MARY RIVER PROJECT
Terrestrial Environment | 2020 Annual Monitoring Report

Prepared For

BAFFINLAND IRON MINES CORPORATION
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3

Prepared By

EDI ENVIRONMENTAL DYNAMICS INC.
2195 – 2nd Avenue
Whitehorse, YT Y1A 3T8

EDI Contact

Michael Setterington, R.P.Bio., CWB
Senior Biologist

EDI Project

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EDI
ENVIRONMENTAL DYNAMICS INC.
Down to Earth Biology

ᓇᐃᓈᖅᓯᒪᔪᑦ

ᓄᓘᔮᖕᓂ ᐱᓕᕆᓂᖅ (ᐱᓕᕆᓂᖅ) ᓴᕕᕋᔭᒃᓴᓂᒃ ᐅᔭᕋᖕᓂᐊᕐᕕᐅᔪᖅ ᕿᑭᖅᑖᓗᖕᒥ ᕿᑭᖅᑖᓘᑉ ᐅᐊᖕᓇᖓᓂ, ᓄᓇᕘᒥ. ᐱᓕᕆᓂᖅ ᐱᖃᓯᐅᔾᔨᔪᖅ ᓴᓇᔭᐅᓂᖓᓂᒃ, ᐊᐅᓚᑕᐅᓂᖓᓂᒃ, ᒪᑐᔭᐅᓂᖓᓂᒃ ᐃᓕᖁᓯᕐᒥᓄᓪᓗ ᐅᑎᖅᑎᑕᐅᓂᖓᓂᒃ 22 ᒥᓕᐊᓐ ᑕᓐᔅᓄᑦ ᐊᕐᕌᒍᒥ ᓯᓚᐃᓐᓇᕐᒦᑦᑐᖅ ᐅᔭᕋᖕᓂᐊᕐᕕᒃ ᐊᐅᓚᓂᐊᖅᑐᖅ 21ᓄᑦ ᐊᕐᕌᐊᒍᓄᑦ. ᓴᕕᕋᔭᒃᓴᑦᑎᐊᕙᓪᓗᒃ ᓈᒻᒪᒃᑐᖅ ᓄᓇᕐᔪᐊᕐᒥᐅᓄᑦ ᐊᐅᓪᓚᖅᑎᑦᑕᕆᐊᒃᓴᖅ ᓯᖅᑲᓕᔭᐅᔭᓅᕈᓂ ᐊᖏᓂᖏᓐᓄᓪᓗ ᐊᕕᒃᑐᖅᑕᐅᓗᓂ ᐃᓚᐅᕈᑎᓕᐅᕐᕕᖅᓴᖏᓪᓗᑎᒃ. ᓴᓇᓯᒋᐊᓚᐅᖅᑐᑦ ᐱᓕᕆᓂᕐᒥᒃ ᐊᑐᖅᑐᓂᓪᓗ ᐱᓕᕆᕝᕕᖕᓂᒃ 2013ᒥ, ᐅᔭᕋᖕᓂᐊᓯᒋᐊᖅᖢᑎᒃ ᓯᑎᐱᕆ 2014ᒥ.

ᐱᓕᕆᓂᕐᒥ ᒫᓐᓇᐅᔾᖅ ᑮᓇᐅᔭᓕᐅᖅᓵᓕᓇᓱᒃᑐᑦ ᐅᔭᕋᖕᓂᐊᕐᓗᑎᒃ 4.2 ᒥᓕᐊᓐ ᑕᓐᔅᓂᒃ ᐊᕐᕌᒍᒥ ᓴᕕᕋᔭᒃᓯᒃ 1ᒥᑦ. ᐊᑯᓂᐅᖏᑦᑐᒧᑦ ᐊᖏᖅᑕᐅᓪᓗᓂ ᐅᔭᕋᖕᓂᐊᒃᑲᓐᓂᕈᒪᔪᑦ ᐅᓯᑲᖅᑐᕐᓗᑎᒃ ᐊᖅᑯᑎᒃᑯᑦ ᐅᒥᐊᕐᔪᐊᒃᑯᓪᓗ ᐊᐅᓪᓚᐅᔾᔨᓗᑎᒃ 6.0 ᒥᓕᐊᓐ ᑕᓐᔅᓂᒃ ᐊᕐᕌᒍᒥ ᕿᙳᐊᓂᑦ ᐊᖏᖅᑕᐅᓪᓗᓂ ᓯᑎᐱᕆ 2018ᒥ ᐊᑯᓂᐅᓯᒋᐊᖅᑕᐅᓪᓗᓂ 2020ᒧᑦ (ᒥᓂᔅᑕᖓᑦᑕ ᒐᕙᒪᓕᕆᓂᕐᓄᑦ ᐅᑭᐅᖅᑕᖅᑐᓕᕆᓂᕐᓂᑦ ᑲᓇᑕᐅᓪᓗ ᐃᓗᐊᓂ ᑕᐅᖅᓰᓐᓂᑦ 2018ᒥ). ᐊᖏᖅᑕᐅᒋᓪᓗᓂ ᐊᖅᑯᑎᑯᑖᒃ ᐅᓯᒐᔭᖅᑐᖅ 18 ᒥᓕᐊᓐ ᑕᓐᔅᓂᒃ ᕿᙳᐊᓂᑦ ᓴᓇᔭᐅᔪᒪᔪᒧᑦ ᐃᑎᔪᒥ ᑐᓚᒃᑕᕐᕕᖕᒧᑦ ᐃᒃᐱᑭᑦᑐᖅᔪᐊᕐᒥ, ᓴᕕᕋᔭᒃᓴᑦ ᐅᓯᓕᖅᓱᖅᑕᐅᓗᑎᒃ ᐅᒥᐊᕐᔪᐊᓄᑦ ᑕᑎᐅᑉ ᐊᑭᐊᓄᐊᕈᑕᐅᓗᑎᒃ ᐃᒥᑦᑑᑉ ᐃᒪᖓᒍᑦ.

2020ᒥ 6.0 ᒥᓕᐊᓐ ᑕᓐᔅᓂᒃ ᓴᕕᕋᔭᒃᓴᓂᒃ ᐅᓯᑲᖅᑕᓚᐅᖅᑐᑦ ᐅᔭᕋᖕᓂᐊᕐᕕᖕᒥᑦ ᕿᙳᐊᓄᑦ ᑐᖅᑯᖅᓯᒪᔪᓄᑦ. ᓴᓇᓗᐊᓚᐅᖏᑦᑐᑦ 2020ᒥ: ᓴᕕᕋᔭᒃᓴᓄᑦ ᑐᖅᑯᖅᑕᕐᕕᖕᒥᒃ ᐃᒥᕐᓄᓪᓗ ᐊᐅᓚᑦᑎᔾᔪᑎᓂᒃ ᓴᓇᓚᐅᖅᑐᑦ ᑭᓛᒥᑕ 106ᒥ, ᓄᑖᒥᒃ ᐊᖅᑯᑎᓕᐅᖅᑕᐅᓪᓗᓂ ᐃᓗᑐᔪᓕᐅᖅᖢᑎᓪᓗ ᐃᒥᕐᓄᑦ ᑲᑎᖅᓱᐃᕝᕕᖕᒥᑦ 560ᒥ ᐊᖅᑯᑎᒥ ᐱᖒᑉ ᓴᓂᐊᓃᑦᑐᒥ, ᑭᓱᖃᕐᕕᓪᓗ ᐊᖏᓪᓕᒋᐊᖅᑕᐅᓪᓗᓂ ᑭᓛᒥᑕ 110 ᐅᖃᖃᑎᒌᓄᑦ ᓇᐸᔪᖏᓐᓂ. 2020 ᐃᓱᓕᑎᓪᓗᒍ, ᑲᑎᔅᖢᒋᑦ ᐱᓕᕆᕝᕕᐅᔪᑦ 556 Hᐃᐊᒃᑎᐊᔅᖑᓚᐅᖅᑐᑦ. ᐃᓚᖓᑦ ᐊᕙᑎᓄᑦ ᐃᓱᒫᓘᑕᐅᓛᖑᖅᑲᑕᐅᓚᐅᖅᑐᖅ ᐱᓕᕆᓂᕐᒧᑦ ᐊᒃᑐᐊᔪᓄᑦ 2020ᒥ ᐳᔪᑦ ᑎᒃᑕᐅᔪᑦ. ᐹᕙᓐᓛᓐᑯᑦ ᐊᑐᓲᖑᕗᑦ ᐅᓄᖅᑐᓂᒃ ᐳᔩᔾᔭᐃᒃᑯᑎᓂᒃ ᐱᓕᕐᕕᓕᒫᑉ ᐃᓗᐊᓂ ᑎᒃᑕᐅᑎᑦᑎᖏᓐᓂᖅᓴᐅᓇᓱᒃᖢᑎᒃ, ᐱᕿᐊᓯᐅᕐᖢᒋᑦ ᐃᒦᑦ ᑳᓪᓯᐊᒻ ᒃᓗᐊᕋᐃᑦᓗ ᐊᖅᑯᑎᓄᑦ, ᐊᑐᐃᓐᓇᖅᐸᒃᖢᑎᒃ ᖃᐹᓂᒃ ᓴᕕᕋᔭᒃᓴᓄᑦ ᓯᖅᑲᓕᔾᔪᑎᓄᑦ, ᐱᐅᓯᒋᐊᖅᖢᒋᓪᓗ ᓴᕕᕋᔭᒃᓴᑦ ᑐᖅᑯᖅᑕᐅᓂᖏᑦ. ᑕᔅᑕᔅᑕᐸᓯᒥᒃ ᐊᑐᓚᐅᖅᑐᑦ ᐊᖅᑯᑎᓕᒫᒃᑯᑦ ᐊᐅᔭᖓᓂ 2020. ᓱᓕᒃᑲᓐᓂᖅᑕᐅᖅ ᐳᔩᔾᔭᐃᒃᑯᑎ ᑕᔅᑦᑐᓇᑦ ᖃᐅᔨᓴᐅᑕᐅᓚᐅᖅᑐᖅ ᓴᕕᕋᔭᒃᓴᓄᑦ ᑐᖅᑯᖅᓯᒪᔪᓄᑦ ᕿᙳᐊᓂ ᓄᕕᐱᕆ 2020ᒥ. ᑕᔅᑦᑐᓇᑦ ᑎᒥᓄᑦ ᐅᓗᕆᐊᓇᖏᑦᑐᖅ, ᐃᒥᕐᓂᒃ ᐃᓚᖃᖅᖢᓂ, ᐊᑯᓂᒧᓪᓗ ᐊᑐᕈᓐᓇᖅᖢᓂ ᖃᐹᖅᓯᓯᖑᓪᓗᓂ ᑐᖅᑯᖅᓯᒪᔪᓂᒃ ᐳᔩᔾᔭᖏᒻᒪᑕ.

ᓄᓇᕘᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑕ ᖃᒥᖅᕈᔭᖕᒪᓄᑦ ᐱᓕᕆᕐᒧᑦ ᐱᔭᓐᓇᐅᑎ ᓇᐃᓴᐅᑎᓕᒃ 005 ᐱᖃᓯᐅᔾᔨᖕᒪᑦ ᐅᓄᖅᑐᓂᒃ ᒪᓕᒋᐊᓕᖕᓂᒃ ᐹᕙᓐᓛᓐᑯᑦ ᓴᕕᕋᔭᒃᓴᓄᑦ ᐅᔭᕋᖕᓂᐊᖅᑎᖏᑕ ᑯᐊᐳᕇᓴᖕᒪᓄᑦ ᖃᐅᔨᓴᓐᓇᐊᖃᖅᑎᑦᑎᓪᓗᓂ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓄᓇᓂ ᐊᕙᑎᓂᒃ. ᐱᓕᕆᔭᐅᔪᑦ ᓄᓇᓂ ᐊᕙᐃᓂᒃ ᖃᐅᔨᓴᕐᓂᕐᓄᑦ ᐊᐅᓚᑕᐅᔪᖅ ᓄᓇᓂ ᐊᕙᑎᓂ ᐊᒃᑐᐃᓂᕐᓗᖕᓄᑦ ᐊᒃᑐᐃᓕᐊᙱᑎᑦᑎᓂᕐᓄᑦ ᖃᐅᔨᓴᕐᓂᕐᓄᓪᓗ ᐸᕐᓇᐅᑎᒧᑦ (ᐹᕙᓐᓛᓐ ᓴᕕᕋᔭᒃᓴᓄᑦ ᐅᔭᕋᖕᓂᐊᕐᕕᖏᑕ ᑯᐊᐳᕇᓴᖕᒪᑦ 2016). ᐊᐅᓚᑕᐅᓪᓗᓂ ᓄᓇᓂ ᐊᕙᑎᓂ ᑲᑎᒪᔨᕋᓛᓂᑦ, ᐃᓚᐅᓪᓗᑎᒃ ᑲᑎᒪᔩᑦ ᐹᕙᓐᓛᓐᑯᓐᓂᑦ, ᕿᑭᖅᑕᓂ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᓐᓂᑦ, ᒐᕙᒪᖏᑦ ᓄᓇᕘᒥ, ᓯᓚᓄᑦ ᓯᓚᐃᓪᓗ ᐊᓯᔾᔨᕐᓂᖏᓐᓄᑦ ᑲᓇᑕᒥᒃᑯᓐᓂᑦ ᒥᑦᑎᒪᑕᓕᖕᒥ ᐊᖑᓇᓱᒃᑐᓕᕆᔨᒃᑯᓐᓂᓪᓗ. ᓄᓇᓂ ᐊᕙᑎᓂ ᖃᐅᔨᓴᕐᓃᑦ ᐱᒋᐊᓚᐅᖅᑐᑦ 2012ᒥ ᑲᔪᓯᓪᓗᑎᓪᓗ 2020ᒧᑦ ᐋᖅᑭᒋᐊᖅᐸᒃᖢᒋᑦ ᖃᐅᔨᓴᕐᓃᑦ ᐊᕐᕌᒍᓂ, ᒪᓕᒃᖢᒋᑦ ᖃᐅᔨᔭᐅᔪᑦ ᑎᓕᐅᕈᑕᐅᔪᓪᓗ ᓄᓇᓂ ᐊᕙᑎᓂ ᑲᑎᒪᔨᓂᑦ.

ᑖᓐᓇ ᐅᓂᒃᑳᖅ ᓇᐃᓈᖅᓯᕗᖅ ᖃᐅᔨᔭᐅᔪᓂᒃ ᑲᑎᖅᓱᐃᓂᕐᓂᒃ ᖃᐅᔨᐊᕐᓂᕐᓂᓪᓗ ᐱᓕᕆᔭᐅᔪᓄᑦ 2020ᒥ ᐱᓕᕆᓂᕐᒧᑦ, ᐱᖃᓯᐅᓪᓗᒋᑦ ᑕᒃᑯᐊ ᖃᐅᔨᓴᕐᓃᑦ (ᓇᐃᓈᖅᓯᒪᔪᑦ ᓇᓗᓇᐃᖅᓯᒪᔪᑦ 0ᒥ):

- ᓯᓚᓂᒃ ᖃᐅᔨᓴᕐᓃᑦ;
- ᓂᐹᕿᓂᕐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ;
- ᕿᓚᒥᒎᑦ ᕿᑦᑎᖕᓂᖏᓐᓂᒃ ᕿᒥᕈᓃᑦ;
- ᑎᒃᑕᐅᖏᑦᑐᓄᑦ ᐳᔪᕐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ;
- ᐳᔪᐃᑦ ᓇᒧᙵᕐᓂᕐᓄᑦ ᐊᔾᔨᙳᐊᒃᑯᑦ ᕿᒥᕐᕈᓃᑦ;
- ᐱᕈᖅᑐᓂ ᐃᔾᔪᕐᓂᓗ ᓴᕕᕋᔭᖅᑲᕐᓂᕐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ;
- ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᓄᑦ ᐱᕈᖅᑐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ;
- ᐱᕈᖅᑐᑦ "ᐱᕈᕐᓂᖏᓐᓄᑦ" ᕿᒥᕐᕈᓃᑦ;
- ᐊᐳᑎᒃᑯᑦ ᑐᒥᓯᐅᕐᓃᑦ;
- ᐊᐳᑎᓄᑦ ᑲᑎᑕᐅᓯᒪᔪᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ;
- ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᑐᒃᑐᓂᒃ ᖃᐅᔨᓴᕐᓃᑦ;
- ᐊᖑᓇᓱᒃᑎᓄᑦ ᐳᓛᕆᐊᖅᑐᓄᓪᓗ ᓇᐃᓈᖅᓯᒪᓃᑦ;
- ᐊᐅᓪᓚᓲᓄᑦ ᑎᖕᒥᐊᓄᑦ ᐃᕙᔪᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ;
- ᖃᖅᑲᓂ ᑎᖖᒥᐊᓄᑦ ᐃᕙᕝᕕᐅᔪᓄᑦ ᕿᑐᕐᖖᒋᐅᕐᓂᕐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ; ᐊᒻᒪᓗ
- ᓂᕐᔪᑎᓂᒃ ᐅᐸᒃᓯᓃᑦ ᑐᕐᑯᔪᓪᓗ.

ᓯᓚᓄᑦ ᖃᓄᐃᓕᖕᒐᓃᑦ 2020ᒥ ᓇᐃᓈᖅᑕᐅᓚᐅᖅᑐᑦ ᓴᓂᐊᓂᓗ ᑕᑯᓇᒃᑕᐅᓪᓗᑎᒃ ᖃᓄᐃᓕᖕᒐᒐᔪᒃᑐᓄᑦ ᕿᒪᒃᑕᑦᑎᓐᓂ. ᔪᕋᒃᑐᓄᑦ ᓂᓪᓗᐊᔾᔭᒃᑐᓂ, ᒪᕐᑯᓄᑦ ᐊᓄᓇᓄᓪᓗ ᖃᐅᔨᓴᐅᑎᓂᒃ ᑖᒃᑯᓂᖓ ᓴᓂᓕᓃᓪᓗᒋᑦ ᐊᒃᓱᕐᓇᓚᐅᖅᑐᑦ 2020ᒥ.

ᐹᕙᓐᓃᓐᑯᑦ ᐱᒋᐊᖅᑎᑦᑎᓚᐅᖅᑐᑦ ᓂᐹᕿᔭᒃᑐᓄᑦ ᖃᐅᔨᓴᕐᓂᕐᒥᒃ 2020ᒥ ᓇᓗᓇᐃᕋᓱᒃᓱᒋᑦ ᐱᓕᕆᓂᕐᒥᑦ ᓂᐹᕿᔭᖕᓃᑦ. 9 ᓂᐱᓄᑦ ᖃᐅᔨᓴᕐᕖᑦ ᓴᓇᔭᐅᓚᐅᖅᑐᑦ ᐊᔾᔨᒌᖏᑦᑐᓄᑦ ᐅᖓᓯᖕᓂᕐᓂᑦ (ᖃᓂᑦᑐᖅ, ᐅᖓᓯᒃᑐᖅ, ᖃᐅᔨᒪᕝᕕᐅᔪᕐᓗ) ᐊᑐᓂ ᐱᓕᕆᕝᕕᐅᔪᓄᑦ (ᐅᔭᕋᖕᓂᐊᕐᕕᒃ, ᐅᓯᑲᖅᑕᕐᕕᐅᑉ ᐊᖅᑯᑎᐊ ᕿᙳᐊᓂᓗ ᑐᓚᒃᑕᕐᕕᒃ), ᐃᒻᒥᓄᑦ ᐊᐅᓚᑦᑐᓄᑦ ᓂᐱᓕᐅᕈᑎᓄᑦ ᐋᖅᑭᒃᓯᒪᓪᓗᑎᒃ ᐊᑐᓂ ᖃᐅᔾᔨᓴᕐᕕᖕᒥ ᓂᐱᓕᐅᕐᓂᐊᕐᒪᑕ ᓂᐱᖃᕐᓃᑦ.

ᓂᐱᐊᕐᓃᑦ ᐊᔾᔨᒌᖃᑦᑕᓚᐅᖏᑦᑐᑦ ᐊᔾᔨᒌᖏᑦᑐᓂ ᐱᓕᕆᕝᕕᐅᔪᓂ, ᐱᖃᓯᐅᓪᓗᒋᑦ ᑕᐃᒪᐃᓚᔪᒃᑐᑦ ᓂᐹᕿᔮᓪᓗ, ᐊᔾᔨᒌᖏᖕᓂᕐᓂᒃ ᓂᐱᖃᕐᓃᑦ, ᓂᓪᓕᑳᓪᓚᒃᑐᓂᓪᓗ ᓂᐱᖃᕐᓃᑦ. ᓂᕆᐅᕆᔭᐅᓂᖓ ᒪᓕᒃᓗᒍ, ᐱᓕᕆᓂᖅ ᓂᐹᕿᔮᖅ ᓂᐱᖅᑯᖅᑐᓂᖓ ᖃᓄᐃᒋᐊᕈᑕᐅᕙᒃᓗᓂ ᓂᕐᔪᑎᓄᑦ (ᓲᕐᓗ., ᓂᐱᖅᑯᖅᑐᓂᖅᓴᑦ 55 Dbaᒥᑦ) ᓴᓇᕝᕕᐅᑐᐃᓐᓇᕆᐊᓕᖕᓂᑦ. ᑭᓯᐊᓂ, 1.5 ᑭᓛᒥᑕᒦᓕᖅᑎᓪᓗᒋᑦ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᕆᐊᓕᖕᓂᑦ, ᐅᖓᑖᓂ 90% ᓂᐱᓄᑦ ᓂᐱᓕᐅᖅᑐᑦ ᓂᐱᑭᖕᓂᖅᓴᐅᓚᐅᖅᑐᑦ ᑖᔅᓯᒪᙱᑦ ᑭᓪᓕᕐᒥᑦ ᓂᕐᔪᑎᓄᓪᓗ ᖃᓄᐃᒋᐊᕈᑕᐅᒐᔭᕐᓇᓂ. ᐱᓕᕆᔪᓄᑦ ᐊᒃᑐᐊᔪᑦ ᓂᐲᑦ ᓂᐱᑭᖕᓂᖅᓴᐅᒐᔪᓚᐅᖅᑐᑦ ᓯᓚᐃᑦ ᐱᐅᓂᖏᓐᓄᑦ ᓂᐹᕿᔭᖏᓐᓂᕐᒧᓪᓗ ᐸᕐᓇᐅᑎᐅᑉ ᐊᐅᓚᓂᕐᓄᑦ ᑭᒥᓕᐊᓄᑦ 40 dBA 1.5 ᑭᓛᒥᑕᒥᑦ ᐱᓕᕆᕝᕕᖕᒥᑦ, ᑭᓯᐊᓂ ᕿᙳᐊᓂ ᓂᐹᕿᔭᖕᓂᖅᓴᐅᕗᑦ ᐊᐅᓚᓂᕐᓄᑦ ᑭᓪᓕᓄᑦ. ᐱᓕᕆᓂᕐᒥᑦ ᐊᐅᓚᐅᑏᑦ ᑐᓴᖅᑕᐅᖏᑦᑐᑦ 3 ᑭᓛᒥᑕᓂᑦ ᓴᓇᔭᐅᑐᐃᓐᓇᕆᐊᓕᖕᓂᑦ. ᖃᐅᔨᓴᒃᑲᓐᓂᖃᑦᑕᕋᖅᑐᑦ ᓂᐱᓄᑦ 2022ᒥ.

ᖃᐅᑕᒫᓄᑦ ᓅᒃᑕᕐᓃᑦ (ᐅᓯᔪᑦ ᐊᓲᓪᓗ) ᐅᓯᑲᖅᑕᕐᕕᐅᑉ ᐊᖅᑯᑎᐊᓂ 2020ᒥ 271.1 ᖑᓚᐅᖅᑐᑦ. ᐅᓄᕐᓂᕆᒐᔪᒃᑕᖏᑦ ᓴᕕᕋᔭᒃᓴᓂᒃ ᐅᓯᔪᑦ ᖃᐅᑕᒫᑦ ᔮᓐᓄᐊᕆ 1ᒥᑦ ᑎᓯᐱᕆ 31, 2020ᒧᑦ 243.3 ᖑᓚᐅᖅᑐᑦ, ᑎᒫᓃᒌᕐᔪᒃᓗᓂ ᑭᖑᓪᓕᖅᐹᒧᑦ ᐊᕙᑎᓄᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ ᐅᓂᒃᑳᒧᑦ ᐃᓚᒋᐊᖅᑕᐅᔪᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓂᑦ. ᐊᓲᑦ ᐃᖏᕐᕋᔪᑦ ᐅᓄᒐᔪᓚᐅᖅᑐᑦ 28.4 ᓄᓇᒃᑰᕈᑎᓄᑦ ᐅᓪᓗᕐᒥ.

ᕿᓚᒥᒎᒃᑯᑦ ᐳᖅᑐᓂᖏᓐᓄᑦ ᕿᒥᕐᕈᖃᑦᑕᓚᐅᖅᐳᑦ ᐊᒃᑐᐃᓂᕐᓲᑐᐃᓐᓇᕆᐊᓕᖕᓄᑦ ᑎᖕᒥᐊᓄᑦ ᐊᓯᓄᓪᓗ ᓂᕐᔪᑎᓄᑦ ᐱᓕᕆᕝᕕᒃ ᐃᓗᐊᓂ ᓇᓗᓇᐃᖅᓯᒪᔪᓂᓗ ᑲᖑᓄᑦ ᐃᓴᐅᕝᕕᖕᓂ (ᔪᓚᐃᒥ ᐋᒡᒌᓯᒥᓗᑐᐊᖅ).

2020ᒧᑦ ᕿᒥᕐᕈᓂᖅ ᐃᓚᓕᐅᔾᔪᕗᖅ ᓱᓕᒃᑲᓐᓂᕐᓂᒃ ᑐᒃᓯᕋᖅᑕᐅᔪᓄᑦ ᓄᓇᓂ ᐊᕙᑎᓂ ᑲᑎᒪᔨᖏᓐᓂᑦ 2020ᒥ ᑲᑎᒪᓂᕐᓂᑦ ᑐᕌᖅᑐᓄᑦ ᖃᖓᑕᔪᑦ ᐊᑯᓂᐅᓂᖏᓐᓂᒃ ᖁᓕᒥᒎᖅᑎᐅᓪᓗ ᐃᓱᒪᒋᔭᖏᓐᓂᒃ, ᖁᓕᒥᒎᑦ ᐳᖅᑐᓂᕐᓄᑦ ᒪᓕᖕᓂᖏᑦ ᖃᖑᖃᖅᑐᓄᑦ ᐃᓴᐅᓕᖅᑎᓪᓗᒋᑦ 89% ᖑᓚᐅᖅᑐᑦ, ᐃᓗᐃᑦᑐᒃᑯᓪᓗ ᒪᓕᖕᒌᑦ ᑕᖅᑭᓖᓂᑦ 96% ᖑᓪᓗᑎᒃ. ᖁᓕᒥᒎᖅᑎᓂᑦ ᖃᓄᖅᑑᖅᑕᐅᔪᑦ (ᓘᕐᓗ ᐳᑭᓈᓇᐊᓖᑦ) ᐅᕐᑯᐊᓯᓇᔭᐅᔪᑦ ᐳᒃᑭᓈᖅᑐᓄᑦ ᓂᕖᖕᒐᔪᓂᒃ ᐅᓯᓪᓗᑎᒃ, ᐃᓄᖕᓂᒃ ᕿᒪᐃᓪᓗᑎᒃ ᐊᐃᒃᓴᖅᓱᑎᒡᓗ. ᐃᓗᐃᑦᑐᒃᑯᑦ ᒪᓕᖕᓃᑦ ᐳᖅᑐᓛᖑᓚᐅᖅᑐᑦ 2020ᒥ ᐊᓯᐊᑕ ᐊᕐᕌᒍᑦ ᓴᓂᐊᓂ.

ᐳᔪᐃᑦ ᑲᑕᖕᓂᖏᓐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᐊᑐᓚᐅᖅᑐᑦ 39ᓂᒃ ᐳᔪᖅᑕᐅᑎᓂᒃ 2020ᒥ ᖃᐅᔨᓇᓱᒃᓱᒋᑦ ᐳᔪᐃᑦ ᓇᒧᙵᕐᓂᖏᑦ ᐊᒃᑐᐊᔪᓄᑦ ᐱᓕᕆᓂᕙᑦ ᐱᓖᕆᔪᓄᑦ, ᐊᑐᖅᓱᑎᒃ ᖃᐅᔨᓴᖅᑭᑎᓂᒃ ᕿᒥᕐᕈᓂᕐᓂᓪᓗ ᐊᕐᕌᒍᓂᑦ ᕿᒪᒃᑕᑦᑎᓐᓂᑦ. 26 ᐳᔪᖅᑕᐅᑏᑦ ᐊᓯᔾᔨᖅᑕᐅᕙᒃᓱᑎᒃ ᑕᖅᑭᑕᒫᑦ, ᐊᓯᖏᑦ ᐊᓯᔾᔨᖅᑕᐅᕙᒃᓱᑎᒃ ᐊᐅᔭᓂ ᑕᖅᑭᓂ ᐅᖓᓯᒃᑐᒦᓐᓂᕙᓄᑦ. ᐳᔪᐃᑦ ᓇᒧᙵᕐᓂᖏᑦᑕᐅᖅ ᓄᓇᓂ ᕿᒥᕐᕈᔭᐅᓚᐅᖅᑐᑦ ᖃᖓᑦᑕᖅᑎᑕᐅᓯᒪᔪᓂᑦ ᐊᔾᔨᙳᐊᓂᑦ. ᑖᒃᑯᐊ ᕿᒥᕐᕈᔭᐅᓚᐅᖅᑐᑦ ᓇᓗᓇᐃᕋᓱᒃᓱᒋᑦ ᐃᓄᐃᑦ ᐊᐅᓪᓚᖅᓯᒪᔪᓂᑦ ᓴᖅᑭᔮᖅᑐᓂᒃ ᐳᔪᖅᓯᐊᕐᓂᕋᖅᑐᓂᑦ ᐅᖓᑖᓂ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᑦ ᐳᔪᐃᑦ ᓇᒧᙵᕋᔭᕐᓂᕐᓄᑦ ᐋᖅᑭᙳᐊᖅᑕᐅᓯᒪᔪᓂᑦ. ᐳᔪᐃᑦ ᓇᒧᙵᕐᓂᖏᑦ ᐅᓄᖅᓯᕆᐊᓚᐅᖅᐳᑦ 2014ᒥᑦ 2019ᒧᑦ ᐅᔭᕋᖕᓂᐊᕐᕕᖕᒥ ᕿᙱᐊᓂᓗ ᓴᖅᑭᔮᖏᓐᓂᖅᓴᐅᓕᖅᓱᑎᓪᓗ 2020ᒥ. ᐅᓯᒃᑲᖅᑕᕐᕕᐅᑉ ᐊᖅᑯᑎᐊᓂ ᐳᔪᐃᑦ ᒪᓕᒐᓗᐊᔭᐅᖅᑐᑦ ᐊᖅᑯᑎᒥᒃ, ᐃᓚᖏᑦ ᐊᕐᕌᒍᑦ (ᓘᕐᓗ 2015, 2019 2020ᓗ) ᐊᕚᖕᓛᓘᕐᓂᖅᓴᐅᓪᓗᑎᒃ ᐊᓯᓂᑦ. ᐳᔪᒃᑲᓪᓚᓚᐅᖅᑐᖅ ᖃᓂᒋᔭᓂ ᕿᙱᐊᑦ, ᐅᔭᕋᖕᓂᐊᕐᕕᖕᒥ ᐅᓯᒃᑲᖅᑕᕐᕕᐅᓪᓗ ᐊᖅᑯᑎᐊᓂ ᐳᔪᖃᓗᐊᕋᓂᓗ ᐊᕙᑎᖏᓐᓂ.

ᐱᕈᖅᑐᓂᒃ ᖃᐅᔨᓴᕐᓃᑦ 2020ᒥ ᐱᖃᓯᐅᔾᔨᓚᐅᖅᑐᑦ ᐱᕈᖅᑐᓄᑦ ᐃᔾᔪᓂᓗ ᓴᕝᕋᔭᓄᑦ ᖃᐅᔨᓴᕐᓂᕐᓂᒃ, ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᓄᑦ ᐱᕈᖅᑐᓄᑦ ᖃᐅᔨᓴᕐᓂᕐᓂᒃ, ᐱᕈᖅᑐᓪᓗ ᐱᕈᕐᓂᖏᓐᓂᒃ. ᐃᔾᔪᕐᓂ ᓴᕝᕋᔭᒃᑯᕐᓃᑦ ᑎᖏᐅᔭᓂᓗ ᓴᕝᕋᔭᒃᑯᕐᓃᑦ ᐱᓕᕆᔪᓂ ᓴᕝᕋᔭᒃᑲᓕᕐᓂᖅᓴᐅᓚᐅᖏᑦᑐᑦ ᓴᓂᐊᓂ ᐱᓕᕆᓚᐅᖏᑎᓪᓗᒋᒥᑦ. ᐃᓚᖏᑦ ᓴᕝᕋᔭᒃᑯᕐᓂᖅᓴᐅᓕᖅᑐᑦ ᖃᐅᔨᔭᐅᓪᓗᑎᒃ ᑭᓯᐊᓂ ᓴᕝᕋᔭᒃᑯᕐᓂᖏᑦ ᑎᒫᓃᓚᐅᖅᑐᑦ ᓈᒻᒪᒃᓱᑎᒡᓘᓐᓃᑦ. ᒫᓐᓇᐅᔪᖅ ᐃᔾᔪᕐᓂ ᑎᖏᐅᔭᓂᓗ ᓴᕝᕋᔭᒃᑯᕐᓃᑦ ᐅᓗᕆᐊᓇᖖᒋᓚᑦ ᐊᕙᑎᓄᑦ ᐃᓄᐃᓪᓗ ᖃᓄᐃᖏᓐᓂᖏᓐᓄᑦ ᐊᑦᑕᕐᓇᖏᑦᑐᒦᓂᖏᓐᓄᓪᓗ; ᖃᐅᔨᓴᖅᑕᐅᖏᓐᓇᕐᓂᐊᖅᐳᑦ ᑖᒃᑯᐊ ᓱᓕᒃᑲᓐᓂᕐᓗ ᐳᐃᒍᔾᔭᐃᖅᓯᓗᑎᒃ ᓱᕈᓂᒃ ᐃᓯᒫᓗᖕᓇᑐᐃᓐᓇᓇᐊᓕᖕᓂᒃ. ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᓄᑦ ᐱᕈᖅᑐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ 2020ᒥ ᑐᕌᓚᐅᖅᐳᑦ ᐊᑕᐅᓯᕐᒧᑦ ᓄᓇᒧᑦ ᑐᒪᐃᑐᓂᒃ ᐱᕈᕐᕕᐅᓚᐅᖅᑐᓂᒃ 2019ᒥ. ᓇᓂᓯᓚᐅᖏᑦᑐᑦ ᑐᒪᐃᑐᓂᒃ ᒪᕐᕈᐃᖅᓱᖅᓱᑎᒃ ᖃᐅᔨᓴᕋᒥᒃ 2020ᒥ.

ᖃᖓᑦᑕᖅᑎᑕᐅᓯᒪᔪᓂᑦ ᐊᔾᔨᙳᐊᓂᑦ ᕿᒥᕐᕈᓃᑦ ᐊᑐᖅᓱᑎᒃ ᐱᕈᖅᑐᖃᕐᓂᕐᓄᑦ ᐊᑐᓕᖅᑎᑕᐅᓚᐅᖅᑐᑦ 2020ᒥ ᑐᒃᓯᕋᐅᑕᐅᔪᒧᑦ ᓄᓇᓂ ᐊᕙᑎᓂ ᑲᑎᒪᔨᖏᓐᓂᑦ ᓇᓗᓇᐃᕈᑕᐅᓪᓗᑎᒃ ᐱᕈᖅᑐᓂᒃ ᖃᐅᔨᓴᕐᓃᑦ ᐱᓕᕆᔭᐅᓗᑎᒃ ᐱᕈᕐᓇᓗᐊᖅᑎᓪᓗᒍ. ᐱᕈᕐᓇᓖᖅ ᓇᓗᓇᐃᖅᑕᐅᓪᓗᓂ ᓯᕗᓪᓕᖅᐹᒥᑦ ᐱᓇᓱᐊᕈᓯᒥᑦ ᔪᓚᐃᒥ ᓯᕗᓪᓕᖅᐹᒧᑦ ᐱᓇᓱᐊᕈᓯᒧᑦ ᓯᑎᐱᕆᒥ, ᐃᓚᓕᐅᔾᔨᓪᓗᑎᒃ ᕿᒪᒃᑕᑦᑎᓐᓂ ᐱᕈᖅᑐᓄᑦ ᖃᐅᔨᓴᕈᓯᕐᓂᒃ.

ᐊᐳᑎᒃᑯᑦ ᑐᒥᓂᒃ ᖃᐅᔨᓴᖃᑦᑕᓚᐅᖅᐳᑦ ᖃᐅᔨᓇᓱᒃᓱᒋᑦ ᓂᕐᔪᑏᑦ ᖃᓄᐃᒋᐊᕐᓂᒋᓐᓄᑦ ᐊᖅᑯᑎᒧᑦ, ᐱᓗᐊᖅᑐᒥᒃ ᑐᒃᑐᑦ ᖃᓄᐃᒋᐊᕐᓂᖏᓐᓄᑦ. ᑕᓪᓕᒪᐃᖅᓱᖅᓱᑎᒃ ᖃᐅᔨᓴᓚᐅᖅᑐᑦ 2020ᒥ: ᐱᖓᓱᑦ ᐅᐱᕐᙳᒥ (ᒫᔾᔭ 17, ᐊᐃᕐᓇᓕ 27, ᒪᐃ 17) ᒪᕐᕈᐃᖅᓱᖅᓱᑎᒡᓗ ᐅᑭᐅᕐᒥ (ᐅᑐᐱᕆ 13 22ᓗ). ᕿᒪᒃᑕᑦᑎᑐᑦ ᖃᐅᔨᓴᕐᓂᖅᑎᑐᑦ ᑕᒪᒃᑮᑲᓴᑦ ᑐᒦᑦ ᑕᑯᔭᐅᔪᑦ ᑎᓇᒐᓂᐊᕐᓂᐅᓚᐅᖅᑐᑦ ᐅᑲᓕᕐᓂᓪᓗ, ᑐᒃᑐᑦ ᑐᒥᖏᓐᓂᒃ ᑕᑯᓇᑎᒃ. ᐊᕚᐸᓗᖏᑦ ᑐᒦᑦ ᑕᑯᔭᐅᔪᑦ ᓂᕐᔪᑎᓂᑦ ᐃᑳᖅᑐᓂᑦ, ᐱᖓᓱᐃᓪᓗᐊᖏᑦ ᒪᓕᒃᓱᑎᒃ 15%ᓗ ᕿᒪᕆᐊᖅᓱᑎᒃ ᐊᖅᑯᑎᒥᑦ.

ᖃᓗᕋᖅᓯᒪᔪᓂᒃ ᐊᐳᑏᑦ ᐳᖅᑐᓂᖏᓐᓂᑦ ᐱᓕᕆᓚᐅᖅᑐᑦ ᒪᓕᖕᒪᖕᒫᑕ ᐊᐅᓚᓂᕐᓄᑦ 1 ᒦᑕᒧᑦ ᐳᖅᑐᓂᕐᓄᑦ ᑭᒡᓕᓂᒃ, ᐃᑳᕈᑕᐅᓪᓗᑎᒃ ᓂᕐᔪᑎᓄᑦ ᑕᑯᑦᑎᐊᕐᓇᖅᓱᑎᒡᓗ ᐊᕐᑯᑎᓄᑦ ᓂᕐᔪᑎᓂᒃ ᑐᓗᖅᓯᔪᒪᓇᑎᒃ. ᖃᓗᕋᖅᓯᒪᔪᑦ ᐳᖅᑐᓂᖏᓐᓄᑦ ᖃᐅᔨᓴᖅᑕᐅᓚᔪᒃᓱᑎᒃ ᐊᑕᐅᓯᐊᖅᓱᑎᒃ ᑕᖅᑭᒥ ᐅᑭᐅᒃᑯᑦ ᑭᓯᐊᓂ ᒪᕐᕈᐃᖅᓱᑲᑕᓕᖅᓱᑎᒃ 2020ᒥ ᑐᒃᑐᓂᒃ ᑕᑯᑲᑕᒃᑲᒥᒃ ᐊᖅᑯᑎᒥ ᔮᓄᐊᕆᒥ. ᖃᓄᐃᒋᐊᕈᑕᐅᓪᓗᓂ ᓄᓇᓂ ᐊᕙᑎᓂ ᑲᑎᒪᔨᓂᑦ, ᖃᐅᔨᓴᕐᕖᑦ ᓇᑭᒥᐊᓚᐅᖅᑐᑦ ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᑦ

ᑮᓕᒥᑕᓂ ᐊᑐᖅᑕᐅᙱᖔᖅᓱᑎᒃ. ᐃᓗᐃᑦᑐᒃᑯᑦ ᒪᓕᓐᓂᑦ ᐳᖅᑐᓚᐅᖅᑐᑦ 96%ᒥ, ᐳᖅᑐᓛᙳᓪᓗᓂ ᐊᓯᓂᑦ ᐊᕐᕌᒍᓂᑦ 2019ᒥ ᐳᖅᑐᓛᙳᓪᓗᑎᒃ.

ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᖃᐅᔨᓴᖃᑦᑕᓚᐅᖅᐳᑦ ᑐᒃᑐᖃᕐᒪᖔᑦ, ᓇᓅᒻᒪᖔᑕ, ᖃᓄᐃᒋᐊᓂᖏᓐᓄᓪᓗ ᐱᓕᕆᓂᕐᒥᑦ ᐱᓕᕆᔭᐅᔪᓄᑦ ᕿᑐᕐᖏᐅᖅᑎᓪᓗᒋᑦ. ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᖃᐅᔨᓴᕐᓂᑦ ᐱᔭᕇᓚᐅᖅᑐᑦ ᔫᓂ 4 9ᓗ ᐊᑯᓐᓂᐊᓂ. 20 ᖃᐅᔨᓴᕐᕖᑦ ᐅᐸᒃᑕᐅᓚᐅᖅᑐᑦ ᒪᕐᑭᐃᖅᓱᖅᓱᑎᒃ, ᐱᖓᓱᑦ ᐊᑕᐅᓯᐊᖅᑕᐅᓪᓗᑎᒃ ᐊᑕᐅᓯᕐᓗ ᐱᖓᓱᐃᖅᓱᖅᑕᐅᓪᓗᓂ. ᑲᑎᖦᖢᒋᑦ ᖃᐅᔨᓴᕐᓂᑦ 18.3 ᐃᑲᕐᕋᐅᓚᐅᖅᑐᑦ, ᖃᐅᔨᓴᕐᕕᐅᒐᔪᒃᓱᑎᒃ 23.9 ᒥᓂᑦᔅᒧᑦ ᐊᑐᓂ ᖃᐅᔨᓴᕐᕕᖕᒥ. ᑐᒃᑐᓂᒃ ᑕᑯᓚᐅᖏᑦᑐᑦ ᖃᐅᔨᓴᖅᑎᓪᓗᒋᑦ, ᑕᐃᒪᓐᓇᑐᑦ ᕿᒪᒃᑕᑦᑎᓐᓂ ᖃᐅᔨᓴᖅᑕᐅᔪᓄᑦ 2013 ᐅᖓᑖᓂ ᑕᐃᒪᓐᓇᑐᑦᑕᐅᖅ ᑐᒃᑐᑭᓐᓂᕐᓄᑦ.

ᑎᖕᒥᐊᓂᒃ ᐃᕙᔪᓂᒃ ᕿᓂᖅᑳᖃᑦᑕᓚᐅᖅᐳᑦ ᓄᓇᓕᓇᓚᐅᖏᓐᓂᕐᒥᓂ ᐱᓕᕆᔪᓂ ᐃᕙᓐᓇᐅᑎᓪᓗᒍ: ᒪᐃ 31ᒥᑦ ᐋᒡᒋᓯ 5, 2020ᒧᑦ. ᕿᓂᖃᑦᑕᓚᐅᖅᑐᑦ ᕿᓂᖅᑐᑦ ᐊᑐᖃᑦᑕᓚᐅᖅᑐᑦ ᐊᒃᖢᓈᓄᑦ ᕿᓂᕈᓯᕐᓂᒃ (ᑐᓂᔭᐅᔪᑦ ᑲᓇᑕᒥ ᓂᕐᔪᑎᓕᕆᓂᕐᓄᑦ ᐱᔨᑦᑎᕋᖅᑎᓂᑦ) ᓇᓂᓯᓇᓱᒃᖢᑎᒃ ᐃᕙᕝᕕᐅᔪᓂᒃ ᓄᓇᐃᔭᐃᖏᓐᓂᕐᒥᑦ. 13 ᑲᑎᖦᖢᒋᑦ ᕿᓂᕐᕕᐅᓚᐅᖅᑐᑦ 11.2 Hᐃᐊᒃᑎᐊᔅᓄᑦ ᓄᓇᓂᒃ. ᐊᑕᐅᓯᖅ ᖃᐅᓪᓗᖅᑖᖅ ᐃᕙᔪᖅ ᓇᓂᔭᐅᓗᐊᖅᑐᖅ, ᓴᓇᔪᓐᓃᖅᓱᑎᒃ ᖃᓂᒌᔭᓂ ᒪᓐᓃᑦ ᑐᑭᓰᕐᒪᑕ ᑭᓯᐊᓂ.

ᐊᒃᑎᒃ ᕌᑉᑐᔅ ᐃᓐᒃ ᐱᔭᕇᖅᓯᓚᐅᖅᑐᑦ ᖃᖅᑲᓂ ᐃᕙᔪᓂᒃ ᖃᐅᔨᓴᕐᓂᕐᓂᒃ ᑲᑐᔾᔨᖃᑎᒋᓪᓗᓂᒋᑦ ᓯᓚᑦᑐᖅᓴᕐᕕᒡᔪᐊᖓ ᐋᓪᐴᑕᐅᑉ, ᑲᔪᓯᔪᖅ 2011ᒥᑦ. ᐱᖓᓱᑦ ᖃᖓᑕᔫᒃᑯᑦ ᑎᖕᒥᐊᓂᒃ ᐊᖑᓇᓱᒃᑎᓄᑦ ᖃᐅᔨᓴᓚᐅᖅᑐᑦ ᔫᓂᐅᑉ ᓄᙳᐊᓂ, ᔪᓚᐃ ᕿᑎᐊᓂ ᐋᒡᒌᓯᐅᓪᓗ ᕿᑎᐊᓂ. ᑲᑎᖦᖢᒋᑦ 175 ᐃᕙᕝᕕᐅᔪᑦ ᐅᐸᒃᑕᐅᓚᐅᖅᑐᑦ: 42 ᑭᒡᒐᕕᐊᕐᔪᐃᑦ, 47 ᖄᔫᑦ 86ᓗ ᐃᕙᕝᕕᐅᖏᑦᑐᑦ ᑕᑯᔭᐅᓚᐅᖅᑐᑦ. 6 ᓂᒃ ᐃᕙᕝᕕᐅᓕᓵᖅᑐᓂᒃ ᓇᓂᓯᓪᓗᑎᒃ 2020ᒥ. ᐊᖑᓇᓱᒃᑎᑦ ᑎᖕᒥᐊᑦ ᐅᓄᕐᓂᖅᓴᐅᖅᑰᔨᓚᐅᖅᑐᑦ ᑕᓪᓕᒪᑦ ᐊᕐᕌᒍᓂᑦ, ᐃᑲᔪᖅᑕᐅᔪᒃᓴᐅᓪᓗᑎᒃ ᐊᕙᙵᖃᕐᓂᖅᓴᐅᓂᕐᓄᑦ. ᐅᐸᒃᓯᒪᖃᑦᑕᐃᓐᓇᓕᔪᑕᐅᖅᑑᒃ ᑎᖕᒥᐊᙳᖃᑎᒌᖏᑦᑑᒃ, ᕿᑐᕐᖏᐅᕐᓂᖅᓴᐅᓪᓗᑎᒡᓗ 2020ᒥ ᓴᓂᐊᓂ ᕿᒪᒃᑕᑦᑎᓐᓂ ᐊᕐᕌᒍᑦ. ᖃᐅᔨᓴᓚᐅᖏᑦᑐᑦ ᑭᒡᒐᕕᐊᕐᔪᐃᑦ ᖄᔫᓪᓗ ᓇᓕᙴᓂᖏᑦ ᐊᒃᑐᖅᑕᐅᒻᒪᙱᑕ ᐅᖓᓯᖕᓂᒃᑯᑦ ᐱᓂᕐᓗᒃᑐᓄᑦ. ᐃᓚᖏᑦ ᐃᕙᕝᕕᐅᔪᑦ ᐱᕈᐃᕝᕕᐅᑦᑎᐊᖅᐸᒃᓱᑎᒃ ᐊᓯᖏᓪᓗ ᐱᕈᐃᕝᕕᐅᑦᑎᐊᖅᐸᓚᑎᒃ ᐊᑐᐊᓇᑎᒃ ᐅᔭᕋᖕᓂᐊᕐᕕᖃᕐᓂᕐᒧᑦ.

2020ᒥ, ᐱᖓᓱᑦ ᑐᖁᓐᓇᕋᑎᒃ ᓂᕐᔪᑎᓂᒃ ᑲᑎᓯᓚᐅᖅᐳᑦ 13ᓗ ᓂᕐᔪᑏᑦ ᑐᖁᔪᓄᑦ ᐅᖃᐅᓯᕆᔭᐅᓚᐅᖅᑐᑦ, ᐊᑕᖕᒥᖅᓱᑎᒃ ᐃᓄᑑᔪᐃᓐᓇᐅᓪᓗᑎᒃ. 9 ᑐᖁᔪᑦ 2020ᒥ ᑎᓇᑲᓂᐊᖑᓪᓗᑎᒃ, 7 ᑐᓗᖅᑕᐅᓪᓗᑎᒃ ᓄᓇᒃᑰᕈᑎᓄᑦ, ᐊᐃᑉᐸᖏᓪᓗ ᒪᕐᕉᒃ ᖃᐅᔨᒪᔭᐅᓇᑎᒃ ᓯᓚ. ᑎᓴᒪᑦ 2020ᒥ ᑎᖕᒥᐊᑦ ᑐᖁᔪᑦ ᒪᕐᕉᒃ ᑐᓗᖅᑕᐅᓪᓗᑎᒃ ᓄᓇᒃᑰᕈᑎᓄᑦ, ᐊᑕᐅᓯᖅ ᐱᓯᖅᑯᒨᖏᑦᑐᖅ ᒪᑎᖢᓂ, ᐊᑕᐅᓯᕐᓗ ᐱᓯᖅᑯᒨᖏᑦᑐᖅ ᑐᖁᓗᓂ ᓂᕐᔪᑎᕋᓛᓂᒃ ᒥᑭᒥᐊᕋᓯᒃᑎᓪᓗᒋᑦ. ᐊᔪᕐᓇᖏᑦᑕᕌᖓᑦ, ᐊᒃᑐᐃᓂᕐᓗᖕᓄᑦ ᐊᒃᑐᐃᓂᖕᓂᖅᓴᐅᔾᔪᑎᖏᑦ ᐊᑐᖅᑕᐅᖅᐳᑦ ᓂᕐᔪᑏᑦ ᐋᓂᖁᓇᒥᑦ ᑐᖁᓗᒥᓪᓘᓂᑦ.

ᓇᓗᓇᐃᖅᓯᒪᔪᑦ 0. ᓄᓇᓂ ᐊᕙᑎᓂ| ᓇᐃᓈᖅᓯᒪᔪᑦ 2020ᒥ ᐊᓯᒃᔨᓚᐅᖅᑎᓐᓇᒋᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᓄᓘᔾᖓᓂ ᐱᓕᕆᔪᓂ.

ᖃᐅᔨᓴᕐᓂᖅ	ᖃᐅᔨᓴᕈᑕᐅᔪᖅ[1]	ᐱᔾᔪᑎᖃᐅᔪᑦ, ᐊᒃᑐᐃᓃᑦ ᑕᑯᔭᐅᔪᑦ, ᐊᒃᑐᓂᕐᓗᖏᔾᔪᑕᐅᔭᕆᐊᓖᑦ ᑎᓕᐅᕈᑏᓪᓗ ᓯᕗᓂᕐᒥ ᐱᓕᕆᐊᖑᔪᓄᑦ	ᖃᓄᐃᓕᖓᓃᑦ ᓴᓂᐊᓂ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ[2]
ᓯᓚᓂᒃ ᖃᐅᔨᓴᕐᓃᑦ	ᐃᑲᔪᖅᑐᖅ ᐊᓯᓕᒫᓄᑦ ᓄᓇᓂ ᐊᕙᑎᓂ ᖃᐅᔨᓴᕐᓂᕐᓄᑦ	ᓯᓚᐃᑦ ᖃᓄᐃᓐᓂᖏᑦ ᑎᑎᕋᖅᑕᐅᕙᒃᓗᑎᒃ ᐃᑲᕐᕋᑕᒦᑦ ᓯᓚᓐᓂᐊᕐᕕᖕᓂ ᐅᔭᕋᖕᓂᐊᕐᕕᖕᒥ ᕿᙵᐊᓂᓗ, ᑎᑎᕋᐅᓴᐅᕙᒃᓗᑎᒃ ᓯᓚᐃᑦ ᖃᓄᐃᓕᖓᓂᖏᑦ 2005ᒥᑦ 2006ᒥᓗ, ᐊᑐᓂᓂᑦ. ᓯᓚᓄᑦ ᖃᐅᔨᒪᔭᐅᔪᑦ ᐃᑲᔫᑕᐅᕗᑦ ᐊᓯᓂᒃ ᖃᐅᔨᓴᕐᓂᕐᓂᒃ; ᐊᒃᑐᐃᖏᓐᓂᖅᓴᐅᓕᕈᑎᖃᕆᐊᖃᕋᑎᒃ. ᓯᓚᓐᓂᐊᕐᕖᑦ ᑲᑎᖅᓱᐃᖏᓐᓇᕐᓂᐊᖅᑐᑦ ᓯᓚᐃᑦ ᖃᓄᐃᓕᖓᖏᓐᓄᑦ ᑎᑦᑎᕋᓂᒃ 2021ᒥ.	ᐱᑕᖃᖏᑦᑐᖅ
ᓂᐹᖅᑭᔭᓐᓂᕐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ	ᓵᑦᑎᓪᓗᓂ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖏᒃ 14b	ᓂᐱᓄᑦ ᖃᐅᔨᓴᓕᓚᐅᖅᑐᑦ 2020ᒥ. 9 ᐃᒻᒥᓂᒃ ᐊᐅᓚᑦᑐᑦ ᓂᐱᓕᐅᕈᑏᑦ ᐃᖅᑲᖓᓇᐅᖅᑕᐅᓚᐅᖅᑐᑦ ᐊᔾᔨᖏᖏᑦᑐᓂ ᐅᖓᓯᖕᓂᕐᓂ ᐱᓕᕆᓂᕐᒥᑦ ᕿᒥᕐᕈᓂᐊᕋᒥᒃ ᐱᓕᕆᓂᕐᒥᑦ ᓂᐹᖅᑭᔭᖅᑐᒃᑐᓐᒃ ᐊᒃᑐᐃᓂᐅᑐᓐᓇᑕᐊᓕᙱᓪᓗ ᓂᕐᔪᑎᓄᑦ. ᓇᓚᐅᑦᑖᖅᑕᐅᓂᖓᑎᑐᑦ, ᐱᓕᕆᓂᕐᒥᑦ ᓂᐹᖅᑭᔭᒃᑐᑦ ᓂᐱᖅᑯᖅᑎᓂᖏᓐᓄᑦ ᖃᓄᐃᒋᐊᖅᑎᑕᐅᖃᑦᑕᓚᐅᖅᐳᑦ ᓂᕐᔪᑎᓂᑦ ᖃᓂᒌᔭᓂ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᑕᓕᖕᓂᑦ ᓂᐱᖅᑯᖅᑐᓗᐊᖕᒐᔪᖕᒋᔅᓗᓂ ᐅᖓᑖᓂ 1.5 ᑭᓛᒥᑕᑦ ᐱᓕᕆᓂᕐᒥᑦ. ᑯᓕᒃᑲᓅᑦ ᓂᐹᖅᑭᔭᔅᔭᐅᒃᑯᑏᑦ ᐊᑐᕆᐊᖃᙱᓚᑦ. ᑯᓕᒃᑲᓂᕐᓄᑦ ᖃᐅᔨᓴᒃᑲᓂᕐᓂᐊᖅᑐᒃᓴᐅᔪᑦ.	ᐊᐅᓚᓂᕐᓄᑦ ᑭᒡᓕᐅᔪᖅ ᐱᓕᕆᓂᕐᒥᑦ ᓂᐱᓄᑦ 40.ᑦᐸ ᖑᔪᖅ 1.5 ᑭᓛᒥᑕᓂᑦ ᐱᓕᕆᕝᕕᐅᑉ ᐊᕙᓗᐊᓂᑦ. ᐊᕙᑎᓂ ᓂᐲᑦ ᑎᒫᓃᑲᔪᓚᐅᖅᑐᑦ 40.ᑦᐸ 1.5 ᑭᓛᒥᑕᓂᑦ ᐱᓕᕆᕝᕙᓕᒫᓂ ᑎᒫᓂᓗ 40 ᑦᐸ 3 ᑭᓛᒥᑕᓂᑦ ᐱᓕᕆᕝᕗᔫᒪᓂᑦ. ᐱᓕᕆᔪᓂᑦ ᓂᐲᑦ ᑐᓴᖅᓴᐅᑲᔪᓚᐅᖏᑦᑐᑦ 3 ᑭᓛᒥᑕᓂᑦ ᐱᓕᕆᕝᕙᓕᒫᓂᑦ.

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[1] ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓖᑦ ᐱᓕᕆᓂᕐᒧᓪᓗ ᐊᖏᖅᓯᒪᔪᑦ ᒪᓕᖕᓗᒋᑦ: ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᐱᓕᕆᓂᕐᒧᑦ ᐱᔪᓐᓇᐅᑎ ᓇᐃᓱᐅᑎᓕᒃ 005 (ᓄᓇᕗᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ

[2] ᓄᓘᔾᖓᓂ ᐱᓕᕆᔪᓂ ᑭᖑᓪᓕᖅᐹᒧᑦ ᐊᕙᑎᓄᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ ᐅᓂᒃᑳᖅ: ᑲᑎᓯᒪᔪᑦ 6 – ᓄᓇᓂ ᐊᕙᑏᑦ (ᐹᕙᓖᓐᑯᑦ ᓴᕕᖅᓭᒃᓴᓄᑦ ᐅᔭᕋᖕᓂᐊᕐᕖᑦ ᑯᐊᐳᕇᓴᖕᒐᑦ 2013a)

ᓇᓗᓇᐃᖅᓯᒪᔪᑦ 0. ᓄᓇᓂ ᐊᕙᑎᓂ| ᓇᐃᓈᖅᓯᒪᔪᑦ 2020ᒥ ᐊᓯᔾᔨᓚᐅᖅᑎᓐᓇᒋᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᓄᓘᔭᖕᓂ ᐱᓕᕆᔪᓂ.

ᖃᐅᔨᓴᕐᓂᖅ	**ᖃᐅᔨᓴᕈᑕᐅᔪᖅ¹**	**ᐱᔭᕇᖅᑕᐅᔪᑦ, ᐊᒃᑐᐃᓃᑦ ᑕᑯᔭᐅᔪᑦ, ᐊᒃᑐᓂᕐᓗᖏᔾᔪᑕᐅᔭᕆᐊᓖᑦ ᑎᓕᐅᕈᑏᓪᓗ ᓯᕗᓂᕐᒥ ᐱᓕᕆᐊᖑᔪᓄᑦ**	**ᖃᓄᐃᓕᖓᓃᑦ ᓴᓂᐊᓂ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ²**
ᖁᓕᒥᒎᑦ ᐳᖅᑐᓂᖏᑦ	ᓵᑦᑎᓪᓗᑎᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᓂᒃ 59, 71 72ᓗ	ᑭᓯᐊᓂ ᐊᐅᓚᓂᕐᓄᑦ ᐱᔾᔪᑎᓄᑦ, ᒪᓕᒡᓗᒍᓗ ᖃᖓᑕᓲᖅᑎᐅᑉ ᐃᓱᒪᒋᔭᖏᑦ ᑐᕌᖅᑐᓄᑦ ᖃᖓᑕᓲᒧᑦ ᐃᓄᐃᓪᓗ ᐊᑦᑕᕐᓇᖅᑐᒦᖏᓐᓂᖏᓐᓄᑦ, ᖃᖓᑕᓲᖅᑏᑦ ᐳᖅᑐᓂᖁᐃᓐᓇᕆᐊᖃᖅᐳᑦ ᑎᒫᓂᐅᖏᑦᑐᖅ 650 ᒦᑕᑦ ᓇᑭᑦ ᓇᒧᑦ ᐃᖏᕐᕋᑎᓗᒋᑦ ᑎᖕᒥᐊᖃᑐᐃᓐᓇᕆᐊᓕᖕᓂᑦ, 1,100 ᒦᑕᓪᓗ ᖁᒻᒧᑦ 1,500 ᓴᓂᒧᑦ ᐅᖓᓯᒋᑎᒋᓗᒋᑦ ᑕᑯᔭᐅᑦ ᑲᑎᙵᔪᑦ ᑎᖕᒥᐊᓄᑦ (ᑲᖑᖃᕝᕕᒃ). ᖃᖓᑕᕝᕕᖃᓇᓪᓗᑎᒃ ᓱᓪᓗᓂᒃ ᐅᐸᔾᔫᖏᓇᒥᒃ ᓂᕐᔪᑎᓄᑦ ᐊᑑᑎᖃᑦᑎᐊᕐᓂᓕᖕᓄᑦ. 2020ᒥ, ᒪᓕᖕᓃᑦ ᐳᖅᑐᓂᕐᓄᑦ ᐃᓗᐊᓂ ᑲᖑᖃᕝᕕᐅᑉ ᐃᓴᐅᓂᖏᓐᓂ (ᔪᓚᐃ-ᐋᒡᒌᓯ) 90% ᖑᓚᐅᖅᑐᖅ, ᒪᓕᖐᓪᓗ ᓯᓚᑖᓂ ᖃᖑᖃᕝᕕᐅᑉ ᐊᓯᓕᒫᓂᓗ ᑕᖅᑭᓕᒫᓂ ᖃᐅᔨᓴᕝᕕᐅᔪᓂᑦ (ᒪᐃ-ᓯᑎᐱᕆ) 96% ᖑᓪᓗᓂ. 2020 ᑎᓴᒪᒋᔭᐅᓕᖅᑐᖅ ᐊᕐᕌᒍ ᖃᖓᑕᔪᑦ ᐳᖅᑐᓂᖏᓐᓂᑦ ᖃᐅᔨᔭᐅᔪᑦ ᕿᒥᕐᕈᔭᐅᓚᐅᖅᐳᑦ ᐊᑕᐅᑦᑎᒃᑯᑦ ᖃᐅᑕᒫᖅᓯᐅᑎᓄᑦ ᖃᖓᑕᓲᖅᑎᓂᑦ ᑎᑎᕋᓂᑦ ᓈᒻᒪᒍᑎᖃᕐᓂᐊᕐᒪᑕ ᐳᒃᑭᑦᑐᒃᑯᑦ ᖃᖓᑕᔪᑦ. ᐳᒃᑭᓈᖅᑐᑦ ᖃᖓᑕᔪᑦ ᐱᔾᔪᑎᖃᑦᑎᐊᖅᑐᑦ ᒪᓕᒃᑐᑐᑦ. ᐱᔾᔪᑎᑦᑎᐊᕙᕆᔭᐅᔪᑦ ᐱᖃᓯᐅᔾᔨᓪᓗᑎᒃ ᐅᑯᓂᖓ: ᓯᓚᐃᑦ, ᓂᕕᖓᔪᓂᒃ ᐅᓯᔪᑦ, ᖃᐅᔨᓴᕐᓃᑦ, ᐃᓄᖕᓂᒃ ᕿᒪᐃᓪᓗᑎᒃ ᐊᐃᒃᓵᖅᓱᑎᒃ ᖃᓂᑦᑐᒧᓪᓗ ᖃᖓᑕᔪᑦ. ᖁᓕᒥᒎᓄᑦ ᐳᖅᑐᓂᕐᓂᒃ ᐃᓚᓕᐅᔾᔨᓗᑎᒃ ᖃᖓᑕᓲᖅᑎᐅᑉ ᐃᓱᒪᒋᔭᖏᑦ ᑲᔪᓯᓂᐊᖅᑐᑦ ᐊᕐᕌᒍᑕᒫᑦ.	ᓂᕆᐅᒋᔭᐅᓚᐅᖅᑐᖅ ᐃᓚᖏᑦ ᑲᖑᐃᑦ ᐃᓃᖅᑕᐅᓂᐊᕐᓂᖏᑦ ᐱᓕᕆᔪᓂᑦ ᐱᓕᕆᐊᓄᑦ ᑭᓯᐊᓂ ᐊᓯᐊᓄᐊᕐᓗᑎᒃ ᖃᓂᑦᑐᒧᑦ ᐅᐸᒃᑕᐅᖏᓐᓂᖅᓴᓄᑦ. ᒥᑭᑦᑐᑯᓗᒃ ᖃᖑᖃᕝᕕᐅᑉ ᐃᓚᖓ ᖁᓕᒥᒎᒃᑯᑦ ᖁᓚᐅᑕᐅᖃᑦᑕᕐᒪᑦ ᓯᓚᑖᓃᑦᑐᐃᓐᓇᐅᐸᓗᒃᓱᓂᓗ ᐱᓕᕆᓂᐅᑉ ᐊᒃᑐᐃᓂᖓᓂ, ᐊᒃᑐᐃᓃᑦ ᐅᓄᖃᑦᑕᓗᐊᕋᔭᖅᑐᒃᓴᐅᖏᑦᑐᑦ. ᐃᓗᐃᑦᑐᒃᑯᑦ, ᐊᒃᑐᐃᓂᕐᓗᐃᑦ ᐊᒃᑐᐊᔪᑦ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᕆᐊᓕᖕᓄᑦ ᖃᐅᔨᓴᕝᕕᐅᔪᒧᓪᓗ ᓂᕆᐅᒋᔭᐅᓚᐅᖅᑐᖅ ᐊᒃᑐᐃᓂᕐᓗᖃᕋᔭᕐᒪᑦ ᖃᐅᔨᔭᐅᔪᓐᓇᖅᑐᓂᒃ ᑭᓯᐊᓂ ᐊᒃᑐᐃᕐᔪᐊᔾᔫᓇᓯᒋᓇᒍ. ᒪᓕᑦᑎᐊᓚᐅᖅᐳᑦ ᐳᒃᑭᓵᓄᑦ ᖁᓕᒥᒎᒃᑯᓇᐊᖅᓃᑦ 2020ᒥ ᐃᓱᒪᒋᓗᒋᑦ ᖃᖓᑕᔫᑎᑦ ᐃᓱᒪᒋᔭᖏᑦ ᐳᒃᑭᑦᑐᒃᑯᑦ ᖃᖓᑕᓂᕐᓄᑦ ᖃᖓᑕᔪᐃᑦᑐᑦ ᐃᑲᕐᕋᖏᑦ ᖃᖑᖃᕝᕕᖕᒥ ᐃᓴᐅᑎᓪᓗᒋᑦ ᐅᓄᖏᓂᖅᓴᐅᓕᖅᑐᑦ 2020ᒥ. ᖃᖓᑕᔪᑦ ᖃᖑᖃᕝᕕᒃᑯᑦ ᑐᕌᖓᔪᑐᐊᖑᓚᐅᖅᑐᑦ ᓂᒋᐊᓂ ᑲᓇᖕᓇᖓᓄᑦ ᖃᐅᔨᔭᐅᔪᓐᓇᖅᑐᑦ ᐊᒃᑐᐃᓂᕐᓗᐃᑦ ᐊᒃᑐᐃᙱᓵᖑᓂᐊᕐᒪᑕ ᐃᓱᒪᒋᓗᒍ ᑲᖑᖃᕝᕕᓕᒫᖅ, ᒪᓕᒡᓗᒋᑦ ᐊᕙᑎᓄᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ ᐅᓂᒃᑳᕐᒥ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᑦ. ᑭᓯᐊᓂ ᖃᐅᔨᓴᓪᓚᑦᑖᓚᐅᖅᓯᒪᖏᑦᑐᑦ ᐊᒃᑐᐃᓂᐅᑐᐃᓐᓇᕆᐊᓕᖕᓄᑦ ᐳᒃᑭᑦᑐᒃᑯᑦ ᖃᖓᑕᓂᕐᓂᑦ ᑲᖑᓄᑦ ᐊᓯᓄᓪᓘᓐᓃᑦ ᑕᒫᓃᖏᓐᓇᖏᑦᑐᓄᑦ ᑎᖕᒥᐊᓄᑦ. ᑐᖁᑕᐅᑲᐅᑎᒋᔪᓂᒃ ᖃᖓᑕᓲᓄᑦ ᖃᐅᔨᔭᐅᔪᖃᖅᓯᒪᖏᑦᑐᖅ, ᒪᓕᒃᓱᓂ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ.
ᐅᓯᑲᖅᑕᕝᕕᐅᑉ ᐊᖅᑯᑎᐊᓂ ᐃᖏᕐᕋᔪᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ	ᐊᑕᐅᑦᑎᒃᑯᑦ ᑕᑯᓇᕐᓗᒋᑦ ᓂᕐᔪᑎᓄᑦ ᐊᒃᑐᐃᓂᕐᓗᐃᑦ ᐳᔪᓕᐅᕐᓃᓪᓗ	ᐊᕐᕌᒍᑕᒫᖅᓯᐅᑏᑦ ᓇᐃᓈᖅᓯᒪᔪᑦ ᐃᖏᕐᕋᑲᑕᐃᓐᓇᖅᑐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ. ᑕᑯᔭᐅᑲᐅᑎᒋᔭᖅᑲᖅᑐᖅ ᓂᕆᐅᓇᖅᑐᓂᒃ ᐊᒃᑐᐃᓂᕐᓂᒃ. ᐃᖏᕐᕋᔪᑦ ᐅᓄᕐᓂᖏᓐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᑲᔪᓯᓂᐊᖅᑐᑦ.	ᐅᓄᕐᓂᕐᓴᐅᓚᐅᖅᑕᖏᑦ ᖃᐅᑕᒫᓄᑦ ᑲᑎᑦᑐᑦ ᓄᓇᒃᑰᕈᑎᒃᑯᑦ ᐃᖏᕐᕋᔪᓂᑦ (ᐅᓯᑲᖅᑕᖅᑐᑦ ᐊᓰᓪᓗ) ᐅᓯᑲᖅᑕᕝᕕᐅᑉ ᐊᖅᑯᑎᐊᒍᑦ 2020ᒥ 271.7 ᓄᓇᒃᑰᕈᑏᑦ ᐃᖏᕐᕋᖃᑦᑕᓚᐅᖅᐳᑦ ᐊᑐᓂ ᐅᓪᓗᕐᒥ. ᐅᓄᕐᓂᕐᓴᐅᓚᐅᖅᑕᖏᑦ ᓴᕕᕋᔾᔮᓂᒃ ᐅᓯᔪᓄᑦ ᖃᐅᑕᒫᓄᑦ ᐅᓯᑲᖅᑕᕝᕕᐅᑉ ᐊᖅᑯᑎᐊᒍᑦ, ᔭᓐᓄᐊᕆ 1ᒥᑦ ᑎᓯᐱᕆ 31, 2020ᒧᑦ 243.3 ᖑᓪᓗᑎᒃ, ᐅᓄᖏᓐᓂᖅᓴᐅᓪᓗᑎᒃ ᑭᖑᓪᓕᖅᐹᒧᑦ ᐊᕙᑎᓄᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ ᐅᓂᒃᑳᒧᑦ ᐃᓚᒋᐊᕈᑎᓂ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓂᑦ. ᐊᓰᑦ ᐃᖏᕐᕋᔪᑦ ᐊᕐᕌᒍᒥ ᐅᓄᕐᓂᕐᓴᐅᓚᐅᖅᑐᑦ 28.4 ᓄᓇᒃᑰᕈᑎᓄᑦ ᓅᒃᑕᖅᑐᓄᑦ ᐊᑐᓂ ᐅᓪᓗᕐᒥ.

ᓇᓗᓇᐃᖅᓯᒪᔪᑦ 0. ᓄᓇᓂ ᐊᕙᑎᓂ| ᓇᐃᓈᖅᓯᒪᔪᑦ 2020ᒥ ᐊᓯᒃᐱᓚᐅᖅᑎᓐᓇᒋᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᓄᓘᔾᖓᓂ ᐱᓕᕆᔪᓂ.

ᖃᐅᔨᓴᕐᓂᖅ	ᖃᐅᔨᓴᕈᑕᐅᔪᖅ[1]	ᐱᔭᕇᖅᑕᐅᔪᑦ, ᐊᒃᑐᐃᓃᑦ ᑕᑯᔭᐅᔪᑦ, ᐊᒃᑐᓂᕐᓗᖏᒃᔪᑕᐅᔭᓇᐊᓖᑦ ᑎᓕᐅᕈᑏᓐᓗ ᓯᕗᓂᕐᒥ ᐱᓕᕆᐊᖑᔪᓄᑦ	ᖃᓄᐃᓕᖓᓃᑦ ᓴᓂᐊᓂ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ[2]
ᐳᔪᐃᑦ ᑲᑕᖕᓂᖏᓐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ	ᓵᑦᑎᓪᓗᑎᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᓂᒃ 36, 50, 54d, 58c, ᐱᓕᕆᓂᕐᒧᑦ ᐊᖏᖅᓯᒪᓂᕐᓗ 60	39 ᐳᔪᖅᑕᐅᑏᑦ ᐃᓕᐅᖅᑲᖅᓯᒪᕗᑦ ᐱᓕᕆᓂᐅᑉ ᐃᓗᐊᓂ, ᐃᓚᖏᑦ ᐅᖓᓯᖕᓂᖅᓴᐅᓪᓗᑎᒃ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᓇᐊᖅᑐᓂᑦ ᖃᐅᔨᒪᔾᔪᑕᐅᓪᓗᑎᒃ ᖃᐅᔨᓴᕐᓂᕐᓄᑦ ᖃᓃᓚᐅᖅᑐᓄᑦ. 7 ᐊᕐᕌᒍᓄᑦ ᖃᐅᔨᓴᖅᑐᑦ ᐋᒡᒌᓯ 2013ᒥᑦ ᑎᓯᐱᕆ 2020ᒍᑦ ᒫᓐᓇᐅᔪᖅ ᐱᔭᕇᖅᑐᑦ. ᐳᔪᖅᑕᐅᑎᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᓇᓗᓇᐃᖅᓯᕗᑦ ᓄᓇᐃᑦ ᐳᔫᕝᕕᐅᓛᖑᔪᑦ ᐃᓗᐊᓃᓪᓗᐊᑕᖅᐳᑦ 1,000 ᒦᑕᓂᑦ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᓇᐊᓕᖕᒥᑦ; ᖃᐅᔨᓴᕋᒥᒃ ᐳᔪᐃᑦ ᑲᑕᖕᓂᖏᓐᓄᑦ 12ᓂ ᖃᐅᔨᓴᕝᕕᖕᓂ 1,000 ᒦᑕᓂᒃ ᐅᖓᓯᖕᓂᓕᖕᓂᑦ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᓇᐊᓕᖕᒥᑦ ᓇᓗᓇᐃᖅᓯᕗᑦ ᐳᔫᓗᐊᓚᐅᖏᑦᑐᑦ 2020ᒥ. ᓯᕗᓂᕐᒥ ᖃᐅᔨᓴᕐᓃᑦ ᑲᔪᓯᓂᐊᖅᑐᑦ ᐳᔪᐃᑦ ᑲᑕᖕᓂᖏᓐᓄᑦ 39 ᓄᓇᓂ ᐊᐅᔭᔭᕐᒥ ᓱᓕᒃᑲᓂᕐᓂᓪᓗ 22 ᐊᕐᕌᒍᓕᒫᖅᑐᓂᒃ ᓄᓇᓂᒃ.	ᐊᕐᕌᒍᑕᒫᑦ ᑲᑎᑦᑐᑦ ᖃᖓᑕᔪᑦ ᐳᔪᑦ ᑲᑎᓐᓂᖏᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᓚᐅᖅᑐᑦ ᐅᖓᑖᓄᐊᕐᓂᐊᕋᔅᓯᔭᐅᓪᓗᑎᒃ 50 ᒍᕋᒻ/ᒦᑕᑦ^2/ᐊᕐᕌᒍᒥ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᓇᐊᖃᖅᑐᓂ, ᑲᑎᑦᑐᑦ ᖃᖓᑕᔪᓂᒃ ᐳᔫᖏᓐᓂᖅᓴᐅᓪᓗᓂ ᓯᓚᑖᓂ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᓇᐊᓕᐅᑉ. 2020ᒍᑦ ᐳᔪᐃᑦ ᑲᑕᖕᓂᖏᓐᓂᑦ ᖃᐅᔨᔭᐅᔪᑦ ᓇᓕᒧᑉᐳᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ ᐳᔪᖃᓛᖑᓛᕐᒪᒡᒎᖅ ᐃᓗᐊᓂᓪᓗᐊᑕᖅ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᓇᐊᓕᐅᑉ.
ᐱᕈᖅᑐᓂ ᐃᔾᔪᓂᓗ ᓴᕕᕋᔭᑦ	ᓵᑦᑎᓪᓗᑎᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᓂᒃ 34, 36, 38 & 50 ᐱᓕᕆᓂᕐᒧᑦ ᐊᖏᖅᓯᒪᓃᓪᓗ 67, 69 & 107	ᐃᔾᔪᕐᓂ ᑎᖏᐅᔭᕐᓂᓗ ᓴᕕᕋᔭᖅᑳᕐᓃᑦ ᖃᐅᔨᓴᖅᑕᐅᓚᐅᖅᑐᑦ 2020ᒥ. ᖃᐅᔨᓴᕝᕕᐅᔪᖅ ᐃᓗᐃᑦᑑᒦᓚᐅᖅᑐᖅ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᓇᐊᓕᐅᑉ; ᖃᐅᔨᓴᒐᒃᓴᖅᑕᖅᓗᑎᒃ ᐱᖓᓱᓂᑦ ᐅᖓᓯᖕᓂᕐᓂᑦ ᓄᓇᓂᑦ ᓴᓇᕝᕕᐅᑐᐃᓐᓇᓇᐊᓕᖕᒥᑦ (ᖃᓂᑦᑐᖅ: 0–100ᒦᑕᑦ, ᐅᖓᓯᒃᑐᖅ: >100–1,000 ᒦᑕᑦ, ᖃᐅᔨᒪᔾᔭᑎᓗ: >1,000 ᒦᑕᑦ). ᐃᔾᔪᓂ ᑎᖏᐅᔭᕐᓂᓗ ᓴᕕᕋᔭᖅᑳᕐᓃᑦ ᐱᓕᕆᓂᕐᒥ ᓇᓗᓇᐃᖅᓯᓪᓗᐊᑕᓚᐅᖅᑐᑦ ᓴᕕᕋᔭᒃᑳᕐᓂᖏᑦᑐᑦ ᑕᑯᓪᓗᒋᑦ ᓴᓂᐊᓂ ᐊᓯᒃᐱᓚᐅᖅᑎᓐᓇᒋᑦ ᖃᐅᔨᒪᔭᐅᔪᓂᑦ. ᐃᓚᖏᑦ ᒥᑭᑦᑐᓂᒃ ᓴᕕᕋᔭᒃᑳᕐᓂᖅᑐᑦ ᖃᐅᔨᔭᐅᓪᓗᑎᒃ ᑭᓯᐊᓂ ᓴᕕᕋᔭᒃᑳᕐᓂᓕᒫᖏᑦ ᑎᒫᓃᓚᐅᖅᑐᑦ ᓈᒻᒪᒃᑐᓂᑰᓃᑦ.	ᐃᔾᔪᕐᓂ ᑎᖏᐅᔭᕐᓂᓗ ᓴᕕᕋᔭᖅᑳᕐᓃᑦ ᒫᓐᓇᐅᔪᖅ ᐅᓗᕆᐊᓇᖏᑉᐳᑦ ᐊᕙᑎᓄᑦ ᐃᓄᐃᓪᓗ ᖃᓄᐃᖏᓐᓂᖏᓐᓄᑦ ᐊᑦᑕᕐᓇᖏᑦᑐᒦᓐᓂᖏᓐᓄᓪᓗ; ᐋᖅᑭᒃᓯᒪᕚᖅᑐᖅ ᖃᐅᔨᓴᐃᓐᓇᕐᓗᒋᑦ ᑖᒃᑯᐊ ᖃᓄᐃᓕᖓᓂᑦ ᐳᐃᒍᔾᔭᐃᖏᓐᓇᕐᓗᒋᓪᓗ ᓴᕕᕋᔭᖕᓂᕐᔫᑐᐃᓐᓇᓇᐊᓖᑦ.
ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᓄᑦ ᐱᕈᖅᑐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᐃᓕᖅᑯᓯᒥᒍᓪᓗ ᐱᕈᕐᕕᐅᒃᑲᓂᖅᑐᑦ	ᓵᑦᑎᓪᓗᑎᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᓂᒃ 32, 37, 38 & 50 ᐱᓕᕆᓂᕐᒧᑦ ᐊᖏᖅᓯᒪᓃᓪᓗ 67, 68, 69 & 70	ᐊᑕᐅᓯᐊᖅᓗᓂ ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᖅ ᐱᕈᖅᑐᖅ (ᑐᒪᐃᑐ, ᓱᓚᓇᒻ ᓚᐃᑯᐳᓯᐊᒻ) ᓇᓂᔭᐅᓚᐅᖅᑐᖅ ᑭᓈᓗᖕᓄᑦ ᑯᕕᕝᕕᐅᑉ ᐊᑖᓂ ᐅᔭᕋᖕᓂᐊᕐᕕᖕᒥ 2019ᒥ. ᑖᓐᓇ ᐅᐸᒃᑕᐅᒃᑲᓂᓚᐅᖅᑐᖅ 2020ᒥ ᕿᓂᕆᐊᖅᓗᑎᒃ ᑐᒥᐊᐃᑐᓂᒃ. ᒪᕐᕈᐃᖅᓱᖅᓗᑎᒃ ᑕᑯᔭᖅᑐᕋᒃ 2020ᒥ, ᑐᒪᐃᑐᓯᐊᓚᐅᖅᑐᑦ ᐱᕈᖅᑐᕐᓗ ᑐᕐᑯᑕᐅᔪᐃᓐᓇᐅᓯᒪᓕᖅᑰᔾᔪᑎᒃ. ᓱᓕᒃᑲᓂᕐᓂᒃ ᐊᒃᑐᐃᓂᕐᓗᔾᔭᐃᒃᑯᑎᓕᐅᕆᐊᖃᖏᑦᑐᑦ. ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᓄᑦ ᐱᕈᖅᑐᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᑲᔪᓯᓂᐊᖅᑐᑦ ᐱᖓᓱᓂᑦ ᑕᓖᒪᓄᑦ ᐊᕐᕌᒍᓄᑦ ᐸᕐᓇᒃᓯᒪᓪᓗᑎᒃ.	ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᑦ ᐱᕈᖅᑐᑦ ᐱᓕᕆᓂᐊᕋᔅᓯᔭᐅᓚᐅᖏᑦᑐᑦ ᐊᒃᑐᐃᓂᕐᓗᓐᓄᑦ ᖃᓄᐃᑦᑐᐊᕈᑎᓄᑦ (ᓲᕐᓗ ᓴᓗᒻᒪᖅᓴᖅᓗᒋᑦ ᐱᕐᑯᑏᑦ ᐅᔭᕋᖕᓂᐊᕐᕕᖕᒧᐊᓚᐅᖅᑎᓐᓇᒋᑦ ᐊᒻᒪᓘᓐᓃᑦ ᐊᑐᖅᓗᑎᒃ ᐱᕈᖅᓴᐃᓪᓗᑎᒡᓘᓐᓃᑦ ᓄᓇᓕᓐᓂᔭᐅᓯᒪᔪᓂ. ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᓂk ᐱᕈᖅᑐᓂᒃ ᑕᑯᓚᐅᖏᒻᒪᑕ 2020ᒥ ᑕᑯᔭᐅᓚᐅᕐᕕᖓᓂ 2019ᒥ ᖃᐅᔨᓴᖅᑎᓪᓗᒋᑦ, ᑐᕐᑯᓇᓱᒋᔭᐅᓪᓗᓂᓗ ᐱᕈᒃᑲᓂᖏᓂᓗ. ᑕᒫᓂᕐᒥᐅᑕᐅᖏᑦᑐᑦ ᐱᕈᖅᑐᓄᑦ ᖃᐅᔨᔭᐅᔪᑦ ᒪᓕᒃᐳᑦ ᑭᖑᓪᓕᖅᐹᒧᑦ ᐊᕙᑎᓄᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ ᐅᓂᒃᑳᓂ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓂᒃ.

ᓇᓗᓇᐃᖅᓯᒪᔪᑦ 0. ᓄᓇᓂ ᐊᕙᑎᓂ| ᓇᐃᓈᖅᓯᒪᔪᑦ 2020ᒥ ᐊᓯᐣᔨᓚᐅᖅᑎᓐᓇᒋᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᓄᓘᔾᔭᖕᓂ ᐱᓕᕆᔪᓂ.

ᖃᐅᔨᓴᕐᓂᖅ	ᖃᐅᔨᓴᕈᑕᐅᔪᖅ[1]	ᐱᔭᕇᖅᑕᐅᔪᑦ, ᐊᒃᑐᐃᓃᑦ ᑕᑯᔭᐅᔪᑦ, ᐊᒃᑐᓂᕐᓗᖕᒋᔾᔪᑕᐅᔭᕆᐊᓖᑦ ᑎᓕᐅᕈᑏᓪᓗ ᓯᕗᓂᕐᒥ ᐱᓕᕆᐊᖑᔪᓄᑦ	ᖃᓄᐃᓕᖓᓃᑦ ᓴᓂᐊᓂ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ[2]
ᐊᐳᑎᒃᑯᑦ ᑐᒥᓂᒃ ᖃᐅᔨᓴᕐᓃᑦ	ᓵᑦᑎᓪᓗᓂ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᒥᒃ 54dii, 58f ᓵᑦᑎᓪᓗᓂ ᕿᑭᖅᑕᓂᒃᑯᑦ ᐃᓱᒫᓘᑎᖏᓐᓄᑦ ᖃᓗᕋᖅᓯᒪᔪᑦ ᐊᐳᑏᑦ ᐳᖅᑐᓄᖏᓐᓄᑦ ᐊᒃᑐᐃᓂᖏᓐᓄᓪᓗ ᓂᕐᔪᑎᓄᑦ.	ᑕᓪᓕᒪᐃᖅᓱᖅᖢᑎᒃ ᐊᐳᑎᒃᑯᑦ ᑐᒥᓂᒃ ᖃᐅᔨᓴᓚᐅᖅᑐᑦ ᐅᓯᑲᖅᑕᕐᕕᐅᑉ ᐊᖅᑯᑎᐊᒍᑦ ᖃᐅᔨᓇᓱᒃᖢᑎᒃ ᓅᒃᑕᕐᓂᖏᓐᓂᒃ ᖃᓄᐃᒋᐊᕐᓂᖏᓐᓂᒡᓗ ᒫᔾᔨᒥ, ᐊᐃᕙᓕᒥ, ᒪᐃᒥ ᐅᑐᐱᕆᒥᓗ. ᑎᕆᒐᓂᐊᑦ, ᐅᑲᓖᑦ, ᐊᕿᒡᒋᑦ ᐊᕚᙵᐃᓪᓗ ᖃᐅᔨᔭᐅᔪᑐᐊᖑᓚᐅᖅᑐᑦ ᖃᐅᔨᓴᖅᑎᓪᓗᒋᑦ, ᑐᒃᑐᓂᑦ ᑕᑯᓚᐅᖏᑦᑎᐊᖅᑐᑦ. ᓂᕐᔪᑏᑦ ᖃᓄᐃᒋᐊᕐᓂᖏᑦ ᐊᖅᑯᑎᒧᑦ ᐳᐃᒍᔾᔭᐃᖅᑕᐅᓪᓗᑎᒃ ᐊᑐᓂ ᓄᓇᒥ ᑐᒥᓯᐊᕝᕕᐅᔪᓂ. ᑐᒥᓂᒃ ᐊᐳᑎᓂ ᖃᐅᔨᓴᕐᓃᑦ ᑲᔪᓯᓂᐊᖅᑐᑦ 2021ᒧᑦ.	ᑭᖑᓪᓕᖅᐹᒧᑦ ᐊᕙᑎᓄᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ ᐅᓂᒃᑳᖅ ᓇᓚᐅᑦᑖᓚᐅᖅᑐᖅ ᓈᒃᑕᖏᓐᓂᖅᓴᐅᑐᐃᓐᓇᕆᐊᓖᑦ ᑐᒃᑐᑦ ᐱᓕᕆᓂᐅᑉ ᐱᕐᔪᑎᐊᕐᔪᐊᖏᑎᒍᑦ ᐊᐅᓚᓂᓕᒫᖕᒐᓄᑦ ᐊᒃᑐᐃᓂᖃᓗᐊᖏᓪᓗᓂ ᑭᓯᐊᓂ ᐅᓄᕐᓂᖏᑦ ᒪᓕᒡᓗᒋᑦ ᕿᑭᖅᑖᓗᑉ ᐅᐊᖕᓇᖕᒐᓂ ᑐᒃᑑᖅᑎᕆᑦ. ᓄᓇᒃᑯᑦ ᖃᐅᔨᓴᕐᓂᕐᓂᑦ ᖃᐅᔨᒍᑎᒃ ᑐᒃᑐᓂᒃ ᐊᖅᑯᑎᒧᐊᕋᓗᐊᖅᖢᑎᒃ ᐃᑳᖏᑦᑐᓂᒃ (ᑐᒦᑦ ᐅᐸᒃᑲᓗᐊᖅᖢᑎᒃ ᐃᑳᕋᑎᒃ ᐊᖅᑯᑎᒥᒃ) ᐅᖃᐅᓯᕆᔭᐅᔭᓂᓪᓗ ᑐᒃᑐᖃᕐᓂᕋᐃᔭᓂᑦ ᓇᓗᓇᐃᖅᓯᒍᑦᑲ ᐅᓄᖅᓯᔭᓂᒃ, ᖃᖓᑕᔫᒃᑯᑦ ᖃᐅᔨᓴᕈᓐᓇᕋᔭᖅᐳᑦ ᑐᑭᓯᐅᔭᑕᐅᒃᑲᓐᓂᕐᓗᑎᒃ ᐊᒃᑐᐃᓂᐅᒃᑲᓐᓂᑐᐃᓐᓇᐃᑎᐊᓕᒃ ᓱᓕᒃᑲᓐᓂᕐᓄᑦ. ᑐᒃᑐᑦ ᑐᒥᖏᓐᓂᒃ ᑕᑯᓚᐅᖏᒻᒪᑕ ᐊᐳᑎᒃᑯᑦ ᑐᒥᓂᒃ ᖃᐅᔨᓴᖅᑎᓪᓗᒋᑦ 2020ᒥ, ᓇᓗᓇᐃᒪᒃᓴᐅᖏᑦᑐᖅ ᐱᓕᕆᓂᕐᒥᑦ ᐱᕐᔪᑎᐊᕐᔪᐊᑦ ᐊᒃᑐᐃᖕᒪᖔᑕ ᐋᒃᑲᓗᓐᓃᑦ ᑐᒃᑐᑦ ᓈᒃᑕᕐᓂᖏᓐᓂᒃ. ᑭᓯᐊᓂ, ᐱᔮᖅᑯᒨᖏᑦᑐᖅ ᑕᑯᔭᐅᔪᑦ ᑐᒃᑐᑦ ᐃᑳᖅᑐᑦ ᐅᓯᑲᖅᑕᕐᕕᐅᑉ ᐊᖅᑯᑎᐊᓂᒃ 2020ᒥ ᐅᖃᖅᑯᔩᙳᑦ ᐊᒡᕕᐊᕈᑕᐅᖏᓐᓇᖕᒐᓂᒃ ᓈᒃᑕᕐᓂᕐᓄᑦ.
ᐊᐳᑎᓄᑦ ᑲᑎᑕᐅᓯᒪᔪᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ;	ᓵᑦᑎᓪᓗᑎᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᓂᒃ 53ai 53cᓗ ᓵᑦᑎᔪᖅ ᕿᑭᖅᑕᓂᒃᑯᑦ ᐃᓱᒫᓘᑎᖏᓐᓂᒃ ᐊᐳᑏᑦ ᑲᑎᑕᐅᓯᒪᔪᑦ ᐳᖅᑐᓂᖏᓐᓄᑦ ᐊᒃᑐᐃᓂᖏᓐᓄᓪᓗ ᓂᕐᔪᑎᓄᑦ.	ᐊᐳᑎᓄᑦ ᑲᑎᑕᐅᓯᒪᔪᓄᑦ ᖃᐅᔨᓴᓚᐅᖅᑐᑦ ᑕᖅᑭᑕᒫᑦ ᒪᕐᕈᐃᖅᓱᖅᖢᑎᒡᓘᓐᓃᑦ ᑕᖅᑭᒥ ᓄᕕᐱᕆ 2019ᒥᑦ ᐊᐃᕐᕆᓕ 2020ᒧᑦ ᑕᑯᓇᒃᖢᑎᒃ ᒪᓕᖕᓂᕐᓂᒃ 1 ᒦᑕ ᐳᖅᑐᓂᓇᔭᓇᐊᖃᖅᑐᓂᒃ. ᐊᐅᓚᑕᐅᓂᖓᑦ ᐊᐳᑎᓄᑦ ᑲᑎᑕᐅᓯᒪᔪᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᐊᐅᓚᔾᔭᐃᕙᖅ ᓂᕐᔪᑎᓄᑦ ᐃᑳᕐᕕᖕᓂᒃ ᑕᑯᓇᖅᓯᑎᒃᑲᓐᓂᖅᖢᒍᓗ ᐊᖅᑯᑎᓄᑦ ᑐᓗᔾᔭᐃᒃᑯᑕᐅᓪᓗᓂᓗ ᓂᕐᔪᑎᓂᒃ. ᒪᓕᒃᓗᒋᑦ ᓄᓇᓂ ᐊᕙᑎᓂ ᑲᑎᒪᔨᖏᑕ ᑐᒃᓯᕋᐅᑖᑦ, ᖃᐅᔨᓴᕝᕕᐅᔪᑦ ᓇᑭᑐᐃᓐᓇᓚᐅᖅᐳᑦ 2020ᒥ. 2020ᒥ, ᒪᓕᒃᑕᐅᒐᔪᖕᓂᐅᓚᐅᖅᑐᖅ ᐊᐳᑎᓄᑦ ᑲᑎᑕᐅᓯᒪᔪᓄᑦ ᖃᐅᔨᓴᖅᓴᓂᑭᓴᓂ 96%ᖑᓚᐅᖅᑐᖅ. ᐃᓚᖏᓐᓂ ᓄᓇᓂ, ᑲᑎᓯᒪᔪᑦ ᐊᐳᑏᑦ ᐋᖅᑭᒋᐊᖅᑕᐅᔪᓐᓇᓚᐅᖏᑦᑐᑦ ᒪᓕᖕᓂᐊᕋᒥᒃ ᑭᒡᓕᓄᑦ ᓄᓇᐃᑦ ᖃᓄᐃᓕᖓᓂᖏᓐᓄᑦ ᐊᑦᑕᕐᓇᖏᑦᑐᒦᓐᓂᕐᓄᓪᓘᓐᓃᑦ ᑭᒡᓕᓄᑦ. ᐊᐳᑎᓄᑦ ᑲᑎᑕᐅᓯᒪᔪᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᑲᔪᓯᓂᐊᖅᑐᑦ ᐅᑭᐅᖏᓐᓂ ᑕᖅᑭᓂ 2021ᒥ.	ᑭᖑᓪᓕᖅᐹᒧᑦ ᐊᕙᑎᓄᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ ᐅᓂᒃᑳᖕᒐᑦ ᓇᓚᐅᑦᑖᓚᐅᖅᑐᑦ ᓈᒃᑕᖏᓐᓂᖅᓴᐅᓂᐊᕐᒪᑕᒎᖅ ᑐᒃᑐᑦ ᐱᓕᕆᐊᕝᕕᐅᑉ ᐱᕐᔪᑎᐊᕐᔪᐊᖏᑎᒍᑦ ᐊᐅᓚᓂᕐᒥᒃ ᑭᓯᐊᓂ ᐊᒃᑐᐃᓂᕐᓗᐊᖅᑲᖅᓯᓂ ᒪᓕᒡᓗᒋᑦ ᕿᑭᖅᑖᓘᑉ ᐅᐊᖕᓇᖕᒐᓂ ᑐᒃᑑᖅᑎᕆᑦ. ᐊᒃᑐᐃᓂᕐᓗᐃᔭᐃᖅᓯᒪᓂᖏᓐᓄᑦ ᐊᖅᑯᑎ (ᐊᐳᑏᑦ ᑲᑎᓯᒪᔪᑦ ᐊᐅᓚᑕᐅᓂᖏᑦ, ᐳᒃᑎᑦᑐᑎ ᐳᖅᑐᓂᖏᑦ), ᐅᓯᑲᖅᑕᕝᕕᒃ ᐊᖅᑯᑎ ᐊᒡᕕᐊᕈᑕᐅᔾᔭᓇᓯᒋᔭᐅᓚᐅᖅᑐᖅ ᑐᒃᑐᑦ ᓈᒃᑕᕐᓂᖏᓐᓄᑦ. ᐅᓄᖅᑐᓂᒃ ᑐᕐᖁᔭᖅᑲᖏᓪᓗᓂᓪᓗᓂᑦ ᑐᒃᑐᓄᑦ ᓂᕆᐅᒋᔭᐅᓚᐅᖅᑐᖅ ᐱᓕᕆᓂᕐᒥᑦ, ᐊᒃᑐᐃᓐᓂᓪᓗ ᐊᒃᑐᐃᓂᕐᓗᐊᖏᓪᓗᑎᒃ ᐃᓗᐃᑦᑐᓄᑦ ᕿᑭᖅᑖᓘᑉ ᐅᐊᖕᓇᖕᒐᓂ ᑐᒃᑑᖅᑎᕆᑦ. ᒪᓕᓪᓚᖕᓂᑦ ᑲᑎᑕᐅᓯᒪᔪᓄᑦ ᐊᐳᑏᑦ ᐳᖅᑐᓂᖏᓐᓄᑦ ᒥᑭᓪᓕᕆᐊᖅᑎᑦᑎᕗᖅ ᐅᓯᑲᖅᑕᕝᕕᒃ ᐊᖅᑯᑎᐊ ᐊᒡᕕᐊᕈᑕᐅᔪᓐᓇᖏᓐᓇᖕᒐᓂᒃ ᑐᒃᑐᑦ ᓈᒃᑕᕐᓂᖏᓐᓄᑦ. ᑭᓯᐊᓂ ᑕᐅᑐᒃᓯᒪᔭᐅᔪᓄᑦ ᖃᐅᔨᒪᔭᐅᖏᓗᐊᕐᒪᑕ ᐊᑑᑎᖃᕐᒪᖔᑕ ᑖᓯᒪᐅᑉ ᐊᒃᑐᐃᓂᕐᓗᔾᔭᐃᒃᑯᑎᐅᑉ ᑐᒃᑐᑦ ᓈᒃᑕᕐᓂᖏᓐᓄᑦ ᑐᒃᑐᑭᓂᕐᓂᕐᓄᑦ. ᑐᒃᑐᖃᕐᓂᖅᓴᐅᓕᕈᓂ ᒪᓕᒡᓗᒋᑦ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᕆᔭᖏᑦ, ᖃᐅᔨᓴᕐᓂᖅᓴᐅᓕᖅᓯᒪᔭᖅᐳᑦ ᑐᒃᑐᑦ ᓈᒃᑕᕐᓂᖏᓐᓄᑦ ᐊᖅᑯᑎᒃᑯᑦ.

ᓇᓗᓇᐃᖅᓯᒪᔪᑦ 0. ᓄᓇᓂ ᐊᕙᑎᓂ| ᓇᐃᓈᖅᓯᒪᔪᑦ 2020ᒥ ᐊᓯᔾᔨᓚᐅᖅᑎᓐᓇᒥᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᓄᓘᔾᔭᖕᓂ ᐱᓕᕆᔪᓂ.

