72	0.64	0.98	0.46	0.88
DF-P-06	0.25	0.29	0.45	0.55	0.42	0.26	0.16	0.36	<0.15	<0.16	<0.10	<0.15
DF-P-07	0.39	0.38	0.39	0.39	<0.16	<0.16	<0.15	0.35	<0.20	0.25	<0.15	<0.15
DF-P-08	2.48	1.52	2.11	1.62	0.83	0.57	0.61	0.55	<0.25	0.34	0.23	0.55
DF-P-09	0.16	0.22	0.22	-	-	-	0.25	<0.14	-	-	-	-
DF-P-10	2.32	1.78	1.64	1.57	0.69	0.60	0.67	0.46	<0.20	0.39	0.21	0.36
DF-P-11	<0.10	0.12	<0.11	-	-	<0.10	<0.10	<0.10	-	-	-	
DF-P-12	0.12	0.11	0.15	-	-	<0.10	<0.10	<0.10	-	-	-	
DF-RN-01	-	-	-	-	-	-	<0.14	<0.18	<0.44	-	-	
DF-RN-02	<0.10	<0.18	<0.11	-	-	0.21	<0.10	<0.10	-	-	<0.10	<0.10
DF-RN-03	0.67	0.55	0.86	0.67	5.48	1.89	0.51	1.44	0.31	3.20	0.99	0.45
DF-RN-04	1.10	1.00	2.04	1.48	17.20	6.02	1.35	3.29	0.62	5.97	1.40	0.70
DF-RN-05	1.53	1.59	3.35	2.01	12.80	12.70	2.92	3.82	0.71	4.91	1.31	0.39
DF-RN-06	0.99	0.87	1.63	0.71	8.14	4.42	0.82	1.37	0.22	2.39	0.76	1.38
DF-RN-07	<0.10	<0.16	<0.11	-	-	0.81	0.10	<0.14	-	-	-	<0.10
DF-RN-08	-	-	-	-	-	-	<0.14	<0.20	<0.53	-	-	

Table 7-4. Summary of total insoluble dustfall (mg/dm²·day), 2024.

Site ID	January	February	March	April	May	June	July	August	September	October	November	December
DF-RS-01	-	-	-	-	-	-	<0.15	<0.10	<0.53	-	-	
DF-RS-02	<0.13	<0.15	0.15	0.37		0.96	0.41	0.26	-	-	-	<0.15
DF-RS-03	0.78	0.89	0.74	1.07	10.60	7.70	3.25	3.80	0.43	0.74	0.47	0.38
DF-RS-04	2.58	3.01	3.07	6.17	25.80	15.30	15.60	23.50	3.64	7.13	1.46	1.60
DF-RS-05	2.04	2.38	2.79	8.68	16.10	17.90	12.80	8.40	1.06	4.44	1.56	0.99
DF-RS-06	0.59	0.62	0.82	1.56	8.20	4.84	2.68	1.30	<0.32	1.00	0.38	0.29
DF-RS-07	<0.10	<0.15	<0.11	<0.10		0.34	<0.10	<0.10	-	-	-	<0.14
DF-RS-08	-	-	-	-	-	-	<0.10	<0.15	<0.30	-	-	
DF-RR-01	-	-	-	-	-	-	<0.15	<0.10	<0.44	-	-	
DF-RR-02	-	-	-	-	-	-	<0.14	<0.10	<0.44	-	-	
DF-TR-25E	<0.10	<0.11	<0.11	0.11	-	0.35	0.12	0.14	-	-	-	0.11
DF-TR-25W	<0.10	<0.11	<0.11	-	-	0.74	0.11	0.12	-	-	-	0.15
DF-TR-56E	<0.10	<0.18	<0.11	-	-	0.29	0.17	0.19	-	-	-	
DF-TR-56W	<0.10	<0.18	<0.11	0.15	-	0.37	0.10	0.11	-	-	-	
DF-TR-75E	<0.10	<0.10	<0.11	0.13	-	0.17	0.12	<0.10	-	-	-	
DF-TR-75W	0.40	0.18	0.15	0.17	-	0.55	0.23	0.29	-	-	-	