ᖃᐅᔨᓴᕐᓂᖅ	ᖃᐅᔨᓴᕈᑕᐅᔪᖅ[1]	ᐱᔭᕇᖅᑕᐅᔪᑦ, ᐊᒃᑐᐃᓃᑦ ᑕᑯᔭᐅᔪᑦ, ᐊᒃᑐᓂᕐᓗᖏᔾᔪᑕᐅᔭᕆᐊᓖᑦ ᑎᓕᐅᕈᑏᓪᓗ ᓯᕗᓂᕐᒥ ᐱᓕᕆᐊᖑᔪᓄᑦ	ᖃᓄᐃᓕᖓᓃᑦ ᓴᓂᐊᓂ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ[2]
ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᑐᒃᑐᓂᒃ ᖃᐅᔨᓴᕐᓃᑦ;	ᓈᑦᑎᓪᓗᓂ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᒥᒃ 53a, 53b, 54b, 58b	ᒪᕐᕉᒃ EDI ᐆᒪᔪᕐᓂᐊᖅᑏᒃ ᖃᐅᔨᓴᓚᐅᖅᑑᒃ ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᑐᒃᑐᓂᒃ ᖃᐅᔨᓴᕐᓂᕐᓂᒃ. ᖃᐅᔨᓴᕐᕕᑦ ᑐᒃᑐᑦ ᕿᑐᕐᖏᐅᖅᑎᓪᓗᒋᑦ (ᔫᓂᖑᓕᓵᖅᑎᓪᓗᒍ 2020). ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᑐᒃᑐᓂᒃ ᖃᐅᔨᓴᕐᕕᓕᒫᑦ ᐅᐸᒃᑕᐅᓚᐅᖅᑐᑦ ᐊᒃᓱᑦ ᐊᑕᐅᓯᐊᖅᑯᑎᒃ; 21 24ᓂᑦ ᒪᕈᐃᖅᓱᖅᑕᐅᓪᓗᑎᒃ ᐅᐸᒃᑕᐅᓪᓗᑎᒃ. ᑲᑎᖅᓱᓯᑦ ᖃᐅᔨᓴᖅᑕᐅᔪᑦ ᐃᑲᕐᕋᖏᑦ 18.3 ᐃᑲᕐᕋᐅᓪᓗᑎᒃ, ᖃᐅᔨᓴᖅᑕᐅᓲᖑᒐᔪᖕᓂᖏᑦ ᐊᑐᓂ ᖃᐅᔨᓴᕐᕕᖕᒥ 23.9 ᒥᓂᑦᓯᙳᓪᓗᓂ. ᑐᒃᑐᓂᒃ ᑕᑯᓚᐅᖏᑦᑐᑦ ᖃᐅᔨᓴᖅᑎᓪᓗᒋᑦ 2020ᒥ. 2016ᒥ, ᖁᕌᓂᑦ ᓄᓇᙳᐊᓕᐅᖅᑐᑦ ᐱᔭᕇᓚᐅᖅᑐᑦ ᓴᖅᑭᑦᑎᓂᐊᕋᒥᒃ ᓇᒧᑎᒋ ᖃᐅᔨᓴᖅᑐᑦ ᑕᑯᔪᓐᓇᕐᒪᖔᑕ ᖃᐅᔨᓴᓕᕈᑎᒃ ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᑐᒃᑐᓂᒃ ᖃᐅᔨᓴᕐᓂᕐᓂᒃ; ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᑐᒃᑐᓂᒃ ᖃᐅᔨᓴᐃᓐᓇᕐᓂᐊᖅᑐᑦ ᐊᕐᕌᒍᑕᒫᑦ ᕿᑐᕐᖏᐅᕐᓂᖏᓐᓂ. 2020ᒥ ᖃᐅᔨᓴᕐᓃᑦ ᐃᓚᓕᐅᑎᔪᑦ ᐅᓄᕐᓂᖅᓴᓄᑦ ᑲᑎᖅᓱᖅᓯᒪᔪᓄᑦ ᖃᐅᔨᔭᐅᓯᒪᔪᓄᑦ ᖃᐅᔨᓴᖅᐸᓪᓕᐊᑎᓪᓗᒋᑦ ᐱᓕᕆᓂᐅᑉ ᐊᐅᓚᓂᖓᓄᑦ.	ᕿᒥᕐᕈᓃᖅ ᓇᓚᐅᑦᑖᓚᐅᖅᑐᖅ ᑕᕝᕗᖓᑲᐅᑎᒋᐅᖏᑦᑐᖅ ᑐᒃᑐᐃᑦ ᐃᓃᖅᑕᐅᓂᖏᓐᓂᒃ ᐅᔾᔨᕆᓂᕐᒧᒃᑕᒥᒧᑦ ᐳᔪᖃᕐᓂᕐᓄᓪᓗ, ᐃᓂᐊ ᐊᑐᑦᑎᐊᒐᒃᓴᐅᔪᓐᓃᖅᓱᓂ ᐱᓕᕆᕝᕕᐅᑉ ᐊᒃᑐᐃᓂᖓᓂ. ᑭᓯᐊᓂ, ᐃᓂᖃᑦᑎᐊᕈᓐᓇᕐᓂᖅ ᒥᑭᒋᓕᒋᐊᕐᓂᐊᕋᓱᒋᔭᐅᓚᐅᖅᑐᖅ 2%ᒥᑦ 4.25%ᒧᑦ, ᐃᓚᖏᑦ ᐊᒃᑐᐃᓂᕐᓗᐃᑦ (ᓄᓇᒃᑰᕈᑏᑦ ᓅᒃᑕᖅᑐᑦ) ᐊᑯᓂᒨᖏᑉᐳᑦ, ᑐᒃᑐᓪᓗ ᑖᒃᑯᓄᖓ ᐊᒃᑐᐃᓂᕐᓗᖕᓄᑦ ᓱᖏᐅᑎᑐᐃᓐᓇᕆᐊᖃᖅᐸᑦ, ᑕᐃᒪᐃᒻᒪᑦ ᒥᑭᒡᓕᑎᖅᓱᒋᑦ ᐊᒃᑐᐃᓂᐅᑐᐃᓐᓇᕆᐊᓖᑦ. ᐅᓄᖅᑐᑦ ᐊᓰᑦ ᕿᑐᕐᖏᐅᕐᕖᑦ ᑕᕝᕗᖓᑲᐅᑎᒋᐅᖏᑦᑐᖅ ᐃᓃᖅᑕᐅᓃᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᓚᐅᖅᑐᖅ ᐊᔾᔨᑐᐃᓇᖅᑎᑐᑦ ᐃᓕᖅᑯᓯᒃᑯᑦ ᐊᓯᔾᔨᖃᑦᑕᕐᓂᕐᓄᑦ ᐊᒃᑐᐃᓂᖃᖅᓴᓂᓗ ᖃᑭᖅᑖᔫᑉ ᐅᐊᖕᓇᖓᓂ ᑐᒃᑐᖃᕐᓂᕐᓄᑦ. ᐅᓪᓗᒥᒧᑦ, ᑐᒃᑐᓂᒃ ᑕᑯᖃᑦᑕᙱᓗᐊᕐᓂᕐᒧᑦ ᐳᖅᑐᔪᓂᑦ ᓄᓇᓂᑦ ᑐᒃᑐᓂᒃ ᖃᐅᔨᓴᓯᒪᕗᑦ ᕿᒥᕐᕈᓇᓱᒃᓱᑎᒃ ᓇᓕᐊᑐᐃᓐᓇᕐᓂᒃ ᐱᓕᕆᓂᕐᒧᑦ ᐊᒃᑐᐊᔪᒃ ᐊᒃᑐᐃᓂᕐᓂᒃ ᑐᒃᑐᑦ ᖃᓄᐃᒋᐊᕐᓂᖏᓐᓄᑦ ᐃᓂᖃᕐᓂᖏᓐᓄᓪᓗᐊᓐᓃᑦ.
ᐊᖑᓇᓱᒃᑎᓄᑦ ᐳᓛᕆᐊᖅᑐᓄᓪᓗ ᓇᐃᓈᖅᓯᒪᓃᑦ	ᓈᑦᑎᓪᓗᓂ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᒥᒃ 54f	ᒪᓕᒋᐊᖃᖏᒃᑲᓗᐊᖅᓱᓂ ᐹᕝᕙᓈᓐᓇᑦ ᐃᓗᕐᖏᓐᓂᓗᓂ, ᐳᓛᕆᐊᖅᑐᑦ ᐅᔭᕋᖕᓂᐊᕐᕕᖕᒧᑦ ᑕᑯᔭᖅᑐᕈᓐᓇᖅᐳᑦ ᐹᕝᕙᓈᓐᓇᑦ ᐅᐊᖅᓯᔪᐊᖅᑐᕐᓂᒃ. 2020ᒥ, ᑲᑎᖅᓱᓯᑦ 316 ᐃᓄᐃᑦ ᐅᐸᓚᐅᖅᑐᑦ ᓄᓘᔾᔭᖕᓄᑦ ᕿᒪᒃᑲᓐᓂᖅᑕᖅᑐᑦ. ᐅᓄᖏᓐᓂᖅᓴᐅᓚᐅᖅᑐᑦ ᕿᒪᒃᑕᑦᑎᓐᓂᑦ ᐊᕐᕌᒍᓂᑦ ᑰᕕᑦ-19ᒧᑦ ᓅᒃᑕᕈᓐᓇᖏᓐᓂᕐᓄᑦ ᐅᐸᒍᓐᓇᖏᓐᓂᕐᓄᓪᓗ. ᐊᖑᓇᓱᒃᑐᓄᑦ ᐳᓛᕆᐊᖅᑐᓄᓪᓗ ᓇᓗᓇᐃᖅᓯᒪᓃᑦ ᑲᔪᓯᓇᓂᐊᖅᑐᑦ ᐱᓕᕆᓂᐅᑉ ᐊᐅᓚᓂᖓᓄᑦ.	ᐱᓕᕆᓂᕐᒥᑦ ᐱᓕᕆᔪᓂᑦ ᐊᒃᑐᐃᓂᐅᑐᐃᓇᕆᐊᖃᕋᓱᐊᖅᑎᓪᓗᒋᑦ ᐊᐅᓪᓚᖅᓯᒪᔪᓄᑦ ᓲᕐᓗ ᐊᖑᓇᓱᒃᑐᓄᑦ, ᓅᒃᑕᖅᑐᓄᑦ, ᑕᖕᒫᖅᑐᓄᓪᓗ, ᐊᒃᑐᐃᓃᑦ ᓂᕆᐅᒋᔭᐅᓚᐅᖅᑐᑦ ᐊᒃᑐᐃᓂᖃᕆᐊᖃᑎᓪᓗ. ᐊᖑᔭᐅᔪᑦ ᐊᓯᔾᔨᕐᓂᐊᕋᓱᒋᔭᐅᓚᐅᖅᑐᑦ ᐱᓕᕆᓂᕐᒥᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ. ᐊᒃᑐᐃᓂᖏᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᑦ ᐊᒃᑐᐃᓂᖃᕐᓂᖅᐹᖑᔪᑦ ᓈᑦᑎᕐᓂᕐᒧᑦ ᑕᖕᒫᕐᓂᕐᒧᓪᓗ ᐃᓗᐃᑦᑐᓂᒃ ᐊᒃᑐᐃᓂᕐᓗᒃᑕᐅᓯᒪᔾᔭᖅᑐᑦ. ᑭᓯᐊᓂᑐᐊᕐᒧᑦ 2020 ᑰᕕᑦ-19 ᒧᓪᓗ ᓄᕙᒻᔭᐊᕐᓇᖅ, ᐊᖑᓇᓱᒃᑎᓄᑦ ᐳᓛᕆᐊᖅᑐᓄᓪᓗ ᐅᓄᖅᓯᒋᐊᖅᓯᒪᕗᑦ ᐳᐃᒍᖅᓯᒪᓕᖅᑕᐅᓂᕐᒥᓂᑦ 2011ᒥ, ᐱᖃᓯᐅᖅᑐᒋᑦ ᐅᓄᖅᑐᑦ ᐊᖑᓇᓯᒋᐊᖅᑐᑦ ᑕᖕᒫᖅᓯᒪᔾᔪᖅᑐᖅᑐᓪᓗ. ᐹᕝᕙᓈᓐᓇᑦ ᐊᐅᓚᑦᑎᓇᕐᓂᐊᖅᐳᑦ ᐅᐸᒍᓇᕐᓂᕐᓂᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒐᒧᑦ ᓇᓗᓇᐃᕈᑎ 13.3.1 ᐃᓄᐃᑦ ᐊᑐᖅᑕᐅᓂᖏᓐᓄᑦ ᐱᕖᓕᕈᑎᒃᓴᓄᓪᓗ ᐊᖏᖃᑎᒌᒍᑎᒥ.

ᓇᓗᓇᐃᖅᓯᒪᔪᑦ 0. ᓄᓇᓂ ᐊᕙᑎᓂ| ᓇᐃᓈᖅᓯᒪᔪᑦ 2020ᒥ ᐊᓯᔾᔨᓚᐅᖅᑎᓇᒋᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᓄᓘᔾᔭᓐᓂ ᐱᓕᕆᔪᓂ.

ᖃᐅᔨᓴᕐᓂᖅ	ᖃᐅᔨᓴᕈᑕᐅᔪᖅ[1]	ᐱᔭᕇᖅᑕᐅᔪᑦ, ᐊᑐᐃᓐᓂᑦ ᑕᑯᔭᐅᔪᑦ, ᐊᑐᓂᕐᓗᖏᔾᔪᑕᐅᓴᕆᐊᓖᑦ ᑎᓕᐅᕆᑦᑐ ᓯᕗᓂᕐᒥ ᐱᓕᕆᐊᖑᔪᓄᑦ	ᖃᓄᐃᓕᖓᓃᑦ ᓴᓂᐊᓂ ᐊᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ[2]
ᓄᓇᓕᕆᓚᐅᖏᓐᓂᕐᒥᓂ ᐃᕙᕝᕕᐅᔭᖅᓯᐅᕐᓃᑦ	ᓵᑦᑎᓪᓗᑎᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᓂᒃ 66, 70	2020ᒥ 125,509 m^2 (12.6 ha)ᑲᓴᑦ ᓄᓇᐃᑦ ᐱᓕᕆᔭᐅᓚᐅᖅᑐᑦ ᐱᓕᕆᓂᕐᒧᑦ ᐱᕐᑯᑎᕐᔪᐊᓄᑦ. ᑕᕝᕙᙵᑦ ᓄᓇᒥᑦ 32% ᐱᓕᕆᔭᐅᓚᐅᖅᑐᑦ ᕿᑐᕐᖏᐅᕐᓇᖏᓐᓂᕐᒥ (ᒪᐃ 31 ᐋᒡᒌᓯ 5ᒧᑦ). ᕿᑐᕐᖏᐅᕐᓇᕐᒥ, 85,192 ᒻ^2 (8.5 Hᐊ) ᑲᓴᑦ ᓄᓇᐃᑦ ᖄᖏᔭᖅᑕᐅᓚᐅᖅᑐᑦ. 13ᖏᖅᓱᖅᖢᑎᒃ ᖄᖏᔭᐃᓚᐅᖏᓐᓂᕐᒥᓂ ᖃᐅᔨᓴᓚᐅᖅᑐᑦ ᑲᑎᖅᓱᒋᑦ 17.7 ᐃᑲᕐᕋᑦ ᐃᓄᖕᓄᑦ ᐱᓕᕆᔭᐅᔪᑦ 111,682 ᒻ^2 (11.2 Hᐊ)ᒍ ᓄᓇᐃᑦ. ᐊᑕᐅᓯᖅ ᖁᐸᓄᐊᑉ ᐃᕙᕝᕕᐊ ᓇᓂᔭᐅᓗᓂ ᓴᓇᔪᓐᓃᖅᖢᑎᒃ ᒪᓐᓃᑦ ᑐᑭᕐᒪᑕ ᑭᓯᐊᓂ. ᖃᐅᔨᓴᐃᓐᓇᕐᓂᐊᖅᑐᑦ ᐱᕈᖅᑐᐃᔭᐃᓕᕌᖕᒪᒥᒃ ᑎᖕᒥᐊᑦ ᐃᕙᓂᖏᓐᓂ.	ᒥᑭᓪᓕᒋᐊᖅᑎᕐᓗᒍ ᐱᓕᕆᓂᐅᑉ ᐊᑐᐃᓂᖏᑦ, ᓄᓇᐃᔭᐃᓚᐅᖏᓐᓂᕐᒥᓂ ᐃᕙᕝᕕᒃᓯᐅᖅᖢᑎᒃ, ᐊᑐᓕᖅᑎᑦᑎᓪᓗᑎᒃ ᐃᕙᕝᕕᖕᓄᑦ ᐊᐅᓚᑦᑎᓂᕐᓄᑦ ᐸᕐᓇᐅᑎᒥᒃ, ᐱᓕᕆᓂᕐᒥᑦ ᐊᑐᐃᓃᑦ ᐃᕙᔪᓄᑦ ᑎᖕᒥᐊᓄᑦ ᓂᕆᐅᒋᔭᐅᓚᐅᖅᑐᑦ ᐅᓄᖏᑦᑐᑎᑐᑦ ᐱᑕᖃᖏᑦᑐᑎᑐᓪᓗᓐᓃᑦ. ᐊᑕᐅᓯᕐᒥᒃ ᐃᕙᕝᕕᐅᔪᒥᒃ ᓇᓂᓯᓪᓗᑎᒃ 2020ᒥ ᓴᓇᔪᓐᓃᖅᖢᑎᒃ ᒪᓐᓃᑦ ᑐᑭᖅᓯᒪᓕᕐᒪᑕ ᑭᓯᐊᓂ, ᑕᐃᒪᐃᒻᒪᑦ, ᐊᑐᐃᓃᑦ ᓇᓕᒧᑉᐳᑦ ᐊᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᓯᒪᔪᓄᑦ.
ᖃᖅᑲᓂ ᑎᖕᒥᐊᓄᑦ ᐃᕙᕝᕕᐅᖃᑦᑕᕐᓃᑦ ᕿᑐᕐᖏᐅᕐᓃᓗ	ᓵᑦᑎᓪᓗᑎᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᓂᒃ 50, 73, 74, ᐱᓕᕆᓕᕐᒧᑦ ᐊᖏᖅᓯᒪᓂᖅ 75ᒍ	ᖃᖅᑲᓂ ᐃᕙᔪᓄᑦ ᑎᖕᒥᐊᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᑲᔪᓯᓯᒪᔪᖅ ᐱᒋᐊᕐᓂᒥᑦ ᐊᑐᐃᓂᕐᓄᓗ ᖃᐅᔨᓴᖅᑕᐅᔪᓄᑦ 2011ᒥᓂᑦ. ᖃᐅᔨᓴᕐᓃᑦ ᑐᕌᓚᐅᖅᑐᑦ ᓇᓗᓇᐃᖅᓯᓇᓱᒃᖢᑎᒃ ᐊᖑᓇᓱᒃᑏᑦ ᑎᖕᒥᐊᑦ ᐃᓂᖃᕐᓂᖏᓐᓂᒃ ᕿᑐᕐᖏᐅᕐᓂᖏᓐᓄᓗ ᖃᐅᔨᒪᔭᐅᔪᓂ ᐃᕙᕝᕕᐅᔪᓂ. ᖃᖅᑲᓂ ᐃᕙᔪᑦ 51% ᐸᒍᖏᓐᓂ ᐅᐸᒃᓯᒪᓚᐅᖅᑐᑦ 175ᓂᑦ ᖃᐅᔨᒪᔭᐅᔪᓂᑦ ᐃᕙᕝᕕᐅᔪᓂᑦ ᐊᖑᓇᓱᒃᑎᓂᑦ ᑎᖕᒥᐊᓄᑦ ᖃᐅᔨᓴᕐᕕᖕᓂ ᖃᐅᔨᓴᖅᑕᐅᔪᓂᑦ ᐊᐅᔭᖓᓂ 2020. ᑖᒃᑯᖓᙵᑦ, 42 ᐃᓂᒋᔭᐅᓚᐅᖅᑐᑦ ᑭᒡᒐᕕᐊᕐᔪᖕᓄᑦ 47ᒍ ᑳᔫᓄᑦ. ᐅᓄᕐᓂᓇᒐᔪᓚᐅᖅᑕᖏᑦ ᕿᑐᕐᖏᐅᖅᑕᐅᔪᑦ ᑭᒡᒐᕕᐊᕐᔪᖕᓄᑦ ᑳᔫᓄᓗ 2020ᒥ 2.38±1.0ᖑᓪᓗᑎᒃ 2.96±1.21ᒍ ᐃᕙᔭᐅᔪᑦ, ᐊᑐᓂ. ᒥᑭᑦᑐᓂᒃ ᓂᕐᔪᑎᖃᕐᓂᕐᓄᑦ ᖃᐅᔨᓴᑦᑕᓚᐅᖅᑐᑦ 2020ᒥᑦ ᓵᖅᑯᓪᓗᒋᑦ ᑳᔩᑦ ᐊᕐᕌᒍᓂᑦ ᐃᓂᖃᖅᑕᕐᓂᖏᓐᓄᑦ ᒪᓕᒃᖢᒋᑦ ᓂᕐᔪᑎᕋᓛᑦ ᐃᓅᓯᓇᖃᑦᑕᖅᑕᖏᑦ. 8 ᐊᕕᙳᑦ ᐱᔭᐅᓚᐅᖅᑐᑦ 2020ᒥ, ᓇᓗᓇᐃᕈᑕᐅᓗᓂ ᐊᕕᙳᖃᓪᓚᖕᓂᖓᓄᑦ ᑕᒫᒥ. ᐅᓄᕐᓂᖏᑦ ᐊᓯᔾᔨᖅᐸᓪᓕᐊᖏᓪᒪᑕ ᑕᑯᓯᒪᓇᑎᓪᓗ ᐱᓕᕆᓂᕐᒥᑦ ᐊᑐᐃᓂᕐᓂᒃ, ᖃᖅᑲᓂ ᐊᖑᓇᓱᒃᑏᑦ ᑎᖕᒥᐊᓄᑦ ᐃᕙᔪᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᐅᓄᖏᓐᓂᖅᓴᐅᓕᕐᑯᔭᐅᓪᓗᑎᒃ.	ᐊᕐᕌᒍᑕᒫᓄᑦ ᐊᔾᔨᒌᖅᑲᑦᑕᖏᓂᓄᑦ ᑭᒡᒐᕕᐊᕐᔪᖕᓂ ᑳᔩᓂᒍ ᐃᓂᖅᑲᓯᓂ ᕿᑐᕐᖏᐅᖅᑐᒍ ᐅᓄᖅᓯᒪᐸᒍᒃᑐᑦ. ᒫᓐᓇᒧᑦ ᐱᓕᕆᓂᕐᒥᑦ ᐊᑐᐃᓂᕐᓂᒃ ᑕᑯᓯᒪᖏᑦᑐᑦ ᐅᓄᕐᓂᕐᓂ ᐅᖓᓯᖕᓂᕐᓂᓄᓪᓗᓃᑦ ᐊᑐᐃᓂᕐᓗᖕᓂᕐᒧᑦ. ᐊᑐᐃᓃᑦ ᖃᖅᑲᓂ ᐃᕙᔪᓂ ᐊᖑᓇᓱᒃᑎᓄᑦ ᐃᓂᖃᕐᕕᐅᓂᕐᓄᑦ ᕿᑐᕐᖏᐅᕐᓂᕐᓄᓗ ᐃᓗᐊᓂᑦᑐᑦ ᐊᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓂᑦ.
ᓂᕐᔪᑎᓂᒃ ᐅᐸᒃᓯᓃᑦ ᑐᕐᑯᔪᓪᓗ	ᓵᑦᑎᓪᓗᑎᒃ ᐱᓕᕆᓂᕐᒧᑦ ᒪᓕᒋᐊᓕᖕᓂᒃ 53a, 53b, 57ᑯᒥᓪᓗ	ᓇᓕᐊᑐᐃᓐᓇᑦ ᐅᐸᒃᓯᓃᑦ ᑐᕐᑯᔪᓪᓗᓐᓃᑦ ᐃᕐᔪᑎᓄᑦ ᐃᓗᐊᓂ ᐹᕙᓃᓃᑯᑦ ᐱᓕᕆᕝᕕᐊᓂ ᐅᖃᐅᓯᕆᓴᐅᔪᑦ ᖃᐅᔨᓴᖅᑕᐅᓪᓗᑎᓪᓗ ᓇᓕᐊᖕᓂ ᑕᖅᑭᓂ ᐊᕐᕌᒍᒥ. ᐊᔪᕐᓇᖏᑦᑕᑦᑕᖏᓪᓚᑦ, ᐊᑐᐃᓂᕐᓗᐃᔾᔭᐃᒃᑯᑎᓕᐅᓰᑦ ᓯᕗᓂᒥ ᐅᐸᒃᓯᖏᓂᖅᓴᐅᓂᐊᕐᒪᑕ ᑐᕐᑯᖏᓂᖅᓴᐅᓗᑎᓪᓗ. 2020ᒥ, ᐱᖓᓱᑦ ᑐᕐᑯᓇᑎᒃ ᓂᕐᔪᑎᓂᒃ ᐅᐸᒃᓯᔪᓂᒃ ᖃᓄᐃᑦᑐᖃᓚᐅᖅᑐᖅ ᐅᖃᐅᓯᕆᓴᐅᓪᓗᑎᒃ, ᐊᑐᓂ ᐊᑕᐅᓯᐅᕙᒃᓗᑎᒃ. ᓂᕐᔪᑏᑦ ᑐᕐᑯᔪᑦ ᐱᑕᖃᓚᐅᖅᑐᑦ 9 ᑎᑎᕐᕿᐊᓂᑦ ᑎᓴᒪᓪᓗ ᑎᖕᒥᐊᑦ (ᖃᐃᙳᖅ, ᑐᓗᒐᖅ, ᑲᖑᖅ, ᖃᖅᓴᐅᖅ).	ᓂᕐᔪᑏᑦ ᑐᕐᑯᔪᑦ ᐱᓕᕆᓂᕐᒥᑦ ᐱᓕᕆᔪᓂᑲᐅᑎᒋᓂᑦ ᐅᓄᓗᐊᔾᔮᖏᓂᐊᕐᕿᓯᐅᓚᐅᖅᓯᒪᔪᑦ ᐱᑕᖃᖏᓪᓗᑎᓪᓗᓃᑦ ᑎᖕᒥᐊᓄᑦ ᐊᖑᓇᓱᒃᑎᓄᑦ, ᑎᖕᒥᐊᓄᑦ, ᑐᒃᑐᓄᑦ ᐊᓯᓄᓪᓗ ᓂᕐᔪᑎᓄᑦ. ᓇᓕᐊᑐᐃᓐᓇᑦ ᑐᕐᑯᔪᑦ ᓂᕆᐅᒋᔭᐅᓚᐅᖅᑐᑦ ᑭᒡᒐᖅᑐᐃᓗᑎᒃ ᐅᓄᖅᑎᑦᑐᓂᒃ ᐃᓗᐃᑦᑐᓂᑦ ᐅᓄᖅᓯᒪᔪᓂᑦ. ᓂᕐᔪᑏᑦ ᑐᕐᑯᔪᑦ 2020ᒥ ᐊᑐᓂᖅᑐᐃᓇᐅᓚᐅᖅᑐᑦ ᐊᑐᐃᓇᑎᓪᓗ ᓂᕐᔪᑎᓂᒃ ᐅᓗᕆᐊᓇᖅᑐᒥᑦᑐᓂᒃ ᐃᑉᐱᓇᖅᑐᓂᑦᑐᓂᒃᑯᓐᓂᒃ. ᑕᐃᒪᐃᒻᒪᑦ ᓂᕐᔪᑏᑦ ᑐᕐᑯᔪᑦ ᐅᓄᓚᐅᖏᓚᑦ ᐃᓗᐃᑦᑐᒃᑯᑦ

ᓇᓗᓇᐃᖅᓯᒪᔪᑦ 0. ᓄᓇᓂ ᐊᕙᑎᓂ| ᓇᐃᓈᖅᓯᒪᔪᑦ 2020ᒥ ᐊᓯᔾᔨᓚᐅᖅᑎᓐᓇᒥᓄᑦ ᖃᐅᔨᓴᕐᓃᑦ ᓄᓘᔮᖕᓂ ᐱᓕᕆᔪᓂ.

ᖃᐅᔨᓴᕐᓂᖅ	ᖃᐅᔨᓴᕈᑕᐅᔪᖅ[1]	ᐱᔭᕇᖅᑕᐅᔪᑦ, ᐊᒃᑐᐃᓃᑦ ᑕᑯᔭᐅᔪᑦ, ᐊᒃᑐᓂᕐᓗᖏᔾᔭᑕᐅᔭᕆᐊᓖᑦ ᑎᓕᐅᕈᑏᓪᓗ ᓯᕗᓂᕐᒥ ᐱᓕᕆᐊᖑᔪᓄᑦ	ᖃᓄᐃᓕᖓᓃᑦ ᓴᓂᐊᓂ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ[2]
		ᐹᕙᓐᓛᓐᑯᑦ ᐊᒃᑐᐃᖕᒋᓐᓂᕐᓗᐃᕙᓪᓕᐊᖕᒋᓐᓇᖅᐳᑦ ᓂᕐᔪᑎᓂᒃ ᐅᐸᒃᓯᓂᕐᓄᑦ ᐱᓕᕆᓂᐅᑉ ᐃᓗᐊᓂ ᐊᔪᕈᓐᓃᖅᓴᑎᑦᑎᓂᒃᑯᑦ, ᒪᓕᒃᑕᐅᑎᑦᑎᓂᒃᑯᑦ, ᖃᐅᔨᓴᕐᓂᖅᑎᒍᓪᓗ ᓱᕈᓂᒃ ᐊᐅᓚᑦᑎᓂᕐᓄᑦ ᐱᓕᕆᔾᔪᓯᕐᓂᓪᓗ ᑐᕌᕈᑎᓂᓪᓗ. ᓂᕐᔪᑎᓂᒃ ᐅᐸᒃᓯᓂᕐᓄᑦ ᑐᕐᑯᔪᓄᓪᓗ ᖃᐅᔨᓴᐃᓐᓇᕐᓂᐊᖅᑐᑦ 2021ᒧᑦ.	ᑭᒡᒐᖅᑐᐃᓪᓗᑎᒡᓗ ᐃᓚᐃᓐᓇᓪᓚᑯᓗᖏᓐᓂᒃ ᐃᓗᐃᑦᑐᒃᑯᑦ ᐅᓄᕐᓂᕐᓂᑦ, ᒪᓕᒃᑐᑦ ᐊᒃᑐᐃᓂᕐᓄᑦ ᓇᓚᐅᑦᑖᕐᓂᒃ.

SUMMARY

The Mary River Project is an iron ore mine located 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. The high-grade iron ore is suitable for international shipment after crushing and screening with no chemical processing facilities. Construction on the Project and associated facilities started in 2013, and mining began in September 2014.

The Project is currently in the Early Revenue Phase, consisting of a mining rate of up to 4.2 mtpa at Deposit No. 1. Temporary approval for a production increase to haul via the Tote Road and ship 6.0 mtpa from Milne Port was approved in September 2018 and extended to cover 2020 (Minister of Intergovernmental and Northern Affairs and Internal Trade 2018). Also approved but not constructed is a railway system that will transport 18.0 mtpa of the ore from the Mine to a proposed all-season deep-water port at Steensby Inlet, where the ore will be loaded into ore carriers for overseas shipment through Foxe Basin.

In 2020, 6.0 mt of iron ore was hauled from the Mine to the Milne Port stockpile, and 5.5 mt of iron ore was shipped out of Milne Port. Construction in 2020 was limited: a new stockpile pad and water management infrastructure were created at km 106, a new access road and water collection ditch were built at the 560 Hillside Road, and a laydown was expanded at the km 110 communication tower. At the end of 2020, the total project footprint was 556 ha.

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 performed for the terrestrial environmental monitoring program is guided by the Terrestrial Environment Mitigation and Monitoring Plan (Baffinland Iron Mines Corporation 2016). It is overseen by the Terrestrial Environment Working Group (TEWG), including members from Baffinland, the Qikiqtani Inuit Association (QIA), the Government of Nunavut, Environment and Climate Change Canada and the Mittimatalik Hunters and Trappers Organization. The terrestrial environment monitoring program began in 2012 and continued through 2020 with adaptations to the programs, based on results and input from the TEWG. This report summarizes the data collection and monitoring activities conducted in 2020 for the Project, including the following survey programs (summaries provided in Table 0):

- weather monitoring;
- noise monitoring study;
- helicopter flight height analysis;
- passive dustfall monitoring;
- dustfall extent imagery analysis;
- vegetation and soil base metals monitoring;
- exotic invasive vegetation monitoring;
- vegetation "green up" analysis;
- snow track surveys;
- snowbank height monitoring;
- Height of Land caribou surveys;
- hunter and visitor log summaries;
- active migratory bird nest surveys;
- cliff-nesting raptor occupancy and productivity surveys; and,
- wildlife interactions and mortalities.

Weather conditions in 2020 were summarized and compared to average conditions from previous years. Malfunctions in temperature, precipitation and wind monitoring equipment made comparisons for these conditions difficult in 2020.

Baffinland initiated a noise monitoring study in 2020 to characterize the Project's noise environment. Nine noise monitoring stations were established at varying distances (Near, Far, and Reference) to each Project area (Mine Site, Tote Road, and Milne Port), with Autonomous Recording Units set up at each station to record the noise environment. The noise environment differed between Project areas, including typical and peak sound pressure levels, variability in sound pressure levels, and impulsive sound events. As expected, the Project generates noise loud enough to elicit wildlife response (i.e., above 55 dBA) close to the PDA. However, over 90% of the noise recordings at 1.5 km from the PDA were below this threshold, and anthropogenic noise events were detected less than 3% of the time at 1.5 km from the PDA.

The mean daily total vehicle transits (haul and other) on the Tote Road in 2020 was 271.7 vehicle transits per day. The mean number of ore haul transits per day on the Tote Road, from January 1 through December 31, 2020, was 243.3, slightly below the FEIS addendum predictions. Other traffic had an annual mean of 28.4 vehicle transits per day.

Helicopter flight height analysis monitors potential disturbance to birds and other wildlife within the Project area and designated Snow Goose moulting area (July and August only). The 2020 analysis incorporates additional detail requested by the TEWG in 2020 meetings regarding flight durations and pilot rationales. In 2020, after including pilot rationale, helicopter flight height compliance inside the Snow Goose area during the moulting period was 89%, and overall compliance in all months was 96%. The most common pilot rationales (i.e., situations requiring low-level flying) reported for low-level flights were slinging, drop-offs, and pick-ups. Overall compliance was highest in 2020 compared to previous years.

The dustfall monitoring program used a total of 39 passive dustfall collectors in 2020 to measure dust deposition related to Project activities, following the same methodology and analysis as in previous years. Twenty-six of these collectors are changed out monthly, while the rest are changed out during the summer months due to their remote location. The passive dustfall monitoring program results indicated that dustfall at all sites, the Mine, Milne Port and the Tote Road linking the two, have remained constant since approximately 2018. However, dustfall does regularly exceed predicted thresholds both at Milne Port and along the Tote Road. Dustfall extent on the landscape was also examined using satellite imagery analysis. This analysis was done to verify Inuit land users' reports of finding visible dust beyond what was predicted in baseline dust isopleth modelling. The imagery analysis indicates that dustfall extents generally increased from 2014 to 2019 at the Mine Site and Milne Port and visibly decreased in 2020. Along the Tote Road, dustfall extents tended to follow the road, with some years (e.g., 2015, 2019, and 2020) being more extensive than others. Dustfall magnitude was high near Milne Port, the Mine Site, and Tote Road infrastructure and generally low in the surrounding area.

One of the leading environmental concerns related to Project activities in 2020 was fugitive dust emissions. Baffinland uses numerous site-wide dust suppression measures to reduce these 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. DustStop was applied to the entirety of the Tote Road in summer 2020. Another new dust suppressant, DusTreat, was applied as a trial to ore stockpiles in Milne Port in November 2020. DusTreat is a non-toxic, water-based, and long-lasting suppressant that acts as a sealant on the stockpiles to prevent dust.

Vegetation monitoring in 2020 included vegetation and soils base metals monitoring, exotic invasive plant monitoring, and vegetation green-up analysis. Soil-metal concentrations and lichen-metal concentrations at the Project mainly indicated no significant increases compared with Baseline values. Some discrete increases in metal concentrations have been identified, but values were either below or within an acceptable range. Presently, soil-metal and lichen-metal concentrations represent a low risk to environmental and human health and safety; the predefined response is to continue monitoring these conditions and further document contaminants of potential concern (CoPCs). Exotic invasive plant monitoring in 2020 targeted a single site where domestic tomato plants were growing in 2019. No tomato plants were observed during two separate visits in 2020.

Satellite imagery analysis using a Normalized Difference Vegetation Index was introduced in 2020 in response to a request by the TEWG to verify that vegetation monitoring fieldwork occurred during the peak growing season. Peak growing season was identified as the first week of July to the first week of September, encompassing all past vegetation monitoring fieldwork.

Snow track surveys were conducted to assess wildlife response to the Tote Road, particularly caribou response. Five surveys were completed in 2020: three in spring (March 17, April 27, May 17) and two in winter (October 13 and 22). As in previous surveys, most tracks observed were from Arctic foxes and Arctic hares, and no caribou tracks were observed. Approximately half of the tracks detected were from animals crossing, a third travelled along, and 15% possibly deflected from the Tote Road.

Snowbank height monitoring was conducted to assess compliance with the operational 1 m height threshold, which facilitates wildlife crossings and improves visibility for drivers to avoid wildlife collisions. Snowbank height surveys usually are conducted once per month during winter but were increased to twice per month in 2020 in response to caribou sightings along the Tote Road in January. In response to a TEWG request, measurement locations were randomized in 2020 instead of using repeated km markers for measurements. Overall compliance was very high at 96%, higher than all previous years except 2019.

Height of Land surveys were conducted to assess caribou presence, distribution, and behaviour concerning Project activities during the calving season. Height of Land surveys were completed between June 4 and June 9, 2020. Twenty stations were visited twice, three were visited once, and one was visited three times. The total observation time was 18.3 hours, with an average observation time of 23.9 minutes per station. No caribou were observed during surveys, consistent with all previous surveys after 2013 and consistent with the low regional caribou population.

Active Migratory Bird Nest Surveys were completed before any land disturbance at the Project during the nesting season: May 31 to August 5, 2020. Surveys consisted of surveyors using a rope drag methodology (provided by Canadian Wildlife Service) to detect any nesting birds before clearing. A total of 13 surveys were completed covering 11.2 ha of land. One Snow Bunting nest was found, and construction was subsequently postponed in the area until the chicks had fledged.

Arctic Raptors Inc. completed cliff-nesting raptor surveys through a collaborative program with the University of Alberta, ongoing since 2011. Three aerial raptor surveys were conducted in 2020 in late June, mid-July, and mid-August. A total of 175 nesting sites were visited; 42 Peregrine Falcon nests, 47 Rough-legged Hawk nests, and 86 empty nesting sites were observed. Six new nesting sites were found in 2020. Raptors appeared to be at a higher point in their population cycle than in the past four years, likely supported by an increased abundance of lemmings. Occupancy was stable for both species, and productivity had increased in 2020 compared to previous years. No evidence was found to suggest that Peregrine Falcon and Rough-legged Hawk demography was affected by distance to disturbance. Some areas have consistently high nest survival while others have consistently low nest survival unrelated to the Mine's presence.

In 2020, three non-fatal wildlife interactions and 13 wildlife mortality incidents were reported, all of which were individual losses. Nine of the mortalities in 2020 involved Arctic Foxes, seven of which were due to collisions with vehicles, and the other two remain unknown. Four of the mortalities in 2020 involved birds, two of which were from collisions with vehicles, one of which was bycatch during gill netting, and one was a bycatch during small mammal trapping. Whenever possible, mitigations are implemented to reduce the risk of wildlife injury or mortality.

Table 0. Terrestrial Environment | Summary of 2020 Baseline Investigations and Monitoring and Research Activities at the Mary River Project.

Survey	**Reason for Survey**[2]	**Work Completed, Effects Observed, Required Mitigation and Recommendations for Future Work**	**Comparison to Impact Predictions**[2]
Weather monitoring	Supports all other terrestrial environment monitoring programs	Weather conditions were recorded hourly at meteorological stations at the Mine Site and Milne Port, which recorded weather data since 2005 and 2006, respectively. Weather data are used to support other monitoring programs; mitigations are not necessary. Meteorological stations will continue to collect weather data in 2021.	N/A
Noise monitoring	Addresses Project Condition 14b	A noise monitoring study was initiated in 2020. Nine Autonomous Recording Units were deployed at various distances from Project areas to examine Project-related noise and potential effects on wildlife. As predicted, Project-related noise was loud enough to elicit a wildlife response near the PDA but was usually not loud enough to cause wildlife response beyond 1.5 km from the Project. Further noise mitigations are not necessary. Further monitoring is likely to occur.	The operational threshold for Project-related noise is 40 dBA 1.5 km from the facility fence. Ambient noise was typically below 40 dBA at 1.5 km from all Project areas and below 40 dBA at 3 km from all Project areas. Project-related noise was typically not audible at 3 km from the Project.
Helicopter flight height	Addresses Project Conditions 59, 71 and 72	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 Goose area). Flight corridors are also used to avoid areas of significant wildlife importance. In 2020, compliance with height requirements within the Snow Goose area during the moulting season (July – August) was 90%, and compliance outside the Snow Goose area and in all areas in all months of analysis (May – September) was 96%. 2020 was the fourth year that flight height data were cross-referenced with daily pilot logs to justify low-level flights. Low-level flights with reasonable explanations were considered compliant. Rational explanations included: weather, slinging, surveys, drop off/pick up sampling, and short-distance flights.	It was expected that some Snow Geese would be displaced by Project-related activities but would relocate to nearby, less disturbed areas. As only a small portion of the Snow Goose area is subject to helicopter flyovers and is mainly outside the Zone of Influence (ZOI), effects would likely be limited. Overall, local disturbance relative to the PDA and Local Study Area (LSA) extent was expected to cause some sensory disturbance but be a not significant adverse effect. Direct mortality due to aircraft was deemed unlikely and thus expected to have a not significant adverse effect.

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[2] Project Conditions and Project Commitments as per: NIRB 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 2012) and Mary River Project early revenue phase addendum to final environmental impact statement: volume 6 — terrestrial environment (Baffinland Iron Mines Corporation 2013a)

Table 0. Terrestrial Environment | Summary of 2020 Baseline Investigations and Monitoring and Research Activities at the Mary River Project.

Survey	Reason for Survey[2]	Work Completed, Effects Observed, Required Mitigation and Recommendations for Future Work	Comparison to Impact Predictions[2]
		Helicopter flight height analysis incorporating pilot rationale will continue annually.	Compliance with minimum helicopter flight heights was high in 2020 when considering the pilots' rationale for low-level flying and flight hours within the Snow Goose area during moulting season decreased in 2020. Flights over the Snow Goose area were limited to its southeastern edge so that any sensory disturbance would be minimal relative to the entire Snow Goose area, consistent with Final Environmental Impact Statement (FEIS) predictions. However, it has not been possible to directly monitor the potential effects of low-level flying on Snow Geese or other migratory birds. No direct mortality due to aircraft has been documented, which is consistent with impact predictions.
Tote Road traffic monitoring	Correlate to wildlife disturbance and dust generation	Annual summary of continual traffic monitoring. No directly observed unexpected effects. Traffic volume monitoring will continue regularly.	The mean daily total vehicle transits (haul and other) on the Tote Road in 2020 was 271.7 vehicle transits per day. The mean number of ore haul transits per day on the Tote Road, from January 1 through December 31, 2020, was 243.3, slightly below the FEIS addendum predictions. Other traffic had an annual mean of 28.4 vehicle transits per day.
Dustfall monitoring	Addresses Project Conditions 36, 50, 54d, 58c, and Project Commitment 60	Thirty-nine dustfall collectors are distributed around the Project area, some of which are further away from the PDA as Reference sites monitoring background levels. Seven years of monitoring from August 2013 to December 2020 are now complete. Passive dustfall monitoring indicates that the areas with the greatest dustfall deposition are restricted mainly to within 1,000 m of the PDA; an investigation of dustfall at 12 monitors 1,000 m distant from the PDA indicates that dustfall was low throughout 2020. Future monitoring will continue to investigate dustfall at the 39 sites through the summer season and a subset of 22 year-round sites.	Annual Total Suspended Particulates (TSP) deposition levels were predicted to exceed 50 g/m²/year within the PDA, with TSP levels decreasing to background outside of the PDA. The 2020 dustfall results are consistent with predictions that the highest dustfall would be limited mainly within the PDA.

Table 0. Terrestrial Environment | Summary of 2020 Baseline Investigations and Monitoring and Research Activities at the Mary River Project.

Survey	Reason for Survey[2]	Work Completed, Effects Observed, Required Mitigation and Recommendations for Future Work	Comparison to Impact Predictions[2]
Vegetation and soil base metals	Addresses Project Conditions 34, 36, 38 & 50 and Project Commitments 67, 69 & 107	Soil-metal and lichen-metal concentrations were monitored in 2020. The study area spanned the entire PDA; sampling was conducted at three distances/locations from the PDA (Near: 0–100m, Far: >100–1,000 m, and Reference: >1,000 m). Soil and lichen metal concentrations at the Project mainly indicated no significant increases compared with Baseline values. Some discrete increases in CoPC metal concentrations were identified, but all values were either below or within an acceptable range.	Soil-metal and lichen-metal concentrations presently represent a low risk to environmental and human health and safety; the predefined response is to continue monitoring these conditions and further document CoPCs.
Exotic invasive vegetation monitoring and natural revegetation	Addresses Project Conditions 32, 37, 38 & 50 and Project Commitments 67, 68, 69 & 70	One occurrence of an exotic species (garden tomato, *Solanum lycopersium*) was found below an effluent outflow pipe at the Mine Site in 2019. This site was revisited in 2020 to monitor for the presence of the garden tomato. During two separate visits in 2020, no garden tomato plants were located, and the plants appeared to have been eradicated. No further mitigations are recommended. Exotic invasive species monitoring will continue on a 3 to 5-year schedule.	Exotic invasive species becoming established was deemed unlikely due to mitigation measures (i.e., cleaning equipment before arrival on site) and the use or establishment of natural revegetation in disturbed areas. As the only occurrence of an exotic species was not observed in 2020 at the location it was found during 2019 monitoring, and it is presumed to have died and not re-established. Exotic invasive species results are consistent with FEIS predictions.
Snow track surveys	Addresses Project Condition 54dii, 58f Addresses QIA concerns about snowbank heights and the effects on wildlife	Five snow track surveys were completed along the Tote Road to investigate the movement and behaviour of caribou in March, April, May, and October. Arctic fox, Arctic hare, ptarmigan, and lemming were the only species detected during surveys; no evidence of caribou was observed. Wildlife response to the road was recorded at each location where tracks were seen. Snow track monitoring will continue in 2021.	The FEIS predicted that there might be a reduction in caribou movement across project infrastructure throughout the operation phase, but it will not be significant at the scale of the North Baffin caribou population. If the ground monitoring of caribou suggests barrier effects (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 impact further. Because no caribou tracks were identified during snow track surveys in 2020, it cannot be determined if Project infrastructure is or is not impacting caribou movement. However, incidental observations of caribou crossing the Tote Road in 2020 suggest that it is not acting as a barrier to movement.

Table 0. Terrestrial Environment | Summary of 2020 Baseline Investigations and Monitoring and Research Activities at the Mary River Project.

Survey	Reason for Survey[2]	Work Completed, Effects Observed, Required Mitigation and Recommendations for Future Work	Comparison to Impact Predictions[2]
Snowbank height	Addresses Project Conditions 53ai and 53c Addresses QIA concerns about snowbank heights and the effects on wildlife	Snowbank height monitoring was conducted monthly or bi-monthly from November 2019 to April 2020 to assess compliance with the 1 m height threshold. Management of snowbank height facilitates wildlife crossings and increases drivers' visibility to help reduce wildlife-vehicle collisions. As per TEWG's request, measurement locations were randomized in 2020. In 2020, the average compliance for snowbank height surveys was 96%. In some areas, snowbanks could not be modified to comply with the threshold because of landscape or safety limitations. Snowbank height monitoring will continue during the winter months in 2021.	The FEIS predicted that there will be a reduction in caribou movement across project infrastructure throughout the operation phase but will be not significant at the scale of the North Baffin caribou population. Due to mitigations on the road (e.g., snowbank management, low embankments), the Tote Road was not expected to be a barrier to caribou movement. A minor to no increase in caribou mortality was anticipated due to the Project, and impacts would be not significant at the scale of the North Baffin Island caribou population. High compliance with snowbank heights minimizes the Tote Road's potential to act as a barrier to caribou movement. However, insufficient observational data are available to quantify the effectiveness of this mitigation on caribou movement due to low caribou numbers. As caribou numbers increase, as is predicted by traditional knowledge, increased monitoring of caribou movement across the roadway will be implemented.
Height of Land (HOL) caribou surveys	Addresses Project Condition 53a, 53b, 54b, 58b	Two EDI biologists conducted HOL surveys during the caribou calving season (early June 2020). All HOL stations were visited at least once; 21 out of 24 were visited at least twice. The total observation time was 18.3 hours, while the average observation time per station was 23.9 minutes. No caribou were observed during these surveys in 2020. In 2016, viewshed mapping was completed to demonstrate the extent of area surveyors could observe while conducting HOL surveys. HOL surveys will continue annually during the calving season. The 2020 observations add to a more extensive database as monitoring efforts continue through the Project's life.	The assessment predicted some indirect caribou habitat loss due to sensory disturbance and dust deposition, leading to reduced habitat effectiveness in a ZOI. However, habitat effectiveness was estimated to be reduced by 2% to 4.25%, some disturbances (i.e., traffic) are short-duration, and caribou may adapt to these disturbances, thus limiting potential impacts. Many alternate calving sites exist within and outside of the ZOI. Indirect habitat loss was predicted to be indistinguishable from natural variation and not significant at the north Baffin Island caribou population scale. To date, insufficient caribou observations during HOL surveys have occurred to assess any Project-related effects on caribou behaviour or habitat use.

Table 0. Terrestrial Environment | Summary of 2020 Baseline Investigations and Monitoring and Research Activities at the Mary River Project.

Survey	Reason for Survey[2]	Work Completed, Effects Observed, Required Mitigation and Recommendations for Future Work	Comparison to Impact Predictions[2]
Hunters and visitors log	Addresses Project Condition 54f	Though not compulsory unless using Baffinland facilities, visitors to the site may check in with Baffinland security. In 2020, a total of 316 individuals checked in at either Mary River or Milne Port camps. This was much lower than previous years due to COVID-19 restrictions on travel and interaction. The hunters' and visitors' log will continue through the life of the Project.	Although Project-related effects may interact with land-use activities such as harvesting, travel, and camping, the impacts were expected to be not significant. The amount of country food harvested was expected to not change meaningfully due to Project-related effects. Although there may be some adverse effects on travel and camping near the PDA itself, Inuit ability to travel and camp throughout the broader area would be not adversely impacted. Except for 2020 and the COVID-19 pandemic, hunter and visitor check-ins have steadily increased since record-keeping began in 2011, including numerous hunting and camping trips. Baffinland will continue to manage access to the Project according to Article 13.3.1 of the Inuit Impact and Benefits Agreement (IIBA).
Pre-clearing nest surveys	Addresses Project Conditions 66, 70	In 2020, approximately 125,509 m² (12.6 ha) of land was disturbed for Project infrastructure. Of this area, 32% were disturbed outside the breeding bird window (May 31 to August 5). During the breeding bird window, approximately 85,192 m² (8.5 ha) of land was cleared. Thirteen pre-clearing surveys were conducted, totalling 17.7 person-hours and 111,682 m² (11.2 ha) of area. One Snow Bunting nest was found, and construction was subsequently postponed in the area until the chicks had fledged. Surveys will continue to be conducted whenever clearing vegetation within the migratory bird nesting season.	By minimizing the Project footprint, conducting pre-clearing nest surveys, and implementing a nest management plan, Project-related effects to nesting birds were expected to be low to nil. One migratory bird nest was located in 2020, and construction was postponed until after the chicks had fledged; thus, effects are consistent with impact predictions.
Cliff–nesting raptor occupancy and productivity	Addresses Project Conditions 50, 73, 74, and Project Commitment 75	The cliff-nesting raptor monitoring program is a continuation of baseline and effects monitoring work conducted since 2011. Surveys focused on confirming raptor occupancy and the productivity of known nesting sites. Cliff-nesting raptors occupied approximately 51% of the 175 known nesting sites within the raptor monitoring area surveyed in summer 2020. Of these, 42 were occupied by Peregrine Falcon and 47 by Rough-legged Hawk. The mean brood size for Peregrine Falcons and Rough-legged Hawks in 2020 was 2.38±1.0 and 2.96±1.21 nestlings, respectively.	Annual variability within Peregrine Falcon and Rough-legged Hawk occupancy and productivity has been relatively high. Thus far, there have been no Project-related effects detected at the RMA level nor as a factor of distance to disturbance. Effects on cliff-nesting raptor occupancy and productivity are within the impact predictions.

Table 0. Terrestrial Environment | Summary of 2020 Baseline Investigations and Monitoring and Research Activities at the Mary River Project.

Survey	Reason for Survey[2]	Work Completed, Effects Observed, Required Mitigation and Recommendations for Future Work	Comparison to Impact Predictions[2]
		Small mammal abundance monitoring was also conducted in 2020 to address Rough-legged Hawks' cyclical occupancy according to small mammal cycles. Eight lemmings were trapped in 2020, indicating high regional small mammal abundance. As populations are stable and there has been no evidence of Project-related effects, cliff-nesting raptor monitoring is recommended to be reduced in frequency.	
Wildlife interaction and mortality	Addresses Project Conditions 53a, 53b, and 57d	Any interactions or mortalities involving wildlife within the Baffinland Project area are reported and investigated year-round. If possible, mitigation measures are implemented to reduce future wildlife interactions and mortalities. In 2020, three non-fatal wildlife interactions and 13 wildlife mortality incidents were reported, all of which were individual losses. Wildlife mortalities involved nine Arctic foxes and four birds (American Pipit, Common Raven, Snow Goose, and Red-throated Loon). 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 2021.	Direct wildlife mortality from Project-related activities was predicted to be low to nil for raptors, birds, caribou, and other wildlife. Any mortalities that do occur were expected to represent a small fraction of the overall population. Wildlife mortalities in 2020 were all individual losses and did not impact any species at risk or sensitive species. Thus, wildlife mortalities were low overall and represented a very small proportion of overall populations, consistent with impact predictions.

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AUTHORSHIP

EDI Environmental Dynamics Inc. prepared this report with support from Arctic Raptors Inc. Report authors include:

Elaine Kennedy, B.Sc.Env., P.Biol.	Author: Noise, Mammals, Wildlife, Bird Sections
Lyndsay Doetzel, M.Sc., R.P.Bio.	Primary Author, Dustfall Section
Kerman Bajina, M.Sc.	Primary Author: Climate Section; biostatistician
Christina Tennant, M.Sc.	Primary Author: Dustfall and Helicopter Sections; GIS Support
Patrick Audet, Ph.D., R.P.Bio.	Co-author: Vegetation Section; Senior Review
Heather Toews, M.Sc.	Co-Author: Vegetation Section
Alastair Franke, Ph.D., Arctic Raptors Inc.	Primary Author: Raptor Section
Al Fontaine, M.Sc.	Senior Review, Raptor Section
Allison Patterson, M.Sc.	Biostatistician, noise
Mike Setterington, M.Sc., R.P.Bio., CWB	Senior Review
Cherie Frick, M.R.M.	Copy Editor
Win Translation	Inuktitut translation of Summary

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

LIST OF PHOTOGRAPHS

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
AIC	Akaike Information Criterion
ALS	ALS Environmental Laboratory
AMBNS	Active Migratory Bird Nest Surveys
ANOVA	Analysis of Variance
ARInc	Arctic Raptors Inc.
ARU	Autonomous Recording Unit
AQNAMP	Air Quality and Noise Abatement Management Plan
CCME	Canadian Council of Ministers of the Environment
CI	Confidence Interval
CoPCs	Contaminants of Potential Concern
CVAAS	Cold Vapour-Atomic Absorption
CWS	Canadian Wildlife Service
dBA	A-weighted DeciBels
DEM	Digital Elevation Model
DOY	Day-of-Year
ECCC	Environment and Climate Change Canada
EDI	EDI Environmental Dynamics Inc.
EPP	Environment Protection Plan
ERP	Early Revenue Program
ESA	European Space Agency
ESRI	Environmental Systems Research Institute
FEIS	Final Environmental Impact Statement
GAMM	Generalized Additive Mixed Model
GIS	Geographic Information System
GN	Government of Nunavut
GPS	Geographic Positioning System
HOL	Height of Land
IIBA	Inuit Impact and Benefit Agreement
INLA	Integrated Nested Laplace Approximation
IQ	Inuit Qaujimajatuqangit
L_{eq}	Equivalent Continuous Sound Level
MDL	Minimum Detection Limit
MHTO	Mittimatalik Hunters and Trappers Organization
MSI	Multispectral Instrument
NDVI	Normalized Difference Vegetation Index
NIR	Near Infrared
NIRB	Nunavut Impact Review Board
OLI	Operational Land Imager

PDA	Potential Development Area
PEFA	Peregrine Falcon
PRISM	Program for Regional and International Shorebird Monitoring
QAQC	Quality Assurance and Quality Control
QIA	Qikiqtani Inuit Organization
RMA	Raptor Monitoring Area
RLHA	Rough-legged Hawk
RSA	Regional Study Area
SDI	Snow Darkening Index
SEL	Sound Exposure Level
SGMA	Snow Goose Management Area
SM4	SongMeter4
SPL	Sound Pressure Level
SWIR	Shortwave Infrared
TEMMP	Terrestrial Environment Mitigation and Monitoring Plan
TEWG	Terrestrial Environment Working Group
TM	Thematic Mapper
TSP	Total Suspended Particles
USGS	United States Geological Survey
VEC	Valued Ecosystem Component
WAIC	Watanabe-Akaike Information Criterion

UNITS

Acronym/Abbreviation	Definition
cm	Centimetre
dm^2	decametre square
g	Gram
ha	Hectare
hrs	Hours
km	Kilometre
km/hr	kilometres per hour
m	Metre
m/s	metre per second
m^2	metre square
magl	metres above ground level
masl	metres above sea level
mg	Milligram
mg/kg	Milligrams per kilogram
mm	Millimetre
Mtpa	million tonnes per year
%	Percent
A	Alpha
°C	degree Celsius

1 OVERVIEW

The Mary River Project (the Project) is an iron ore mine located in the Qikiqtaaluk Region on North Baffin Island, Nunavut. As a condition of Project approval, the Nunavut Impact Review Board (NIRB) Project Certificate No. 005 includes numerous conditions that require Baffinland Iron Mines Corporation (Baffinland) to conduct effects monitoring for the terrestrial environment. Work conducted for the terrestrial environmental monitoring program is guided by Inuit Qaujimajatuqangit and the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland Iron Mines Corporation 2016). This work is overseen by the Terrestrial Environment Working Group (TEWG), including members from Baffinland, the Qikiqtani Inuit Association (QIA), the Government of Nunavut (GN), Environment and Climate Change Canada (ECCC) and the Mittimatalik Hunters and Trappers Organization (MHTO). Several data collection and monitoring programs are conducted as part of the terrestrial environmental monitoring program, the frequency of which is outlined in the TEMMP (Baffinland Iron Mines Corporation 2016).

The inter-disciplinary terrestrial environment monitoring program provides a holistic assessment of potential Project effects on numerous inter-related valued ecosystem components. Monitoring programs are designed to complement each other and provide a greater understanding of ecosystem-wide responses and pathways than any single program. For example, dustfall deposition is captured by passive dustfall sampling, dustfall effects on plants are captured by vegetation monitoring, and any bioaccumulation effects on caribou will be monitored by caribou tissue sampling and fecal pellet analysis. To date, numerous programs have been conducted for the Project:

- dustfall monitoring (2013–2020);
- dustfall extent imagery analysis (2020);
- vegetation abundance monitoring (2014, 2016, 2017, 2018, 2019);
- vegetation and soil base metals monitoring (2012–2017, 2019, 2020);
- exotic invasive vegetation monitoring and natural revegetation (2014, 2019, 2020);
- normalized difference vegetation index analysis (2020);
- Height of Land caribou surveys (2013–2020);
- snow track surveys and snowbank height monitoring (2014–2020);
- noise monitoring pilot study (2020);
- Red Knot surveys (2014, 2019);
- active migratory bird nest surveys (2013–2020);
- cliff-nesting raptor occupancy and productivity surveys (2011–2020);
- helicopter flight height analysis (2015–2020);
- caribou fecal pellet collection (2011, 2012, 2013, 2014, 2020);
- caribou water crossing surveys (2014);
- carnivore den survey (2014);
- communication tower surveys (2014, 2015);

- roadside waterfowl surveys (2012–2014);
- staging waterfowl surveys (2015);
- tundra breeding bird PRISM (Program for Regional and International Shorebird Monitoring) plots (2012, 2013, 2018);
- bird encounter transects (2013); and
- coastline nesting and foraging habitat surveys along Steensby Inlet (2012) and Milne Inlet (2013).

The results of the 2012 to 2019 surveys are described in the Terrestrial Environment Annual Monitoring Reports (EDI Environmental Dynamics Inc. 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020).

Figure 1-1 illustrates an overview of terrestrial environmental monitoring programs in 2020 at the Project. The 2020 terrestrial environment monitoring programs summarized in this report includes:

- dustfall monitoring program;
- dustfall extent imagery analysis;
- noise monitoring study;
- helicopter flight height analysis;
- vegetation and soil base metals monitoring;
- exotic invasive vegetation monitoring;
- vegetation green-up date analysis;
- snow track surveys;
- snowbank height monitoring;
- Height of Land surveys;
- hunters and visitors log summaries;
- active migratory bird nest surveys;
- raptor occupancy and productivity surveys; and
- wildlife interactions, incidental observations, and mortalities.

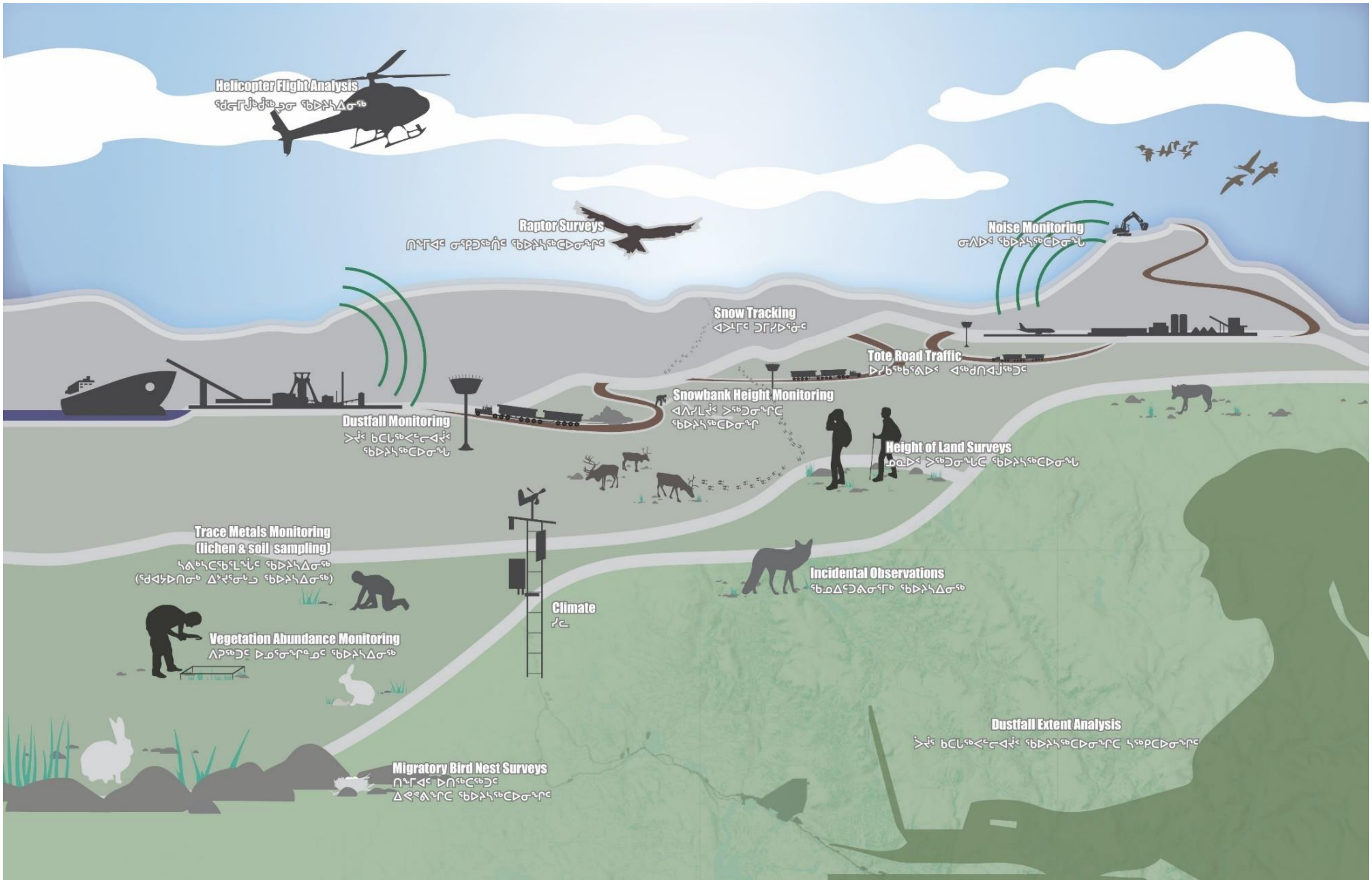

Figure 1-1. Graphical overview of the Mary River Project terrestrial environmental monitoring programs.

2 TERRESTRIAL ENVIRONMENT WORKING GROUP

The Terrestrial Environment Working Group (TEWG) was formed in 2012 as a collaborative effort to develop and refine monitoring programs based on best available science and local knowledge. The TEWG includes Baffinland, QIA, MHTO, GN, and ECCC as core members, along with various observer groups. Baffinland conducts multiple TEWG meetings throughout the year to discuss all topics related to the Project, either by invitation from the community or by request to meet on specific items. These meetings guide information gathering and sharing, which influences Baffinland's monitoring programs, Project operations, and a greater understanding of the environment.

In 2020, Baffinland held three TEWG meetings:

- February 26, 2020 (in-person, Ottawa)
- June 24, 2020 (virtual)
- December 10, 2020 (virtual)

In addition to discussing the previous year's monitoring results, the TEWG meeting in 2020 focused on dustfall deposition and extent, helicopter use, and options for regional caribou monitoring. Meeting minutes are distributed by Baffinland and are available for comment by the TEWG. Appendix A summarizes the TEWG input on various terrestrial monitoring programs since 2018, and how this input has been addressed and/or incorporated into the monitoring programs.

The TEWG comments on the draft of this 2020 Terrestrial Environment Annual Monitoring Report and Baffinland's responses are in Appendix B.

3 INUIT PARTICIPATION

Inuit participation is standard practice in Baffinland's field monitoring programs, including:

- hiring and training Inuit to work on terrestrial monitoring programs;
- supporting the participation of the MHTO in the TEWG;
- funding for two full-time on-site Environmental Monitors to be appointed and solely employed by the QIA following Article 15.8 of the Inuit Impact and Benefit Agreement (IIBA; Qikiqtani Inuit Association and Baffinland Iron Mines Corporation 2018); and
- implementing a community-based monitoring program through the Mary River IIBA Qikiqtani Inuit Association and Baffinland Iron Mines Corporation 2018).

In all previous terrestrial monitoring years, Inuit participated in various monitoring programs as research assistants and consultants (e.g., Height of Land, vegetation abundance, vegetation and soils base metals, and raptor monitoring). Inuit research assistants from numerous communities on Baffin Island provided critical support and insight for field programs. Inuit research assistants have gained essential skills and training through participation in field programs such as plant identification, bird identification, Arctic biology, field logistics, GPS navigation, data collection methods, and data management.

Due to the COVID-19 pandemic in 2020, Baffinland could not include Inuit research assistants from the Baffin Island communities in the terrestrial environment monitoring programs as they have in previous years. As part of their effort to eliminate any risk of COVID-19 exposure to communities, Nunavummiut workers were asked to remain home. Any interaction of mine site personnel with community members was minimized. However, Baffinland did find opportunities for Inuit participation in field programs from other departments within the Project. These Baffinland staff members lived outside of Nunavut in 2020, so they did not pose a risk of community exposure to COVID-19 within Nunavut. Two Baffinland Human Resources staff members joined the Height of Land surveys and raptor monitoring surveys when available, for a total of 26 hours.

Additionally, a QIA Environmental Monitor joined for approximately three hours of vegetation and soil base metals sampling and noise monitoring fieldwork. These staff members and the QIA Environmental Monitor voiced appreciation for the chance to get out on the land and learn more about the terrestrial environmental monitoring programs that Baffinland is running. Baffinland will resume regular inclusion of Inuit research assistants in field programs when it is safe to do so in future years.

4 CLIMATE

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

- *"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."*

The climate data recorded at the Mary River Project contributes to several other datasets and analyses. Recent climate data can be compared to historical baseline data to study changes in long-term climate patterns. Temperature, precipitation, and wind data are used to supplement dustfall deposition analyses. Dustfall dispersion and deposition are strongly related to weather conditions (*e.g.,* dustfall dispersion tends to be higher during dry, windy conditions than during rainy conditions). Incorporating observed weather conditions into the dustfall analyses can help explain certain patterns and trends in dustfall. Temperature and precipitation data may be used to estimate vegetation green-up and phenology for vegetation surveys. Wind data are also used to estimate snow distribution prior to and during snow tracking surveys.

From 1963 to 1965, Environment Canada operated a climate station at Mary River during the summer months (Baffinland Iron Mines Corporation 2012). These climate data have been included to make comparisons with data collected from Baffinland's on-site meteorological stations. Baffinland established a meteorological station at Mary River Camp in June 2005 and at Milne Port in June 2006. Data from these stations were used to create a baseline dataset from 2005 to 2010. Data continues to be collected from these stations until the present day (Baffinland Iron Mines Corporation 2012). Where relevant, the 2020 weather data were compared with the baseline (2005–2010) and post-baseline (2013–2019) weather data. Data included hourly records of air temperature, precipitation, and wind speed and direction.

Weather conditions from January 1, 2020, to December 31, 2020, were reported from on-site meteorological stations at the Mine Site and Milne Port. Summaries of 2020 weather conditions at the Mine Site and Milne Port included monthly air temperatures (mean, minimum and maximum), monthly precipitation (quantity and frequency), and wind direction and speed. A likely instrumentation error occurred for both air temperature and precipitation readings at the Mine Site. Mean, minimum, and maximum readings were consistently higher across the year than in any prior year. These readings were compared to ECCC temperatures recorded for other northern communities on Baffin Island, such as Igloolik and Pond Inlet, and were still found to be substantially higher. Therefore, temperature data from the Mary River Camp meteorological station were used instead. Alternative data for a total quantity of precipitation were not available for the Mine Site; these results are presented but should be interpreted with caution as they are possibly erroneous. Additionally, the wind speed and direction sensor at Milne Port malfunctioned from January to August, so values associated with wind speed and direction at Milne Port were limited to September through December.

Comparisons of 2020 weather data were made against baseline (2005–2010) and post-baseline (2013–2019) periods. 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 (quantities and frequencies) were averaged across the years when those data were collected within the baseline and post-baseline periods. Cumulative proportions of wind speed and direction were calculated based on data across all years within each period.

4.1 AIR TEMPERATURE AND PRECIPITATION

Mine Site — In 2020, mean monthly air temperatures rose above zero in May (monthly mean of –6.1°C), reached an annual monthly high of 14.1°C in July, and remained above zero through September (monthly mean of 5.3°C). No data were available for October and November. Temperatures fluctuated above and below zero in early May, but it was not until June 7 that those temperatures remained consistently above zero. The timing of the fluctuations above and below zero was consistent with baseline patterns (2005–2010) and post-baseline (2013–2019) periods. Mean monthly air temperatures in 2020 were consistent with baseline and post-baseline periods, but the mean temperature in December was warmer (Figure 4-1).

Minimum and maximum temperatures were unavailable for the Mary River Camp data set in 2020. However, extremes in mean air temperatures were fairly consistent with the minimums and maximums recorded in previous periods. The lowest temperatures recorded at the Mine Site were −59.1°C in April 2007 of the baseline period (excluding erroneous readings of extreme lows below −60°C, post September 2009), −46.6°C in January 2015 of the post-baseline period (excluding an erroneous low of −73°C in September of 2014), and −46.0°C in January of 2020. Comparable historical data (1963–1965) in winter months are lacking, but the lowest temperature recorded in late winter/spring was −40.6°C in April of 1964. The highest temperatures recorded at the Mine Site were 22.8°C in July 2009 of the baseline period, 24.5°C in July 2016 of the post-baseline period, and 23.7°C in July 2020. For a complete monthly comparison among baseline (2005–2010) and all post-baseline years (2013–2020), see Appendix Table C-1. All these summer temperatures were greater than what was identified in the historical record (20.6°C in July 1965).

June through August tend to be the wettest months for North Baffin Island. This pattern holds for both the Mine Site and Milne Port across most periods. In 2020, a sensor malfunction resulted in erroneous precipitation data for the month of May — these data have been excluded from this report. Total rainfall in June 2020 (46.8 mm) was typical of what has occurred in past periods (Figure 4-1, Figure 4-2). However, no rainfall was recorded in July and August of 2020, and very sparse precipitation was evident in September 2020. This pattern of precipitation deviates from those observed during baseline (2005–2010) and post-baseline (2013–2019) periods (Figure 4-1).

Both the frequency and quantity of precipitation at the Mine Site followed the same pattern (Figure 4-2). Baseline and post-baseline periods had the greatest number of days with precipitation, on average, in June (7.2 days and 10 days), July (9.2 days and 13.5 days), and August (11.8 days and 8.7 days). In contrast, rainfall in 2020 was much lower during all these months. Rainfall was minimal in June (5 days) and September (1 day), and no rainfall occurred in July and August. Overall, 2020 experienced substantially fewer days of precipitation (6 days) in comparison to baseline (44.3 days) and post-baseline (52.1 days) periods.

Milne Port [3]— In 2020, mean monthly air temperatures at Milne Port rose above zero in June (monthly mean of 4.4°C), reached the annual monthly high of 11.5°C in July, and then fell below zero once again in September (monthly mean of −1.4°C). In May, temperatures began to fluctuate above and below zero, and by June 8, air temperatures were consistently above zero. Conversely, in early September, temperatures began to fluctuate above and below zero, and by September 16, air temperatures were consistently below zero. These timings of the fluctuations above and below zero were consistent with mean monthly air temperatures in baseline (2005–2010) and post-baseline (2013–2019) periods. The mean monthly air temperatures across these three periods were also consistent.

The lowest temperatures recorded at Milne Inlet were −46.9°C in February 2008 of the baseline period, −50.2°C in January 2019 of the post-baseline period, and −45.5°C in January of 2020. The highest temperatures recorded at Milne Port were 22.3°C in July 2009 of the baseline period, 22.4°C in July 2016 of the post-baseline period, and 22.7°C in July of 2020. For a complete monthly comparison among baseline (2006–2010) and all post-baseline years (2013–2020), see Appendix C.

In summary, mean air temperatures were much lower at Milne Port than at the Mine Site during 2020. Mean, minimum, and maximum temperatures at Milne Port were consistent with previous periods, whereas temperatures at the Mine Site were significantly higher than those of previous periods (Figure 4-1 and Figure 4-3).

Milne Port experienced only four months with recorded precipitation in 2020: May, June, July, and September. Given June and July's warmer temperatures, precipitation was presumably rainfall, whereas in May and September, precipitation was most likely snowfall (<1 mm combined). June and July had the greatest total quantity of precipitation: 31.0 mm and 20.9 mm, respectively (Figure 4-3). This was lower than the greatest mean monthly rainfall in baseline and post-baseline periods: 43.7 mm and 33.1 mm, both in July, respectively (Figure 4-3). The total cumulative precipitation at Milne Port in 2020 was 52.4 mm, much less than the averages for baseline (85.3 mm) and post-baseline (92.1 mm) periods.

The frequency and quantity of precipitation at Milne Port followed the same pattern: generally lower than average, except for June (Figure 4-3 and Figure 4-4). Aside from June and July, there was rarely precipitation recorded at Milne Port. Even so, the rainiest month in 2020 (June) only had three days of rain, whereas the rainiest month (July) in baseline and post-baseline periods had 7.8 and 12.5 days, on average. However, these three days resulted in a relatively large quantity of precipitation (e.g., 17.2 mm in a single rain event in June). Overall, in 2020, Milne Port experienced a lower quantity of precipitation and substantially fewer days of precipitation (8 days) in comparison to the averages in baseline (25.8 days) and post-baseline (45.3 days) periods.

In summary, the frequency of precipitation at both the Mine Site and Milne Port was lower than baseline and post-baseline periods. The total quantity of precipitation at Milne Port was proportional to the number of rainy days it experienced. In contrast, while the Mine Site experienced few rainy days (less than half of the baseline and post-baseline periods), it experienced a substantially greater rainfall quantity, particularly in May

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[3] There was a wind sensor error at the Milne Port weather station, and data is missing from January through August 2020. This is being investigation. An update to these data will be provided either in a revised report on in the 2021 annual report.

(see data disclaimer, above). Overall, the Mine Site had a greater frequency and quantity of total precipitation than Milne Port.

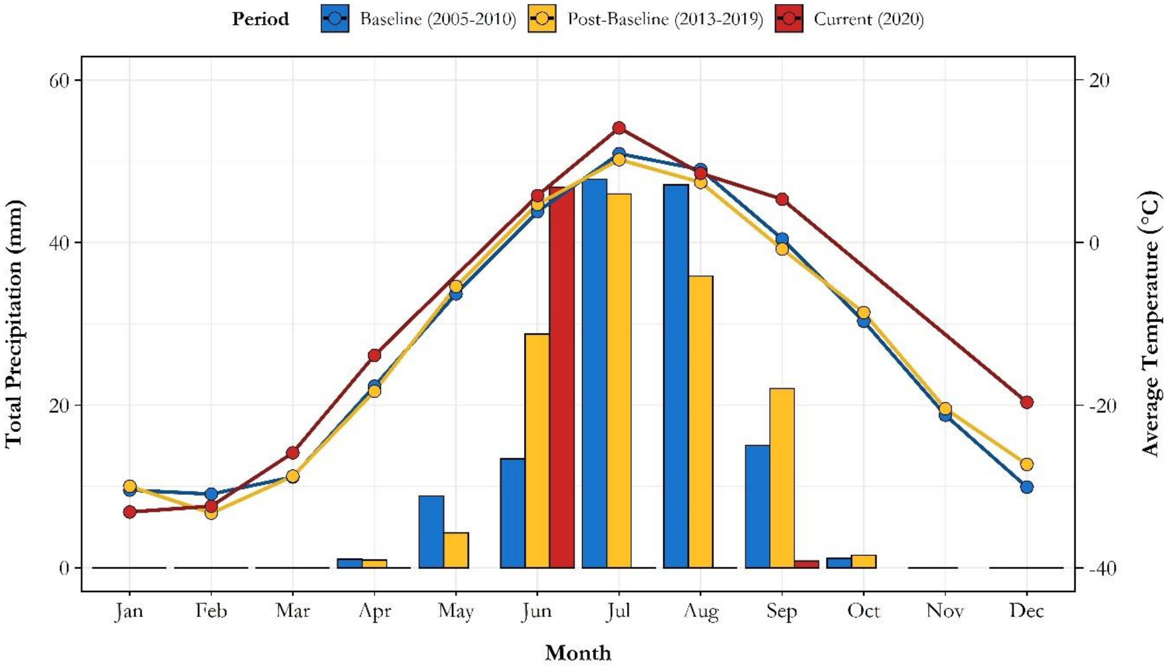


Figure 4-1. Mine Site monthly average air temperatures* (lines, °C) and total precipitation (bars, mm) during the current (2020), post-baseline (2013–2019), and baseline (2005–2010) periods.

**Original temperature results for the Mine Site in 2020 were likely erroneous and are replaced here with temperature data collected at the Mary River Camp. Precipitation data are missing for May 2020 due to a sensor malfunction.*

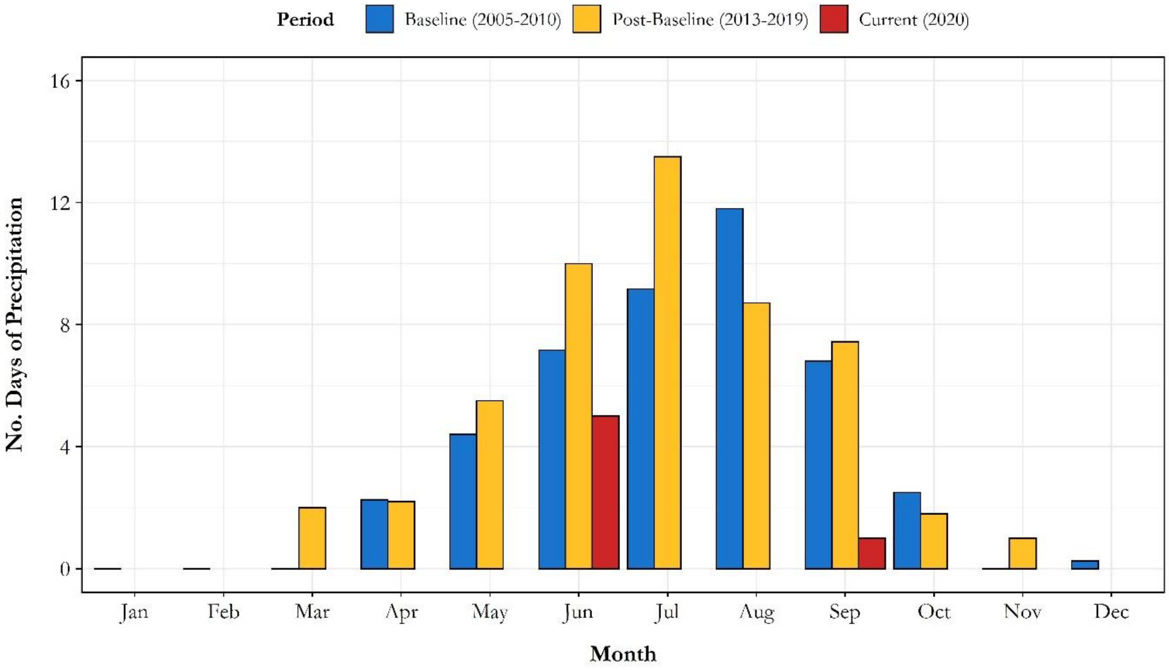


Figure 4-2. Mine Site monthly frequency of precipitation* (i.e., number of days) during the current (2020), post-baseline (2013–2019), and baseline (2005–2010) periods.

**Precipitation data are missing for May 2020 due to a sensor malfunction.*

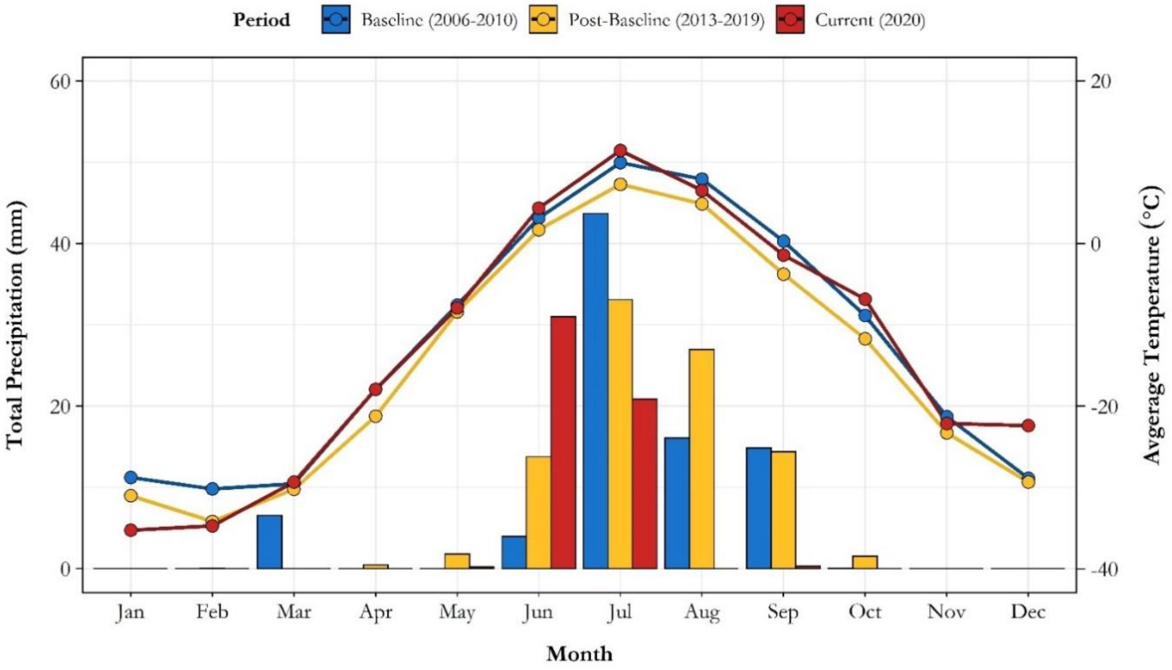


Figure 4-3. Milne Port monthly average air temperatures (lines, °C) and total precipitation (bars, mm) during the current (2020), post-baseline (2013–2019), and baseline (2005–2010) periods.

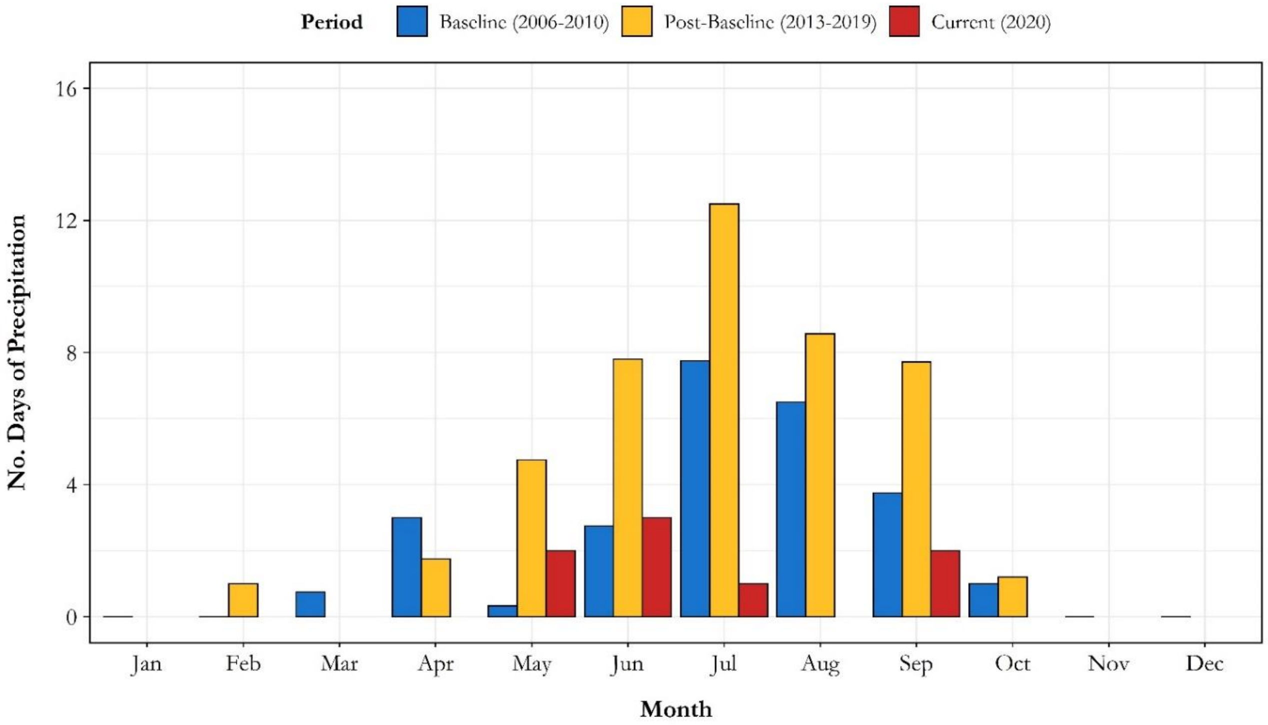


Figure 4-4. Milne Port monthly frequency of precipitation (i.e., number of days) during the current (2020), post-baseline (2013–2019), and baseline (2005–2010) periods.

4.2 WIND SPEED AND DIRECTION

Wind data with zero values for both hourly average wind speed and wind direction were excluded from analyses, but their proportions in 2020 are provided for both sites. Milne Port had 6,138 hours (69.9%), and the Mine Site had 113 hours (1.3%) with no wind speed or direction recorded. A comparison between wind conditions in 2020, post-baseline, and baseline periods is provided in the text below. To visualize wind speed and direction using windrose plots, any average speeds >20.8 m/s were classified as 'gale' on the Beaufort scale because of their relatively low frequency of occurrence. Wind data were not recorded at the Environment Canada Mary River meteorological station between 1963 to 1965, so no comparison was possible.

Mine Site — At the Mine Site in 2020, the prevailing wind direction was southeast, followed by northwest (Figure 4-5). Relative wind speeds were also proportional to the most frequent wind direction: southeastern winds had more episodes characterized as 'moderate breeze' (5.6–8.1 m/s), 'fresh breeze' (8.1–10.8 m/s), and 'strong breeze' (10.8–13.9 m/s) on the Beaufort scale. A few episodes of east and northeast winds were the only ones to reach speeds classified as 'near gale' (13.9–17.2 m/s) and 'gale' (17.2–20.8 m/s). Northerly and westerly winds were uncommon and generally weak. The maximum speed recorded at the Mine Site in 2020 was 21.9 m/s, which, on the Beaufort scale, is classified as 'strong gale' (20.8–24.4 m/s).

Baseline (2005–2010) and post-baseline (2013–2019) wind directions and speeds at the Mine Site were reasonably consistent compared to those in 2020. In baseline years, most winds were southeasterly and characterized as 'moderate breeze' to 'strong breeze.' Post-baseline years also had predominantly southeasterly winds, typically ranging between a 'gentle breeze' (3.3–5.6 m/s) and a 'fresh breeze' (8.1–10.8 m/s), though occasional 'gale' (17.2–20.8 m/s) and 'strong gale' winds occurred. Maximum wind speeds during baseline and post-baseline years were also similar to 2020, except for a 41.9 m/s 'hurricane' reading in June 2006 and a few instances classified higher than 'strong gale' in post-baseline years, e.g., 28.4 m/s; 'violent storm' in December 2016.

Milne Port — The wind speed and direction sensor at Milne Port malfunctioned from January to August 2020, so measurements were limited to September through December. The prevailing wind directions at Milne Port were north-northeast (i.e., coming off Milne Inlet) and southeast (i.e., coming from the Mine Site), with very little wind from the west or east (Figure 4-6). North-north-easterly winds were generally strongest, with over half of these winds being classified as 'fresh breeze' (8.1–10.8 m/s) or higher on the Beaufort scale. Westerly and southwesterly winds generally did not exceed a 'moderate breeze' (5.6–8.1 m/s). Southeasterly and north-easterly winds were the only ones that reached speeds classified as 'near gale' (13.9–17.2 m/s) or 'gale' (17.3–20.8 m/s). One occasion occurred where southeasterly winds reached an hourly average of 22.5 m/s ('strong gale') in August 2020. The maximum wind speed recorded for Milne Port was 100 m/s or 360 km/h. However, this wind speed is unlikely as it represents a speed greater than 'hurricane' on the Beaufort scale. The same maximum speed was identified in the post-baseline period in 2018. An issue with the wind sensor was identified by on-site staff in 2018. Despite maintenance and repairs to the Milne Port weather station on August 28, 2018, an issue with the sensor remains likely. A more realistic estimate of maximum wind speed is 30.0 m/s ('violent storm'), recorded in December 2020.

Baseline (2005–2010) and post-baseline (2013–2019) wind directions and speeds were consistent with 2020 data. Both had primarily north-easterly and southeasterly winds, with the strongest winds from the southeast. These two periods were similar to the 2020 data regarding one predominant wind direction (i.e., southeast). Still, the 2020 data demonstrated the greatest wind flow from the north-northeast. This discrepancy may be due to the missing wind data for January to August 2020. Maximum wind speeds during baseline and post-baselines years were, on average, equal to or greater than the 30.0 m/s recorded in 2020 (e.g., 29.9 m/s 'violent storm' in October 2008 and, excluding anomalous readings from 2018, 40.35 m/s 'hurricane' in April 2016).

In summary, baseline and post-baseline wind directions and speeds were mainly consistent with the 2020 data collected at the Mine Site. Still, they were somewhat different from the 2020 data collected at Milne Inlet, likely due to missing data for Milne Inlet. At the Mine Site, prevailing winds were most often from the southeast and strongest from the east across all periods. In 2020, a greater frequency of northwesterly winds occurred compared to previous periods at the Mine Site. The wind direction in 2020 at Milne Port was predominantly from the north-northeast and southeast, which also produced the strongest winds.

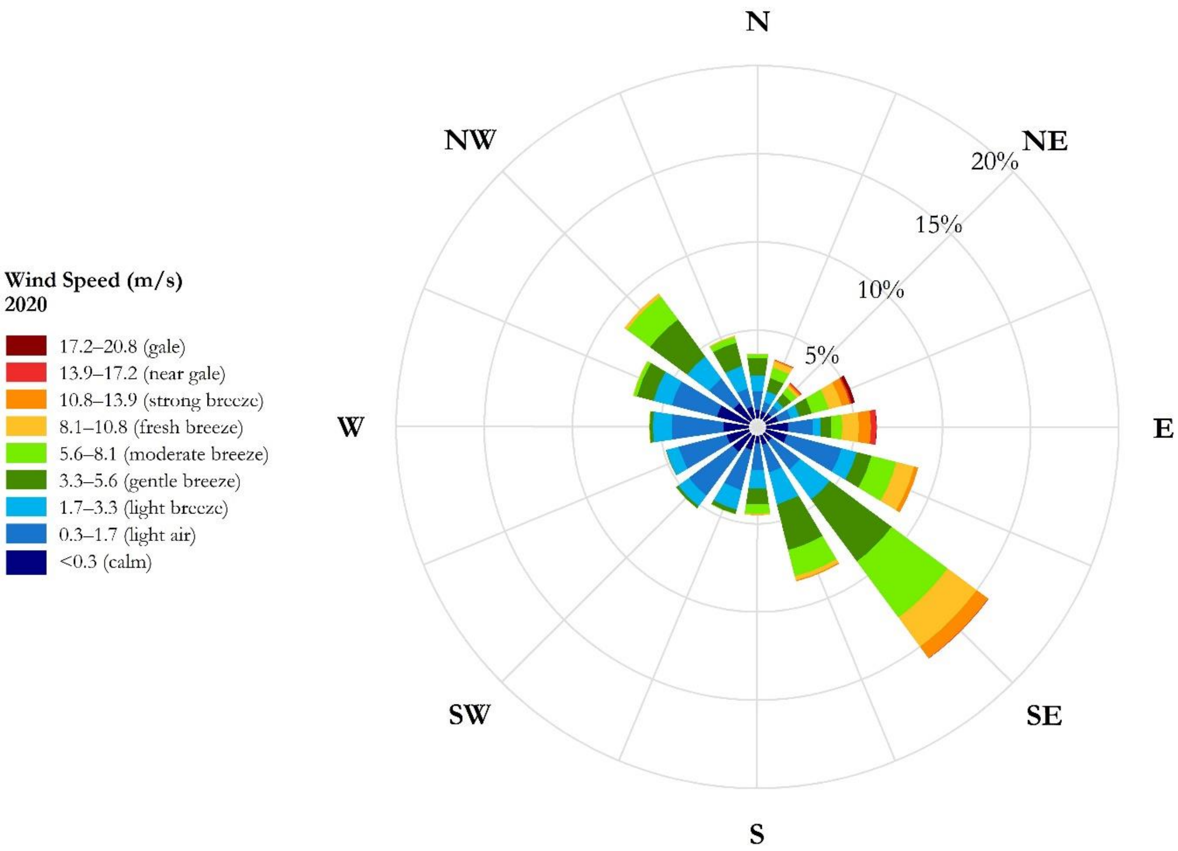


Figure 4-5. **The cumulative proportions of wind speeds and directions at the Mine Site meteorological station in 2020.**
Note: only hourly data with wind speed >0 m/s and an associated bearing were used; 113 hours of data did not meet these criteria.

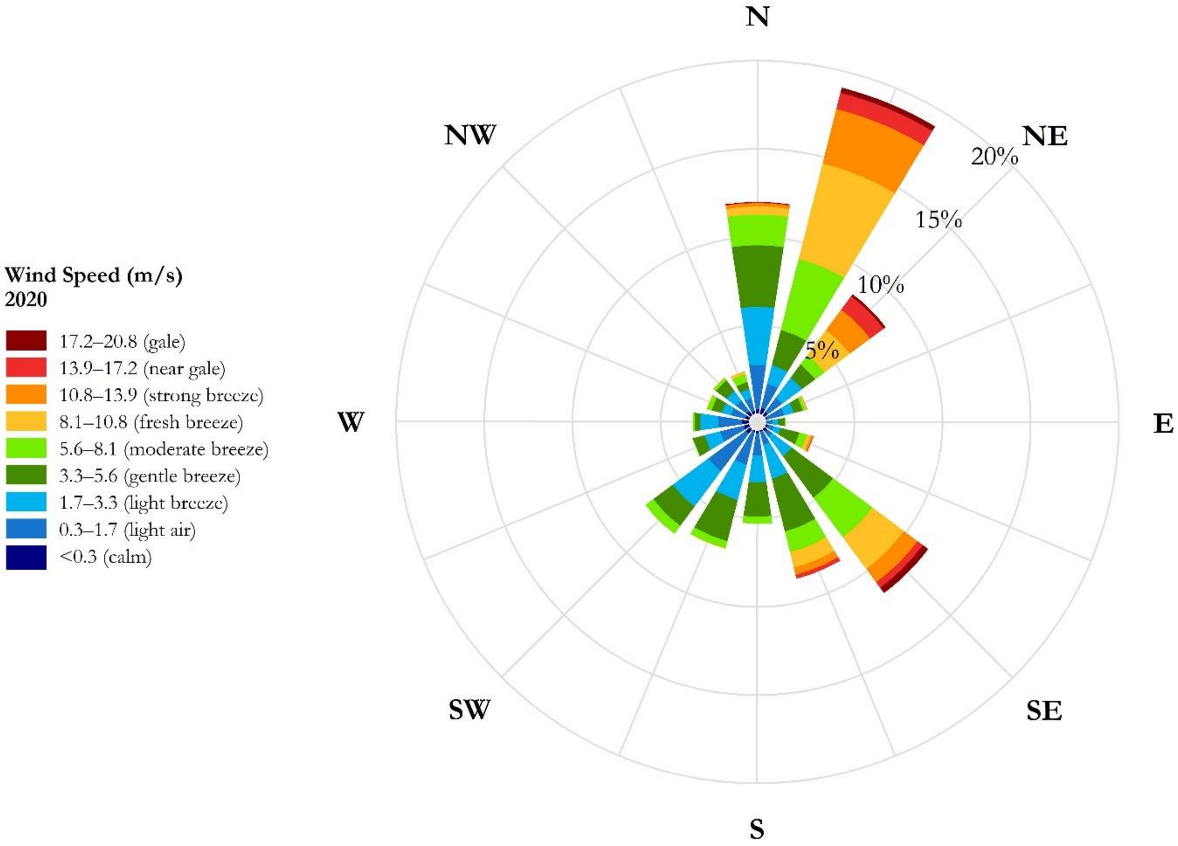


Figure 4-6. The cumulative proportions of wind speeds and directions at the Milne Port meteorological station in 2020.

Note: only hourly data with wind speed >0 m/s and an associated bearing were used; 6,138 hours of data did not meet these criteria. The wind speed and direction sensor at Milne Port malfunctioned from January to August, so values associated with wind speed and direction at Milne Port were limited to September through December.

5 NOISE

The 2020 Noise Monitoring Study was designed to address a knowledge gap in the current monitoring program for project-related effects on wildlife distribution and behaviour. To date, noise monitoring at the Project has focused on human health (*i.e.,* as part of occupational hygiene monitoring) but has not informed (more broadly) how Project noise is perceived by wildlife and other users across the landscape. As such, the program and associated study contribute to the fulfillment of NIRB Project Certificate No. 005 Project Condition #14(b) (Nunavut Impact Review Board 2020):

- *"The Proponent, through coordination with the TEWG as may be appropriate, shall demonstrate appropriate adaptive management for project activities during operations which have the potential to produce noise and sensory disturbance to wildlife and other users of project areas."*

Noise is an integral component of ecosystem function and plays a role in species interactions and behaviour. Noise is commonly measured as Sound Pressure Level (SPL) in decibels (dB) units: a logarithmic measurement unit of acoustic intensity. A-weighted decibel (dBA) represents the sum of sound energy across all frequencies audible to humans. It is the commonly used unit of measurement of noise concerning wildlife response (Blickley and Patricelli 2010). Examples of familiar sounds representing different dB levels are presented in Table 5-1.

Table 5-1. Examples of familiar sounds representing different decibel (dB) levels.

dB	Common sounds
120	Jet taking off at 60 m
110	Amplified rock music
100	Jet taking off at 600 m, ATV; motorcycle at 1 m
90	Loud shout
80	Busy traffic intersection
70	Noisy restaurant
60	Normal conversation at 1 m
50	Moderate rainfall
40	Quiet office or living room
30	Soft whisper at 1.5 m, Bedroom of a country home
0	The threshold of human hearing

Source: Directive 038: Noise Control (Alberta Energy Regulator 2007)

Studies investigating anthropogenic noise effects on wildlife vary widely in their methods and scope (e.g., taxa, study type, duration, noise parameters), and no standard guidelines or directives presently exist for noise monitoring (Barber et al. 2010, Shannon et al. 2016). Despite differences in experimental design and approaches to data capture, a common thread among available studies is that (1) different species vary in their detection of and response to environmental and anthropogenic noise, and (2) anthropogenic noise can substantially affect terrestrial wildlife behaviour. Responses have been documented in terrestrial wildlife for SPL as low as 40 dBA, but are more often recorded at 55 dBA to 60 dBA (Barber et al. 2010, Shannon et al.

2016). Additionally, species vary in their ability to produce and detect sounds at different frequencies — noises that are audible to some species may be inaudible to others (Barber et al. 2010). A caribou's hearing capacity is like humans. It ranges from 70 Hz to 38 kHz at a sound pressure of 60 dB, with optimal audibility from 500 Hz to 32 kHz (Flydal et al. 2001). Most anthropogenic noises are audible to caribou except for very low-frequency sounds (Flydal et al. 2001).

The 2020 Noise Monitoring Study focuses on Project-related activities causing anthropogenic noise, including camp operations (e.g., vehicles, power generation), aircraft flights, mining, blasting, crushing, and transportation. As described hereafter, the study used passive automated recording units (ARUs — SongMeter SM4, used in 2019 for bird surveys and AudioMoth units — open-source acoustic monitoring devices) to collect samples of full-spectrum sound recordings used to characterize the source and intensity of impulsive sound events and measure continuous sound exposure. The primary objectives of the study were to:

- Determine the utility and effectiveness of wildlife ARUs and AudioMoth units for monitoring Project-related sound,
- Record and characterize the noise produced by the Project near its main areas of activity (Mine Site, Tote Road, and Milne Port),
- Assess how sound varies between sites and with distance from the Potential Development Area (PDA); and
- Determine compliance with the 40 dBA threshold at a distance of 1.5 km from the PDA (Section 3.4, *Air Quality and Noise Abatement Management Plan*, Baffinland Iron Mine Corporation 2021).

5.1 METHODS

5.1.1 FIELD DEPLOYMENT

As summarized in Table 5-2 and shown on Map 5-1, a total of nine noise monitoring stations were established along three transects at the Mine Site, along the Tote Road, and Milne Port. Along each of the three transects, noise monitoring stations were installed at three distances: Near (200 m from current Project infrastructure), Far (1.5 km from the edge of the mapped PDA), and Reference (≥3 km from the edge of the mapped PDA). Near sites were selected to capture a representative sample of noise near Project activities. The 1.5 km distance for Far sites was selected based on the Early Revenue Phase noise modelling (Baffinland Iron Mines Corporation 2013b) that predicted slightly elevated noise levels at this distance. The ≥3 km Reference distance was selected based on the same noise modelling that predicted no detectable Project-related noise at this distance.

To the extent possible, noise monitoring transects were sited on generally level terrain in open (i.e., unobstructed) areas to minimize noise interference caused by landscape features. The noise monitoring stations were installed in areas having a clear line of sight to Project infrastructure, away from non-target noise sources (e.g., watercourses).

Noise monitoring stations comprised one Audiomoth and SM4 ARUs mounted approximately 1 m above the ground (Photo 5-1). Before installation, all noise monitoring units were calibrated using a 94 dB tone. Each unit's microphone was pointed towards the Project to maximize noise capture from the Project. The SongMeters were programmed to record using only the right-hand microphone to maintain comparability with Audiomoth units with a single microphone.

Table 5-3 outlines the recording parameters used for noise monitoring during each sampling period. The units were programmed to record all environmental noise for 15 minutes at the top of each hour in June and 10 minutes at the top of each hour in July. The recording period was decreased in July to increase the total sampling period duration. Noise monitoring units recorded at a sampling rate of 96,000 Hz to cover the hearing range of caribou (approximately 70 Hz to 38,000 Hz) (Flydal et al. 2001).

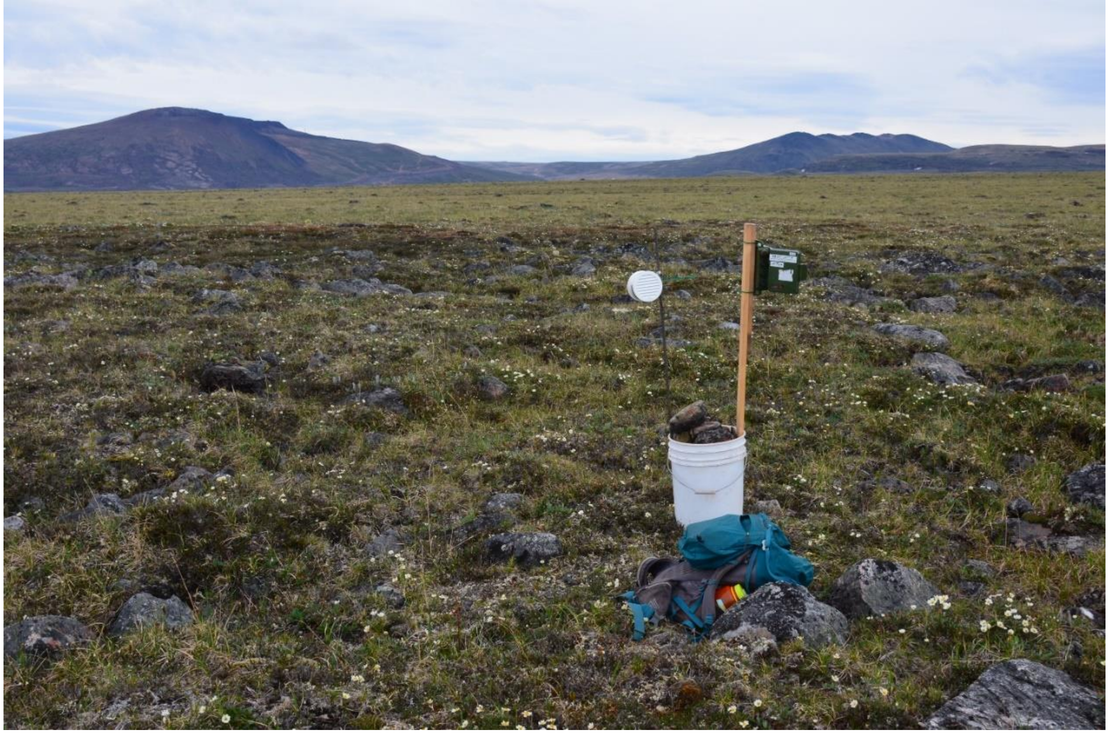


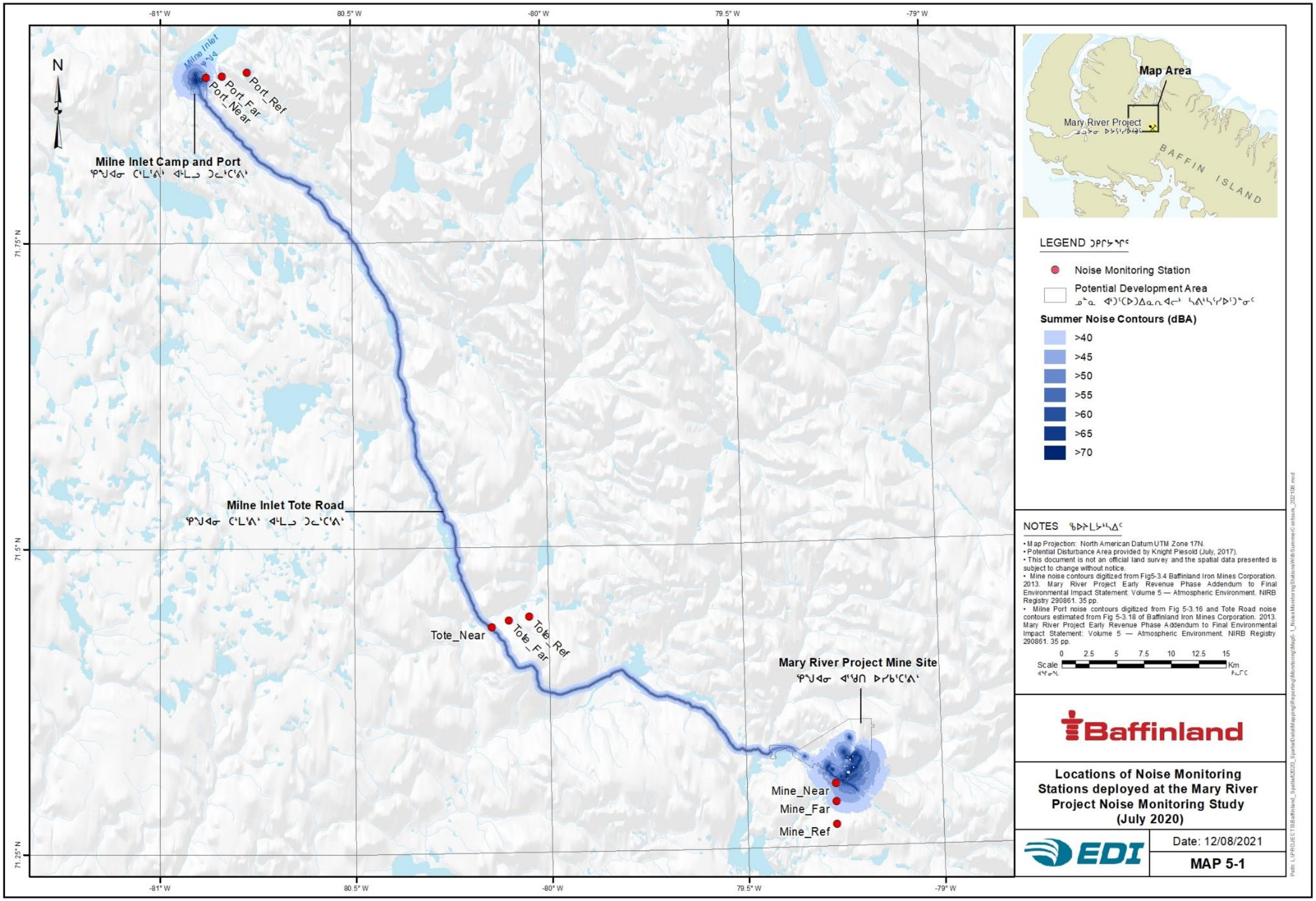
Photo 5-1. Typical Noise Monitoring Study Station at the Mary River Project, July 2020.

Table 5-2. Noise Monitoring Study station distance to the Mary River Project PDA for the 2020.

Site	Station	Distance to PDA (metres)
Mine Site	Near	0
	Far	1,503
	Reference	3,556
Tote Road	Near	41
	Far	1,515
	Reference	3,188
Milne Port	Near	0
	Far	1,401
	Reference	3,660

Table 5-3. Recording parameters used for the Noise Monitoring Study at the Mary River Project, 2020.

Sampling Period	Sampling Duration (full recording days only)	Recording Duration	Sampling Rate (kHz)
June 5 to June 8, 2020	4 days	15 minutes every hour	96,000
July 17 to July 26, 2020	10 days	10 minutes every hour	96,000



NOTES

- Map Projection: North American Datum UTM Zone 17N.
- Potential Disturbance Area provided by Knight Piesold (July, 2017).
- This document is not an official land survey and the spatial data presented is subject to change without notice.
- Mine noise contours digitized from Fig5-3.4 Baffinland Iron Mines Corporation. 2013. Mary River Project Early Revenue Phase Addendum to Final Environmental Impact Statement: Volume 5 — Atmospheric Environment. NIRB Registry 290861. 35 pp.
- Milne Port noise contours digitized from Fig 5-3.16 and Tote Road noise contours estimated from Fig 5-3.18 of Baffinland Iron Mines Corporation. 2013. Mary River Project Early Revenue Phase Addendum to Final Environmental Impact Statement: Volume 5 — Atmospheric Environment. NIRB Registry 290861. 35 pp.

Locations of Noise Monitoring Stations deployed at the Mary River Project Noise Monitoring Study (July 2020)

5.1.2 ANALYSIS

The sound analysis was performed using Kaleidoscope Pro version 5.4.1 (Wildlife Acoustics Inc. 2015). Statistical analysis was performed using R version 3.6.3 (R Development Core Team 2020). Audio recordings and spectrograms were reviewed to classify the sound source for all impulsive sound events. Noise events were grouped into three broad categories:

- Geophony — naturally occurring, non-biological sounds (e.g., wind and rain)
- Biophony — sounds emitted by non-human organisms (e.g., birds and insects)
- Anthrophony — sounds emitted from human-made sources (e.g., vehicles, machinery, and aircraft)

5.1.2.1 Comparison of Automated Recordings Units

The performance of Audiomoth and SM4 ARUs was compared both qualitatively and quantitatively. Spearman's correlation coefficients were used to measure how consistently paired ARUs measured A-weighted equivalent continuous sound level (L_{eq}) at each site. L_{eq} is the constant noise level that would produce the same total energy over a given period, accounting for variation in sound levels over the recording period and is measured in dBA. Scatterplots of L_{eq} measurements within each recording period from the paired devices were used to identify any systematic differences in the measurements of the Audiomoth and SM4 units. Paired spectrograms were reviewed to determine the cause of differences between recording devices.

5.1.2.2 Impulsive Sound Events

Impulsive sounds are short-term sound events that are significantly louder than average sound levels. This analysis defined impulsive sound events as any sound with a maximum 1-second duration at least 6 dBA above the mean sound level. The start and end of impulsive events were defined as the continuous period when dBA was at least 3 dBA above the mean sound level in each recording. Impulsive sound events were measured for each 1-minute (1-min) interval within all recordings. The intensity of impulsive sound events was measured as cumulative sound exposure level (SEL) and peak sound. The SEL is the total sound energy of a noise event if the entire noise event occurred within one second (Pater et al. 2009). This allows for a comparison between noise events with different durations and sources. Peak sound is the maximum dBA recorded within the 1-min recording interval that the sound event occurred.

The distribution of SEL and peak sound measurements was compared across sites and distance classes for the three main anthropogenic sound sources: vehicles, machinery, and aircraft. The 10th, 50th, and 90th percentile of SEL and peak sounds were reported for each sound source and monitoring station. The intensity of sound from an impulsive event can vary depending on the sound source, distance to the recording unit, environmental conditions, and topography. The 10th, 50th, and 90th percentiles are reported to show the distribution of sound levels associated with different sources as measured at each station.

5.1.2.3 Continuous Sound Events

A-weighted equivalent continuous sound level (L_{eq}) measurements were used to quantify continuous ambient sounds. L_{eq} was calculated for each recording over a 15-min (June) or 10-min (July) period. Density plots were used to compare the complete distribution of average sound levels across all monitoring sites. The 50th percentile of L_{eq} measurements was used to report 'typical' sound levels at each monitoring site. The 10th of L_{eq} measurements were used to report background sound levels at each site; this represents the quietest 10% of all recordings. The 90th percentile Leq measurement was used to report peak sound levels for each site; this represents the loudest 10% of al recordings. The Project's *Air Quality and Noise Abatement Management Plan* follows ERCB Directive 038 (Alberta Energy Regulator 2007), with an established limit of 40 dBA at 1.5 km from the PDA (with some exceptions, Sec. 3.4, Baffinland Iron Mine Corporation 2021). Therefore, the proportion of sampling periods with a noise level higher than 40 dBA are also reported.

The region experiences consistent wind, which significantly affects sound level measurements. Wind can be louder than sound generated by Project activities, thus masking anthropogenic sounds. All recordings were classified as calm or windy in a two-stage process to account for the effects of wind and rain on sound level measurements. First, recordings with any impulsive sound events due to geophony were classified as 'windy,' while recordings with only impulsive sound events from biophony or anthrophony were classified as 'calm.' Second, spectrograms of the remaining recordings were reviewed manually and classified as windy if a sound signature of wind was present in more than 25% of the recording. Density plots and summary statistics are presented for all recordings (including windy periods) and a subset of recordings during calm periods.

5.2 RESULTS AND DISCUSSION

5.2.1 COMPARISON OF AUTOMATED RECORDING UNITS

Sound level measurements from paired units were highly correlated. The mean Spearman's correlation coefficient across sites was 0.89 (range: 0.79–0.97), meaning that both units recorded consistent trends in the acoustic environment. However, the relationship between the different units' measurements was not linear over the full range of sound levels (Figure 5-1). Under quiet sound conditions, the Audiomoth units tend to overestimate sound levels. In windy conditions, the SM4 units overestimate sound levels. The SM4 units had a lower noise floor, meaning they could measure lower sound levels under quieter conditions than the Audiomoth units. The lowest dBA recorded on SM4 units was 28.1 dBA compared to 35.7 dBA on the Audiomoth units. However, the SM4 ARUs have an external microphone, which experienced more interference from wind than the Audiomoth units, which have an internal microphone.

Wind interference was picked up as a low-frequency rumble, which could be heard in recordings and viewed in spectrograms of the SM4 recordings (Figure 5-2). This interference occurred with all the SM4 units and was not present in simultaneous recordings of Audiomoth units. Wind interference on the SM4 recordings was associated with elevated L_{eq} measurements, fewer detections of impulsive sound events, and difficulty in classifying sound sources from recordings and spectrograms. Because of the higher level of wind-related interference on SM4 recordings, only the Audiomoth data were used in the following analysis.

Neither of the ARU models recorded sound levels as low as those found in baseline conditions on calm days (25 to 30 dBA using Larson-Davis Model 812 and 820 precision integrating sound level meters, RWDI AIR Inc. 2008). This may be due to one or all of the following:

1. Background noise conditions are, indeed, noisier than in 2008.
2. The equipment used in this study are not sensitive enough to take measurements as low as the sound level meters used in the baseline study.
3. The current study included measurements made under 'normal weather conditions', including interference from wind and rain, unlike the 'absolute calm conditions' obtained during the baseline study

Further investigation would be required to address these aspects of the study.

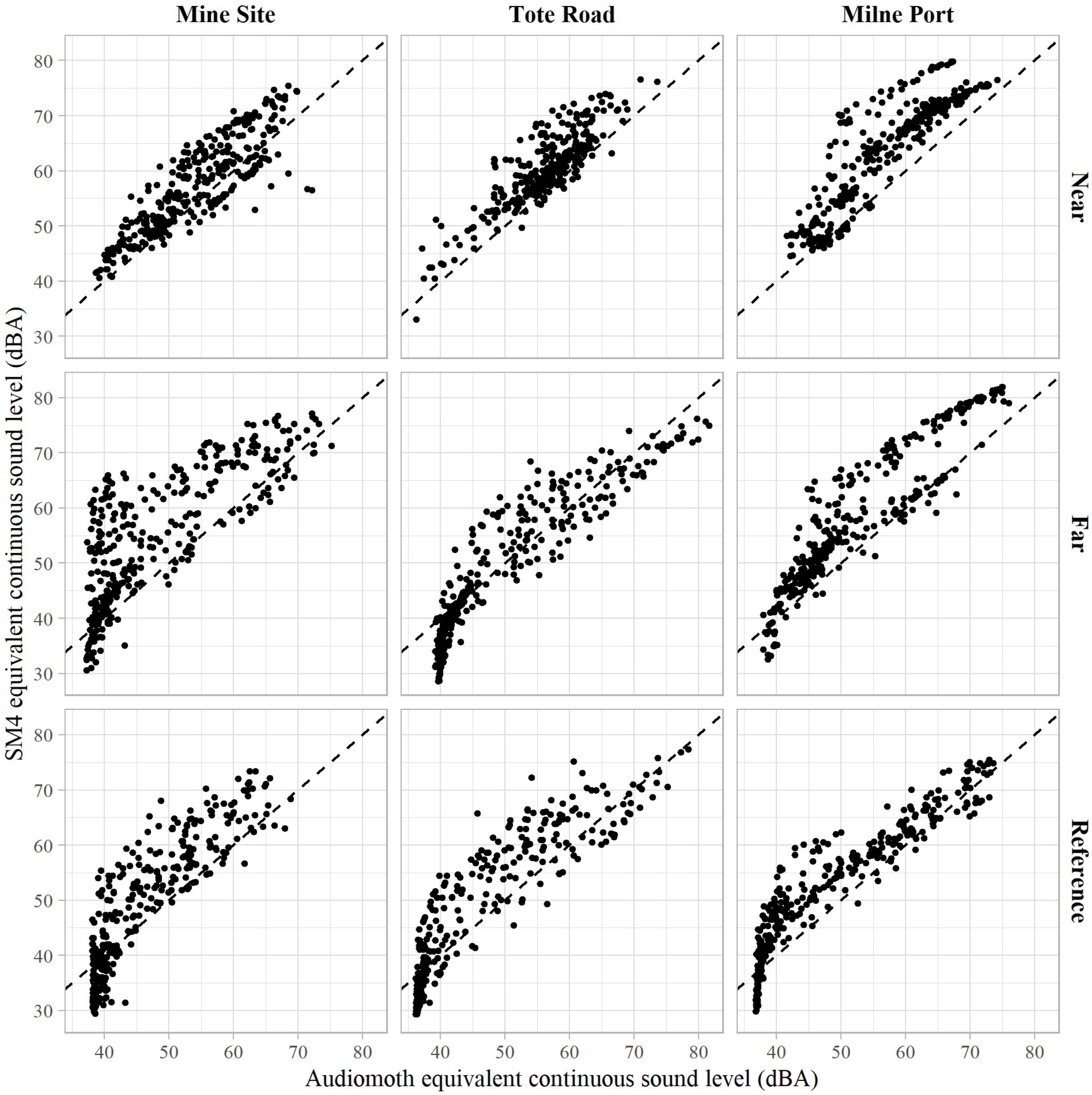


Figure 5-1. Scatterplots showing paired equivalent continuous sound level measurements made by Audiomoth and SM4 automated recording units at each monitoring site.

The dashed horizontal line shows 1:1 ratio between the two axes.

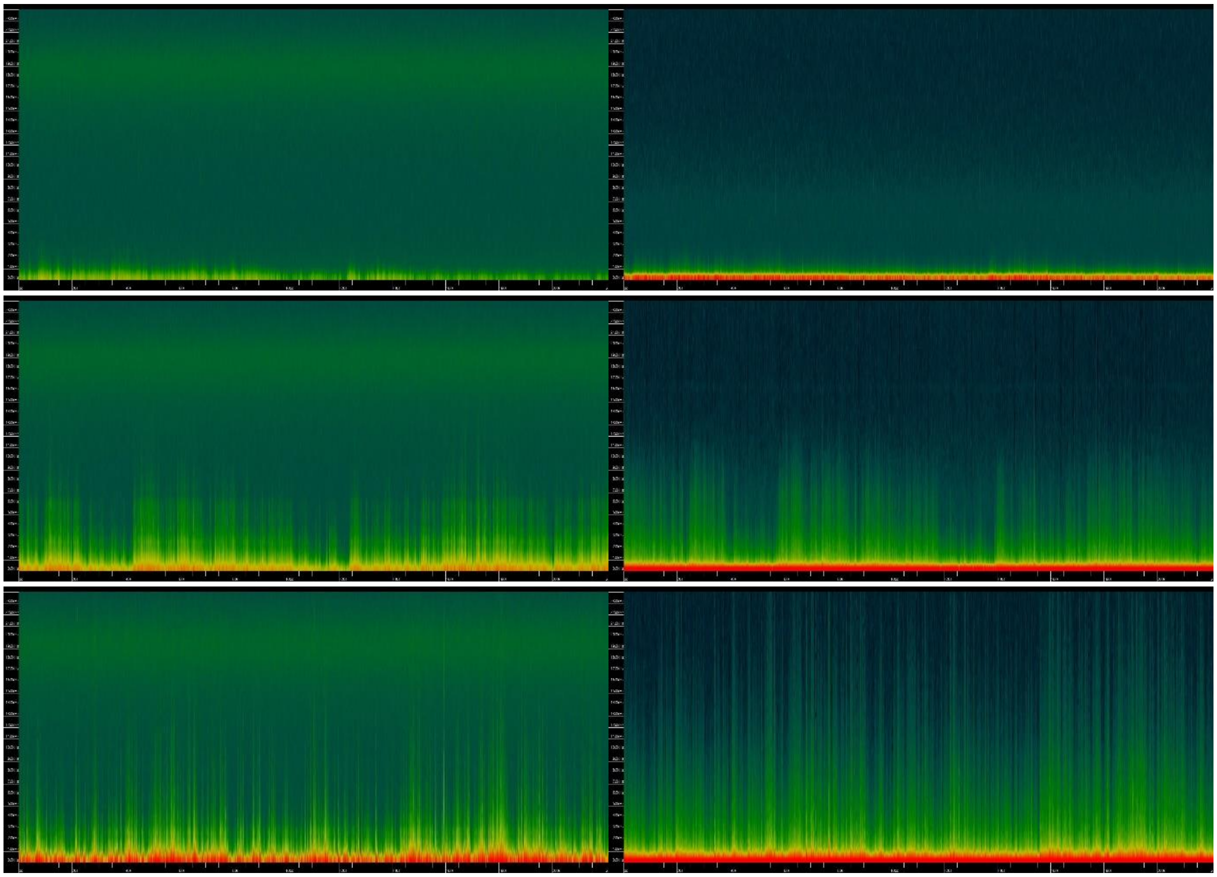


Figure 5-2. Paired spectrograms of recordings from Audiomoth (left) and SM4 (right) automated recording units. *Each panel is an example of a recording made during light (top), moderate (middle), or strong (bottom) wind conditions. The x-axis shows time (0-220 sec), and the y-axis shows frequency (0 – 23 kHz). Colours show the signal amplitude, with warmer colours corresponding to higher amplitudes that produce louder sounds. The SM4 units picked up more low-frequency interference from wind, which appears as spikes in amplitude in the lower frequency range.*

5.2.2 IMPULSIVE SOUND EVENTS

Most impulsive sound events resulted from geophony (Figure 5-3) — referring to naturally occurring sound produced by habitat, excluding living organisms — specifically noise from wind or rain. The monitoring station near the Tote Road had the highest rate of anthrophony (26.8%) among all monitoring sites, with more than five times as many noise events from human activity as the monitoring station near the Mine Site (4.2%) or near Milne Port (4.3%). The proportion of sampling periods with noise events from anthrophony declined with distance from the Project for all Project areas. At all Far monitoring sites, noise events from anthrophony occurred less than 3% of the time. At all Reference monitoring sites, noise events from anthrophony occurred less than 0.3% of the time.

The primary detectable impulsive sound events recorded were traffic noises at the Tote Road stations. Because vehicle passages were discrete and consistent, they could be distinguished from background noise. Impulsive noise events may have been more difficult to distinguish at the Mine Site and Milne Port due to the consistent and dispersed noise sources. This creates a noise environment of a more constant, lower-level sound at the

Mine Site and Milne Port compared to the Tote Road, which is characterized by more impulsive and discontinuous sound events.

Anthropogenic noise events were classified into three primary noise sources: aircraft, machinery, and vehicles. Vehicles were the most frequent (Figure 5-4) and highest intensity (Figure 5-5) noise source for the Near Tote Road station (Table 5-4). Machinery was the most frequent noise source for stations near Mine Site and Milne Port, but aircraft generated the most intense noise events at these stations. The number of noise events associated with vehicles and machinery declined with distance from the Project. Noise exposure relating to aircraft was highest near the Mine Site (as expected, since the airstrip is located at the Mine Site) and declined with distance. No consistent relationship occurred for aircraft noise and distance from the Tote Road or Milne Port; aircraft sound events were infrequent but at all distance categories. Consistent with predictions in baseline noise models, noise events from machinery and vehicles were rarely detected at Far monitoring stations and almost never at Reference stations.

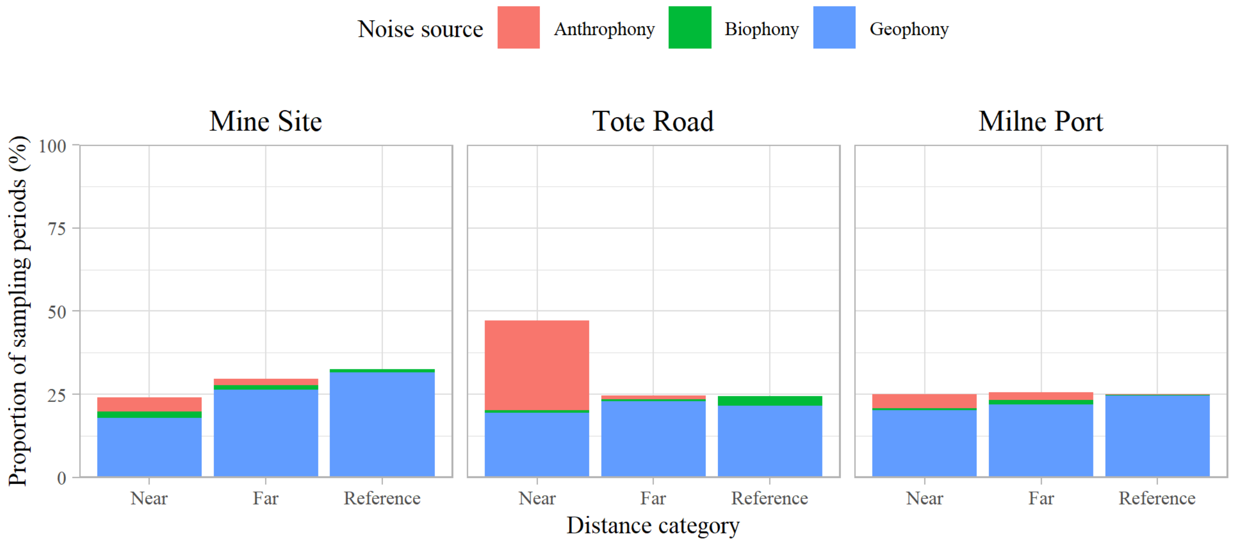


Figure 5-3. Barplot showing the proportion of 1-minute sampling periods with impulsive noise events due to anthrophony (vehicles, machinery, and aircraft), biophony (birds and insects), and geophony (wind and rain).

Based on 3,840 minutes of monitoring at each site.

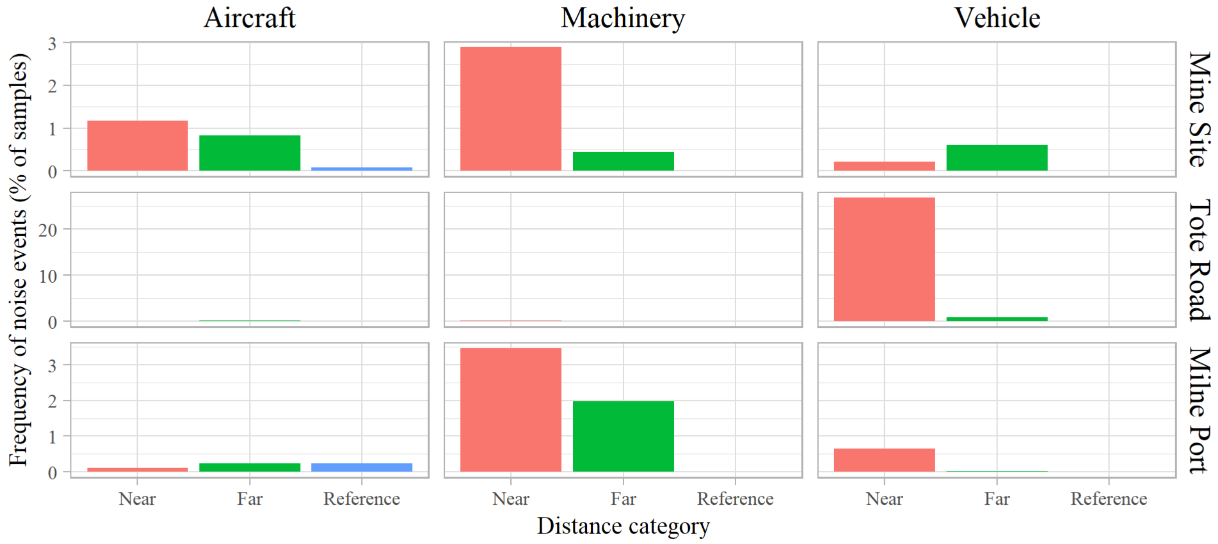


Figure 5-4. Barplots showing the frequency of noise events from aircraft, machinery, and vehicles by Project Area and distance from the Project. Different y-axis values are used for each row of plots.

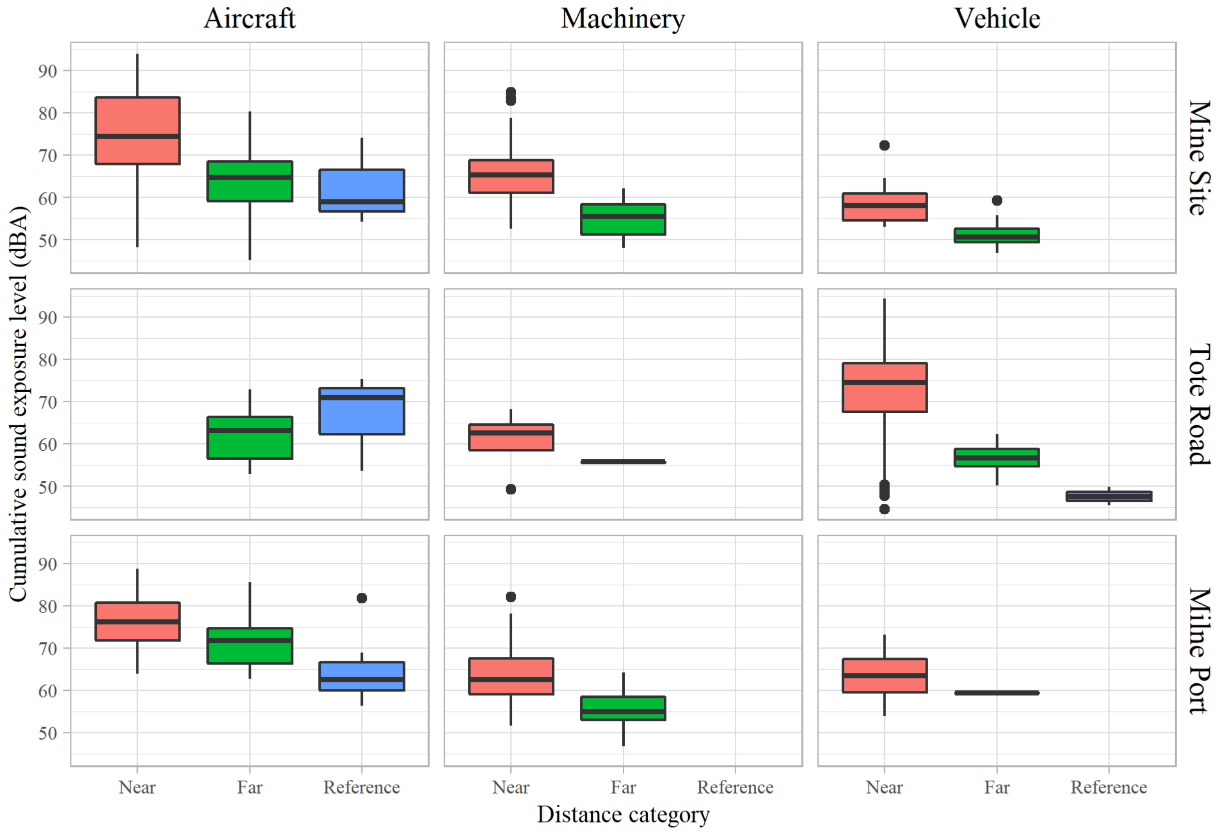


Figure 5-5. Boxplots showing the cumulative sound exposure level (SEL) of noise events from aircraft, machinery, and vehicles by Project Area and distance from the Project.

Table 5-4. Frequency and intensity of anthropogenic noise events by noise source, Project area, and distance category.

Sound Source	Project Area	Distance	Frequency (%)	SEL (dBA)			Peak (dBA)		
				10th	50th	90th	10th	50th	90th
Aircraft	Mine Site	Near	1.17	59.4	74.4	87.1	54.3	67.0	79.0
		Far	0.83	52.1	64.8	74.2	50.1	60.2	65.9
		Reference	0.08	55.2	59.0	71.0	51.1	53.3	68.2
	Tote Road	Near	0.00	-	-	-	-	-	-
		Far	0.16	53.8	63.1	70.0	51.4	57.7	65.2
		Reference	0.08	57.1	70.9	74.4	51.1	63.5	67.5
	Milne Port	Near	0.10	67.0	76.2	85.5	63.6	70.9	78.5
		Far	0.23	63.3	71.8	79.7	58.3	68.4	73.8
		Reference	0.23	57.3	62.5	71.5	53.0	55.8	64.1
Machinery	Mine Site	Near	2.89	57.8	65.3	75.4	54.3	60.4	69.4
		Far	0.44	49.2	55.5	59.7	46.2	49.3	54.5
		Reference	0.00	-	-	-	-	-	-
	Tote Road	Near	0.10	53.0	62.5	66.7	50.6	58.1	62.5
		Far	0.05	55.6	55.7	55.8	50.9	51.5	52.1
		Reference	0.00	-	-	-	-	-	-
	Milne Port	Near	3.46	55.7	62.5	71.5	52.4	58.1	67.6
		Far	1.98	50.4	55.0	60.4	47.0	51.3	55.4
		Reference	0.00	-	-	-	-	-	-
Vehicle	Mine Site	Near	0.21	53.0	58.0	66.9	50.2	56.1	66.6
		Far	0.60	48.5	50.6	54.3	46.2	47.5	51.9
		Reference	0.00	-	-	-	-	-	-
	Tote Road	Near	26.74	59.6	74.5	81.8	54.0	67.8	74.4
		Far	0.91	52.1	56.7	61.0	48.8	51.9	55.8
		Reference	0.05	45.8	47.6	49.4	45.8	47.2	48.6
	Milne Port	Near	0.65	56.9	63.5	70.9	53.9	58.5	64.1
		Far	0.03	59.4	59.4	59.4	57.4	57.4	57.4
		Reference	0.00	-	-	-	-	-	-

Note: Frequency represents the percent of 1-minute sampling periods with a noise event related to each source. The table summarizes the 10th, 50th, and 90th percentile of cumulative sound exposure level (SEL) and maximum (peak) noise measurements for all sound events, based on 3,840 minutes of monitoring at each site.

5.2.3 CONTINUOUS SOUND EVENTS

5.2.3.1 Wind

Wind was a constant noise source — all monitoring sites experienced windy conditions during more than half of the recordings (Table 5-5). Windy conditions were most prevalent at Milne Port. Typical noise levels ranged from 0.7 dBA to 9.3 dBA louder during windy periods than calm periods. Peak noise levels were up to 14 dBA louder at Near sites on windy days than calm days, and generally between 20 dBA and 25 dBA louder at Far and Reference sites. This means that wind is likely masking at least some Project-related noise and is a consistent noise interference source on the north Baffin Island landscape. This is further supported by the different density distribution figures and higher variability for all recording periods versus the subset of recording periods for which windy periods were filtered out (Figure 5-6 and Figure 5-7). The following noise monitoring results are reported for calm conditions only.

Table 5-5. Summary of A-weighted continuous sound pressure level (Leq) for each monitoring site, including all 15-minute (June) samples recorded at 1-hour intervals between June 5th and June 8th, 2020, and 10-minute (July) samples recorded at 1-hour intervals between July 17 and July 27, 2020.

Project Area	Distance	All Recordings (L_{eq})				Calm Recordings (n)	Calm Recordings (%)	Calm Recordings (L_{eq})			
		Background 10th	Typical 50th	Peak 90th	>40 dBA (%)			Background 10th	Typical 50th	Peak 90th	>40 dBA (%)
Mine Site	Near	43.0	54.3	64.6	98.5	146	43.5	41.2	49.5	62.7	97.3
	Far	38.3	43.5	65.3	73.2	152	45.2	37.8	39.6	43.1	43.4
	Reference	38.3	42.0	58.8	62.5	135	40.2	38.2	38.6	40.8	17.8
Tote Road	Near	48.5	57.3	62.8	97.9	160	47.6	48.4	56.6	61.6	97.5
	Far	39.9	44.1	67.1	84.5	147	43.8	39.7	40.4	43.6	65.3
	Reference	36.3	40.1	63.0	50.0	143	42.6	36.2	36.5	38.1	6.3
Milne Port	Near	45.8	57.5	67.3	100.0	111	33.0	43.8	48.2	53.8	100
	Far	41.0	48.4	68.6	93.2	134	39.9	39.6	44.3	48.2	85.8
	Reference	37.1	45.2	65.6	64.0	104	30.9	36.9	37.5	40.1	11.5

Note: Results are presented for all recordings and for recordings made under calm weather conditions. The 10th, 50th and 90th percentile are used to indicate, respectively, the background, typical, and peak continuous sound pressure level that was recorded at each monitoring site. The percentage of recordings with >40 Leq is reported for comparison to the operational noise threshold, 1.5 km from the PDA. The sample size for all monitoring sites was n = 336.

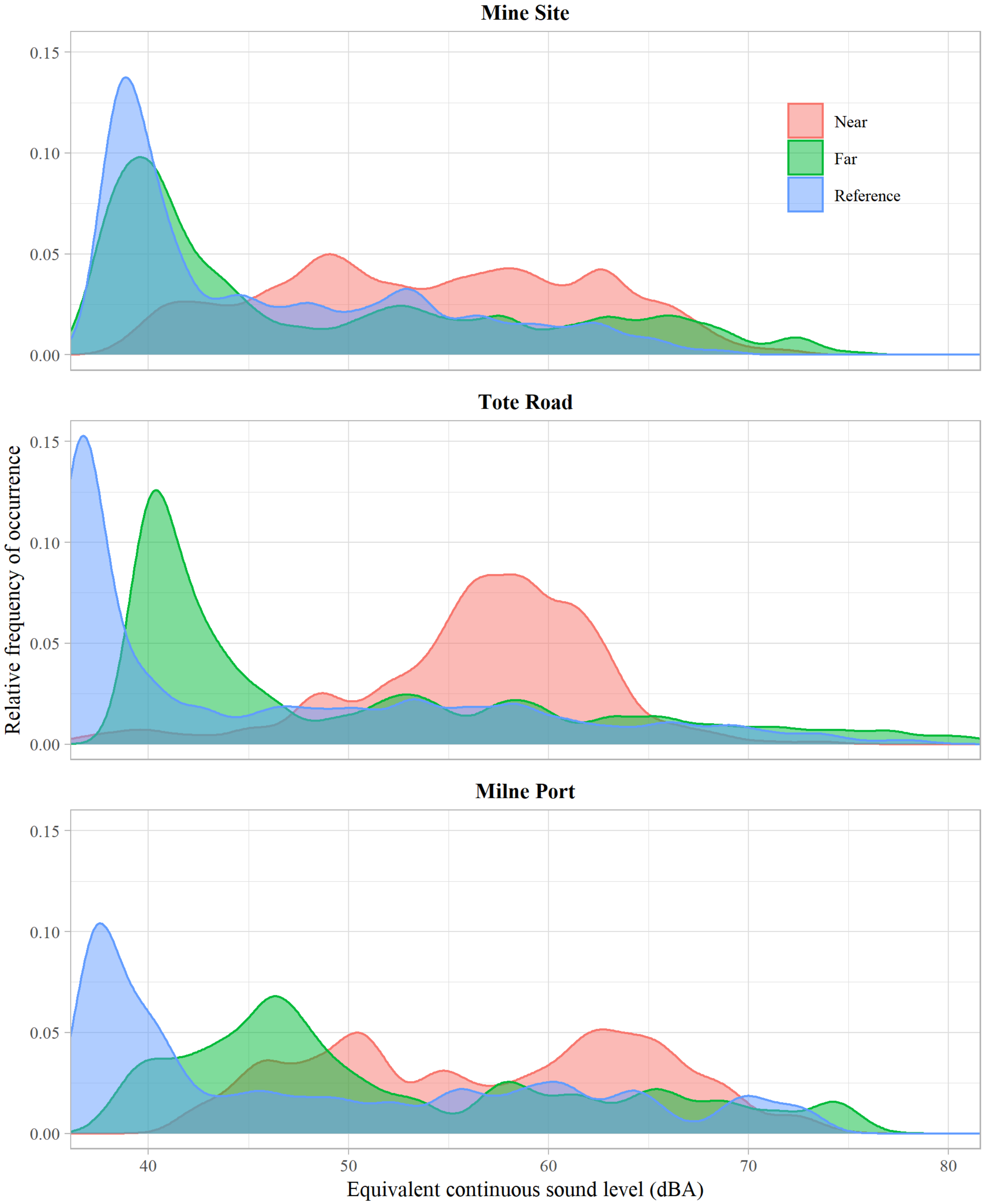


Figure 5-6. Density plots showing the relative frequency of occurrence of continuous sound levels (L_{eq}) for each distance category within each Project area for all recordings (n = 338 per site), including windy periods. *Values on the y-axis can be interpreted as relative probabilities; for example, a height of 0.2 means that L_{eq} measurement occurred twice as often as a L_{eq} with a height of 0.1.*

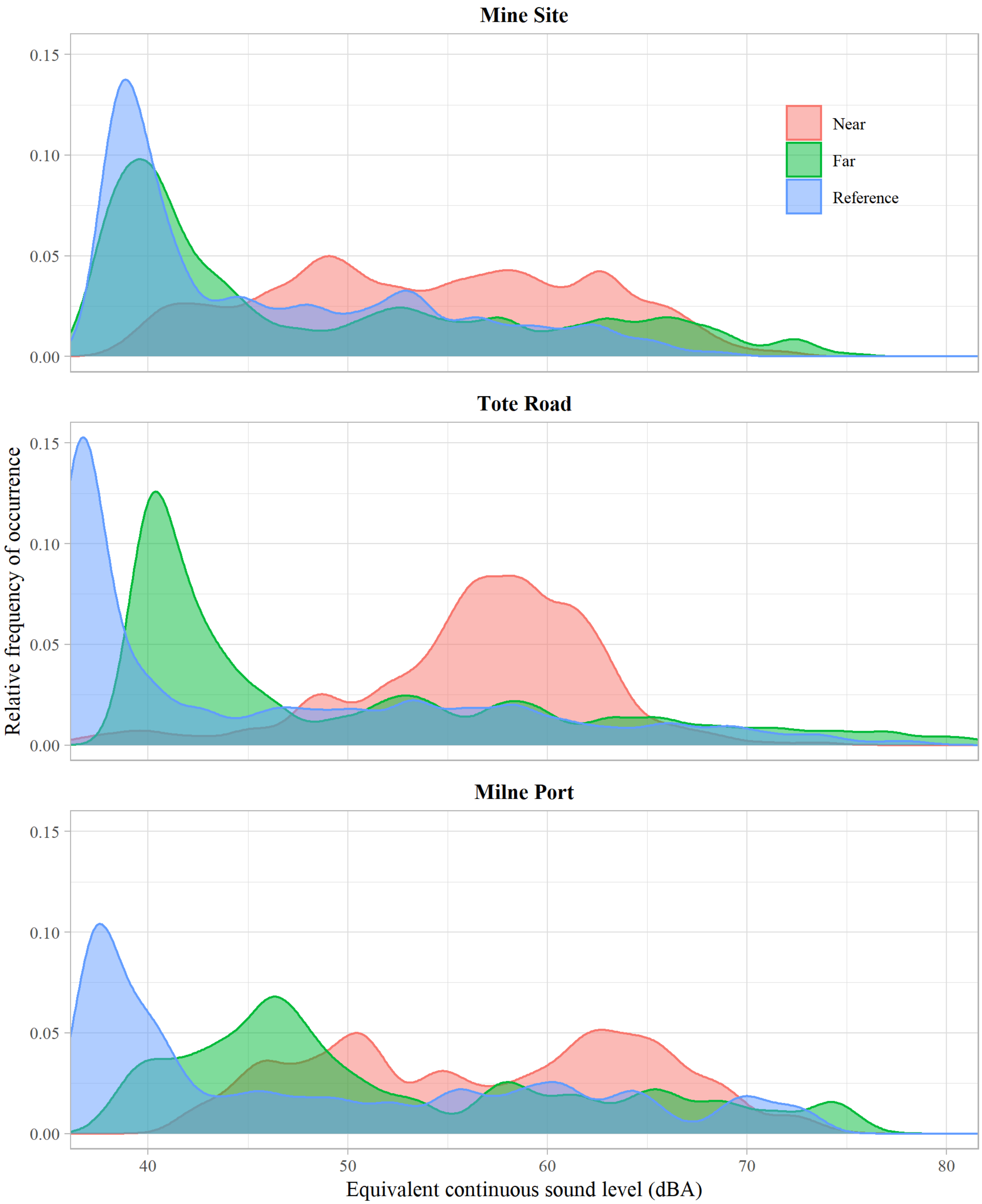


Figure 5-7. Density plots showing the relative frequency of continuous sound levels (L_{eq}) for each distance category within each Project area for recordings made in calm weather (i.e., without wind or rain).

Values on the y-axis can be interpreted as relative probabilities. For example, a height of 0.2 means that L_{eq} measurement occurred twice as often as a L_{eq} with a height of 0.1. See Table 5-3 for sample sizes at each monitoring site.

5.2.3.2 Noise Environment Characterization

Mine Site — Stations experienced calm conditions during 40.2 to 45.2% of sampling periods. Under these conditions, the Near monitoring station's typical sound levels were elevated relative to the Far and Reference sites with typical sound levels of 49.5 dBA and peak sound levels of 62.7 dBA. There was significant overlap in the sound levels measured at the Far and Reference sites (Figure 5-7); background and typical sound levels were both within 1 dBA for the far and reference sites (Table 5-5). Peak sound levels at the Far station were 2.3 dBA higher than at the Reference station. Typical sound levels decreased by 9.9 dBA from the Near station to the Far station and by 1.0 dBA from the Far to the Reference station.

Tote Road — Stations experienced calm conditions during 42.6 to 47.6% of sampling periods. Under these conditions, the Near monitoring station had the highest typical sound levels (56.6 dBA) among all the monitoring stations and peak sound levels (61.6 dBA), comparable to the Mine Site. Sound levels at the Far Station were much lower than the Near Station (Figure 5-7); background, typical, and peak sound levels were all elevated at the Far Station was still elevated relative to the Reference Station by 3.5-5.5 dBA (Table 5-5).-Typical sound levels decreased by 16.2 dBA from the Near station to the Far station and by 3.9 dBA from the Far station to the Reference station. A slight difference was found in median sound levels between all recordings (57.3 dBA) and calm recordings (56.6 dBA) at the Near station because the wind did not mask passing vehicles at this site. At the Far and Reference stations, including windy recordings increased typical sound levels by 3.7 dBA and 3.6 dBA, respectively.

Milne Port — Stations experienced calm conditions less often than the other Project Areas (i.e., 30.9 to 39.9% of sampling periods). The Near monitoring station had similar typical sound levels (48.2 dBA, calm) as the Mine Site; however, peak sound levels (53.8 dBA, calm) were lower than Near stations at the other Project areas. Sound levels at the Far Station were much lower than the Near Station (Figure 5-7). Compared to the other Project areas, the Port had the greatest difference in background, typical, and peak sound levels between the Far Station and the Reference Station (Table 5-5). Typical and peak sound levels at the Far station were higher than the other Project areas (44.3 and 48.2 dBA, respectively). Typical and peak sound levels at the Reference station were like other Project areas (37.5 and 40.1 dBA, respectively). Typical sound levels decreased by only 3.9 dBA from the Near station to the Far station and by 6.8 dBA from the Far station to the Reference station.

Background sound levels are the L_{eq} of quietest 10% of all recordings made under calm conditions. Background sound levels were similar for the Mine Site and Milne Port Near stations, ranging from 41.2 to 43.8 dBA, while the background sound level at the Tote Road Near station was higher at 48.4 dBA. Background sound level was similar at all Far and Reference sites, ranging from 36.2 to 39.7 dBA.

Typical sound levels are the median L_{eq} of all recordings made under calm conditions. Typical sound levels at Near stations exceeded 40 dBA in all Project areas, as expected from such proximity to Project activities. Among monitoring stations in the Near category, typical sound levels were greatest at the Tote Road (56.6 dBA) and similar at Mine Site (49.5 dBA) and Milne Port (48.2 dBA, Table 5-5). This is likely due to the proximity and frequent traffic noise source at the Tote Road, whereas noise at the Mine Site and Milne Port may be more dispersed and dissipated more among the noise sources.

Peak sound levels are the L_{eq} of loudest 10% of all recordings made under calm conditions. Peak sound levels recorded during the study were highest at the Mine Site Near station (62.7 dBA), followed by the Tote Road Near station (61.6 dBA) and the Milne Port Near station (53.8 dBA). Peak noise dissipated to below 49 dBA at all Far stations and below 41 dBA at all Reference stations. Peak and maximum noise levels were likely caused by Project-related activities and not wind since these were elevated the most in Near and Far stations, but not at the Reference stations. The range between Peak and Background noise levels was also much more pronounced at Near stations (average of 15 dB difference) than the Far and Reference stations (average of 6 dBA and 1 dBA difference, respectively). This difference further suggests that the elevated noise recorded was produced by Project activities.

5.2.3.3 Noise Dissipation

Project-related noise dissipated differently between Project areas. Typical noise levels dissipated between Near and Far stations the least at Milne Port (3.9 dBA), moderately at Mine Site (9.9 dBA), and the most at Tote Road (16.2 dBA). Dissipation between Far and Reference sites were much lower, ranging from 1.0 dBA dissipation at Mine Site to 6.8 dBA at Milne Port. This indicates that Project-related noise dissipates quickly from the PDA at the Mine Site and Tote Road but potentially carries farther at Milne Port. As Milne Port had the quietest Near station, the comparatively high SPLs at the Far station may be due to local terrain acting to amplify noise or alternative noise sources detected at the Far station (e.g., ships at the Port, wildlife, land users). These results matched the original baseline prediction that Project-related noise would be audible at 1.5 km from the PDA but approaching background levels. As predicted in baseline noise modelling, typical ambient noise had dissipated to within 1 dBA of background levels by 3 km (Reference) from the PDA for all Project areas.

5.2.3.4 Noise Density Distribution

After filtering out windy periods, differences were apparent in the density distribution of noise recordings between the Project areas and distance classes (Figure 5-6 and Figure 5-7). Reference noise was slightly higher at the Mine Site than at the Tote Road and at Milne Port. Noise recorded Near the Project areas was generally quieter at Milne Port than the other two Project areas (typically under 52 dBA). Noise recorded both near and far from the PDA was consistent at the Tote Road (i.e., generally within the same range of dBA), likely because the primary noise source was traffic, which produces a similar sound with each passing vehicle. Noise recorded Near the PDA was most variable (i.e., a wider range of dBA) and generally reached louder levels at the Mine Site. Still, noise recorded Far from the Mine Site was relatively consistent and moderately variable. The variable noises at the Mine Site may have been due to the variety of operational activities occurring in the area, such as blasting, traffic, crushing, and flights. The noise was variable both Near and Far from Milne Port, and generally quieter at Near stations but louder at Far stations than other Project areas. This may be due to various activities occurring at Milne Port, shipping noise being picked up at the Far site, terrain conditions affecting noise dissipation or other environmental factors. As expected, Reference noise density distribution was consistent for all Project areas.

5.2.3.5 Comparison to Baseline

The project's baseline noise assessment was conducted in 2007 by RWDI (RWDI AIR Inc. 2008). Before construction, noise monitoring stations were set up near the Mine Site and Milne Port to record the ambient noise environment. During the baseline assessment, anthropogenic noises were minimal — limited to exploration activities or the occasional passage of land users at Milne Port or presence at the future mine site. Using Equivalent Continuous Sound Pressure Level (L_{eq}), baseline noise levels near the Mine Site ranged from 20 to 34 dBA during the sampling period, with a 24 hour mean of 25 dBA, while baseline noise levels at Milne Port ranged from 21 to 35 dBA, with a 24 hour mean of 30 dBA. The baseline study used weather station data to filter out windy days and timed the sampling period outside most exploration activities.

Baseline noise modelling predicted that Project-related noise would be audible to a maximum of 40 dBA at 1.5 km from the PDA and not be audible at 3 km from the PDA (Baffinland Iron Mines Corporation 2013b). These predictions were incorporated into the operational noise threshold of 40 dBA at 3 km from the PDA outlined in the Project's Air Quality and Noise Abatement Management Plan (AQNAMP, Baffinland Iron Mine Corporation 2020).

Consistent discrepancies were found between study data and baseline data. Reference L_{eq} obtained through the study are several dBA louder than baseline data for minimum, maximum, and typical values after removing windy periods. The baseline noise study also found that background noise was approximately 5 dB louder at Milne Port than at the Mine Site; this was not observed in the study (typical noise levels at the Reference sites were 1.1 dBA quieter at Milne Port than at the Mine Site). These discrepancies are likely due to the higher "noise floor" of Audimoth units as they could not record noise below 35 dBA. The minimum noise levels reported here are likely an overestimate of the actual sound environment.

Regarding noise predictions modelled in the ERP (Baffinland Iron Mines Corporation 2013b), typical noise levels were predicted to be below 40 dBA 1.5 km from the PDA (except for some areas at the Mine Site).The 40 dBA prediction was commonly exceeded at the Far stations for all Project areas (43.4% - Mine Site, 65.3% - Tote Road, 85.8% - Milne Port). It is probable that some exceedances are also associated with low levels of wind interference because this analysis included recordings where wind was detectable in <25% of the recording interval.

5.2.3.6 Wildlife Response

The Project generates continuous and impulsive anthropogenic noise loud enough to elicit a wildlife response (i.e., continuous peak sound or impulsive sound events above 55 dBA). The Tote Road Near station had typical continuous sound SPLs above 55 dBA, and both the Tote Road and Mine Site Near stations had peak continuous sound SPLs above 55 dBA. However, over 90% of continuous sound at 1.5 km from the PDA was below 55 dB in all Project Areas, which generally would not cause a wildlife response.

Impulsive anthropogenic sound events above 55 dBA were detected at all distance categories and all Project areas but as expected, were more frequent and intense at Near stations. Although impulsive aircraft sounds (*i.e.*, airplanes, helicopters) were consistently above 55 dBA in all distance categories, these sound events were rare, especially away from the Mine Site. Excluding the Mine Site Near site, no single site exceeded 1% frequency of impulsive aircraft noise, and cumulative frequency of impulsive aircraft noise over these sites was still less than 2%. Thus, any disturbance to wildlife caused by aircraft noise would be infrequent and short in duration. Generally, impulsive machinery and vehicle sound events dissipated to the near threshold of wildlife response (i.e., 55 dBA to 60 dBA) at 1.5 km distance from the PDA. These occurred less than 3% of the time. Although the Project generates impulsive anthropogenic sound events in all Project areas that are loud enough to elicit a wildlife response at 1.5 km from the PDA (i.e., above 55 dB), these loud noises are infrequent and unlikely to cause significant wildlife disturbance.

5.3 NOISE MONITORING SUMMARY

In summary, key finding from the Noise Monitoring Study in relation to objectives include:

- Deployment of ARUs at the Project and determination of utility and effectiveness for monitoring Project-related sound
    - Automated recording units effectively recorded the ambient noise environment with minimal time and resource investment for field deployment but a considerable investment for analysis.
    - Audiomoths were preferred to SM4s because they were less sensitive to wind interference. However, a 35 dBA “noise floor” in Audiomoth units likely overestimated the ambient noise environment when sound levels were below 35 dBA. Because of this limitation, sound level measurements from these devices are useful for comparing the relative acoustic environment among sites but are less effective at measuring absolute sound levels for comparison to ERP predictions.
- Recording and characterization of noise produced by the Project near its main areas of activity (Mine Site, Tote Road, and Milne Port); Assessment of how sound varies between sites and with distance from the PDA; and Determination of compliance with the 40 dBA threshold at 1.5 km from the PDA.
    - Wind was a major factor in recording quality; more than half of all recordings were affected by wind interference, which can mask Project-related noises.
    - Most impulsive sound events were from wind or rain. Anthropogenic sound events were detected at all Project areas and distance categories, and frequencies of types of anthropogenic sound events (machinery, aircraft, and vehicle) varied by Project area. Except for aircraft noise, anthropogenic sound events dissipated with distance from the PDA.
    - The typical continuous sound environment differed between Project areas. The continuous sound along the Tote Road was, on average, louder than at the Mine Site or Milne Port, though this may have been due to ARU location being closer to the road noise than were the mine and port site recorders rather than point source noise levels.
    - Continuous noise level density distribution differed between Project areas. The Mine Site had the widest distribution/variance of noises in the Near distance category. In contrast,

Milne Port had the widest distribution/variance in the Far distance category, and Tote Road had the most consistent noises.

- Noise level dissipation differed between Project areas. Noise dissipated between Near and Far stations the most at the Tote Road, and the least at Milne Port, and dissipated to within 1 dBA of background levels at Reference stations.
- Although the Project does generate noise loud enough to elicit wildlife response (i.e., above 55 dBA) close to the PDA, over 90% of the noise recordings at 1.5 km from the PDA were below this threshold, and anthropogenic noise events were detected less than 3% of the time at 1.5 km from the PDA.
- Project-related noise was audible at 1.5 km from the PDA but was generally not audible at 3 km from the PDA.
- Due to the infrequency of anthropogenic noise events and the noise dissipation away from the PDA, it is unlikely that Project-related noise will have any measurable effect on wildlife distribution or behavior at or beyond 1.5 km from the PDA.

6 HELICOPTER OVERFLIGHTS

The NIRB Project Certificate No. 005 Amendment 3 includes three Project Conditions to ensure that disturbance to birds and wildlife caused by aircraft is minimized whenever possible (Nunavut Impact Review Board 2020). The conditions are as follows:

- Project Condition #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…"*
- Project Condition #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 1,500 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."*
- Project Condition #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, in collaboration with the TEWG, 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).

To monitor compliance with these Project Conditions and Baffinland's commitment, data from helicopter flight logs were analyzed to determine adherence with the Project Conditions.

6.1 METHODS

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

- 1,100 metres above ground level (magl) while travelling through the key moulting area for Snow Geese during moulting season, July and August, or 1,500 m horizontal distance from the boundary;
- 650 magl during point-to-point travel in areas outside of the Snow Goose area during moulting season and all areas in all other months; and,

- 1,100 magl vertical and 1,500 m horizontal distance from observed concentrations of migratory birds at all times.

Canadian Helicopters provided flight tracklog data and daily pilot timesheets (with flight details) to provide context and explain the need for transits that did not adhere to flight height guidelines. Point data were provided in feet above sea level and converted to metres above sea level (masl). A Digital Elevation Model (DEM) 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 find the elevation above ground level in metres (i.e., magl) at each tracklog point, the masl from the DEM was subtracted from the masl from the helicopter tracklog.

To assure the calculated values were correct, a Quality Assurance/Quality Control procedure was completed on the data by querying the flight tracklog data's status field. It was assumed that when the helicopter status was "wheels off" or "wheels on", the elevation would be at or close to 0.0 magl. With a sample size of 6,535 points, the average elevation above ground level was 5.1 m. The standard deviation in 2020 indicated that accuracy was approximately ±26 m.

The flight tracklog points were joined with the pilot logs 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. The minimum flight height and flight time were calculated for each flight line segment.

Data were split into two categories: 1) data within the Snow Goose area during moulting season (July and August) in relation to 1,100 magl elevation requirement and 2) data outside the Snow Goose area during moulting season and in all areas in all other months in relation to 650 magl elevation requirement. The datasets were then analyzed separately to assess specific flight height allowances using the different areas and minimum flight height values. The first and last flight line segments of a flight as the helicopter takes off or lands were considered compliant, despite being below the elevation requirement. Flight data with rationale for flying at lower elevations than required was considered compliant with rationale. Based on these criteria, flight data were organized into the following six categories:

- data within the Snow Goose area in July and August, where the 1,100 magl elevation requirement was achieved (compliant);
- data within the Snow Goose area in July and August where the 1,100 magl elevation requirement was not achieved, but the rationale for low-level flying was given (compliant with rationale);
- data within the Snow Goose area in July and August where the 1,100 magl elevation requirement was not achieved and no rationale for low-level flying was given (non-compliant);
- data outside the Snow Goose area during moulting season and in all areas in all other months where the 650 magl elevation requirement was achieved (compliant);
- data outside the Snow Goose area during moulting season and in all areas in all other months where the 650 magl elevation requirement was not achieved, but the rationale for low-level flying was given (compliant with rationale); and,

- data outside the Snow Goose area during moulting season and in all areas in all other months where the 650 magl elevation requirement was not achieved and no rationale for low-level flying was given (non-compliant).

Additional details concerning helicopter pilot rationale and flight time were requested during 2020 TEWG meetings. The helicopter flight database used for assessing compliance was re-analyzed from 2017 to 2019 and incorporated into the 2020 analysis to address this request. The 2017–2019 reanalysis results are presented in Appendix D, while the results of the 2020 analysis are presented below. Flight time was calculated for each pilot rationale stated in the pilot logs.

To comply with the horizontal guidelines, pilots were given the spatial boundaries of any identified concentrations of migratory birds, buffered by the required 1,500 m horizontal avoidance distance. Pilots were then asked to avoid flying in these areas. The only area identified for horizontal avoidance was the key moulting area for Snow Geese.

6.2 RESULTS AND DISCUSSION

A discrepancy exists between Project Condition #59, suggesting that minimum flight height should be 610 magl in all areas, whereas Project Condition #71 prescribes a minimum flight height of 650 magl. Considering that most, if not all, areas where Baffinland operated in June through September 2020 were likely to have migratory birds present, the default minimum altitude for the analysis was 650 magl.

No "observed concentrations of migratory birds" or areas prescribed explicitly by the TEWG to avoid migratory birds were identified in 2020. Except for the Snow Goose area, no analysis was required to determine compliance of 1,100 m vertical and 1,500 m horizontal distance of any other location. No known public complaints occurred about helicopter overflights for follow-up as per Project Condition #72. In 2020, Canadian Helicopters operated four helicopters during the summer season, consistent with 2019 and 2018 operational requirements.

A total of 1,863 transits were flown from May to September, of which 116 (6%) intersected the Snow Goose area (all months), and 1,747 (94%) were outside of the area (Table 6-1). The total flight time was 852.3 hours, with 22.1 hours (2.60%) flown within the Snow Goose area (all months) and 830.2 hours (97.40%) flown outside the area (Table 6-2).

In 2020, flight height compliance within the Snow Goose area during the moulting season was 89.5% (Table 6-3, Map 6-3 and Map 6-4). The low compliance in July within the Snow Goose area was due to a single non-compliant flight, accounting for 48.6% (0.45 hours) of the total flight time. A helicopter was ferrying to the Project late in the season, and the pilot, who was new to the project, did not know about the Snow Goose area. Overall compliance in all areas for all months was 96.4% (Table 6-4; Map 6-1 to Map 6-5). Again, the low compliance in May was due to non-compliant ferry flights of helicopters arriving at site for the first time that account for a high proportion of the 1.84 hours flown in May. These ferry flights arriving from off-site may have experienced operational constraints (i.e., fuel capacity and flight range).

Pilots maintain a 1,100 m vertical distance above ground level when flying over the Snow Goose area whenever possible during moulting season. If this flight height 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, which causes more overall disturbance. As an alternative, pilots sometimes fly over the eastern edge of the Snow Goose moulting area. Baffinland understands that Snow Geese are typically concentrated in the core of the moulting area and are seldom present near the edges, so disturbance to birds under flight paths at the edge of the Snow Goose area is unlikely. This alternative reduces the overall flight time and associated disturbance. Flights over the Snow Goose area are considered non-compliant.

Table 6-1. Number of transits flown per month with a breakdown of transits (№ and %) flown over and outside of the Snow Goose area, May 1– September 30, 2020.

Month	Total № of Transits	№ of Transits Over Snow Goose Area	% Transits Over Snow Goose Area	№ of Transits Outside Snow Goose Area	% Transits Outside Snow Goose Area
May	2	2	100	0	0
June	185	4	2	181	98
July	614	10	2	604	98
August	756	67	9	689	91
September	306	33	11	273	89
Total	**1,863**	**116**	**6**	**1,747**	**94**

Table 6-2. Number of flight hours per month with a breakdown of flight time (hrs and %) flown within and outside the Snow Goose area, May 1– September 30, 2020.

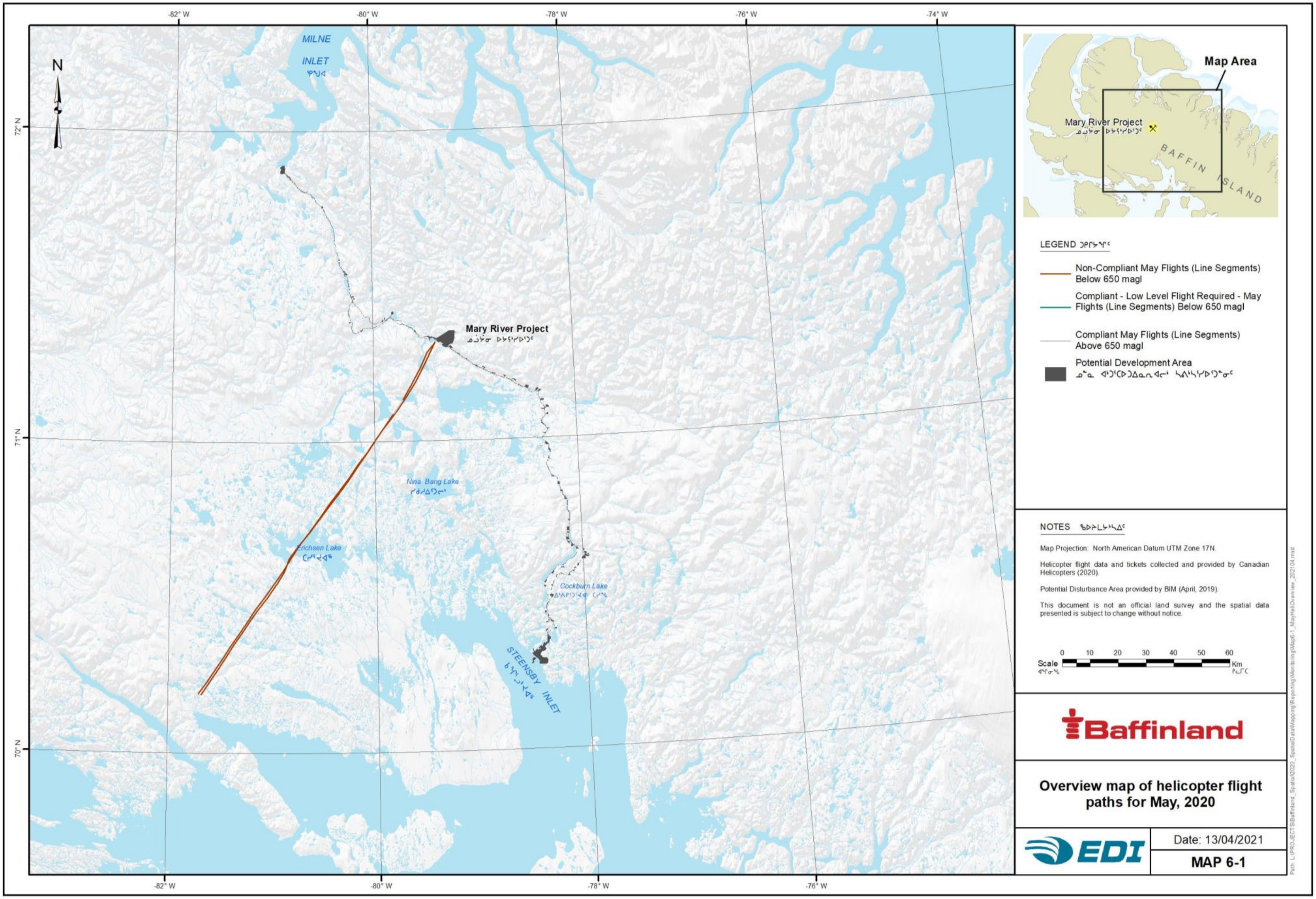
Month	Total Flight Hours	Flight Hours Over Snow Goose Area	% Flight Time Over Snow Goose Area	Flight Hours Outside Snow Goose Area	% Flight Time Outside Snow Goose Area
May	1.84	0.95	51.54	0.89	48.46
June	78.56	0.76	0.97	77.79	99.03
July	234.02	0.93	0.40	233.09	99.60
August	375.27	14.12	3.76	361.14	96.24
September	162.66	5.39	3.31	157.28	96.69
Total	**852.34**	**22.15**	**2.60**	**830.20**	**97.40**

Table 6-3. Number of flight hours of flight height compliance (≥ 1,100 magl) within the Snow Goose area during moulting season, July 1 – August 31, 2020.

Month	Area	Total Flight Hours	Compliant		Compliant with Rationale		Combined Compliance	Non-compliant	
			hrs	%	hrs	%	%	hrs	%
May	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
June	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
July	Within SNGO Area	0.93	0.13	13.77	0.35	37.63	51.41	0.45	48.59
August	Within SNGO Area	14.12	2.88	20.42	10.11	71.58	92.00	1.13	8.00
September	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total		**15.05**	**3.01**	**20.01**	**10.46**	**69.48**	**89.49**	**1.58**	**10.51**

Table 6-4. Number of flight hours of overall flight height compliance in all areas for all months between May 1 – September 30, 2020.

Month	Area	Total Flight Hours	Compliant		Compliant with Rationale		Combined Compliance	Non-compliant	
			hrs	%	hrs	%	%	hrs	%
May	All Areas	1.84	0.07	3.63	0.00	0.00	3.63	1.77	96.37
June	All Areas	78.56	19.16	24.39	56.23	71.58	95.97	3.17	4.03
July	All Areas	234.02	58.21	24.88	168.01	71.79	96.67	7.79	3.33
August	All Areas	375.27	112.23	29.91	251.43	67.00	96.91	11.60	3.09
September	All Areas	162.66	45.85	28.19	110.28	67.80	95.99	6.53	4.01
Total		**852.34**	**235.52**	**27.63**	**585.96**	**68.75**	**96.38**	**30.86**	**3.62**



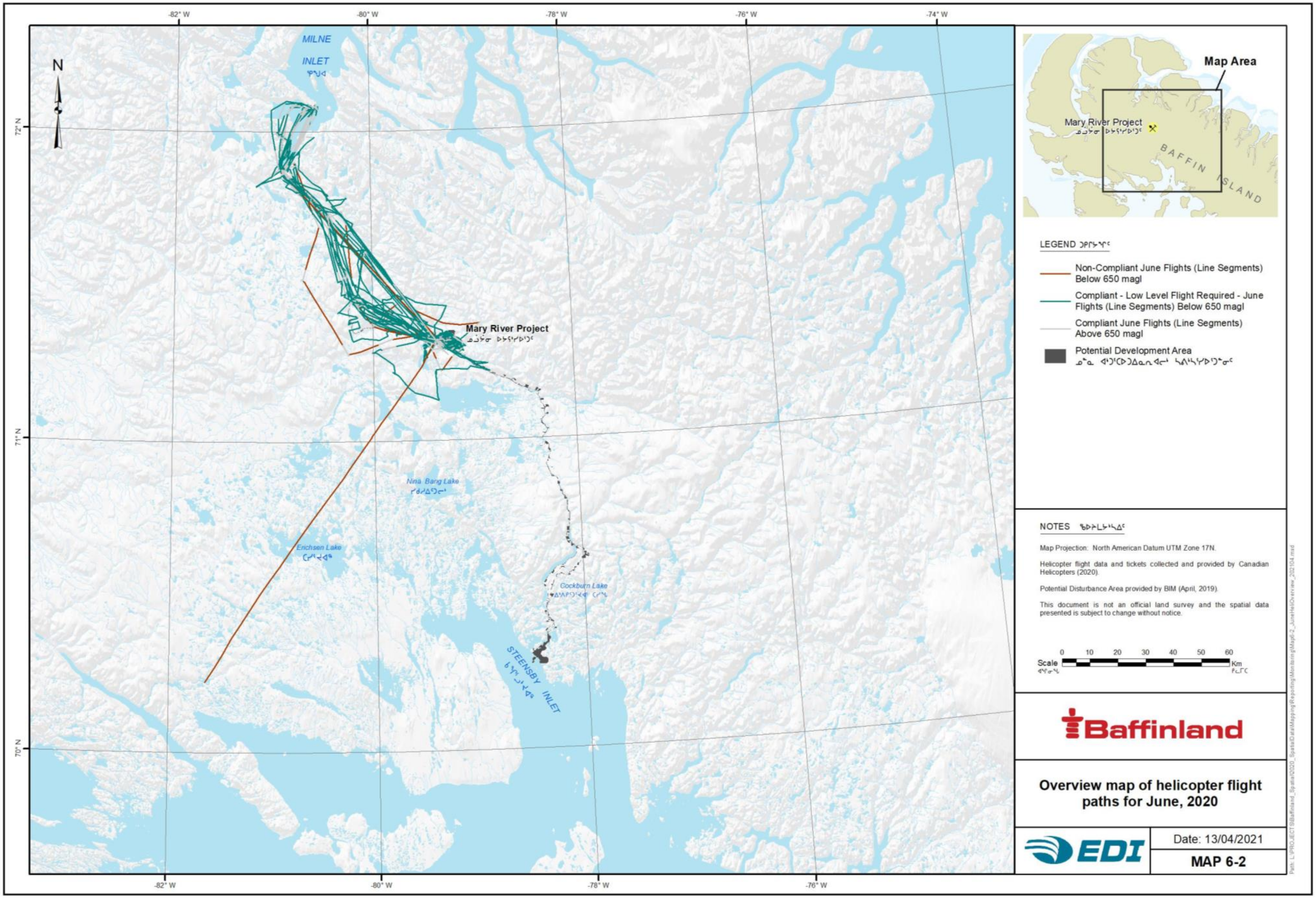
Map Projection: North American Datum UTM Zone 17N.

Helicopter flight data and tickets collected and provided by Canadian Helicopters (2020).

Potential Disturbance Area provided by BIM (April, 2019).

This document is not an official land survey and the spatial data presented is subject to change without notice.

Overview map of helicopter flight paths for May, 2020



NOTES

Map Projection: North American Datum UTM Zone 17N.

Helicopter flight data and tickets collected and provided by Canadian Helicopters (2020).

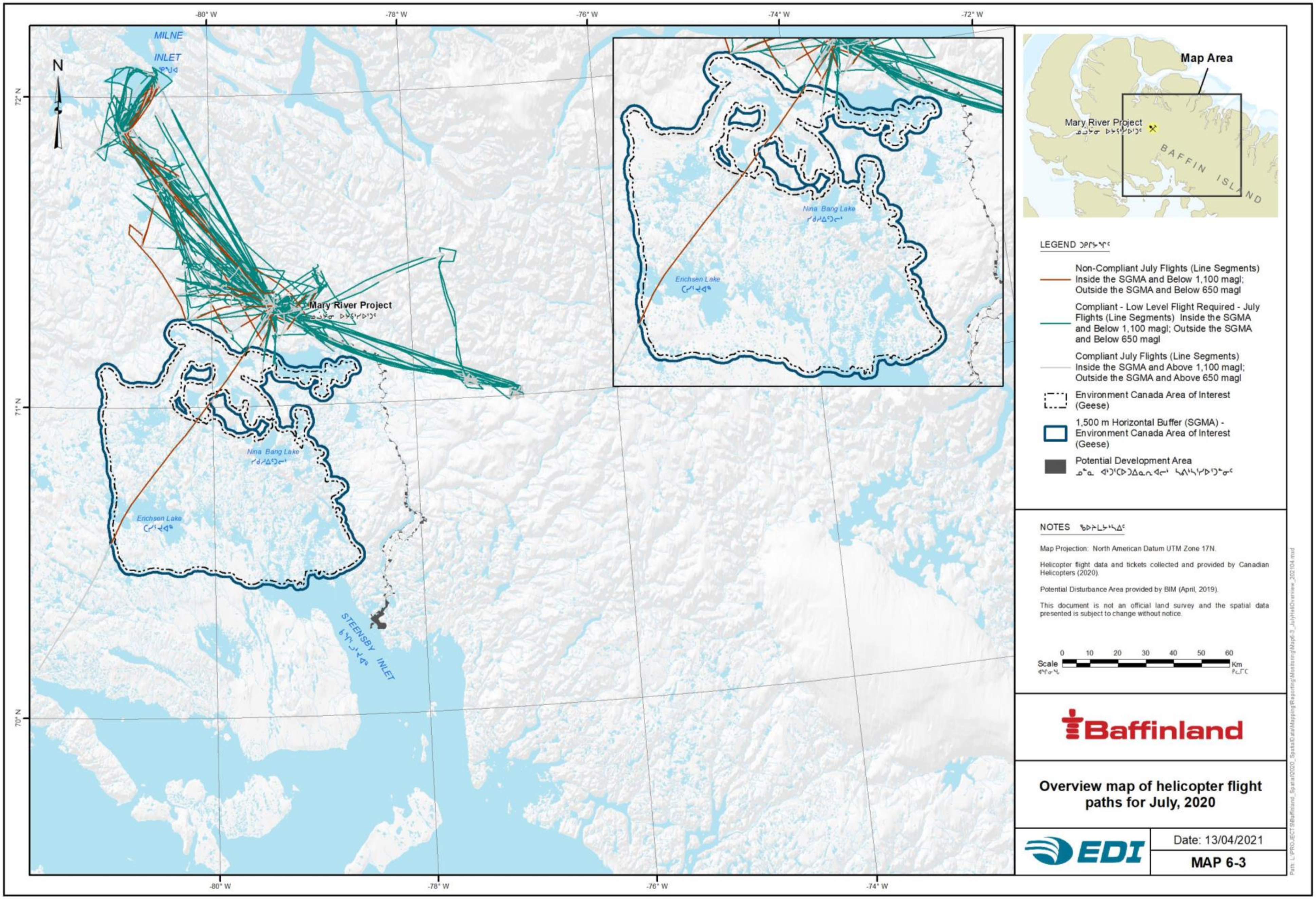
Potential Disturbance Area provided by BIM (April, 2019).

This document is not an official land survey and the spatial data presented is subject to change without notice.

Overview map of helicopter flight paths for June, 2020

Date: 13/04/2021

MAP 6-2



Overview map of helicopter flight paths for July, 2020

Date: 13/04/2021

MAP 6-3

LEGEND

- Non-Compliant July Flights (Line Segments) Inside the SGMA and Below 1,100 magl; Outside the SGMA and Below 650 magl
- Compliant - Low Level Flight Required - July Flights (Line Segments) Inside the SGMA and Below 1,100 magl; Outside the SGMA and Below 650 magl
- Compliant July Flights (Line Segments) Inside the SGMA and Above 1,100 magl; Outside the SGMA and Above 650 magl
- Environment Canada Area of Interest (Geese)
- 1,500 m Horizontal Buffer (SGMA) - Environment Canada Area of Interest (Geese)
- Potential Development Area

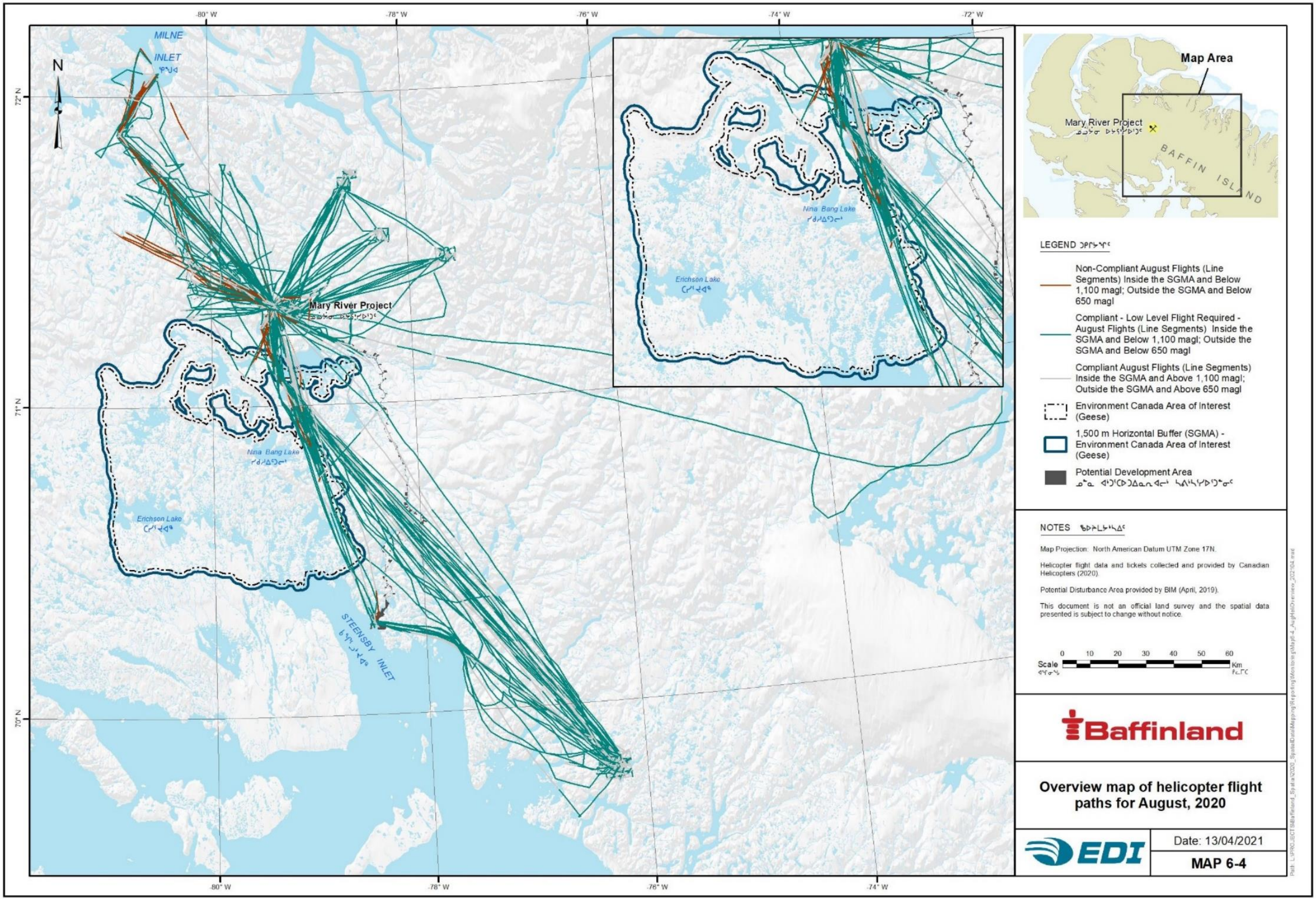
NOTES

Map Projection: North American Datum UTM Zone 17N.

Helicopter flight data and tickets collected and provided by Canadian Helicopters (2020).

Potential Disturbance Area provided by BIM (April, 2019).

This document is not an official land survey and the spatial data presented is subject to change without notice.


-80° W
-78° W
-76° W
-74° W
-72° W
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MILNE
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Mary River Project
Nina Bang Lake
Erichson Lake
STEENSBY INLET
Map Area
Mary River Project
BAFFIN ISLAND
LEGEND
Non-Compliant August Flights (Line Segments) Inside the SGMA and Below 1,100 magl; Outside the SGMA and Below 650 magl
Compliant - Low Level Flight Required - August Flights (Line Segments) Inside the SGMA and Below 1,100 magl; Outside the SGMA and Below 650 magl
Compliant August Flights (Line Segments) Inside the SGMA and Above 1,100 magl; Outside the SGMA and Above 650 magl
Environment Canada Area of Interest (Geese)
1,500 m Horizontal Buffer (SGMA) - Environment Canada Area of Interest (Geese)
Potential Development Area
NOTES
Map Projection: North American Datum UTM Zone 17N.
Helicopter flight data and tickets collected and provided by Canadian Helicopters (2020).
Potential Disturbance Area provided by BIM (April, 2019).
This document is not an official land survey and the spatial data presented is subject to change without notice.
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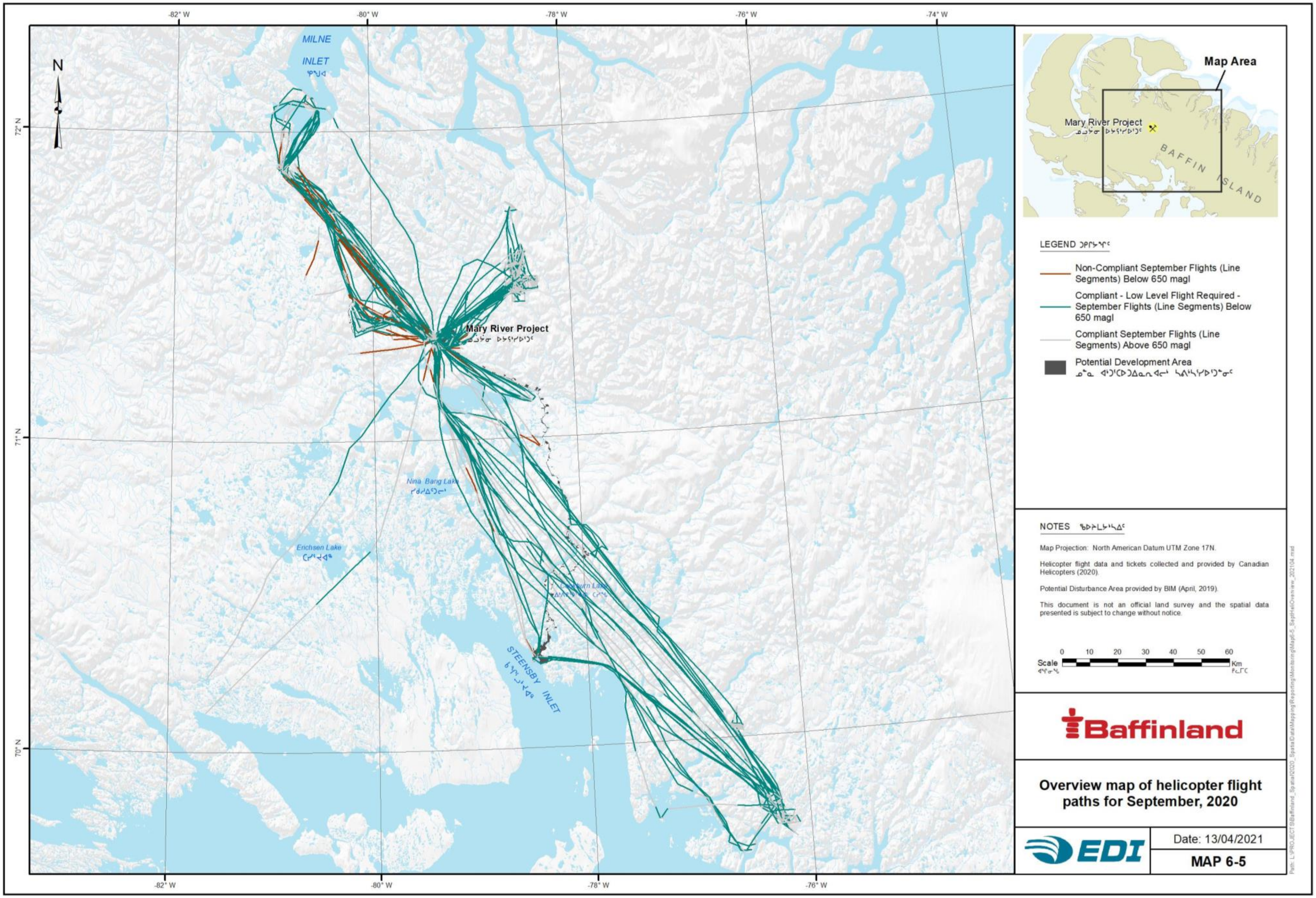
Km
Baffinland
Overview map of helicopter flight paths for August, 2020
EDI
Date: 13/04/2021
MAP 6-4



LEGEND ᑐᑭᒥᔭᕐᑦ

- Non-Compliant September Flights (Line Segments) Below 650 magl
- Compliant - Low Level Flight Required - September Flights (Line Segments) Below 650 magl
- Compliant September Flights (Line Segments) Above 650 magl
- Potential Development Area ᓄᓇ ᐊᒃᑐᖅᑕᐅᑐᐃᓇᓐᓂᐊᓕᒃ ᓴᐱᕐᓴᖅᓯᐅᑦᑐᓂᑦ

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Map Projection: North American Datum UTM Zone 17N.

Helicopter flight data and tickets collected and provided by Canadian Helicopters (2020).

Potential Disturbance Area provided by BIM (April, 2019).

This document is not an official land survey and the spatial data presented is subject to change without notice.

Scale ᐊᖏᓂᖓ 0 10 20 30 40 50 60 Km ᑭᓚᒥᑕ

Overview map of helicopter flight paths for September, 2020

Date: 13/04/2021

MAP 6-5

Path: L:\PROJECT\Baffinland_Spatial\2020_Spatial\DataMapping\Reporting\Monitoring\Map6-5_SeptHeliOverview_202104.mxd

Flight height data were cross-referenced with pilot logs from daily timesheets for the fourth consecutive year in 2020. For analytical purposes, flight line segments were designated "compliant" when elevation requirements were followed, "compliant with rationale" where elevation requirements were not met but pilot's discretionary rationale for deviating from flight heights was provided, and "non-compliant" if they did not meet elevation requirements and no explanation was provided. This further breakdown of compliance was requested during 2020 TEWG meetings. Pilot rationales given to explain low-level flights are described in Table 6-5.

A breakdown of primary low-level flight hours with rationale for 2020 is provided in Table 6-6 (secondary or tertiary rationale was not included). Results showed that most low-level flight line segments were compliant when considering rationale provided by pilots for low-level flying. Flights with rationale from pilot logs accounted for 68.7%. of the total flight hours. Within the Snow Goose area during moulting season, where the flight height requirement is ≥1,100 magl, 1.2% of the total flight hours were compliant with rationale. Outside the Snow Goose area and in all areas in all other months where the flight height requirement is ≥650 magl, 67.5% of total flight hours were compliant with rationale. The percentage of low-level compliant with rationale flights was similar to what was observed in 2018, and higher than 2019.

Low-level flights with rationale will likely continue in future years as most of the helicopter work conducted at the Project requires either low-level flying for safety/operational reasons (e.g., slinging, surveys) or multiple short-distance flights whereby helicopters are unable to reach the required elevations between take-off and landing sites (e.g., staking, sampling, drop-offs/pickups). In 2020, pilots' most common reasons for flying below the elevation requirements were slinging, drop off/pick up, and surveys.

Overall, 2020 flight height compliance was high both inside and outside the Snow Goose area. The high level of compliance observed in 2020 was due primarily to the additional analysis performed, which considered rationale provided by pilots for many of the transits flown below the elevation requirements, as well as improved documentation (i.e., enhanced communications) of the rationale for low-level flights by pilots and Baffinland staff over the years.

Pilots made efforts to avoid the Snow Goose area during the moulting season when possible in 2020, as only 6% of all transits and 2.6% of total flight hours were flown over the Snow Goose area. Most transits over the Snow Goose area also appeared to be direct flights between the Project and Steensby Port, which only skirted the eastern edge of the Snow Goose area boundary. Most flights near the boundary were within a well-defined track, away from the core of the Snow Goose area identified as having higher concentrations of geese.

Non-compliant flight line segments were those that did not achieve elevation requirements and where no rationale for low-level flying was provided. Some non-compliant flight line segments included the ferrying flights to and from the Project at the start and end of the season and the takeoff and landing. Currently, only the first and last flight segments can be identified as takeoff or landing segments. However, it may take multiple flight segments for a helicopter to reach or land from the required flight height, resulting in non-compliant or compliant with rationale intermediary flight segments. Baffinland will continue to work with Canadian Helicopters to document flight height compliance and communicate elevation requirements to pilots throughout the flying season.

Although most transits were below the recommended elevations, the potential disturbance to birds or other wildlife cannot be directly quantified. However, based on the results of the noise monitoring study (Section 5), helicopter noise is likely too infrequent in all Project areas away from the Mine Site to cause any significant disturbance to wildlife.

Table 6-5. Descriptions of pilot rationales given for low-level flights. Descriptions are stated with a flight height requirement of 650 magl and apply to a flight height requirement of 1,100 magl.

Rationale	Description
Drop off/pick up	The distance between take-off and landing sites does not allow enough time to gain 650 magl; the topography between sites, particularly around the drill locations, has large elevation changes over a short distance that does not allow the helicopter to reach 650 magl or it is not practical for the helicopter to climb to 650 magl (e.g., when descending from Nuluujaak Mountain).
Survey	Surveys can involve short-duration flights between survey points that do not allow enough time to gain 650 magl; some surveys require low level flying as part of the survey methodology, such as flying a low-level grid pattern for a geotechnical survey, keeping a sensor at a constant elevation relative to the ground.
Slinging	Helicopters slinging heavy loads fly low for safety purposes, so if there is an issue, the load can be quickly lowered to the ground in a controlled manner or dropped and maintain visual reference of the landing location.
Short distance	The short distance between take-off and landing sites does not allow enough time to gain 650 magl.
Sampling	Sampling can involve short-duration flights between sampling points that do not allow enough time to gain 650 magl.
Staking	Very low-level flying is required while staking out a grid as stakes are deployed from the helicopter during transit and crew members are in and out of the helicopter at grid corners.
Weather	Poor visibility associated with low cloud restricts pilots to flying below the cloud line under 650 magl; high winds and/or flat light conditions (reduces a pilot's depth-of-field causing poor ground reference) can make it challenging to maintain a consistent 650 magl flight height.
Mobilization/Demobilization	Ferrying of the aircraft to and from the Project where operational constraints (e.g., fuel capacity and flight range) are factors.
Other	The flight's nature requires low-level flying or short distances/durations (e.g., tours, maintenance flights, evacuations, and search and rescue).

Table 6-6. Helicopter flight hours summarized according to pilot rationale for flights within the ≥1,100 magl and ≥650 magl flight height requirements, May 1 – September 30, 2020.

Rationale	Flight Hours	% of Total Flight Hours	≥1,100 magl Flight Height Requirement		≥650 magl Flight Height Requirement	
			Flight Hours	% of Total Flight Hours	Flight Hours	% of Total Flight Hours
Slinging	292.01	34.26	2.87	0.34	289.13	33.92
Drop off/Pick up	132.26	15.52	4.15	0.49	128.11	15.03
Survey	67.55	7.93	1.58	0.19	65.97	7.74
Short Distance	48.87	5.73	0.54	0.06	48.33	5.67
Weather	39.33	4.61	1.31	0.15	38.01	4.46
Sampling	3.27	0.38	0.00	0.00	3.27	0.38
Other	2.67	0.31	0.00	0.00	2.67	0.31
Total	**585.96**	**68.75**	**10.46**	**1.23**	**575.50**	**67.52**

6.3 INTER-ANNUAL TRENDS

Flights inside the Snow Goose area during the moulting period have decreased over the last four years, from 15% of transits and 5.9% of flight hours in 2017 down to 4% of transits and 1.8% of flight hours in 2020 (Table 6-7 and Table 6-8).

Helicopter flight height compliance inside the Snow Goose area during the moulting period was 89.5% in 2020, similar to 2018 (89.6%), higher than in 2017 (82.0%), but lower than 2019 (93.8%). Compliance for 2020 was considerably higher than 2015 (55%) and 2016 (10%) (Figure 6-1). Helicopter flight height compliance outside the Snow Goose area during moulting season and in all areas in all other months for 2020 (96.5%) was similar to 2018 (96.1%) and 2019 (93.0%) and was higher than all other previous years.

The top pilot rationales for low-level flights between 2017 and 2020 were slinging and drop off/pick up, with percent of total flight hours ranging from 8.29% to 34.26% (Table 6-9). Surveys and weather also contributed up to 16.98% of the total flight hours, and sampling remained steady between 0.3% and 0.8%. Other reasons given for low-level flights have varied over the years and maybe due to phrasing or classification changes.

Total flight hours have decreased from 2018 to 2020 (Table 6-10). However, there were no site tours conducted in 2020, which would have resulted in several days' worth of helicopter flight time. Overall, the 'compliant', 'compliant with rationale', and 'non-compliant' percentages of flight hours in 2020 were similar to the compliance percentages in 2018. While the percentage of fully compliant flight hours dropped from 35.4% in 2019 to 27.6% in 2020, the combined compliance increased from 93.0% to 96.4%. The number of non-compliant flight hours in 2020 was the lowest (3.62%) in the last four years, and the number of compliant with rationale flight hours (585.96 hrs) was the second lowest, resulting in a reduction of total disturbance in the area.

During the moulting season over the Snow Goose area, with a flight height requirement of ≥1,100 magl, the percentage of fully compliant flight hours dropped from 38.4% in 2019 to 20.0% in 2020 (Table 6-11), primarily due to a ferry flight passing through the Snow Goose area in July to arrive at the Project. The total number of hours flown below the 1,100 magl flight height requirement decreased from 16.5 hours in 2019 to 12.0 hours in 2020, signifying a decrease in total flight time and thus total disturbance in the area. Compliance for the ≥650 magl flight height compliance followed the same pattern as the overall compliance.

Table 6-7. Number of transits flown per year with a breakdown of transits (№ and %) within the ≥1,100 magl and ≥650 magl flight height requirements, 2017 to 2020.

Year	Total № of Transits	≥1,100 magl Flight Height Requirement		≥650 magl Flight Height Requirement	
		№ of Transits	% Transits	№ of Transits	% Transits
2017	1,345	205	15	1,140	85
2018	2,489	198	8	2,291	92
2019	3,110	207	7	2,903	93
2020	1,863	77	4	1,786	96

Table 6-8. Number of flight hours per year with a breakdown of flight time (hrs and %) within the ≥1,100 magl and ≥650 magl flight height requirements, 2017 to 2020.

Month	Total Flight Hours	≥1,100 magl Flight Height Requirement		≥650 magl Flight Height Requirement	
		Flight Hours	% Flight Hours	Flight Hours	% Flight Hours
2017	762.15	45.30	5.94	716.85	94.06
2018	1,701.60	35.31	2.07	1,666.30	97.93
2019	1,411.63	26.82	1.90	1,384.81	98.10
2020	852.34	15.05	1.77	837.29	98.23

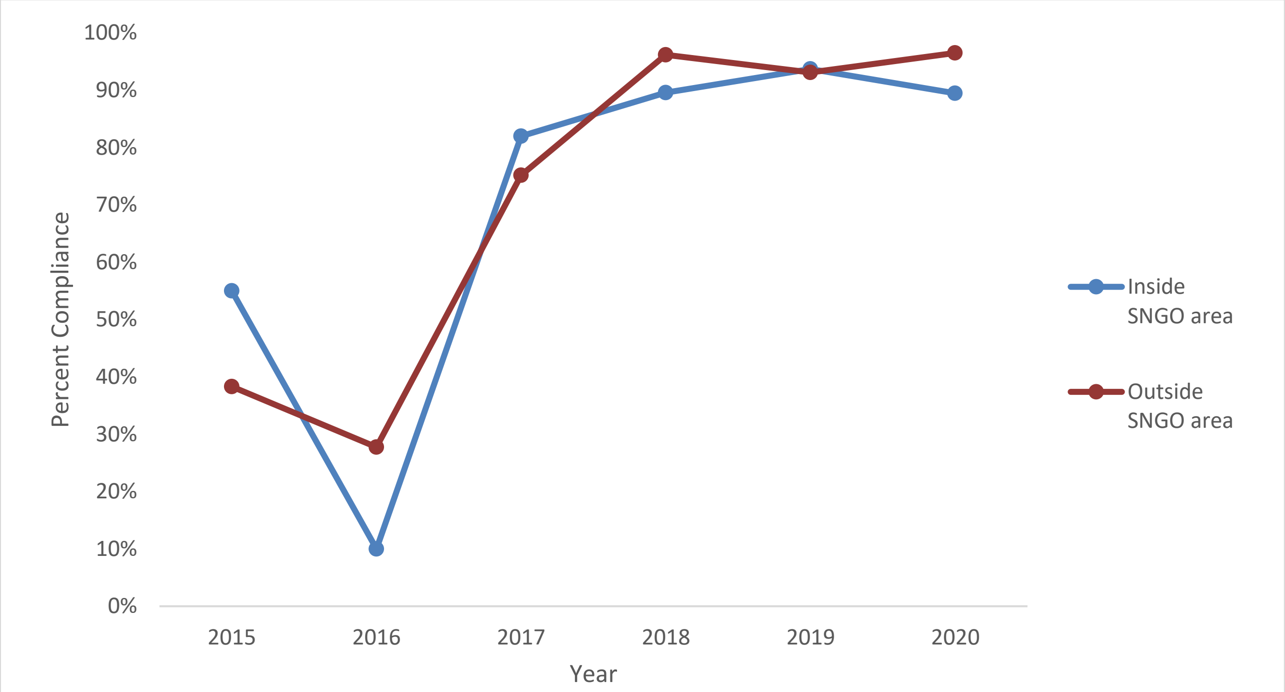

Figure 6-1. Percent compliance for flights inside the Snow Goose (SNGO) area during the moulting season and outside the Snow Goose area during the moulting season and in all areas in all other months from 2015–2020.

Table 6-9. Total and percent of flight hours for "compliant with rationale" flights summarized by rationale category, 2017 to 2020.

	2017		2018		2019		2020	
Rationale	**hrs**	%	**hrs**	%	**hrs**	%	**hrs**	%
Slinging	114.58	15.03	486.91	28.62	227.87	16.14	292.01	34.26
Drop off/Pick up	63.20	8.29	277.22	16.29	326.26	23.11	132.26	15.52
Survey	36.12	4.74	288.85	16.98	176.21	12.48	67.55	7.93
Weather	57.65	7.56	55.12	3.24	18.55	1.31	39.33	4.61
Short Distance	0.35	0.05	0.00	0.00	0.07	0.00	48.87	5.73
Staking	32.03	4.20	0.00	0.00	17.12	1.21	0.00	0.00
Mobilization/Demobilization	12.65	1.66	0.00	0.00	21.22	1.50	0.00	0.00
Other	0.00	0.00	24.07	1.41	15.02	1.06	2.67	0.31
Sampling	2.17	0.29	11.35	0.67	10.94	0.77	3.27	0.38
Total	**318.74**	**41.82**	**1,143.52**	**67.20**	**813.25**	**57.61**	**585.96**	**68.75**

Table 6-10. Total flight hours and overall flight height compliance by flight hours and percent, 2017 to 2020.

Year	Total Flight Hours	Compliant		Compliant with Rationale		Combined Compliance	Non-compliant	
		hr	%	hr	%	%	hr	%
2017	762.15	257.84	33.83	318.74	41.82	75.65	185.56	24.35
2018	1,701.60	490.22	28.81	1,143.52	67.20	96.01	67.86	3.99
2019	1,411.63	500.02	35.42	813.25	57.61	93.03	98.36	6.97
2020	852.34	235.52	27.63	585.96	68.75	96.38	30.86	3.62

Table 6-11. The number of flight hours and overall flight height compliance by flight hours and percent within the ≥1,100 magl and ≥650 magl flight height requirements, 2017 to 2020.

	≥1,100 magl Flight Height Requirement							≥650 magl Flight Height Requirement						
Year	Flight Hours	Compliant		Compliant with Rationale		Non-compliant		Flight Hours	Compliant		Compliant with Rationale		Non-compliant	
		hr	%	hr	%	hr	%		hr	%	hr	%	hr	%
2017	45.30	11.89	26.24	25.27	55.78	8.15	17.98	716.85	245.96	34.31	293.47	40.94	177.42	24.75
2018	35.31	3.73	10.56	27.90	79.03	3.67	10.40	1,666.30	486.49	29.20	1,115.62	66.95	64.19	3.85
2019	26.82	10.31	38.45	14.84	55.35	1.66	6.20	1,384.81	489.71	35.36	798.40	57.65	96.70	6.98
2020	15.05	3.01	20.01	10.46	69.48	1.58	10.51	837.29	232.51	27.77	575.50	68.73	29.28	3.50

6.4 HELICOPTER FLIGHT HEIGHT SUMMARY

- Additional helicopter flight height analysis requested by the TEWG in 2020 was conducted for 2017 to 2020, which incorporated more detailed reporting on the pilot rationale and analysis of flights by line segments and duration.
- Helicopter flight heights continue to be used to monitor potential disturbance to birds and other wildlife inside and outside the Snow Goose moulting area.
- In 2020, after incorporating pilot rationale, helicopter flight height compliance inside the Snow Goose area during the moulting period was 89.5%, and overall compliance in all areas in all months was 96.4%.
- The 2020 flight season was the fourth consecutive year that additional analysis was performed that considered rationale provided by pilots for many of the transits flown below the elevation requirements.
- This additional analysis showed that when considering the rationale provided by pilots for low-level flying (e.g., slinging, pickups/drop-offs, weather), most low-level flight segments were compliant.

- The high percentage of low-level compliant flights in both areas was similar in 2020 to what was observed in 2018 and 2019. It will likely continue in future years as most helicopter work conducted at the Project requires either low-level flying for safety/operational reasons (e.g., slinging, surveys), or multiple short-distance flights where helicopters are unable to reach the required elevations between take-off and landing sites (e.g., staking, sampling, drop-offs/pickups).
- Helicopter flight height analysis, including rationale from pilot timesheets will continue in 2021.

7 TOTE ROAD TRAFFIC

Traffic along the Tote Road is monitored and recorded by Site Security daily at the Mary River Project. Both ore haul traffic and other vehicle traffic (e.g., truck transits related to the transfer of personnel, equipment and/or fuel) are recorded. These data are compared with the projected ore haul and non-haul vehicle transits. Not all vehicle travel on the Tote Road consists of an entire round trip from the Mine Site to Port Site. Traffic is therefore tracked as 'vehicle transits,' which were counted as a one-way trip; return trips comprised two transits.

The mean number of ore haul transits per day from January 1 through December 31, 2020, was 243.3 (Table 7-1; Figure 7-1). This is slightly below what was predicted in the FEIS Addendum for the Production Increase Proposal (ore haul transits: 236, non-haul transits: 40; Stantec 2018). Other traffic had an annual mean of 28.4 vehicle transits per day. The mean daily total vehicle transits (haul and other) on the Tote Road in 2020 was 271.7 vehicle transits per day.

Table 7-1. Mean and total vehicle transits along the Tote Road, including ore haul, non-haul, and all vehicles combined; data from January 1, 2020 through December 31, 2020.

Sample	Ore Haul Transits		Non-Haul Transits		Combined Vehicle Transits	
Year	Daily Mean	Total	Mean	Total	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

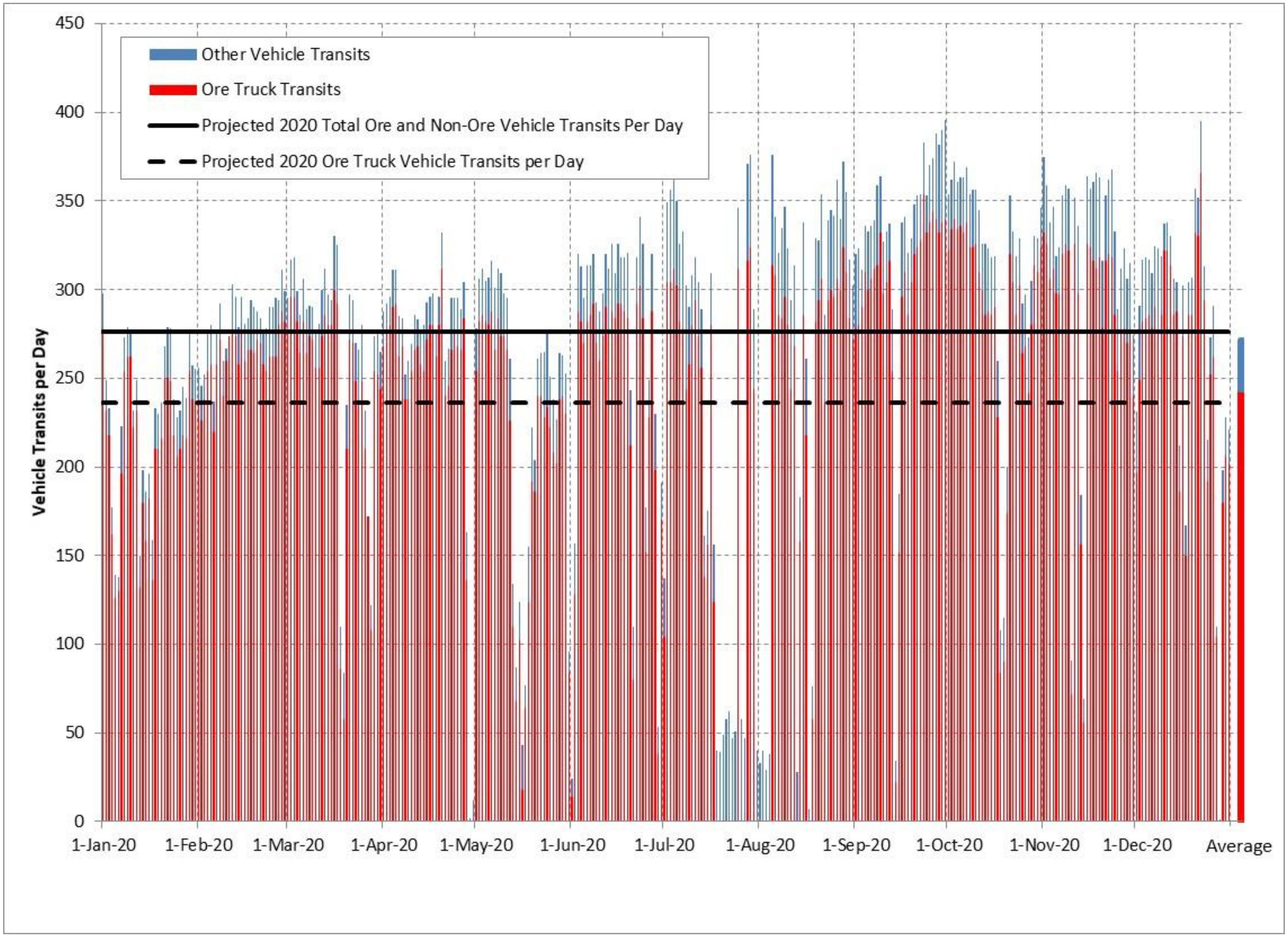

Figure 7-1. Vehicle transits per day on the Tote Road, including both ore trucks (red) and all other traffic (blue); January 1 through December 31, 2020. *Also included is the projected maximum number of vehicle transits per day and the projected maximum number of Ore Haul Trucks per day on the Tote Road.*

8 DUSTFALL

Several Project Conditions (e.g., Project Conditions 36, 50, 54d and 58c) relate to the effects of dustfall and to dustfall monitoring at the Project (Nunavut Impact Review Board 2020). Since summer 2013, the Project has implemented a dustfall monitoring program intended to meet these Conditions, the objective 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 ranges predicted with the dustfall dispersion models (Baffinland Iron Mines Corporation 2013b).

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

Note: Project Condition #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 Climate and Section 9.3 Vegetation "Green-Up" Dates.

8.1 PASSIVE DUSTFALL SAMPLING

8.1.1 METHODS

8.1.1.1 Review of Supporting Data

The dustfall monitoring program involves reviewing supporting data that could influence the volume and extent of dustfall during 2020. These supporting data comprise an overview of weather conditions at the Mine Site and Milne Inlet meteorological stations and vehicle traffic on the Tote Road:

- Climate data (including a summary of air temperature and precipitation data) is presented in Section 4.
- Traffic data (including the number of ore haul truck transits and other vehicle transits on the Tote Road) is presented in Section 7.

8.1.1.2 Passive Dustfall Sampling

The 2020 dustfall monitoring program involves passive dustfall sampling across the Project area following standard test methods for collecting and measuring dustfall (ASTM International 2010). Each dustfall sampler comprises one sampling apparatus, including a hollow post, approximately 2 m high, and a bowl-shaped terminal holder for the dust collection vessel. The terminal bowl is topped with 'bird spikes' to prevent birds perching and contaminating samples with feces (see Photo 8-1). Dust collection canisters were placed in the holder; these containers were pre-charged with 250 mL of algaecide in summer and 250 mL of isopropyl alcohol in winter. Collection vessels were changed out once per month and shipped to ALS Environmental Laboratory (ALS) in Waterloo, Ontario, to analyze total suspended particulates (TSP; units of mg/dm²·day) and a suite of metals. In addition to the TSP analysis, the dustfall samples were analyzed for total metal concentrations to help inform potential trends of metals in soil and vegetation tissues, collected as part of vegetation health monitoring.

Photo 8-1. Dustfall monitoring station DF-P-01.

As summarized in Table 8-1, the Regional Study Area (RSA) was divided into four areas for the purposes of reviewing dustfall data:

1. Mine Site;
2. Milne Port;

3. Tote Road North crossing (km 28); and,
4. Tote Road South crossing (km 78).

As shown in Map 8-1, the study design is comprised of 39 dustfall samplers distributed across the Project area:

- nine dustfall samplers 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;
- six dustfall samplers located at Milne Port: four active sites on the Port Site footprint, one located at the PDA boundary, and one reference site situated on a ridge approximately 3,000 m northeast (upwind) of the Port Site outside of the predicted extent of dustfall;
- sixteen dustfall samplers divided between two sites along the Tote Road (North sites and South sites); these two sites are organized into transects, each composed of eight dustfall samplers 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. An additional six monitors are organized as three pairs, all located 1,000 m distant from the Tote Road; and,
- two reference dustfall samplers located 14,000 m southwest of the Tote Road (one at the North site, one at the South site).

Monthly passive dustfall sampling was conducted year-round at 26 of the 39 monitoring locations; these sites are all distributed within 1,000 m of the PDA and tend to experience higher dustfall levels. The remaining 13 monitoring stations are situated at, or greater than, 1,000 m from the PDA and historically experience lower dustfall levels. Monthly sampling is conducted in June, July, and August, but paused during winter (e.g., September to May) due to their remote locations and inaccessibility without helicopter support. For data analysis, these sampling categories are delineated as 'year-round' and 'summer.'[4]

The 2020 dustfall monitoring program includes data collected for a full calendar year from early January 2020 through late December 2020 (Table 8-2).

Table 8-1. Dustfall monitoring site location and sampling period information for the Mary River Project 2020 dustfall monitoring program.

Site ID	Location	Sample Period	Distance to PDA (m)	Expected Dustfall	Latitude	Longitude
DF-M-01	Mine Site	year-round	Within PDA	High	71.3243	-79.3747
DF-M-02	Mine Site	year-round	Within PDA	High	71.3085	-79.2906
DF-M-03	Mine Site	year-round	Within PDA	High	71.3072	-79.2433
DF-M-04	Mine Site	summer[1]	9,000	Nil	71.2197	-79.3277
DF-M-05	Mine Site	summer[1]	9,000	Nil	71.3731	-78.9230

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[4] This seasonal delineation is also supported by seasonal patterns.

Table 8-1. Dustfall monitoring site location and sampling period information for the Mary River Project 2020 dustfall monitoring program.

Site ID	Location	Sample Period	Distance to PDA (m)	Expected Dustfall	Latitude	Longitude
DF-M-06	Mine Site	summer[1]	1,000	Moderate	71.3196	-79.1560
DF-M-07	Mine Site	summer[1]	1,000	Moderate	71.3000	-79.1953
DF-M-08	Mine Site	summer[1]	4,000	Moderate	71.2945	-79.1002
DF-M-09	Mine Site	summer[1]	2,500	Low	71.2936	-79.4127
DF-RS-01	Tote Road – south, km 78	summer[1]	5,000	Nil	71.3275	-79.8001
DF-RS-02	Tote Road – south, km 78	year round	1,000	Low	71.3893	-79.8324
DF-RS-03	Tote Road – south, km 78	year round	Within PDA, 100 m from Tote Road	Moderate	71.3967	-79.8228
DF-RS-04	Tote Road – south, km 78	year round	Within PDA, 30 m from Tote Road	Moderate	71.3975	-79.8222
DF-RS-05	Tote Road – south, km 78	year round	Within PDA, 30 m from Tote Road	Moderate	71.3980	-79.8228
DF-RS-06	Tote Road – south, km 78	year round	Within PDA, 100 m from Tote Road	Moderate	71.3986	-79.8234
DF-RS-07	Tote Road – south, km 78	year round	1,000	Nil	71.4077	-79.8182
DF-RS-08	Tote Road – south, km 78	summer[1]	5,000	Nil	71.4489	-79.7106
DF-RN-01	Tote Road – north, km 27	summer[1]	5,000	Nil	71.6883	-80.5363
DF-RN-02	Tote Road – north, km 27	year round	1,000	Low	71.7145	-80.4704
DF-RN-03	Tote Road – north, km 27	year round	Within PDA, 100 m from Tote Road	Moderate	71.7186	-80.4473
DF-RN-04	Tote Road – north, km 27	year round	Within PDA, 30 m from Tote Road	Moderate	71.7189	-80.4456
DF-RN-05	Tote Road – north, km 27	year round	Within PDA, 30 m from Tote Road	Moderate	71.7185	-80.4414
DF-RN-06	Tote Road – north, km 27	year round	Within PDA, 100 m from Tote Road	Moderate	71.7189	-80.4397
DF-RN-07	Tote Road – north, km 27	year round	1,000	Nil	71.7226	-80.4165
DF-RN-08	Tote Road – north, km 27	summer[1]	5,000	Nil	71.7435	-80.2898
DF-P-03	Milne Port	summer[1]	3,000	Nil	71.8996	-80.7884
DF-P-04	Milne Port	year round	Within PDA	Low	71.8710	-80.8828
DF-P-05	Milne Port	year round	Within PDA	Moderate	71.8843	-80.8945
DF-P-06	Milne Port	year round	Within PDA	Low	71.8858	-80.8790
DF-P-07	Milne Port	year round	Within PDA	Moderate	71.8838	-80.9160
DF-P-08	Milne Port	year round	1,000	Moderate	71.8722	-80.9126

Table 8-1. Dustfall monitoring site location and sampling period information for the Mary River Project 2020 dustfall monitoring program.

Site ID	Location	Sample Period	Distance to PDA (m)	Expected Dustfall	Latitude	Longitude
DF-RR-01	Reference – Road	summer[1]	14,000	Nil	71.2805	-80.2450
DF-RR-02	Reference – Road	summer[1]	14,000	Nil	71.5189	-80.6923
DF-TR-25E	Tote Road	year round	1,000	Nil	71.7425	-80.4394
DF-TR-25W	Tote Road	year round	1,000	Low	71.7395	-80.5068
DF-TR-56E	Tote Road	year round	1,000	Nil	71.5097	-80.2109
DF-TR-56W	Tote Road	year round	1,000	Low	71.4944	-80.2685
DF-TR-75E	Tote Road	year round	1,000	Nil	71.3902	-79.9917
DF-TR-75W	Tote Road	year round	1,000	Low	71.3709	-80.0007

[1] Summer sampling includes data collection from June, July, August, and September.

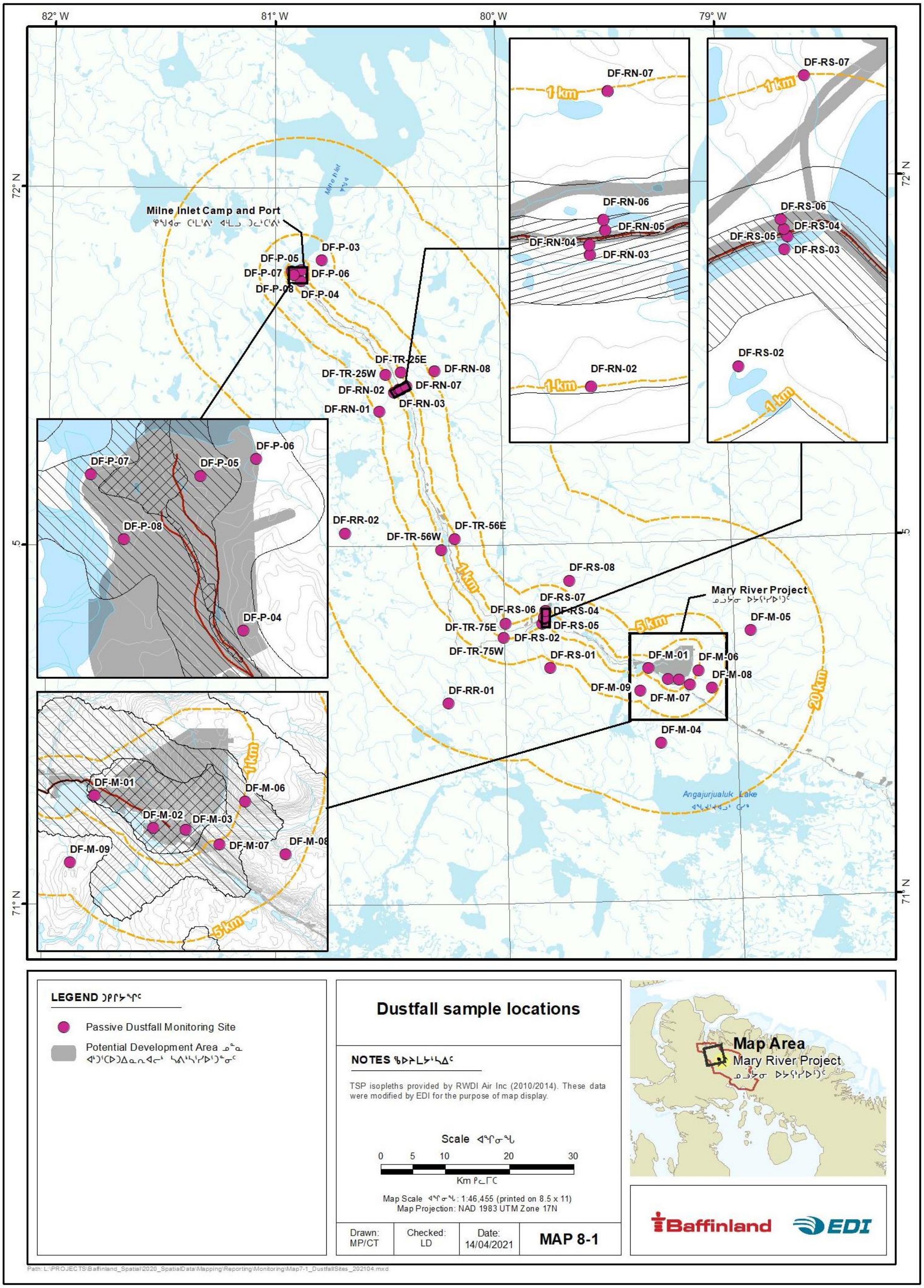
Table 8-2. Record of sampling associated with the Mary River Project 2020 dustfall monitoring program.

Sampling Session	Start Date[1]	End Date[1]	No. of Days	No. of Canisters Deployed	No. of Canisters Analyzed	Sampling Solution
1	04-Jan-2020	05-Feb-2020	27–28	26	26	Alcohol
2	04-Feb-2020	03-Mar-2020	28–29	26	26	Alcohol
3	04-Mar-2020	01-Apr-2020	28–30	26	25 [2]	Alcohol
4	02-Apr-2020	01-May-2020	28–30	26	26	Alcohol
5	02-May-2020	29-May-2020	28–34	26	26	Alcohol
6	30-May-2020	29-Jun-2020	27–31	39	39	Alcohol
7	30-Jun-2020	24-Jul-2020	27–30	39	39	Algaecide
8	1-Aug-2020	23-Aug-2019	23–30	39	39	Algaecide
9	23-Aug-2020	21-Sept-2020	27–30	38	38	Algaecide
10	22-Sept-2020	21- Oct-2020	29–30	16 [3]	16 [3]	Alcohol
11	21-Oct-2020	19-Nov-2020	29–60 [3]	26	26	Alcohol
12	19-Nov-2020	20- Dec-2020	28–31	26	26	Alcohol

[1] Sample collection and jar changeout can take more than one day for all sites to be collected; the first date of monthly sampler changeout is presented here.

[2] Sample jar for site DF-TR-25W leaked in transit and was not analyzed.

[3] Samples from 10 sites could not be accessed in late October due to poor snow conditions for snowmobiling. These samples were all collected at the end of November, and had 60-day sampling intervals, rather than 30. These sites include: DF-RS-02, DF-RS-07, DF-RN-02, DF-TR-07, DF-TR-25W, DF-TR-25E, DF-TR-56W, DF-TR-56E, DF-TR-75W, and DF-TR-75E.



Dustfall sample locations

NOTES

TSP isopleths provided by RWDI Air Inc (2010/2014). These data were modified by EDI for the purpose of map display.

Map Scale: 1:46,455 (printed on 8.5 x 11)
Map Projection: NAD 1983 UTM Zone 17N

Drawn:	Checked:	Date:	
MP/CT	LD	14/04/2021	MAP 8-1

Path: L:\PROJECTS\Baffinland_Spatial\2020_SpatialData\Mapping\Reporting\Monitoring\Map7-1_DustfallSites_202104.mxd

8.1.1.3 Data Trends and Statistical Analysis

Extent and Magnitude of Dustfall at Various Sites — Dustfall deposition rates (as TSP) for each site were compiled for the 2020 monitoring season 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 summer sampling periods (June, July, August, and September) were used to examine the relationship between dustfall and distance from the source (i.e., the PDA boundary) at the Mine Site, Milne Inlet port, North Tote Road Crossing (km 28) and South Tote Road Crossing (km 78). Mixed-effects statistical models were used to test for the interactions between distance from Project infrastructure and daily dustfall:

- Sites were treated as the random effect variables.
- Three distance groupings/categories were applied to dustfall sampling locations in proximity to the Mine Site and Milne Port: Near (within footprint), Far (1,000 m – 5,000 m), and Reference (>5,000 m).
- Four distance groupings/categories were applied to dustfall sampling locations near the Tote Road North and Tote Road South (30 m, 100 m, 1,000 m, and 5,000 m).

For this report, median values and inter-quartile ranges summarized dustfall within distance classes. Statistical analysis was conducted using R version 4.0.3 (R Development Core Team 2020). All data distributions were evaluated and handled to verify the assumptions of the parametric analyses[5]. Statistical significance, referring to the probability that the means are different from one another, was set at 95% (i.e., p-value <0.05).

Seasonal Variation in Dustfall — Daily dustfall was assessed at year-round sites across all Project areas (Mine Site, Milne Inlet port, North Tote Road Crossing and South Tote Road Crossing) to evaluate and identify any discrete seasonal/monthly patterns or continuous temporal patterns. The month of dustfall collection was identified from the period between consecutive sample dates (e.g., samples collected in early or mid-December were associated with dustfall in November). Generalized least squares regression was used to test for the season (summer and winter) effects 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 the sample site and sine/cosine functions of the month and the interaction between them. Statistical analysis was conducted using R version 4.0.3 (R Development Core Team 2020). All data distributions were evaluated and handled to verify the

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[5] 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 Kruskall-Wallis tests, with data stratified by sampling month. Kruskall-Wallis tests were performed using the R package 'coin' (Hothorn et al. 2006). If there was an effect of distance class on dustfall, pairwise tests were used to determine which distance classes were different. The 95% bias-correct and accelerated confidence intervals were calculated for each estimate by bootstrapping datasets and testing mixed effects models 1,000 times.

assumptions of each respective analysis[6]. Statistical significance, referring to the probability that the means are different from one another, was set at 95% (i.e., p-value <0.05).

Annual Dustfall — Within the Early Revenue Program (ERP) Final Environmental Impact Statement (FEIS), annual TSP rates predictions were developed with input from the results of the dust dispersion models, existing literature related to air quality guidelines and dust deposition, and similar dust monitoring programs in place at other northern mines:

Low:	1 to 4.5 g/m²/year;
Moderate:	4.6 to 50 g/m²/year; and,
High:	≥50 g/m²/year.

The results of the 2020 dustfall sampling program for monitoring site with year-round data collection were converted from units of mg/dm²·day to g/m²/year. They were compared with the modelled dust deposition isopleths for the Project to determine if deposition rates exceed the predicted range. Data for each month were converted to g/m²/day, and then summed to add up to one year.

Note 1: Sites in the nil and low isopleth zones were not sampled during the winter months, so annual accumulation was not calculated for those sites. Very low dustfall accumulation, often below laboratory detection, was observed at these sites during the summer months.

Note 2: The laboratory detection limit for dustfall sampling is 0.10 mg/dm²·day, which converts to an annual dustfall of 3.6 g/m²/year and is a substantial proportion of the low dustfall threshold of 4.5 g/m²/year. Therefore, total annual dustfall may be overestimated at some sites where data collected each month had dustfall below the laboratory detection limit.

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[6] All dustfall data were $\log_e$ transformed prior to 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 period time (Zuur et al. 2009). Model selection procedures followed an information theoretic approach using corrected Akaike's Information Criterion (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 Leven's tests) conducted, to confirm assumptions of normality and equality of variance in the residuals. If these assumptions were violated, non-parametric Kruskall-Wallis tests were conducting using R package 'coin' (Hothorn et al. 2006), and bootstrap resampling (1,000 times) was conducted to develop 95% bias-correct and accelerated confidence intervals for each estimate. If there was evidence of an effect of season or month on daily dustfall, the estimate marginal means were used to determine the geometric mean effect after accounting for the effect of sample site (Lenth et al. 2018).

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 (Mine Site, Milne Port, North Tote Road Crossing, and South Tote Road Crossing). Only sites that were sampled throughout the year were included in analyses. The month of dustfall collection was identified from the period between consecutive sample dates (e.g., samples collected in early or mid-December were associated with dustfall in November). Seasonal or monthly models were used to test the main effects of season/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 data distributions were evaluated and handled to verify the assumptions of each respective analysis[7]. Statistical significance, referring to the probability that the means are different from one another, was set at 95% (i.e., p-value <0.05).

8.1.2 RESULTS AND DISCUSSION

8.1.2.1 Magnitude and Extent of 2020 Dustfall

Mine Site — The 2020 monitoring program included nine dustfall samplers associated with 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 more than 5,000 m from the Mine Site (Table 8-1).

Within the mine footprint, dustfall deposition rates at DF-M-01, located near the airstrip, ranged from 0.30 to 17.00 $mg/dm^2 \cdot day$, with the highest dustfall recorded in May 2020 (Table 8-3). At DF-M-02, located nearest the crusher, the dust deposition rates ranged from 0.44 $mg/dm^2 \cdot day$ (June 2020) to 5.45 $mg/dm^2 \cdot day$ in March 2020. At site DF-M-03, located just south of the mine haul road near the ore deposit, the dustfall deposition rates ranged from 0.38 $mg/dm^2 \cdot day$ in November 2020 to a high of 6.96 $mg/dm^2 \cdot day$, measured in May 2020.

Outside the PDA, but within a 5,000 m radius, sites DF-M-06, -07, -08, and -09 were sampled during the summer months, from June to September. Dustfall sampled at these stations was low, ranging from below detection (<0.10 $mg/dm^2 \cdot day$) to a high of 0.31 $mg/dm^2 \cdot day$ in June 2020 at DF-M-07 (Table 8-3). Dustfall

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[7] All dustfall data were $\log_e$ transformed prior to analysis and results were back transformed to the original scale. A constant variance structure for season was used to account for higher variation in summer dustfall relative to winter dust fall; the same structure was used for year effects in the time-series model (Zuur et al. 2009).

Residual diagnostic plots were examined, and formal tests (Shapiro-Wilk and Leven's tests) conducted, to confirm assumptions of normality and equality of variance in the residuals. If these assumptions were violated, nonparametric Kruskall-Wallis tests were conducting using R package 'coin' (Hothorn et al. 2006), and bootstrap resampling (1,000 times) was conducted to develop 95% bias-correct and accelerated confidence intervals for each estimate. If there was evidence of an effect of season or month on daily dustfall we used estimate marginal means to determine the geometric mean effect (Lenth et al. 2018). Model selection procedures followed an information theoretic approach using corrected Akaike's Information Criterion (AICc; Burnham and Anderson 2002). Models with the lowest scores were identified as the best trade-off between parsimony and explained variance. Statistical analysis was conducted using R version 4.0.3 (R Development Core Team 2020).

deposition rates at both Mine Site reference locations (DF-M-04 and DF-M-05) were below detection (<0.10 mg/dm²·day) in all samples collected (also sampled only during summer months)

Dustfall was significantly higher in the Near monitoring sites when compared with Far and Reference monitors ($\chi^2 4 = 76.01$, $p < 0.001$; Figure 8-1 and Figure 8-2). Geometric mean daily dustfall was highest in the Near distance class at 1.10 (CI = 0.68–1.77) mg/dm²·day, which was significantly higher than the other two distance classes (all $p < 0.001$). Eight samples (50%) in the Far distance class were above the detection limit (0.1 mg/dm²·day); the geometric mean daily dustfall recorded at the Far distance class was 0.14 (CI = 0.09–0.21) mg/dm²·day. No samples in the Reference distance class were above the detection limit (0.10 mg/dm²·day).

Table 8-3. 2020 Dustfall (All Sites) — Total Suspended Particulates (TSP, $mg/dm^2 \cdot day$).

Site Name	Sample Collection Timing											
	Jan 4 – Feb 5	Feb 5 – Mar 3	Mar 4 – Apr 1	Apr 2 – May 1	May 1 – Jun 5	Jun 5 – Jun 26	Jun 26 – Jul 24	Jul 24 – Aug 23	Aug 23 – Sept 21	Sept 22 – Oct 21	Oct 22 – Nov 19	Nov 19 – Dec 20
DF-M-01	0.33	0.41	6.61	1.86	17.00	1.18	0.84	0.94	0.57	5.89	0.30	1.51
DF-M-02	1.29	1.91	5.45	1.99	2.93	0.44	0.97	1.18	0.66	4.93	0.73	1.25
DF-M-03	0.46	1.42	2.34	4.03	6.96	1.91	3.22	2.14	1.36	5.96	0.38	0.49
DF-M-04	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-	-
DF-M-05	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-	-
DF-M-06	-	-	-	-	-	0.11	0.28	<0.10	<0.10	-	-	-
DF-M-07	-	-	-	-	-	0.31	0.20	0.17	<0.10	-	-	-
DF-M-08	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-	-
DF-M-09	-	-	-	-	-	0.23	<0.10	0.15	0.12	-	-	-
DF-P-03	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-	-
DF-P-04	<0.10	0.11	0.22	1.62	2.59	0.65	0.40	0.47	1.23	0.69	0.12	<0.10
DF-P-05	0.89	1.25	2.28	3.80	7.67	1.73	1.46	1.60	4.42	6.67	0.71	1.15
DF-P-06	0.17	0.27	0.59	0.80	0.94	0.13	0.12	0.11	0.42	1.25	0.12	0.15
DF-P-07	0.14	<0.10	0.22	0.63	0.21	0.10	<0.10	0.21	0.67	0.76	0.12	0.13
DF-P-08	0.39	0.18	0.94	1.50	1.62	0.48	1.04	1.27	1.01	2.62	0.24	1.01
DF-RN-01	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-	-
DF-RN-02	<0.10	<0.10	<0.10	<0.10	<0.10	0.23	0.40	<0.10	<0.10	0.13[1]	0.13[1]	<0.10
DF-RN-03	0.28	0.44	0.39	1.47	3.66	3.05	4.97	2.39	3.45	5.84	0.55	0.45
DF-RN-04	0.80	0.91	0.84	3.18	8.62	6.14	10.20	5.48	8.19	13.00	1.17	0.85
DF-RN-05	0.87	1.47	1.32	4.51	18.80	13.50	8.45	7.23	7.70	12.90	1.30	1.61
DF-RN-06	0.43	0.60	0.49	2.32	7.86	5.92	3.67	2.88	3.40	5.05	0.59	0.65
DF-RN-07	<0.10	<0.10	<0.10	0.15	0.45	0.50	0.64	0.30	0.13	0.15[1]	0.15[1]	<0.10
DF-RN-08	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-	-
DF-RS-01	-	-	-	-	-	0.12	0.10	<0.10	<0.10	-	-	-
DF-RS-02	<0.10	<0.10	<0.10	0.24	1.25	0.67	1.17	0.56	0.39	0.32[1]	0.32[1]	<0.10
DF-RS-03	0.42	0.43	0.72	1.53	7.21	4.68	5.40	3.62	1.72	10.00	0.61	0.33

Table 8-3. 2020 Dustfall (All Sites) — Total Suspended Particulates (TSP, $mg/dm^2 \cdot day$).

Site Name	Sample Collection Timing											
	Jan 4 – Feb 5	Feb 5 – Mar 3	Mar 4 – Apr 1	Apr 2 – May 1	May 1 – Jun 5	Jun 5 – Jun 26	Jun 26 – Jul 24	Jul 24 – Aug 23	Aug 23 – Sept 21	Sept 22 – Oct 21	Oct 22 – Nov 19	Nov 19 – Dec 20
DF–RS-04	1.86	1.99	2.62	6.64	35.60	37.00	20.90	21.00	8.10	54.00	3.26	1.47
DF-RS-05	1.61	1.24	1.87	5.26	16.80	17.40	19.40	6.84	4.00	24.60	2.54	1.07
DF-RS-06	0.34	0.37	0.48	1.63	5.27	3.74	3.79	1.40	1.28	6.08	0.61	0.36
DF-RS-07	<0.10	<0.10	<0.10	0.15	0.41	0.23	0.22	<0.10	<0.10	0.12 [1]	0.12 [1]	<0.10
DF-RS-08	-	-	-	-	-	0.14	<0.10	<0.10	<0.10	-	-	-
DF-RR-01	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-	-
DF-RR-02	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-	-
DF-TR-25E	<0.10	<0.10	<0.10	0.23	0.90	0.59	0.54	0.47	0.20	0.19 [1]	0.19 [1]	<0.10
DF-TR-25W	<0.10	0.11	-	0.18	0.44	0.53	0.52	0.36	0.27	0.21 [1]	0.21 [1]	<0.10
DF-TR-56E	<0.10	<0.10	<0.10	<0.10	0.51	0.60	0.53	0.16	0.12	<0.10 [1]	<0.10 [1]	<0.10
DF-TR-56W	<0.10	<0.10	<0.10	0.11	0.25	0.30	0.33	0.19	0.10	0.26 [1]	0.26 [1]	<0.10
DF-TR-75E	<0.10	<0.10	<0.10	0.17	0.46	0.36	0.37	<0.10	<0.10	<0.10 [1]	<0.10 [1]	<0.10
DF-TR-75W	<0.10	<0.10	0.18	0.84	0.91	1.30	0.65	0.61	0.52	0.72 [1]	0.72 [1]	0.13

[1] Samples from 10 sites could not be accessed in late October due to poor snow conditions for snowmobiling. These samples were all collected at the end of November, and had 60-day sampling intervals, rather than 30. These sites include: DF-RS-02, DF-RS-07, DF-RN-02, DF-TR-07, DF-TR-25W, DF-TR-25E, DF-TR-56W, DF-TR-56E, DF-TR-75W, and DF-TR-75E. Data for these sites is therefore the same for October and November sample results as results are averaged on a per day basis.

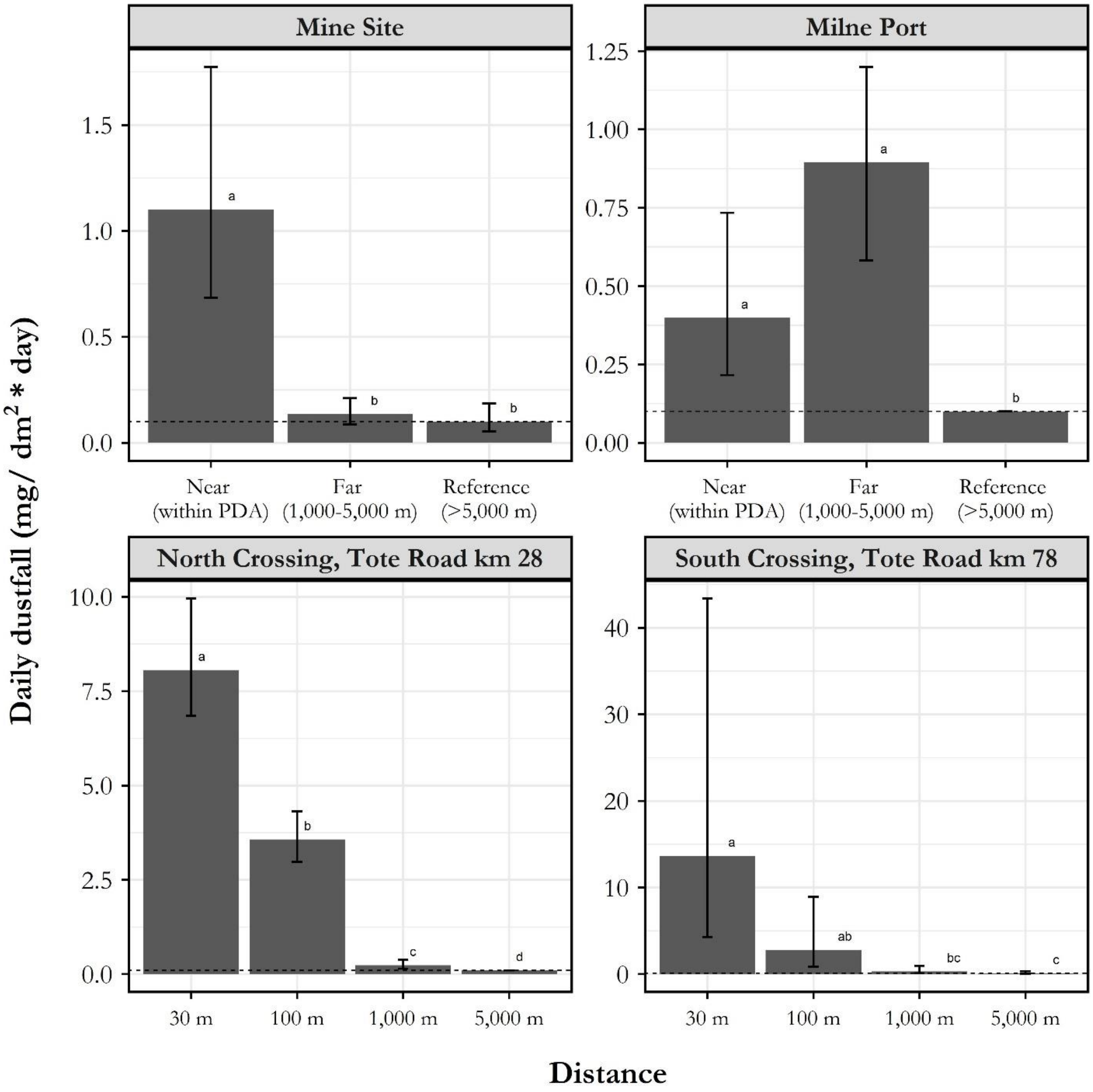


Figure 8-1. **Daily dustfall (mg/dm²·day) for the Mine Site, Milne Port, Tote Road north crossing (km 28), and Tote Road south crossing (km 78).**

Tote Road sites are measured as a function of distance from the Tote Road. Scales are different for each area to allow a review of differences between the sites at each area. Bar heights show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the $\log_e$ *scale and back-transformed to the natural scale. The dashed horizontal line indicates the minimum detection limit (MDL) for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.*

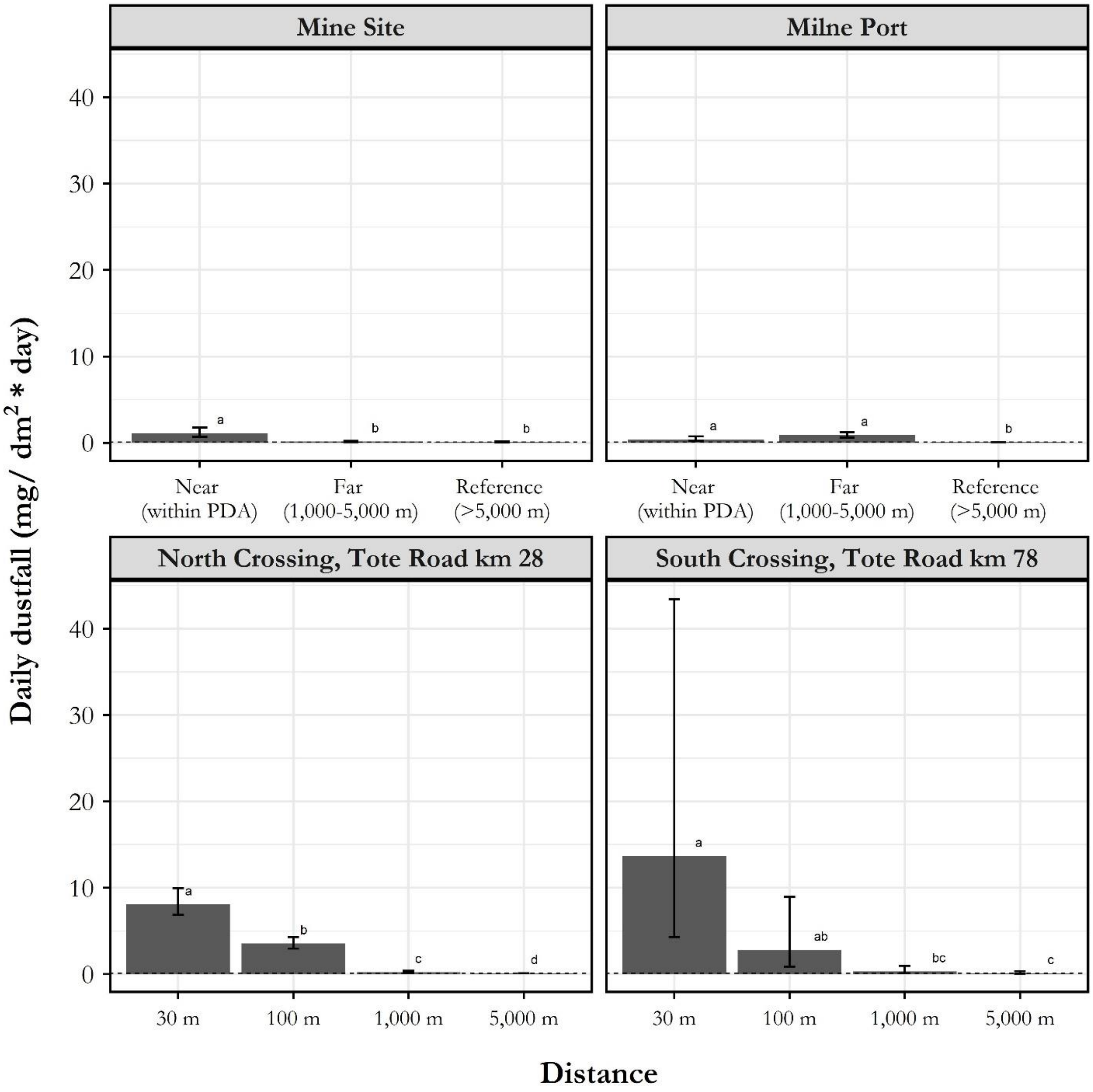


Figure 8-2. Daily dustfall (mg/dm²·day) for the Mine Site, Milne Port, Tote Road north crossing (km 28), and Tote Road south crossing (km 78).

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. Bar heights show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the $\log_e$ *scale and back-transformed to the natural scale. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.*

Milne Port — Six dustfall samplers were associated with Milne Port in 2020 (Table 8-1; Map 8-1): five active sites on the port footprint and one Reference site located northeast of the Port Site.

Dustfall deposition rates at Milne Port were highest at DF-P-05, located centrally in the camp area, to the east of the sealift staging pad, where dustfall ranged from 0.71 mg/dm^2·day (November 2020) to 7.67 mg/dm^2·day in May 2020 (Table 8-3). Dustfall deposition rates at DF-P-06, nearest to the sealift staging pad on the west side, ranged from 0.11 mg/dm^2·day to a high of 1.25 mg/dm^2·day. Dustfall deposition at DF-P-08, nearest the ore pad, ranged from 0.18 mg/dm^2·day to 2.62 mg/dm^2·day (Table 8-3), which was comparable with dustfall at DF-P-04, primarily associated with the Tote Road and quarry operations, and ranged from below detection to 2.59 mg/dm^2·day. Dustfall at DF-P-07, near the ore pad, had dustfall ranging from below detection (<0.10 mg/dm^2·day) to 0.76 mg/dm^2·day. Dustfall deposition rates at the Milne Port Reference site, DF-03-P, which was sampled only in summer months, were below detection in all samples.

No statistically significant difference was found between Near and Far distances classes ($\chi^2$1 = 1.12, p = 0.29) and both had overlapping bootstrapped confidence intervals. Geometric mean daily dustfall was highest in the Far distance class at 0.89 (CI = 0.58–1.20) mg/dm^2·day, followed by 0.40 (CI = 0.22–73) mg/dm^2·day at Near sites. This is likely because DF-P-08 falls in the 'far' distance class, but is downwind of the ore stockpiles, and, as a result, has higher dustfall than noted at DF-P-07, which is in the 'Near' class. No samples in the Reference distance class were above the detection limit (0.10 mg/dm^2·day).

Tote Road Dustfall — Twenty-four dustfall monitors were associated with the Tote Road in 2020: eight at each of two transects perpendicular to the road (the North crossing site at km 27 of the Tote Road, and South crossing site at km 78 of the Tote Road), two Reference samplers 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 kilometres 25, 56 and 75. These six paired sites were added in 2019, at the request of the QIA and the MHTO, to increase monitoring of dustfall at 1,000 m from the Tote Road.

North Crossing, Tote Road km 28 — Dustfall was highest at the sample stations nearest the centerline on both sides of the Tote Road (DF-RN-04 and -05) with dustfall that ranged from 0.80 to 13.0 mg/dm^2·day at DF-RN-04 and from 0.87 to 18.80 mg/dm^2·day at DF-RN-05. Dustfall decreased with distance from the centerline, and dustfall at DF-RN-03 and DF-RN-06 ranged from 0.28 to 5.84 mg/dm^2·day, and from 0.43 to 7.86 mg/dm^2·day, respectively. Dustfall in two monitors 1,000 m from the PDA (DF-RN-02 and -07) ranged from below detection to 0.40 mg/dm^2·day, and below detection to 0.64 mg/dm^2·day, respectively. Dustfall deposition data collected during the summer season at the farthest sites (DF-RN-01 and -08) were below laboratory detection, <0.10 mg/dm^2·day (Table 8-3).

Strong evidence was found for an effect of distance from the north road on daily dustfall (Figure 8-1 and Figure 8-2). Geometric mean daily dustfall was highest in the 30 m distance class (8.06 (CI = 6.85–9.96) mg/dm^2·day) compared to all others (all p = 0.001). Geometric mean daily dustfall at collectors 100 m from the PDA was 3.57 (CI = 2.98–4.32) mg/dm^2·day, which was significantly higher than the two farther distance classes (all p = 0.001). There was also a significant difference in dustfall between the 1,000 m and 5,000 m distance classes ($\chi^2$1 = 8.49, p = 0.004). Geometric mean daily dustfall at collectors 1,000 m from the PDA was 0.24 (CI = 0.15–0.39) mg/dm^2·day, and 75% of all samples were above the detection limit. All daily dustfall at collectors 5,000 m from the PDA were less than 0.10 mg/dm^{2}·day because none of these samples were at or above the detection limit.

South Crossing, Tote Road km 78 — Dustfall was highest at the sample station nearest the centerline on the south side of the Tote Road (DF-RS-04), where dustfall ranged from 1.47 to 54.00 mg/dm^{2}·day. On the north side of the road (DF-RS-05), the dustfall ranged from 1.07 to 24.60 mg/dm^{2}·day. Dustfall decreased with distance from the centerline, and dustfall at DF-RS-03 and DF-RS-06 ranged from 0.33 to 10.00 mg/dm^{2}·day and from 0.34 to 6.08 mg/dm^{2}·day, respectively. Dustfall in collectors at 1,000 m from the PDA (DF-RS-02 and -07) ranged from below detection to 0.24 mg/dm^{2}·day, and below detection to 1.25 mg/dm^{2}·day, respectively. Dustfall deposition data collected during the summer season at the farthest sites (DF-RN-01 and -08) ranged from below detection to 0.12 mg/dm^{2}·day, and below detection to 0.14 mg/dm^{2}·day, respectively (Table 8-3). The south crossing monitors are in a wide valley where high winds are common, generally travelling north to south; these sites are also just north of a bridge crossing. As vehicles exit the bridge, they accelerate, resulting in increased dust production, which the winds then blow towards the south of the Tote Road. Therefore, dustfall at the south crossing is generally higher than at other monitoring locations along the Tote Road.

As seen at the North crossing, dustfall at the South crossing decreased significantly with increasing distance from the Tote Road centerline. Evidence was found of an effect of distance from the south road on daily dustfall ($\chi^{2}4 = 82.51$, $p < 0.0001$; Figure 8-1 and Figure 8-2). Geometric mean daily dustfall was highest at collectors 30 m from the PDA at 13.66 (CI = 4.30–43.38) mg/dm^{2}·day, which was significantly higher than that at collectors 1,000 m and 5,000 m from the PDA (all $p \leq 0.01$) but not that that are 100 m from the PDA ($p = 0.17$). Geometric mean dustfall in the collectors at 100 m from the PDA was 2.82 (CI = 0.89–8.95) mg/dm^{2}·day, which was higher than collectors 5,000 m from the PDA ($p = 0.02$). Geometric mean dustfall in 1,000 m (0.31 [CI = 0.10–0.99] mg/dm^{2}·day) and 5,000 m (0.11 [CI = 0.03–0.34] mg/dm^{2}·day) distances classes were not different from each other ($p = 0.38$). Six samples (75%) in the 1,000 m distance class and three samples (38%) in the 5,000 m distance class were above the 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 in summer months, were below lab detection in all samples (Table 8-3) and are not included in graphs such as Figure 8-1 and Figure 8-2.

Dustfall at Sites 1,000 m from the Potential Development Area — Twelve dustfall monitoring sites were located at 1,000 m distance from the PDA; two were located at the Mine Site, and the other ten in various locations along the Tote Road. The two Mine Site collectors were sampled only during the summer period; however, the road sites were sampled throughout the year.

A review of summer data for all sites indicated significant differences in dustfall among the sites located 1,000 m from the Project infrastructure during the summer months (F11,34 = 11.74, $p < 0.0001$; Figure 8-3). Geometric mean daily dustfall during the summer months was highest for DF-TR-75W at 0.72 (CI = 0.17–3.09) mg/dm^{2}·day. Dustfall was significantly higher at this site than all others (all $p \leq 0.04$) except DF-RS-02 ($p > 0.99$), DF-TR-25E ($p = 0.56$), and DF-TR-25W ($p = 0.46$).

Significant differences in dustfall occurred among the sites located 1,000 m from the Project infrastructure based on year-round data (F9,90 = 11.28, p < 0.0001; Figure 8-4). Geometric mean daily dustfall was, once again, highest for DF-TR-75W at 0.39 (CI = 0.23–0.64) mg/dm²·day, but lower than the geometric mean in summer months. Dustfall was significantly higher at this site than all others (all p ≤ 0.03) except DF-RS-02 (p = 0.65). Evidence also suggested that dustfall at DF-TR-75W was greater than dustfall at DF-TR-25E (p = 0.56).

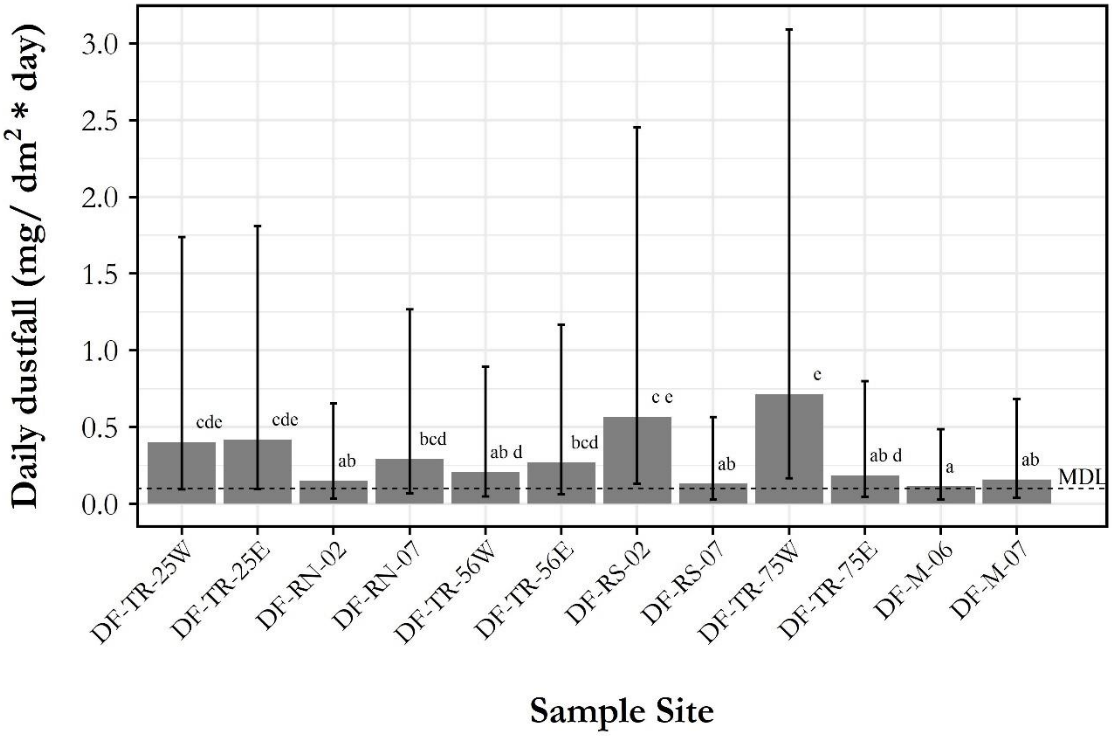


Figure 8-3. Daily dustfall (mg/dm²·day) for all sites 1,000 m from project infrastructure during the summer season.
Bar heights show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the $\log_e$ scale and back-transformed to the natural scale. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.

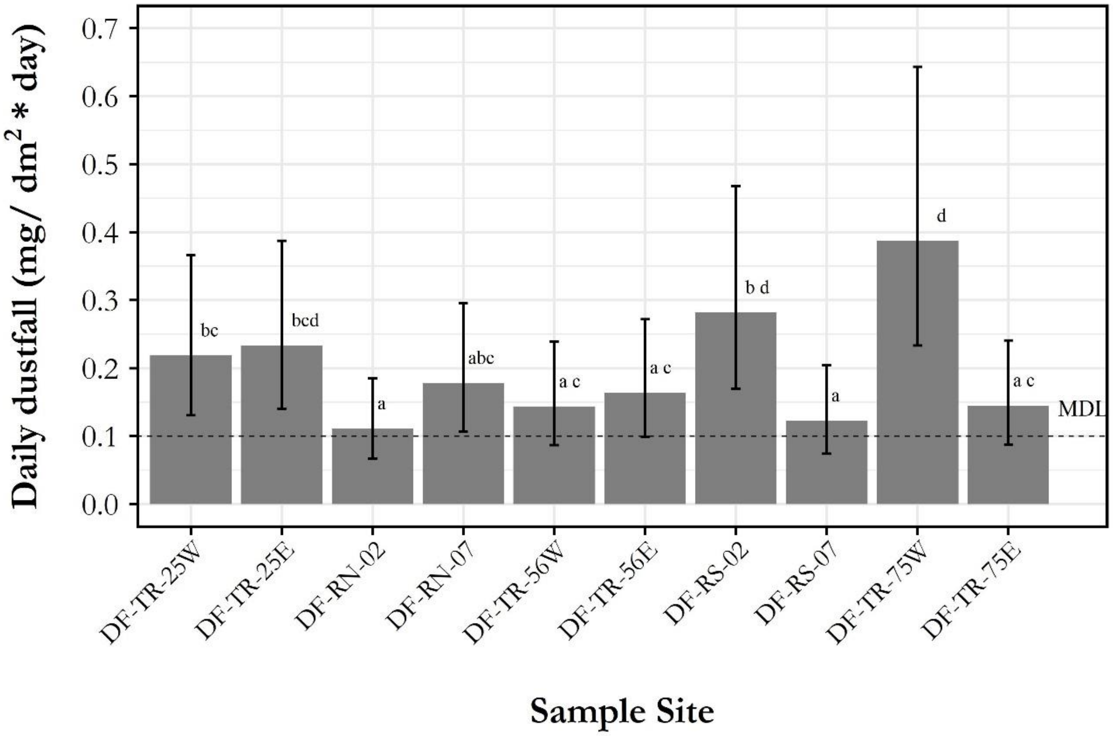


Figure 8-4. Daily dustfall (mg/dm²·day) for all sites 1,000 m from the Tote Road using year-round data.
Bar heights show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the $\log_e$ scale and back-transformed to the natural scale. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.

8.1.2.2 Seasonal Comparisons of 2020 Dustfall

Seasonal variations in dustfall in all Project areas were investigated as per the dustfall monitoring objectives. Dustfall deposition across various components of the PDA did not respond consistently to seasonality; dustfall at the Mine Site and at Milne Port was elevated in early spring (March/April) and early fall (September), while dustfall deposition along the Tote Road seemed to be elevated through the summer months with a peak in September.

Mine Site — Patterns across time were best represented by a sinusoidal function of the month, whereby fluctuations in geometric mean daily dustfall followed a five-month cyclic pattern with peaks in April and September ($F_{1,34}$ = 13.59, p = 0.0008; Figure 8-5). This model better explained variation in the data than a model categorizing summer and winter seasons (AICc = 96.15 versus 103.92, respectively). There were no differences in geometric mean daily dustfall among sites ($F_{2,32}$ = 13.59, p = 0.74); all sites had overlapping confidence intervals for each month. The sinusoidal function corresponds with a mean value of 1.5 (CI = 1.09–2.11) mg/dm²·day that fluctuated to a high of 3.22 in April and September and a low of 0.72 in mid-summer and mid-winter months.

Milne Port — Patterns across time were, as at the Mine Site, best represented by a sinusoidal function of the month, whereby fluctuations in geometric mean daily dustfall followed a five-month cyclic pattern with peaks in April and September ($F_{1,54} = 30.33$, $p < 0.0001$; Figure 8-5). These cycles corresponded to different mean values dependent on the site (different functions for each site; $F_{4,54} = 41.89$, $p < 0.0001$; Figure 8-5). This model better explained variation in the data than a model categorizing summer and winter seasons (AICc = 120.72 versus 131.92, respectively). The sinusoidal functions corresponded with a mean value of that fluctuation between periods of highs (April and September) and lows (mid-summer and mid-winter months) in geometric mean daily dustfall. Site DF-P-05 had the highest geometric mean dustfall during peaks, 4.72 $mg/dm^2 \cdot day$, compared to all other sites (all $p < 0.0009$), followed by DF-P-08 with the second highest peaks (all $p < 0.01$) at 1.65 $mg/dm^2 \cdot day$. Site DF-P-07 had the lowest daily rate, 0.38 $mg/dm^2 \cdot day$, and was significantly different from all sites except DF-P-06 ($p = 0.16$).

North Crossing, Tote Road km 28 — Patterns across time were best represented by differences in months rather than fluctuating patterns across time (AICc = 50.41 versus 78.91, respectively). This is made clear by the relatively poor-fitting sinusoidal function (four-month periods in fluctuations; Figure 8-5). However, season differences similarly explained sufficient variation (AICc = 53.36) because of the rise in dustfall during summer months (Figure 8-6 and Figure 8-7). The slightly less support for seasonal differences was because April and May were classified as winter months; nevertheless, seasonal differences were evident. Because data violated normality assumptions, non-parametric Kruskal-Wallis tests were used to identify the statistical differences among sites and seasons. The effects of season ($\chi^2 1 = 14.54$, $p = 0.0001$) was confirmed but not for the effect of site ($\chi^2 3 = 9.86$, $p = 0.02$). Confidence intervals corresponding to each site in each season were developed from bootstrap resampling procedures. Geometric mean daily dustfall was greatest at site DF-RN-05 during summer at 9.70 (CI = 6.39–15.46) $mg/dm^2 \cdot day$, which decreased significantly to 2.46 (CI = 1.62–4.84) $mg/dm^2 \cdot day$ during winter (Figure 8-5). The second highest mean daily dustfall site was DF-RN-04 during summer at 6.98 (CI = 4.32–15.46) $mg/dm^2 \cdot day$, which decreased significantly to 1.77 (CI = 1.14–3.00) $mg/dm^2 \cdot day$ during winter. The lowest rates were associated with site DF-RN-03 with 3.28 (CI = 2.20–5.38) $mg/dm^2 \cdot day$ during summer and 0.83 (CI = 0.53–1.63) $mg/dm^2 \cdot day$ during winter.

South Crossing, Tote Road km 78 — Patterns across time were best represented by differences per month rather than a season or fluctuating patterns across time (AICc = 15.15 versus 47.12 and 95.49, respectively). This is made clear by the relatively poor-fitting sinusoidal function (four-month periods in fluctuations; Figure 8-5) and similar dustfall rates among seasons (Figure 8-7). Solid evidence was found for an effect of the site ($F3,34 = 230.26$, $p < 0.0001$) and month ($F10,34 = 154.85$, $p < 0.0001$). Geometric mean daily dustfall was consistently highest at site DF-RS-04 across several months (Figure 8-5); the highest values were associated with May (45.14 $mg/dm^2 \cdot day$; [CI = 35.84–56.86]) and September (29.89 $mg/dm^2 \cdot day$; [CI = 25.04–35.68]). This same pattern was evident across all sites, even those with relatively low dustfall overall. E.g., the highest rates for site DF-RS-06 were 7.03 (CI = 5.58–8.85) $mg/dm^2 \cdot day$ in September and 4.65 (CI = 3.90–5.56) $mg/dm^2 \cdot day$ in May.

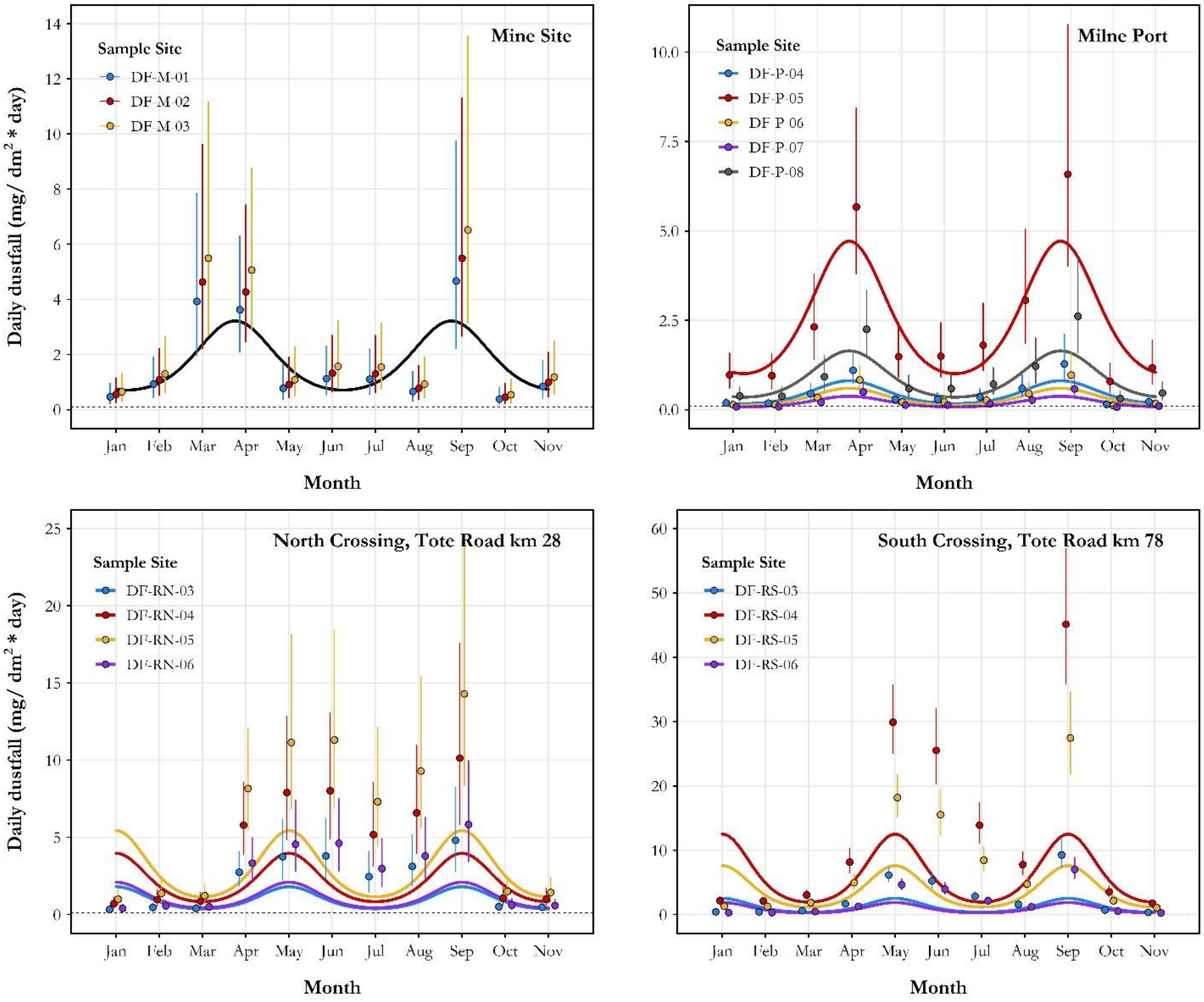


Figure 8-5. Daily dustfall (mg/dm²·day) by site and month (time-series or category).

Axis scales are different for each area to allow a review of differences between the sites at each area. Bar heights show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the loge scale and back-transformed to the natural scale. Lines correspond with sinusoidal functions relative to each sample site. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.

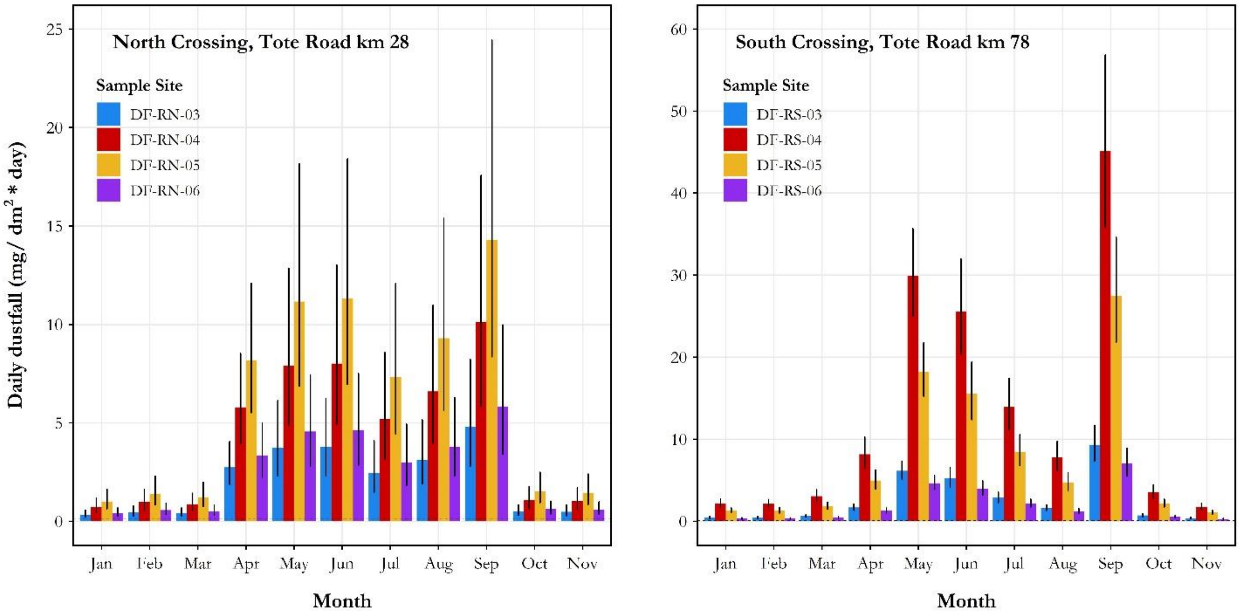


Figure 8-6. Daily dustfall (mg/dm²·day) by site and month.
Axis scales are different for each area to allow a review of differences between the sites at each area. Bar heights show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the $\log_e$ scale and back-transformed to the natural scale. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.

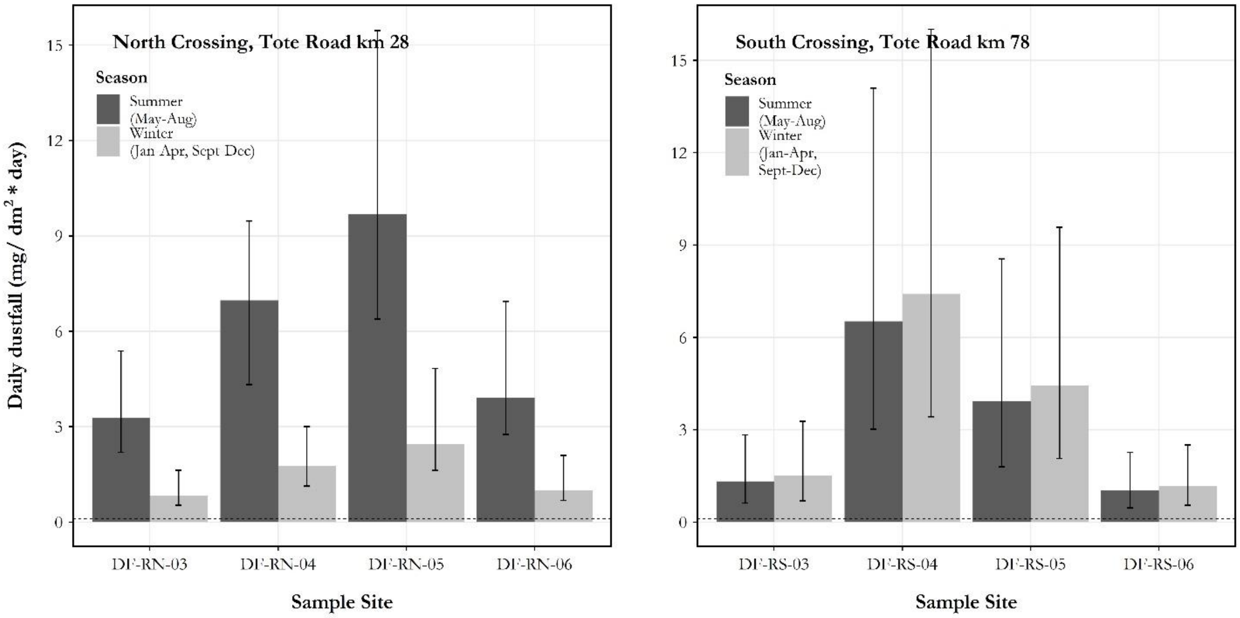


Figure 8-7. Daily dustfall (mg/dm²·day) by site and season (summer and winter).
Bar heights show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the $\log_e$ scale and back-transformed to the natural scale. The dashed horizontal line indicates MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.

8.1.2.3 2020 Annual Dustfall

Total annual dustfall was calculated for all sites that were sampled year-round for the 2020 calendar year. Sites in the nil and low isopleth zones were not sampled during winter months when helicopter access was unavailable; therefore, annual accumulation was not estimated for these sites. However, low dustfall accumulation, generally below laboratory detection, was observed at these remote sites during the summer months. It can therefore be reasonably assumed that this would also be the case in the winter months.

Annual dustfall in monitors at the Mine Site were all predicted to be in the 'high' isopleth ($\geq$50 g/m²/year). The highest dustfall was noted at site DF-M-01 (107.18 g/m²/year), followed by DF-M-03 (88.51 g/m²/year) and DF-M-02 (68.36 g/m²/year) (Table 8-4, Figure 8-8).

Year-round dustfall sampler at Milne Port Site DF-P-05 had annual dustfall deposition rates greater than 50 g/m²/year, which differs from predictions that expected it would fall into the moderate isopleth. The total annual deposition rate at DF-P-05 was 96.80 g/m²/year (Table 8-4). Annual dustfall at DF-P-08 was 35.60 g/m²/year, which fall within the predicted moderate isopleth. Annual dustfall from Milne Port Sites DF-P-04, -06 and -07 fell into the moderate isopleth with annual dustfall rates of 23.89, 14.57 and 35.60 g/m²/year, respectively; however, DF-P-04 and -06 were modelled to be in the low isopleth range (Figure 8-8).

Annual dustfall at the North and South Tote Road crossing locations within 30 m of the road centerline fell within the high isopleth, though they were modelled to fall into the moderate isopleth range (Table 8-4; Figure 8-8). However, while dustfall at the South Road crossing, measured at 100 m from the centerline, exceeded the moderate isopleth range, dustfall at the North road crossing, measured at 100 m from the centerline, was within the predicted moderate isopleth.

Annual dustfall at all 10 Tote Road monitors located 1,000 m from the road centerline fell above the 'low' isopleth threshold of 4.5 g/m²/year. Annual dustfall at these sites ranged from 6.09 to 21.53 g/m²/year, with the highest annual dustfall of the 1,000 m sites recorded at DF-TR-75W (Table 8-4 and Figure 8-9).

Table 8-4. 2020 Annual Dustfall Accumulation for sites sampled year-round throughout 2020 (January 8 to December 26, 2020).

Site	Area	Distance from PDA	Predicted Range [1]	Isopleth Upper Limit	Annual Dustfall (g/m²/year)	EIS Prediction Comparison
DF-M-01	Mine Site	0	High	N/A [2]	107.18	Within prediction
DF-M-02	Mine Site	0	High	N/A	68.36	Within prediction
DF-M-03	Mine Site	0	High	N/A	88.51	Within prediction
DF-P-04	Milne Inlet Port	0	Low	4.5	23.89	Above prediction
DF-P-05	Milne Inlet Port	0	Moderate	50	96.80	Above prediction
DF-P-06	Milne Inlet Port	0	Low	4.5	14.57	Above prediction
DF-P-07	Milne Inlet Port	0	Moderate	50	8.12	Within prediction
DF-P-08	Milne Inlet Port	0	Moderate	50	35.60	Within prediction
DF-RS-03	Road South	100	Moderate	50	107.37	Above prediction
DF-RS-04	Road South	30	Moderate	50	566.58	Above prediction
DF-RS-05	Road South	30	Moderate	50	298.61	Above prediction
DF-RS-06	Road South	100	Moderate	50	74.41	Above prediction
DF-RN-03	Road North	100	Moderate	50	77.57	Above prediction
DF-RN-04	Road North	30	Moderate	50	133.38	Above prediction
DF-RN-05	Road North	30	Moderate	50	228.80	Above prediction
DF-RN-06	Road North	100	Moderate	50	97.12	Above prediction
DF-RN-02	Tote Road	1,000	Low	4.5	6.09	Above prediction
DF-RN-07	Tote Road	1,000	Low	4.5	9.56	Above prediction
DF-RS-02	Tote Road	1,000	Low	4.5	16.92	Above prediction
DF-RS-07	Tote Road	1,000	Low	4.5	6.65	Above prediction
DF-TR-25E	Tote Road	1,000	Low	4.5	12.12	Above prediction
DF-TR-25W	Tote Road	1,000	Low	4.5	10.03	Above prediction
DF-TR-56E	Tote Road	1,000	Low	4.5	8.89	Above prediction
DF-TR-56W	Tote Road	1,000	Low	4.5	7.72	Above prediction
DF-TR-75E	Tote Road	1,000	Low	4.5	7.59	Above prediction
DF-TR-75W	Tote Road	1,000	Low	4.5	21.53	Above prediction

[1] Predictions based on pre-Project dust dispersion models.

[2] The 'high' range does not have an upper limit; sites modelled in the high category are predicted to have >50 g/m²/year of total suspended particulate matter (dustfall).

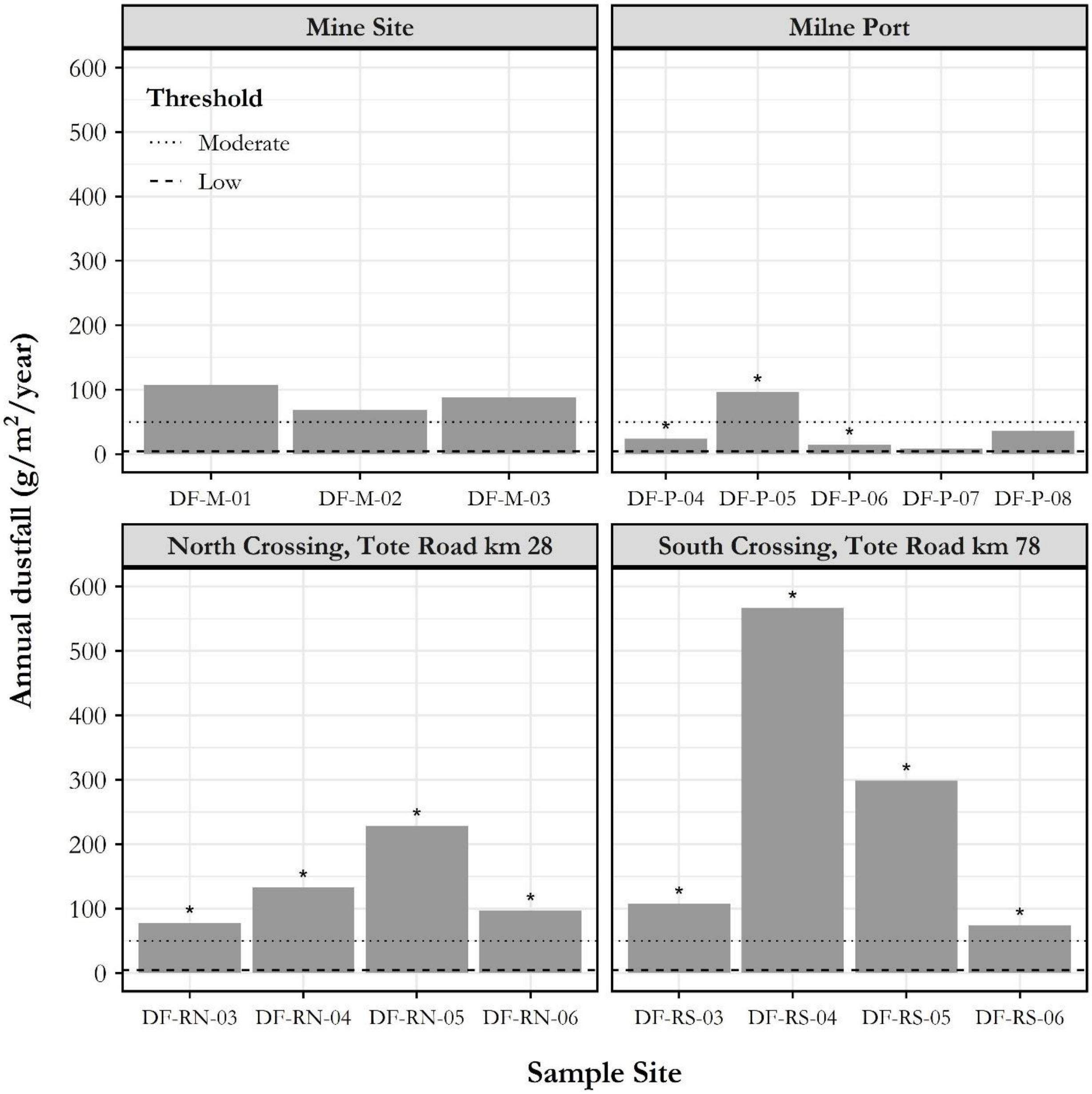


Figure 8-8. Annual dustfall (g/m²/year) for stations sampled year-round.

Dashed horizontal lines show low, moderate, and high dust isopleth upper limits. The asterisk (*) denotes that the annual dustfall was greater than projected by the predicted isopleth.

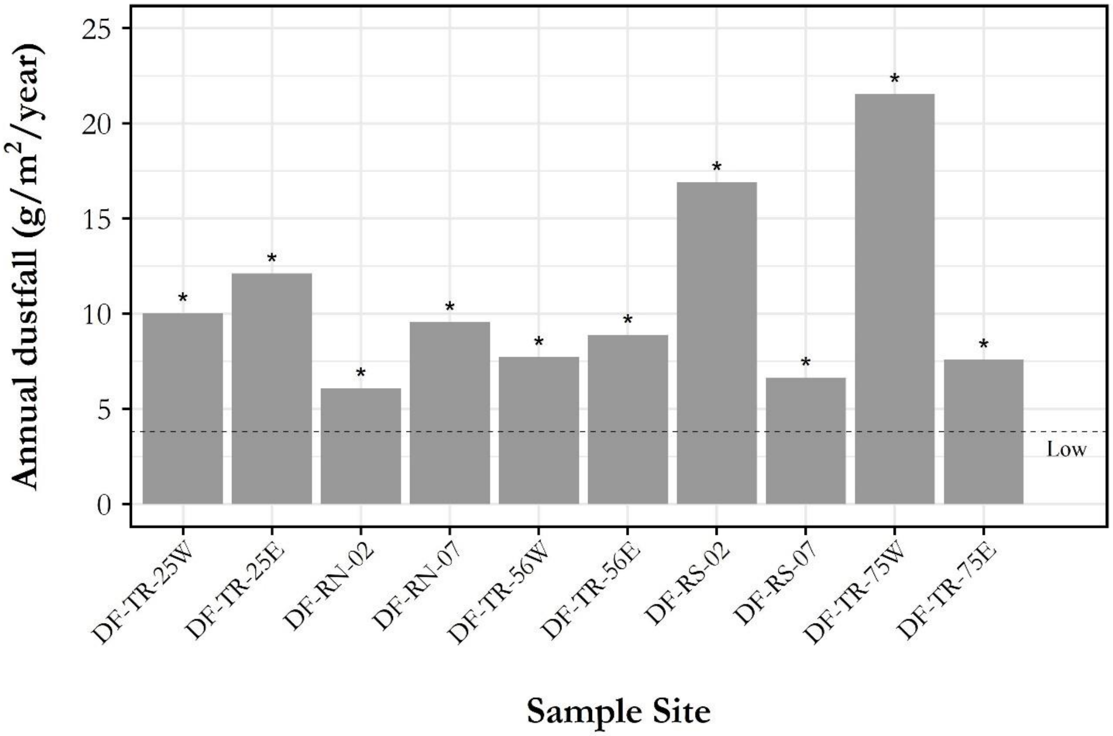


Figure 8-9. Total annual dustfall (g/m²/year) at Tote Road sites located 1,000 m distant from the centreline.
Dashed horizontal line shows low dust isopleth upper limits. The asterisk (*) denotes that the annual dustfall was greater than projected by the predicted isopleth.

8.1.3 INTER-ANNUAL TRENDS

8.1.3.1 Seasonal Dustfall

Mine Site — Inter-annual dustfall deposition patterns across time were best represented by differences in months rather than seasons or fluctuating patterns across time (AICc = 613.21 versus 635.26 and 633.18, respectively). The strongest evidence was for the effect of month ($F_{11,204} = 5.82$, $p < 0.0001$; Figure 8-10). Dustfall deposition from 2014 through 2020 at the Mine Site was consistently higher in March and April than in any other months. The lowest dustfall deposition rates were associated with January, July, August, and October. The greatest mean differences were between April and January, July, August, and October (all $p < 0.001$). March and April were not significantly different among years ($p > 0.9$). The highest geometric mean daily dustfall rates were in March (5.63 [CI = 1.95–16.33] mg/dm²·day) and April (4.53 [CI = 1.45–14.08] mg/dm²·day) of 2016. The lowest daily dustfall months were in July (0.61 [CI = 0.20–1.89] mg/dm²·day) and October (0.61 [CI = 0.20–1.91] mg/dm²·day) of 2015. There was no evidence of a year effect ($F_{5,199} = 1.69$, $p = 0.14$).

Milne Port — Monthly comparisons, rather than seasonal comparisons, became the focus of analysis when it was determined that inter-annual patterns were best represented by a sinusoidal function of month rather than by season (AICc = 919.24 versus 943.22, respectively); fluctuations in geometric mean daily dustfall followed a five-month cyclic pattern with peaks in April and September ($F_{1,349} = 4.94$, p = 0.03; Figure 8-11). A significant interaction existed between year and the sinusoidal function ($F_{5,349} = 3.23$, p = 0.007), demonstrating varied fluctuation rates in geometric mean daily dustfall among years. This was consistent with certain years having greater overall dustfall ($F_{5,349} = 3.14$, p = 0.009). Highs and lows across months were most pronounced in 2020 (e.g., high of 1.17 [CI = 0.39–3.57] mg/dm²·day in April and low of 0.31 [CI = 0.10–0.96] mg/dm²·day in January) but, overall, 2018 had the highest mean dustfall during peaks and across months (Figure 8-11). The relatively flat curve in 2019 is because those data did not conform well with an approximate five-month period, unlike other years. The standard error of the monthly estimates for 2019 was greater than the corresponding mean values.

North Crossing, Tote Road km 28 — As at the Mine Site, inter-annual patterns across time were best represented by differences in months rather than seasons or fluctuating patterns across time (AICc = 676.26 versus 809.50 and 777.97, respectively). The strongest evidence was for the effect of month ($F_{11,265} = 30.07$, $p < 0.001$; Figure 8-12), with only suggestive evidence of a year effect ($F_{5,265} = 1.99$, p = 0.08). The year effect corresponded to a potential difference between 2019 and 2020 dustfall (p = 0.03). The greatest mean differences were between June and January, a mean difference of 11.41 mg/dm²·day ($p < 0.001$). Geometric mean daily dustfall was highest in June 2020 (7.16 [CI = 2.42–21.20] mg/dm²·day) and lowest in January 2019 (0.40 [CI = 0.13–1.17] mg/dm²·day).

South Crossing, Tote Road km 78 — Inter-annual patterns across time were best represented by differences in months rather than seasons or fluctuating patterns across time (AICc = 675.01 versus 1,006.19 and 908.66, respectively). Strong evidence existed for the effect of month ($F_{11,272} = 87.78$, $p < 0.001$) and year ($F_{5,272} = 5.35$, p = 0.0001). The highest geometric mean daily dustfall occurred in May and June for all years (Figure 8-13); the highest values were associated with 2020 (14.49 [CI = 4.16–50.43] mg/dm²·day in May and 13.97 [CI = 3.93–49.72] mg/dm²·day in June). The lowest geometric mean daily dustfall occurred in December and January for all years; the lowest values were associated with 2016 (0.25 [CI = 0.07–0.89] mg/dm²·day in January and 0.27 [CI = 0.07–0.98] mg/dm²·day in December).

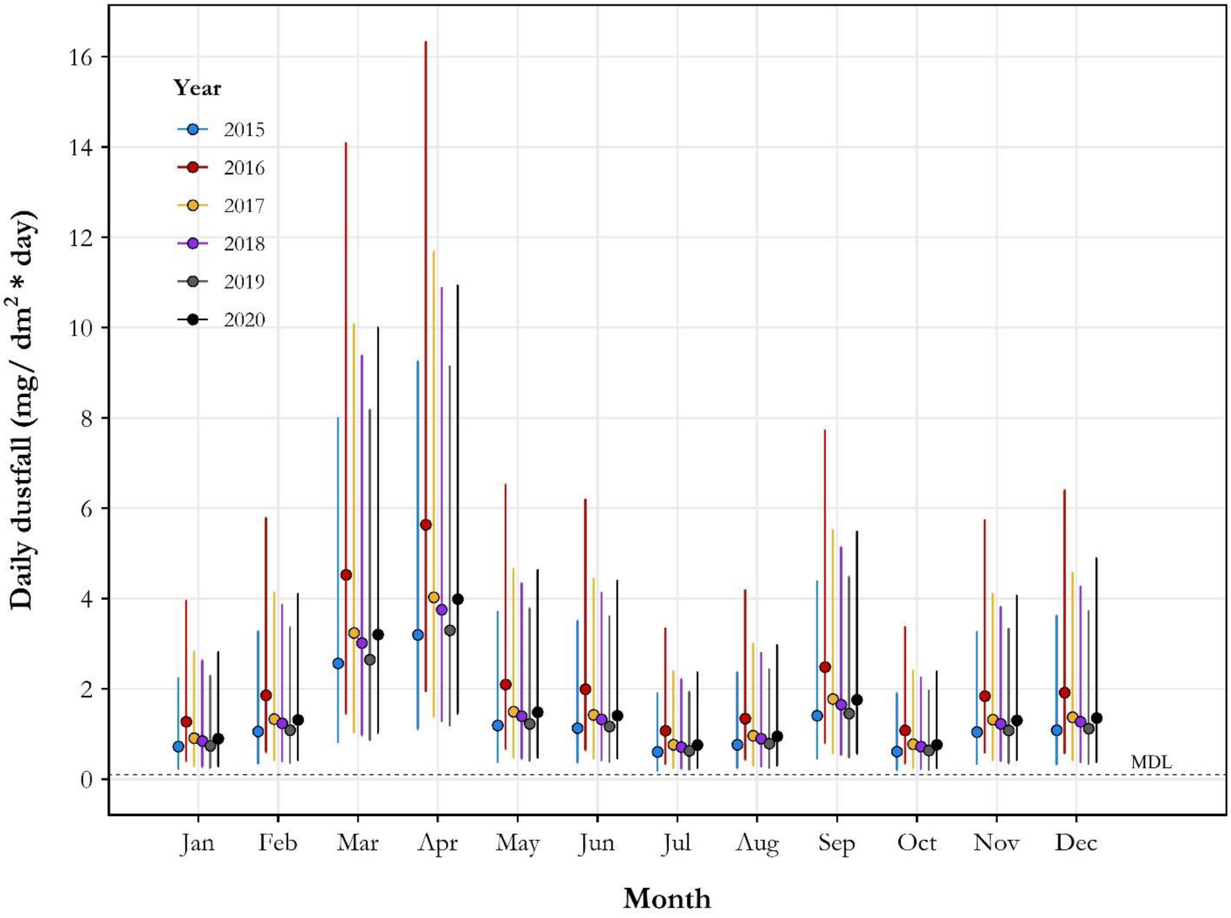


Figure 8-10. Mine Site — Inter-annual differences in daily dustfall (mg/dm²·day).

Points show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the $\log_e$ *scale and back-transformed to the natural scale. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.*

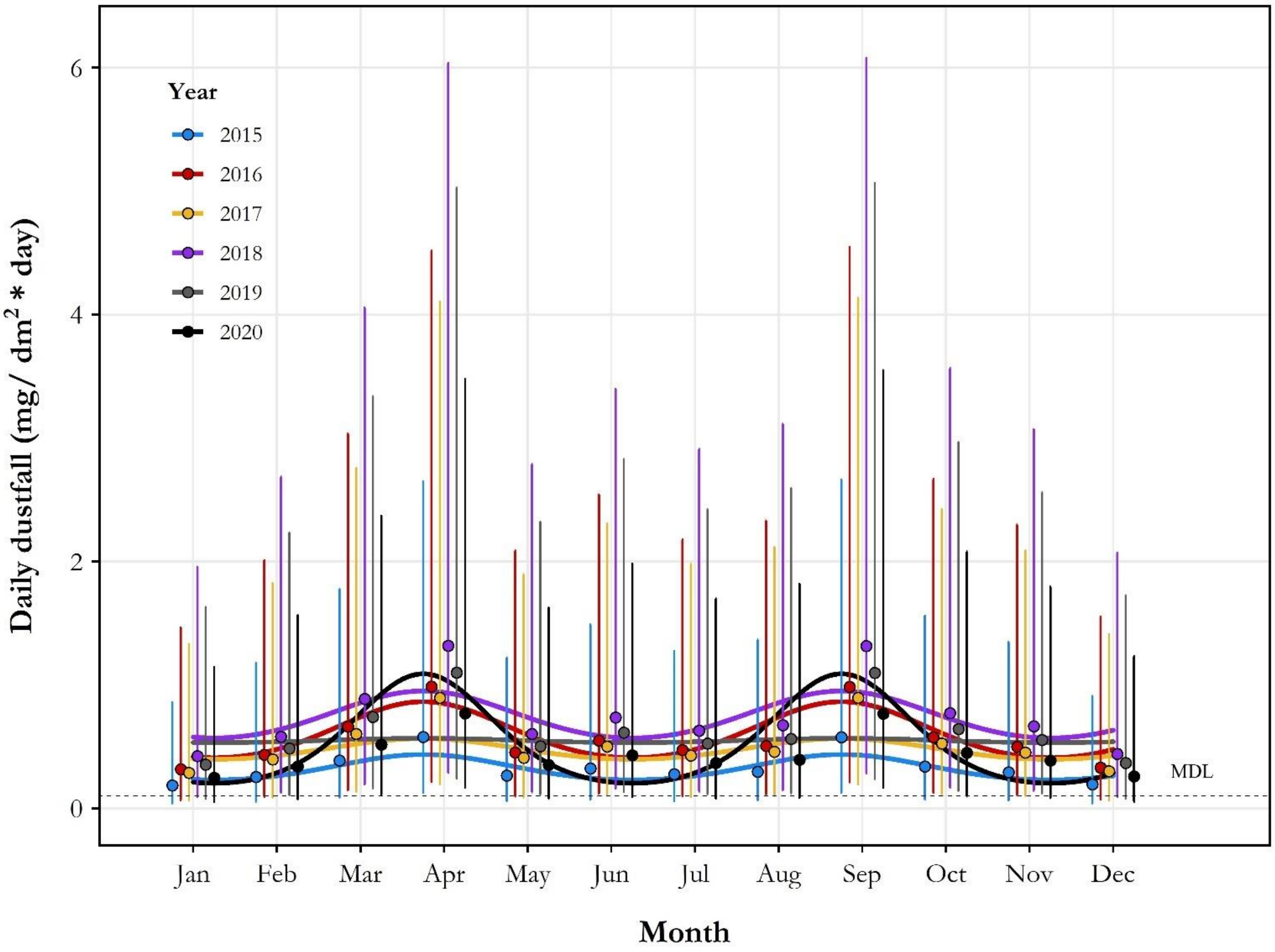


Figure 8-11. Milne Port — Inter-annual differences in daily dustfall (mg/dm²·day); data from sites DF-P-01 and DF-P-08 removed because it is not available for all years.

Points show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the log$_e$ scale and back-transformed to the natural scale. Lines correspond with sinusoidal functions relative to each year. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.

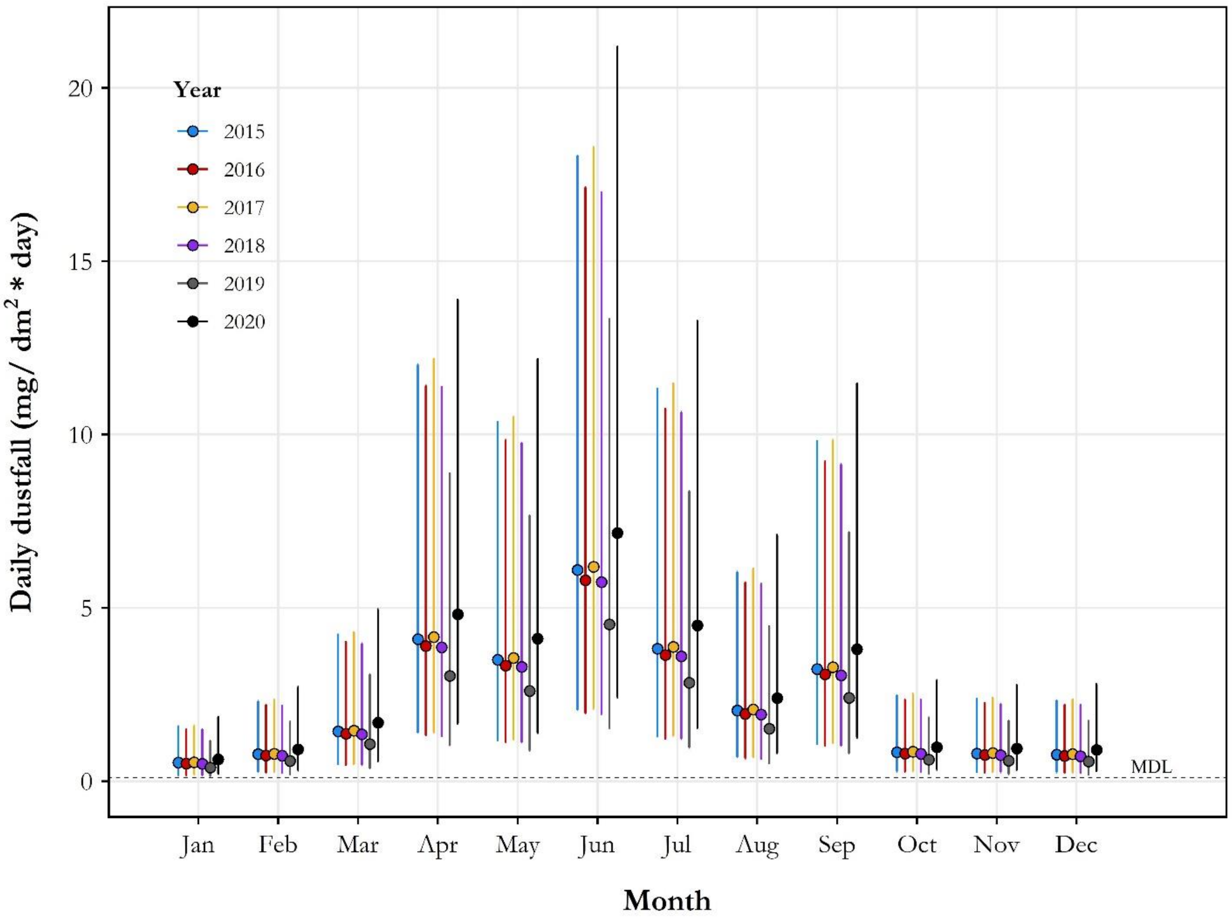


Figure 8-12. Tote Road-North — Inter-annual differences in daily dustfall (mg/dm²·day).
Points show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the log_e scale and back-transformed to the natural scale. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.

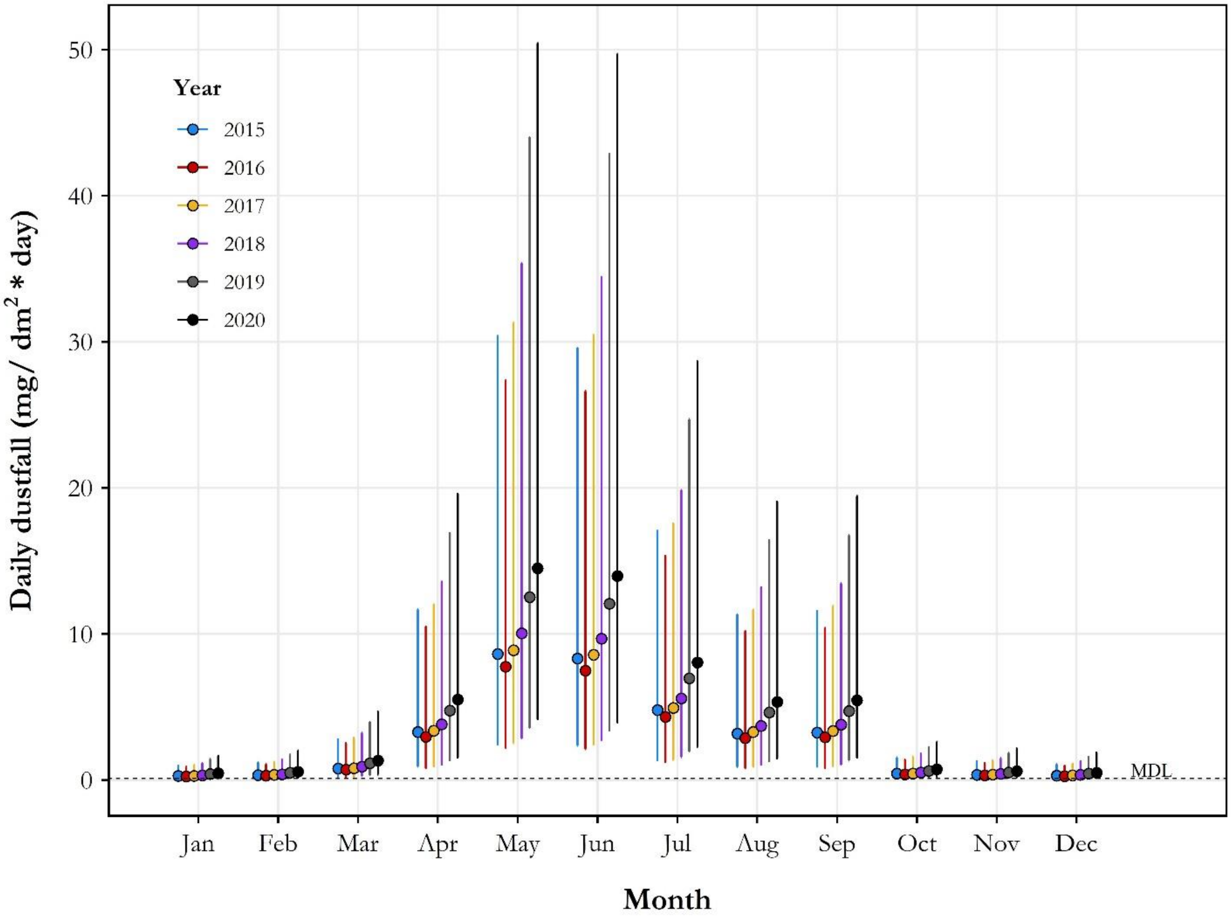


Figure 8-13. Tote Road-South — Inter-annual differences in daily dustfall (mg/dm²·day).
Points show geometric mean daily dustfall with 95% confidence intervals. Confidence intervals are asymmetrical because dust data were analyzed on the $\log_e$ scale and back-transformed to the natural scale. The dashed horizontal line indicates the MDL for dust samples and the maximum dustfall rate at reference sites unaffected by the Project.

8.1.3.2 Total Annual Dustfall

Dustfall deposition in 2020 was within ranges observed in previous years across the Project area (Figure 8-14). The Mine Site dustfall monitoring station DF-M-01 has had highly variable dustfall throughout all monitoring years, with no discernable trend. Dustfall at DF-M-02 and -03 remain consistent with the previous year, neither increasing nor decreasing. Dustfall at all Milne Port monitoring sites remained consistent with previous years. Dustfall at DF-P-05 and DF-P-07 has decreased slightly since 2018, while dustfall has remained consistent or increased slightly at DF-P-04 and DF-P-06. Dustfall along the Tote Road showed modest increases at both the North (km 28) and South (km 78) crossings. However, dustfall at the north monitoring location continues to be less in magnitude than that at the south monitoring location.

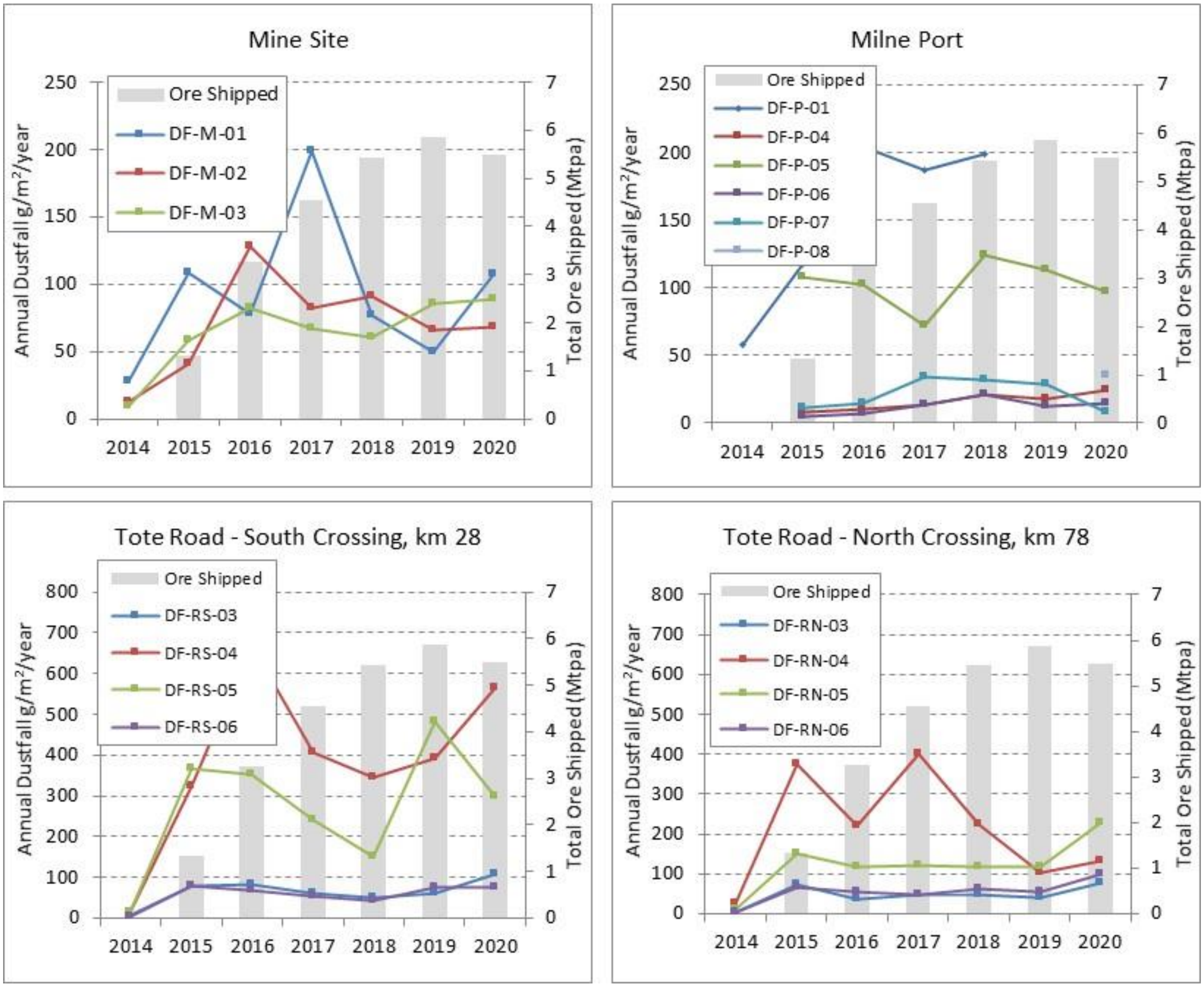


Figure 8-14. Annual dustfall (g/m²/year) across the Project area.
Note that the Y-axis scales differ between plots.

8.2 DUSTFALL EXTENT IMAGERY ANALYSIS

During the February 2020 TEWG meetings, representatives from the MHTO commented that the dustfall monitoring data and analyses do not reflect what hunters see on the ground. In response to that comment, Baffinland began investigating ways to enhance its dustfall monitoring program, including adding satellite imagery analyses to better characterize the spatial extent of Project-related dustfall trends.

The three objectives of the dustfall extent image analyses were to:

- determine the optimal dates of satellite imagery to extract dustfall extents;
- develop a workflow to identify snow cover and map the extent of the dust on snow; and,
- compare multiple years of dust extent where feasible.

This analysis focused on dust deposited on snow to extract dustfall extent due to its high visibility to the naked eye and high detectability using multispectral analysis. To an observer on the ground, dust on snow can be visible at dustfall deposition as low as 0.1–0.2 g/m^2 (Li et al. 2013). In remote sensing, dust and snow have different spectral characteristics, absorbing and reflecting light in different wavelengths. Multispectral bands (e.g., visible, near-infrared, shortwave) of satellite imagery can take advantage of the different reflectance values of dust and snow, allowing for automated extraction of pixels representing dust coverage using comparisons of the various multispectral bands (band ratios).

8.2.1 METHODS

Imagery from Landsat 5 Thematic Mapper (TM), Landsat 8 Operational Land Imager (OLI), and Sentinel-2 Multispectral Instrument (MSI) sensors were used in the dustfall extent image analysis (Table 8-5). Landsat data are available from the United States Geological Survey (USGS) and have a revisit time of 16 days (USGS 2020). Sentinel-2 data are available from the European Space Agency (ESA) and have a revisit time of 5 days (ESA 2020a).

Images between March 15 and May 15 from 2004 to 2020 were selected for the dustfall extent image analysis. This period was chosen for extensive snow cover and available light. Additional image filters were applied to maximize dust detection: cloud cover $\leq$ 10% and snow cover $\geq$50%. Where available, multiple images covering the same area were chosen to account for dustfall extent variability due to snowfall events that can regularly bury dust and snowmelt that can cause dust to accumulate on the snow surface (Li et al. 2013)

Surface reflectance products were downloaded using the getSpatialData R Statistical software package (Schwalb-Willmann 2018). The surface reflectance product contains georeferenced images corrected for topography and atmospheric conditions, giving reflectance values for each pixel as they would appear at the Earth's surface (Jenkerson 2019a, b, ESA 2020b). Landsat images came with a pixel quality band layer identifying pixels representing clouds, cloud shadows, and snow. Sentinel-2 images came with a classification mask including categories for saturated/defective pixels, clouds and cloud shadows, water, vegetation, non-vegetated and snow.

Table 8-5. Summary of Satellite Imagery Used for dustfall extent image analysis.

Mission	Analysis Years	Sensor	Image Tiles	Bands[a]	Resolution
Landsat 5	2004 – 2011	Thematic Mapper (TM)	27-10, 27-11, 28-10, 28-11, 29-10, 30-09, 30-10, 31-09, 31-10, 32-09, 32-10, and 33-09	Band 1: B 0.45 – 0.52 µm Band 2: G 0.52 – 0.60 µm Band 3: R 0.63 – 0.69 µm Band 4: NIR 0.76 – 0.90 µm Band 5: SWIR1 1.55 – 1.75 µm Band 7: SWIR2 2.08 – 2.35 µm	30 m 30 m 30 m 30 m 30 m 30 m
Landsat 8	2013 – 2020	Operational Land Imager (OLI)	27-10, 27-11, 28-10, 28-11, 29-10, 30-09, 30-10, 31-09, 31-10, 32-09, 32-10, and 33-09	Band 2: B 0.45 – 0.51 µm Band 3: G 0.53 – 0.59 µm Band 4: R 0.64 – 0.67 µm Band 5: NIR 0.85 – 0.88 µm Band 6: SWIR1 1.57 – 1.65 µm Band 7: SWIR2 2.11 – 2.29 µm	30 m 30 m 30 m 30 m 30 m 30 m
Sentinel-2	2019-2020	Multispectral Instrument (MSI)	17WMV, 17WNT, 17WNU, 17WNV, 17WPT, 17WPU, and 17WPV	Band 2: B 0.46 – 0.52 µm Band 3: G 0.54 – 0.58 µm Band 4: R 0.65 – 0.68 µm Band 8a: NIR 0.86 – 0.88 µm Band 11: SWIR1 1.57 – 1.66 µm Band 12: SWIR2 2.10 – 2.28 µm	20 m[b] 20 m[b] 20 m[b] 20 m 20 m 20 m

[a] B = Blue, G = Green, R = Red, NIR = Near Infrared, and SWIR = Shortwave Infrared.

[b] Imagery was also available at 10 m resolution.

Both R Statistical software (R Development Core Team 2020) and ESRI ArcMap 10.7 (ESRI 2019) were used to process and analyze the images. Images were reprojected to UTM zone 17 NAD83 and clipped to a 20 km buffer around the PDA of present and proposed infrastructure. Saturated, cloud-covered, and non-snow pixels were excluded from the analysis using masks. For Landsat images, pixel values of 20,000 represent saturated pixels and were masked out as they do not contain valid reflectance values. Saturated pixels occur when the high reflectance of the surface (e.g., fresh snow) is beyond the sensor's range, causing sensor saturation. Cloud and snow masks were derived from pixel quality bands using the Landsat Quality Assessment ArcGIS Toolbox (USGS 2017). For Sentinel-2 images, the provided classification masks were used to remove all pixels not classified as snow. Some cloud masks were not adequate to completely remove clouds. A visual check was conducted to remove images with identifiable clouds. Images with thin clouds or fog that were not distinguishable from the snow cover may not have been identified and removed from the analysis. The resulting image database represented a selection of high-quality satellite images of the PDA and 20 km buffer from March to May for years between 2004 and 2020, when dust should be detectable against a snow-covered landscape with minimal spectral or atmospheric interference.

The image bands used for the dustfall extent analysis represent ranges of wavelengths on the electromagnetic spectrum (Table 8-5). Features such as snow, rock, and vegetation absorb and reflect at different wavelengths. These distinct absorption and reflection characteristics can be used to identify and extract features from the imagery using combinations of bands called band ratios.

This analysis focused on identifying and extracting iron dust produced from the mining activities of the Project. Iron ore consists primarily of the iron oxides hematite and magnetite (Senkow et al. 2018). A literature review was conducted to determine potential band ratios and combinations of band ratios that could be used to identify and extract iron dust from the satellite imagery (Table 8-6). Most candidate band ratios were based on iron's spectral properties and have been used to find surface mineral deposits during mineral exploration activities (Ramadan et al. 2001, Rockwell 2013, Ducart et al. 2016, Van der Werff and Van der Meer 2016). One study created a band ratio called the Snow Darkening Index (SDI) for extracting mineral dust on snow using Landsat and UAV imagery (Mauro et al. 2015). This band ratio is not specific to iron and may therefore capture dustfall from non-iron sources such as the gravel substrate of the Tote Road. The SDI minimizes the effect of the changing reflectance of snow due to changing snow crystal structure; as it ages and melts the non-static reflectance can make it challenging to distinguish dust from snow.

Table 8-6. Band ratios trialled for extracting dustfall extent from multispectral satellite images.

Band Ratio	Detection	Source	Type	Used	Figure 6-1
Red/Blue	Minor Ferric	Rockwell 2013, Ducart et al. 2016, Van der Werff and Van der Meer 2016	Mineral Exploration	No	C
Red/Green	Ferric Iron, Fe^{3+}	Van der Werff and Van der Meer 2016	Mineral Exploration	Yes	D
Red/SWIR1	Ferrous Oxides	Van der Werff and Van der Meer 2016	Mineral Exploration	No	E
SWIR1/NIR	Ferric Oxides	Van der Werff and Van der Meer 2016	Mineral Exploration	No	F
SWIR1/Blue	Magnetite	Ramadan et al. 2001	Mineral Exploration	No	G
(Red+SWIR1)/NIR	Ferric	Ducart et al. 2016	Mineral Exploration	No	H
(Red/Blue)*(Red+SWIR1)/NIR	Ferric Iron, Fe^{2+}	Rockwell 2013	Mineral Exploration	No	I
(Green+SWIR1)/(Red+NIR)	Ferrous Coarse-Grained	Rockwell 2013	Mineral Exploration	No	J
(SWIR2/NIR)+(Green/Red)	Ferrous Iron, Fe^{2+}	Van der Werff and Van der Meer 2016	Mineral Exploration	No	K
(Red−Green)/(Red+Green)	Snow Darkening Index (SDI)	Mauro et al. 2015	Dust on Snow	Yes	L

In a preliminary analysis, all the band ratios in Table 8-6 were applied to a subset of 22 images with visible dust from 2015 to 2020 (Figure 8-15). Band ratios with a SWIR band tended to be affected by an image artifact, possibly thin clouds not captured in the mask process or visual check, that was not apparent in the visible or NIR bands. The resulting images contained areas misrepresented as dustfall. Based on the results of the preliminary analysis, only two band ratios were selected for further use. The SDI, (Red−Green)/(Red+Green), was chosen as it was explicitly created to extract mineral dust on snow from imagery and provide a relative estimation of mineral dust magnitude. The band ratio Red/Green was also chosen as it did not contain a SWIR band and appeared to extract dustfall extent based on visual observation. The band ratio Red/Blue also showed promise, but the Blue band was usually saturated in the Landsat 5 images, which prevented creating a baseline dataset, and so was not used.

The SDI band ratio values ranged from −1 to 1, with values greater than 0 indicating the presence of dust. However, upon visual observation, values greater than 0.01 for Landsat and values greater than 0.02 for Sentinel-2 images appeared to capture the extent of visible dust in the images. The relative magnitude increases as the SDI value increases, with 0 representing no dust and 1 representing the most dust. These values do not represent measurable concentrations since there are no ground measurements of spectral reflectance and the corresponding dustfall concentrations for this area from March to May.

The Red/Green band ratio requires a threshold value to separate pixels classified as "dust" and "non-dust." The threshold value was determined as the mean plus the band ratio values' standard deviation (San et al. 2004). The threshold value varied between images and years due to changes in the sensor, lighting, and land cover (e.g., snow cover, exposed ground) present in each image. To minimize variability between images across the 20 km buffer area within the same year, the mean and standard deviation of the Red/Green band ratio was calculated for each image, and an average threshold value was determined for each year. The thresholds were applied to each image in each year, creating a raster layer of 1 for dust and 0 for non-dust.

To represent the maximum dustfall extent, a composite dataset for each year was calculated by taking the maximum value of all raster layers in the same year. The SDI had the added dimension of representing the highest relative magnitude. Baseline datasets for the Red/Green band ratio and SDI were created from the maximum values of the 2004–2007, 2009, and 2013 composite Landsat datasets, representing the background dust extent and relative magnitude prior to the construction of the Project. This baseline was subtracted from subsequent years, 2014 to 2020, for both Landsat and Sentinel-2, to remove background dust and to represent the extent and relative magnitude of dust possibly produced by Project activities.

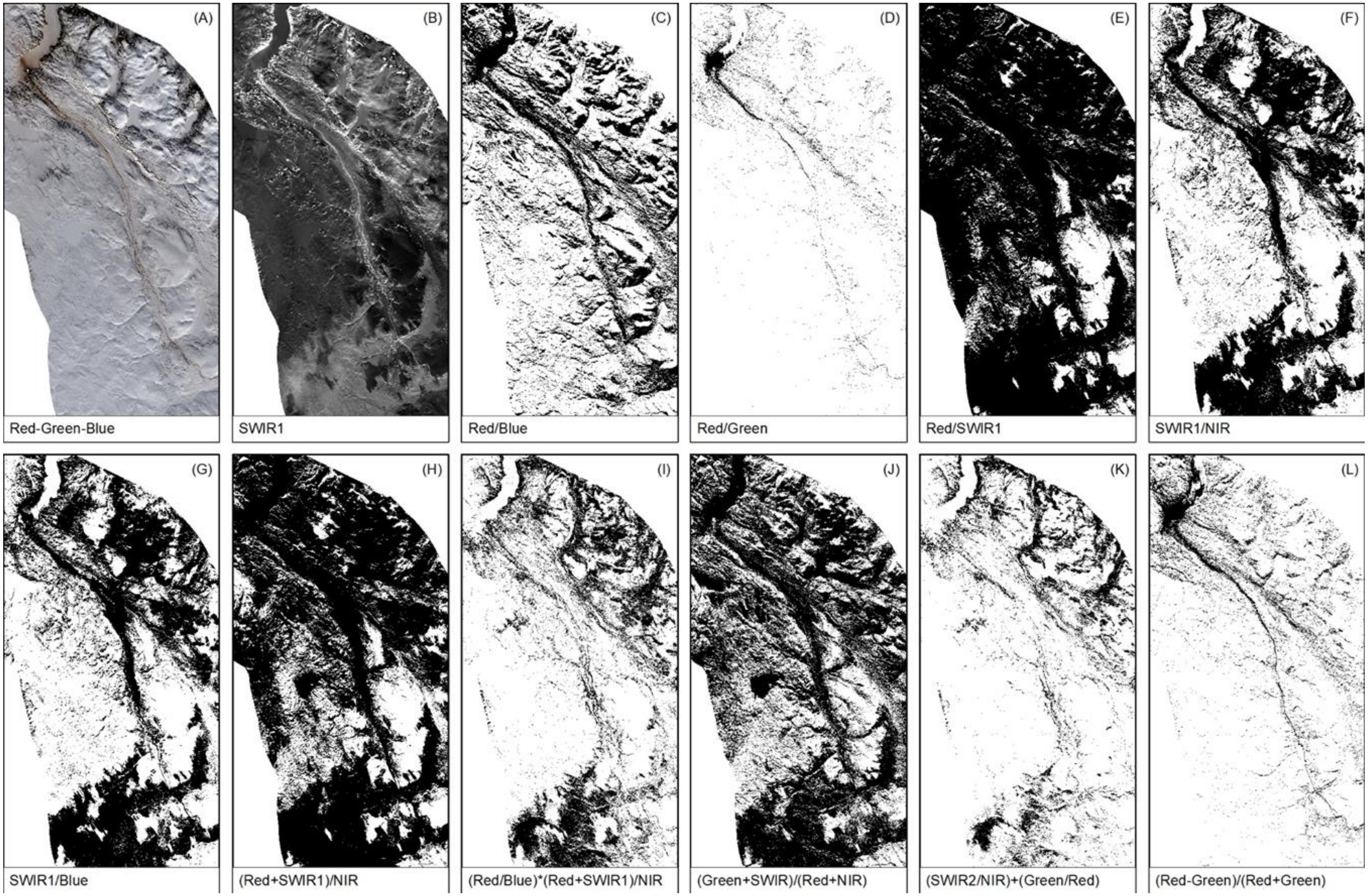


Figure 8-15. Example Landsat 8 (A) RGB image encompassing the Mary River Project, from May 3, 2020, used in the preliminary analysis.
A possible low cloud is visible to the south of the SWIR1 band (B). Panels C-L represents the band ratio raster layers extracted from the Landsat 8 image.

8.2.2 RESULTS AND DISCUSSION

8.2.2.1 Scene Distribution

The number of suitable images varied between years, ranging from 8 to 48 (Table 8-7). Some years did not have enough images to provide full coverage. The years 2008, 2010, and 2011 did not have enough imagery for analysis, and 2012 was a data gap year between the surface reflectance product of Landsat 5 and Landsat 8 data (Landsat 6 failed and Landsat 7 had a sensor error causing striping; USGS 2020). For Landsat 8, 2013 only covered the northern half of the RSA but was included in the analysis because it included the current infrastructure area.

Early April provided the most Landsat 5, Landsat 8, and Sentinel-2 images (Figure 8-16). Early April also provided Landsat images distributed over the greatest number of years. Sentinel-2 has a higher revisit time (5 days) than Landsat (16 days), potentially resulting in more available images for analysis.

Years with a low number of images or areas with a low number of overlapping images may not represent the greatest dustfall extent or magnitude. Some areas may only have one or two overlapping images that may underestimate the dustfall if captured following a snowfall event.

Table 8-7. Number of used Landsat 5, Landsat 8, and Sentinel-2 images per year.

Satellite	2004	2005	2006	2007	2009	2013	2014	2015	2016	2017	2018	2019	2020
Landsat 5	12	8	12	9	8								
Landsat 8						8	22	33	16	14	17	12	13
Sentinel-2												28	48

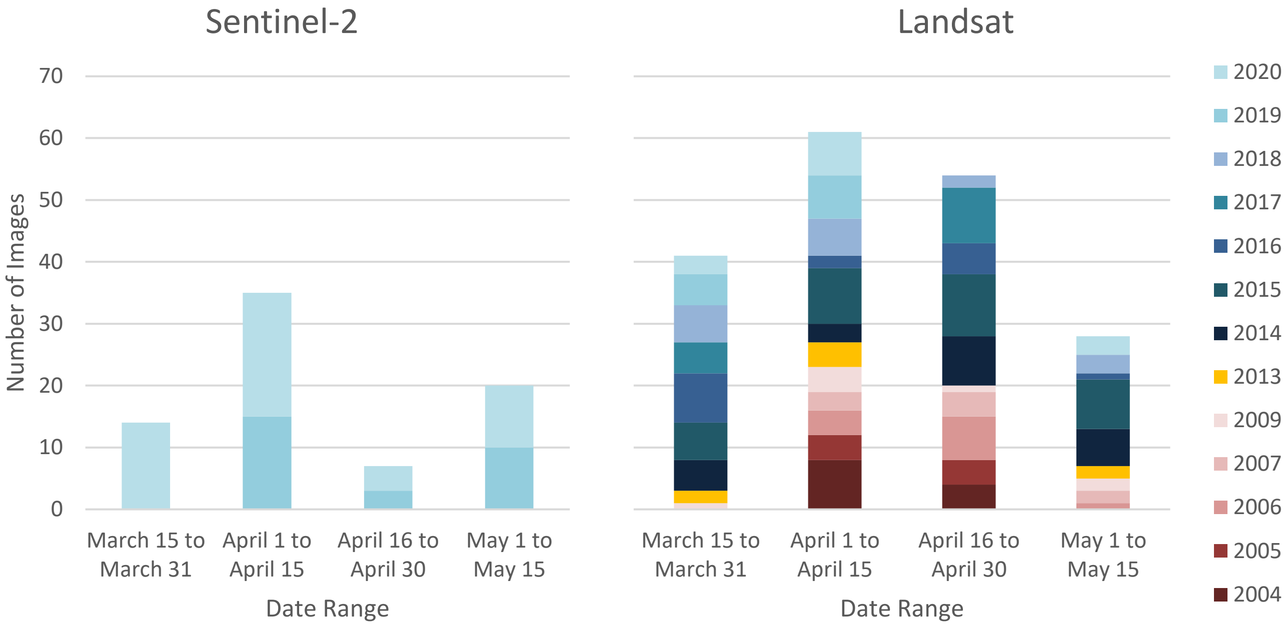


Figure 8-16. Total number of Sentinel-2 and Landsat images used for each year by time of year between March 15 and May 15.

For Landsat, years 2004 to 2009 are Landsat 5 images and years 2013 to 2020 are Landsat 8 images.

8.2.2.2 Dustfall Extent and Magnitude

The extracted dustfall extents and relative magnitudes represent possible extents of ferric iron (Red/Green band ratio) and extents and relative magnitude of mineral dust (SDI, (Red−Green)/(Red+Green) band ratio) accumulated on the snow cover. Dustfall extents derived from Sentinel-2 imagery were more extensive on the surrounding terrain and indicated higher magnitudes than Landsat-derived data. The difference may be due to the different resolutions of Sentinel-2 (20 m) and Landsat (30 m) imagery, as the reflectance of dust within a Landsat pixel may be more diluted by snow within the same pixel than in a Sentinel-2 pixel. Despite this difference, the overall trends appear to be similar between the two datasets.

Although baseline values have been removed, the dustfall represented in Map 8-2 to Map 8-11 cannot be solely attributed to the Project. Dust may come from other sources in the area, such as exposed ground and wind-exposed ridges. Identification and contributions from dust sources cannot be determined solely from the satellite imagery analysis presented here. However, from the trends in dustfall extent and relative magnitude over time, it may be assumed that the primary source of dust around Project infrastructure is related to mining operations.

Baseline — Baselines datasets, shown in Map 8-2 to Map 8-9, had extensive dustfall across the landscape. However, upon visual inspection, other landscape features appeared to be captured in the same band ratios as dustfall. The main features also extracted included south-facing slopes and bare ground not excluded by the snow masks. These other extracted features were present in all years, not just the baseline datasets. By subtracting the baseline, which contains these features from subsequent years, these features' effects were removed or minimized.

Milne Port — Dustfall extents of ferric iron (Red/Green band ratio) extracted from Landsat imagery increased from 2014 to 2018 around Milne Port (Map 8-2). The increase in extent was primarily along Milne Inlet, and a smaller increase was visible southwest of Milne Port. Dustfall extents from 2018 to 2020 were similar.

Dustfall extents of mineral dust (SDI band ratio) derived from Landsat imagery followed a similar pattern to the ferric iron extent, with a consistent increase in extent from 2014 through 2019 along Milne Inlet (Map 8-3). The 2020 extent was reduced compared to 2019; it was more similar to the 2018 extent along Milne Inlet but less extensive southwest of Milne Port. Relative mineral dust magnitudes were generally high at Milne Port and low to moderate in the surrounding areas.

The ferric iron dustfall extent extracted from Sentinel-2 imagery for 2019 and 2020 along Milne Port was similar to the extent extracted from Landsat imagery (Map 8-2 and Map 8-10). On land, the ferric iron dust detected in Sentinel-2 imagery appeared more extensive. Consistent with the Landsat data, the mineral dust detected in Sentinel-2 imagery was greater in 2019 than in 2020, both of which were more extensive on land and showed higher relative magnitudes than the Landsat data (Map 8-3 and Map 8-11).

The TSP modelling isopleths created for the FEIS shown in Map 8-10 and Map 8-11 captured some of the higher magnitudes of dustfall around Milne Port. Still, they did not appear to capture the visible dustfall along Milne Inlet.

Mine Site — At the Mine Site, the Landsat-derived ferric iron dustfall extent for 2015 appeared to be greater than the extents from 2016 to 2018 (Map 8-4). The Landsat derived extents from 2019 and 2020 were greater than previous years.

The 2015 mineral dust extent from Landsat imagery for 2015 also appeared to be more extensive than in 2016, 2017, and 2018 (Map 8-5). The 2019 dust extent from Landsat imagery was the most extensive. The 2020 dust extent was reduced compared to 2019 and had lower magnitudes but was still greater than all other previous years. Relative mineral dust magnitudes tended to be high around the Project infrastructure and south of the Project in 2016 and 2019. Low magnitudes were found to the south and northwest of the Mine Site.

The Sentinel-2 2019 ferric iron dustfall extent was similar to the Landsat 2019 extent, while the Sentinel-2 2020 extent was reduced compared to the Landsat 2020 data (Map 8-4 and Map 8-10). The Sentinel-2 derived mineral dust extents followed the decrease from 2019 to 2020 as seen in the Landsat data but had higher relative magnitudes (Map 8-5 and Map 8-11).

The TSP modelling isopleths appeared to capture the Mine Site's mineral dust magnitudes in 2020 (Map 8-11). While not as apparent in 2019, the modelling generally captured the change in magnitude to the south of the Mine Site.

Tote Road North — The ferric iron dustfall extent extracted from Landsat imagery was similar between the years 2015 to 2020 (Map 8-6). The 2016 and 2017 extents may be slightly reduced.

For the mineral dust extents derived from Landsat imagery, 2015 and 2019 appeared to be the greatest along the Tote Road (Map 8-7). Relative magnitudes were generally low and restricted to within 500 m of the Tote Road.

The Sentinel-2 2019 and 2020 ferric iron dustfall extents were more extensive in the surrounding terrain than the Landsat data but appeared similar along the Tote Road itself (Map 8-6 and Map 8-10). As seen in the Landsat data, the Sentinel-2 derived mineral dust extents followed the decrease in extent from 2019 to 2020. The 2019 Sentinel-2 mineral dust extent was greater than the Landsat 2019 extent, and both 2019 and 2020 Sentinel-2 derived relative magnitudes were higher than the Landsat data (Map 8-7 and Map 8-11).

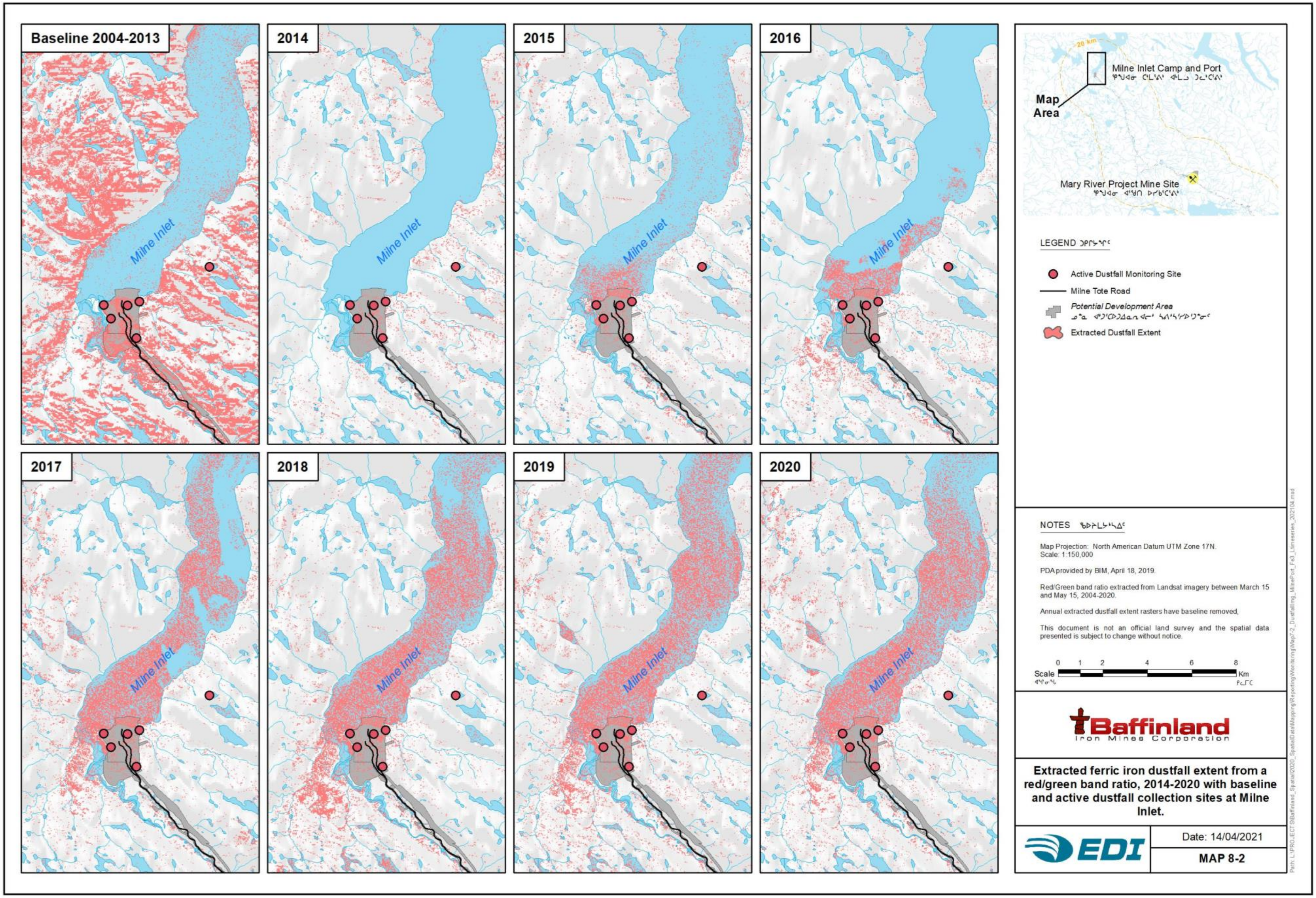
The TSP modelling isopleths appeared to capture the mineral dust magnitude along the Tote Road in 2020 (Map 8-11). The 2019 dustfall extended outside the isopleths, but the TSP modelling generally captured the pattern of mineral dust extent and magnitude along the Tote Road.

Tote Road South — The ferric iron dustfall extent for Tote Road South derived from Landsat imagery was the most extensive in 2020, followed by 2015 and 2019 (Map 8-8). The remaining years appeared similar in extent.

The mineral dust extents and relative magnitudes extracted from Landsat imagery were similar in 2015 and 2016. The highest relative magnitude was detected along the Tote Road's west side, as shown in Map 8-9. The 2019 data were the most extensive but had generally low magnitude, representing a more dispersed dustfall pattern.

The Sentinel-2 derived ferric iron dustfall extents were more extensive than the Landsat data (Map 8-8 and Map 8-10). The 2020 Sentinel-2 extent covered a similar area across Muriel Lake as the Landsat data. The mineral dust extent for 2020 derived from Sentinel-2 imagery was similar to the 2020 Landsat data, while the mineral dust extent for 2019 was more extensive than the 2019 Landsat data (Map 8-9 and Map 8-11). The decrease in extent from 2019 to 2020 was apparent in both the Sentinel-2 and Landsat data. The relative magnitude was higher in the Sentinel-2 data than in the Landsat data.

The TSP modelling isopleths captured the mineral dust magnitude along the Tote Road in 2020 (Map 8-11). The 2019 dustfall extended outside the isopleths, but the TSP modelling generally captured the pattern of mineral dust extent and magnitude along the Tote Road.



NOTES

Map Projection: North American Datum UTM Zone 17N.
Scale: 1:150,000

PDA provided by BIM, April 18, 2019.

Red/Green band ratio extracted from Landsat imagery between March 15 and May 15, 2004-2020.

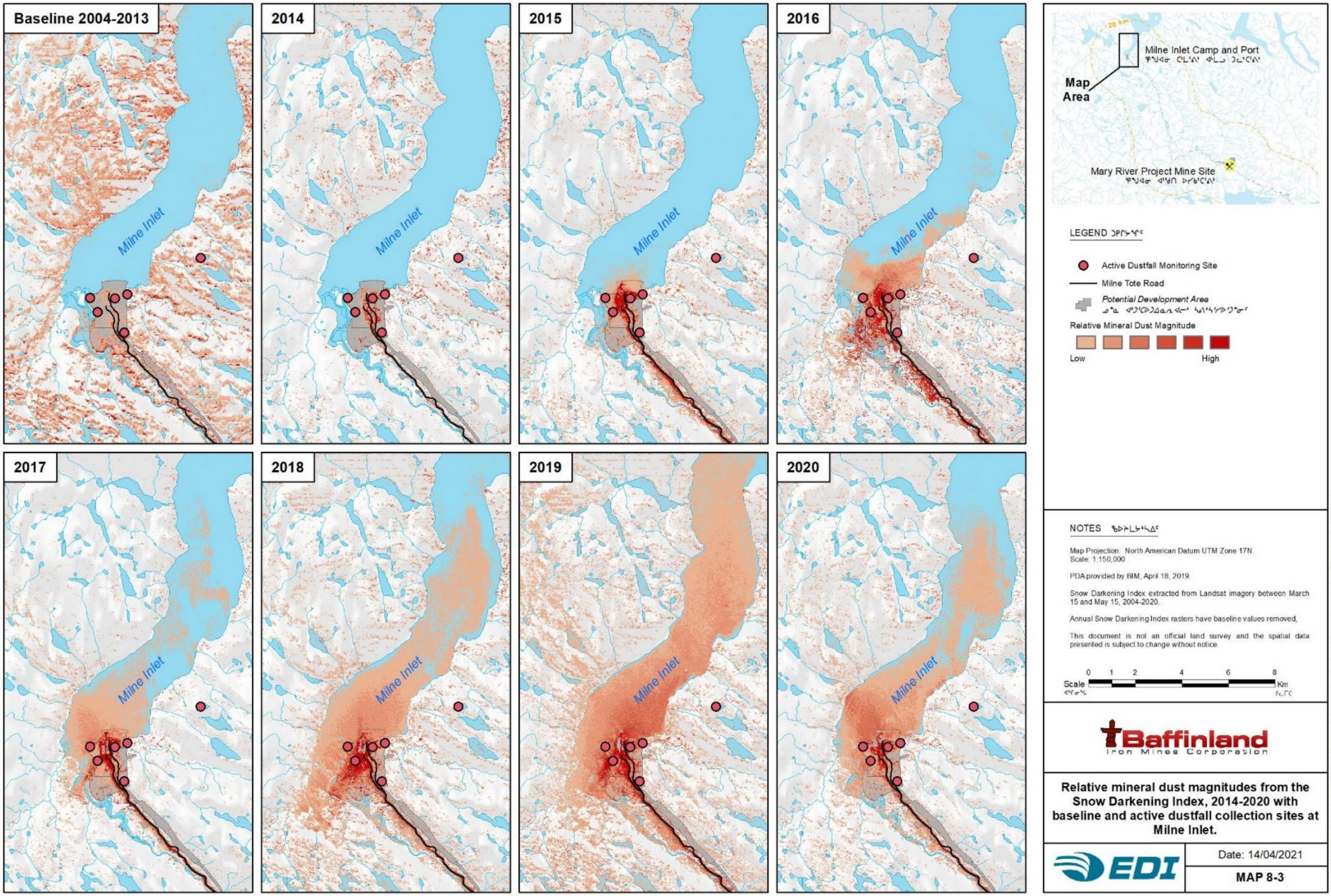
Annual extracted dustfall extent rasters have baseline removed,

This document is not an official land survey and the spatial data presented is subject to change without notice.

Extracted ferric iron dustfall extent from a red/green band ratio, 2014-2020 with baseline and active dustfall collection sites at Milne Inlet.

Date: 14/04/2021

MAP 8-2



NOTES

Map Projection: North American Datum UTM Zone 17N.
Scale: 1:150,000

PDA provided by BIM, April 18, 2019.

Snow Darkening Index extracted from Landsat imagery between March 15 and May 15, 2004-2020.

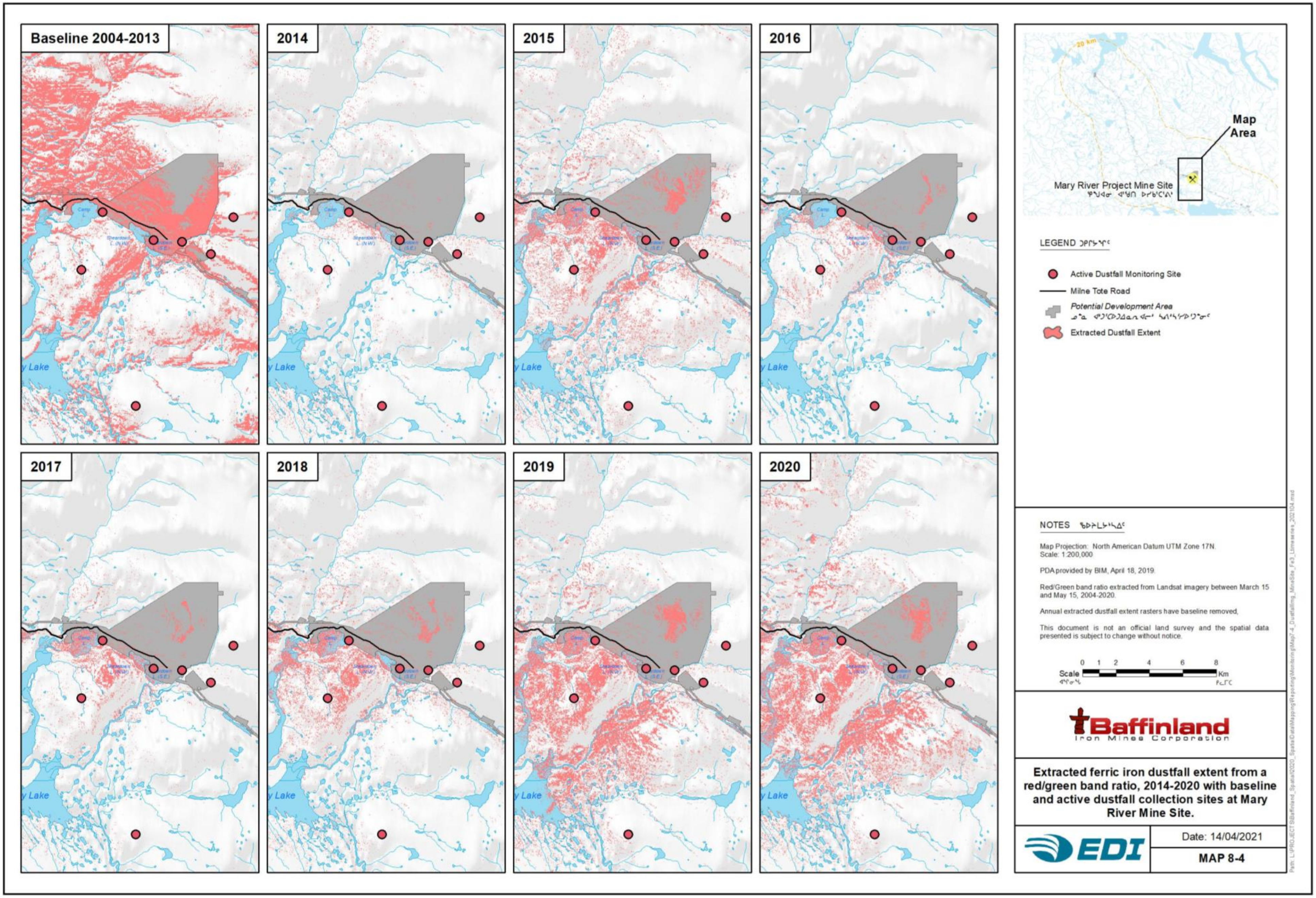
Annual Snow Darkening Index rasters have baseline values removed,

This document is not an official land survey and the spatial data presented is subject to change without notice.

Relative mineral dust magnitudes from the Snow Darkening Index, 2014-2020 with baseline and active dustfall collection sites at Milne Inlet.

Date: 14/04/2021

MAP 8-3



NOTES

Map Projection: North American Datum UTM Zone 17N.
Scale: 1:200,000

PDA provided by BIM, April 18, 2019.

Red/Green band ratio extracted from Landsat imagery between March 15 and May 15, 2004-2020.

Annual extracted dustfall extent rasters have baseline removed,

This document is not an official land survey and the spatial data presented is subject to change without notice.

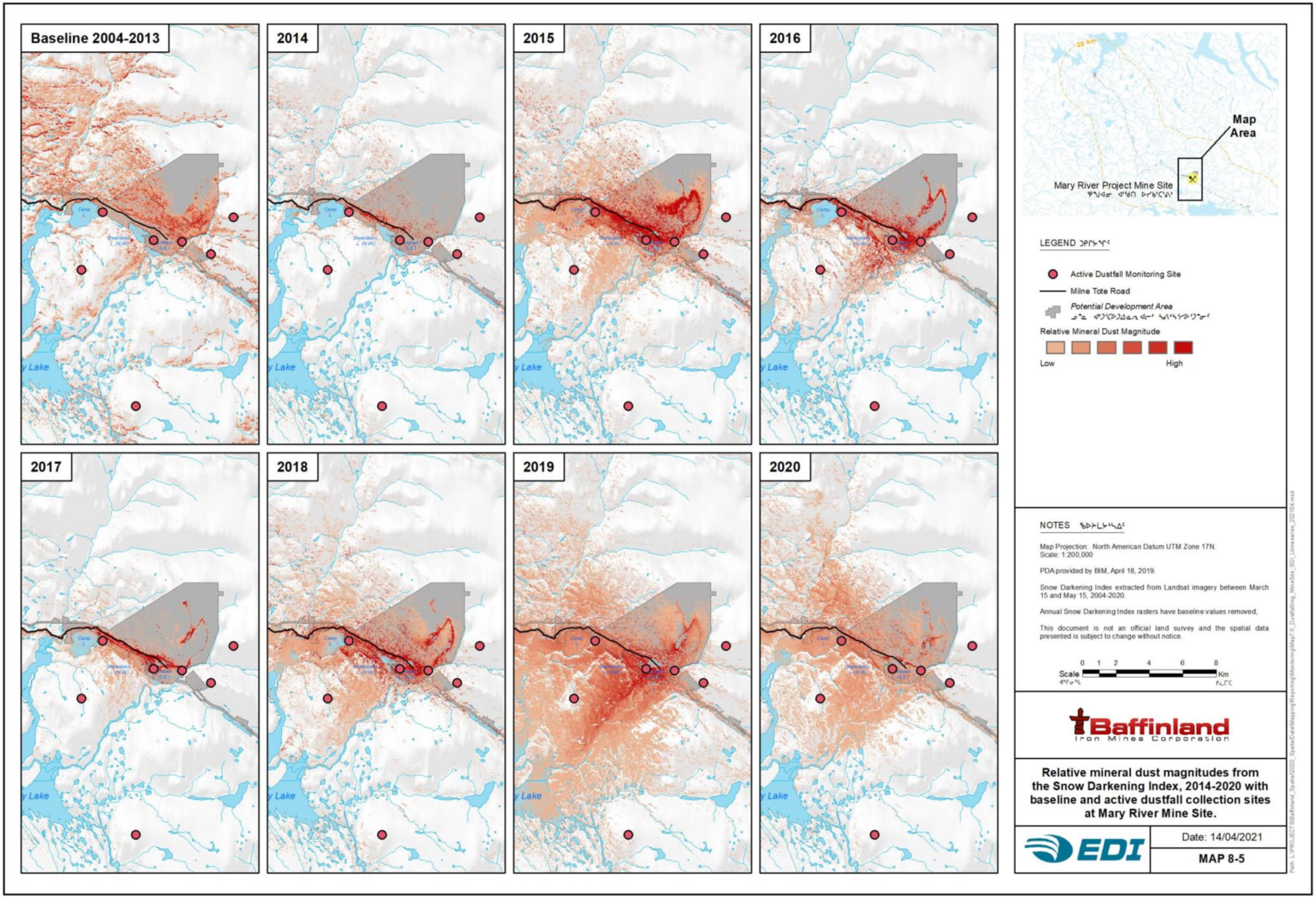
Baffinland Iron Mines Corporation

Extracted ferric iron dustfall extent from a red/green band ratio, 2014-2020 with baseline and active dustfall collection sites at Mary River Mine Site.

EDI

Date: 14/04/2021

MAP 8-4



NOTES

Map Projection: North American Datum UTM Zone 17N.
Scale: 1:200,000

PDA provided by BIM, April 18, 2019.

Snow Darkening Index extracted from Landsat imagery between March 15 and May 15, 2004-2020.

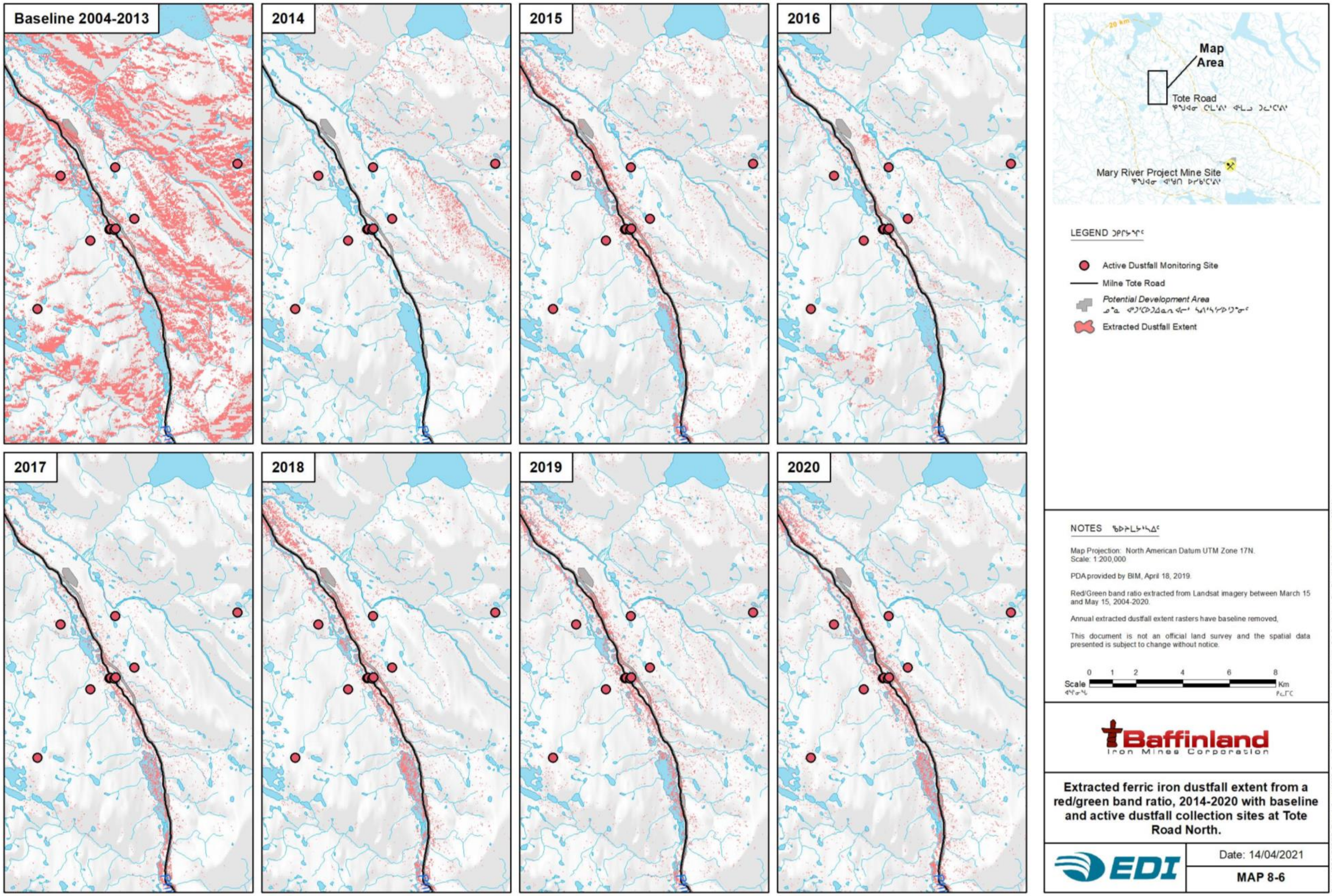
Annual Snow Darkening Index rasters have baseline values removed,

This document is not an official land survey and the spatial data presented is subject to change without notice.

Relative mineral dust magnitudes from the Snow Darkening Index, 2014-2020 with baseline and active dustfall collection sites at Mary River Mine Site.

Date: 14/04/2021

MAP 8-5



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Map Projection: North American Datum UTM Zone 17N.
Scale: 1:200,000

PDA provided by BIM, April 18, 2019.

Red/Green band ratio extracted from Landsat imagery between March 15 and May 15, 2004-2020.

Annual extracted dustfall extent rasters have baseline removed,

This document is not an official land survey and the spatial data presented is subject to change without notice.

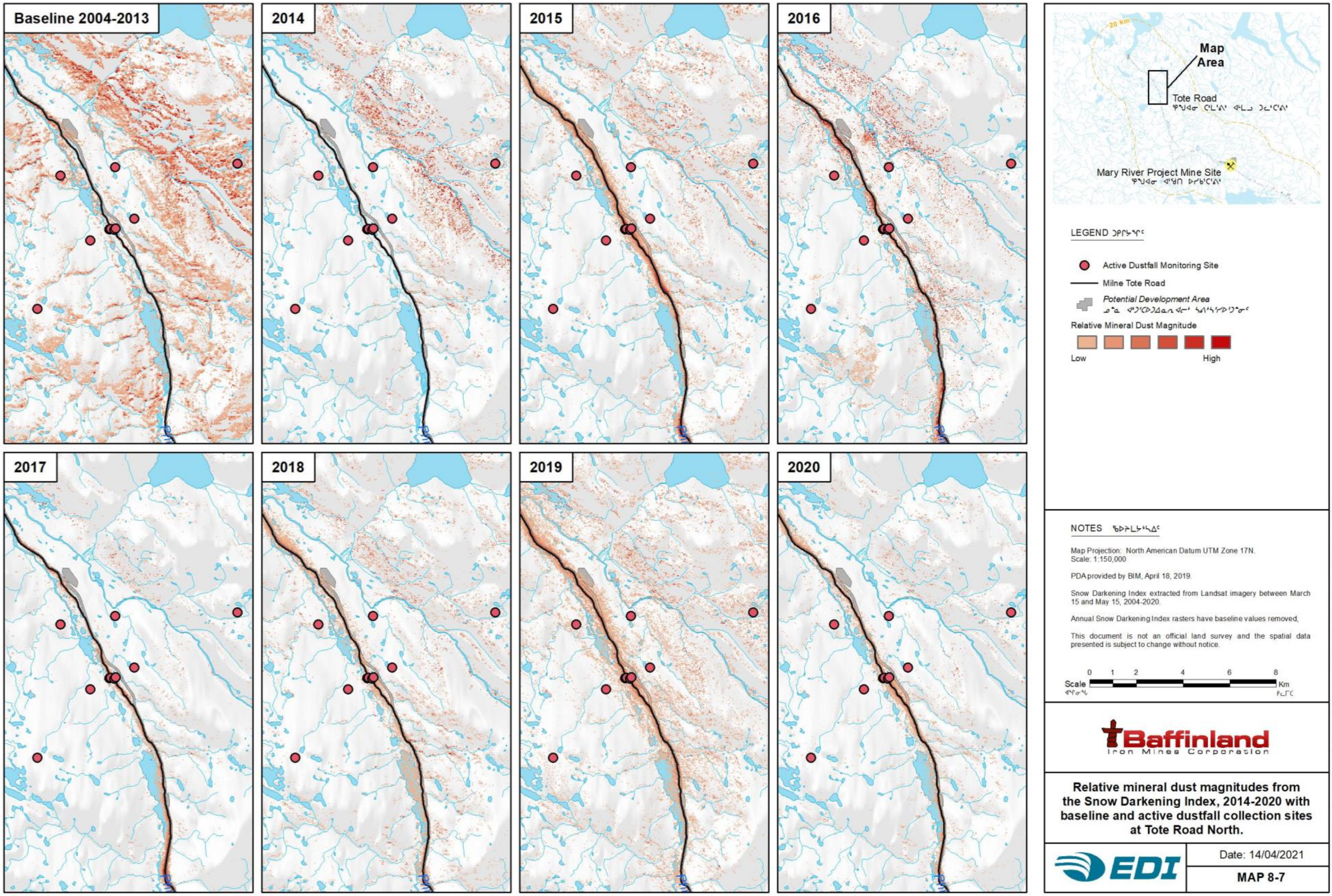
Scale 0 1 2 4 6 8 Km

Extracted ferric iron dustfall extent from a red/green band ratio, 2014-2020 with baseline and active dustfall collection sites at Tote Road North.

Date: 14/04/2021

MAP 8-6

Path: L:\PROJECTS\Baffinland_Spatial\2020_Spatial\DataMapping\Reporting\Monitoring\Map7-6_Dustfalling_ToteRoadN_Fe3_Umeseries_202104.mxd



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Map Projection: North American Datum UTM Zone 17N.
Scale: 1:150,000

PDA provided by BIM, April 18, 2019.

Snow Darkening Index extracted from Landsat imagery between March 15 and May 15, 2004-2020.

Annual Snow Darkening Index rasters have baseline values removed,

This document is not an official land survey and the spatial data presented is subject to change without notice.

Baffinland
Iron Mines Corporation

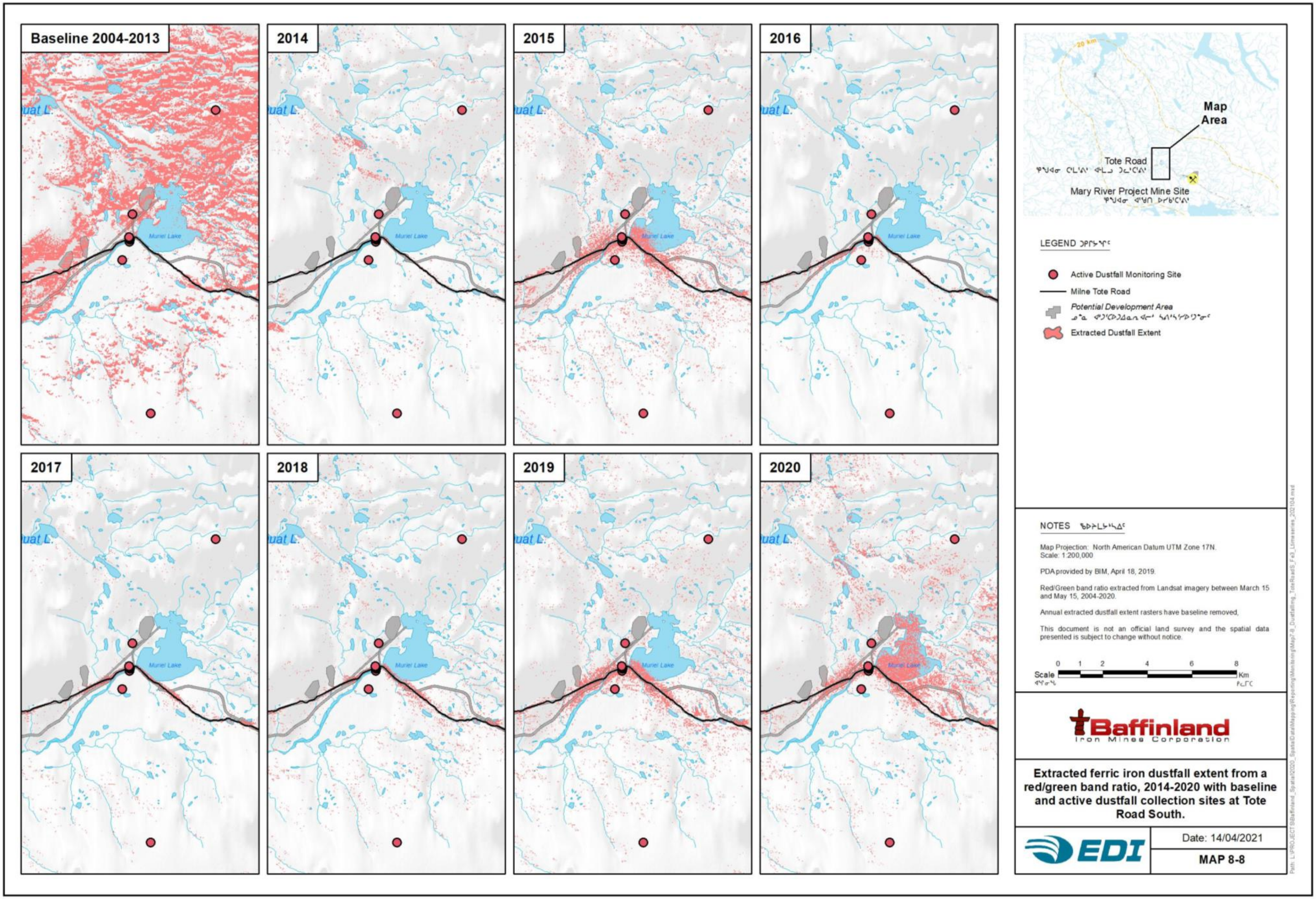
Relative mineral dust magnitudes from the Snow Darkening Index, 2014-2020 with baseline and active dustfall collection sites at Tote Road North.

EDI

Date: 14/04/2021

MAP 8-7

Path: L:\PROJECTS\Baffinland_Spatial\2020_SpatialData\Mapping\Reporting\Monitoring\Map7-7_DustfallImg_ToteRoadN_SDI_Ltimeseries_202104.mxd



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Map Projection: North American Datum UTM Zone 17N.
Scale: 1:200,000

PDA provided by BIM, April 18, 2019.

Red/Green band ratio extracted from Landsat imagery between March 15 and May 15, 2004-2020.

Annual extracted dustfall extent rasters have baseline removed,

This document is not an official land survey and the spatial data presented is subject to change without notice.

Scale 0 1 2 4 6 8 Km

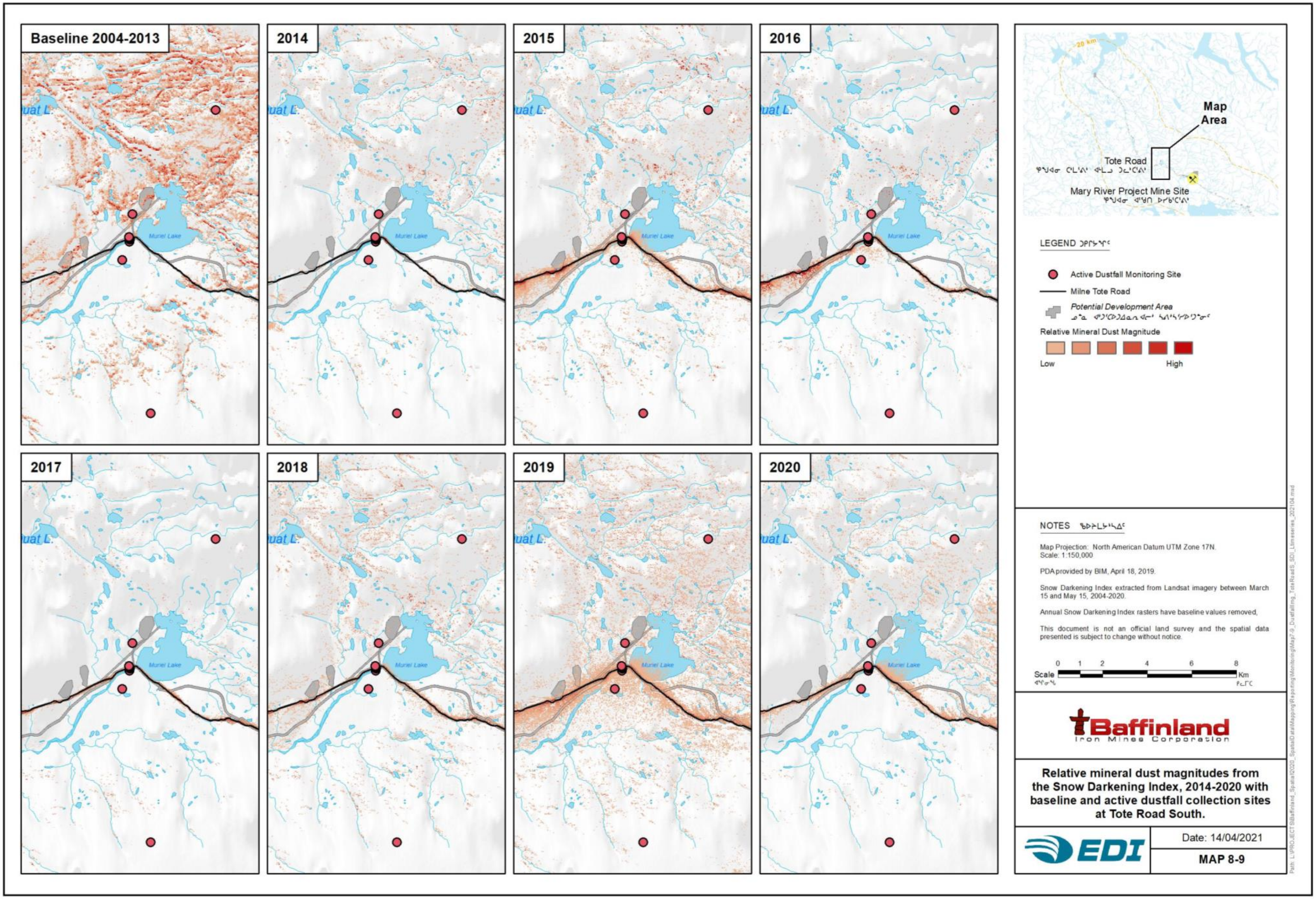
Baffinland
Iron Mines Corporation

Extracted ferric iron dustfall extent from a red/green band ratio, 2014-2020 with baseline and active dustfall collection sites at Tote Road South.

EDI

Date: 14/04/2021

MAP 8-8



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Map Projection: North American Datum UTM Zone 17N.
Scale: 1:150,000

PDA provided by BIM, April 18, 2019.

Snow Darkening Index extracted from Landsat imagery between March 15 and May 15, 2004-2020.

Annual Snow Darkening Index rasters have baseline values removed,

This document is not an official land survey and the spatial data presented is subject to change without notice.

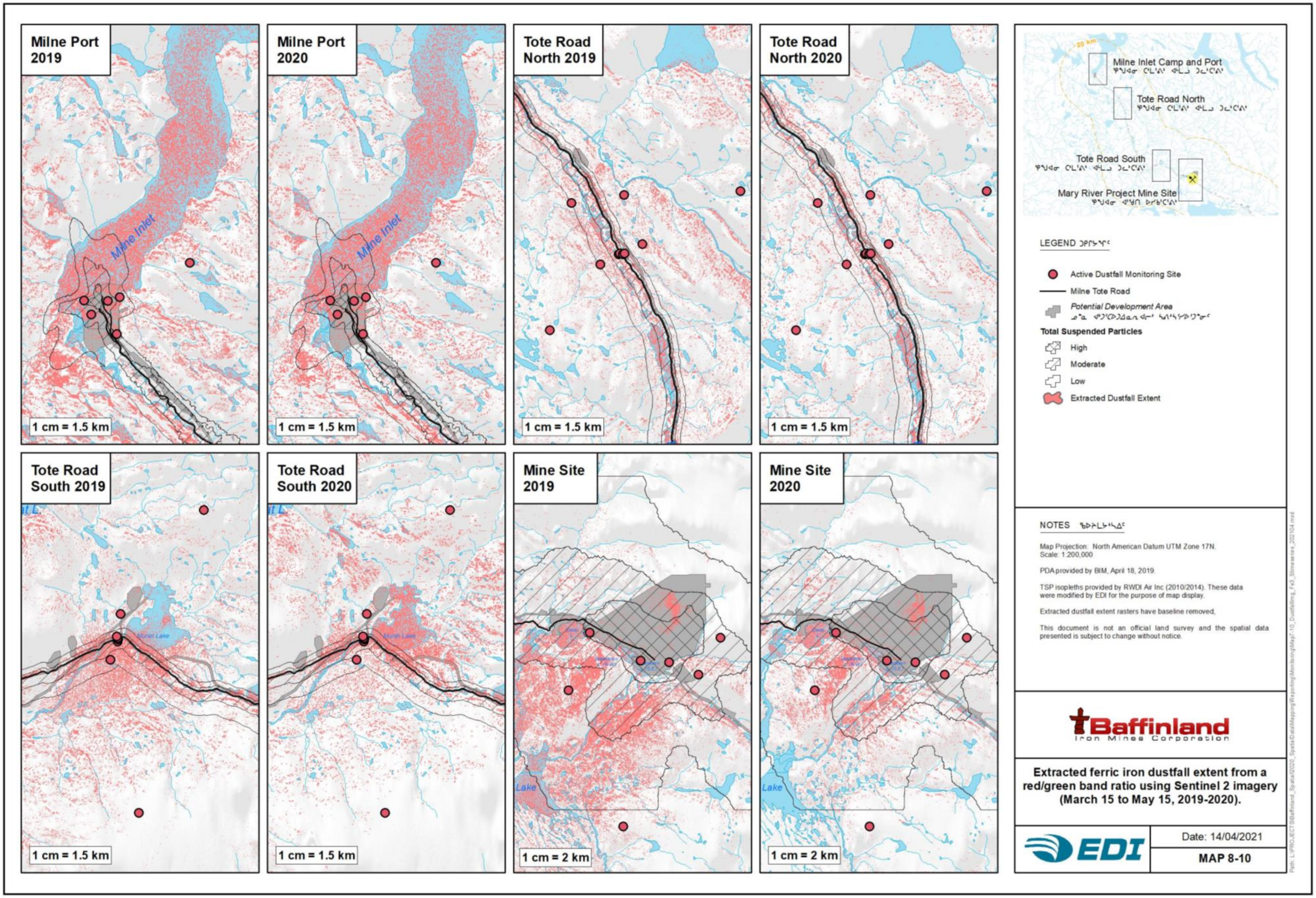
Baffinland
Iron Mines Corporation

Relative mineral dust magnitudes from the Snow Darkening Index, 2014-2020 with baseline and active dustfall collection sites at Tote Road South.

EDI

Date: 14/04/2021

MAP 8-9



Map Projection: North American Datum UTM Zone 17N.
Scale: 1:200,000

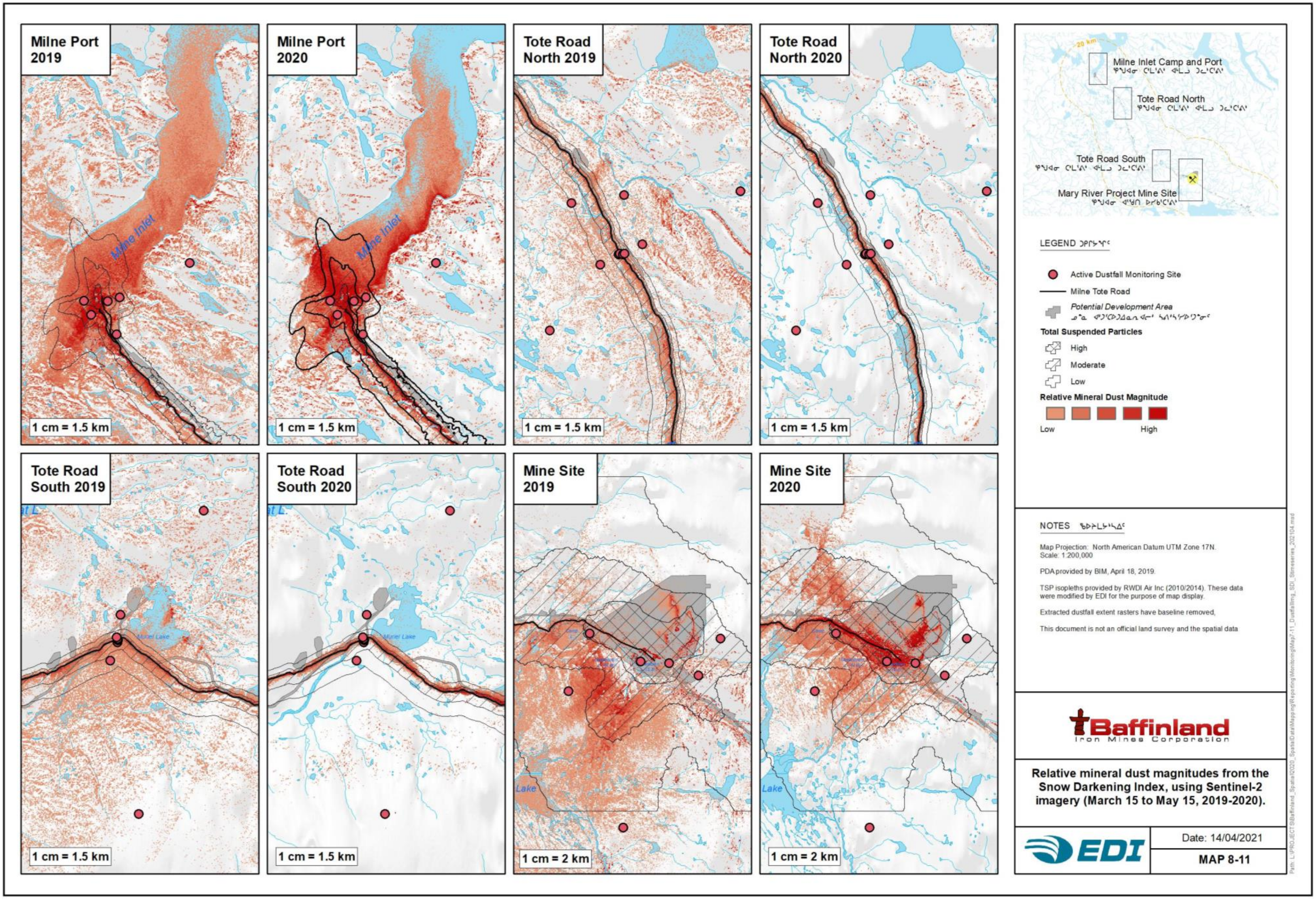
PDA provided by BIM, April 18, 2019.

TSP isopleths provided by RWDI Air Inc (2010/2014). These data were modified by EDI for the purpose of map display.

Extracted dustfall extent rasters have baseline removed.

This document is not an official land survey and the spatial data presented is subject to change without notice.

Extracted ferric iron dustfall extent from a red/green band ratio using Sentinel 2 imagery (March 15 to May 15, 2019-2020).



NOTES

Map Projection: North American Datum UTM Zone 17N.
Scale: 1:200,000

PDA provided by BIM, April 18, 2019.

TSP isopleths provided by RWDI Air Inc (2010/2014). These data were modified by EDI for the purpose of map display.

Extracted dustfall extent rasters have baseline removed,

This document is not an official land survey and the spatial data

Relative mineral dust magnitudes from the Snow Darkening Index, using Sentinel-2 imagery (March 15 to May 15, 2019-2020).

Date: 14/04/2021

MAP 8-11

8.3 DUSTFALL SUPPRESSION AND MITIGATION IN 2020

Baffinland conducted several activities through the 2020 calendar year to mitigate dustfall from all the Project areas. Dust suppression in 2020 included the use/application of two new substances at the Milne Port and along the Tote Road.

Dustfall Suppression at the Milne Port Ore Stockpiles — DusTreat, a specialized crusting agent produced by SUEZ Water Technologies & Solutions Canada (SUEZ), and the equipment to apply this product, was purchased and arrived on the 2020 sealift. Baffinland applied the product to the ore stockpile (beginning November 2020), as per SUEZ's application techniques and dosage calculations. DusTreat is a non-toxic substance that coats the outside of the stockpiles and acts as a sealant to prevent lift-off of dust from the stockpiles. This type of application is effective at reducing dust from stockpiles at other sites, is known to last for months, and is rain resistant.

Dustfall Suppression along the Tote Road — DustStop®, produced by Cypher Environmental, was trialled in August 2019 over a 4 km stretch (from KM 103.5 to KM 97) of the Tote Road and subsequently applied along the entire Tote Road in 2020. A representative from Cypher Environmental was on site to instruct the road maintenance personnel on the product's use and application. Instructions and methods provided by Cypher Environmental were followed by Baffinland staff. During the 2019 trial, improved dust suppression was visually observed over three days throughout the application zones, and the product also showed signs of water-shedding during rain events supporting improved road sealant and application lifespan.

In 2020, DustStop® use was expanded with the product being applied along the entire Tote Road. Two initial applications of the product along the entire Tote Road (24 hours apart) were completed. Maintenance applications of DustStop® were undertaken throughout the summer as needed based on routine visual inspections. When product reapplication ended for the 2020 season due to ambient air temperatures, water application continued for the duration of the 2020 dust season. Product performance is currently being reviewed and evaluated to determine suitability for long-term use.

Other Initiatives — Other ongoing studies and initiatives at the Project are intended to understand dustfall and dustfall suppression better; these include:

- working on the stockpiles at Milne Port over the last year or so to understand how dust is created and moves;
- assessing the methods used to drop iron ore into the stockpiles and to evaluate and to adjust conveyor heights to minimize drop distances to ore stockpiles, which serves to minimize dust creation;
- installing shrouding at the discharge end of the ore stackers to reduce the effect of windblown dust during stacking activities;
- installing chutes on the shiploader to prevent windblown dust during loading operations;
- systematic watering in combination with the application of calcium chloride to control dust emissions from road surfaces;

- ongoing installation of hoods and shrouds on Crusher Facility equipment (stackers and conveyors) to minimize dust generation during crushing operations; and,
- installing rubber bellows on Crusher Facility equipment to control the fall of ore to the pad and reduce the dust dispersion as ore is being discharged to the pad.

8.4 DUSTFALL SUMMARY

Passive Dustfall:

- Dustfall monitoring data were compared to predictions made in the Project's FEIS and are important in the context of effects on other indicators, including potential vegetation and soil changes.
- The mean number of ore haul transits per day in 2020 was 271.7, and the number of non-haul transits per day was 28.4. These data are consistent with recent years and fall below the projected number of ore and non-ore haul transits for 2020.
- The magnitude of annual dustfall at the Mine Site sample locations was consistent with recent years. In 2020, the highest dustfall at the Mine Site area was associated with the airstrip. The airstrip has consistently had the highest dustfall deposition in the Mine Site area, except for 2019.
    - Dustfall at the Mine Site in 2020 did not show a clear summer/winter difference; it followed a five-month cyclical pattern, with the highest dustfall measured in April and September. This cyclical annual pattern was not evident in an inter-annual comparison; elevated dustfall was noted in late winter/early spring months of March and April each year, with a non-significant increase in September.
- The magnitude of dustfall at Milne Port has remained constant, or in some cases has slightly decreased, a trend that began in 2018.
    - Dustfall at Milne Port in 2020 did not show a clear summer/winter difference; it followed a five-month cyclical pattern, with the highest dustfall measured in April and September. This cyclical annual pattern has strengthened during the Project life, from 2015 – 2020.
- Along the Tote Road in 2020, dustfall was consistent with all monitoring years.
    - In all areas along the Tote Road, dustfall was elevated from April through September, longer than the 'summer' season.
- Dustfall, one kilometre from the PDA, was measured at 12 sites in 2020. Dustfall was low at all sites, ranging from below laboratory detection to a high of 1.30 mg/dm²·day.
- Dustfall continued to remain relatively constant at most year-round sampling locations throughout the Project area.

Dustfall Extent:

- Dustfall extents and relative magnitudes were extracted from satellite images using a ferric iron Red/Green band ratio and the Snow Darkening Index (Red−Green)/(Red+Green) band ratio.
- Annual dustfall extents and relative magnitudes for 2014 to 2020 were calculated with baseline values from 2004 to 2013 removed.
- Dustfall extents derived from Sentinel-2 imagery were more extensive on the surrounding terrain and had a higher magnitude than the Landsat derived data.
- Ferric iron dustfall extents generally increased through the years to 2019 with a similar extent in 2020 at Milne Port and the Mine Site. Along the Tote Road, dustfall extents tended to follow the road, with some years (i.e., 2015, 2019, and 2020) being more extensive than others.
- Mineral dustfall extents generally increased from 2014 to 2019 and decreased in 2020 at Milne Port and the Mine Site. Along the Tote Road, dustfall extents tended to follow the road within 500 m, with 2015 and 2019 being the most extensive years.
- Mineral dustfall magnitude was high near Milne Port, the Mine Site, and along the Tote Road, and generally low in the surrounding area.
- The modelling isopleths for total suspended particles captured the general trend of the mineral dustfall magnitude, except at Milne Port, where the model results did not illustrate the visible dust seen along Milne Inlet.

9 VEGETATION

Data collection for long-term vegetation monitoring was completed in 2020 for the following programs:

- dustfall monitoring (Section 7);
- vegetation and soil base metal monitoring; and,
- exotic invasive vegetation targeted monitoring.

9.1 VEGETATION AND SOIL BASE METALS MONITORING

The NIRB Project Certificate No. 005 conditions address the concern of potential increase in trace metal concentrations in vegetation and soil from Project activities (Nunavut Impact Review Board 2020):

- Project Condition #34 — *The Proponent shall conduct soil sampling to determine metal levels of soils in areas with berry-producing plants near any of the potential development areas, prior to commencing operations.*
- Project Condition #36 — *The Proponent shall establish an on-going monitoring program for vegetation species used as caribou forage (such as lichens) near Project development areas, prior to commencing operations.*
- Project Condition #38, 50 and Project Commitment #67, 69 and 107 also addresses these limitations or relates to the reporting requirements for the vegetation and soil base metal monitoring program.

These Project conditions are addressed by implementing a long-term vegetation and soil base metals monitoring program established in the TEMMP (Baffinland Iron Mines Corporation 2016a). The objectives of the vegetation and soil base metals monitoring program are to:

- monitor metal concentrations in vegetation and soil, particularly caribou forage (i.e., lichen), near Project infrastructure; and,
- verify that metal concentrations are below or within the acceptable range for soil quality thresholds and relevant vegetation indicator values[8].

Given that dustfall deposition is the primary source of anthropogenic metals at the Project, the vegetation and soils base metals monitoring program has been designed to align and facilitate comparisons with the dustfall monitoring program (Section 6) to assess metals uptake in vegetation and soils related to Project activities.

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[8] Defined by the Canadian Council of Ministers of the Environment (CCME) that establish standard sampling procedures/requirements and quality guidelines; or defined by peer-reviewed literature sources.

9.1.1 METHODS

9.1.1.1 Monitoring History and Changes in Samplings Procedures

Procedures for the vegetation and soils base metals monitoring program have been adapted over time due to Project circumstances, investigative outcomes, and recommendations from the TEWG:

- In 2008, pre-construction data on vegetation and soil base metals concentrations for the Project were first collected as a baseline; however, these data were not used due to sampling and analytical discrepancies. Additionally, collection methods were not effectively documented and did not facilitate data continuity or comparability (Baffinland Iron Mines Corporation 2010a).
- In 2012 and 2013, additional baseline sampling was conducted within the RSA. The vegetation sampling focused on three focal groups: lichen (*Flavocetraria cucullata, Flavocetraria nivalis, Cladina arbuscula* and *Cladina rangiferina*), willow (*Salix* spp.), and blueberry (*Vaccinium uliginosum*). The analysis focused on seven contaminants (metals/metalloids) of potential concern (CoPC): aluminum, arsenic, cadmium, copper, lead, selenium, and zinc (EDI Environmental Dynamics Inc. 2014). Canadian Council of Ministers of the Environment (CCME) standard sampling procedures and soil quality guidelines were used as threshold values for soil; peer-reviewed literature sources were used in the absence of explicit quality guidelines for lichen.–Monitoring design and key findings are presented in the *2013 Terrestrial Environment Annual Monitoring Report* (EDI Environmental Dynamics Inc. 2014).
- In 2014, sampling design and intensity were increased to improve data capture and analysis. Lichen — recognized as sensitive indicators of environmental conditions and accumulators of atmospheric pollutants (Naeth and Wilkinson 2008, Aslan et al. 2011) — was selected as the key indicator and focal group for metal uptake. Blueberry and willow were removed as assessment targets due to their limited abundance or lack of reference guidelines (EDI Environmental Dynamics Inc. 2015)~~.~~–Aluminum was removed as a focal CoPC due to its high variability, ubiquitous nature, and lack of CCME and US Environment Protection Agency (US EPA) soil quality guidelines to protect environmental and human health.
- In 2016, the NIRB 2014–2015 Annual Monitoring Report for the Mary River Project (Nunavut Impact Review Board 2015) presented recommendations from the NIRB and GN to further modify the vegetation and soil base metals monitoring program. Before implementing any modification, Baffinland evaluated the program's experimental design — especially in relation to statistical power and the ability to detect Project-related effects — to optimize sampling intensity and distribution. Ultimately, study design was expanded to facilitate 'Near', 'Far' and 'Reference' locations; the procedures were then aligned with the dustfall monitoring program where feasible. Monitoring design and key findings are presented in the *2017 and 2018 Terrestrial Environment Annual Monitoring Report* (EDI Environmental Dynamics Inc. 2017, 2018).
- In 2019, the vegetation and soil base metals monitoring program was formalized (using present methodology) with considerations and inclusions as per the NIRB and GN recommendations (EDI Environmental Dynamics Inc. 2017). The analysis focused on six CoPCs in soil and lichen:

arsenic, cadmium, copper, lead, selenium, and zinc. Soil and lichen CoPC concentrations were compared between the 'Before' and 'After' periods and the distance from the PDA.

- In 2020, ten additional sample sites were added to the Far distance category. Since most Project-emitted dust is deposited within 1,000 m of the PDA, increasing sample size in this range will improve statistical ability to detect and quantify changes in metal concentrations associated with this distance. This modification to the study design was implemented in response to TEWG reviewer comments in 2019.

At present, the 2020 vegetation and soil base metals monitoring program is directly comparable with assessments from 2016 to 2019. Where possible, modifications to the Methods have incorporated input from the TEWG and NIRB to improve and further refine data capture and baseline comparisons. Baseline data for the vegetation and soil base metal monitoring program includes sampling from 2012–2016.

9.1.1.2 Vegetation and Soil Sampling

The study area was divided into three Project areas (Milne Port, Tote Road, Mine Site), and sampling was conducted at three distances from the PDA (Near: 0–100 m, Far: >100–1,000 m, and Reference: >1,000 m). Sampling distances were informed based by the dustfall monitoring program results (EDI Environmental Dynamics Inc. 2015).

Vegetation (i.e., lichen) and soil sampling were conducted from July 8 through July 19, 2020. A total of 60 sites were sampled across the study area; sampling sites and locations are presented in Table 9-1 and shown on Map 9-1 and Map 9-2. A summary of all sites, coordinates, distances, and parameters are included in Appendix E— Vegetation and Soils Base Metals Monitoring Sites, 2012–2020. In 2020, all past sampling sites were renamed with a permanent Site ID to compare metal concentrations between sampling periods. To account for variability in site selection (which may differ due to GPS accuracy, microsite, and lichen availability), past sampling sites that were within a 35 m radius of each other were assumed to represent the same Site ID.

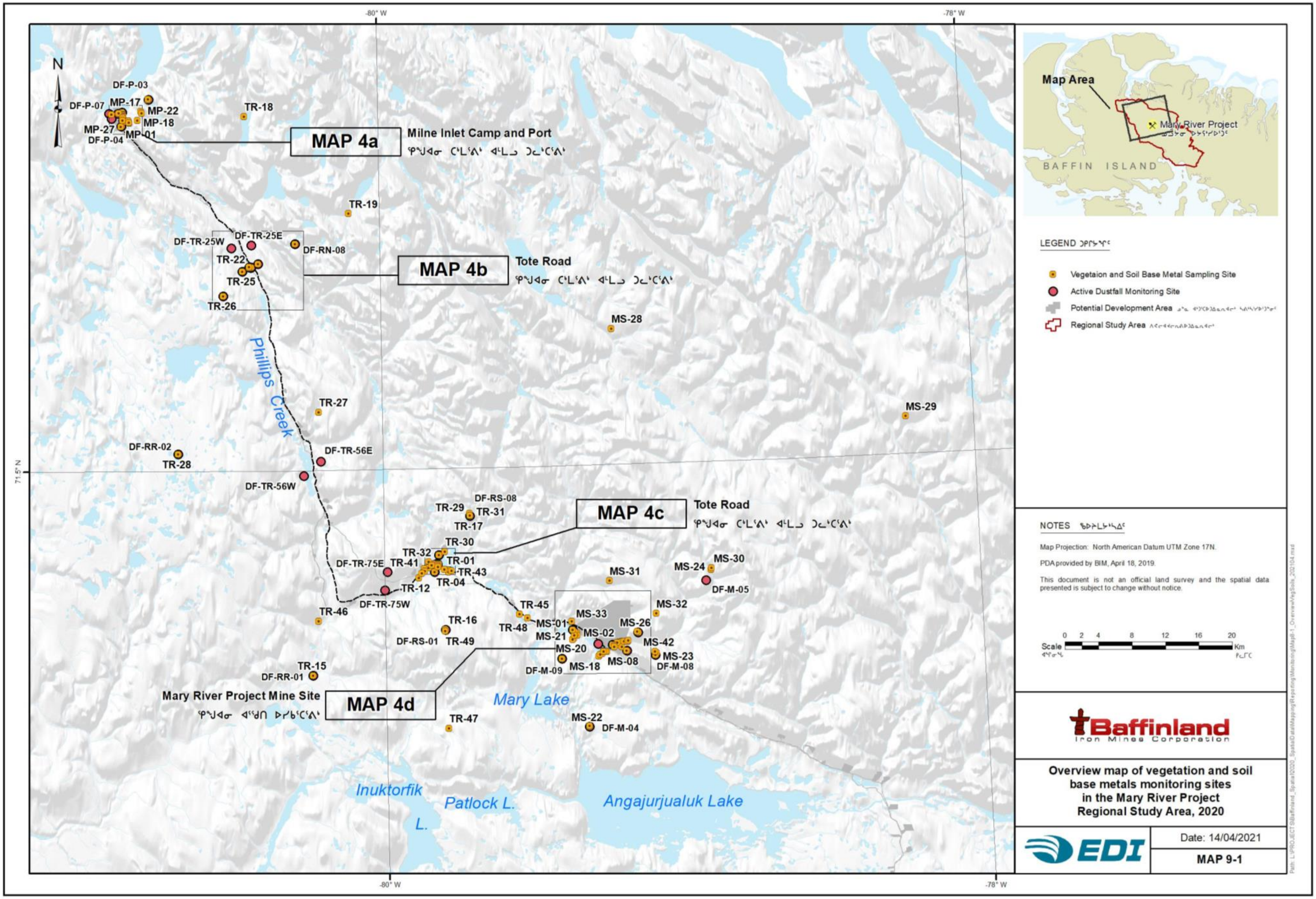
During field sampling, the following technical procedures were conducted to provide quality assurance and quality control (QAQC):

- A new pair of nitrile gloves were worn at each sample site.
- Stainless steel tablespoons used for soil sampling were cleaned with alcohol wipes before and after each sample.
- A minimum of 10 grams of each vegetation sample was collected at each site.
- A minimum of 100 grams of soil from the top A horizon was collected at each site to a depth of approximately 5 cm and above permafrost to capture the top layer of the rooting zone, where the potential for metal uptake in plants is expected to be the greatest.
- Samples were placed in new Ziploc® bags, frozen and sent to an accredited laboratory for metals analyses.

Replicate samples of both soil and lichen were collected from approximately 20% of the sample sites to evaluate the precision of field and laboratory methods and estimate sample variability (Horowitz 1990).

Table 9-1. **2020 vegetation and soil base metals monitoring sample locations and distribution for the Mary River Project.**

Distance Category	Distance from PDA (m)	Total Number of Sites	Project Area	Number of Sites per Project Area	
				Soil	Lichen
Near	0–100	30	Milne Port	10	10
			Mine Site	10	10
			Tote Road	10	10
Far	>100–1,000	20	Milne Port	5	5
			Mine Site	11	11
			Tote Road	4	4
Reference	>1,000	10	Milne Port	3	3
			Mine Site	4	4
			Tote Road	3	3
Total		**60**		**60**	**60**



NOTES

Map Projection: North American Datum UTM Zone 17N.

PDA provided by BIM, April 18, 2019.

This document is not an official land survey and the spatial data presented is subject to change without notice.

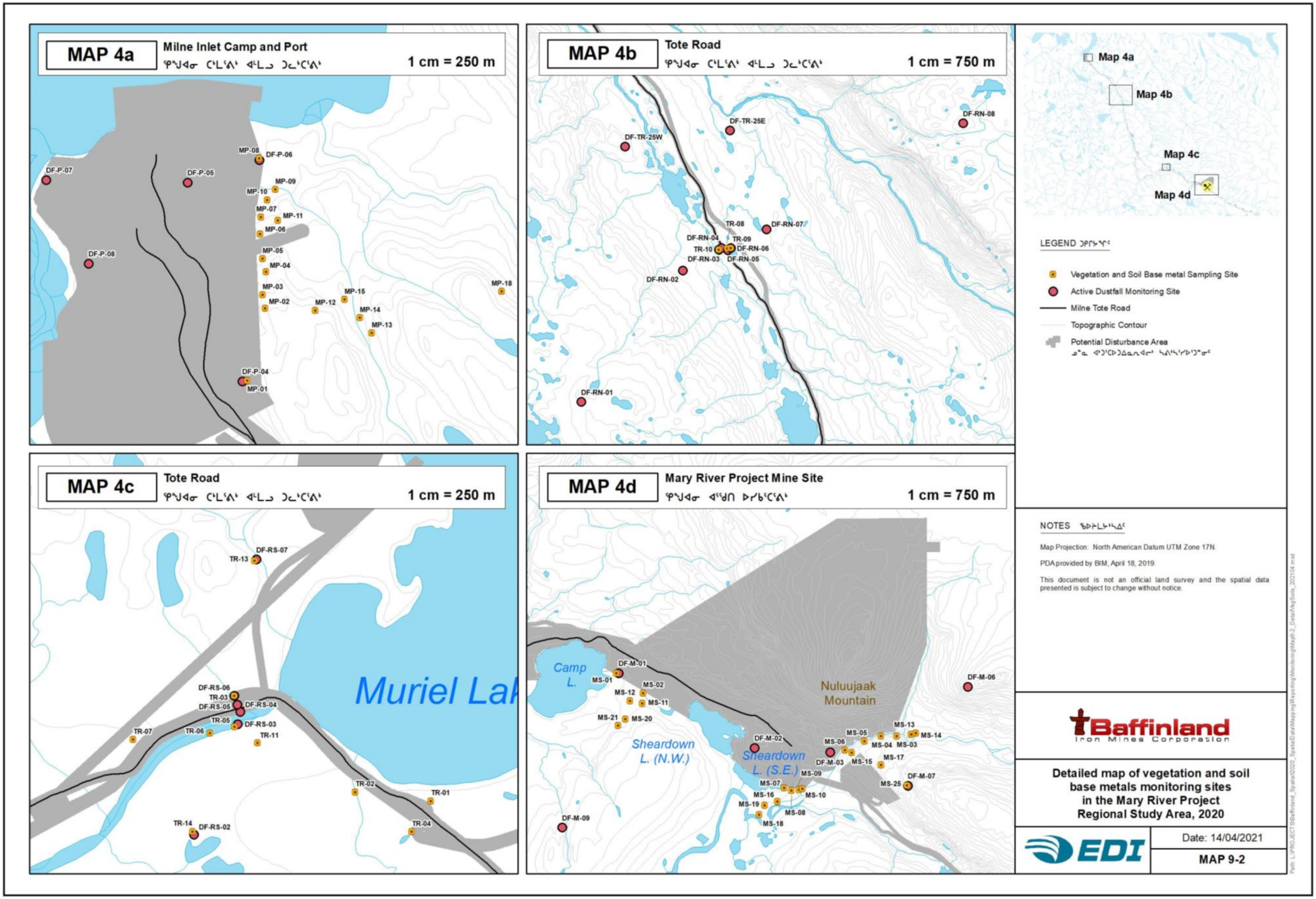
Baffinland Iron Mines Corporation

Overview map of vegetation and soil base metals monitoring sites in the Mary River Project Regional Study Area, 2020

EDI

Date: 14/04/2021

MAP 9-1



LEGEND

- ● Vegetation and Soil Base metal Sampling Site
- ● Active Dustfall Monitoring Site
- — Milne Tote Road
- — Topographic Contour
- ▨ Potential Disturbance Area

NOTES

Map Projection: North American Datum UTM Zone 17N.

PDA provided by BIM, April 18, 2019.

This document is not an official land survey and the spatial data presented is subject to change without notice.

Baffinland
Iron Mines Corporation

Detailed map of vegetation and soil base metals monitoring sites in the Mary River Project Regional Study Area, 2020

EDI

Date: 14/04/2021

MAP 9-2

9.1.1.3 Vegetation and Soil Base Metals Analysis

Soil and vegetation samples were analyzed for a total of 36 elements by ALS Labs[9]. The comprehensive list of metals analyzed (and associated assessment standards) is presented in Appendix G — Vegetation and Soils Base Metals Monitoring Laboratory Results, 2020. The CoPCs presented in this, and previous annual reports focus on a subset of the laboratory's total metals analysis. Six metal/metalloid CoPCs have been reported on since 2012: arsenic (As), cadmium (Cd), copper (Cu), lead (Pb), selenium (Se), and zinc (Zn). These focal CoPCs were selected based on the following criteria:

- analysis and outcomes of baseline metal concentrations in soil and vegetation (EDI Environmental Dynamics Inc. 2015, 2017). Most metals were not detectable in soil and vegetation samples and therefore are not considered for analytical presentation;
- analysis and outcomes of metal concentrations in the ore sampled from the Project (Appendix 6G-1, FEIS; Baffinland Iron Mines Corporation 2010b) comprised of iron (64%) and 21 other trace metals. Mercury was not present at measurable concentrations in the ore sampled and therefore was not considered for analytical presentation; and,
- review of various guidelines and information sources relating to metals of concern for vegetation health, with the potential for uptake by wildlife and humans:
    - the CCME soil quality guidelines for the protection of environmental and human health (Canadian Council of Ministers of the Environment 2006);
    - peer-reviewed literature on native flora and lichen-specific toxicity (Nash 1975, Tomassini et al. 1976, Nieboer et al. 1978, Folkeson and Andersson-Bringmark 1988, Kinalioglu et al. 2010);
    - peer-reviewed literature on the presence and effects of metals in the Arctic and northern terrestrial biota (Canadian Arctic Contaminants Assessment Report 2003, Gamberg 2008); and,
    - *The Evaluation of Exposure Potential from Ore Dusting* (Appendix 6G-1 and 6G-2, FEIS; Baffinland Iron Mines Corporation 2010, Intrinsik Environmental Sciences Inc 2011), which includes a screening-level assessment of caribou exposures to metals in ore dust.

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[9] Laboratory analyses followed the British Columbia Lab Manual for "Metals in Animal Tissue and Vegetation (Biota) – Prescriptive." Tissue samples are homogenized and sub-sampled prior to hot block digestion with nitric and hydrochloric acids, in combination with the addition of hydrogen peroxide (modified from Environment Protection Agency Method 6020A; (Environmental Protection Agency 1998). Soils were analyzed following the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Before 2019 monitoring, the micro-digestion analysis for total metal concentrations in soil and vegetation tissues was performed by high-resolution mass spectrometry using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). As of 2019, accredited laboratories across Canada and the United States replaced high-resolution mass spectrometry with collision cell inductively coupled plasma-mass spectrometry (Hawthorne 2020). Despite this change, no significant differences in the results are expected (Jenson 2020). To account for the analyses of total mercury in soil and vegetation tissues, which considers both elemental and organic (e.g., methyl mercury), a strong acid digestion followed by analysis with cold vapor-atomic absorption spectrometry (CVAAS) was used.

Base metal concentration thresholds and indicator values for soil and vegetation (i.e., lichen) are presented in Table 9-2. CCME *Soil Quality Guidelines for the Protection of Environmental and Human Health* for Agriculture, representing the highest soil quality standards in Canada, were chosen as indicators and threshold values of soil metal concentration for the Project based on the following criteria:

- Land use types at the Project (i.e., hunting and foraging) involve a potential for soil and food ingestion (Canadian Council of Ministers of the Environment 2006).
- Background soil metal concentrations were all well below CCME agricultural guidelines.
- The CCME guidelines were consistent with the risk assessment and evaluation of exposure potential from ore dusting events in selected Valued Ecosystem Components (VEC; Intrinsik Environmental Sciences Inc 2011).

Currently, no standardized metal concentration threshold values exist for lichen in Arctic environments. Instead, indicator values were selected from peer-reviewed literature relevant to the Canadian High Arctic. In this respect, indicator values could be defined for cadmium, copper, lead, and zinc (Table 9-2); no reference indicator values were identified for selenium or arsenic. These indicator values may signal a change in vegetation health, such as reduced vigour or growth. Indicator values are predictive and suggest the potential for initial adverse effects to vegetation health, not a threshold past which acute toxicity occurs. As data continue to be collected through the vegetation and dustfall monitoring programs or other relevant research initiatives, indicator values may be revised to improve the dose-response relationship between metals and lichen.

Table 9-2. Soil-Metal and Lichen-Metal concentration thresholds for Contaminants of Potential Concern.

CoPCs	Soils[1] (mg/kg)	Lichens (mg/kg dry weight)
pH	6–8	—[2]
Arsenic	12	—[2]
Cadmium	1.4	30[3]
Copper	63	15–20[4]
Lead	70	5–15[5]
Selenium	1	—[2]
Zinc	200	178[6]

[1] CCME Agricultural Soil Quality Guidelines for the Protection of Environmental and Human Health

[2] No reference indicator values identified

[3] From Nash 1975, Nieboer et al. 1978

[4] From Tomassini et al. 1976, Nieboer et al. 1978, Folkeson and Andersson-Bringmark 1988

[5] From Tomassini 1976, Nieboer et al. 1978, Kinalioglu et al. 2010

[6] From Nash 1975, Nieboer et al. 1978, Folkeson and Andersson-Bringmark 1988

9.1.1.4 Data Trends and Statistical Analysis

Before conducting statistical analyses, soil and vegetation base metal concentrations for each sample were vetted and compared with CCME soil quality guidelines and lichen indicator values. Any aberrant values or potential exceedances (i.e., above CCME threshold or lichen indicator values) were flagged and communicated to Baffinland personnel.

For this report, means and estimates of variance were calculated for each CoPC. Besides evaluating environmental compliance, these values were examined to identify potential trends and tendencies that could warrant further investigation. Statistical data were grouped and analyzed according to the Project area and sampling distances to determine trends across the entire Project. Statistical analyses were handled in two stages:

Stage 1: General Trends — Two-way Analyses of Variance (ANOVA), used to estimate variation among and between groups, were applied to the data to compare Baseline (2012–2016) versus 2019 and 2020 Monitoring outcomes. Pairwise comparisons (applying Tukey's range test) were used to determine which groupings (e.g., Project area and sampling distance) were significantly different from one another. All data distributions were evaluated and handled to verify the assumptions of the parametric analyses. Statistical significance, referring to the probability that the means are different from one another, was set at 95% (i.e., p-value <0.05).

Stage 2: Distance Analysis — If pairwise comparisons indicated differences in metal concentrations across sampling distance, a linear model was fit to the data and simple regression analysis used to estimate parameters and further describe the data trend. Both metal concentrations and distance were log-transformed for this analysis. Any values within the dataset below the level of detection of the metal analysis were allocated a value one-half of the detection limit.

All analyses were performed using R version 3.6.3 (R Development Core Team 2020). Pairwise comparisons were conducted using the 'emmeans' package for R, version 1.4.2. Graphs were created using 'ggplot2', version 3.3.0.

9.1.2 RESULTS AND DISCUSSION

Soil-metal concentrations and lichen-metal concentrations were mostly below or otherwise within acceptable ranges in relation to applicable CCME soil quality thresholds or lichen indicator values. The results suggest that soil and vegetation base metal concentrations currently represent a low risk to the environment and human health. The following subsections are intended to highlight potential trends and tendencies that may warrant more in-depth consideration during future monitoring activities. Discussions on these findings are provided for focal CoPCs, emphasizing areas of the Project indicating discrete increases or other notable trends. For brevity and clarity of presentation, comprehensive statistical analyses are not shown but available as required.

The dataset for soil and vegetation CoPCs from 2012 to 2020 is provided in Appendix F. The dataset for soil and vegetation base metals concentrations, and certificates of quality assurance for all laboratory analyses from the 2020 monitoring program are provided in Appendix G.

9.1.2.1 Soil-Metal Concentrations

Table 9-3 summarizes the relative change in CoPC concentrations in soil (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Colour categories highlight if and where mean concentrations are significantly greater than baseline and whether these values are above or below CCME soil quality values. Overall, nearly all sample locations (i.e., Project areas and sample distances) showed no significant change in relation to Baseline values; but discrete increases in CoPCs (within acceptable ranges) were recorded at the Milne Porte (arsenic, copper, lead, zinc) and along the Tote Road (zinc). Nearly all sample sites were below the CCME soil quality guideline, except for isolated soil metal exceedances for copper at MS-06 (near the Mine Site) and zinc at TR-08 (along the Tote Road)[10]. Given their respective toxicities and effects on environmental and human health, any increases in arsenic, copper, lead and zinc at the Project — even those below soil quality thresholds and within acceptable concentrations — have been flagged for further characterization. Those CoPC concentrations that showed no significant increases or trends from Baseline (cadmium, selenium) and were below the soil quality threshold value are not discussed further. Site-specific data and trends are available upon request. Presently, Baffinland will continue monitoring these conditions and track any changes in relation to Baseline conditions.

Table 9-3. Summary of changes in soil Contaminants of Potential Concern (2020 vs. Baseline).

Analyte	**Mine Site**			**Tote Road**			**Milne Port**		
	Near	Far	Reference	Near	Far	Reference	Near	Far	Reference
Arsenic	▨	▨	▨	▨	▨	▨	▨	🟨	▨
Cadmium	▨	▨	▨	▨	▨	▨	▨	▨	▨
Copper	▨	▨	▨	▨	▨	▨	▨	▨	▨
Lead	▨	▨	▨	▨	▨	▨	▨	🟨	▨
Selenium	▨	▨	▨	▨	▨	▨	▨	▨	▨
Zinc	▨	▨	▨	▨	▨	▨	▨	🟨	▨

Gray = No change from Baseline
Yellow = Significant increase from Baseline, mean concentration below CCME soil quality guidelines
Orange = Significant increase from Baseline, mean concentration above lower CCME soil quality guidelines

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[10] Sample site MS-06 — located on a slope in proximity to and facing the Mine Site — has indicated increasing CoPCs concentrations since 2016 resulting in Cu exceedances in both 2019 and 2020. Although Cu is not acutely toxic at these concentrations, this site was flagged for future monitoring and investigation. Sample site TR-08 only indicated an exceedance for Zn. Upon closer evaluation of available replicates and controls, it was determined that this could be an aberrant sample.

Arsenic (As) — Table 9-4 summarizes the relative change in soil-As concentrations (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-5 provides a further breakdown of soil-As concentrations (i.e., mean and median values and maximum and minimum ranges) in relation to the reporting detection limits (RDL) and applicable soil quality thresholds. Figure 9-1 illustrates soil-As concentration in relation to Project area and sampling period, while Figure 9-2 shows the relationship to sampling distance at Milne Port (i.e., the Project area where significant soil-As increases were observed). These figures demonstrate the sample distributions in relation to soil quality thresholds. Significant increases in the soil-As concentration in 2019 and 2020 compared to Baseline were observed at Near and Far sites at Milne Port. However, all mean values were below the CCME soil quality threshold. Soil-As does not presently pose a risk to human or environmental health.

Table 9-4. Change in mean Soil-As concentrations across Project areas, distance classes, and sampling periods.

Project Area	**Near (0 – 100 m)**			**Far (100 – 1,000 m)**			**Reference (> 1,000 m)**		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	⬜	⬜	⬜	⬜	⬜	⬜	⬜	⬜	⬜
Tote Road	⬜	⬜	⬜	⬜	⬜	⬜	⬜	⬜	⬜
Milne Port	⬜	🟨	⬜	⬜	🟨	🟨	⬜	⬜	⬜

Gray = No change from Baseline.
Yellow = Significant increase from Baseline, mean concentration below CCME soil quality guidelines.
Orange = Significant increase from Baseline, mean concentration above lower CCME soil quality guidelines.

Table 9-5. Soil-As concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	**Distance from PDA**	**Sampling Period**	**n²**	**RDL**	**Below RDL³ (%)**	**Mean**	**Median**	**Inter-quartile range**	**Min**	**Max**	**Guideline⁴**	**Above Guideline⁴ (%)**
Mine Site	Near	Baseline¹	12	0.5	50.0	0.49	0.43	0.65	0.25	1.53	12	0.0
		2019	11	0.5	54.5	0.54	0.25	0.91	0.25	3.35	12	0.0
		2020	10	0.5	30.0	0.79	0.66	1.43	0.25	3.29	12	0.0
	Far	Baseline	4	0.5	75.0	0.31	0.25	0.08	0.25	0.56	12	0.0
		2019	4	0.5	50.0	0.50	0.51	0.65	0.25	1.30	12	0.0
		2020	11	0.5	54.5	0.44	0.25	0.49	0.25	1.52	12	0.0
	Reference	Baseline	14	0.5	50.0	0.47	0.41	0.58	0.25	1.86	12	0.0
		2019	5	0.5	60.0	0.37	0.25	0.34	0.25	0.71	12	0.0
		2020	4	0.5	25.0	0.62	0.74	0.23	0.25	1.09	12	0.0
Tote Road	Near	Baseline	15	0.5	80.0	0.33	0.25	0.00	0.25	1.25	12	0.0
		2019	12	0.5	83.3	0.32	0.25	0.00	0.25	1.08	12	0.0
		2020	10	0.5	70.0	0.41	0.25	0.53	0.25	1.56	12	0.0
	Far	Baseline	9	0.5	66.7	0.37	0.25	0.35	0.25	1.26	12	0.0
		2019	4	0.5	100.0	0.25	0.25	0.00	0.25	0.25	12	0.0
		2020	4	0.5	100.0	0.25	0.25	0.00	0.25	0.25	12	0.0
	Reference	Baseline	14	0.5	42.9	0.58	0.62	0.65	0.25	4.14	12	0.0
		2019	4	0.5	25.0	0.62	0.76	0.32	0.25	1.03	12	0.0

Table 9-5. Soil-As concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile range	Min	Max	Guideline[4]	Above Guideline[4] (%)
		2020	3	0.5	33.3	0.74	0.98	0.70	0.25	1.65	12	0.0
Milne Port	Near	Baseline	15	0.5	20.0	0.77	0.81	0.42	0.25	2.78	12	0.0
		2019	10	0.5	0.0	1.54	1.31	2.06	0.69	4.38	12	0.0
		2020	10	0.5	10.0	1.31	1.29	0.89	0.25	3.59	12	0.0
	Far	Baseline	4	0.5	75.0	0.33	0.25	0.13	0.25	0.75	12	0.0
		2019	3	0.5	0.0	1.65	1.79	0.72	1.02	2.46	12	0.0
		2020	5	0.5	0.0	1.38	1.41	0.27	1.13	1.75	12	0.0
	Reference	Baseline	3	0.5	0.0	0.75	0.83	0.16	0.57	0.89	12	0.0
		2019	4	0.5	25.0	0.76	0.91	0.65	0.25	1.65	12	0.0
		2020	3	0.5	0.0	1.18	1.09	0.29	0.97	1.55	12	0.0

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites.

[3] Maximum MDL across all sampling years.

[4] Guidelines based on CCME Agricultural Soil Quality Guidelines for the Protection of Environmental and Human Health.

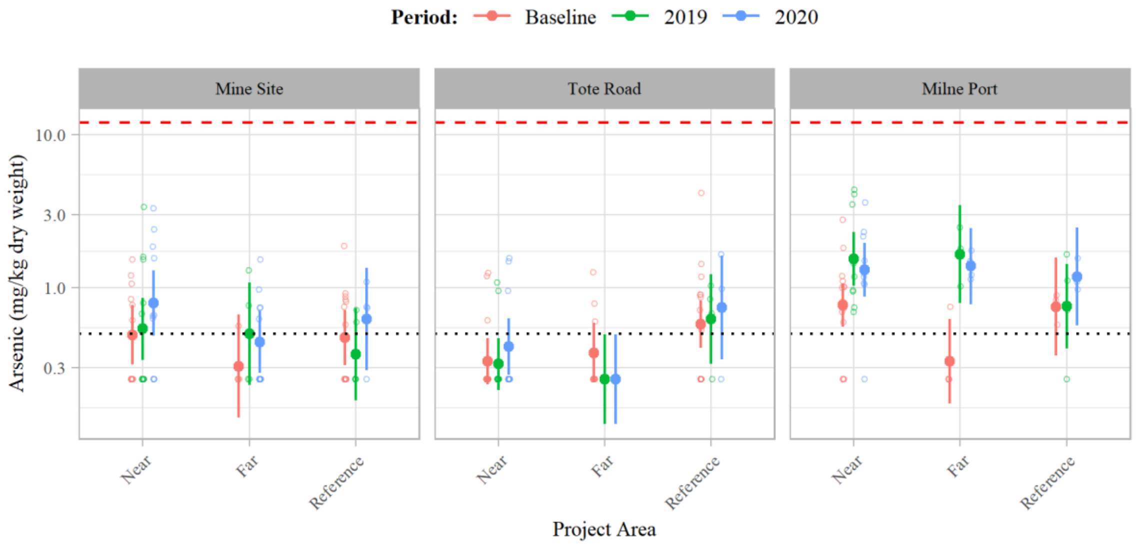


Figure 9-1. Soil-As concentrations compared by Project area, distance class, and sampling period.
Solid points with error bars show means (± 95% CI); open circles show individual sample values. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the CCME guideline, 12 mg/kg, and the black dotted line shows the minimum detection limit, 0.5 mg/kg.

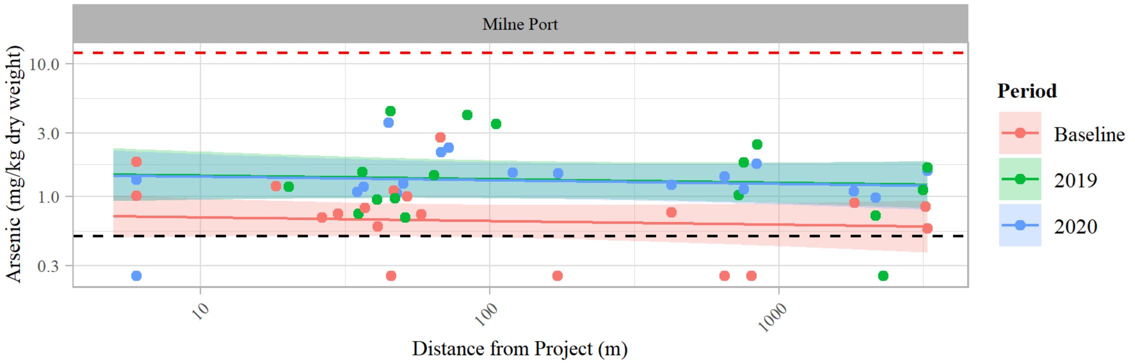


Figure 9-2. Soil-As concentrations with relation to distance from the PDA at Milne Port.
Each colour represents a sampling period; solid lines are mean concentrations and shaded areas are 95% confidence regions. The red dashed line shows the CCME guideline, 12 mg/kg, and the black dotted line shows the minimum detection limit, 0.5 mg/kg.

Copper (Cu) — Table 9-6 summarizes the relative change in Cu concentrations in soil (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-7 provides a further breakdown of soil-Cu concentrations (i.e., mean and median values as well as maximum and minimum ranges) in relation to the RDL and applicable soil quality thresholds. Figure 9-3 illustrates soil-Cu concentration in relation to Project area and sampling period; no trends were identified in relation to sampling distance. This figure demonstrates the sample distribution in relation to soil quality thresholds. Increases in mean soil-Cu concentration in the Far distance category relative to Baseline were observed at Milne Port but were not statistically significant nor above the soil quality threshold. As mentioned, the MS-06 sample site near the Mine Site was identified as Cu exceedance of the threshold, but this did not affect mean values for this distance and Project area category. All other values were below the CCME soil quality threshold. Soil-Cu is not acutely toxic at these concentrations and should not presently pose a risk to human or environmental health.

Table 9-6. Change in mean Soil-Cu concentrations across Project area, distance class, and sampling period.

Project Area	**Near (0 – 100 m)**			**Far (100 – 1,000 m)**			**Reference (> 1,000 m)**		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	▨	▨	▨	▨	▨	▨	▨	▨	▨
Tote Road	▨	▨	▨	▨	▨	▨	▨	▨	▨
Milne Port	▨	▨	▨	▨	🟨	🟨	▨	▨	▨

Gray = No change from Baseline.
Yellow = Significant increase from Baseline, mean concentration below CCME soil guidelines.
Orange = Significant increase from Baseline, mean concentration above lower CCME soil guideline.

Table 9-7. Soil-Cu concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile range	Min	Max	Guideline[4]	Above Guideline[4] (%)
Mine Site	Near	Baseline[1]	12	0.5	0.0	4.60	4.66	5.06	1.54	19.10	63	0.0
		2019	11	0.5	0.0	6.04	3.74	5.67	2.13	81.20	63	9.1
		2020	10	0.5	0.0	9.33	5.94	11.00	2.09	370.00	63	10.0
	Far	Baseline	4	0.5	0.0	2.89	2.90	0.64	2.09	3.97	63	0.0
		2019	4	0.5	0.0	2.36	2.86	2.47	0.90	4.77	63	0.0
		2020	11	0.5	0.0	3.58	3.19	2.52	1.86	6.07	63	0.0
	Reference	Baseline	14	0.5	0.0	4.68	4.57	4.99	0.86	16.90	63	0.0
		2019	5	0.5	0.0	2.70	2.32	1.23	2.03	4.07	63	0.0
		2020	4	0.5	0.0	5.53	7.57	3.48	1.30	12.60	63	0.0
Tote Road	Near	Baseline	15	0.5	13.3	1.11	1.06	0.45	0.25	7.03	63	0.0
		2019	12	0.5	0.0	1.97	1.50	0.60	0.89	49.80	63	0.0
		2020	10	0.5	0.0	2.02	2.12	2.51	0.51	5.85	63	0.0
	Far	Baseline	9	0.5	0.0	1.65	1.77	3.24	0.52	4.45	63	0.0
		2019	4	0.5	25.0	0.71	0.98	0.23	0.25	1.07	63	0.0
		2020	4	0.5	0.0	1.59	1.87	1.25	0.74	2.69	63	0.0
	Reference	Baseline	14	0.5	0.0	4.00	4.79	2.74	0.67	8.77	63	0.0
		2019	4	0.5	0.0	4.27	5.85	2.26	1.04	9.37	63	0.0
		2020	3	0.5	0.0	5.09	9.13	4.39	1.42	10.20	63	0.0
Milne Port	Near	Baseline	15	0.5	0.0	5.00	5.25	1.88	1.56	27.20	63	0.0
		2019	10	0.5	0.0	7.14	6.30	8.64	3.41	18.10	63	0.0
		2020	10	0.5	0.0	6.52	6.49	2.30	2.28	14.60	63	0.0
	Far	Baseline	4	0.5	0.0	3.02	3.43	1.14	1.55	4.56	63	0.0
		2019	3	0.5	0.0	7.69	7.69	3.54	4.92	12.00	63	0.0
		2020	5	0.5	0.0	7.59	6.23	2.03	5.37	15.40	63	0.0
	Reference	Baseline	3	0.5	0.0	5.23	4.20	3.03	3.55	9.60	63	0.0
		2019	4	0.5	0.0	4.90	5.30	1.91	2.65	7.80	63	0.0
		2020	3	0.5	0.0	4.86	4.12	2.19	3.53	7.90	63	0.0

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites.

[3] Maximum MDL across all sampling years.

[4] Guidelines based on CCME Agricultural Soil Quality Guidelines for the Protection of Environmental and Human Health.

Yellow = indicates sample value above guideline.

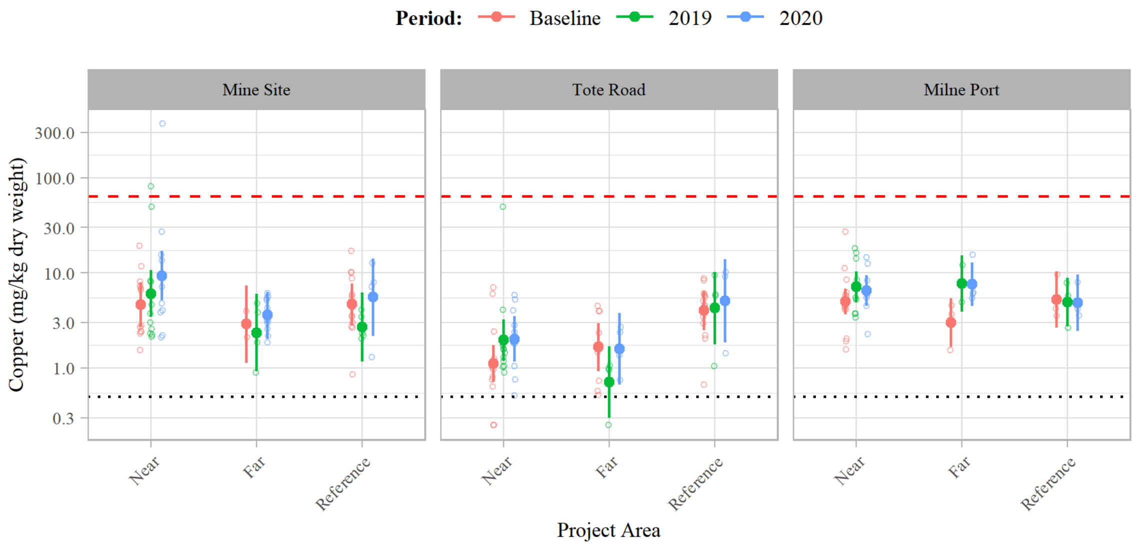


Figure 9-3. Soil-Cu concentrations compared by Project area and sampling period.
Solid points with error bars show means (± 95% CI); open circles show individuals sample values. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the CCME guideline, 63 mg/kg, and the black dotted line shows the minimum detection limit, 0.5 mg/kg.

Lead (Pb) — Table 9-8 summarizes the relative change in soil-Pb concentrations (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-9 provides a further breakdown of soil-Pb concentrations (i.e., mean and median values and maximum and minimum ranges) in relation to the RDL and applicable soil quality thresholds. Figure 9-4 illustrates soil-Pb concentrations in relation to Project area and sampling period; no relationship was identified in relation to sampling distance. This figure demonstrates the sample distributions in relation to soil quality thresholds. Increases in mean soil-Pb concentration relative to Baseline were observed in the Far distance category in 2019 and 2020 at Milne Port, which is not consistent with a Project-related effect. All values are below the CCME soil quality threshold. Soil-Pb does not presently pose a risk to human or environmental health.

Table 9-8. Change in mean Soil-Pb concentrations across Project areas, distance classes, and sampling periods.

Project Area	**Near (0 – 100 m)**			**Far (100 – 1,000 m)**			**Reference (> 1,000 m)**		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	▨	▨	▨	▨	▨	▨	▨	▨	▨
Tote Road	▨	▨	▨	▨	▨	▨	▨	▨	▨
Milne Port	▨	▨	▨	▨	🟨	🟨	▨	▨	▨

Gray = No change from Baseline.
Yellow = Significant increase from Baseline, mean concentration below guidelines.
Orange = Significant increase from Baseline, mean concentration above lower guideline.

Table 9-9. Soil-Pb concentrations (mg/kg) in soil compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile range	Min	Max	Guideline[4]	Above Guideline[4] (%)
Mine Site	Near	Baseline[1]	12	0.5	0.0	5.11	4.29	4.94	2.61	11.20	70	0.0
		2019	11	0.5	0.0	4.50	4.62	4.93	1.84	17.90	70	0.0
		2020	10	0.5	0.0	5.26	4.48	3.67	1.72	38.50	70	0.0
	Far	Baseline	4	0.5	0.0	2.87	2.85	1.49	2.02	4.34	70	0.0
		2019	4	0.5	0.0	2.90	2.85	1.11	1.60	5.42	70	0.0
		2020	11	0.5	0.0	2.82	2.53	1.09	1.66	5.15	70	0.0
	Reference	Baseline	14	0.5	0.0	3.65	4.15	1.94	1.40	6.83	70	0.0
		2019	5	0.5	0.0	3.24	2.96	2.07	2.35	4.72	70	0.0
		2020	4	0.5	0.0	4.49	5.68	1.12	2.12	5.98	70	0.0
Tote Road	Near	Baseline	15	0.5	0.0	1.35	1.18	0.72	0.54	6.51	70	0.0
		2019	12	0.5	0.0	1.65	1.27	0.40	0.80	28.20	70	0.0
		2020	10	0.5	0.0	1.81	1.65	1.65	0.80	4.90	70	0.0
	Far	Baseline	9	0.5	0.0	1.47	1.29	1.17	0.82	3.89	70	0.0
		2019	4	0.5	0.0	1.10	1.10	0.10	0.96	1.26	70	0.0
		2020	4	0.5	0.0	1.35	1.45	1.11	0.86	2.16	70	0.0
	Reference	Baseline	14	0.5	0.0	3.70	3.95	2.39	1.18	7.85	70	0.0
		2019	4	0.5	0.0	3.18	3.45	1.45	1.78	4.91	70	0.0
		2020	3	0.5	0.0	3.16	3.64	2.82	1.26	6.90	70	0.0
Milne Port	Near	Baseline	15	0.5	0.0	5.08	4.73	2.68	1.64	22.50	70	0.0
		2019	10	0.5	0.0	7.41	6.29	5.61	3.69	14.00	70	0.0
		2020	10	0.5	0.0	5.75	5.80	2.55	2.12	12.30	70	0.0
	Far	Baseline	4	0.5	0.0	3.18	3.52	0.73	1.82	4.52	70	0.0
		2019	3	0.5	0.0	9.71	9.31	6.92	5.17	19.00	70	0.0
		2020	5	0.5	0.0	8.15	7.05	4.71	5.63	11.60	70	0.0
	Reference	Baseline	3	0.5	0.0	3.37	2.98	0.75	2.92	4.41	70	0.0
		2019	4	0.5	0.0	3.54	4.13	1.63	1.39	6.65	70	0.0
		2020	3	0.5	0.0	4.57	4.32	1.08	3.74	5.89	70	0.0

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites.

[3] Maximum MDL across all sampling years.

[4] Guidelines based on CCME Agricultural Soil Quality Guidelines for the Protection of Environmental and Human Health.

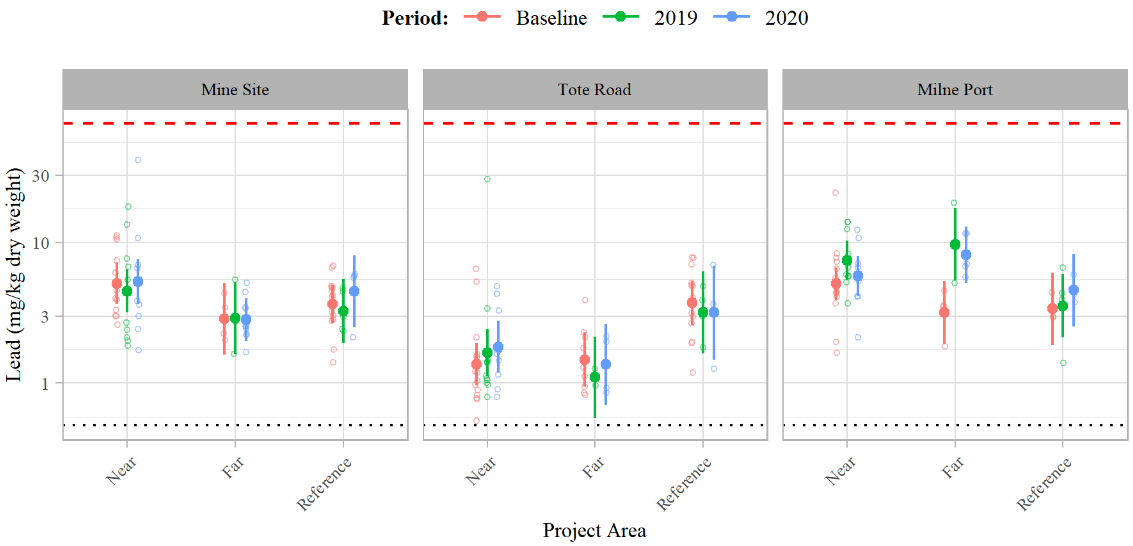


Figure 9-4. Soil-Pb concentrations compared by Project area, distance class, and sampling period.
Solid points with error bars show means (± 95% CI); open circles show individual sample values. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the CCME guideline, 70 mg/kg, and the black dotted line shows the minimum detection limit, 0.5 mg/kg.

Zinc (Zn) — Table 9-10 summarizes the relative change in Zn concentrations in soil (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-11 provides a further breakdown of soil-Zn concentrations (i.e., mean and median values as well as maximum and minimum ranges) in relation to the RDL and applicable soil quality thresholds. Figure 9-5 illustrates soil-Zn concentration in relation to Project area and sampling period, while Figure 9-6 illustrates the relationship to sampling distance at Milne Port (i.e., the Project area where significant soil-Zn increases were observed). These figures demonstrate the sample distributions in relation to soil quality thresholds. A significant increase in mean soil-Zn concentration relative to Baseline was observed in the Far distance category in 2020 at Milne Port, which is not consistent with a Project-related effect. As mentioned, the TR-08 sample site has been identified as the source for metal exceedance; it was then determined that this is likely an aberrant sample. Otherwise, all other values were below the CCME soil quality threshold. Soil-Zn is not acutely toxic at these concentrations and therefore does not presently pose a risk to human or environmental health.

Table 9-10. Change in mean Soil-Zn concentrations across Project areas, distance classes, and sampling periods.

Project Area	**Near (0 – 100 m)**			**Far (100 – 1,000 m)**			**Reference (> 1,000 m)**		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	▨	▨	▨	▨	▨	▨	▨	▨	▨
Tote Road	▨	▨	▨	▨	▨	▨	▨	▨	▨
Milne Port	▨	▨	▨	▨	▨	🟨	▨	▨	▨

Gray = No change from Baseline.
Yellow = Significant increase from Baseline, mean concentration below guidelines.
Orange = Significant increase from Baseline, mean concentration above lower guideline.

Table 9-11. Soil-Zn concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA (m)	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile range	Min	Max	Guideline[4]	Above Guideline[4] (%)
Mine Site	Near	Baseline[1]	12	2	0.0	13.29	12.80	6.83	6.40	29.70	200	0.0
		2019	11	2	0.0	13.23	9.20	11.85	4.20	88.40	200	0.0
		2020	10	2	0.0	18.09	12.90	17.05	8.10	152.00	200	0.0
	Far	Baseline	4	2	0.0	9.59	10.10	0.65	7.90	10.50	200	0.0
		2019	4	2	0.0	5.38	5.40	5.35	2.90	11.70	200	0.0
		2020	11	2	0.0	9.32	10.00	2.35	2.90	15.00	200	0.0
	Reference	Baseline	14	2	0.0	14.42	14.70	4.13	4.10	39.60	200	0.0
		2019	5	2	0.0	10.34	10.30	2.20	6.90	19.90	200	0.0
		2020	4	2	0.0	15.02	19.00	10.18	5.40	26.90	200	0.0
Tote Road	Near	Baseline	15	2	13.3	3.43	3.30	1.85	1.00	16.20	200	0.0
		2019	12	2	0.0	4.76	3.65	0.90	2.40	86.20	200	0.0
		2020	10	2	10.0	7.41	5.80	5.95	1.00	316.00	200	10.0
	Far	Baseline	9	2	0.0	5.07	4.80	5.60	2.00	17.00	200	0.0
		2019	4	2	25.0	2.30	2.85	1.15	1.00	3.50	200	0.0
		2020	4	2	0.0	4.24	4.10	1.65	2.60	7.40	200	0.0
	Reference	Baseline	14	2	0.0	10.91	14.20	8.43	2.40	19.40	200	0.0
		2019	4	2	0.0	9.88	11.40	9.03	4.20	19.30	200	0.0
		2020	3	2	0.0	11.33	14.30	9.05	4.50	22.60	200	0.0
Milne Port	Near	Baseline	15	2	0.0	15.39	15.80	10.35	4.10	35.30	200	0.0
		2019	10	2	0.0	20.18	19.25	12.10	9.70	32.00	200	0.0
		2020	10	2	0.0	24.22	18.95	10.70	13.60	179.00	200	0.0
	Far	Baseline	4	2	0.0	10.80	11.80	7.78	4.20	23.90	200	0.0
		2019	3	2	0.0	25.21	30.60	7.05	16.90	31.00	200	0.0
		2020	5	2	0.0	27.86	22.90	9.10	20.30	49.60	200	0.0
	Reference	Baseline	3	2	0.0	12.85	11.40	5.05	9.50	19.60	200	0.0
		2019	4	2	0.0	12.74	14.80	6.68	5.80	21.10	200	0.0
		2020	3	2	0.0	16.76	20.30	5.95	10.40	22.30	200	0.0

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites.

[3] Maximum MDL across all sampling years.

[4] Guidelines based on CCME Agricultural Soil Quality Guidelines for the Protection of Environmental and Human Health.

Yellow = indicates sample value above guideline.

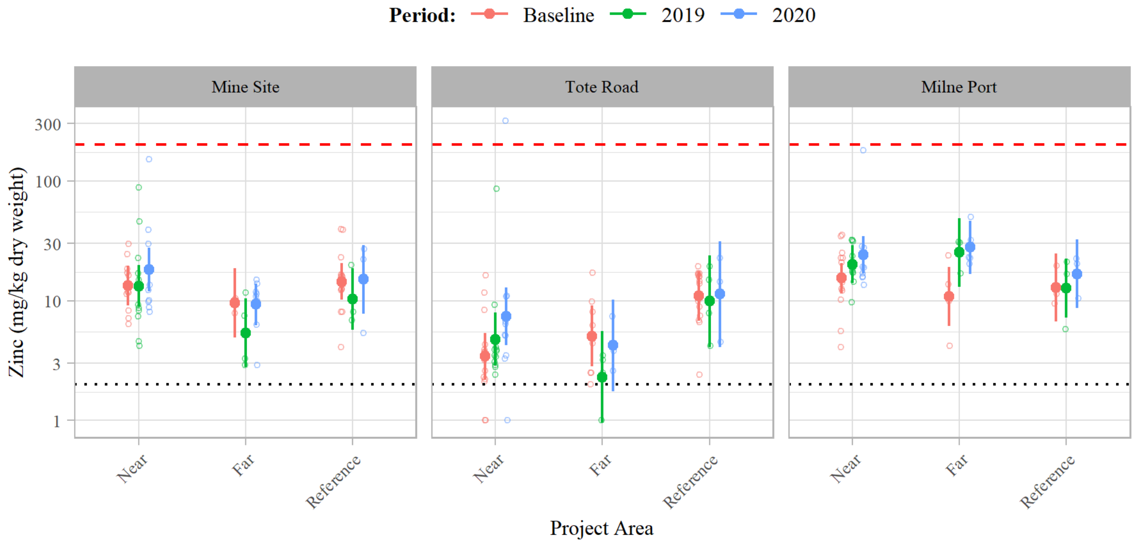


Figure 9-5. Soil-Zn concentrations compared by Project area, distance class, and sampling period.
Solid points with error bars show means (± 95% CI); open circles show individuals sample values. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the CCME guideline, 200 mg/kg, and the black dotted line shows the reportable detection limit, 2 mg/kg.

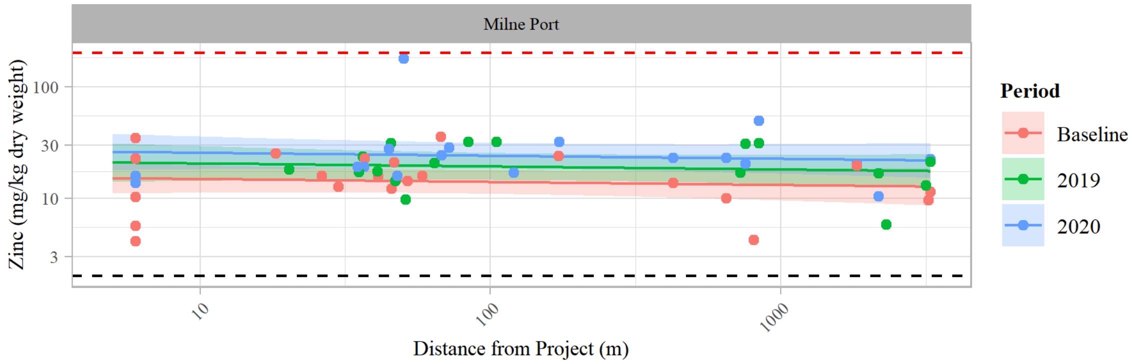


Figure 9-6. Soil-Zn concentrations in relation to sampling distance from the PDA at Milne Port.
Each colour represents a sampling period; solid lines are mean concentrations, and shaded areas are 95% confidence regions. The red dashed line shows the CCME guideline, 200 mg/kg, and the black dotted line shows the reportable detection limit, 2 mg/kg.

9.1.2.2 Lichen-Metal Concentrations

Table 9-12 summarizes the relative change in CoPC concentrations in lichen (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Colour categories highlight if and where mean concentrations show an increasing (but not significant) trend or are significantly greater than baseline and whether these values are above or below the lichen indicator values. Overall, many sample locations (i.e., Project areas and sample distances) showed no significant change in relation to Baseline values; however, discrete increases in the concentrations of CoPCs (within acceptable ranges) in lichen were recorded at the Mine Site (As, Pb, Se), along the Tote Road (Cd, Cu, Pb, Se), and at Milne Port (As, Pb). These increases were primarily observed at the Near and Far sampling locations, but occasionally at the Reference locations. Mean values for sample locations were below or within an acceptable range of the lichen indicator values; no threshold exceedances were recorded. Given their acute toxicity and effects on environmental and human health, any increases in As, Cd, Cu, Pb and Se at the Project — even those below lichen indicator values and within acceptable concentrations — have been flagged for further characterization and should be the focus of future monitoring. Presently, the recommended action is to continue monitoring these conditions and track any changes in relation to Baseline conditions.

Table 9-12. Summary of changes in CoPC concentrations in lichen (2020 vs. Baseline).

Analyte	**Mine Site**			**Tote Road**			**Milne Port**		
	Near	Far	Reference	Near	Far	Reference	Near	Far	Reference
Arsenic	⬜	🟨	⬜	⬜	⬜	⬜	🟨	🟨	⬜
Cadmium	⬜	⬜	⬜	🟨	🟨	⬜	⬜	⬜	⬜
Copper	⬜	⬜	⬜	🟨	⬜	⬜	⬜	⬜	⬜
Lead	🟨	⬜	⬜	🟧	🟨	⬜	🟨	⬜	⬜
Selenium	⬜	🟨	⬜	⬜	🟨	🟨	⬜	⬜	⬜
Zinc	⬜	⬜	⬜	⬜	⬜	⬜	⬜	⬜	⬜

Gray = No change from Baseline.
Yellow = Significant increase from Baseline, mean concentration below lichen indicator value.
Orange = Significant increase from Baseline, mean concentration above lower lichen indicator value.

Arsenic — Table 9-13 summarizes the relative change in lichen-As concentrations (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-14 then provides further breakdown of lichen-As concentrations in relation to the RDL. Figure 9-7 illustrates lichen-As concentration in relation to Project area and sampling period, while Figure 9-8 illustrates the relationship to sampling distance at the Mine Site and Milne Port (i.e., the Project areas where significant increases in lichen-As were observed compared to Baseline values). No lichen indicator values exist for As to evaluate the specific risk to environmental health and safety. However, most lichen-As concentrations were consistently low across all sample sites and near or below the detection limit.

Table 9-13. Change in mean Lichen-As concentrations across Project areas, distance classes, and sampling periods.

Project Area	Near (0 – 100 m)			Far (>100 – 1,000 m)			Reference (> 1,000 m)		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	▨	▨	▨	▨	▨	🟨	▨	▨	▨
Tote Road	▨	▨	▨	▨	▨	▨	▨	▨	▨
Milne Port	▨	🟨	🟨	▨	▨	🟨	▨	▨	▨

Gray = No change from Baseline.

Yellow = Significant increase from Baseline, mean concentration below lichen indicator value.

Orange = Significant increase from Baseline, mean concentration above lower lichen indicator value.

Table 9-14. Lichen-As concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value [4]	Above Indicator Value (%)
Mine Site	Near	Baseline[1]	12	0.05	0.0	0.09	0.10	0.03	0.06	0.24	-	-
		2019	11	0.05	0.0	0.17	0.15	0.04	0.11	0.33	-	-
		2020	10	0.05	0.0	0.17	0.17	0.03	0.14	0.23	-	-
	Far	Baseline	4	0.05	50.0	0.05	0.05	0.05	0.03	0.11	-	-
		2019	4	0.05	0.0	0.12	0.13	0.05	0.09	0.15	-	-
		2020	11	0.05	0.0	0.14	0.16	0.06	0.08	0.20	-	-
	Reference	Baseline	13	0.05	30.8	0.08	0.09	0.10	0.03	1.10	-	-
		2019	5	0.05	40.0	0.07	0.07	0.10	0.03	0.36	-	-
		2020	4	0.05	50.0	0.05	0.04	0.06	0.03	0.14	-	-
Tote Road	Near	Baseline	15	0.05	0.0	0.18	0.19	0.06	0.10	0.35	-	-
		2019	12	0.05	0.0	0.23	0.23	0.06	0.18	0.31	-	-
		2020	10	0.05	0.0	0.16	0.15	0.03	0.13	0.24	-	-
	Far	Baseline	9	0.05	0.0	0.08	0.07	0.04	0.05	0.11	-	-
		2019	4	0.05	0.0	0.10	0.08	0.03	0.07	0.19	-	-
		2020	4	0.05	0.0	0.08	0.09	0.02	0.05	0.11	-	-
	Reference	Baseline	11	0.05	72.7	0.04	0.03	0.03	0.03	0.15	-	-
		2019	4	0.05	75.0	0.03	0.03	0.01	0.03	0.07	-	-
		2020	3	0.05	100.0	0.03	0.03	0.00	0.03	0.03	-	-
Milne Port	Near	Baseline	14	0.05	21.4	0.07	0.07	0.02	0.03	0.23	-	-
		2019	10	0.05	0.0	0.12	0.13	0.04	0.08	0.16	-	-
		2020	10	0.05	0.0	0.11	0.12	0.04	0.08	0.19	-	-
	Far	Baseline	4	0.05	75.0	0.03	0.03	0.01	0.03	0.07	-	-
		2019	3	0.05	0.0	0.06	0.06	0.01	0.06	0.08	-	-
		2020	5	0.05	0.0	0.09	0.08	0.08	0.05	0.16	-	-
	Reference	Baseline	3	0.05	33.3	0.05	0.06	0.03	0.03	0.08	-	-
		2019	4	0.05	100.0	0.03	0.03	0.00	0.03	0.03	-	-

Table 9-14. Lichen-As concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value [4]	Above Indicator Value (%)
		2020	3	0.05	66.7	0.03	0.03	0.02	0.03	0.06	-	-

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites.

[3] Maximum MDL across all sampling years.

[4] No indicator value is available.

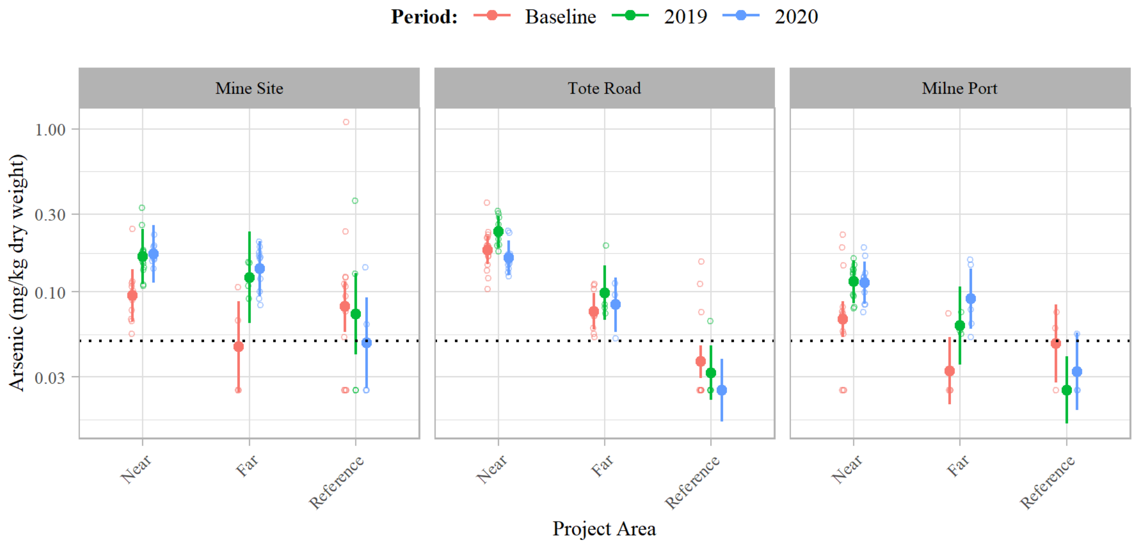


Figure 9-7. Lichen-As concentrations compared by Project area, distance class, and sampling period.
Solid points with error bars show means (± 95% CI); open circles show individuals sample values. Concentrations below the detection limit are displayed as half the detection limit. The black dotted line shows the minimum detection limit, 0.05 mg/kg.

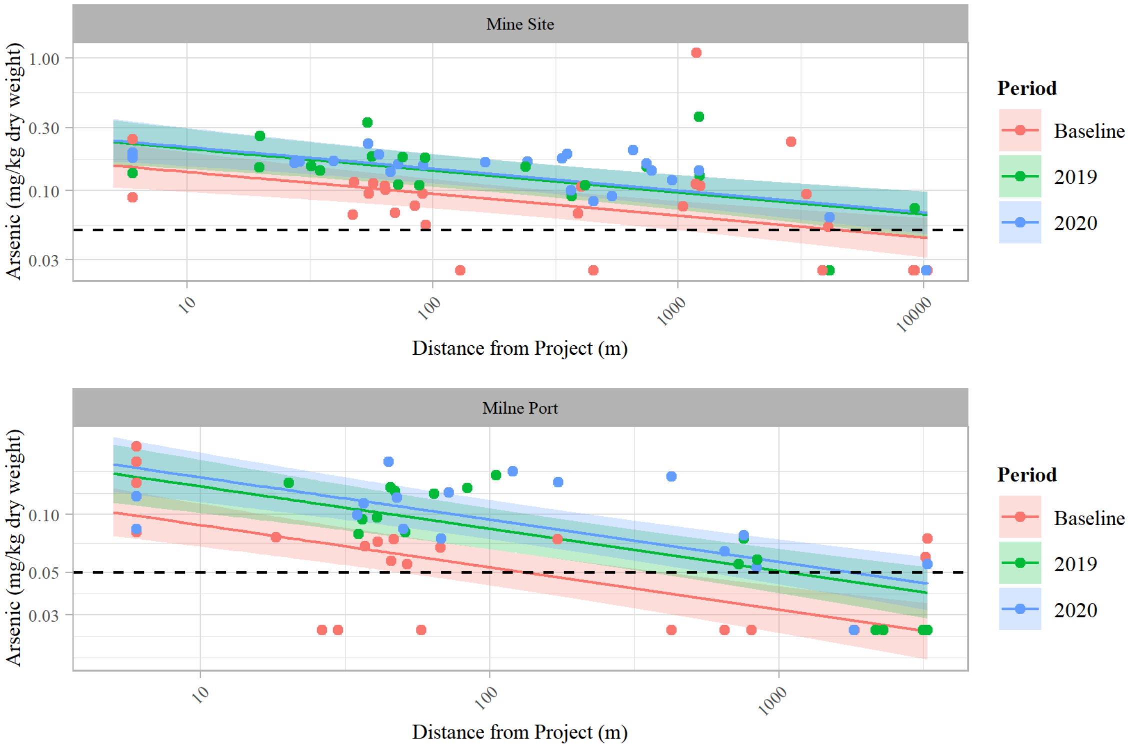


Figure 9-8. Lichen-As concentrations in relation to distance from the PDA at the Mine Site and Milne Port. *Each colour represents a sampling period; solid lines are mean concentrations, and shaded areas are 95% confidence regions. Concentrations below the detection limit are displayed as half the detection limit. The black dotted line shows the minimum detection limit, 0.05 mg/kg.*

Cadmium — Table 9-15 summarizes the relative change in lichen-Cd concentrations (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-16 provides further breakdown of lichen-Cd concentrations in relation to the RDL. Figure 9-9 illustrates lichen-Cd concentration in relation to Project area and sampling period, while Figure 9-10 illustrates the relationship to sampling distance at the Tote Road (i.e., the Project area where significant increases in lichen-Cd were observed compared to Baseline values). All values are below the lichen indicator value and near or below the detection limit. Lichen-Cd is not presently considered to pose a risk to environmental health.

Table 9-15. Change in mean Lichen-Cd concentrations across Project areas, distance classes, and sampling periods.

Project Area	Near (0 – 100 m)			Far (>100 – 1,000 m)			Reference (> 1,000 m)		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	▨	▨	▨	▨	▨	▨	▨	▨	▨
Tote Road	▨	🟨	🟨	▨	🟨	🟨	▨	▨	▨
Milne Port	▨	▨	▨	▨	▨	▨	▨	▨	▨

Gray = No change from Baseline.
Yellow = Significant increase from Baseline, mean concentration below lichen indicator value.
Orange = Significant increase from Baseline, mean concentration above lower lichen indicator value.

Table 9-16. Mean Lichen-Cd concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value [4]	Above Indicator Value (%)
Mine Site	Near	Baseline[1]	12	0.01	0.0	0.06	0.05	0.03	0.03	0.17	30	0.0
		2019	11	0.01	0.0	0.08	0.06	0.05	0.04	0.74	30	0.0
		2020	10	0.01	0.0	0.09	0.07	0.03	0.04	1.09	30	0.0
	Far	Baseline	4	0.01	0.0	0.04	0.04	0.00	0.03	0.04	30	0.0
		2019	4	0.01	0.0	0.05	0.06	0.01	0.04	0.06	30	0.0
		2020	11	0.01	0.0	0.06	0.06	0.03	0.03	0.10	30	0.0
	Reference	Baseline	13	0.01	0.0	0.12	0.11	0.10	0.04	0.26	30	0.0
		2019	5	0.01	0.0	0.11	0.12	0.07	0.07	0.19	30	0.0
		2020	4	0.01	0.0	0.15	0.18	0.06	0.07	0.23	30	0.0
Tote Road	Near	Baseline	15	0.01	0.0	0.04	0.04	0.02	0.03	0.10	30	0.0
		2019	12	0.01	0.0	0.09	0.08	0.04	0.06	0.19	30	0.0
		2020	10	0.01	0.0	0.09	0.11	0.08	0.04	0.18	30	0.0
	Far	Baseline	9	0.01	0.0	0.04	0.03	0.02	0.03	0.08	30	0.0
		2019	4	0.01	0.0	0.08	0.07	0.07	0.04	0.18	30	0.0
		2020	4	0.01	0.0	0.07	0.09	0.03	0.03	0.11	30	0.0
	Reference	Baseline	11	0.01	0.0	0.06	0.05	0.02	0.04	0.17	30	0.0
		2019	4	0.01	0.0	0.05	0.04	0.02	0.03	0.12	30	0.0
		2020	3	0.01	0.0	0.07	0.07	0.05	0.04	0.13	30	0.0
Milne Port	Near	Baseline	14	0.01	0.0	0.04	0.04	0.01	0.02	0.09	30	0.0
		2019	10	0.01	0.0	0.04	0.04	0.00	0.03	0.05	30	0.0
		2020	10	0.01	0.0	0.04	0.04	0.01	0.02	0.05	30	0.0
	Far	Baseline	4	0.01	0.0	0.03	0.03	0.01	0.02	0.05	30	0.0
		2019	3	0.01	0.0	0.03	0.03	0.00	0.02	0.03	30	0.0
		2020	5	0.01	0.0	0.03	0.04	0.01	0.02	0.05	30	0.0
	Reference	Baseline	3	0.01	0.0	0.04	0.03	0.01	0.03	0.06	30	0.0
		2019	4	0.01	0.0	0.03	0.03	0.03	0.02	0.06	30	0.0

Table 9-16. Mean Lichen-Cd concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value [4]	Above Indicator Value (%)
		2020	3	0.01	0.0	0.03	0.02	0.01	0.02	0.04	30	0.0

1 Baseline = baseline sampling during pre-construction for all years up to and including 2016.

2 Number of sample sites.

3 Maximum MDL across all sampling years.

4 Indicator value is a metal concentration (mg/kg dry weight), selected from the best available scientific research for a similar or related lichen species and metal/metalloid, which may signal a change in vegetation health, such as reduced vigour or growth.

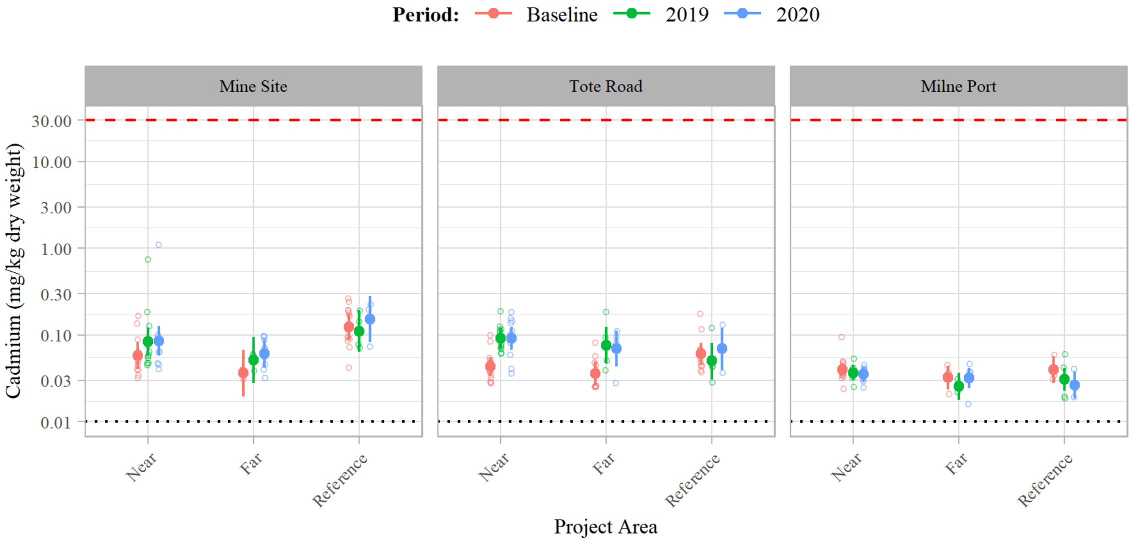


Figure 9-9. Lichen-Cd concentrations compared by Project area, distance class, and sampling period.

Solid points with error bars show means (± 95% CI); open circles show individual sample values. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the CCME guideline, 30 mg/kg, and the black dotted line shows the minimum detection limit, 0.01 mg/kg.

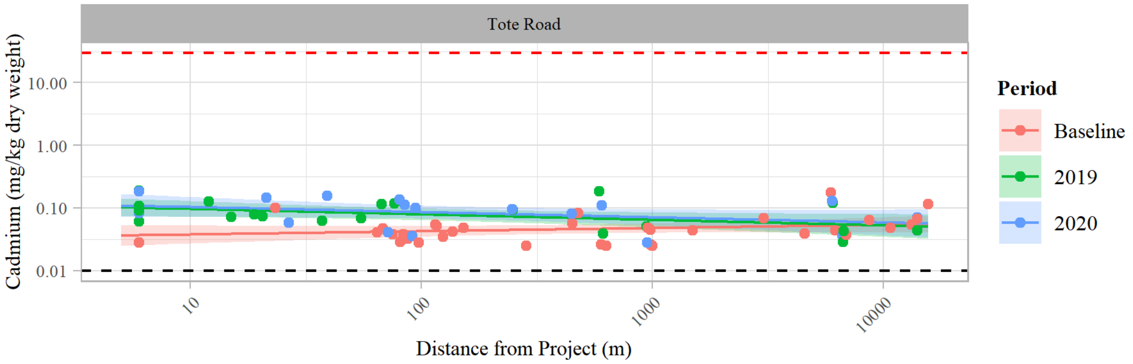


Figure 9-10. Change in Lichen-Cd concentrations with relation to distance from the PDA at the Tote Road.
Each colour represents a sampling period; solid lines are mean concentrations, and shaded areas are 95% confidence regions. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the lichen indicator value, 30 mg/kg, and the black dotted line shows the minimum detection limit, 0.01 mg/kg.

Copper — Table 9-17. summarizes the relative change in lichen-Cu concentrations (2020 versus Baseline conditions) across all Project areas and at each sampling distance/location. Table 9-18 provides a further breakdown of lichen-Cu concentrations in relation to the RDL. Figure 9-11 illustrates lichen-Cu concentration in relation to Project area and sampling period, while Figure 9-12 illustrates the relationship to sampling distance at the Tote Road (the Project area where significant increases in lichen-Cu were observed compared to Baseline values). All values were below the lichen indicator value. Lichen-Cu is not presently considered to pose a risk to environmental health.

Table 9-17. Change in mean Lichen-Cu concentrations across Project areas, distance classes, and sampling periods.

Project Area	**Near (0 – 100 m)**			**Far (>100 – 1,000 m)**			**Reference (> 1,000 m)**		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	▨	▨	▨	▨	▨	▨	▨	▨	▨
Tote Road	▨	🟨	▨	▨	▨	▨	▨	▨	▨
Milne Port	▨	▨	▨	▨	▨	▨	▨	▨	▨

Gray = No change from Baseline.
Yellow = Significant increase from Baseline, mean concentration below lichen indicator value.
Orange = Significant increase from Baseline, mean concentration above lower lichen indicator value.

Table 9-18. Lichen-Cu concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value [4]	Above Indicator Value (%)
Mine Site	Near	Baseline[1]	12	0.1	0.0	2.10	2.03	0.94	1.29	3.44	15/20	0.0
		2019	11	0.1	0.0	3.11	2.88	1.23	1.89	12.70	15/20	0.0
		2020	10	0.1	0.0	2.61	2.45	0.89	1.51	4.58	15/20	0.0
	Far	Baseline	4	0.1	0.0	1.48	1.07	0.95	0.93	4.49	15/20	0.0
		2019	4	0.1	0.0	1.94	1.88	0.92	1.45	2.88	15/20	0.0
		2020	11	0.1	0.0	1.91	1.82	1.06	1.36	2.86	15/20	0.0
	Reference	Baseline	13	0.1	0.0	1.28	1.14	0.43	0.81	3.18	15/20	0.0
		2019	5	0.1	0.0	1.12	1.09	0.45	0.84	1.64	15/20	0.0
		2020	4	0.1	0.0	1.14	1.01	0.52	0.77	2.20	15/20	0.0
Tote Road	Near	Baseline	15	0.1	0.0	3.21	3.38	1.27	1.16	6.06	15/20	0.0
		2019	12	0.1	0.0	4.87	4.34	1.76	3.32	8.94	15/20	0.0
		2020	10	0.1	0.0	2.68	2.59	0.87	2.08	4.00	15/20	0.0
	Far	Baseline	9	0.1	0.0	1.35	1.22	0.85	0.69	3.82	15/20	0.0
		2019	4	0.1	0.0	1.72	1.58	0.59	1.31	2.72	15/20	0.0
		2020	4	0.1	0.0	1.59	1.72	0.34	1.06	2.05	15/20	0.0
	Reference	Baseline	11	0.1	0.0	0.94	0.87	0.27	0.66	2.14	15/20	0.0
		2019	4	0.1	0.0	0.87	0.88	0.14	0.74	1.03	15/20	0.0
		2020	3	0.1	0.0	0.95	1.04	0.14	0.78	1.05	15/20	0.0
Milne Port	Near	Baseline	14	0.1	0.0	0.99	0.86	0.38	0.68	2.12	15/20	0.0
		2019	10	0.1	0.0	1.08	1.10	0.21	0.91	1.41	15/20	0.0
		2020	10	0.1	0.0	1.10	1.09	0.14	0.91	1.48	15/20	0.0
	Far	Baseline	4	0.1	0.0	0.87	0.84	0.13	0.76	1.06	15/20	0.0
		2019	3	0.1	0.0	0.80	0.84	0.11	0.68	0.90	15/20	0.0
		2020	5	0.1	0.0	0.96	0.93	0.48	0.67	1.31	15/20	0.0
	Reference	Baseline	3	0.1	0.0	0.84	0.82	0.08	0.77	0.93	15/20	0.0
		2019	4	0.1	0.0	0.75	0.77	0.12	0.63	0.87	15/20	0.0
		2020	3	0.1	0.0	0.73	0.74	0.11	0.63	0.84	15/20	0.0

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites.

[3] Maximum MDL across all sampling years.

[4] Indicator value is a metal concentration (mg/kg dry weight), selected from the best available scientific research for a similar or related lichen species and metal/metalloid, which may signal a change in vegetation health, such as reduced vigour or growth.

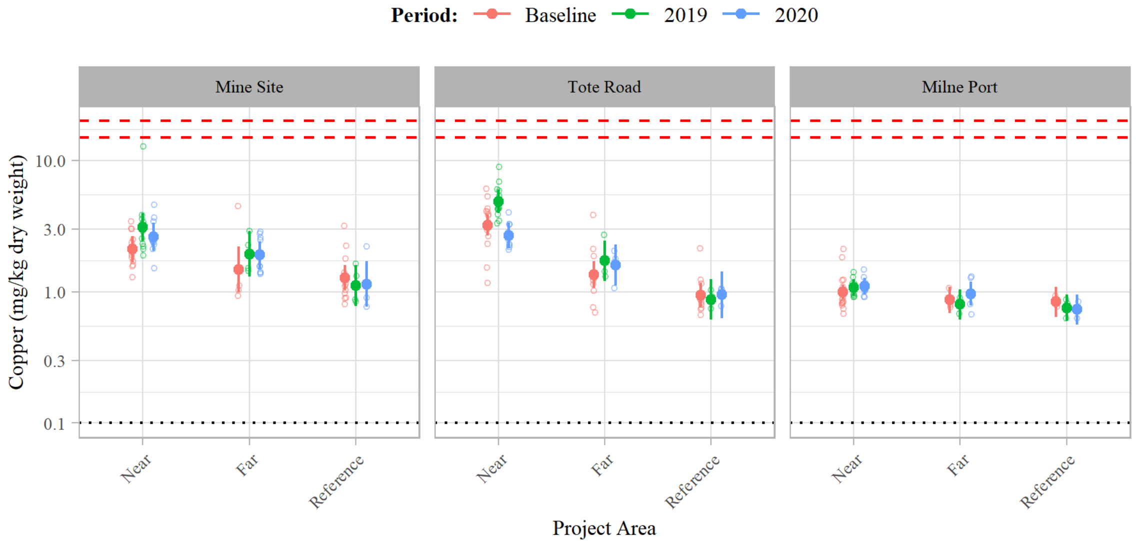


Figure 9-11. Lichen-Cu concentrations compared by Project area, distance class, and sampling period.
Solid points with error bars show means (± 95% CI); open circles show individual sample values. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the lower and upper lichen indicator values, 15 and 20 mg/kg, and the black dotted line shows the minimum detection limit, 0.1 mg/kg.

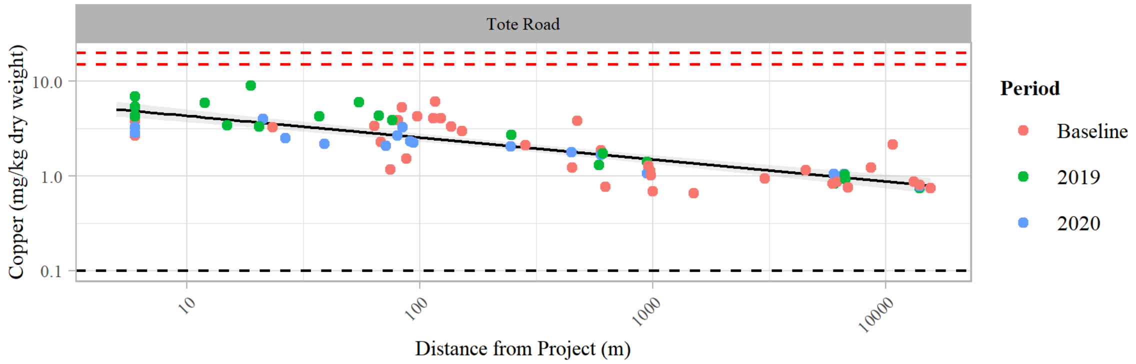


Figure 9-12. Change in Lichen-Cu concentrations in relation to distance from the PDA at the Tote Road.
The solid line shows mean concentrations, and the shaded area is the 95% confidence region. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the lower and upper lichen indicator values, 15 and 20 mg/kg, and the black dotted line shows the minimum detection limit, 0.1 mg/kg

Lead — Table 9-19 summarizes the relative change in lichen-Pb concentrations (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-20 provides a further breakdown of lichen-Pb concentrations in relation to the RDL. Figure 9-13 illustrates lichen-Pb concentration in relation to Project area and sampling period, while illustrates Figure 9-14 the relationship to sampling distance at the Mine Site, along the Tote Road, and at the Milne Port. Most values were below the lower lichen indicator value, whereas isolated samples at the Mine Site, along the Tote Road, and at Milne Port fell within or were marginally above the lower, and occasionally upper, values of the lichen-Pb indicator range. Most increases and exceedances were found in the Near distance category, and mean values for the Tote Road Near category exceeded the lower lichen-Pb indicator value. A negative relationship was identified between lichen-Pb concentration and distance to the PDA for all Project areas. Since mean values do not exceed upper indicator values, lichen-Pb is not presently considered a risk to environmental health and safety. However, the data trends suggest that values are increasing.

Table 9-19. Changes in mean lichen-Pb Concentrations across Project areas, distance classes, and sampling periods.

Project Area	Near (0 – 100 m)			Far (>100 – 1,000 m)			Reference (> 1,000 m)		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	⬜	🟨	🟨	⬜	⬜	⬜	⬜	⬜	⬜
Tote Road	⬜	🟧	🟧	⬜	🟨	🟨	⬜	⬜	⬜
Milne Port	⬜	🟨	🟨	⬜	⬜	⬜	⬜	⬜	⬜

Gray = No change from Baseline.

Yellow = Significant increase from Baseline, mean concentration below lichen indicator value.

Orange = Significant increase from Baseline, mean concentration above lower lichen indicator value.

Table 9-20. Lichen-Pb concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value [4]	Above Indicator Value (%)
Mine Site	Near	Baseline[1]	12	0.02	0.0	1.18	1.23	0.50	0.58	3.47	5/15	0.0
		2019	11	0.02	0.0	2.35	2.19	1.28	1.22	4.82	5/15	0.0
		2020	10	0.02	0.0	2.40	2.16	2.20	1.49	4.77	5/15	0.0
	Far	Baseline	4	0.02	0.0	0.92	0.89	0.49	0.56	1.67	5/15	0.0
		2019	4	0.02	0.0	1.43	1.52	0.92	0.81	2.38	5/15	0.0
		2020	11	0.02	0.0	1.49	1.40	0.72	0.91	3.32	5/15	0.0
	Reference	Baseline	13	0.02	0.0	1.28	1.41	1.95	0.28	6.71	5/15	7.7/0.0
		2019	5	0.02	0.0	0.95	0.82	0.98	0.44	2.11	5/15	0.0
		2020	4	0.02	0.0	0.95	1.05	0.29	0.48	1.53	5/15	0.0
Tote Road	Near	Baseline	15	0.02	0.0	1.74	1.76	1.31	0.53	3.23	5/15	0.0
		2019	12	0.02	0.0	6.48	6.18	1.62	4.05	15.30	5/15	83.3/8.3
		2020	10	0.02	0.0	5.63	6.14	3.01	3.17	8.72	5/15	60.0/0.0
	Far	Baseline	9	0.02	0.0	0.70	0.78	0.47	0.22	1.26	5/15	0.0
		2019	4	0.02	0.0	1.96	1.74	1.42	1.14	4.53	5/15	0.0
		2020	4	0.02	0.0	2.35	2.85	1.17	0.73	5.15	5/15	25.0/0.0
	Reference	Baseline	11	0.02	0.0	0.67	0.70	0.35	0.29	1.76	5/15	0.0
		2019	4	0.02	0.0	0.48	0.48	0.08	0.43	0.53	5/15	0.0
		2020	3	0.02	0.0	0.45	0.45	0.07	0.38	0.53	5/15	0.0
Milne Port	Near	Baseline	14	0.02	0.0	1.07	0.97	0.36	0.53	2.60	5/15	0.0
		2019	10	0.02	0.0	1.69	1.60	0.50	1.01	2.71	5/15	0.0
		2020	10	0.02	0.0	1.79	1.66	0.86	1.11	3.18	5/15	0.0
	Far	Baseline	4	0.02	0.0	0.67	0.65	0.40	0.41	1.19	5/15	0.0
		2019	3	0.02	0.0	0.59	0.53	0.28	0.41	0.97	5/15	0.0
		2020	5	0.02	0.0	0.88	0.94	1.26	0.26	2.10	5/15	0.0

Table 9-20. Lichen-Pb concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value [4]	Above Indicator Value (%)
	Reference	Baseline	3	0.02	0.0	0.55	0.45	0.25	0.40	0.91	5/15	0.0
		2019	4	0.02	0.0	0.35	0.32	0.08	0.27	0.53	5/15	0.0
		2020	3	0.02	0.0	0.37	0.34	0.06	0.34	0.46	5/15	0.0

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites·

[3] Maximum MDL across all sampling years.

[4] Indicator value is a metal concentration (mg/kg dry weight), selected from the best available scientific research for a similar or related lichen species and metal/metalloid, which may signal a change in vegetation health, such as reduced vigour or growth.

Yellow = indicates sample value above Indicator Value.

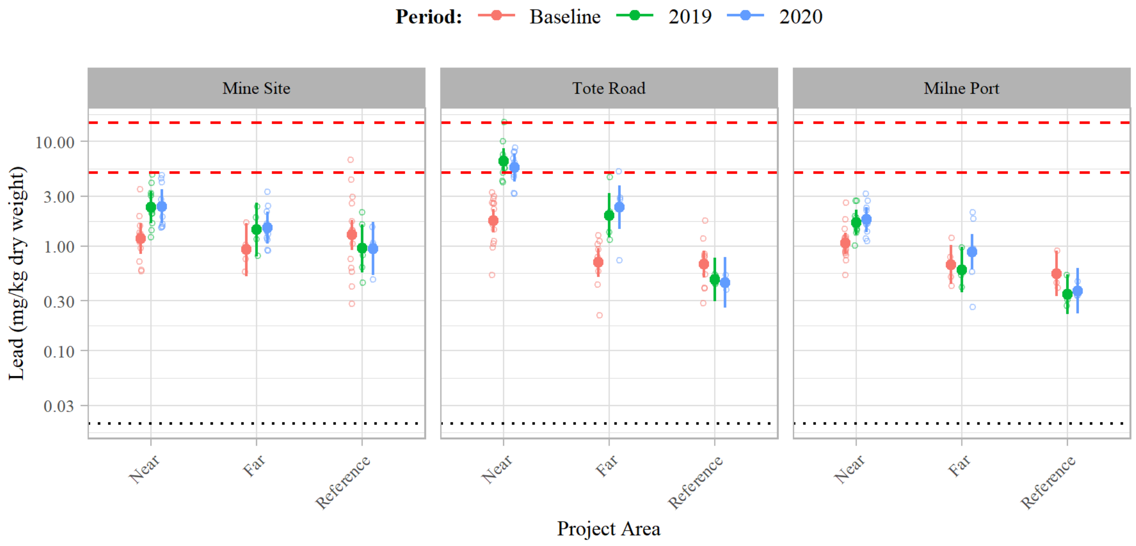


Figure 9-13. Lichen-Pb concentrations compared by Project area, distance class, and sampling period.

Solid points with error bars show means (± 95% CI), open circles show individual sample values. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the lower lichen indicator value of 5 mg/kg (upper value is 15 mg/kg), and the black dotted line shows the minimum detection limit, 0.02 mg/kg.

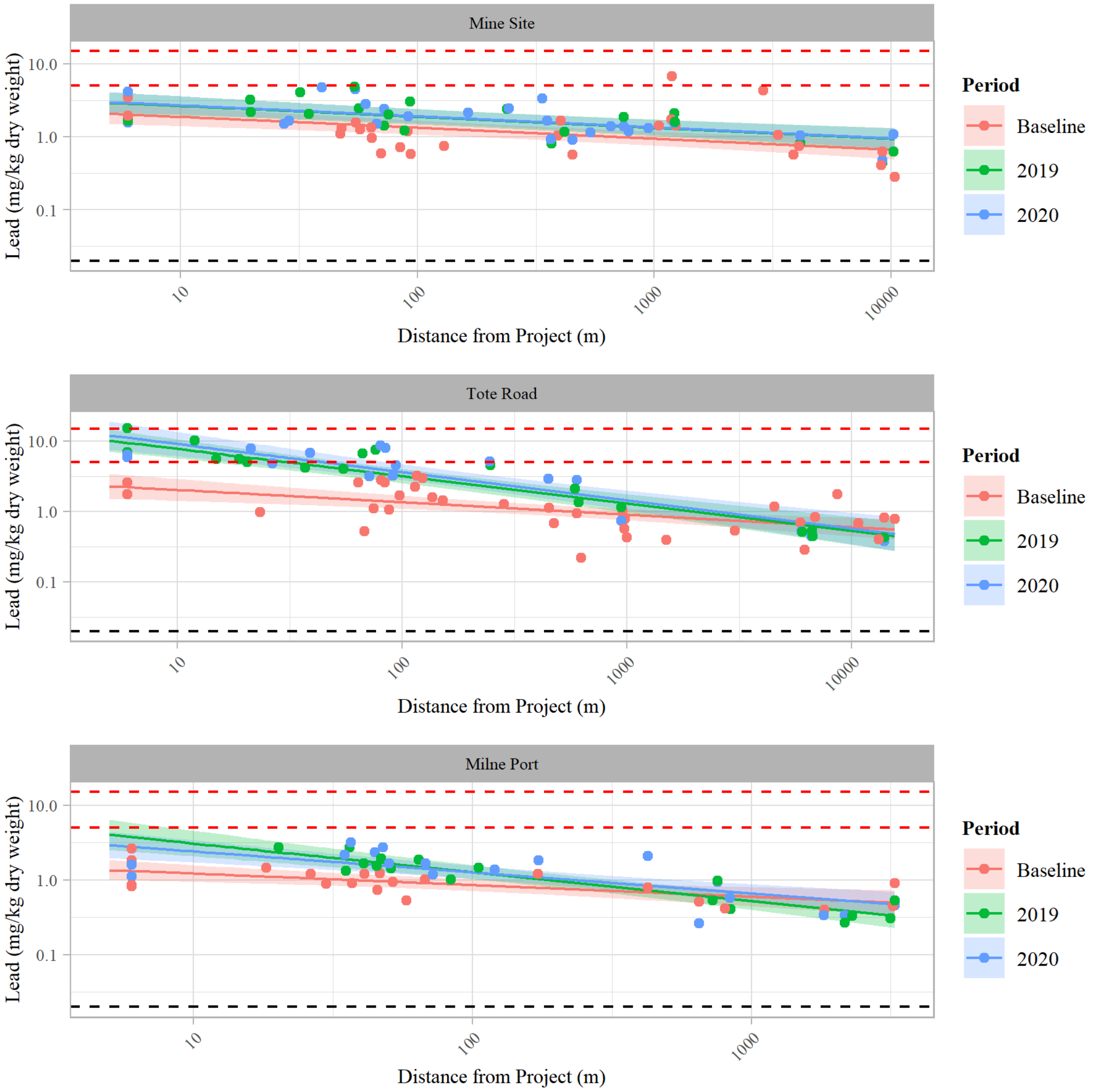


Figure 9-14. Change in Lichen-Pb concentrations with distance from the PDA for the Mine site, Tote Road, and Milne Port.

The solid line shows mean concentrations, and the shaded area is the 95% confidence region. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the lower and upper indicator values, 5 and 15 mg/kg, and the black dotted line shows the minimum detection limit, 0.02 mg/kg.

Selenium — Table 9-21 summarizes the relative change in lichen-Se concentrations (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-22 then provides a further breakdown of lichen-Se concentrations in relation to the RDL. Figure 9-15 illustrates lichen-Se concentration in relation to Project area and sampling period, while Figure 9-16 illustrates the relationship to sampling distance at the Mine Site and along the Tote Road (i.e., the Project areas where significant increases in lichen-Se were observed compared to Baseline values). Significant increases in lichen-Se were observed in Far and Reference distance classes, which do not suggest a Project-related effect. No lichen indicator values exist for

Se to evaluate the specific risk to environmental health and safety. Overall, most lichen-Se concentrations were consistently low across all sample sites and near or below the detection limit.

Table 9-21. Change in mean Lichen-Se concentrations across Project areas, distance classes, and sampling periods.

Project Area	**Near (0 – 100 m)**			**Far (100 – 1,000 m)**			**Reference (> 1,000 m)**		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	⬜	⬜	⬜	⬜	🟨	🟨	⬜	⬜	⬜
Tote Road	⬜	⬜	⬜	⬜	⬜	🟨	⬜	🟨	🟨
Milne Port	⬜	⬜	⬜	⬜	⬜	⬜	⬜	⬜	⬜

Gray = No change from Baseline.
Yellow = Significant increase from Baseline, mean concentration below lichen indicator value.
Orange = Significant increase from Baseline, mean concentration above lower lichen indicator value.

Table 9-22. Lichen-Se concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	**Distance from PDA**	**Sampling Period**	**n[2]**	**RDL**	**Below RDL[3] (%)**	**Mean**	**Median**	**Inter-quartile Range**	**Min**	**Max**	**Indicator Value [4]**	**Above Indicator Value (%)**
Mine Site	Near	Baseline[1]	12	0.05	8.3	0.06	0.07	0.02	0.03	0.09	-	-
		2019	11	0.05	0.0	0.08	0.08	0.03	0.06	0.11	-	-
		2020	10	0.05	0.0	0.08	0.08	0.01	0.07	0.11	-	-
	Far	Baseline	4	0.05	50.0	0.04	0.04	0.03	0.03	0.07	-	-
		2019	4	0.05	0.0	0.07	0.07	0.01	0.06	0.08	-	-
		2020	11	0.05	9.1	0.07	0.08	0.02	0.03	0.11	-	-
	Reference	Baseline	13	0.05	15.4	0.07	0.08	0.04	0.03	0.20	-	-
		2019	5	0.05	0.0	0.09	0.09	0.02	0.07	0.12	-	-
		2020	4	0.05	0.0	0.08	0.08	0.02	0.07	0.11	-	-
Tote Road	Near	Baseline	15	0.05	0.0	0.07	0.07	0.02	0.05	0.08	-	-
		2019	12	0.05	8.3	0.06	0.07	0.01	0.03	0.08	-	-
		2020	10	0.05	0.0	0.07	0.07	0.02	0.06	0.09	-	-
	Far	Baseline	9	0.05	44.4	0.04	0.06	0.04	0.03	0.07	-	-
		2019	4	0.05	25.0	0.05	0.07	0.02	0.03	0.08	-	-
		2020	4	0.05	0.0	0.07	0.07	0.01	0.06	0.07	-	-
	Reference	Baseline	11	0.05	45.5	0.04	0.06	0.03	0.03	0.07	-	-
		2019	4	0.05	0.0	0.06	0.06	0.01	0.05	0.08	-	-
		2020	3	0.05	0.0	0.07	0.07	0.01	0.07	0.08	-	-

Table 9-22. Lichen-Se concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n²	RDL	Below RDL³ (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value ⁴	Above Indicator Value (%)
Milne Port	Near	Baseline	14	0.05	7.1	0.07	0.07	0.02	0.03	0.14	-	-
		2019	10	0.05	0.0	0.07	0.07	0.01	0.05	0.08	-	-
		2020	10	0.05	10.0	0.06	0.07	0.01	0.03	0.09	-	-
	Far	Baseline	4	0.05	25.0	0.05	0.06	0.02	0.03	0.07	-	-
		2019	3	0.05	33.3	0.05	0.06	0.02	0.03	0.06	-	-
		2020	5	0.05	0.0	0.06	0.07	0.02	0.05	0.08	-	-
	Reference	Baseline	3	0.05	0.0	0.06	0.05	0.01	0.05	0.07	-	-
		2019	4	0.05	50.0	0.04	0.04	0.03	0.03	0.06	-	-
		2020	3	0.05	33.3	0.05	0.06	0.02	0.03	0.07	-	-

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites.

[3] Maximum MDL across all sampling years.

[4] No indicator value is available.

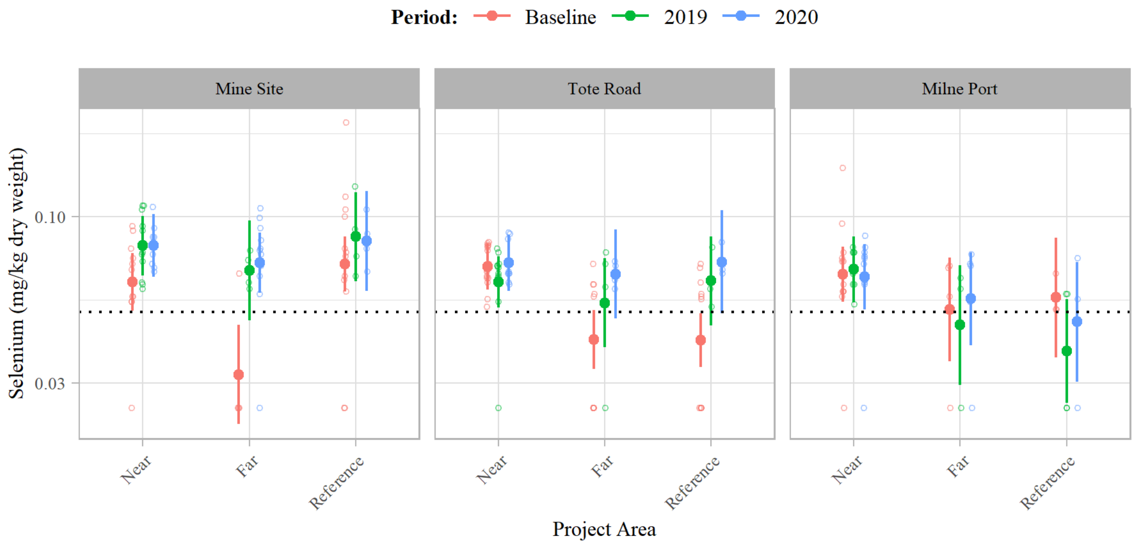


Figure 9-15. Lichen-Se concentrations compared by Project area, distance class, and sampling period.
Solid points with error bars show means (± 95% CI); open circles show individual sample values. Concentrations below the detection limit are displayed as half the detection limit. The black dotted line shows the minimum detection limit, 0.05 mg/kg.

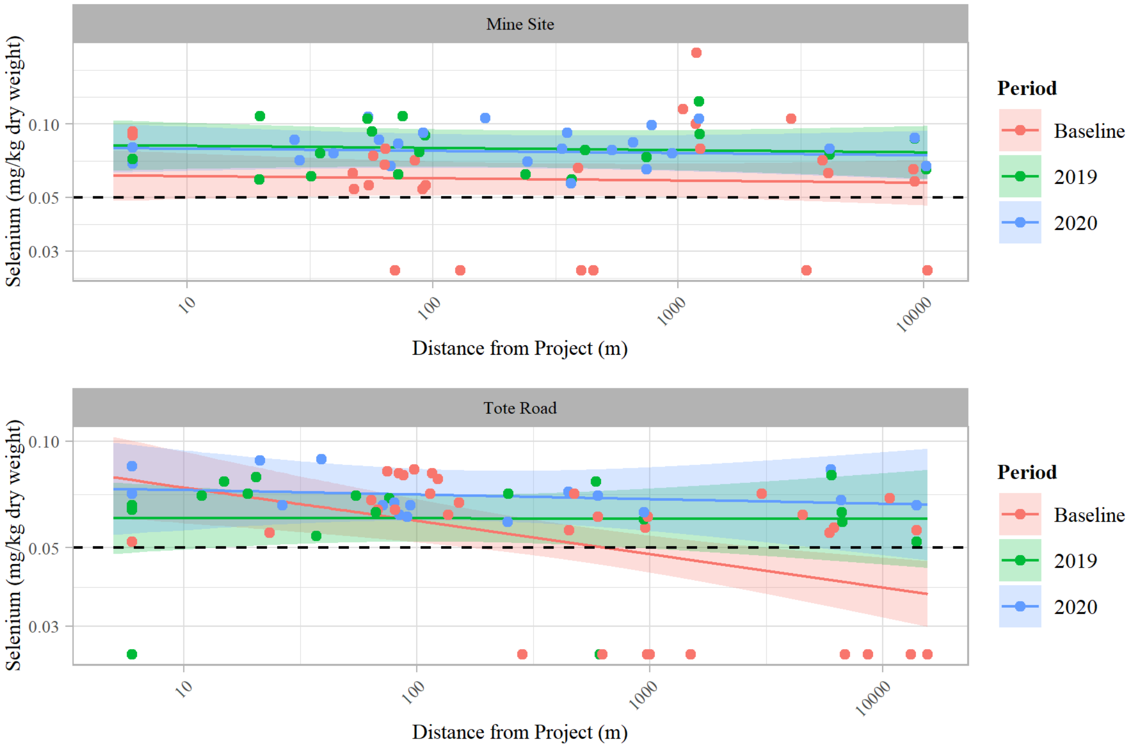


Figure 9-16. Change in Lichen-Se concentrations with relation to distance from the PDA at the Mine Site and Tote Road.

The solid line shows mean concentrations, and the shaded area is the 95% confidence region. Concentrations below the detection limit are displayed as half the detection limit. The black dotted line shows the minimum detection limit, 0.05 mg/kg.

Zinc — Table 9-23 summarizes the relative change in lichen-Zn concentrations (2020 versus Baseline conditions) across all Project areas and at each sampling distance. Table 9-24 provides a further breakdown of lichen-Zn concentrations in relation to the RDL. Figure 9-17 illustrates lichen-Zn concentration in relation to Project area and sampling period. A significant increase in mean lichen-Zn was observed in the Reference distance class at the Mine Site, which is not consistent with a Project-related effect. All mean values were below the lichen indicator value for Zn. Lichen-Zn is not presently considered to pose a risk to environmental health.

Table 9-23. Change in mean Lichen-Zn concentrations across Project areas, distance classes, and sampling periods.

Project Area	**Near (0 – 100 m)**			**Far (>100 – 1,000 m)**			**Reference (> 1,000 m)**		
	Baseline	2019	2020	Baseline	2019	2020	Baseline	2019	2020
Mine Site	▨	▨	▨	▨	▨	▨	▨	▨	🟨
Tote Road	▨	▨	▨	▨	▨	▨	▨	▨	▨
Milne Port	▨	▨	▨	▨	▨	▨	▨	▨	▨

Gray = No change from Baseline.

Green = Increasing but not significant trend from Baseline (p >0.05).

Yellow = Significant increase from Baseline, mean concentration below lichen indicator value.

Orange = Significant increase from Baseline, mean concentration above lower lichen indicator value.

Red = Significant increase from Baseline, mean concentration above upper lichen indicator value.

Table 9-24. Lichen-Zn concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	**Distance from PDA**	**Sampling Period**	**n[2]**	**RDL**	**Below RDL[3] (%)**	**Mean**	**Median**	**Inter-quartile Range**	**Min**	**Max**	**Indicator Value [4]**	**Above Indicator Value[4] (%)**
Mine	Near	Baseline[1]	12	0.5	0.0	14.27	14.25	5.10	10.80	20.40	178	0.0
Mine	Near	2019	11	0.5	0.0	17.74	17.60	5.85	13.30	25.50	178	0.0
Mine	Near	2020	10	0.5	0.0	16.68	16.00	1.33	12.50	29.40	178	0.0
Mine	Far	Baseline	4	0.5	0.0	11.18	10.65	3.93	9.08	15.50	178	0.0
Mine	Far	2019	4	0.5	0.0	14.99	14.25	4.53	12.30	20.50	178	0.0
Mine	Far	2020	11	0.5	0.0	15.72	16.00	4.60	10.10	22.10	178	0.0
Mine	Reference	Baseline	13	0.5	0.0	17.08	18.00	5.40	9.82	29.10	178	0.0
Mine	Reference	2019	5	0.5	0.0	19.12	19.00	4.20	13.70	27.50	178	0.0
Mine	Reference	2020	4	0.5	0.0	25.00	27.60	10.70	14.40	36.20	178	0.0
Road	Near	Baseline	15	0.5	0.0	16.91	18.00	3.60	8.57	28.80	178	0.0
Road	Near	2019	12	0.5	0.0	19.78	20.70	4.73	14.40	24.30	178	0.0
Road	Near	2020	10	0.5	0.0	16.90	17.50	6.33	12.60	21.40	178	0.0
Road	Far	Baseline	9	0.5	0.0	12.96	12.30	3.10	7.14	33.20	178	0.0
Road	Far	2019	4	0.5	0.0	16.38	17.10	3.98	12.20	20.30	178	0.0
Road	Far	2020	4	0.5	0.0	16.27	17.05	3.95	10.30	23.40	178	0.0
Road	Reference	Baseline	11	0.5	0.0	13.80	15.30	5.15	6.47	20.60	178	0.0
Road	Reference	2019	4	0.5	0.0	13.40	13.21	8.72	8.76	22.70	178	0.0
Road	Reference	2020	3	0.5	0.0	17.26	20.60	7.58	9.94	25.10	178	0.0
Port	Near	Baseline	14	0.5	0.0	10.55	10.55	2.94	7.16	16.20	178	0.0
Port	Near	2019	10	0.5	0.0	9.49	9.29	1.37	7.97	11.60	178	0.0
Port	Near	2020	10	0.5	0.0	10.03	9.89	1.80	7.92	13.50	178	0.0
Port	Far	Baseline	4	0.5	0.0	9.90	10.65	1.35	7.70	11.00	178	0.0
Port	Far	2019	3	0.5	0.0	7.51	7.90	1.09	6.32	8.49	178	0.0
Port	Far	2020	5	0.5	0.0	8.49	8.99	1.59	6.41	9.94	178	0.0

Table 9-24. Lichen-Zn concentrations (mg/kg) compared by Project area, distance class, and sampling period.

Area	Distance from PDA	Sampling Period	n[2]	RDL	Below RDL[3] (%)	Mean	Median	Inter-quartile Range	Min	Max	Indicator Value [4]	Above Indicator Value[4] (%)
Port	Reference	Baseline	3	0.5	0.0	11.30	12.10	1.65	9.40	12.70	178	0.0
Port	Reference	2019	4	0.5	0.0	8.44	8.28	2.21	6.37	11.70	178	0.0
Port	Reference	2020	3	0.5	0.0	9.17	9.41	1.52	7.67	10.70	178	0.0

[1] Baseline = baseline sampling during pre-construction for all years up to and including 2016.

[2] Number of sample sites.

[3] Maximum MDL across all sampling years.

[4] Indicator value is a metal concentration (mg/kg dry weight), selected from the best available scientific research for a similar or related lichen species and metal/metalloid, which may signal a change in vegetation health, such as reduced vigour or growth.

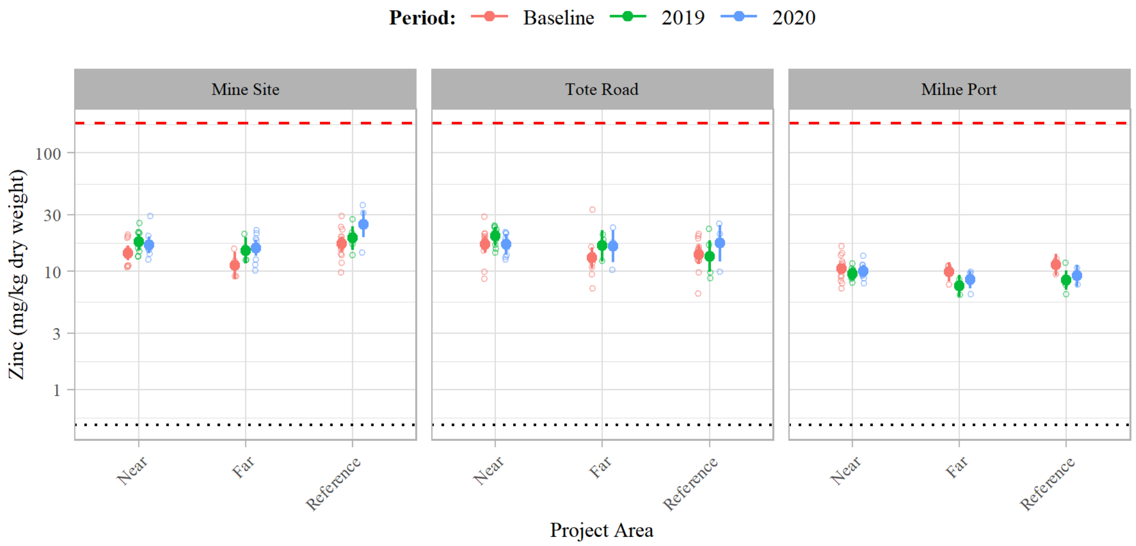


Figure 9-17. Lichen-Zn concentrations compared by Project area, distance class, and sampling period.

Solid points with error bars show means (± 95% CI); open circles show individual sample values. Concentrations below the detection limit are displayed as half the detection limit. The red dashed line shows the lichen indicator value, 178 mg/kg, and the black dotted line shows the minimum detection limit, 0.5 mg/kg.

9.1.3 SUMMARY AND FOLLOW-UP INVESTIGATION

Soil-metal concentrations at the Project generally indicated no significant increases from the Baseline values, and sample values were below or within an acceptable range for soil-metal concentrations. Lichen-metal concentrations had some discrete increases at the Project, but all sample locations were below or within an acceptable range for lichen-metal concentrations. As such, soil-metal and lichen-metal concentrations presently represent a low risk to environmental and human health and safety. Baffinland will continue monitoring these conditions and further document CoPCs. Should these values increase and result in exceedances of threshold values, it may be necessary to re-evaluate and refine potential triggers and corrective actions.

Dustfall and Vegetation and Soil Metals — Dustfall deposition is presumed to be the primary source of increased metals in soil and vegetation at the Project. A burgeoning objective, driven by input from the TEWG, is to align and where possible correlate data from the dustfall monitoring program (Section 7) with outcomes from the vegetation and soil base metals monitoring program. Efforts have been made to streamline the sampling locations and study design to facilitate comparisons between these respective monitoring programs. For example, pairing vegetation and soil sample sites in proximity to permanent dustfall monitoring locations and conducting sampling concurrently. These steps are intended to bridge interpretations of the effects of dustfall on soil-metal and lichen-metal concentrations and align any triggers and corrective actions.

Efforts have been made to enhance the vegetation and soil base metals monitoring data's interpretive value. For example, post-hoc analysis of shared base metals sampling-dustfall sampling sites (as described above) was conducted to identify any additional trends and tendencies. Other examples are handling sample material (i.e., washing tissue samples or not) and analyzing vegetation tissue samples to differentiate (to the extent possible) whether metals are being taken up by vegetation via the soil or are adsorbed to surficial vegetative tissues via deposition. Although some metals indicated varying relationships, no cohesive trends have emerged among CoPC metals. Further analysis (pending additional data collection) would be beneficial to draw meaningful conclusions and recommendations. Brief, preliminary findings from these investigations are provided in Appendix I. These outcomes can be reviewed by stakeholders to examine the current and potential value of this information to inform the vegetation and soil base metals monitoring program.

9.2 EXOTIC INVASIVE VEGETATION TARGETED MONITORING

Conditions under the NIRB Project Certificate No. 005 were developed to address concerns for the potential introduction and spread of exotic invasive vegetation from Project-related activities. Baffinland committed to establishing a long-term program to monitor for the potential introduction of invasive vegetation species. This commitment directly relates to the following:

- Project Condition #32 — *The Proponent shall ensure that equipment and supplies brought to the Project sites are clean and free of soils that could contain plant seeds not naturally occurring in the area. Vehicle tires and treads in particular must be inspected prior to initial use in Project areas.*
- Project Condition #37 — *The Proponent shall incorporate protocols for monitoring for the potential introduction of invasive vegetation species (e.g. surveys of plant populations in previously disturbed areas) into its Terrestrial Environment and Monitoring Plan. Any introductions of non-indigenous plant species must be promptly reported to the Government of Nunavut Department of Environment.*
- Project Condition #38, 50 and Project Commitment #67, 68, 69 & 70 also relate to monitoring for the potential introduction of invasive species or the reporting requirements for the exotic invasive monitoring program.

To meet these requirements, a long-term monitoring program for exotic invasive vegetation was initiated in 2014 and will continue through the life of the mine and into post closure. The TEMMP outlines a monitoring plan for exotic invasive vegetation that includes targeted surveys in the Project footprint every five years or as triggered by observations from personnel on site (Baffinland Iron Mines Corporation 2016a).

The objectives of the exotic invasive vegetation monitoring program are to:

- quantify the presence and occurrence of exotic invasive vegetation in and adjacent to the Project footprint through long-term monitoring; and,
- assess disturbed areas to determine recolonization by plants, invasive or native.

Exotic vegetation refers to plant species found outside of their natural range and are either introduced by human activities or environmental factors such as climate change. However, not all non-native species are considered invasive (Government of Nunavut 2020). Invasive species have certain biological traits that can negatively impact the environment, economy, human health or other species. Based on available information from the Government of Nunavut (2020), no known invasive vegetation species occur in Nunavut.

Exotic invasive vegetation monitoring was conducted in 2019 and marked the second survey for exotic invasive vegetation for the Project. One exotic species was found in the Project footprint during surveys — a garden tomato (*Solanum lycopersium*) was growing at the Mine Site below the sewage/effluent discharge pipe.

Exotic invasive vegetation monitoring in 2020 focused on the effluent outflow at the Mine Site where several garden tomato plants were found growing during 2019 surveys; this location was targeted to determine if any plants remained after winter. Presence/absence sampling was used to search for the tomato plants in the effluent outflow area. The area was surveyed on foot by two biologists.

The effluent outflow was surveyed on two separate occasions on July 13 and July 20, 2020, for 30 minutes each, for a total of two survey person hours (Photo 9-1). Surveyors searched intensely (i.e., multiple passes of the location, including between rocks and in crevices) in various habitats surrounding the effluent outflow, with a focus on the exact locations where tomato plants were observed in 2019. No garden tomato plants, nor other exotic invasive plants, were observed in 2020.

Photo 9-1. **Targeted follow-up exotic invasive species monitoring at the effluent outflow where garden tomato plants were observed in 2019 at the Mary River Project (July 20, 2020).**

9.3 VEGETATION "GREEN-UP" DATES

Baffinland is committed to a long-term monitoring program to study potential abundance changes used as caribou forage within the RSA. To meet these monitoring commitments, a long-term vegetation monitoring program was initiated in 2014. The vegetation abundance monitoring program's objective is to measure percent plant cover and plant group composition of available caribou forage within the RSA to track potential changes at varying distances from the edge of the PDA through long-term monitoring. To make sure vegetation monitoring data across years are comparable, vegetation measurements occur during the peak growing season each year. To that end, the TEWG requested that Baffinland determine peak green-up dates in monitoring years and show that the vegetation monitoring program was/is timed appropriately to vegetation green-up in the RSA. The analysis presented herein is in response to that TEWG request.

Remotely sensed imagery from satellites could complement on-the-ground vegetation sampling by providing higher temporal resolution information about vegetation cover over a larger spatial scale within the RSA. The Normalized Difference Vegetation Index (NDVI) uses near-infrared reflectance and red reflectance to estimate the area covered by live vegetation from multi-spectral images. This method has been widely used to measure percent cover and phenology of tundra vegetation (Jia et al. 2003, Laidler et al. 2008, Pattison et al. 2015).

9.3.1 METHODS

The NDVI was used to estimate peak vegetation growth ("green-up") within the RSA from 2014–2019. The imagery was obtained from the United States Geological Survey Landsat 8 surface reflectance derived spectral indices (Vermote et al. 2016). All images with less than 20% cloud cover collected between May and October were included in the analysis. Mean NDVI value within a 100 m radius of each long-term monitoring plot was extracted from all LANDSAT images. The NDVI can have values ranging between −1 and 1, with values of 0 or less indicating no vegetation cover and values closer to 1 indicating complete vegetation cover. For each plot, the mean number of images available per year was 9, with a range of 3 to 12 images (Table 9-25).

A generalized additive mixed model (GAMM) was used to estimate the timing of peak vegetation abundance within the RSA. Mean NDVI was the response variable, day of year and year were fixed effects, and plot and year were included as random effects. A smoothing factor was applied to the day of the year, and the year was treated as a categorical variable. This approach modelled a non-linear effect of day of the year on mean NDVI while allowing the mean NDVI to vary among years. The peak growing season was estimated based on the first and last days that mean NDVI was greater than 80% of the maximum NDVI. Eighty percent was chosen to define the peak growing season because this threshold included all values of mean NDVI where NDVI reached a plateau in summer (Figure 9-18). Statistical analysis was conducted using R version 3.6.3 (R Development Core Team 2020), with the 'raster' (version 3.0-7) and 'mgcv' (version 1.8-30) packages.

Table 9-25. Summary of Landsat 8 Normalized Difference Vegetation Index (NDVI) imagery available between May and October from 2014–2019.

Year	Images per Plot Mean (Range)	Start Date	End Date
2014	11.3 (10–12)	2014-05-01	2014-10-03
2015	11.2 (8–15)	2015-05-01	2015-09-04
2016	8.9 (7–12)	2016-05-01	2016-09-29
2017	7.7 (5–10)	2017-05-16	2017-09-30
2018	8.3 (7–12)	2018-05-05	2018-10-05
2019	6.9 (3–11)	2019-05-15	2019-09-13

9.3.2 RESULTS AND DISCUSSION

The GAMM results showed that mean NDVI was highest, and the growing season was longest in 2019 (Table 9-26, Figure 9-18). The lowest NDVI and shortest growing season occurred in 2017. NDVI begins to increase in the last week of May. Across years, NDVI reaches a plateau in the first week of July (Day-of-Year [DOY] = 188) and then begins to decline again after the first week of September (DOY = 251).

Vegetation sampling for the Project occurred within the peak growing season in each year sampling took place. The first day of vegetation sampling occurred between 6 and 16 days after the start of the peak growing season. The last day of vegetation sampling occurred between 29 and 43 days before the end of the growing season.

To ensure future vegetation sampling continues to coincide with the peak in vegetation growth, vegetation sampling should occur between the 195 (July 27) and 244 (Aug 24) DOY. This timing coincides with a period at least one week after the start and before the end of the growing season in each of the last six years. This will allow for some inter-annual and local-scale variation in the timing of green-up and will be consistent with the timing of sampling in prior monitoring years.

Table 9-26. Annual estimated maximum Normalized Difference Vegetation Index (NDVI) and peak growing season.

Year	Max NDVI	Peak Growing Season			Vegetation Sampling Dates	
		Start (DOY)	End (DOY)	Length (days)	Start (DOY)	End (DOY)
2014	0.34	188	250	62	204	214
2015	0.33	188	250	62	--	--
2016	0.37	187	251	64	196	222
2017	0.32	189	250	61	203	219
2018	0.39	186	251	65	194	219
2019	0.41	186	252	66	192	209

General Note: This table is based on the generalized additive mixed model for NDVI relative to the day of the year. Peak growing season dates are compared to the dates when long-term vegetation monitoring plots were sampled each year.
No vegetation sampling was done in 2015.

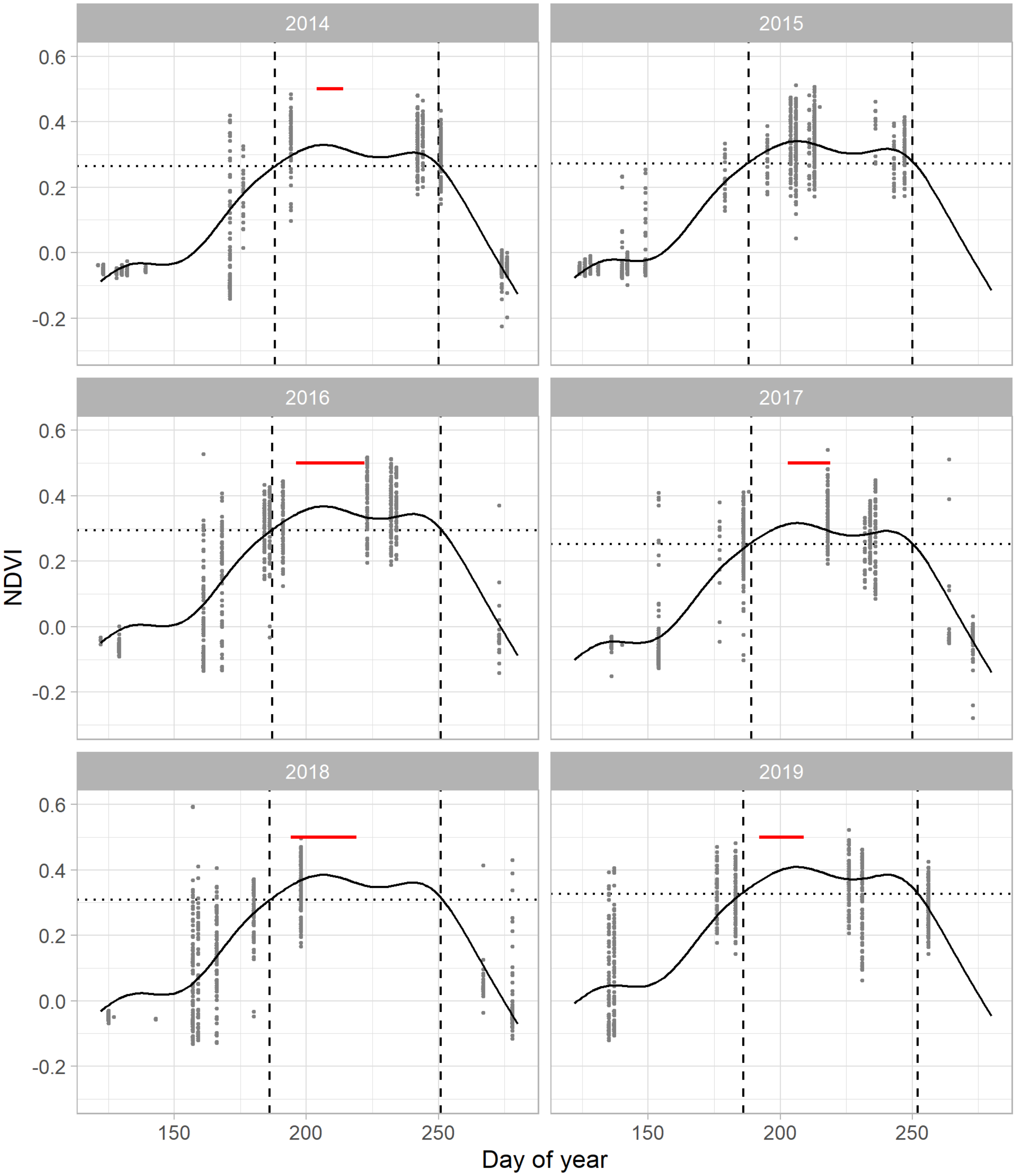


Figure 9-18. The estimate of green vegetation proximal to the Mary River Project long-term vegetation monitoring plots.

Solid black lines show the estimated mean NDVI; small grey points show mean NDVI within 100 m of individual vegetation plots from Landsat 8 imagery. Dotted horizontal lines show 80% of peak NDVI, and dashed vertical lines show the start and end of the peak growing season (dashed vertical lines). Red horizontal line segments show the range of sampling dates for long-term vegetation monitoring plots; no vegetation sampling was done in 2015.

9.4 VEGETATION SUMMARY

- Soil-metal and lichen-metal concentrations at the Project generally indicated no significant increases compared with Baseline values. Some discrete increases in CoPC metal concentrations have been identified, but all values were either below or within an acceptable range. Soil-metal and lichen-metal concentrations presently represent a low risk to environmental and human health.
- Targeted follow-up monitoring of exotic invasive vegetation in 2020 did not detect the presence of the garden tomato (*Solanum lycopersium*) plants that were observed at the effluent outflow in 2019. No new exotic invasive vegetation were identified during targeted or incidental sampling in 2020.
- The green-up date data analyses confirmed that vegetation sampling from 2014 to 2019 occurred during the peak vegetation cover each year.

10 MAMMALS

Mammal monitoring conducted in 2020 included several surveys designed to enhance baseline data and monitor the effects of Project-related activities on caribou and other wildlife. These mammal monitoring programs are used for surveillance-level monitoring of Project effects within and near the PDA. Surveillance-level monitoring collects relative and reconnaissance information that allows Baffinland to understand, predict, and mitigate potential mammal interactions with the Project. Specific surveys conducted as part of the 2020 mammal monitoring program included snow track surveys, snowbank height monitoring, Height of Land caribou surveys, incidental observations and the wildlife log.

As the North Baffin caribou are currently at a low point in their 60-year population cycle, caribou observations during surveys and incidentally are infrequent. This is expected for such low caribou densities when the chances of a caribou occurring near Project infrastructure are inherently low. Nevertheless, Height of Land surveys, in conjunction with snow track surveys and snowbank surveys, provide important reconnaissance and surveillance data on local caribou behaviours and interactions with the Project, and may provide an early indicator of relative changes in caribou populations. These surveys are designed to monitor individual-level responses to the Project (e.g., disturbance during calving, deflection from the Tote Road) and inform appropriate mitigations and adaptive management actions to minimize any negative Project-related effects, regardless of overall caribou population size.

As outlined in the TEMMP, the current survey frequency is appropriate for low caribou densities; when caribou densities increase, survey frequency will be increased correspondingly.

Snow Track Surveys

Concerns from the TEWG that caribou would avoid crossing linear features due to train or vehicle presence and the potential for constraining wildlife movement across roadways resulted in the establishment of the following terms and conditions for the Project (Nunavut Impact Review Board 2020):

- Project Condition #54dii) *"The Proponent shall provide an updated Terrestrial Environmental Management and Monitoring Plan which shall include…Snow track surveys during construction and the use of video-surveillance to improve the predictability of caribou exposure to the railway and Tote Road. Using the result of this information, an early warning system for caribou on the railway and Tote Road shall be developed for operation."*
- Project Condition #58f) *"Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes… Any updates to information regarding caribou migration trails. Maps of caribou migration trails, primarily obtained through any new collar and snow tracking data, shall be updated (at least annually) in consultation with the Qikiqtani Inuit Association and affected communities, and shall be circulated as new information becomes available."*

Snow track surveys were conducted to address these Project Conditions in March, April, May, and October 2020 to study caribou and other wildlife movement in relation to the road and document behavioural reactions to human activities near the Project footprint.

10.1.1 METHODS

The snow track surveys took place on March 17, April 27, May 17, 2020, October 13, and October 22, 2020. Two or three Baffinland employees conducted surveys. The purpose of the snow track surveys was to collect data on caribou and other wildlife response to Project-related activities based on patterns of movement observed by their tracks. The survey was conducted by light truck, with one Baffinland employee driving and one or two observers. The surveyors drove slowly (30 km/hr) along the Tote Road from the Project to Milne Inlet, looking for tracks from the vehicle. When wildlife tracks were observed, surveyors would get out of the truck to confirm the species and then follow the tracks towards and away from the road to observe behaviour, habitat use and possible divergence of travel paths, where possible. When tracks were near or crossed the Tote Road, surveyors would record the following information:

- latitude and longitude at the point where the tracks crossed the road;
- species that produced the tracks;
- number of sets of tracks counted (i.e., group size);
- a designation describing travel in relation to the road (e.g., deflected, travelled along, or crossing the road);
- height of the snowbank measured at either the crossing point or likely point of deflection (i.e., the point where the animal redirected its path away from the road); and,
- photos and additional information, if relevant.

10.1.2 RESULTS AND DISCUSSION

The March 17 survey was completed approximately 36 hours after a snowfall with excellent visibility, excellent tracking conditions, and light winds for the survey duration. Snow cover was consistently high along the length of the Tote Road. Wind speeds recorded at the Project in the 36 hours leading up to the survey were light to moderate, generally ranging from 2 to 6 m/s, which likely limited the snow's re-distribution after the snowfall, allowing for high confidence in detection and age estimation of observed tracks. Wind speed data were not available for Milne Port. Surveyors observed eight distinct sets of Arctic fox (*Vulpes lagopus*) tracks during the March survey, primarily on the Tote Road's east side. Of the seven sets of tracks considered fresh, four crossed the Tote Road, while three paralleled the road. No deflections were noted. One set of lemming (*Cricetidae* sp.) tracks was also recorded; however, no caribou or other mammal tracks were observed.

The April 27 survey was completed approximately 24 hours after a snowfall with excellent visibility, good tracking conditions, and light winds for the survey duration. Snow cover was consistently high along the length of the Tote Road. Wind speeds recorded at the Project in the 24 hours leading up to the survey were moderate, generally ranging from 5 to 11 m/s, which likely re-distributed the snow shortly after the snowfall event, resulting in a light dusting of windswept snow. Wind speed data were not available for Milne Port. Surveyors observed ten distinct sets of Arctic fox tracks during the April survey on both sides of the Tote Road, 9 of which were considered fresh. Of the nine sets of fresh tracks, seven travelled along the Tote Road, one crossed the road, and one deflected from the road. One set of Ptarmigan (*Lagopus* sp.) tracks was also recorded paralleling the road. No signs of caribou or other mammal tracks were observed.

The May 17 survey was completed approximately three days after a light snowfall, resulting in poor tracking conditions despite excellent visibility and light winds. Snow cover was melting leading up to the survey as daytime temperature, and sun exposure increased, and snow cover throughout the survey was approximately 50%. Average hourly temperatures at the Project in the three days leading up to the survey ranged from 4°C to 13°C, and −7°C to 0°C at Milne Port. Average hourly wind speeds recorded at the Project in the three days leading up to the survey were moderate to strong, ranging from 1 to 13 m/s, but any wind effects were likely minimal due to the low quantity of fresh snow. Surveyors observed three distinct sets of Arctic fox tracks during the May survey, none of which were considered fresh. Of the old fox tracks, two travelled along the Tote Road while one deflected from the road. Two sets of Arctic hare (*Lepus arcticus*) tracks were recorded crossing the road, one of which was fresh. No signs of caribou or other mammal tracks were observed.

The October 13 and 22 surveys were completed to take advantage of recent snowfall and adequate light conditions (surveys usually only occur in spring due to limited snowfall and light in late fall and winter). The October 13 survey was conducted approximately 17 hours after a snowfall with excellent visibility and light wind for the survey duration. Wind speeds recorded at Milne Port (the survey starting point) in the 24 hours leading up to the survey were light to moderate, generally ranging from 1 to 6 m/s, which likely covered old tracks and left any recent tracks relatively undisturbed, allowing for excellent tracking conditions and confidence. Surveyors observed 40 sets of Arctic fox tracks; 34 of them were considered fresh. Of the fresh fox tracks, 15 crossed, 10 travelled along, and 9 deflected from the Tote Road. One fresh set of Arctic hare tracks crossed the Tote Road. Three sets of lemming tracks were also recorded, but no caribou or other mammal tracks were observed.

The October 22 survey was conducted approximately 48 hours after a snowfall. Survey conditions were good, with excellent visibility and light winds for the duration of the survey. Wind speeds recorded at Milne Port (the survey starting point) in the 48 hours leading up to the survey were light to strong, generally ranging from 0 m/s to 15 m/s. The occasional strong winds may have caused some tracks to be covered by blowing snow. Nonetheless, surveyors detected 27 sets of Arctic fox tracks, 16 of which were considered fresh. Of these, 12 crossed, two travelled along, and two deflected from the Tote Road. One set of fresh Arctic hare tracks (crossed) and lemming tracks (travelled along) were also observed. No caribou or other mammal tracks were observed.

Typical site conditions and examples of observed tracks during the March, April, and May surveys are displayed in Photo 10-1 to Photo 10-4. Locations of tracks and their responses to the Tote Road are depicted in Map 10-1.

Snow track surveys will continue annually and will occur more often by on-site staff once caribou are observed near the site on a consistent and regular basis (e.g., based on trends observed from the Height of Land monitoring data, incidental monitoring data, or on observations of harvesters and as reported to Baffinland and the TEWG).

Photo 10-1. Fresh Arctic fox tracks observed near km 78 on the Tote Road, March 17, 2020.

Photo 10-2. Fresh Arctic fox tracks observed crossing the Tote Road near km 78, March 17, 2020.

Photo 10-3. Fresh Arctic fox tracks observed travelling along the Tote Road near km 3, April 27, 2020.

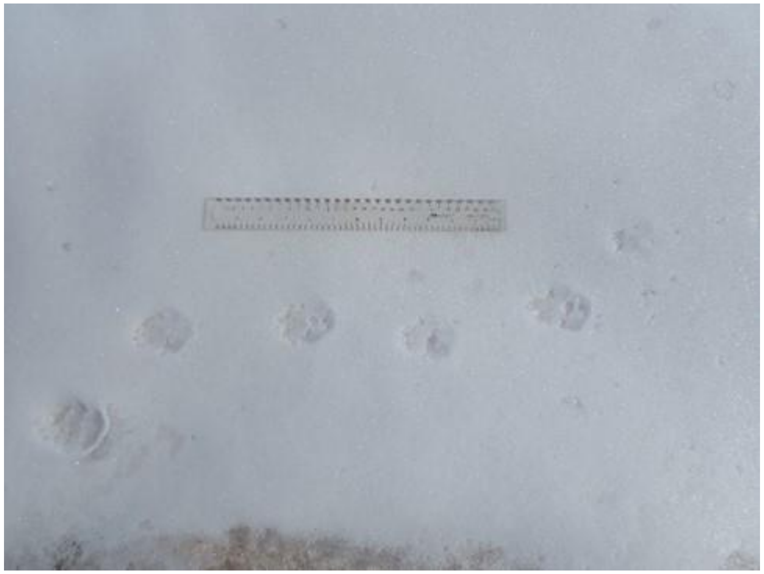
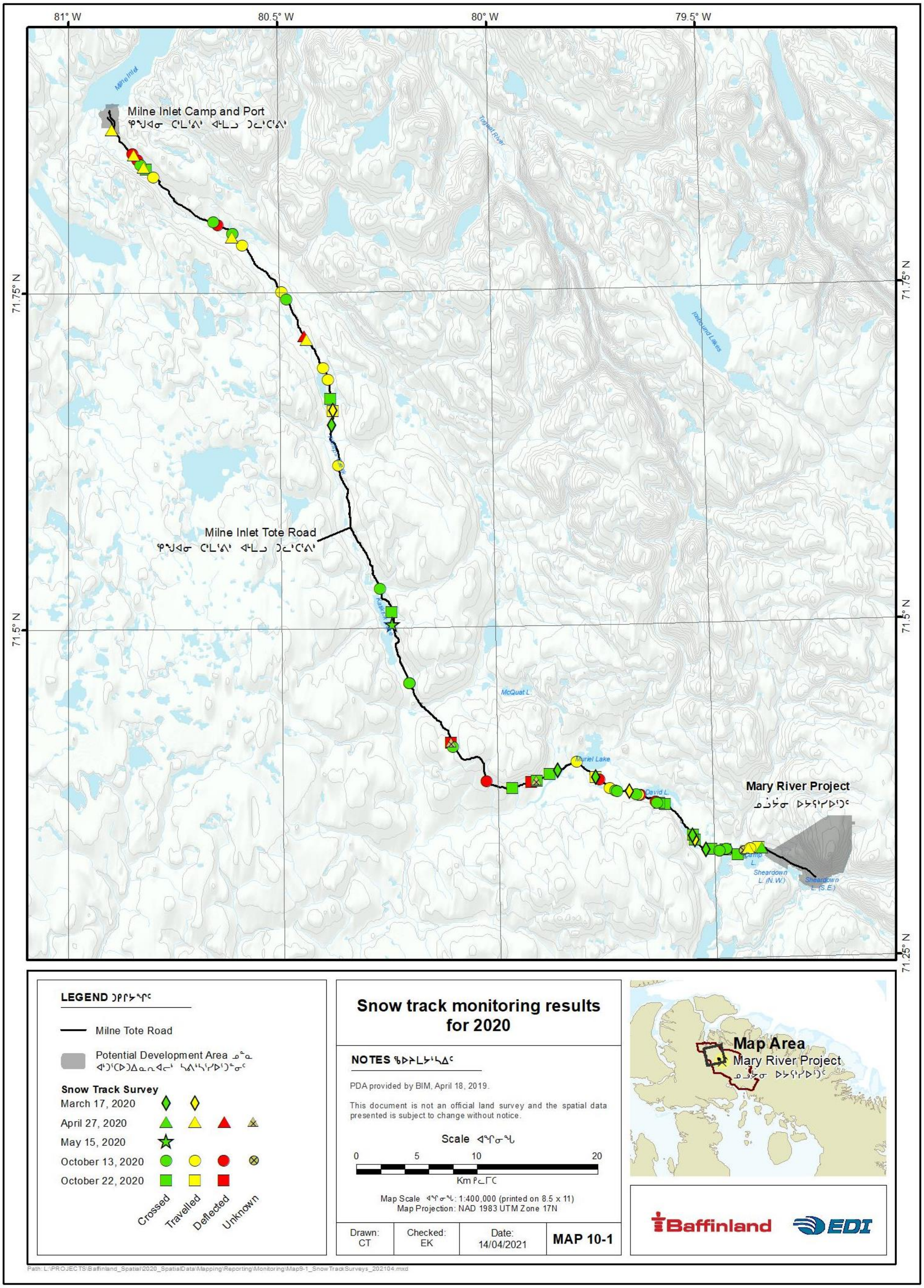


Photo 10-4. Old Arctic fox tracks observed travelling along the Tote Road near km 60, May 17, 2020.



Snow track monitoring results for 2020

NOTES

PDA provided by BIM, April 18, 2019.

This document is not an official land survey and the spatial data presented is subject to change without notice.

Scale ᐊᖏᓂᖓ

0 5 10 20

Km

Map Scale: 1:400,000 (printed on 8.5 x 11)
Map Projection: NAD 1983 UTM Zone 17N

Drawn:	Checked:	Date:	
CT	EK	14/04/2021	**MAP 10-1**

Path: L:\PROJECTS\Baffinland_Spatial\2020_SpatialData\Mapping\Reporting\Monitoring\Map9-1_SnowTrackSurveys_202104.mxd

10.2 SNOWBANK HEIGHT MONITORING

In conjunction with the snow track survey, the following Project Conditions were issued to address uncertainty in the FEIS (Baffinland Iron Mines Corporation 2012) and ERP FEIS (Baffinland Iron Mines Corporation 2013a) with respect to caribou movement (Nunavut Impact Review Board 2020):

- Project Condition #53ai) *"Specific measures intended to address the reduced effectiveness of visual protocols for the Milne Inlet Tote Road and access roads/trails during times of darkness and low visibility must be included."*
- Project Condition #53c) *"The Proponent shall demonstrate consideration for…Evaluation of the effectiveness of proposed caribou crossing over the railway, Milne Inlet Tote Road and access roads as well as the appropriate number."*

To address these conditions, Baffinland committed to various mitigation measures allowing for effective caribou crossings of the Tote Road. Mitigation measures were developed to reduce the likelihood of a barrier effect on caribou movement, which involves snowbank management and maintaining the snowbank heights at no more than 100 cm along roadways and smoothing the snowbanks on the edges of roadways to reduce the probability of drifting snow. These mitigations are designed to allow for caribou to cross the transportation corridor without being blocked by steep snowbanks and to allow greater visibility for drivers to help reduce wildlife-vehicle collisions.

10.2.1 METHODS

The snowbank height monitoring was conducted monthly from November 2019 to January 2020 and twice-monthly from February 2020 to April 2020 (nine surveys total), representing an increase from previous years. Before January 2018, only one snowbank height monitoring survey was conducted during the winter period; from January 2018 to January 2020, only one survey was conducted per winter month. Survey frequency was temporarily increased to twice per month following multiple caribou sightings along the Tote Road in January 2020. The Baffinland staff conducted monitoring by driving along the Tote Road and stopping at a randomized set of 50 km markers (e.g., km 5.8, km 16.0, km 42.1). A new set of randomized km markers was created for each survey. Based on comments from the TEWG, this randomized site selection method was introduced to eliminate potential bias from using repeated sample locations and achieve a more representative sample of snowbank heights along the entire length of the Tote Road.

At each of the 50 randomized km markers, surveyors measured the east and west snowbanks' height in centimetres, captured photos of each snowbank, and recorded any relevant comments. Snowbank measurements were collected from the solid road surface to the top of the snowbank using survey rulers. East and west snowbank heights were measured at 50 separate km markers along the Tote Road, resulting in 100 target measurements during each survey (Photo 10-5 to Photo 10-8). Occasionally, measurements could not be recorded for safety reasons (e.g., low visibility, oncoming traffic, bridge, or curves in the road), in which case that sample location was skipped. Snowbank heights were evaluated as compliant if they were at or below 100 cm, and non-compliant if they were above 100 cm.

10.2.2 RESULTS AND DISCUSSION

Snowbank height monitoring was conducted once-monthly from November 2019 to January 2020 and twice-monthly from February 2020 to April 2020. Each monthly survey was completed in one day. Measurements across all surveys ranged from 0 cm to over 200 cm. Compliance to the 100 cm height limit ranged from 88% to 100% among surveys, with an overall average compliance of 96% for all surveys combined (Table 10-1). During several of the surveys, many of the snowbanks were pushed back and feathered out to reduce drifting and height (Photo 10-7 and Photo 10-8). Mean snowbank heights per survey typically ranged from 30 cm to 60 cm. Generally, sample locations with snowbanks exceeding the 100 cm height threshold could not be pushed back or feathered out for safety and operational reasons, such as steep topography or winding sections of road constraining snowbank maintenance (Figure 10-1).

Table 10-1. Summary of snowbank height monitoring survey results at Mary River for 2019/2020.

Survey Date	Number of Measurements Taken	Compliances	Exceedances	Percent Compliance
November 12, 2019	94	92	2	98%
December 10, 2019	96	96	0	100%
January 20, 2020	96	84	12	88%
February 11, 2020	94	92	2	98%
February 24, 2020	90	86	4	96%
March 2, 2020	90	90	0	100%
March 16, 2020	92	91	1	99%
April 11, 2020	100	96	4	96%
April 28, 2020	100	93	7	93%
2019/2020 Total	**852**	**820**	**32**	**96%**

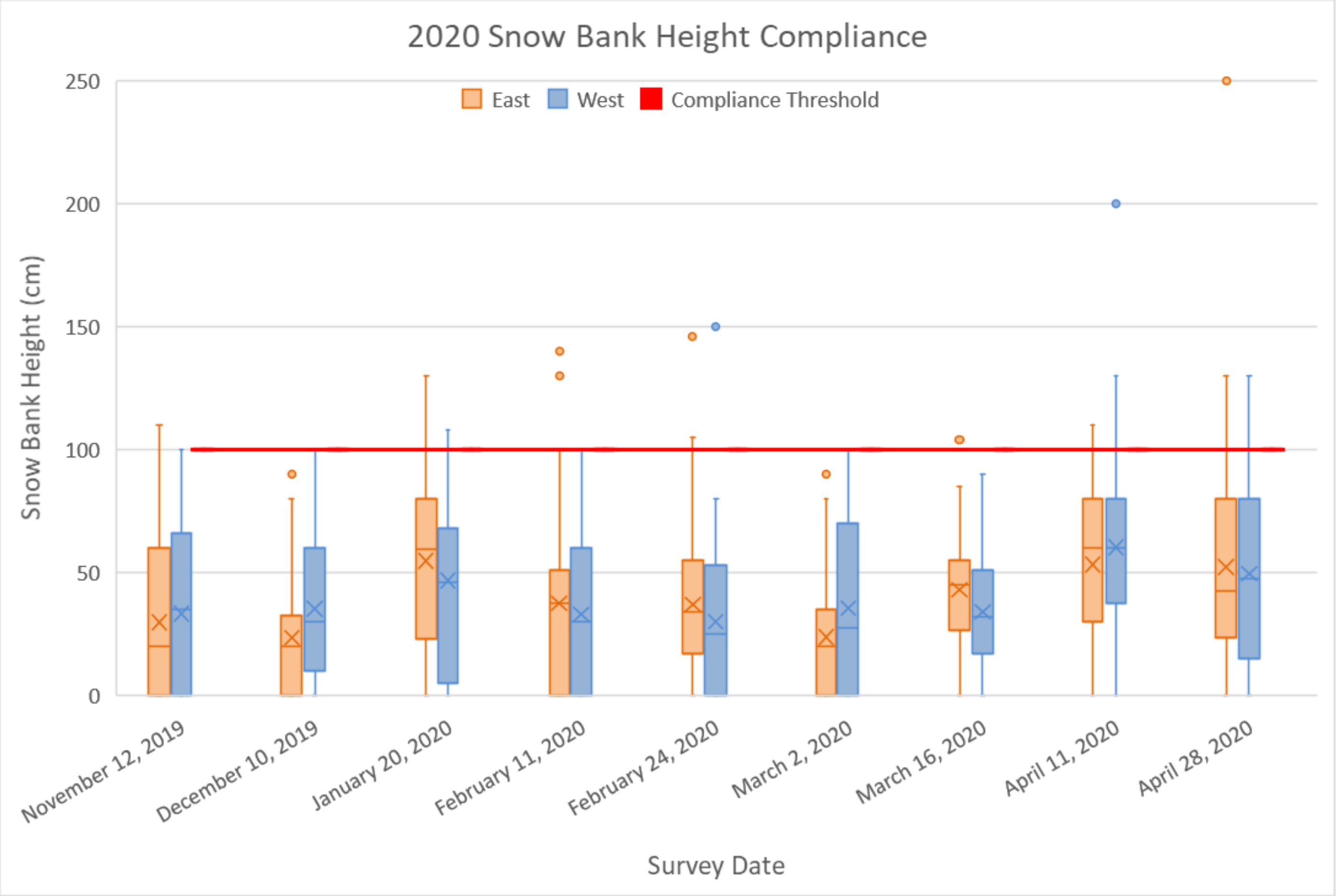


Figure 10-1. Snowbank height data for east and west snowbanks at 50 randomized km markers per survey along the Tote Road at the Mary River Project, measured from November 2019 to April 2020.

X represents the mean snowbank height for each survey. The horizontal line represents the median. The box represents the first and third quartiles, and the whiskers represent the minimum and maximum values within 1.5 times the interquartile range.

Photo 10-5. View of a compliant (60 cm) snowbank. Heights are measured from the road surface up to the bank's top at randomized locations along the Tote Road (km 56.0; February 11, 2020).

Photo 10-6. View of a non-compliant (140 cm) snowbank. Height management may be unsafe if terrain features limit machinery movement (km 55.8.0; February 11, 2020).

Photo 10-7. View of snowbank management in progress along Tote Road to facilitate wildlife crossing and improve drivers' visibility (near km 72; April 11, 2020).

Photo 10-8. View of a snowbank that has been pushed back and feathered along Tote Road to facilitate wildlife crossing and improve drivers' visibility (km 76.7; April 11, 2020).

10.3 HEIGHT OF LAND SURVEYS

The following Project Conditions were developed to monitor and mitigate potential disturbance to caribou calving near, or interacting with, the Project (Nunavut Impact Review Board 2020):

- Project Condition #53b) *"Monitoring and mitigation measures at points where the railway, roads, trails, and flight paths pass through caribou calving areas, particularly during caribou calving times."*
- Project Condition #54b) *"Monitoring for caribou presence and behavior during railway and Tote Road construction"*
- Project Condition #58b) *"A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behaviour and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails."*

To address these Project conditions, Height of Land (HOL) surveys were initiated in 2013 to study caribou habitat use and behavioural reactions to human activities near the Project footprint, especially during the calving season (i.e., during May/June). The HOL surveys focus is to examine how or if caribou, especially cows with calves, respond to Project-related activities and infrastructure. The HOL surveys allow for long-term monitoring and observation of caribou behaviour throughout the Project's life, providing information to verify predicted Project-related effects on caribou movement and habitat use. Behaviour sampling has been found to provide insight into responses to environmental stimuli (Martin and Bateson 1993).

10.3.1 METHODS

The HOL surveys use a basic survey technique to observe an area from a high point of land (to increase the observable area) for a prescribed amount of time, using binoculars and a spotting scope to detect and record caribou and their proximity to Project infrastructure. Survey methods were developed in consultation with the TEWG (specifically the MHTO), incorporating Inuit Qaujimajatuqangit into strategies for detecting caribou. The 2020 HOL surveys were conducted in early June 2020 to observe caribou during the calving period; opportunistic late winter surveys were not conducted in 2020. Surveys included two to four observers travelling within the Project footprint, stopping at predetermined HOL stations, and scanning the landscape for approximately 20 minutes. Surveyors included one to two EDI biologists and one or two Baffinland staff (when resources allowed).

In response to TEWG comments about increasing the HOL survey effort, EDI endeavoured to visit each HOL station at least twice; however, significant inclement weather delayed HOL surveys. All but three stations were visited two or three times. The HOL stations were established at the highest point possible, although a 360-degree view was rarely achievable. Project components (e.g., the Tote Road, accommodation complexes, Deposit No. 1) were visible from each station. Stations were chosen based on their location along the Tote Road, gain in height (e.g., improved view), and accessibility in spring conditions. Stations 1 to 16 are generally accessible by foot under suitable conditions, and Stations 17 to 24 would be inaccessible if not for helicopter support due to waterbodies and long travel time by foot. At each station, the following information was recorded:

- station number;
- location description (direction from road, aspect, terrain, other identifying features);
- general habitat description (vegetation and soil), where possible;
- photograph numbers (taken in multiple directions);
- observation start and end time; and,
- snow cover on landscape.

Observations were made with one spotting scope and one to three sets of binoculars (Photo 10-9 to Photo 10-12). Generally, observations were made continuously for 20 to 35 minutes by scanning the viewable landscape. If caribou were observed, the crew would begin monitoring behaviour following protocols established and described in the 2013 Annual Monitoring Report (EDI Environmental Dynamics Inc. 2014). Observations would be made as either a focal or scan sample (depending on the number of caribou; Martin and Bateson 1993) and recorded on field datasheets. For scan sampling, activity categories (e.g., walking, foraging, running, lying) would be assigned and tallied every two minutes. For the focal sample, activity observations would be recorded every two minutes; however, certain events (e.g., a truck passing by) would also be recorded to document any unique response. The individual's or group's distance to Project infrastructure and directional movement would also be recorded when possible. Distance from the observers would either be estimated by sight or by using a GPS.

In 2016, viewshed mapping was completed to demonstrate how far and to what extent surveyors could observe while conducting HOL surveys (EDI Environmental Dynamics Inc. 2017). The viewshed was modelled to determine the amount of viewable area while conducting HOL surveys. A total of 227 km² were surveyed within the viewshed area, survey coverage ranging from 5 km² to 22 km² from each HOL station (Map 10-2). See Section 4.3.1 in the 2016 Annual Monitoring Report (EDI Environmental Dynamics Inc. 2017).

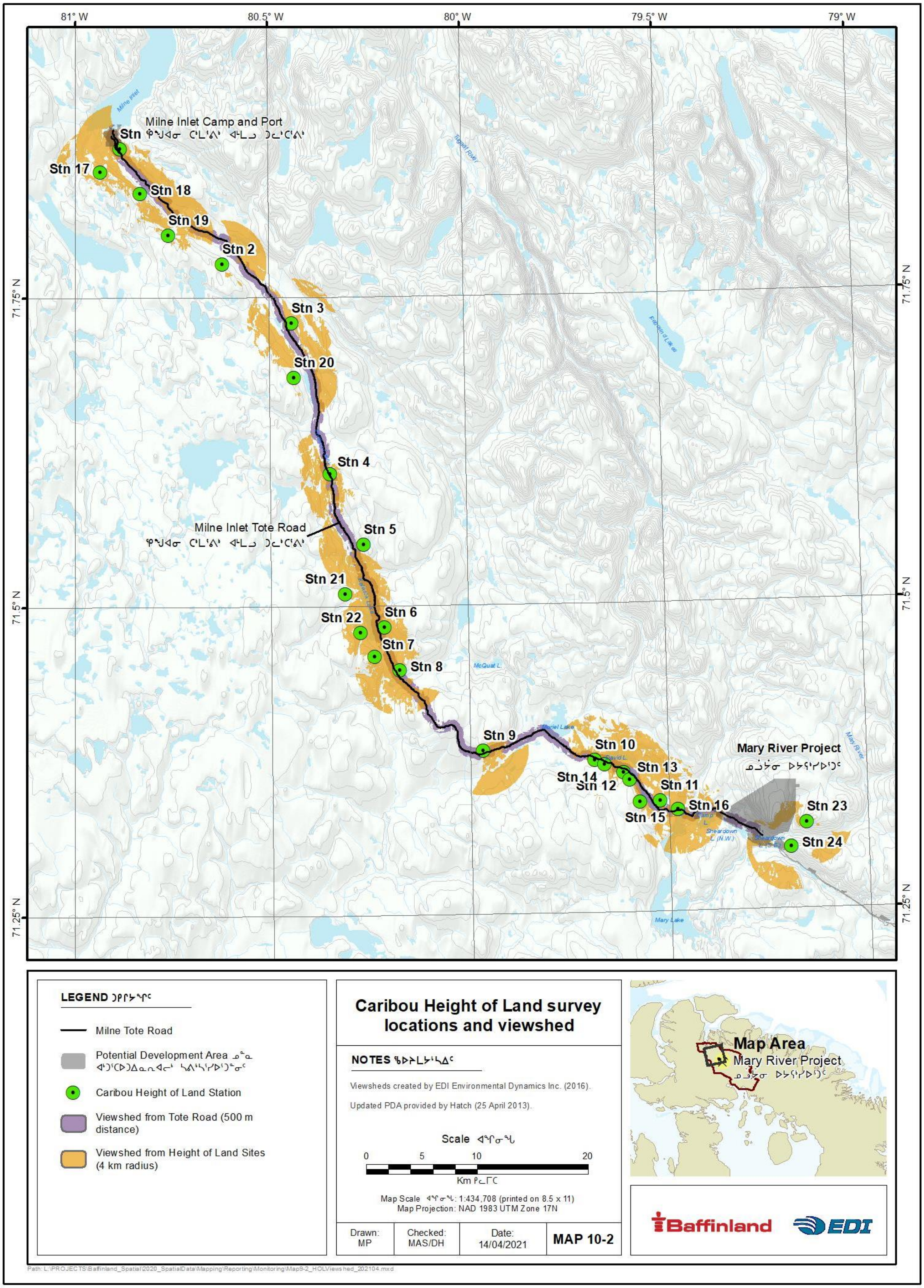
During the June 2019 TEWG meeting, the MHTO suggested that observation station locations be re-evaluated to incorporate historic migration and calving patterns and any new information relevant to HOL goals and methodologies. When travel restrictions associated with COVID-19 cease, Baffinland will look to engage with the MHTO further on design and sampling locations for the HOL program. It is Baffinland's hope that over time the HOL surveys may become a community-led monitoring program.

Photo 10-9. Height of Land surveys conducted in early June, during peak calving season, were accessed by helicopter or hiking from th Tote Road; Station 19, June 4, 2020.

Photo 10-10. Height of Land surveys conducted in early June, during peak calving season, were accessed by helicopter or hiking from the Tote Road; Station 24, June 5, 2020.

Photo 10-11. Height of Land surveys conducted in early June, during peak calving season, were conducted using binoculars and spotting scope; Station 1, June 7, 2020.

Photo 10-12. Height of Land surveys conducted in early June, during peak calving season, were conducted using binoculars and spotting scope; Station 10, June 8, 2020.



Caribou Height of Land survey locations and viewshed

10.3.2 RESULTS AND DISCUSSION

No caribou were observed during HOL surveys in 2020. A total of 18 hours and 20 minutes of HOL surveys were conducted, with an average of 23.9 minutes of survey time per visit. All surveys were completed in early June, during peak calving season (Table 10-2). Twenty-one of the twenty-four HOL stations were visited at least twice, and one station was visited three times during the 2020 site visit. In 2020, stations 4, 9, 10, 14 and 16 were accessed by foot, and the remainder of the stations were accessed by helicopter. During the field visit, snowstorms and low visibility ceilings restricted access to the Tote Road and reduced air travel days for the 2020 field assessment. Increased snow depth from snowstorms, reduced foot access and required more helicopter station visits than the 2019 assessment.

Weather conditions during the HOL surveys ranged from excellent, clear viewing conditions to good, overcast conditions with wind. Temperatures during the surveys ranged from −1˚C to 5˚C and snow cover ranged from 10 to 95% across the landscape. Snow cover was enough to observe tracks in the snow for most areas; however, no caribou tracks or fresh signs of caribou were observed during surveys or on route to survey stations. Survey times at each station ranged from 20 to 35 minutes in duration, with observation times typically exceeding 20 minutes if observers were attempting to distinguish an unidentifiable object on the landscape (e.g., a suspected animal).

Table 10-2. Summary details of Height of Land surveys conducted for the Mary River Project in 2020.

Method of Transportation to HOL Station	Dates of Observation	Number of Observers per Survey	Survey Effort (hh:mm)
Helicopter; Truck and hiking from Tote Road	June 4, 5, 6, 7, 8, 9	2–4	18:20
Total	**6 Days**		**18:20**

10.4 INCIDENTAL OBSERVATIONS

Site personnel are asked to record wildlife sightings in the camps' wildlife logs at Sailiivik Camp (*i.e.*, the Accommodations Complex at the Mine Site) and Milne Port Accommodations Complex. These logs indicate the wildlife species that occur in proximity to Project infrastructure or areas where exploration or monitoring may be occurring.

Wildlife species recorded in the camp wildlife logs in 2020 are summarized in Table 10-3. A total of 11 caribou from seven groups were reported in 2020, most of which were outside the PDA. Most of the caribou were observed in exploration areas southeast of the Project in summer. Four separate observations of a single caribou were recorded from the Tote Road. The first observation was on January 1, 2020, near km 89, while the other three observations were on January 19, 21, and 22, all between km 94 and 95. The caribou were all sighted first by Ore Haul Truck drivers, who followed the caribou decision tree to determine their response and notified dispatch and Site Environment as soon as possible. Site Environment investigated the sightings and recorded travel paths via snow tracking after the caribou had left the area (Figure 10-2, Photo 10-13 and Photo 10-14). All caribou were reported to have crossed the Tote Road at least once, and sometimes twice. In the last three sightings, there was evidence of the caribou feeding on lichen in the area. Due to the similarity in date and location of these observations, it is likely that these last three sightings (and possibly the January 1 sighting) all represent the same individual.

Polar bears were observed on six separate occasions from all areas of the Project (Mine Site, Tote Road, and Milne Port), and polar bear tracks were observed once outside of the PDA. All observations were of individual polar bears, except for a family of three bears (a mother and two cubs) seen from Milne Port. If a polar bear is sighted within 8 km of Project work sites and accommodations, the Polar Bear Safety Plan is implemented and responses vary depending on proximity of the bear (Baffinland Iron Mines Corporation 2016b). If a polar bear is sighted within 1.5 km of worksites and accommodations, all employees are to remain inside a building or vehicle while the bear is monitored, and depending on the bear's behaviour, a Code 1 may be called.

Several birds were also recorded on the wildlife logs, including: Snow Bunting (*Plectrophenax nivalis*), American Pipit (*Anthus rubescens*), Lapland Longspur (*Calcarius lapponicus*), Horned Lark (*Eremophila alpestris*), Northern Wheatear (*Oenanthe oenanthe*), Redpoll (*Acanthis flammea*), Common Raven (*Corvus corax*), Rock Ptarmigan (*Lagopus muta*) Semipalmated Plover (*Charadrius semipalmatus*), Baird's Sandpiper (*Calidris bairdii*), Sandhill Crane (*Grus canadensis*), Common Eider (*Somateria mollissima*), King Eider (Somateria spectabilis), Red-breasted Merganser (*Mergus serrator*), Long-tailed Duck (*Clangula hyemalis*), Northern Pintail (*Anas acuta*), Common Loon (*Gavia immer*), Pacific Loon (*Gavia pacifica*), Yellow-Billed Loon (*Gavia adamsii*), Red-Throated Loon (*Gavia stellata*), Canada/Cackling Goose (*Branta hutchinsii, B. canadensis*), Snow Goose (*Chen caerulescens*), Arctic Tern (*Sterna paradisaea*), Glaucous Gull (*Larus hyperboreus*), Ivory Gull (*Pagophila eburnean*), Rough-legged Hawk (*Buteo lagopus*), Snowy Owl (*Bubo scandiacus*), Gyrfalcon (*Falco rusticolus*), Long-tailed Jaeger (*Stercorarius longicaudus*), and Peregrine Falcon (*Falco peregrinus tundrius*).

Table 10-3. Incidental wildlife species observations recorded in the 2020 Mary River and Milne Port camps wildlife logs.

Common Name	Number of Observations				
	Scientific Name	Mary River Camp	Tote Road	Milne Inlet	Outside PDA[1]
Arctic hare	*Lepus arcticus*	26	1	12	–
Arctic fox	*Vulpes lagopus*	98	20	75	–
Red fox	*Vulpes vulpes*	3	3	7	–
Collared lemming	*Dicrostonyx groenlandicus*	10	–	–	–
Ermine	*Mustela erminea*	–	1	–	–
Caribou	*Rangifer tarandus groenlandicus*	–	4[2]	–	7
Narwhal	*Monodon monoceros*	–	–	250[3]	–
Ringed seal	*Pusa hispida*	–	–	8	–
Polar bear	*Ursus maritimus*	2[4]	3[5]	3[6]	–
Polar bear (tracks)	*Ursus maritimus*	–	–	–	1

Notes: [1] Wildlife sightings in areas outside the PDA ;[2]Four sightings of individual caribou on January 1, 19, 20, and 22, 2020. The latter three sightings were all in the same area around km 94, and the caribou crossed the Tote Road on all three occasions; [3]One group of approximately 200 to 300 narwhal was seen in Milne Port on August 28, 2020, displaying social behaviours such as calling; [4] Individual polar bears were seen on two separate occasions passing through or near Mary River Camp – April 9 and August 7, 2020; [5] Individual polar bears were seen on three separate occasions from the Tote Road – June 13, June 27, and November 9, 2020; [6] A mother and two cubs were seen heading towards the sea ice on November 20, 2020.

Figure 10-2. Tracklog of caribou travel path from at km 94 of the Tote Road at the Mary River Project on January 19, 2020.

Photo 10-13. View of caribou tracks crossing the Tote Road from incidental observation near km 95 on January 19, 2020.

Photo 10-14. View of caribou tracks from incidental observation near km 94 on January 22, 2020.

10.5 HUNTERS AND VISITORS LOG

Baffinland monitors land users' presence in the Project area by maintaining a log of visitors to the site, with notation for those travelling through and hunting within the RSA. However, there is no certainty of a complete data set. Individuals are not required to check in with Baffinland security unless they are stopping in and using the Baffinland facilities. A total of 316 individuals stopped and checked in at either the Mine Site or Milne Port camps in 2020, most of whom stopped at Milne Port (188 individuals in 60 groups), while 118 individuals in 51 groups were recorded at the Mine Site. Group size ranged from one to eight individuals. People visiting the area were often hunting, resting, stopping for food, or having vehicles serviced. Not all visitor activities were recorded. Baffinland provided food, beverages, transportation, tools, supplies, fuel and mechanical assistance to hunters and visitors, if requested and safe.

The low number of visitor check-ins in 2020 was most likely due to the COVID-19 pandemic. Few visitor check-ins were recorded between March and August when risks and restrictions were highest. Very few check-ins occurred from September to December; these were generally associated with extenuating circumstances (e.g., search and rescue including a broken-down ATV, and a capsized boat).

10.6 INTER-ANNUAL TRENDS

In June 2013, a group of five caribou were observed in the PDA during HOL surveys; however, caribou have not been observed during surveys conducted between 2014 and 2020 (Figure 10-3). Survey effort has increased over the years in response to TEWG input (i.e., increasing minimum survey time from 15 to 20 minutes, increasing the number of survey stations from 16 to 24, increasing station visits from once to twice per season). Lack of caribou observations on site is consistent with low regional caribou numbers reported through Inuit Qaujimajatuqangit, received at workshops held in November 2015 and April 2016. Caribou abundance surveys conducted in 2014 by the Government of Nunavut also reported low abundance throughout Baffin Island (Pretzlaw 2016).

The current caribou ecology on North Baffin Island (low numbers and low movement) is the primary factor contributing to a lack of caribou observations and subsequent lack of measurable change in caribou behaviour or habitat use. While greater survey effort would provide additional confidence in the lack of caribou observations, more effort would be unlikely to provide the data needed to document changes in caribou behaviour or habitat use. Caribou densities in the region would need to be considerably higher to allow for identification of these changes (as discussed in 2020 TEWG meetings). Ground-based caribou surveys (HOL, snow tracking, snowbank height) continue to provide important data on individual-level caribou response to Project interactions and can inform individual-level mitigations such as reduced activity near a calving caribou, even when caribou occurrences are low. They also provide an early relative estimate of caribou abundance, which can influence the timing for regional-level surveys. No caribou, wolf or other large mammal tracks were observed during snow tracking surveys conducted between 2014 and 2020. Most tracks observed were from Arctic foxes and Arctic hares, whose detection rates have remained similar throughout all survey years (Figure 10-4).

Most snowbank height measurements complied with the 100 cm height limit between 2014 and 2020. Compliance of snowbank height was similar for 2014, 2015, 2016, 2018, 2019, and 2020, ranging between 80% to 97%, with the 2017 measurements having the lowest overall rate of compliance at 66% (Figure 10-5).

Substantially fewer visitors were recorded in 2020 than in 2018 and 2019 (Figure 10-6). During the first few years of monitoring (2010 to 2014), less than 100 visitors were recorded per year. The number of visitors increased moderately between 2015 and 2017, ranging from 150 to 300 visitors per year, before a substantial increase in 2018 and 2019 to 539 and 936 visitors, respectively. A total of 316 visitors were recorded in 2020. The sharp drop in visitor check-ins in 2020 was most likely due to restricted travel and interaction caused by the COVID-19 pandemic. These numbers often represent the same group(s) of visitors leaving and returning from trips and making multiple trips in a year. As checking in is not mandatory, these numbers do not guarantee a complete record of all visitors.

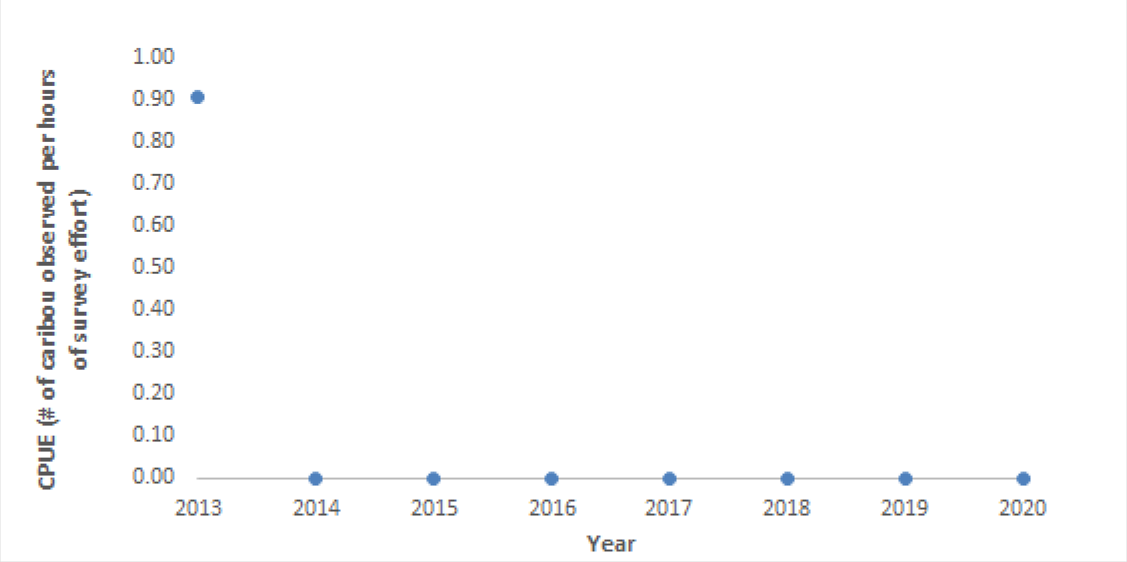


Figure 10-3. Inter-annual caribou Height of Land survey trends at the Mary River Project, 2013 – 2020.

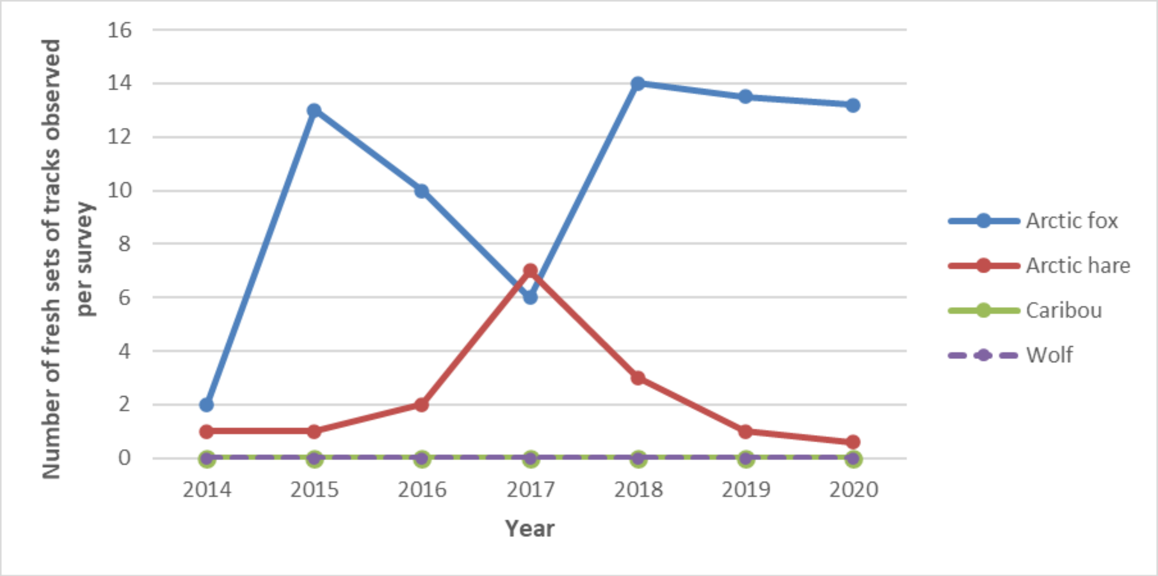


Figure 10-4. Inter-annual snow track survey trends at the Mary River Project, 2014 – 2020.

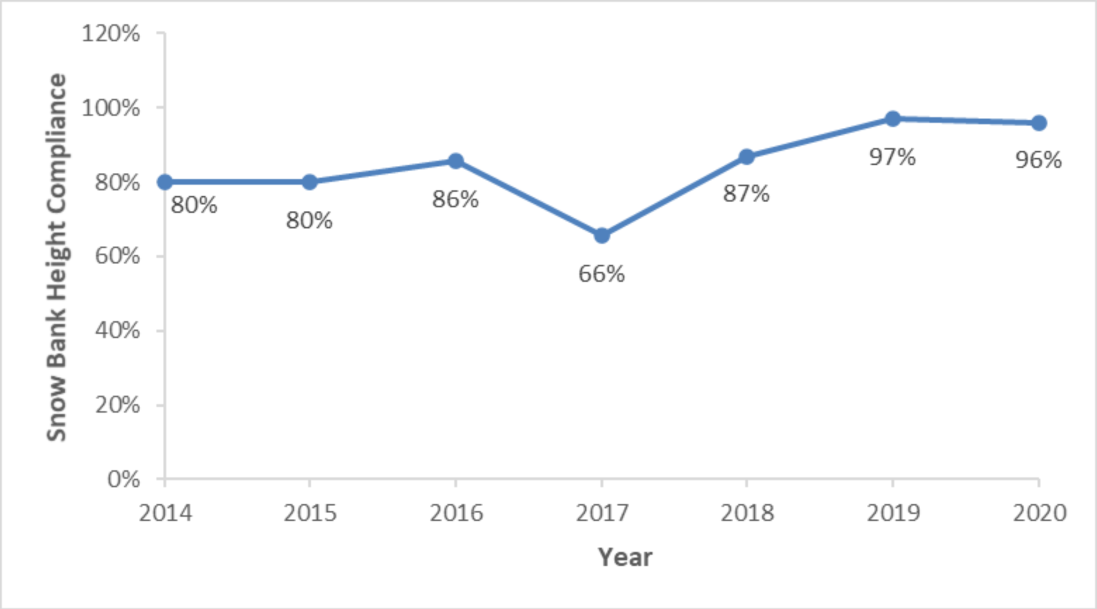


Figure 10-5. Inter-annual snowbank height monitoring survey trends at the Mary River Project, 2014 – 2020. *Snowbank height monitoring was conducted once yearly from 2014 – 2017, once monthly in 2018 and 2019, and twice monthly in 2020.*

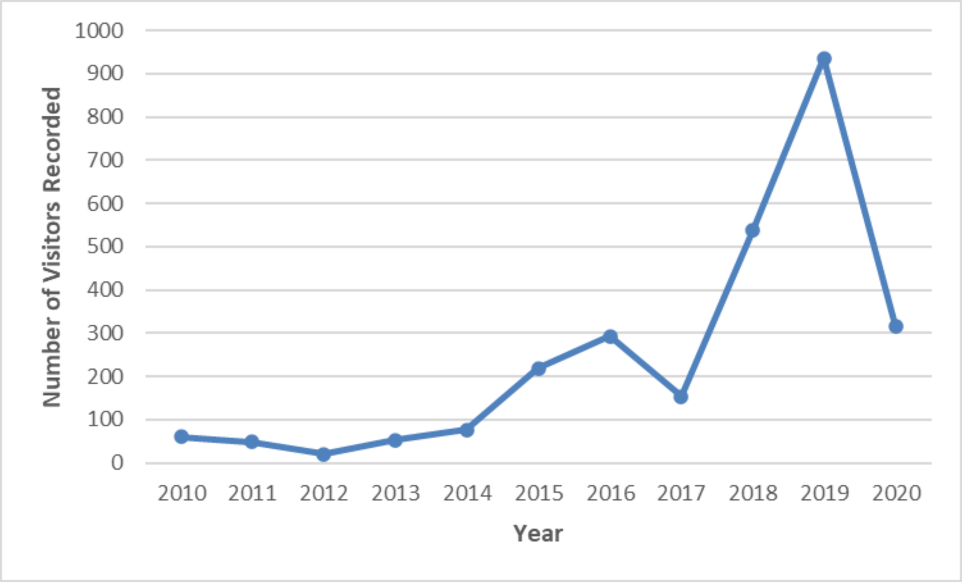


Figure 10-6. Inter-annual hunter and visitor trends at the Mary River Project, 2010 – 2019.

10.7 MAMMALS SUMMARY

- Ground-based surveys continue to be used to monitor potential wildlife interactions with the Project. These include snow track surveys, snowbank height surveys, Height of Land (HOL) surveys, and incidental sighting reports from on-site personnel.
- Five snow tracking surveys were conducted in 2020. No caribou, wolf or other large mammal tracks were observed in surveys; Arctic fox and Arctic hare tracks were observed in similar numbers to previous surveys.
- Snowbank height monitoring was conducted monthly from November 2019 to January 2020, and twice-monthly from February 2020 to April 2020 following multiple caribou sightings along the Tote Road in January (nine surveys total). The average percent compliance with the 100 cm snowbank height threshold was 96%, which was higher than most years except 2019 (97%). In 2020, survey locations used randomized km locations instead of repeated km locations to improve representativeness and reduce bias.
- HOL surveys were conducted during the caribou calving season (early June 2020). All HOL stations were visited at least once; 21 out of 24 were visited at least twice. The total observation time was 18.3 hours, while the average observation time per station was 23.9 minutes. No caribou were observed during these surveys in 2020. This is consistent with low numbers of incidental caribou observations associated with the Project, low regional population estimates informed by GN surveys, and a low point in the population cycle informed by IQ.
- Four observations of a single caribou occurred near km 94 on the Tote Road in January 2020; due to similar timing and location, all observations may have been of the same individual. Drivers followed the Caribou Decision Tree to respond appropriately, and Site Environment monitored and tracked the caribou's path when possible. The caribou crossed the Tote Road multiple times but otherwise did not interact with the Project.
- HOL, snow track surveys, snowbank height surveys, and incidental observations using wildlife logs will continue in 2021.

11 BIRDS

In 2020, the Project surveys for birds included pre-clearing nest surveys when necessary and continued monitoring and baseline data collection for cliff-nesting raptors. Specific surveys included:

- pre-clearing nest surveys for breeding birds; and,
- cliff-nesting raptor occupancy and productivity surveys.

Project Condition #74 requires that *"The Proponent shall continue to develop and update relevant monitoring and management plans for migratory birds…key indicators for follow up monitoring…will include: Peregrine Falcon, Gyrfalcon, Common and King Eider, Red Knot, seabird migration and wintering, and songbird and shorebird diversity."* (Nunavut Impact Review Board 2020). During previous years, bird surveys included several surveys for songbirds and shorebirds to meet that portion of Project Condition #74. However, analysis of the survey results from the 2012 and 2013 PRISM plots and the 2013 bird encounter transects indicated that monitoring of Project-related effects on songbirds and shorebirds was unlikely to detect an effect of disturbance due to the low number of birds present. Subsequent discussions with the TEWG and Canadian Wildlife Service (CWS) concluded that effects monitoring for tundra breeding birds could be discontinued but that Baffinland would:

- contribute to regional monitoring efforts by conducting 20 PRISM plots every five years (completed in 2018; next scheduled for 2023);
- complete coastline nesting surveys of the identified islet near the proposed Steensby Port Site before construction of the port;
- conduct pre-clearing nest surveys before any clearing of vegetation or surface disturbance during the nesting season; and,
- Continue monitoring programs for cliff-nesting raptors (annual occupancy and productivity) and inland waterfowl survey when qualified biologists are available and on site (roadside waterfowl survey).

11.1 ACTIVE MIGRATORY BIRD NEST SURVEYS

Project Condition #66 states that "*If Species at Risk or their nests and eggs are encountered during Project activities or monitoring programs, the primary mitigation measure must be avoidance. The Proponent shall establish clear zones of avoidance based on the species-specific nest setback distances outlined in the Terrestrial Environment Management and Monitoring Plan."* Project Condition #70 states that *"The Proponent shall protect any nests found (or indicated nests) with a buffer zone determined by the setback distances outlined in its Terrestrial Environment Mitigation and Monitoring Plan, until the young have fledged. If it is determined that observance of these setbacks is not feasible, the Proponent will develop nest-specific guidelines and procedures to ensure bird's nests and their young are protected."* (Nunavut Impact Review Board 2020).

Consistent with the Project Certificate requirements, pre-clearing nest surveys were conducted before any disturbance to make sure no bird nests were in areas where clearing or disturbance was scheduled. In 2020, Baffinland attempted to clear potential development areas in advance of the breeding bird window as much as possible, therefore reducing the likeliness of interaction with nesting birds. Within any proposed disturbance, pre-clearing nest surveys are necessary between May 31 and August 5 while birds are actively nesting (TEMMP Section 3.2, Baffinland Iron Mines Corporation 2016).

11.1.1 METHODS

In 2020, pre-clearing nest surveys were conducted by Baffinland Environmental staff in areas that had to be disturbed for approved construction activities during the nesting season (May 31 to August 5). In early June, at the beginning of pre-clearing surveys, EDI biologists trained on-site staff on nest searching methods provided by CWS to Baffinland in 2015 (TEWG meeting no. 6; April 22, 2015). Training included nest searching methods using rope-drags and identification of common species known in the area. Rope drags were constructed following the template provided by CWS (Rausch 2015).

Pre-clearing surveys were conducted with a minimum of three observers. Observers conduct surveys by pulling the rope drag back and forth through the area systematically, stopping regularly to note any bird observations. Areas were surveyed for active nests a maximum of five days before clearing. If nests were found, then development was delayed until the nest or nesting areas were no longer active. If no nests were found and the area was not developed within the five-day window, surveys were conducted again to ensure no birds had started nesting. While nest searching, observers looked for nesting bird behaviour signs, including broken wing displays, alarm calls, or carrying food, indicating a nest was within the area. Surveyors recorded all bird observations during surveys, but identification was limited to the individual observers' skills.

11.1.2 RESULTS AND DISCUSSION

Thirteen pre-clearing surveys were conducted between May 31 and August 5, 2020, consisting of 17.85 hours and 111,682 m² (11.2 ha) surveyed at the Mine Site, Tote Road and Milne Port (Table 11-1. Summary of Active Migratory Bird Nest Surveys conducted in 2020 during the bird nesting season.). One Snow Bunting nest was detected during the 2020 AMBNS at the 560 Hillside; a no-disturbance buffer was created to protect the nest, and construction was postponed until the chicks had fledged and left the area. Baffinland Environmental staff noted numerous songbirds during surveys, but no other nesting behaviour indications were observed (e.g., carrying food, carrying nesting material).

Although Baffinland attempts to schedule most clearing and construction outside of the breeding bird window, some land disturbance occurs in summer when ground conditions are favourable. In total, approximately 125,509 m² (12.6 ha) was disturbed for Project infrastructure in 2020. Of this area, 32% was disturbed outside of the breeding bird window. During the breeding bird window, approximately 85,192 m² (8.5 ha) of land was cleared, while 111,682 m² (11.2 ha) was surveyed through AMBNS (Table 11-1). Some sites were surveyed multiple times if clearing had not been completed within the five-day time frame following a survey.

Table 11-1. Summary of Active Migratory Bird Nest Surveys conducted in 2020 during the bird nesting season.

Location	Date	Site Description	Nest Located	Birds Observed	Surveys Effort (hours)	Area Surveyed (m²)
Mary River	June 11, 2020	Km 106 Pad	–	–	4 surveyors, 0.75 hours	2,472
Mary River	June 30, 2020	Km 106 Pad	–	Snow Bunting (3), Sandhill Crane (2)	3 surveyors, 2.25 hours	14,107
Mary River	July 8, 2020	Km 106 Pad	–	Snow Bunting (1)	3 surveyors, 1.4 hours	9,275
Mary River	July 9, 2020	Km 106 Pad	–	–	3 surveyors, 1 hour	12,653
Mary River	July 15, 2020	Km 106 Pad	–	–	3 surveyors, 1 hour	14,291
Mary River	July 21, 2020	Km 106 Pad	–	Northern Wheatears, Snow Buntings, Common Redpoll	4 surveyors, 3.2 hours	27,181
Mary River	June 17, 2020	560 Hillside	–	Snow Bunting (9)	3 surveyors, 3.6 hours	10,309
Mary River	July 5, 2020	560 Hillside	–	Snow Bunting (1)	3 surveyors, 1 hour	3,937
Mary River	July 6, 2020	560 Hillside	–	–	3 surveyors, 0.75 hours	2,812
Mary River	July 15, 2020	560 Hillside	Snow Bunting	Snow Bunting (6), American Pipit (7)	3 surveyors, 0.85 hours	4,396
Mary River	July 21, 2020	560 Hillside	Snow Bunting (carrying food to a nest located in the previous survey)	Snow Bunting (1), songbird (1)	4 surveyors, 0.2 hours	973
Milne Port	June 19, 2020	MP Q1 Access Road	–	–	4 surveyors, 1.25 hours	8,428
Mary River	August 6, 2020	Km 110 Communication Tower	–	–	3 surveyors, 0.4 hours	847
Total Survey Effort (Hours) and Total Area Surveyed (m²)					**17.65 hours**	**111,682**

11.2 RAPTOR EFFECTS MONITORING

The NIRB Project Condition #74 identifies Peregrine Falcon and Gyrfalcon (*Falco rusticolus*) as key indicators for follow-up monitoring of birds (Nunavut Impact Review Board 2020). Further, during the final hearing, Baffinland committed to monitoring relevant sections of the Project area for Peregrine Falcon nesting activities (Commitment #75).

- Project Condition #74: *The Proponent shall continue to develop and update relevant monitoring and management plans for migratory birds under the Proponent's Environmental Management System, Terrestrial Environment Mitigation and Monitoring Plan prior to construction. The key indicators for follow up monitoring under this plan will include: peregrine falcon, gyrfalcon, common and king eider, red knot, seabird migration and wintering, and songbird and shorebird diversity.*
- Project Commitment #75: *Baffinland is committed to monitoring relevant sections of the project area for nesting and migration activities, noting both areas and patterns, for Falcons, Eiders, Red Knots, seabirds, songbirds and shorebirds.*

11.2.1 BACKGROUND 2011–2020

Arctic Raptors Inc. (ARInc.) personnel have conducted raptor monitoring as part of the terrestrial baseline surveys and terrestrial effects monitoring efforts from 2011 through 2020. In general, surveys of known nesting sites have been conducted by truck along the Tote Road and by helicopter from the Mine Site to Milne Inlet. Over this period, monitoring objectives have been modified periodically to align with priorities for each phase of the Project (e.g., pre-baseline, construction, and operations of the Early Revenue Phase).

In 2011, surveys were conducted based on nesting site locations provided by Baffinland to substantiate and undertake quality control of monitoring data collected from 2006 to 2008 in the RSA (extending from Milne Inlet in the north to Steensby Inlet in the south). A second goal was to gauge the potential for establishing a dedicated study area based at Steensby Inlet that could serve as a replicate for the long-term monitoring program near Rankin Inlet, Nunavut. ARInc. initiated a banding program of breeding adults and nestlings, collected blood samples, searched for nesting locations that had not been previously identified, and conducted small mammal trapping following protocols already in place at Rankin Inlet. Surveys were conducted in 2012 of all known nesting sites with the same goals identified in 2011. Surveys conducted in 2013 investigated nesting habitat selection of Peregrine Falcons (PEFA) and Rough-legged Hawks (RLHA). Fieldwork in 2014 involved extensive ongoing surveys (occupancy and productivity) of known nesting sites within the RSA and additional coverage of areas not previously surveyed to validate habitat selection models.

Before the 2015 breeding season, ARInc. was tasked with providing a monitoring program to estimate the potential effects of the Project. This marked a departure from extensive monitoring of known nesting sites throughout the RSA to monitoring nests within a 10 km buffer of the PDA, hereafter referred to as the Raptor Monitoring Area (RMA). The density of nesting sites was distributed disproportionately, with higher densities located within 3 km of anthropogenic disturbance and much lower density beyond 3 km of disturbance. Thus, starting in 2015, the survey effort shifted from extensive monitoring of known nesting sites throughout the

RSA to monitoring of nesting sites only within the RMA and searching for previously unknown nesting sites. In 2015, efforts to locate previously unknown nesting sites focused on those areas further from disturbance to address the limitation associated with a small sample size further from disturbance. Survey effort in 2016 similarly focused on monitoring known nesting sites within the RMA and searching for previously unknown nesting sites, but also placed greater effort on multiple visits to address detection error. Fieldwork, analysis and reporting in 2020 followed the methodology adopted in 2016. Issues raised in previous reports that are continuing to be addressed include terminology, methods to address the effect of alternative nesting sites on estimates of occupancy and reproductive success, and collection of additional data to address the influence of prey and weather on these same indicators.

11.2.2 TERMINOLOGY

The terminology used throughout this section follows Franke et al. (2017). The following terms are highlighted to clarify terminology used in this report and to distinguish key terms used from similar terms that have distinct meaning:

Nest — the structure made or the place used by birds for laying their eggs and sheltering their young (Steenhof and Newton 2007) regardless of whether eggs are laid in the nest in a given year or in any year (Millsap et al. 2015, Steenhof et al. 2017);

Nesting site — the substrate that supports the nest or the specific location of the nest on the landscape (Ritchie and Curatolo 1982, Millsap et al. 2015, Steenhof et al. 2017).

Alternative nesting site — one of potentially several nests within a nesting territory that is not a used nest in the current year (Millsap et al. 2015).

Fully surveyed site — a nesting site that receives two or more visits in a single season, where each visit is associated with a different phase in the breeding cycle (pre-laying, incubation, brood-rearing), or within phases, but visits are separated by sufficient time to be independent observations (e.g., early incubation and late incubation).

Nesting territory — an area that contains, or historically contained, one or more nests within the home range of a mated pair; a confined locality where nests are found, usually in successive years, and where no more than one pair is known to have bred at one time (Newton and Marquiss 1984, Steenhoff and Newton 2007). Note that a nesting territory may or may not be defended (Postupalsky 1974) and probably does not include all of a pair's foraging habitat (Newton and Marquiss 1984, Steenhoff and Newton 2007).

Occupancy — the quotient of the count of occupied nesting territories and the count of known nesting territories that were fully surveyed in each breeding season (Franke et al. 2017).

Brood size — the actual number of young hatched from a single nesting attempt by a pair of birds. For studies in which mortality that occurs between hatching and the first observation of the brood is unknown, it is appropriate to report brood size (i.e., number hatched) only for broods equal to, or less than, 10 days of age. For broods older than 10 days of age, see Brood Size ≥10 days. Report mean and standard error, or standard deviation.

Brood size ≥ 10 days — the number of young hatched from a single nesting attempt by a pair of birds. For studies in which mortality occurs between hatching and the first observation of the brood is unknown, and nestlings are equal to, or greater than, 10 days of age, but less than Minimum Acceptable Age MAA) for assessing success. Report mean and standard error, or standard deviation.

Minimum acceptable age (MAA) for assessing success — a standard nestling age at which a nest can be considered successful. An age when young are well grown but not old enough to fly and after which mortality is minimal until actual fledging. Typically 80% of the age that young of a species typically leave the nest of their own volition for many species, but lower (65–75%) for species in which age at fledging varies considerably or for species that are more likely to leave the nest prematurely when checked (Steenhoff and Newton 2007).

Daily survival rate (DSR) — the probability that at least one young or egg in a nest will survive a single day (Dinsmore et al. 2002, Steenhoff and Newton 2007).

Nest survival — the probability that a nesting attempt survives over the entire nesting period. When DSR (Dinsmore et al. 2002) is assumed to be constant over time and E is the nesting period (usually expressed in days), nest survival is DSR^E; otherwise, nest survival is the product of each estimated DSR. For raptors, nest survival is the equivalent of nesting success for egg-laying pairs (Steenhof et al. 2017).

Occupied nest — a nest containing eggs, young, or an incubating bird. It also includes a mated pair on or near the nest and a recently repaired (or decorated) nest (Postupalsky 1974, Millsap et al. 2015).

Occupied nesting territory — a nesting territory occupied by a pair of birds as evidenced by an occupied nest, territorial behavior, or reproductive-related activity. Evidence for occupancy can include observations of eggs, young, an incubating bird, a mated pair on or near the nest, a pair copulating, or at least one bird engaged in nest defense (Steenhof et al. 2017).

Productivity — the number of young that reach the minimum acceptable age for assessing success; usually reported as the number of young produced per territorial pair or occupied territory in a particular year (Steenhoff and Newton 2007, Steenhof et al. 2017).

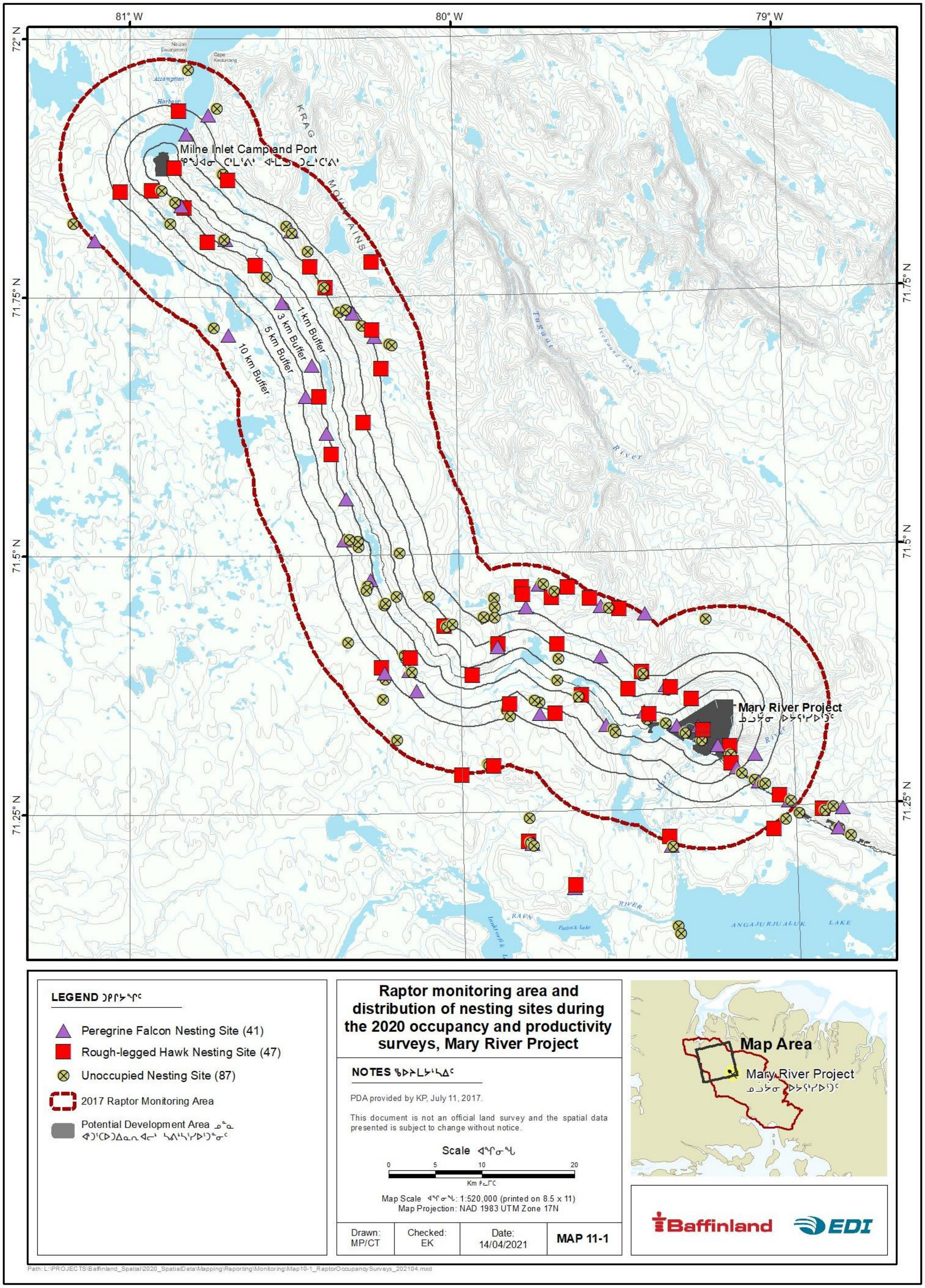
Total production — the total number of young detected.

11.2.3 BREEDING PHENOLOGY

Breeding phenology is an important determinant of the timing of occupancy and productivity surveys. In Nunavut, the earliest documented arrival for Peregrine Falcons is May 10 at a known breeding site near Rankin Inlet (Court et al. 1988). Although the timing of arrival on territory varies with spring conditions, most sites are occupied during the third week of May. Median laying date in Rankin Inlet (June 9 ± 4.0 days) was earlier than Igloolik (June 15 ± 3.6 days; $Chi^2 = 31.56$, $p < 0.001$) and North Baffin Island (June 16 ± 3.5 days; $Chi^2 = 35.56$, $p < 0.001$) with no difference observed between Igloolik and north Baffin Island ($Chi^2 = 0.77$, $p = 0.38$) (Jaffré et al. 2015). The incubation period of the fourth laid egg (33 days) is similar to what has been reported elsewhere (Burnham 1983). Rough-legged Hawk breeding phenology is very similar to Peregrine Falcons but is typically advanced by a week to 10 days (Poole and Bromley 1988). Additionally, the presence of breeding pairs in locations where ground squirrels are absent (as is the case on Baffin Island) is typically cyclic in association with lemming abundance. The timing of surveys on Baffin Island was conducted to match the phenology of local breeding birds.

11.2.4 RAPTOR MONITORING DATA

The landscape is generally rugged, and elevation varies, ranging from sea-level to 685 metres above sea-level. The area includes a wide valley associated with Philip's Creek surrounded by high plateaus and mountains. The valley extends southward into poorly drained plains and rolling tundra. Vegetation is patchy and dominated by mountain avens (*Dryas* spp.) and Arctic willow (*Salix arctica*), along with alpine foxtail (*Alopecurus* spp.), wood rush (*Luzula* spp.), and saxifrage (*Saxifraga* spp). Dry or high elevation sites are very sparsely vegetated, whereas wet areas have a continuous cover of sedge (*Carex* spp.), cottongrass (*Eriophorum* spp.), saxifrage, and moss. Peregrine Falcon and Rough-legged Hawk are the most common raptor species. Gyrfalcon, Snowy Owl, and Common Raven were also encountered. The spatial extent of the 2020 surveys was limited to nesting sites within the RMA (Map 11-1).



Raptor monitoring area and distribution of nesting sites during the 2020 occupancy and productivity surveys, Mary River Project

NOTES ᖄᐅᔨᒪᔭᕐᓴᐃᑦ

PDA provided by KP, July 11, 2017.

This document is not an official land survey and the spatial data presented is subject to change without notice.

Map Scale ᐊᖏᓂᖓ: 1:520,000 (printed on 8.5 x 11)
Map Projection: NAD 1983 UTM Zone 17N

Drawn:	Checked:	Date:	
MP/CT	EK	14/04/2021	**MAP 11-1**

Path: L:\PROJECTS\Baffinland_Spatial\2020_SpatialData\Mapping\Reporting\Monitoring\Map10-1_RaptorOccupancySurveys_202104.mxd

11.2.5 METHODS

Raptor surveys from 2011 to 2014 were conducted throughout the region extending from Milne Inlet to Steensby Inlet, and results of those surveys were reported in previous Annual Monitoring Reports (EDI Environmental Dynamics Inc. 2013, 2014, 2015, 2016). Survey efforts from 2015 to 2020 focused on monitoring occupancy and reproductive success within the RMA, and opportunistically documented previously unknown nesting sites.

11.2.5.1 Helicopter Survey

Three helicopter surveys of equal effort (~20 hours each) were conducted in 2020: June 25 to 28, July 18 to 21, and August 11 to 14. The focus of these surveys was to search known nesting sites for the presence of cliff-nesting birds. In addition to the structured surveys, favorable habitat was opportunistically searched when ferrying between known sites, camps, or other mine infrastructure, and when raptors or signs of site use (e.g., whitewash, orange-coloured lichen, and unused nests) were observed. Sites were considered occupied if one or more adults displayed territorial or reproductive behaviour (e.g., vocalization and/or flight behaviour associated with the defense of breeding territory or presence of nest building, nest, or eggs). Locations with partially built or unused nests without detecting breeding aged adults were noted as such (i.e., no birds detected).

11.2.5.2 Assigning Nesting Sites to Nesting Territories

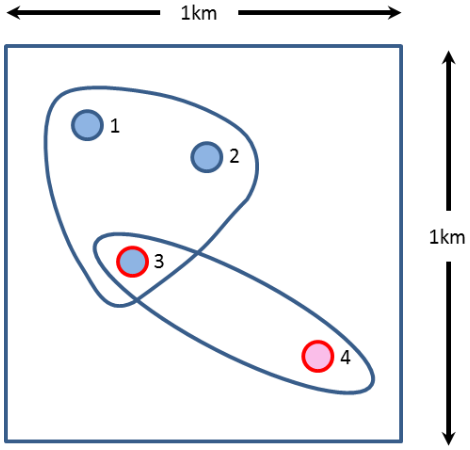
In the absence of marked individuals, it can be challenging to identify alternative nesting sites definitively. Failure to account for alternative nesting sites can lead to underestimating demographic parameters such as annual productivity. A rule-based approach was used to estimate the number of alternative nesting sites within the RMA to address this issue. Mean Nearest Neighbour Distance within the RMA equalled 1.2 km, and this information was used with the following ruleset to identify clusters of nesting sites that were potential alternative nesting sites (Figure 11-1):

- If two species-specific nesting sites were within 1 km of each other, they were considered alternative nesting sites in a single nesting territory.
- If the same species occupied two nesting sites within 1 km of each other in a given year, they were considered separate territories.
- If multiple species-specific nesting sites were within 1 km of one another, discrete geographic landforms or discontinuities in cliff structure were used to separate or combine sites into territories.

Temporal patterns of multi-species occupancy were used to assess the plausibility of decisions based on applying the three rules listed above. For example, if two nesting sites were located within 1 km of each other and were occupied by two different species in alternating years, these nesting sites were identified as different alternative nesting sites for each species.

Assigning Identification Numbers (ID) to Nesting Territories was conducted according to the following ruleset:

- Nesting Territory IDs were assigned within species only (e.g., Nesting Territory IDs for Peregrine Falcons and Rough-legged Hawks were never shared).
- Nesting Territory IDs were assigned using the Identification Number of one of the Nesting Sites in the cluster according to the following ruleset, in order of priority:
    i. length of tenure (i.e., nesting sites with the longest tenure); and,
    ii. first tenure (i.e., nesting sites with the first tenure in the event length of tenure was equal).



NS ID	PEFA NT ID	RLHA NT ID	2011	2012	2103	2014	2015	2016	2017
1	**1**	**-**	PEFA	PEFA	NBD	NBD	NBD	PEFA	PEFA
2	1	-	NBD	NBD	PEFA	NBD	PEFA	NBD	NBD
3	1	4	NBD	NBD	NBD	PEFA	RLHA	RLHA	NBD
4	-	4	RLHA	RLHA	NBD	RLHA	NBD	NBD	RLHA

Figure 11-1 Rule-based approach used to assign nesting sites to nesting territories for occupancy modelling.
A cluster of four nesting sites within 1 km of one another that exhibit a site occupancy history among seven years for two species (PEFA and RLHA). Nesting Sites 1 and 2 (blue circles with blue borders) have been occupied solely by PEFA. Nesting Site 4 (red circle with red border) has been occupied solely by RLHA. Nesting Site 3 (blue circle with red border) has been occupied by both PEFA and RLHA. In this example, Nesting Sites 1, 2 and 3 are grouped into a single PEFA Nesting Territory and assigned Nesting Territory ID 1 based on PEFA–specific tenure length (Nesting Site 1 has the longest tenure) and first tenure. Nesting Sites 3 and 4 are grouped into a single RLHA Territory and assigned Nesting Territory ID 4 based on RLHA–specific tenure length (Nesting Site 4 has the longest tenure) and first tenure. Unique nesting locations are ultimately defined by a Nesting Territory ID and a Nesting Site ID (E.g., NT ID 1, NS ID 2). NBD = no birds detected.

11.2.5.3 Occupancy Modelling

Although estimation of nesting site occupancy can serve as a metric of population status (MacKenzie et al. 2002, 2003), detection of nesting pairs is imperfect, and estimating the proportion of occupied sites without accounting for detection error can lead to underestimation of true occupancy (Kéry and Schmidt 2008). Occupancy modelling can estimate parameters that influence occupancy and simultaneously account for imperfect detection (Marsh and Trenham 2008). In any given year, the status of a nesting site is limited to one of only two outcomes: occupied or not occupied. Occupancy modelling estimates the following parameters:

1) initial colonization — the probability that a nesting site is occupied in the first survey year (ψ);
2) colonization — the probability that an unoccupied site becomes occupied between years (ε);
3) extinction — the probability that occupied site becomes unoccupied between years (γ); and,
4) detection — the probability that Peregrine Falcons are detected given that the nesting site is occupied (p).

Nesting site survival is estimated as the reciprocal of extinction (i.e., the probability an occupied site remains occupied between years; $1\text{-}\gamma$). Also, environmental covariates can be added to an occupancy model to test whether they influence the above parameters using a logit link function. Multi-year occupancy was calculated in R (R Development Core Team 2020) using the 'unmarked' package. When appropriate, data were standardized (e.g., distance to the nearest occupied neighbour was standardized by subtracting the mean from each distance value and dividing by the standard deviation), and then explicitly formatted for 'unmarked' using the *unmarkedMultFrame* function.

Occupancy among years was analyzed separately for Peregrine Falcons and Rough-legged Hawks. The total number of nesting sites was filtered to include only those nesting sites occupied at least once between 2012 and 2020 for each species. A total of 100 and 104 known nesting sites were used to analyze Peregrine Falcon and Rough-legged Hawk multi-year occupancy trends, respectively. Model fitting of candidate models (Table 11-2) was performed using the *colext* function. Akaike Information Criterion (AIC) was used for model selection.

Five candidate models were selected *a priori* to address anthropogenic (i.e., distance to disturbance) and ecological factors (i.e., distance to the nearest occupied neighbour and maximum Normalized Difference Vegetation Index [NDVI]) with the potential to influence occupancy (Table 11-2). The aim of this analysis was two-fold: 1) to estimate the proportion of occupied nesting sites and identify factors that may influence whether sites were occupied, and 2) to estimate the trend in nesting site occupancy from 2012 to 2020. Data from 2011 were removed from the analysis as only four nesting sites were fully surveyed. The trend in occupancy was estimated using annual occupancy probabilities to calculate the average rate of change (λ) at the population level (MacKenzie et al. 2003) where a value <1 indicates population decline and >1 indicates an increase. A sixth candidate model testing for the effect of lemming abundance on Rough-legged Hawk occupancy was analyzed separately for 2018 – 2020, the period for which small mammal monitoring has been conducted (Table 11-2).

Table 11-2. Occupancy modelling estimated: 1) initial colonization (ψ); 2) colonization (ε); 3) extinction (γ), and; 4) detection (p) survival (i.e., an occupied site remains occupied).

Model Structure	Tests for effect of:
ψ(1) + ε(1) + γ(1) + p(year)	Null (examine relative effects of covariates in other models)
ψ(NDVI) + ε(NDVI) + γ(NDVI) + p(year)	Vegetative productivity as characterized by NDVI
ψ(d2d) + ε(d2d) + γ(d2d) + p(year)	Distance to disturbance (project footprint)
ψ(dnon) + ε(dnon) + γ(dnon) + p(year)	Distance to the nearest occupied neighbour (competition)
ψ(1) + ε(year) + γ(year) + p(year)	Time (captures the effect of missing covariates)
ψ(1) + ε(lemming) + γ(lemming) + p(year)	Lemming abundance (2018 – 2020 for RLHA only)

Covariate: Distance to Disturbance — Within the spatial extent of the study area, ESRI ArcGIS for Desktop v.10.3 (ESRI 2011) was used to calculate the distance from all raptor nest sites to the nearest mapped disturbance features (e.g., Project infrastructure). Shapefiles were derived from CAD drawings provided by HATCH, the on-site procurement and engineering contractors. From the CAD files, the Mine Site, Milne Port and Tote Road footprints were used to represent current and proposed disturbance as of September 2014. The ArcGIS Near Tool was used to calculate the Euclidean distance (i.e., straight-line) for each nest site (i.e., point location) to the nearest point of the Project footprint. Sites that were located within the spatial extent of the PDA received a distance value of 0 metres. Values of distance to disturbance for only those sites within the RMA were retained for effects analysis on occupancy and reproductive success.

Covariate: Distance to Nearest Occupied Neighbor — Nearest neighbour distances were calculated in R (R Development Core Team 2019) using the 'sp', 'rgeos', and 'geosphere' packages. These packages were used to transform the geographic coordinates describing nesting site locations into spatial objects, calculate pairwise distances and identify the shortest distance between neighbouring nesting site locations. These values were used to calculate straight-line distances between nearest occupied neighbours.

Covariate: Normalized Difference Vegetation Index — NDVI (25 m^2 Landsat 8 images 2015 – 2020) was used to quantify plant productivity throughout the study area. Plants absorb solar radiation within the visible spectrum for photosynthesis, and leaf cell structures reflect light in the near-infrared. This results in a spectral reflectance signature that is unique to plants. Depending on the quantity of photosynthetically active vegetation, NDVI values range from 0.0 (entirely snow-covered) to 1.0 (maximum green-up). However, sunlight reflecting from vegetation can be obscured by cloud cover. All values from May 1 through August 31 were calculated and stacked for each cell within the RMA to account for cloud and snow-cover. This resulted in five-year time series for each cell. For each time series, the maximum value within a 3,500 m buffer surrounding each nesting territory site was extracted (Figure 11-2). This resulted in a single value characterizing vegetation productivity for each nesting territory.

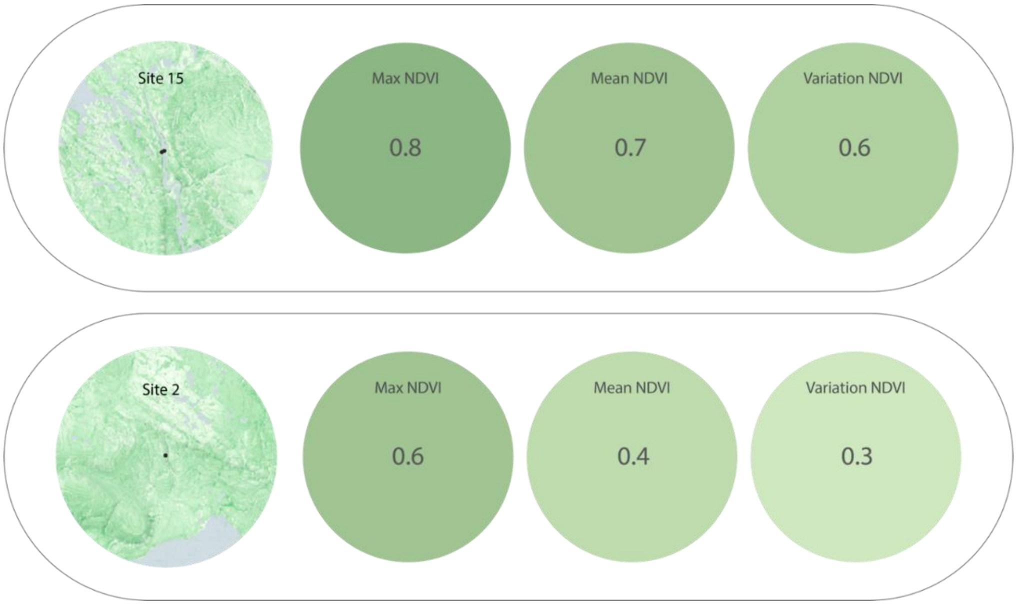


Figure 11-2. The mean, maximum, and standard deviation of Normalized Difference Vegetation Index (NDVI) values were calculated within a 3,500 m buffer surrounding each nest site to examine whether NDVI influenced nesting site occupancy and breeding success.

Covariate: Small Mammal Abundance — Two small mammal trapping sessions were conducted from June 30 to July 3 and August 7 to 14, 2020, following the procedure outlined by Cadieux et al. (2015). Two trapping sites were selected based on habitat suitability for both brown and collared lemmings (based on the presence of old lemming nests, runways and burrows, seed-bearing plants, wet and dry tundra, and accessibility by light truck along the Tote Road. Two permanent line transects were staked (GPS-located) at each trapping site. Line transects were 300 m long with 20 stations spaced 15 m apart. Each station consisted of a flagged stake and three museum special snap traps attached to the stake using string (1 m in length) for 240 traps. Traps were evenly distributed around the stake at a distance no further than 1 m and baited with peanut butter. Traps were checked once daily for three trap-nights, resulting in 720 trap-nights per trapping session. Recorded information included captures, misfires, or missing bait from each trap. Relative abundance was calculated for the period 2018–2020, as follows:

$$\text{number of individuals caught per 100 trap-nights} = \left(\frac{\text{number of lemmings trapped}}{\text{standardized trap}-\text{nights}}\right) \times 100$$

where standardized trap-nights (STN) is estimated as follows:

$$\text{STN=total trap nights-(number trapped + number of misfires)} \times 0.5$$

11.2.5.4 Reproductive Success

Brood Size — Given that nestling age during the survey period varied annually among years and sites, annual productivity measures are expected to be biased high (i.e., counts of nestlings are often done when nestlings are less than the MAA). For this report, any nesting site that was surveyed at least twice was considered "fully surveyed" and estimates of reproductive success were reported as the number of young hatched from a single nesting attempt by a pair of birds (i.e., mean brood size ≥ 10 days ± standard deviation) for fully surveyed sites. All nesting sites were contained within a unique nesting territory (i.e., no nesting territories were occupied by more than one pair of birds, regardless of the existence of known alternative nesting sites within nesting territories).

Spatiotemporal Patterns in Nesting Site Survival — To investigate spatial and temporal patterns in nesting site survival, the probability that a nesting site produced young was modelled given that the nesting site was occupied as a function of distance to the nearest occupied nesting site, distance to anthropogenic disturbance, NDVI, grouping effects of nesting sites, and year (Table 11-3). This base model was compared to three additional models that differed only in the way that spatiotemporal variation among nesting sites was incorporated, as follows: 1) static spatial structure among years; 2) variable spatial structure among years, and; 3) autoregressive spatial structure, where the spatial effect in a given year depended upon the previous year. All models were constructed and executed within the framework of Integrated Nested Laplace Approximation (INLA) using the R package 'R-INLA' (Rue et al. 2014) and compared using Watanabe-Akaike Information Criterion (WAIC). Covariates within the top model were individually assessed based on their posterior distribution proximity to zero.

Methods used to investigate nest survival were identical for both species. However, because the total number of breeding Rough-legged Hawk pairs in the RMA varied considerably (47 in peak years, and only one pair in 2013), the Rough-legged Hawk data were reduced to only include years where the number of breeding pairs within the RMA was greater than 15 (2012, 2014, 2015, 2016, and 2020). Therefore, Rough-legged Hawk nesting site survival that assumed an autoregressive spatial structure could not be modelled.

Table 11-3. Candidate models used to identify factors important for explaining nesting site survival.

Model	Tests for the effect of:
intercept	Null model (examine relative effects of covariates in other models)
Intercept + dnon	Distance to nearest occupied nesting site (dnon)
Intercept + d2d	Distance to disturbance (d2d)
Intercept + NDVI	Vegetative productivity (NDVI)
Intercept + dnon + d2d	Additive effects of dnon and d2d
Intercept + dnon + NDVI	Additive effects of dnon and NDVI
Intercept + NDVI + d2d	Additive effects of NDVI and d2d
Intercept + dnon + d2d + NDVI	Additive effects of dnon and d2d and NDVI
Top model + space	Static spatial structure among years
Top model + space + static	Variable spatial structure among years
Top model + space + AR1	Spatial effect in a given year depends on spatial effect in the prior year

Note: The effect of three different factors was considered on their own (nearest neighbour distance, distance to disturbance, and vegetative productivity) and in combination with one another. After ascertaining the top-ranked model, effects of spatial and temporal structure inherent to nesting site survival were then tested.

11.2.6 RESULTS AND DISCUSSION

11.2.6.1 Nesting Site Detections

A total of 175 unique nesting sites were detected in the RMA from 2012 to 2020. Among years, the greatest number of previously unknown nesting sites detected occurred in 2014 (19) and 2015 (32). This was primarily due to efforts associated with the model validation aspect of the nesting habitat selection study (Galipeau et al. 2019) and efforts to increase sample sizes in regions further from a disturbance in 2014 and 2015, respectively. The number of known nesting sites has increased considerably in the RMA from 2012 to 2020 (107 to 175, respectively); the percentage of known sites checked annually has remained high (range of 83% to 100%).

In 2020, 175 nesting sites were surveyed at least three times throughout the breeding season. For all years pooled, cliff-nesting raptors were detected at approximately half of the known nesting sites checked. However, in years when detecting Rough-legged Hawks was low (i.e., 2013 and 2017 to 2019), cliff-nesting raptors were detected at approximately one-third of known nesting sites. Of the 175 nesting sites visited in 2020, cliff-nesting raptors were detected at 89 sites: 42 held Peregrine Falcons, and 47 held Rough-legged Hawks. Raptors were not detected at 86 known nesting sites (Table 11-4).

Table 11-4. Summary statistics for survey effort and detections at known Peregrine Falcon and Rough-legged Hawk nesting sites within the Raptor Monitoring Area from 2012 to 2020.

Variable	Year								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total nesting sites known	107	108	127	159	162	167	169	169	175
New nesting sites found	—	1	19	32	3	5	2	0	6
Count of sites checked	107	90	125	147	142	166	166	165	175
Count of checked sites occupied	76	30	77	99	70	63	63	55	89
Count of fully surveyed sites	50	35	90	113	99	158	164	164	175
Count of sites not detected	31	60	48	48	72	103	103	110	86
Proportion of sites not detected	29%	67%	38%	33%	51%	62%	62%	67%	49%
Count of sites PEFA detected	29	29	43	50	48	50	49	43	42
% of sites PEFA detected	27%	32%	34%	34%	34%	30%	30%	26%	24%
Count of sites RLHA detected	45	1	31	47	18	5	12	11	47
% of sites RLHA detected	42%	1%	25%	32%	13%	3%	7%	7%	27%

11.2.6.2 Assigning Nesting Sites to Nesting Territories

Only nesting sites occupied at least once by Peregrine Falcons or Rough-legged Hawks since 2012 were used to delineate nesting territories (n.b., the analysis conducted for the 2018 report incorporated known nesting sites before 2012, including those that had not been occupied from 2012 to 2018, and those that had been occupied by irruptive species such as the Snowy Owl). As indicated, the 2019 report only used Peregrine Falcons and Rough-legged Hawks sites from 2012 to 2019. This approach was maintained for the current analysis, which resulted in an examination of 100 nesting sites for Peregrine Falcons, and 104 nesting sites for Rough-legged Hawks. Using the methods outlined in Section 11.2.5.2 — Assigning Nesting Sites to Nesting Territories, the 100 Peregrine nesting sites were reduced to a total of 84 distinct nesting territories, and the 104 Rough-legged Hawk nesting sites were reduced to 87 distinct nesting territories (Figure 11-3).

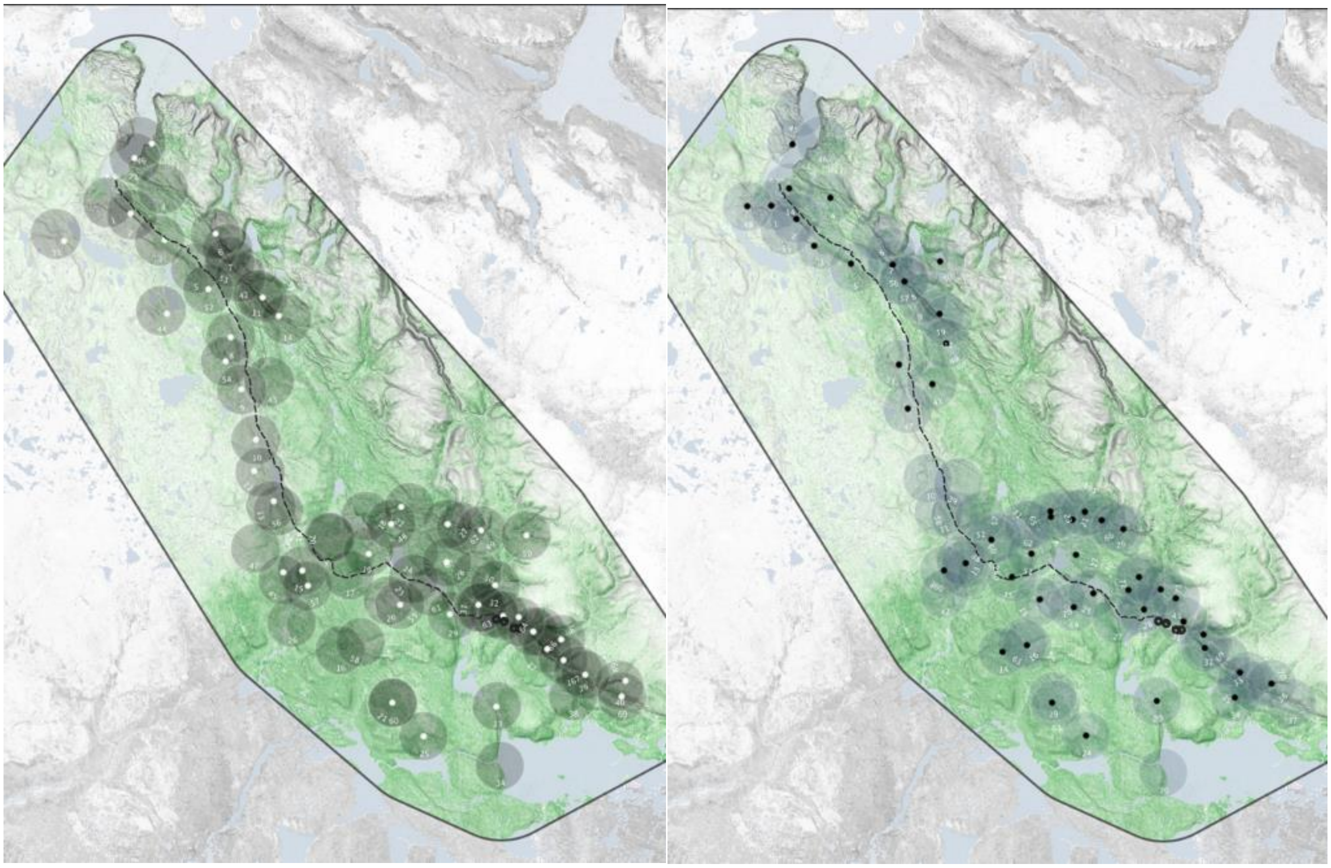


Figure 11-3. Species-specific nesting territories were delineated using cluster analysis. *Although Peregrine Falcon (left) and Rough-legged Hawk (right) territories often overlapped due to similar space use, territories were assigned unique identification numbers depending on the species, resulting in a total of 84 distinct peregrine falcon nesting territories and 87 rough-legged hawk nesting territories.*

11.2.6.3 Occupancy

From 2012 to 2020, the top model for Peregrine Falcons indicated that colonization and extinction were best explained by vegetation productivity (i.e., maximum NDVI value; see Table 11-5 and Figure 11-4). Distance to disturbance and distance to the nearest neighbour appeared in the fourth and fifth models with ΔAIC of 14.04 and 24.10, respectively; and markedly greater than the cut-off of ΔAIC <2.0, indicating that neither covariate explained patterns in colonization and extinction among years. Both nesting site colonization and extinction increased with the NDVI, indicating greater site turnover at nesting sites in higher vegetation productivity areas. The time-series (Figure 11-5) showed relative population stability among years as indicated by $\lambda = 0.99 \pm 0.10$.

Table 11-5. Site occupancy modelling for Peregrine Falcons (2012–2020, top), Rough-legged Hawks (2012–2020, middle), and Rough-legged Hawks (2018–2020, bottom).

PEFA Model 2012–2020	AICc	Delta_AICc	ModelLik	AICcWt	LL	Cum.Wt
NDVI	1748.23	0.00	1.00	0.96	-856.26	0.96
Null	1754.74	6.51	0.04	0.04	-863.58	1.00
Distance to disturbance	1762.27	14.04	0.00	0.00	-863.28	1.00
Year	1769.25	21.03	0.00	0.00	-849.01	1.00
Distance to nearest occupied neighbour	1772.31	24.08	0.00	0.00	-879.70	1.00

RLHA Model 2012–2020	AICc	Delta_AICc	ModelLik	AICcWt	LL	Cum.Wt
Year	1124.05	0.00	1.00	1.00	-526.91	1.00
Null	1162.83	38.78	0.00	0.00	-567.70	1.00
Distance to disturbance	1169.22	45.17	0.00	0.00	-566.89	1.00
NDVI	1186.82	62.77	0.00	0.00	-575.68	1.00
Distance to nearest occupied neighbour	1254.56	130.51	0.00	0.00	-620.85	1.00

RLHA Model 2018–2020	AICc	Delta_AICc	ModelLik	AICcWt	LL	Cum.Wt
Year	494.02	0.00		0.47	-238.25	0.47
Lemming	494.15	0.13		0.44	-238.32	0.92
NDVI	498.46	4.44		0.05	-239.27	0.97
Null	499.62	5.60		0.03	243.38	1.00
Distance to disturbance	506.03	12.01		0.00	243.06	1.00
Distance to the nearest occupied neighbour	545.19	51.17		0.00	266.16	1.00

Note: The main parameters inherent to metapopulation dynamics (i.e., colonization (γ) and extinction (ε)) were incorporated. To investigate the effect of covariates linked to occupancy, colonization and extinction were modelled as a function of NDVI, time (year), distance to disturbance, and distance to the nearest occupied site against a null model that estimated a single population-level mean for each of the parameters. Model selection was conducted using Akaike Information Criterion.

From 2012 to 2020, the top model for Rough-legged Hawk included a year effect for colonization and extinction (Table 11-5). Multi-year occupancy (from 2012 to 2020) for Rough-legged Hawks (Figure 11-6) indicated $\lambda = 3.51 \pm 6.54$. Although λ is much larger than 1.0, the 95% confidence interval overlaps zero, and

λ should not be interpreted as either a decrease or increase over time due to considerable annual variation. Distance to disturbance and distance to the nearest neighbour appeared in the third and fifth models with ΔAIC of 45.17 and 130.51, respectively, markedly greater than the cut-off of ΔAIC <2.0, indicating that neither covariate can explain patterns in colonization and extinction.

When considering only those years for which small mammal monitoring has been conducted (2018–2020), the top model for Rough-legged Hawk included a year effect for colonization and extinction. The second-ranked model included a lemming effect, and ΔAIC was 0.13, indicating no difference between the top-ranked and second-ranked models. However, this model only extends over three years and two time-steps (2018/19 and 2019/20), so caution should be exercised in interpreting these results.

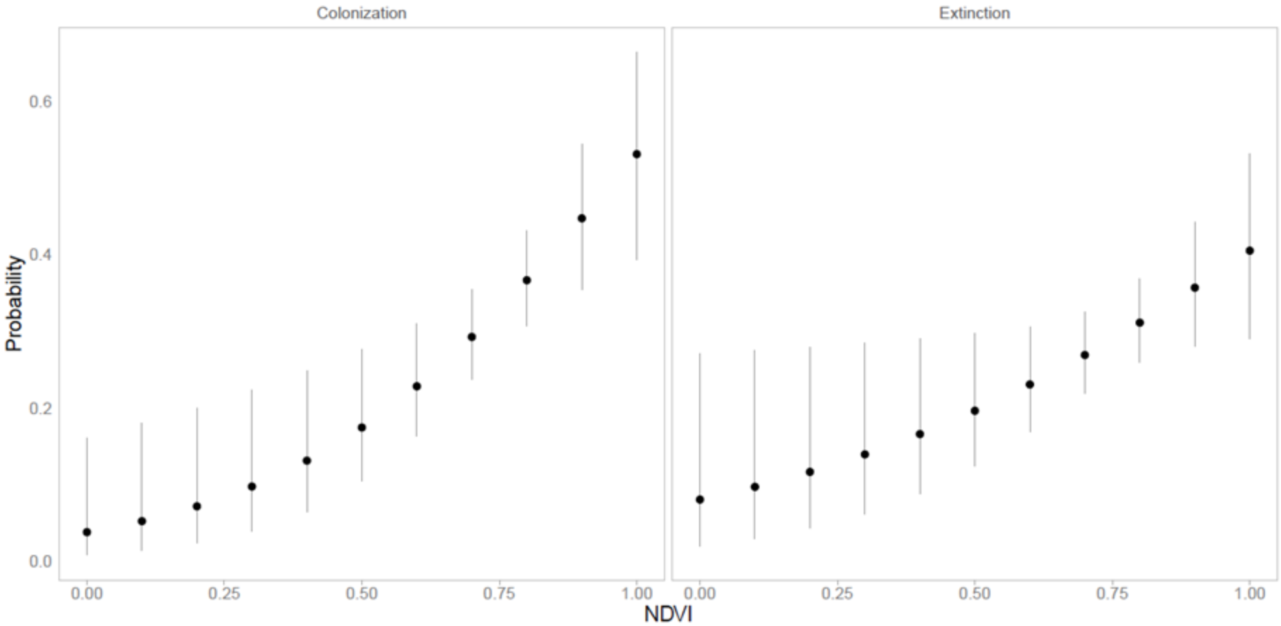


Figure 11-4. Effect of Normalized Difference Vegetation Index on the probability of Peregrine Falcon colonization (i.e., the probability that an unoccupied site becomes occupied between years; ε), and extinction (i.e., the probability that occupied site becomes unoccupied between years; γ).

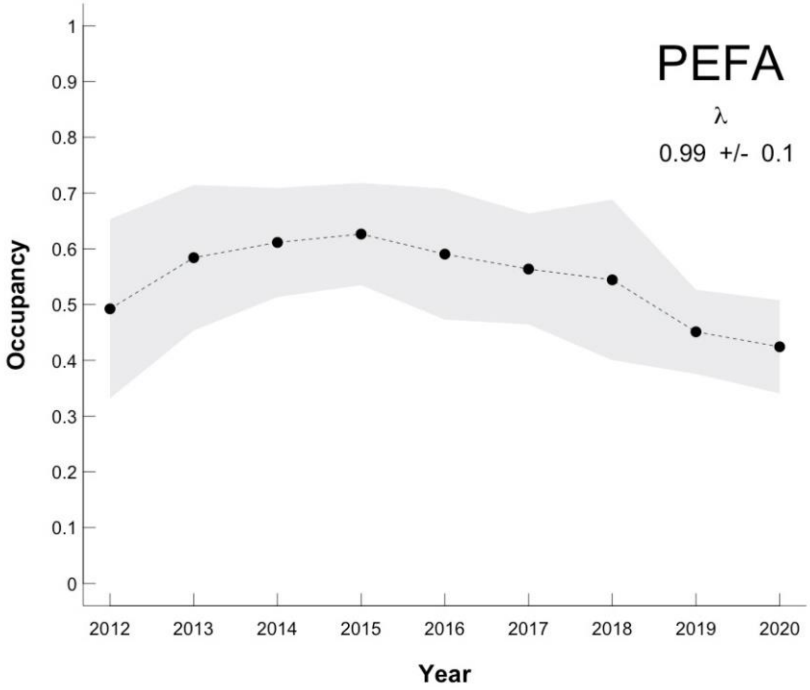


Figure 11-5. Annual estimates (± 95% confidence intervals) of nesting territory occupancy for Peregrine Falcons within the Raptor Monitoring Area from 2012–2020 has remained stable with λ = 0.99 ± 0.10.

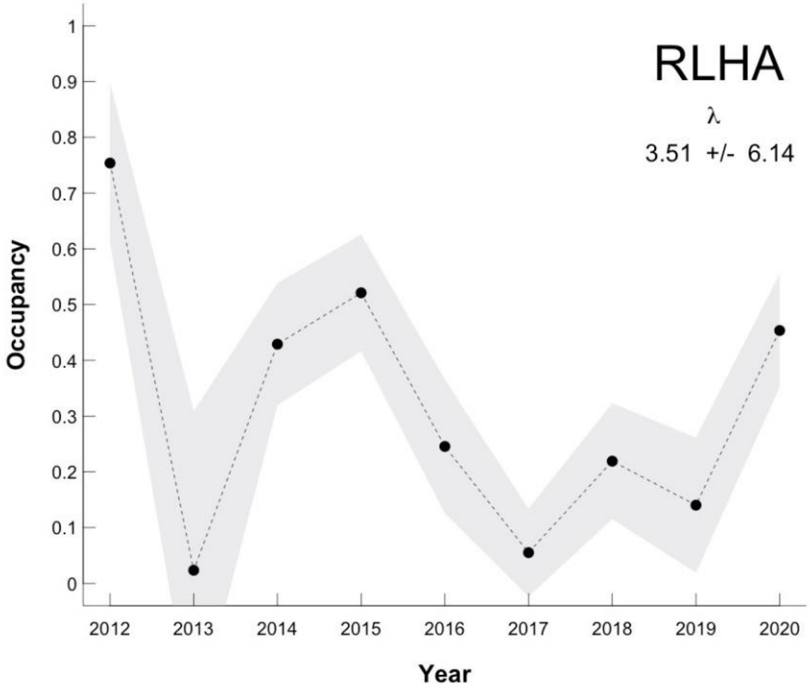


Figure 11-6. Annual estimates (± 95% confidence intervals) of nesting territory occupancy for Rough-legged Hawks within the Raptor Monitoring Area from 2012–2020.

11.2.6.4 Reproductive Success

Brood Size — Mean brood size for Peregrine Falcons and Rough-legged Hawks within the RMA in 2020 was 2.38±1.0 and 2.96±1.21 nestlings per fully-surveyed occupied site, respectively (Table 11-6). These values represent increases from previous years (0.90 nestlings per brood greater than the eight-year mean for Peregrine Falcons and 1.74 nestlings per brood higher for Rough-legged Hawks).

Nest Survival — The analysis involved a two-step process: Step 1 involved investigating covariate importance for Peregrine Falcons and Rough-legged Hawks using GLMMs. The AIC was used to compare 11 candidate models that included all combinations of distance to the nearest neighbour, distance to disturbance, and NDVI. For both species, several candidate models were within $\Delta AIC<2$. All three covariates were present in either nested structure or as standalone characteristics, indicating no clear evidence for excluding any of the covariates.

Distance to the nearest occupied neighbour, distance to disturbance, and NDVI were weak predictors (i.e., 95% Credible Intervals overlapped zero) of nest survival for either species (Figure 11-7, Figure 11-9). Thus, Step 2 involved assessing patterns in nest survival to determine whether they were influenced spatially and/or temporally using Integrated Laplace Approximation in R (R-INLA). In general, model performance was improved by incorporating spatial correlation (Table 11-7). For Rough-legged Hawks, the top model included spatial correlation that varied with a year (Figure 11-10). For Peregrine Falcons, nest survival was best explained by a spatial correlation structure that remained static among years (i.e., no temporal effect) (Figure 11-8), with localized areas where nest survival appears to be consistently above or below the average. Potential sources of spatiotemporal correlation may include variation in food availability, environmental conditions, and disturbance effects not captured by fixed variables.

Table 11-6. Mean brood size for Peregrine Falcons and Rough-legged Hawks within the Raptor Monitoring Area from 2011–2020 for fully surveyed sites.

Parameter	Year								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Peregrine Falcons									
Mean brood size ± SD	0.76 ±1.19	1.43 ±1.05	1.59 ±1.44	1.98 ±1.18	2.38 ±1.60	1.22 ±1.61	0.94 ±1.20	1.53 ±1.22	2.38 ±1.01
Total production	13	33	65	95	114	61	46	66	112
Rough-legged Hawks									
Mean brood size ± SD	1.44 ±1.14	0	2.22 ±0.76	2.30 ±1.24	1.78 ±1.55	1.00 ±1.15	0.58 ±0.90	0.45 ±1.04	2.96 ±1.21
Total production	26	0	60	106	32	5	7	5	133

Mean brood sized is typically used for studies when mortality between hatching and the first observation of the brood is unknown, and nestlings are equal to, or greater than, 10 days of age, but less than Minimum Acceptable Age for Assessing Success.

Table 11-7. Model selection results for nesting site survival of Peregrine Falcons and Rough-legged Hawks within the Raptor Monitoring Area.

Peregrine Falcons			Rough-legged Hawks		
Model	**WAIC**	**Delta**	**Model**	**WAIC**	**Delta**
fixed + r(b) + r(y) + spat	405.45	0.0	fixed + r(b) + r(y) + spat/time	187.74	0
fixed + r(b) + r(y)	416.93	11.48	fixed + r(b) + r(y)	189.50	1.76
fixed + r(b) + r(y) + spat/AR1	418.22	12.77	fixed + r(b) + r(y) + spat	217.78	30.04
fixed + r(b) + r(y) + spat/time	418.71	13.26			

To investigate spatiotemporal patterns in nesting site survival, the probability was modelled that a nesting site produced young given that the nesting site was occupied as a function of distance to the nearest occupied nesting site, distance to disturbance, NDVI, and grouping effects of nesting sites and year. This base model was compared to three additional models that differed only in the way that spatiotemporal variation among nesting sites was incorporated, as follows: 1) static spatial structure among years (spat); 2) variable spatial structure among years (spat/time), and 3) autoregressive spatial structure, where the spatial effect in a given year depended upon the previous year (spat/AR1).

The fixed term in the model description refers to the distance to the nearest occupied neighbour, distance to disturbance, and NDVI. The term r(variable) refers to a random grouping variable where b = nest site, and y = year. The "spat" terms refer to three different spatial correlation structures: 1) spat/temp (AR1) references an autoregressive term where spatial correlation in the current year is dependent on the correlation structure from the previous year, 2) spat/temp(year) refers to year-specific correlation structure that is independent of the correlation structure in previous years, and 3) spat refers to a spatial correlation structure that remains fixed among all years. Top models are those with the lowest WAIC, and delta refers to the difference between the respective and top models.

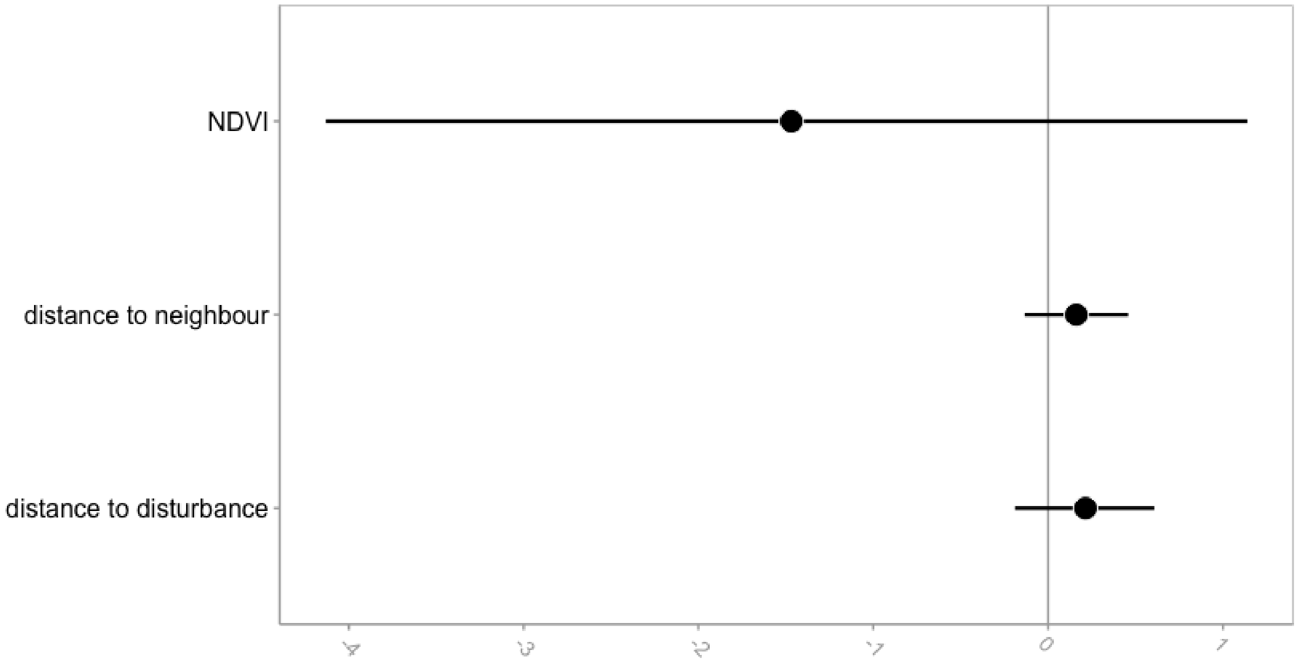


Figure 11-7. Posterior mean with 95% credible intervals from the top model for Peregrine Falcon nest survival.
As indicated by posterior distributions that overlap zero, distance to the nearest occupied neighbour, distance to disturbance, and NDVI all have a weak effect on Peregrine Falcon breeding success. This model also included random variables for brood and year level effects and a spatial correlation structure that remained static from 2012 to 2020.

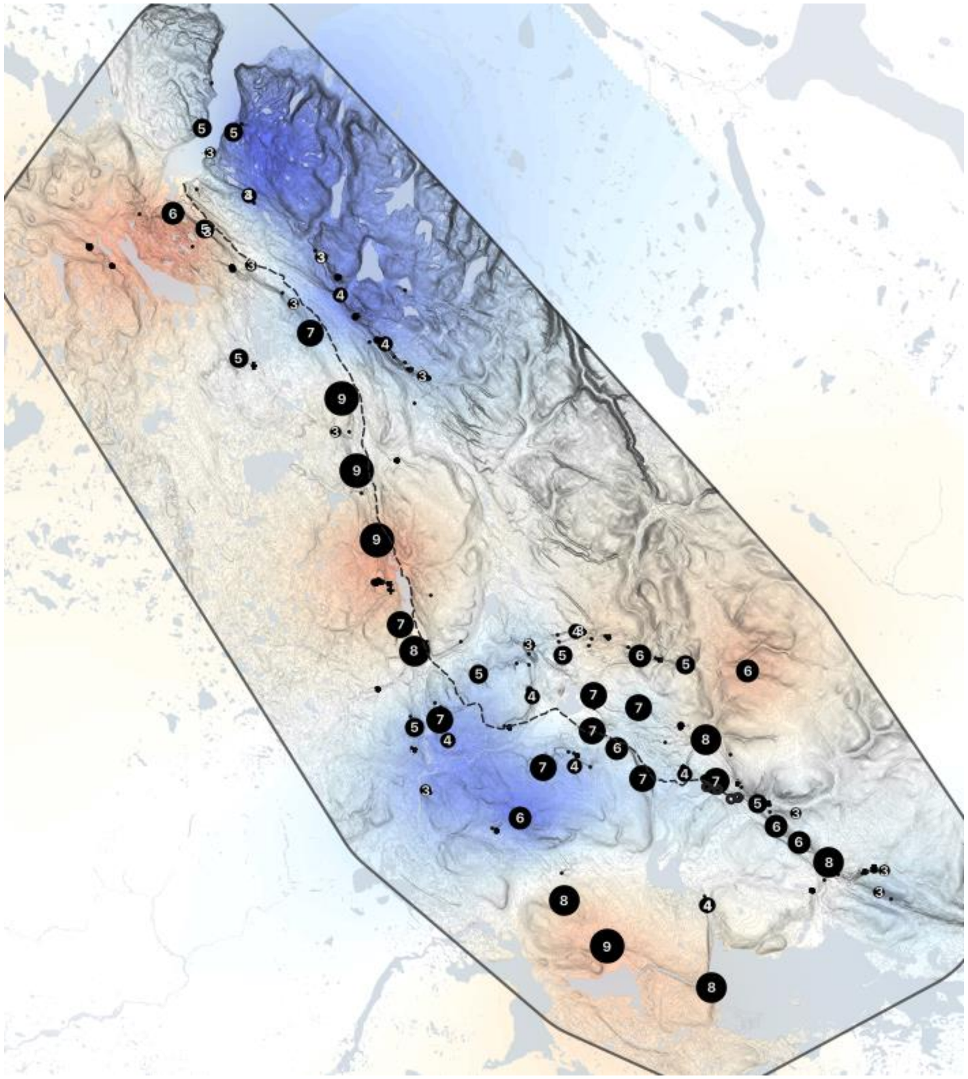


Figure 11-8. Spatial correlation in the probability of nest survival among all nest sites occupied by Peregrine Falcons since 2012.

Multiple spatial structures were compared within the model for Peregrine breeding success using WAIC, including spatial correlation that varied by year, autoregressive spatial correlation that depended on the previous year, and spatial correlation that remained static among all years. Static correlation performed the best, and as seen here, there are localized areas where nest survival appears to be consistently above or below the average. Point size reflects the number of years a particular site has been occupied, which is further specified by the label.

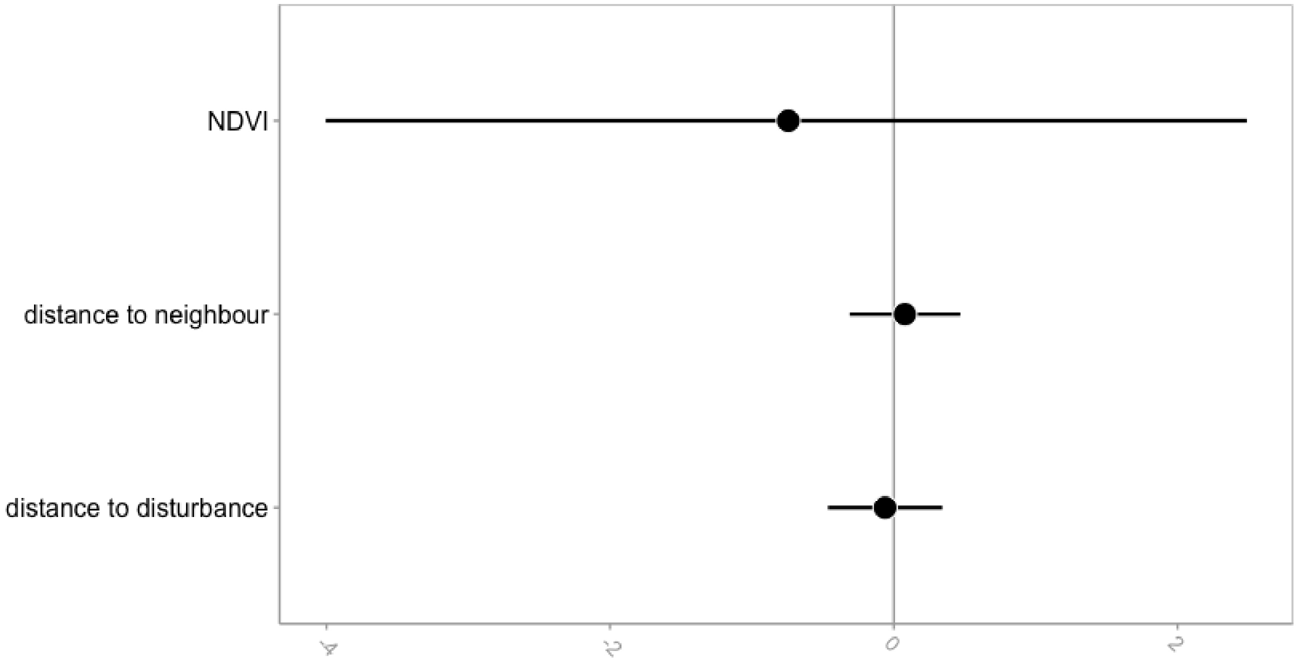


Figure 11-9. Posterior mean plus 95% credible intervals of fixed covariates within the top model for Rough-legged Hawk breeding success.

The number of breeding Rough-legged Hawk pairs in the RMA varies from 47 in high years, to just 1 in low years. To correctly estimate a year effect, data from years with fewer than 15 breeding pairs in the study (2013, 2017, 2018, 2019) were removed. As indicated by posterior distributions that overlap zero, distance to the nearest occupied neighbour, distance to disturbance, and NDVI all have a weak effect on Rough-legged Hawk breeding success. This model also included random variables for brood and year level effects and a spatial correlation structure that changed with each year 2012 to 2020.

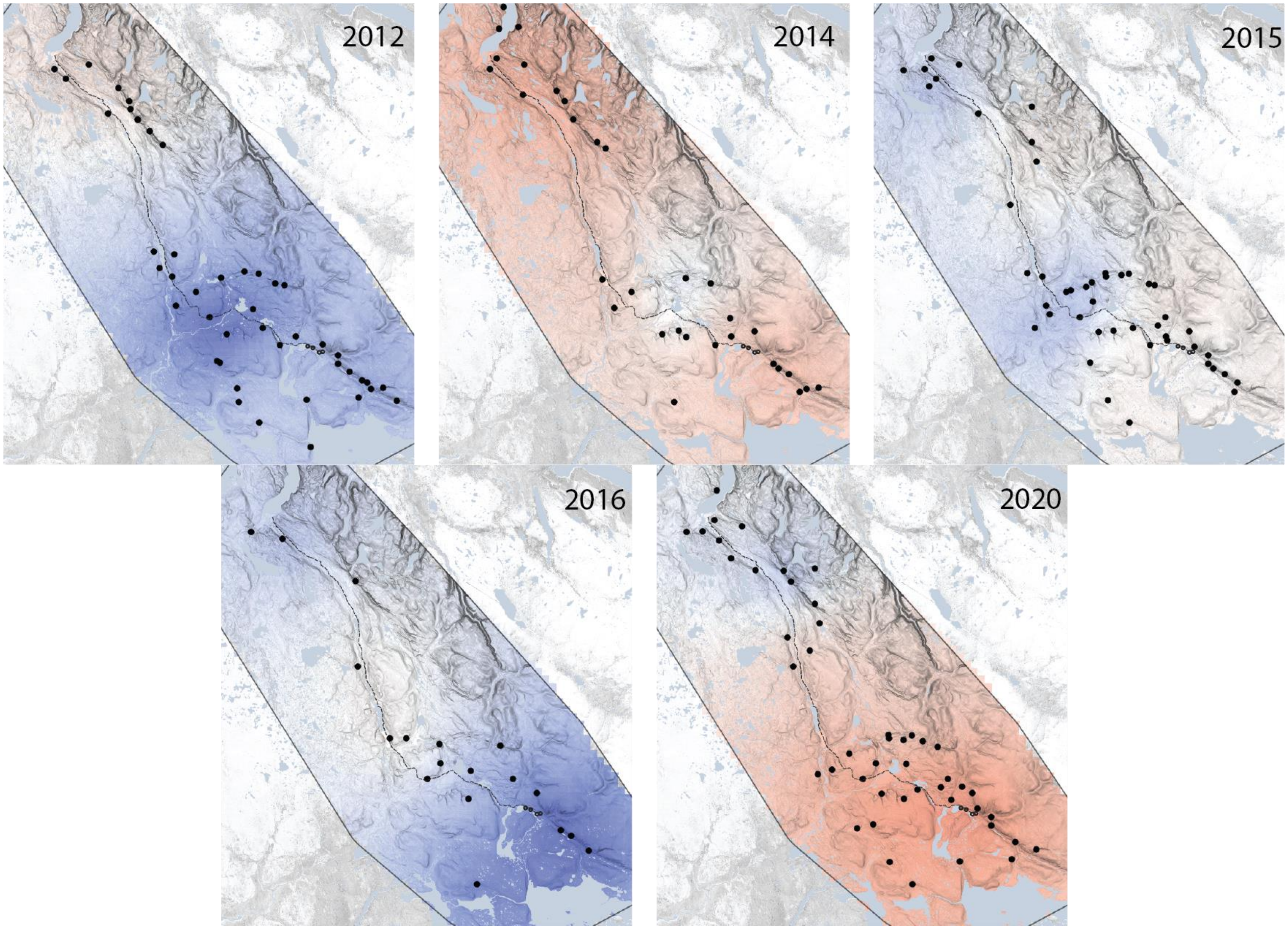


Figure 11-10. Spatial correlation in nest survival among nest sites occupied by Rough-legged Hawks in peak years since 2012.

For Rough-legged Hawks, two spatial/temporal structures were compared against a null model using WAIC. The first structure including spatial correlation that did not change among years, and the second included a spatial correlation structure that changed with each year. For RLHA, a spatial correlation structure that changed with each peak year (years of high abundance) performed the best.

11.2.6.5 Small Mammal Monitoring

Small mammal monitoring in 2020 totalled 1,440 trap-nights over two, 3-night trapping sessions. Over the trapping duration, a total of seven collared lemmings and one brown lemming were trapped. A total of 64 misfires were recorded. Total captures increased from previous years (1 in 2019 and 0 in 2018) and indicated higher lemming abundance.

11.3 BIRDS SUMMARY

- In 2020 13 AMBNS surveys were completed covering 11.2 ha. One Snow Bunting nest was detected, and construction was postponed in the area until the chicks had fledged.
- Annual cliff-nesting raptor Project-effects surveys have been conducted since 2013. In 2020, site occupancy and reproductive success were estimated for all known nest sites located within 10 km of the PDA.
- A total of 175 unique nesting sites were monitored in the RMA in 2020. Eighty-nine sites were occupied by cliff-nesting raptors: 42 by Peregrine Falcon and 47 by Rough-legged Hawk.
- No evidence was found to suggest that Peregrine Falcon and Rough-legged Hawk demography has been affected by distance to disturbance.
- The occupancy trend (λ) from 2012–2020 for Peregrine Falcons was stable, with low among-year variation, and among the environmental covariates tested, NDVI had the greatest explanatory power.
- The occupancy trend (λ) from 2012–2020 for Rough-legged Hawks was stable, with a high among-year variation. Although none of the environmental covariates tested were important, a year effect was apparent.
- The relative abundance of lemmings was higher in 2020 (i.e., 64) than in 2018 or 2019.
- Consistent with known natural history relationships, there is weak support for a lemming-driven trend in Rough-legged Hawk occupancy (λ) from 2018–2020.
- Mean brood size for Peregrine Falcons, and Rough-legged Hawks was as high or higher than for any other year since 2012.
- Over all years of raptor monitoring, there has been no evidence of Project-related effects to Peregrine Falcons or Rough-legged Hawks, and populations have been stable. Raptor monitoring will thus be put on hold in 2021, and effort will be re-allocated to publishing a paper describing the results of these studies.

12 WILDLIFE INTERACTIONS

Although wildlife interactions and mortalities related to the Project are uncommon and measures are taken to avoid them, incidents did occur in 2020. When a wildlife interaction or mortality occurs, an incident report is written, and an investigation is undertaken to understand the circumstances better. Based on the investigation outcomes, mitigation methods, when possible, are implemented to help prevent further interactions and mortalities.

12.1 WILDLIFE INTERACTIONS AND MORTALITIES IN 2020

In 2020, three non-fatal wildlife interactions and 13 wildlife mortality incidents were reported. The 13 wildlife mortalities were all individual losses. Two of the three non-fatal wildlife incidents involved Arctic foxes being found in garbage bins or cardboard boxes, likely wildlife attractants. In each case, the foxes ran away once the bins were opened. The third non-fatal incident involved a Pacific Loon being caught in a gill net used to collect fish as part of a fish monitoring program. A wildlife biologist removed and inspected the loon for injuries before releasing it. The loon did not have any apparent injuries and was released. Following this incident, gills nets were checked more frequently.

In 2020, wildlife mortalities involved five different species:

- Arctic fox (9)
- American Pipit (1)
- Common Raven (1)
- Snow Goose (1)
- Red-throated Loon (1)

Most of the fatal wildlife incidents involved vehicle collisions. Mortalities of seven Arctic foxes, one Common Raven, and one Snow Goose were confirmed or suspected as a result of vehicle collisions. Two Arctic foxes were found deceased without any evidence indicating the cause of death. One American Pipit was accidentally caught in a snap trap during small mammal monitoring. Following the mortality, the trap was relocated. One Red-throated Loon was caught in a gill net deployed for a fish monitoring program at Milne Port (Scientific Licence No.: S-20/21-1006-NU). The loon was found deceased upon discovery in the net.

12.2 WILDLIFE INTERACTION AND MORTALITY PREVENTION MEASURES

Baffinland continues to mitigate wildlife interactions in the Project area by training, enforcing, and monitoring waste management practices and guidelines. All management, supervisors and contract staff attend mandatory Environment Protection Plan (EPP) training, which is then passed on to all employees. The EPP includes protection measures for wolf, polar bear, Arctic fox, and caribou and waste management guidelines that are continually updated and implemented. Incineration and proper waste sorting are the most prominent deterrents used. Wildlife attractants such as food scraps and human waste are sorted and sealed in animalproof containers and incinerated on site. Waste sorting guidelines that clearly define where food and other attractants should be placed are posted around each site.

Significant effort was undertaken in 2018 and 2019 to improve onsite waste management infrastructure with the objective of minimizing human-wildlife interactions at the landfill. NIRB site visits prior to 2018 resulted in recommendations to improve the fencing at the landfill facility to reduce windblown debris escaping. A 275 m fence was installed on the west side (downwind) of the landfill in the fall of 2018 to address these concerns. The fence also repurposed over 800 used tires as part of Baffinland's used tire disposal and recycling initiative. The fence captures windblown debris from the landfill effectively. In 2019, after procuring additional materials on the summer sealift, Baffinland fully enclosed the active cells at the landfill in accordance with the Landfill Fence Design that was submitted to NIRB on August 26, 2019 (Photo 12-1, Photo 12-2). Maintenance inspections of the fence will be incorporated in ongoing inspections of the landfill.

Additionally, wire skirting is used under the main camps at both sites to ensure that no wildlife such as foxes or hares can den underneath. For equipment, honking the horn before starting the vehicle helps to scare off wildlife that might be hiding in or near the equipment. Wildlife has the right of way on all roadways unless they create a safety hazard. Snowbanks along Tote Road are reduced where feasible by feathering back snow with equipment to make sure personnel along Tote Road can view wildlife crossing the road. Feeding of wildlife is strictly prohibited, and non-compliance is dealt with accordingly.

Photo 12-1. View of recently installed fencing enclosing the landfill site to minimize windblown debris escapement and wildlife interactions at the Mary River Project.

Photo 12-2. View of the entrance to the landfill site with recently installed fencing at the Mary River Project.

12.3 INTER-ANNUAL TRENDS

Most mortalities that have occurred on site from 2014 to 2020 have been attributed to collisions with infrastructure or vehicles. Other reported causes of mortality include fatal injuries incurred from heavy machinery or Project infrastructure, and dispatching of animals by on-site staff when rabies was suspected.

No inter-annual trends were identified in terms of wildlife mortality. In 2020, four avian species mortalities were reported within the range of historic avian mortalities for the Project. Nine Arctic fox mortalities were reported, which is also typical for the Project. No other mortalities were reported in 2020. No caribou mortalities have occurred thus far because of the Project (Figure 12-1).

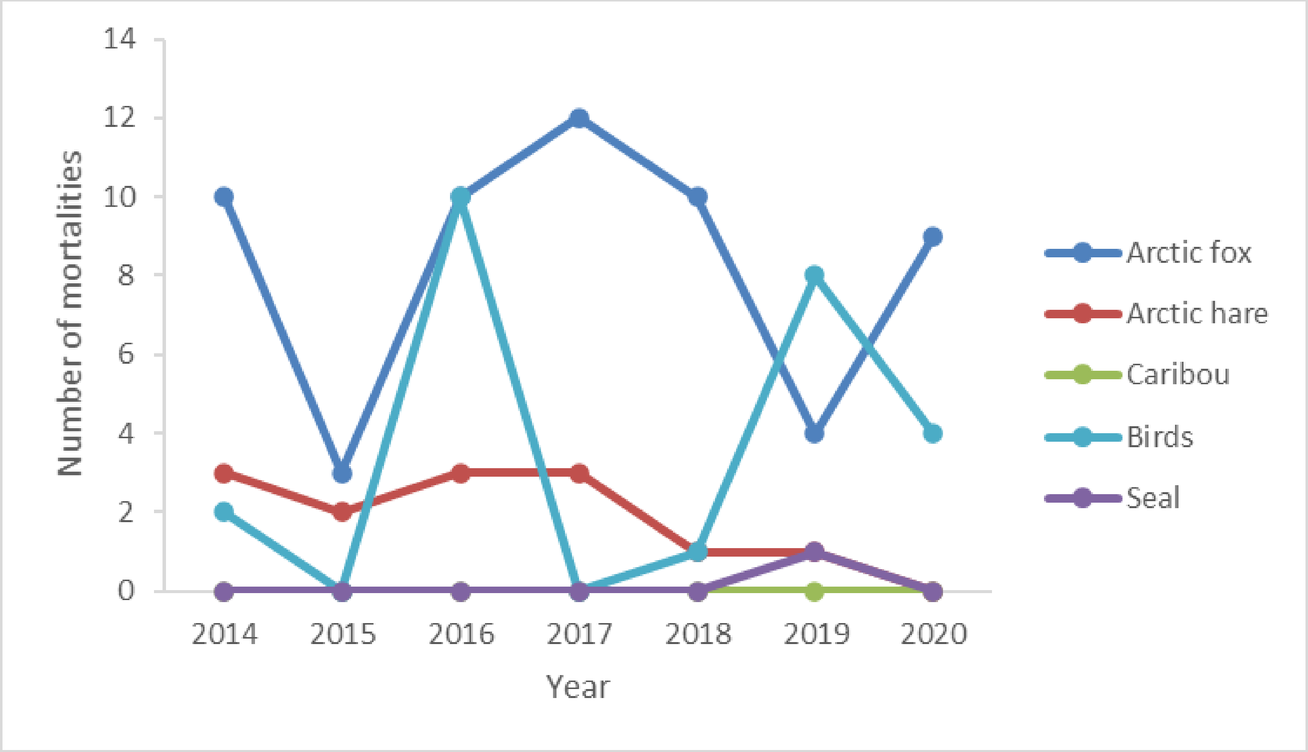


Figure 12-1. Inter-annual wildlife mortality trends at the Mary River Project, 2014–2020.

12.4 WILDLIFE INTERACTIONS AND MORTALITIES SUMMARY

- In 2020, three non-fatal wildlife interactions and 13 wildlife mortality incidents were reported, all of which were individual losses.
- Four of the mortalities in 2020 involved avian species, two of which were due to collisions with vehicles, one of which was bycatch during gill netting, and one of which was bycatch during small mammal trapping.

- Nine of the mortalities in 2020 involved Arctic Foxes, seven of which were due to collisions with vehicles, and the other two remain unknown.
- Baffinland continues to mitigate wildlife interactions in the Project area by training, enforcing, and monitoring waste management practices and guidelines and integrating preventative measures into road maintenance, infrastructure design, and the Environment Protection Plan.

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APPENDICES

APPENDIX A SUMMARY OF PROGRAM COMPONENTS AND/OR PROGRAM DESIGN MODIFICATIONS IN CONSIDERATION OF TERRESTRIAL ENVIRONMENT WORKING GROUP (TEWG) FEEDBACK

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
GENERAL				
General	pre-2018	Monitoring components developed with input from TEWG and integrated into the Terrestrial Environmental Effects Monitoring Plan (TEEMP).	N/A	Captured through annual reports to the NIRB (e.g., 2017, 2018, 2019).
	2018	1. Challenges with dust control is noted and new mitigations should be considered for inclusion to reduce dustfall (T-03222018; T-05062018; 2018 TEAMR comments); 2. Baffinland requests input from TEWG on evaluation of annual trends to determine if any programs should be changed on results observed thus far. (T-22032018);	1. Baffinland is implementing new dust control measures including use of calcium chloride (and other options) for dust suppression, and engineering controls such as installation of shrouds at ore transfer points, reducing drop heights, etc.; 2. Baffinland to explore application of new types of dust suppressants to those previously used.	Captured through annual reports to the NIRB (e.g., 2017, 2018, 2019).
	2019	Ongoing challenges with dust control remains (MHTO, QIA; 2018 TEAMR comments, T-04242019, T-20062019).	Baffinland to be piloting application of a new dust suppressant on Tote Road (Dust Stop®).	Captured through annual reports to the NIRB (e.g., 2017, 2018, 2019).
	2020	1. Ongoing challenges with dust control remains (MHTO, QIA; 2019 TEAMR comments, T-24062020, T-12102020). 2. Baffinland to consider correcting for wind when using sound recorders during noise pilot study (ECCC; T-24062020).	1. Baffinland to be piloting application of a new dust suppressant on ore pile at Milne Port (DusTreat). 2. Use of acoustic recording units (ARUs) initially used for the Red Knot surveys to be used for pilot noise study in combination with audiomoths.	Additional details to be provided as part of 2020 reporting efforts.
DUSTFALL MONITORING PROGRAM				
Relevant to PC conditions 36, 50, 54d, 85c, 60	pre-2018	Monitoring components developed with input from TEWG and integrated into the Terrestrial Environmental Effects Monitoring Plan (TEEMP).	Existing program includes monitoring of dustfall at 33 sites through summer and 16 year-round.	N/A
	2018	1. Tote Road traffic should be monitored and presented as part of dustfall results (QIA; T-22032018);	1. Traffic monitoring was included as part of reporting starting in 2018. Improvements were made to the traffic logs to better quantify road traffic;	See 2018 Terrestrial Environment Annual

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		2. Request that dustfall be monitored at all sites year-round (GN, 2018 TEAMR, T-24042019)	**2. Baffinland restricts winter sampling to only those stations found most valuable (i.e., those located nearest project development areas) given the inherent safety risks associated with visiting sites in the dark winter months and lack of access by helicopter. Accordingly, dustfall sampling is completed year-round at 16 of the 33 monitors.**	Monitoring Report (TEAMR).
	2019	1. Request that additional dustfall samplers be added along the Tote Road to better define the magnitude of dustfall at 1,000 m distance from Project activities (QIA; 2018 TEAMR comments; T-24042019) 2. Request that Baffinland consider installation of dustfall samplers that are at lower heights than the standardized 2 m apparatus currently being used (GN, QIA; T-20062019);	1. Six new additional dustfall samplers were added along the Tote Road at 1,000 m distance in 2019; samplers were placed at 1,000 m from each side of the road at km 25, 56 and 75. Locations were selected based on input from the MHTO during an August 2018 Mary River Site visit; 2. Sampler (DF-P-01) located at Milne Port near ore stockpile relocated to account for expansion of stockpile area (now called DF-P-08). 3. Baffinland will continue to use dustfall samplers installed at heights of ~2 m high based on standardized methods (ASTM International 2019).	See 2019 TEAMR.
	2020	**1. Request that Baffinland continue to consider installation of dustfall samplers that are at lower heights than the standardized 2 m apparatus currently being used (GN, QIA; T-26022020, T-24062020, T-10122020);** 2. Baffinland to better investigate dust extent on snow given visual observation as reported by land users (MHTO, QIA; T-26022020, T-24062020) 3. Request that Baffinland include longer-term air temperature trends and other weather variables that go back further than 2018 (QIA: TEAMR 2019, T-26022020);	**1. Baffinland will continue to use dustfall samplers installed at heights of ~2 m high based on standardized methods (ASTM International 2019). Baffinland has also communicated with Natural Resources Canada (NRCan) to learn further about relevant research methods being completed to monitor dust, including feasibility of using satellite imagery. As part of the December 10, 2020 TEWG meeting agenda, NRCan planned to present their research that is relevant to dust monitoring however due to delays in the meeting schedule, the agenda item will be moved to a future TEWG meeting.**	Additional details to be provided as part of 2020 reporting efforts.

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		4. Request that Baffinland consider investigating soil and vegetation base metals data to, for example, traffic levels and weather conditions that influence dust deposition, and integrate with data on dust extent (T-26022020).	2. Baffinland has also included, as part of its 2020 reporting effects, an analysis of satellite imagery examining dust on snow to better understand the extent of dust deposition related to Project activities; 3. An update to the analysis and presentation of weather data is planned as part of 2020 reporting efforts. Baffinland will endeavor to show longer-term climate trends instead of summarizing a single year and comparing solely to the previous year. 4. Baffinland will continue to investigate the relationship between dustfall and metals concentrations in soil and vegetation in future monitoring programs and analysis, and integrate information with new sampling analyses (e.g., dustfall extent through satellite imagery).	
Vegetation				
Vegetation Abundance Monitoring Relevant to PC Conditions 36, 38, 50 and Project Commitments 67, 69, 107 Vegetation and Soil Base Metals Monitoring Relevant to PC Conditions 34, 36, 38, 50 and Project	pre-2018	1. GN and QIA request additional vegetation abundance sites to be monitored in 2018 from 2017.	Baffinland completed third year of vegetation monitoring in 2017 and requests input from TEWG on future sampling frequency once results are available for review; Vegetation abundance trend analysis will be completed to assess potential changes in percent plant cover and plant group composition.	See 2017 TEAMR.
	2018	1. Request that Baffinland include assessment of soil moisture at vegetation abundance monitoring sites (ECCC; 2018 TEAMR comments, T-24042019, T-20062019); 2. Request that Baffinland add additional reference sites in order to control for the potential effects of soil moisture on plant cover and composition (GN, ECCC; 2018 TEAMR comments, T-24042019);	1. Baffinland to include soil moisture as part of future vegetation abundance study design; 2. Baffinland to consider addition of new reference sites in 2019 to reduce variability. 3. The point quadrat method for monitoring vegetation abundance is considered one of the most objective and repeatable methods for monitoring vegetation. This statement is supported by several resources across multiple decades from 1933–2013;	See 2018 TEAMR.

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
Commitments 67, 69, 107		3. Request that Baffinland justify use of the point quadrat method for vegetation monitoring (GN; 2018 TEAMR comments, T-24042019); 4. Request that Baffinland consider exploring the timing of snowmelt and green-up in future monitoring efforts (QIA; 2018 TEAMR comments, T-24042019).	4. Baffinland will consider exploring green-up as part of future vegetation monitoring.	
Exotic Invasive Vegetation Monitoring and Natural Revegetation Relevant to PC Conditions 32, 37, 38, 50 and Project Commitments 67, 68, 69, 70	2019	1. Request that Baffinland include assessment of soil moisture at vegetation abundance monitoring sites to determine if there are moisture differences between Near and Reference sites (ECCC, QIA; 2018 and 2019 TEAMR comments, T-24042019, T-20062019, T-02262020); 2. Request that Baffinland expand the number of Reference sites as part of the vegetation abundance monitoring program in 2019 (GN, ECCC; 2018 TEAMR, T-11122018, T-24042019, T-20062019). **3. Discussions on frequency of monitoring for the vegetation abundance monitoring program are ongoing (2019 TEAMR comments, T-7102019, T-26022020).**	1. Baffinland added a soil moisture assessment as part of the vegetation abundance study design and analysis. Soil moisture regime was incorporated into vegetation analyses as a covariate to account for associations with some plant groups. Further discussions with ECCC confirmed that additional analysis adequately addressed initial concerns. 2. Baffinland added 9 new vegetation monitoring references sites in 2019 (up from six). 3. Baffinland is in support of completing another year of vegetation and soils base metals/metalloids monitoring in 2020 to further investigate observed potential trends; ongoing discussions regarding frequency of monitoring.	See 2019 TEAMR.
	2020	**1. Baffinland to consider alternative methods to analyzing vegetation abundance in 2020 (2019 TEAMR comments, T-26022020, T-24062020);** 2. As part of additional year of vegetation and soil base metals/metalloids monitoring in 2020, Baffinland to include a more detailed description of sample locations, concentrations and trends, screening for specific metals, in addition to relevant context should specific sample values be above or below analytical detection limits (QIA, ECCC; 2019 TEAMR comments, T-24062020).	**1. Baffinland will investigate alternative methods for analyzing vegetation abundance in 2020 though this will not result in changes to 2020 monitoring plans.** 2. Vegetation and soil based metals sampling completed in 2020. Integration of dustfall and vegetation being addressed through pairing of vegetation sites and new analyses to investigate trace metals to dustfall at paired sites; Further direction from the TEWG regarding sampling frequency, number of representative reference sites, soil moisture regime, and integration with	Additional details to be provided as part of 2020 reporting efforts.

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		3. Request that Baffinland consider exploring the timing of snowmelt and green-up in future monitoring efforts (QIA; 2018 TEAMR comments, T-24042019, T-26022020).	dustfall monitoring can be discussed at future TEWG meetings upon review of newest data; 3. Baffinland completed green-up analysis to better understand timing of vegetation growth.	
Birds				
Cliff-nesting raptor occupancy and productivity surveys Relevant to PC conditions 50, 73, 74, and Project Commitment 75 Pre-clearing Nest Surveys Relevant to PC conditions 66, 70	pre-2018	1. Bird surveys are most successful through collaborations established with ECCC-CWS and Arctic Raptors Inc. Raptor program influenced by QIA and TEWG input (QIA; T-05062018).	N/A	
	2018	1. Continue cliff-nesting raptor occupancy and productivity surveys (T-03222018); 2. Consider inclusion of small mammal trapping as part of raptor studies to assess whether raptor occupancy is associated with natural small mammal cycle (T-03222018) 3. Request for Baffinland to continue collaborating and provide funding and logistical support to regional shorebird monitoring conducted by ECCC-Canadian Wildlife Service (CWS) for improved efforts (T-05062018); 4. Investigate potential presence of Red Knot within the Mary River Project regional study area through vocalization study in collaboration with ECCC-CWS (ECCC; 2018 TEAMR, T-05062018);	1. Baffinland continues to collaborate with University of Alberta researchers (through Arctic Raptors Inc.) to assess cliff-nesting raptor occupancy and productivity surveys; 2. Small mammal trapping included as part of raptor monitoring program design. 3. Collaboration with ECCC-CWS continues through PRISM surveys in 2018; 4. Red knot surveys deferred to 2019 field season;	See 2018 TEAMR.
	2019	1. Investigate potential presence of Red Knot within the Mary River Project regional study area through vocalization study in collaboration with ECCC-CWS in 2019 (ECCC; 2018 TEAMR comments, T-24092019, T-20062019);	1. Baffinland, in collaboration with ECCC-CWS, deployed 9 passive sound recording devices as an attempt to detect Red Knot vocalizations throughout the breeding season. Based on 2019 results, additional Red Knot surveys are not necessary along the northern transportation corridor and active Project areas (e.g., Mary River, Milne Port).	See 2019 TEAMR.

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		2. Request that Baffinland investigate alternative means to small mammal snap-trapping (ECCC: 2018 TEAMR report comments);	**2. Baffinland considered other methods (e.g., live trapping, indices) however snap-trapping remains most suitable method considering program objectives, timing, and feasibility.**	
	2020	**1. Request that Baffinland re-deploy sound recorders in the Steensby Port area and along the south rail line to collect baseline data on Red Knot and other species in those areas (QIA, ECCC- CWS; 2019 TEAMR report comments).**	**1.Baffinland will consider the re-initiation of vocalization surveys in suitable Red Knot habitat prior to initiating development-related activities in the Steensby Port and south rail line areas. Note that ARUs were used for noise pilot study completed in 2020.**	N/A
Mammals				
Snow Track Surveys Relevant to PC conditions 54dii, 58f Snow Bank Height Monitoring Relevant to PC conditions 53ai, 53c Height of Land (HOL) caribou surveys Relevant to PC conditions 53a, 53b, 54b, 58b	pre-2018	1. All carnivore monitoring programs put on hold in 2015 based on TEWG feedback due to low abundance of wolves. Studies to be reinitiated in the future should changes occur in wolf abundance and after further discussion with the GN and TEWG. 2. Request Baffinland enhance efforts for observing caribou during HOL surveys.	1. All carnivore monitoring programs put on hold in 2015 due to low abundance of wolves based on TEWG feedback. Baffinland will reinitiate surveys upon feedback from the TEWG, GN or through local knowledge that numbers are increasing and/or high enough to monitor. 2. Increase in HOL survey locations from 16 to 24 and survey time (~15 mins to 20 mins) per station by survey team.	
	2018	1. Request to increase snowbank monitoring frequency (GN; T- 22032018; 2018 TEAMR) 2. Baffinland to complete snow track surveys to not only look for caribou and other wildlife tracks but also assess potential interactions with Tote Road (i.e., deterrence) (GN; 2018 TEAMR comments, T-24042019). 3. General ongoing request to expand caribou monitoring programs, including, though not exclusively, consideration of expanded Height of Land (HOL) surveys (time at each station, addition of new stations and/or frequency of visits since	1. Baffinland increased snowbank monitoring frequency from one annual survey to at least once per month (November through May), though depends on snow conditions adequate for surveying. in early 2018, banks were assessed in Jan, Feb, April and May. 2. To better assess concerns related to road permeability, snow bank height will be recorded at all locations where snow tracks are observed in addition to completing a deterrent assessment (i.e., assess whether animal deterred by road based on direction of tracks).	See 2018 TEAMR.

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		sites only visited once (GN; T-05062018, T-03082018); 4. Baffinland to evaluate the addition of "daily species logs" or driver sightings as part of general wildlife incidental sighting records, while correcting for daylight hours, visibility and search effort (ECCC; 2018 TEAMR comments, T-24042019).	3. Baffinland will consider expanding site-specific caribou monitoring programs when North Baffin caribou numbers increase. Three caribou aerial surveys were completed out of Mary River in April 2018. To help define caribou monitoring at the regional level, Baffinland, in coordination with the Government of Nunavut (GN), remains committed to developing a Memorandum of Understanding (MoU) that outlines a collaborative approach to mutually-sponsoring regional-level information needs. Methods for regional-level monitoring would be determined in conjunction with the TEWG and specifics identified in a future MoU (under development). 4. Baffinland will investigate potential ways for standardizing incidental observations to contribute to continual site monitoring of wildlife encounters going forward.	
	2019	1. Specific request to expand HOL survey effort at 24 stations given that no caribou have been observed since 2013 during HOL surveys; specific considerations should be made to incorporate historical migration and calving patterns, and any new information relevant to HOL goals and methodologies (MHTO, QIA; 2019 TEAMR comments, T-24042019, T-20062019); 2. Request for snow bank height sampling locations to be randomized for each monthly sampling period instead of revisiting the same locations (GN; 2019 TEAMR comments, T-07102019, T-26022020). 3. General ongoing discussions for Baffinland to expand caribou monitoring programs including	1. Baffinland doubled its efforts in 2019, by visiting each HOL site at least twice (double effort from 2018) over the surveyed calving season period. Consultation on HOL program design will be considered as part of future TEWG meetings and subsequently considered for implementation in 2021. 2. Baffinland will sample snowbank heights using a randomized approach starting in winter 2019. Baffinland notes that snowbank surveys are conducted randomly and opportunistically based on safe driving conditions along the Tote Road and Site Environment staff availability. Surveys are completed independently of road maintenance activities.	See 2019 TEAMR.

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		caribou health assessments through contaminant (metals) monitoring (T-24042019, T-20062019). **4. Baffinland to consider completing fox den surveys as part of raptor monitoring program (GN, MHTO; T-20062019).**	3. Baffinland's existing vegetation health monitoring program (includes vegetation and soil base metal monitoring) is an integral component for measuring potential pathways of effects leading to metals uptake in wildlife, including caribou. Caribou health as evaluated through caribou tissues and body condition measurements would need to be investigated at a regional level to adequately assess regional trends and provide context for assessing causality and potential impacts related to Baffinland activities. Baffinland notes that previous attempts dating to 2015 were made to obtain sample kits from hunters travelling through Project areas but none were available. Baffinland has insisted that collaboration by numerous parties (e.g., MHTO, GN) is critical for the successful implementation of a caribou tissue monitoring program. Accordingly, Baffinland initiated discussions for potential collaboration with the caribou contaminants project lead funded through the Northern Contaminants Program (NCP) in December 2019. **4. Terrestrial program already expanded in 2019 to include avian distance surveys, raptor productivity and occupancy, winter nest counts, and small mammal trapping. To be considered in future years only if relevant to do so.**	
	2020	**1. General ongoing request to expand caribou monitoring program including HOL survey effort, contaminant monitoring, etc. (QIA; TEAMR 2019 report comments, T-24042019, T-20062019, T-24022020, T-24062020, T-10122020).**	**1. To address questions related to caribou contaminant levels, Baffinland partnered with co-leads (Gamberg Consulting and ECCC) of the proposed Caribou Contaminant Monitoring Program (CCMP) to obtain funding through the Northern Contaminant Program (NCP) in 2020. Through collaboration with the GN, CCMP will be obtaining caribou tissue samples from Pond**	

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		2. Request to integrate further Inuit observations into monitoring efforts moving forward (QIA; TEAMR 2019) 3. Request that Baffinland continue to re-evaluate usefulness of existing snow track survey methods including whether this captures potentially more distant avoidance responses and whether existing survey method should be modified to consider alternative approaches such as with surveys completed by snowmobile, drone, etc. (QIA; 2019 TEAMR comments, T-24042019, T-20122020)	Inlet hunters to assess their contaminant levels (including metals). As of February 22, 2021, no data are available. Baffinland is conducting analyses to determine the statistical power of various monitoring options to measure potential changes in caribou movement across Project infrastructure. The results of this work will inform decisions regarding future caribou impact monitoring effort; 2. Baffinland will discuss further with the TEWG potential options for integrating Inuit observations into future reporting efforts. 3. Baffinland notes that the primary purpose of snow track surveys is to monitor how caribou and other wildlife may interact with the Tote Road and associated traffic at close proximity. Accordingly, other surveys may be better suited to assess potential impacts at higher distances such as Height of Land when caribou are seen at higher numbers; Baffinland also notes that use of snowmobiles had been considered during early methodology development but was ultimately deemed unsuitable. Baffinland remains open to considering other suitable alternative options should they be brought forward.	
Helicopter Flights				
Relevant to PC conditions 59, 71, 72	Pre 2018	Ongoing efforts to improve flight height compliance tracking and performance.	Flight height data cross-referenced with pilot logs from daily timesheets to help justify noncompliant transits	
	2018	1. Request to improve helicopter pilot flight rational entries in pilot logs including descriptions of rationale (2018 TEAMR, T-22032018, T-05062018);	1. Baffinland enhanced communications to ensure all personnel are made aware of flight height requirements and reasoning, flight corridors, etc.;	See 2018 TEAMR.

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		2. Request that both horizontal avoidance (to Snow Goose [SNGO] areas) and height restrictions should actively be considered as part of helicopter flight requirements (GN, ECCC; 2018 TEAMR comments).	Additional pilot oversight provided by Site Environment team to ensure rationale is provided to improve reporting relevant to meeting compliance on flight height requirements. Specific examples provided in report to explain low-level flights (e.g., weather, slinging, staking, drop-off/pick-up); 2. Baffinland reports on individual helicopter flight tracks as part of annual reporting, in addition to advising pilots to stay outside of the defined SNGO area boundary that is buffered by the required 1,500 m horizontal avoidance distance.	
	2019	1. Ongoing request to improve helicopter pilot flight rational entries in pilot logs including descriptions of rationale for non- compliance flights (QIA, GN, QIA; 2019 TEAMR comments, T- 24042019, T-02262020); 2. Request that both horizontal avoidance (to SNGO areas) and height restrictions should actively be considered as part of helicopter flight requirements (GN, ECCC, QIA; 2019 TEAMR comments, T-24042019).	1. As part of helicopter briefings, Baffinland provides Snow Goose area boundaries for entry into individual helicopters' GPS systems to clearly denote SNGO boundaries. 2. Baffinland continues to work through requests related to improving helicopter flight rationale entries in pilot logs and modifying analyses to better understand overall helicopter use and how compliance and non-compliance data is recorded, analyzed and reported. Results presented in 2019 are preliminary and analyses will continue into 2020, including a review of historical data. The 2019 TEAMR does include detailed breakdown of rationale for low-level flights, categorizing compliance into fully compliant, non-compliant with rationale, and non-compliant without rationale.	See 2019 TEAMR.
	2020	**1. Ongoing request to improve helicopter pilot flight rational entries in pilot logs including descriptions of rationale for non- compliance flights and the provision of total transits (ECCC, QIA; 2019 TEAMR comments, T-02262020, T-24062020, T-10122020);**	1. Baffinland continues to work through requests related to improving helicopter flight rationale entries in pilot logs and adapting analyses to better describe overall helicopter use, assess how compliance and non-compliance data is recorded, analyzed and reported, in addition to summarizing total transits. Baffinland intends to include	Additional details to be provided as part of 2020 reporting efforts.

Table A-1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

Monitoring Program	Year	TEWG Feedback (annual program reports or meetings)	Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback	Reported in
		2. Request that Baffinland consider other areas of observed concentrations of migratory birds that are separate from the identified SNGO area boundaries (QIA, MHTO, ECCC); 2019 TEAMR comments; T-26022020, T-24062020).	historical data as part of 2020 data analysis and reporting efforts. This includes changing how helicopter flight data is analyzed and reported (e.g., from points to line segments), and flight duration (i.e., the number of flight hours of compliant and non-compliant flying); **2. Baffinland will consider other areas that may be identified by the TEWG as part of future discussions with the TEWG**.	
WILDLIFE INTERACTION AND MORTALITY REPORTING				
Relevant to PC conditions 53a, 53b, and 57d	2019	**1. Request that Baffinland investigate how fox mortality numbers across years compare with data on population cycles and prey availability (lemming cycles) (QIA; 2019 TEAMR comments)**	**1. Baffinland notes that assessing the fundamental ecological question of predator/prey relationships is beyond the scope of Project effects monitoring and thus TEAMR, thus will not be considered for inclusion into existing programs.**	See 2019 TEAMR.
HUNTERS AND VISITORS LOG				
Relevant to PC conditions 54f	2019	**1. Concern that data for number of hunters and visitors are not collected in a way that allows any statement to be made about whether people are avoiding the mine and road or not (QIA; 2019 TEAMR comments).**	**1. Baffinland notes that the hunter and visitor log is voluntary to respect individuals' privacy and does not represent a complete record of all visitors passing through the Project area. Regardless, Baffinland will continue to manage access to the Project in a manner consistent with Article 13.3.1 of the Mary River Inuit Impact and Benefit Agreement.**	See 2019 TEAMR.

Notes: Bold items indicate that discussions may still be ongoing or that Baffinland will not be addressing the request (with Baffinland response). The key source of the Terrestrial Environment Working Group (TEWG) feedback received is provided by referencing either TEWG meeting date(s) (e.g., T- ddmmyyyy), when change(s) were requested and/or comments were raised (though may not necessarily include all meetings over which topic was discussed) or through comments received during the Terrestrial Environment Annual Monitoring Report (TEAMR) review process (e.g., 2018 TEAMR and 2019 TEAMR).

REFERENCES

Baffinland Iron Mines Corporation (Baffinland), 2018. 2017 Annual Report to the Nunavut Impact Review Board. March 31, 2018.

Baffinland Iron Mines Corporation (Baffinland), 2019. 2018 Annual Report to the Nunavut Impact Review Board. March 31, 2019.

Baffinland Iron Mines Corporation (Baffinland), 2020. 2019 Annual Report to the Nunavut Impact Review Board. May 15, 2020.

EDI Environmental Dynamics Inc. (EDI). 2018. 2017 Mary River Project Terrestrial Environment Annual Monitoring Report (TEAMR). July 2018.

EDI Environmental Dynamics Inc. (EDI). 2019. 2018 Mary River Project Terrestrial Environment Annual Monitoring Report (TEAMR). July 2019.

EDI Environmental Dynamics Inc. (EDI). 2020. 2019 Mary River Project Terrestrial Environment Annual Monitoring Report (TEAMR). July 2020.

APPENDIX B TEWG COMMENTS ON THE DRAFT 2020 TEAMR AND BAFFINLAND'S RESPONSES

Name: Krupesh Patel

Agency / Organization: Environment and Climate Change Canada

Date of Comment Submission: 07/09/2021

#	Document Name	Section Reference	Comment	Baffinland Response
1	2020 BIM Terrestrial AMR Draft for TEWG	Section 6 Helicopters	Project condition 71 indicates that if 1100m vertical height cannot be achieved then a lateral distance of 1500m should be maintained from the Snow Goose concentration area during the molting period (July - August). The report indicates several instances of flights that have not maintained the 1100m altitude and that have transected the eastern end of the Snow Goose area during molting season instead of maintaining the 1500m lateral distance as set out in the PC. Although additional details on the flight logs and rationales were provided in the 2020 report, ECCC strongly encourages the proponent to meet PC 71 and maintain lateral distance of 1500m from the Snow Goose nesting area if a 1100m vertical height achievable.	In response to these observations, Baffinland has implemented new protocol in 2021. On days where weather limits vertical altitude below 1,100 magl, helicopters are directed to fly around the snow goose zone, keeping the horizontal distance at 1,500 m. Results of the protocol will be presented in the 2021 Annual Report.

Name: Susan Leech, Bruce Stewart, Jeff Higdon

Agency / Organization: QIA

Date of Comment Submission: July 8 2021

#	Document Name	Section Reference	Comment	Baffinland Response
1	Overarching working group issues	N/A	Regarding the meetings of the Technical Working Group, presentation materials and an agenda need to be provided before the meeting, giving participants enough time to review these items beforehand. The meetings will be most effective if all members can identify concerns they would like to discuss. The agenda should be built around those concerns. Additionally, the revised TOR for the TEWG have not yet been finalized. This should be addressed as soon as possible.	1. Baffinland provides meeting materials in Inuktitut and English a few days before scheduled meetings. Given that participants have been part of the Working Groups for several years, they are expected at this point to be familiar with Baffinland's annual monitoring programs and other key regional initiatives. As per the Working Groups' Terms of Reference (ToR), participants are appointed by their organization for their discipline expertise, and they can provide feedback based on their knowledge and familiarity with the subject matter. Baffinland also notes that the timing for delivery of the meeting materials is not inconsistent with other public meetings held in Nunavut (i.e., NIRB community meetings or QIA Annual General Meetings). While Baffinland remains committed to continuously working to improve timing for delivery of these materials, that commitment does not override the expectations outlined above. Baffinland encourages Working Group participants to begin taking a more proactive role to identify in advance of Working Group meetings key items they wish to discuss. This can be done using existing processes within the Working Groups, especially by providing comments on the draft agendas when they are circulated well in advance of the meetings. 2. Revisions to the ToR for both the MEWG and TEWG have been active throughout the Phase 2 review process, with the Government of Nunavut mostly leading the initiative. The challenges with completing the final ToR have been largely due to capacity constraints for various parties to review and return comments and in reaching agreement on the consensus-based approach for generating recommendations. Baffinland will continue to progress the review of the ToRs at regular MEWG

#	Document Name	Section Reference	Comment	Baffinland Response
				and TEWG meetings and will work closely with QIA to ensure the final working group ToRs align with that of the Inuit Committee. Baffinland intends for this process to be complete within 6 months of the issuance of an amended Project Certificate 005, should Phase 2 be approved.
2	EDI (2021a)	Overarching Comment	Each monitoring program in the annual report should include a summary section on: a) concerns with the current monitoring programs in terms of their ability to answer the questions, based on concerns expressed by the TEWG and on review by Baffinland consultants; and b) suggested improvements to the program based on comments from the TEWG. This would allow the TEWG to track improvements in the program over time. As this document is on the public record, it is important to provide this information clearly and transparently within the document.	This was specifically provided for in the 2020 TEAMR. See Appendix A — *Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback.*
3	EDI (Environmental Dynamics Inc.) 2021a. Mary River Project terrestrial environment: 2020 annual monitoring report. Prepared for Baffinland Iron Mines Corporation Oakville, ON April 2021. Draft 533 pp. [Baffinland file: 2020 Terrestrial Environment Annual	Executive Summary, general comment	All monitoring programs should be reported in the summary, including traffic.	The Final 2020 TEAMR has been updated to include all monitoring programs in the Executive Summary.

#	Document Name	Section Reference	Comment	Baffinland Response
	Monitoring Report Draft for TEWG.pdf]			
4	EDI (2021a)	Executive Summary, p.i	The discussion on dust mitigations seems misplaced. Discussions regarding dust should include a summary on the findings of dust monitoring and not just a summary of mitigations. The following page, which is also labelled p. i contains a short summary of dustfall monitoring, including passive dustfall collection, and imagery analysis. It is not clear if the stated conclusions are a result of the passive collection, the imagery analysis, or both. Because these are two different programs that are not analyzed together, conclusions should clearly be tied to one program or the other.	The comments are noted, and revisions were made to the Final 2020 TEAMR.
5	EDI (2021a)	Executive Summary, p.ii	1. a) The paragraph on vegetation monitoring includes a finding that “some discrete increases in metal concentrations have been identified, but values were either below or within an acceptable range.” it is not clear whether these increases were found in soils, in lichen, or both. This information should be included in the summary. b) The identification that “the predefined response [to increases in metal concentrations in either soils	1a. The Summary Section is intended as a concise/succinct inventory of key findings and observations of the Terrestrial Environment Monitoring Report. The statement that “some discrete increase in CoPC metal contractions were identified […]” is preceded by the assertion that these findings apply to both soil and lichen-metal. 1b. Soil and lichen metal concentrations are either below or within an acceptable range. We consider that continuing to monitor these endpoints is both reasonable and appropriate. The sampling design is rigorous and supported/informed by statistical power analysis. Based on results to-date there is presently no reason to revisit mitigation. If effects should be detected that fall outside this acceptable range, issue specific mitigation will be developed in consideration of the findings.

#	Document Name	Section Reference	Comment	Baffinland Response
			or metals] is to continue monitoring these conditions and further document contaminants of potential concern (CoPCs)" brings up the question of whether this predefined response is appropriate. At what point will mitigation occur and what will this mitigation be? 2a) In the section on snow track surveys, it is stated that "approximately half of the tracks detected were from animals crossing, a third from travelling along, and 15% deflecting from the Tote Road." BIM should determine, through a survey of peer-reviewed research, how to interpret these observations and particularly, what percentage of deflection and/or travel along the road should be considered significant. This additional research should also include implications of deflection / travel along the road as well as efficacy in detecting deflections. b) The summary additionally notes 13 wildlife mortality incidents, at least 9 of which were due to vehicle collisions. Is this number in line with or higher than expected?	2a Given that the monitoring program has yielded a limited sample size of non-target species, there is no justification for this level of effort. If caribou were interacting with the Project site in a substantially greater number, this type of study would be appropriate. Until such a time, monitoring will continue as an incidental surveillance focused program. 2b. Vehicle collision-based mortalities were predicted to be possible in the FEIS. Vehicle-wildlife collisions are universal occurrences on roads. The nine vehicle-related mortalities (two birds, seven Arctic Fox) were qualitative, not absolutely predicted.

#	Document Name	Section Reference	Comment	Baffinland Response
6	EDI (2021a)	Table 0, p. iv	The row summarizing Noise Monitoring includes the following sentence: "Ambient noise was typically below 45 dBA at 1.5 km from all Project areas and below 40 dBA at 3 km from all Project areas. Project-related noise was typically not audible at 3 km from the Project" The word "typically" is concerning as it provides very little information besides the implication that more than 50% of the time, the observation is as reported. The executive summary also includes the words "generally", "usually", and "mainly". When there are quantitative measurements available to summarize findings, those measurements should be included so it is clear what the precise findings are.	Where possible, specific results are presented within the summary. However, Table 0 is intended as a summary. Key findings and observations (compared with impact predictions) have been presently concisely/succinctly for brevity. The full details related to this question are provided in the body of the report, Section 5. It is also noted that Executive Summary is intended to provide a non-technical summary of the results. Referring to the statistical or quantitative results, rather than using language that is accessible to a non-technical audience, and can be translated into other languages such as Inuktitut would eliminate the secondary benefit of this section of the Report.
7	EDI (2021a)	Table 0, p. iv	The row on the dustfall monitoring program includes the following sentence: "The 2020 dustfall results are consistent with predictions that the highest dustfall would be limited mainly within the PDA (p. iv)." The only data included in the "Comparison to Impact Predictions" column are those that are consistent with predictions. Most of the annual dustfall measurements	Table 0 is intended as a Summary. Key findings and observations (compared with impact predictions) have been presently concisely/succinctly for brevity. Full details are presented in the report section 8.1.2.

#	Document Name	Section Reference	Comment	Baffinland Response
			summarized in Section 8 are well outside of predictions. QIA is requesting that Baffinland report on all of the predictions and how the current monitoring results vary from those predictions.	
8	EDI (2021a)	Table 0, p. v.	The Helicopter Flight Analysis row includes a description of a prediction made around displacement of snow geese. There has been no work conducted to measure snow goose displacement and determine whether they have in fact relocated to nearby, less disturbed areas. Snow goose displacement caused by project activities should be evaluated. The helicopter flight summary should additionally include a short description of actual compliance vs. compliance with rationale.	Table 0 is intended as a Summary. Key findings and observations (compared with impact predictions) have been presently concisely/succinctly for brevity. The details on compliance with and without rationale are provided in the body of the report, section 6.
9	EDI (2021a)	Table 0, p. v	Re: soil and lichen metal concentrations, the summary should clarify whether discrete increases in metal concentrations were in lichen, or soil, or both.	Table 0 is intended as a Summary. Key findings and observations (compared with impact predictions) have been presently concisely/succinctly for brevity. The statement that "some discrete increase in CoPC metal contractions were identified […]" applies to both soil and lichen-metal.
10	EDI (2021a)	Table 0, p. vi	The Snow Track Survey row includes the following statement: "Because no caribou tracks were identified during snow track surveys in 2020, it cannot be determined if Project infrastructure is or is not impacting caribou movement. However,	It is unclear how QIA has determined that "*11 caribou were expected to cross the Tote Road, as determined by snow tracking or observations*." The only reference to 11 caribou is that of incidental observations outside of the PDA reported through the 2020 season, and mostly to the southeast of the Project area, nowhere near the Tote Road. Based on the evidence to date, the statement that "Because no caribou tracks were identified during snow track

#	Document Name	Section Reference	Comment	Baffinland Response
			incidental observations of caribou crossing the Tote Road in 2020 suggest that it is not acting as a barrier to movement (p. vi).” As will be described later in the TEAMP, 11 caribou were expected to cross the Tote Road, as determined by snow tracking or observations. There is no information given on how many trucks were on the road at that time or other environmental factors related to the road that would result in it acting as a barrier to movement. There has not been a full analysis of the movement of caribou or how they interact with the road. While the observation of caribou crossing the road is an important point, it can only be analyzed as part of a larger dataset. This dataset has not yet been collected, so this statement that the Tote Road is not acting as a barrier is not informed and misleading. QIA is requesting that this statement be clarified in the report (i.e., change to: there is currently no scientific evidence to determine whether the road is a barrier to caribou at this time).	surveys in 2020, it cannot be determined if Project infrastructure is or is not impacting caribou movement” is valid.
11	EDI (2021a)	Table 0, p. vii	HOL survey results continue to highlight the futility of this program at current caribou population densities. QIA is aware that changes are in the works for	Baffinland does not consider the HOL surveys “futile.” There simply have been no HOL-based caribou observations near Project infrastructure. This is a long-term monitoring program that will, in combination with other local and regional initiatives, show trends in caribou occurrence across time. Currently, caribou occurrence is

#	Document Name	Section Reference	Comment	Baffinland Response
			this program in 2021 (i.e., deployment of wildlife cameras). Inuit Qaujimajatuqangit indicates caribou avoidance of the Project area at levels that are considered unacceptable to Inuit. This has been stated on the public record at the MRP Phase 2 hearings numerous times. At a minimum, the summary section should provide the assessment information and acknowledge that the assessment contradicts IQ and current observations from Inuit knowledge holders.	very low, and the HOL surveys are one standardized method for quantifying that observation. The assessment of Project effects does not contradict Inuit observations. The FEIS predicted that caribou are likely to use sites near the mine less often than they would in the absence of the mine. Inuit observations are confirming that FEIS prediction. That said, the low number of caribou sightings near the Project is also likely a product of the low caribou populations on North Baffin. As the population recovers, increased efforts for monitoring, including community-based monitoring programs can occur.
12	EDI (2021a)	Table 0, p. ix	Regarding wildlife mortalities, please revise the statement that "Wildlife mortalities in 2020 were all individual losses and did not impact any species at risk or sensitive species." Snow geese are a culturally important species and other species listed here (particularly foxes and red-throated loon) also have cultural and economic importance.	Baffinland recognizes all species as being culturally important. The statement made in the TEAMR is specific to Species at Risk and other listed species such as by the National General Status Working Group.
13	EDI (2021a)	Subsection 4.1 Air Temperature and Precipitation, (p. 7); subsection 4.2, p. 12.	Section 4.1 includes information that "a sensor malfunction resulted in erroneous precipitation data for the month of May - these data have been excluded from this report (p. 7)." Section 4.2 states "The wind speed and direction sensor at Milne Port	Monitoring meteorology in the arctic tundra environment is difficult for several reasons. The persistent winds and very cold temperatures take a toll on the instruments, especially the sensors that have moving parts such as wind sensors and tipping bucket rain gauges. The remote meteorology stations are also prone to damage by wildlife or humans. Many of the meteorology stations are remote and only accessible during summer by helicopter for maintenance and calibration. Hence, if a meteorology sensor fails at a remote station during winter the repairs cannot be safely done until a helicopter returns to site at the beginning of summer.

#	Document Name	Section Reference	Comment	Baffinland Response
			malfunctioned from January to August 2020…" (p. 12) The 2019 TEAMP also identified that there were malfunctioning gauges that reduced the amount of usable data for Milne Inlet and Mary River areas. These are significant data losses that can affect the interpretation of other data. Why did this take so long to detect and fix? How will this be avoided in future? QIA recommends that all monitoring equipment be serviced and maintained regularly so there are no gaps in data.	Monthly meteorology data quality checks are being done for the Milne Port and Mary River stations to confirm that representative data is being collected and to identify if adjustments or repairs are required as feasible.
14	EDI (2021a)	Section 5 Noise, p. 15	"Responses have been documented in terrestrial wildlife for SPL [sound pressure levels] as low as 40 dBA but are more often recorded at 55 dBA to 60 dBA." This threshold level is cited; however, this report would benefit from a more comprehensive explanation of the origins of this range of noise. Is there evidence that this range is appropriate for the Arctic environment and its unique ecosystem? Threshold levels developed in forested areas may not be appropriate for the Arctic environment as trees will absorb a fair amount of sound.	An investigation of Arctic or species-specific sound level thresholds for wildlife is beyond the scope of this report. Further, without a complementary observational dataset on wildlife responses to various sound levels, an analysis of the appropriateness of the threshold cannot be completed. Such a study would require a statistically meaningful number of observations to occur, which is not possible with the current caribou population. It is also noted that measured sound levels at a given point is independent of the ecosystem in which it occurs.
15	EDI (2021a)	Section 5 Noise, subsection 5.1 Field Deployment,	1. QIA recommends adding noise monitoring stations to parts of the rail alignment to capture	1. Additional monitoring for baseline sound along the dogleg of the railway is not required.

#	Document Name	Section Reference	Comment	Baffinland Response
		Map 5-1, text pp. 16-18	baseline data before any rail is built. This is especially important in the diversion area of the planned railroad as it overlaps with identified caribou calving habitat. 2. In addition to the information provided on the locations of field transects (i.e., generally flat and open areas to minimize noise interference caused by topographical features…), can Baffinland explain how transect locations were selected in terms of the predicted highest noise locations associated with the project based on the noise modelling completed by RWDI AIR Inc. (2008)? Provide a map showing locations of transects relative to Project noise modelling. Without knowing the extent of spatial overlap, it is difficult to tell whether these transects represent areas of predicted highest noise levels associated with the project.	The Mary River Project's Noise Baseline Study appropriately characterized noise levels in the absence of the Project. That baseline study showed that in the absence of wind, Average 24-hour sound exposures ranged from 25 to 30 dBA, depending on location (*RWDI AIR Inc. 2008. Mary River Project Final Environmental Impact Statement: Volume 5, Appendix 5D-1 — Noise Baseline Study. NIRB Registry 285856. Submitted to Knight Piésold Ltd. for Baffinland Iron Mines Corporation*). 2. Figure 5-1 in the Final 2020 TEAMR has been included to show the sampling locations relative to modelled predictions.
16	EDI (2021a)	Subsection 5.1.1. Field Deployment, p. 16, p. 16 and sub-section 5.2.3.5 Comparison to Baseline, p. 31	The subsection identifies that a total of nine noise monitoring stations were set up Near (200 m), Far (1.5 km) and Reference (>/= 3 km) (p. 16). The Comparison to Baseline Subsection states, "Baseline noise modelling predicted that Project-related noise would be audible to a	The sites and their distances from the edge of the PDA are presented in Figure 5-1. The specific distances are provided below. A similar table has now been included in the final 2020 TEAMR.

<table>
<tr><th>#</th><th>Document Name</th><th>Section Reference</th><th>Comment</th><th>Baffinland Response</th></tr>
<tr><td></td><td></td><td></td><td>maximum of 45 dBA at 1.5 km from the PDA and not be audible at 3 km from the PDA (p.31).”

It is implied that there is at least one reference site that is set up at a distance greater than 3 km -- can you confirm whether this is the case? If this is true, then data from that site cannot precisely support or refute the prediction, which is based on a distance of 3 km. Furthermore, it is not clear how far that reference site is from the PDA and how measurements were used in analysis.</td><td>
<table>
<tr><th>Site</th><th>Distance to edge of PDA (m)</th></tr>
<tr><td>Mine Near</td><td>0</td></tr>
<tr><td>Mine Far</td><td>1,503</td></tr>
<tr><td>Mine Ref</td><td>3,556</td></tr>
<tr><td>Tote Near</td><td>41</td></tr>
<tr><td>Tote Far</td><td>1,515</td></tr>
<tr><td>Tote Ref</td><td>3,188</td></tr>
<tr><td>Port Near</td><td>0</td></tr>
<tr><td>Port Far</td><td>1,401</td></tr>
<tr><td>Port Ref</td><td>3,660</td></tr>
</table>

Section 5 already outlines e how the data were used in the analysis.</td></tr>
<tr><td>17</td><td>EDI (2021a)</td><td>Subsection 5.1.4 Impulsive Sound Events, p. 19;
5.2.2 Impulsive Sound Events, p. 23</td><td>In subsection 5.1.4 impulsive sound events are defined as “any sound with a maximum 1-second duration at least 6 dBA above the mean sound level (p. 19)” and “The start and end of impulsive events were defined as the continuous period when dBA was at least 3 dBA above the mean sound level in each recording.” What is the source for these definitions?

Subsection 5.2.2 contains the conclusion “Consistent with predictions in baseline noise models, noise events from machinery and vehicles were rarely detected at Far monitoring stations and rarely at Reference stations.”

Baseline predictions were that Project related noise would not be audible at 3 km (reference sites).</td><td>1. A map of the noise monitoring stations relative to regular helicopter flight corridors is provided in Map TE-In response to a request from the GN, Baffinland calculated disturbance coefficients for helicopter overflights along regularly travelled corridors, where flights may be < 300 magl (Section 3.1 of *Knight Piésold Ltd. 2019. Memorandum: Mary River Project — Phase 2 Proposal — Revised Addendum to Technical Supporting Document 27 - Cumulative Effects Assessment. NIRB Registry 325014. Submitted to Baffinland Iron Mines Corporation, Oakville, Ontario. 47 pp.*). The QIA is encouraged to review that material to determine if this request is relevant.

2. The predicted hourly average sound level (Leq(1-hour) 1.5 km from the Tote Road was ~ 28 dBA (Figure 5-3.18, *Baffinland Iron Mines Corporation. 2013. Mary River Project Early Revenue Phase Addendum to Final Environmental Impact Statement: Volume 5 — Atmospheric Environment. NIRB Registry 290861. 35 pp.*). Table 5-4 of the 2020 annual report summarizes continuous sound levels at all stations. For the Far Site along the Tote Road, typical sound levels were 40.4 dBA on calm days. This difference may be due to instrumentation “sound floors” not being as sensitive as the original equipment used in the</td></tr>
</table>

#	Document Name	Section Reference	Comment	Baffinland Response
			This conclusion suggests that noise was audible on some occasions, which is not consistent with predictions. The results indicate a need to review whether additional mitigations are necessary to reduce noise associated with the Project in some areas, particularly to avoid noise disturbance during periods of high sensitivity for caribou (e.g., calving / post-calving). Figure 5-4 shows the cumulative sound exposure level of noise events from aircraft, machinery and vehicles by area and distance from the project. While infrequent (% frequency is shown in Table 5-3), aircraft are clearly an important source of high impulse noise at both the mine site and along the Tote road. How do noise monitoring stations overlap with areas that experience frequent below-threshold helicopter flights? 1 QIA requests that a map showing locations of transects relative to locations of below threshold helicopter flights be provided. This information may indicate other areas that require noise monitoring to be undertaken, to ensure this information is included in the ZOI calculations.	baseline study. The lowest sound pressure the Audiomoth units were able to record was 28.1 dBA, and for the SM4 units was 35.7 dBA, even at Reference sites (3 km) where anthropogenic sounds were seldom recorded (Section 5.2.1, Figure 5-1). The discrepancy between modelled background sound levels, and the suspected sound floor of the units used for this monitoring program may be investigated further. We suspect the elevated levels at all sites may be due to continuous wind noise, the problem of which was illustrated the spectrograms of Figure 5-2. Further investigation is required, and proposed for 2022

#	Document Name	Section Reference	Comment	Baffinland Response
			Also in reference in Figure 5-4, the distribution of vehicle noise along the Tote Road at the Far station appears to be entirely above 45 dBA. While again these measurements are relatively infrequent (0.91% of 1 minute sampling periods based on Table 5-3), they may be important depending on how representative the "Far" site along the Tote Road is of noise levels at this distance from the road. 2. Please comment on whether this "Far" site was predicted to experience high noise levels in the original modelling work (RWDI AIR Inc. 2008).	
18	EDI (2021a)	Section 5.2.1 Comparison of Automated Recording Units, p. 20	Section 5.2.1 states: "Under quiet sound conditions, the Audiomoth units tend to overestimate sound levels, while in windy conditions, the SM4 units overestimate sound levels." 1) How are you determining that the measured levels are overestimated on one unit? Through comparison to the measurements on the other unit? Could they not just as easily be underestimated on the other unit?	The sound recordings clearly show wind interference, and those effects are illustrated in the spectrogram example for the SM4s in Figure 5-2. In the paired recordings, there is an audible loud "rumbling" sound in the SM4 recording that is not present on the simultaneous Audiomoth recording. This may be due to the SM4's external microphones vibration in the wind. We do not know if there are other differences that would affect recording ranges at the low end. The statement that the Audiomoths are overestimating sound levels when it is quiet perhaps comes from the scatterplots in Figure 5-1, where we can see the measurements for the Audiomoths never drop below ~38 dB while the SM4 units continue to measure a range of values below 38 dB (this is clearest in the bottom row showing the reference sites). Further investigation is required, and proposed for 2022
19	EDI (2021a)	Analysis Section 5.1.5 Continuous	Section 5.1.5 states: "Baseline noise modelling for the Project	There is no meaningful "cumulative" anthropogenic sound signature at Reference Sites. Anthropogenic noise at Reference

#	Document Name	Section Reference	Comment	Baffinland Response
		Sound Events; Results and Discussion Section 5.2.3 Continuous Sound Levels	predicted Leq at 1.5 m from the Project would be less than the background 45 dBA baseline noise levels (RWDI AIR Inc. 2008)." Results of A-weighted Leq in Table 5-4 (p. 26) show percentages of dBA measures that are above 45 dBA on windy days and calm days. At the far sites and reference sites, exceedances of the predicted levels are common on windy days. The cumulative noise levels from all sources may be problematic for caribou; these factors should be taken into account in estimating the zone of influence. Additional mitigations may be necessary to reduce the frequency of cumulative noise levels. At Milne Port, exceedances were common (45.5%) on calm days. This result suggests a larger zone of influence around the port area.	sites accounts for only 0.08% of the time records at the Mine Site, Tote Road, and 0.23% of time at Milne Port (from aircraft noise, Table 5-3, which was also found at all sites in the baseline). It was always expected that sound at near sites would exceed 40 dBA. Noise levels near Project operations do not suggest that there is a larger ZOI. These results do not change the conservatively estimated ZOI of 14 km from the edge of the PDA.
20	EDI (2021a)	Section 5.3 Noise Monitoring Summary, p. 32	1. A very helpful product to come out of this analysis would be a map of noise threshold exceedances. This would assist in the development of a caribou ZOI. 2. Note also that caribou hear at higher frequencies than humans; how was this factor taken into account in interpreting these data?	1. Noise levels near Project operations do not suggest that there is a larger ZOI. These results do not change the conservatively estimated ZOI of 14 km from the edge of the PDA. 2. Discussion on caribou hearing was provided in the report (Section 5) to put the analyses in context.

#	Document Name	Section Reference	Comment	Baffinland Response
21	EDI (2021a)	Section 6 Helicopters subsection 6.2 Results and Discussion, p. 37	This subsection states, "this 1,500 m horizontal buffer is not always practical as it results in longer flight times, which causes more overall disturbance. As an alternative, pilots sometimes fly over the eastern edge of the Snow Goose moulting area." PC 71 requires that pilots keep a 1,100 vertical and a 1,500 m horizontal buffer with the entirety of the Snow Goose moulting area. Therefore, pilots should be considered out of compliance if they do not meet these requirements. If the Snow Goose moulting area is larger than it should reasonably be, then PC 71 should be revised.	In response to these observations, Baffinland has implemented new protocol in 2021. On days where weather limits vertical altitude below 1,100 magl, helicopters are directed to fly around the snow goose zone, keeping the horizontal distance at 1,500 m.
	EDI (2021a)	Table 6-4 Number of flight hours of overall flight height compliance in all areas for all months between May 1 - September 30, 2020, p. 38	QIA appreciates this information and notes that it meets the recommendations given in review of the 2019 TEAMP.	Acknowledged.
22	EDI (2021a)	Section 8 Dustfall subsection 8.1.1.2 Passive Dustfall Sampling, p. 53-54	The subsection describes the methodology for passive dustfall sampling: "Each dustfall sampler comprises one sampling apparatus, including a hollow post, approximately 2 m high, and a bowl-shaped terminal holder for the dust collection vessel."	Passive dustfall monitoring at the Mary River Project follows the American Society for Testing and Materials (ASTM) International Standard Test Method for Collection and Measurement of Dustfall (ASTM International. 2010. Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter); Designations D1739-98 (reapproved 2010). American Society for Testing and Materials (ASTM), West Conshohocken, PA, United States). The laboratory analysis, performed by ALS Environmental,

#	Document Name	Section Reference	Comment	Baffinland Response
			There is continued concern that sampling dust 2 m above ground level will not accurately capture the dust levels occurring at ground level. This is especially true because dust is highly mobile and will move around the landscape through wind transport. Microtopography will be an important factor for where dust accumulates over time. This is not captured in the current dustfall sampling methodology, which may result in a failure to appropriately monitor the project effects on vegetation from dustfall over time. QIA recommends that Baffinland conduct a parallel sampling program to assess how well the current sampling program reflects dustfall at ground level, particularly in winter when they are difficult to monitor and subject to freezing. Collection of snow cores or installation of ground level collectors should be considered to obtain samples of dust entrapped in the snowpack. Other approaches that could be considered in discussion with the TEWG: pH gradient in soil as per research by Wenjun Chen / NRCAN [see NERB Bulletin v2i9); remote sensing for spectral changes in vegetation to detect dustfall amounts [see Ma et al. 2020, *Remote Sens.* **2020**, *12*(22), 3759]	follows the British Columbia Ministry of Environment (MOE) laboratory methods for inorganic air constituents (Austin 2015). All other projects reviewed and monitored by the Nunavut Impact Review Board (NIRB) follow the ASTM standard 2-metre-high passive dustfall sampling protocol. Those standards are identified for TMAC's Hope Bay Project (TMAC Resources 2019), Sabina Gold and Silver's Back River Project (Sabina Gold and Silver Corp. 2019), and Agnico Eagle's Meliadine Gold Mine (Agnico Eagle Mines Limited 2020). However, as per QIA's recurring request, dustfall monitoring at a lower height of 1 metre, in addition to current monitoring at the standard height of 2 metres is being implemented in late 2021. Additional discussions on the other approaches proposed by the QIA can be discussed with the TEWG per the recommendation.

#	Document Name	Section Reference	Comment	Baffinland Response
23	EDI (2021a)	Sec. 8.1.1.2, p. 54	In winter, September 22 to June 29), 250 ml of isopropyl alcohol is placed in the dust collection vessels to aid dust collection (p. 54). QIA Monitors have reported frequent freezing of this solution. The frozen surface will not capture incoming dust as efficiently as the liquid, so winter sampling will underestimate dustfall. This freezing is likely due to dilution of the isopropyl with water, either prior to addition or as snow enters the trap, since solutions of 90-100% isopropyl have freezing points of -57° to -90°C. QIA recommends that Baffinland avoid dust loss caused by freezing of the dust collection solution, and assess the magnitude of dust loss when such freezing occurs. Perhaps freezing might be avoided by using a higher volume of 90-100% isopropyl in a larger collector vessel or more frequent checking. A statistically useful sample of dust collectors that freeze and do not freeze should be run in tandem to assess the magnitude of dust losses.	Baffinland has pioneered winter dustfall sampling in Arctic Canada. During winter dustfall sampling the sample vessels were filled with 50% isopropyl alcohol (IPA) as per the BC sampling manual recommendations. While observations were made that this media was freezing during colder winter months, EDI began consulting with ALS regarding increasing the IPA content. ALS needed time to investigate whether their metals analysis method would not be affected by the increase in IPA as IPA can interfere with arsenic and selenium analyses done by ICPMS. This investigation is now completed, and the vessels will be filled with 75% IPA for the winter 2021/22 season It is expected this modification to the solution will mitigate for any potential freezing. As an additional measure, Baffinland will continue to conduct analyses of satellite imagery to enhance understanding of the extent and magnitude of dustfall during the winter months. BC lab manual reference: https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/lab-manual/section-g-2020.pdf
24	EDI (2021a)	Sec. 8.1.1.2, p. 54	"…dustfall samples were analyzed for total metal concentrations to help inform potential trends of metals in soil and vegetation tissues, collected as part of vegetation health monitoring." (p. 54). This dust also enters	Assessment/evaluation of the effect of dust or dust suppressants on freshwater systems is outside the scope of the Terrestrial Environment Monitoring Program.

#	Document Name	Section Reference	Comment	Baffinland Response
			freshwater systems. Potential effects of dust suppressants used on the Tote road also have not been assessed, nor have those of chemical residues from truck tires that can harm fish (Tian et al. 2021). QIA recommends that these residues be assessed in samples from a subset of the collectors situated 30 and 100 m from the tote road. Tian, Z., Zhao, H., Peter, K.T., and 24 others. 2021. A ubiquitous tire rubber-derived chemical induces acute mortality in coho salmon. Science 371: 185-189.	
25	EDI (2021a)	Section 8 Dustfall subsection 8.1.1.3 Data Trends and Statistical Analysis, p. 59	This subsection defines three distance groups in proximity to the Mine Site and Milne Port and four distance groups applied to sampling locations near the Tote Road. There is no explanation for why those distance groups were chosen. Are they chosen based on the distribution of dust data?	Study design and establishment of the distance groups were informed by data collection in 2015 and 2016. Dustfall measured within the PDA helps guide dust suppression/mitigation, the Near area provides an accurate measure of dustfall from 1,000 to 5,000 m distance where most of the dust is distributed, and the Far area outside the 5,000 m distance act as reference sites.
26	EDI (2021a)	Section 8, subsection 8.1.1.3 Data Trends and Statistical Analysis, p. 60	"Milne Port site DF-P-01 was relocated to DF-P-08 to accommodate stockpile area expansion; therefore, data from these two sites were compiled for the annual dustfall and inter-annual trend analysis." This section should include a discussion on how this site change may alter the monitoring program and how compiling data from the 2	It can be assumed that DF-P-08 (located at the edge of the PDA) will have lower dustfall than DF-P-01 (which is located within the ore stockpile area). However, it is felt that the data provided by DF-P-08 will provide a more accurate representation of the dustfall leaving the PDA. This means that the annual dustfall for DF-P-08/01 will be lower than what it would have been for DF-P-01 alone. Regarding interannual analysis, there is an error in the text, DF-P-01 and DF-P-08 were not included in the interannual analysis given the differences between the sites, as described in figure caption 8-11.

#	Document Name	Section Reference	Comment	Baffinland Response
			sites affects interannual trend analysis, and how the change will be identified over the long-term to ensure that its effects are obvious in future comparisons.	
27	EDI (2021a)	s.8.1.2.1, Figure 8-1, p. 65	Figure 8-1 consists of four panels that give the initial impression they are directly comparable, which they are not, each having a different y-axis scale and there being two different x-axis scales. QIA recommends that the two upper panels be presented with their own caption and matching y-axes (0 to 1.75), and that the two lower panels be presented with their own caption and matching y - axes (0 to 45).	Due to the differences in dustfall deposition, when all panels have the same y-axis it is difficult to see within-area nuances, this is why there are two figures, 8.1 with different y-axes, and 8.2 which is the same information with consistent y-axes to allow between area comparison. The inclusion of these two figures was done to reflect a change to the report first made on the 2019 TEAMR at the request of QIA.
28	EDI (2021a)	s.8.1.2.1, Figure 8-2, p. 66	Figure 8-2, which uses the same y-axis scale for all 4 panels helps put the magnitude of dustfall at the various distances from the Project components in context. Using the whitespace to lengthen each figure (i.e., top to bottom) would provide better definition for the MDL line and bars with low daily dustfall.	Please see response to comment 27.
29	EDI (2021a)	s.8.1.2.1, Figures 8-3, 8-4, and 8-9, pp. 69, 70, 77	These figures would be more informative if the station sequence followed approximately that on Map 8-1.	A change to how the data is presented will be done in future reports to reflect this comment.
30	EDI (2021a)	s.8.1.2.3, Figure 8-8, p. 76	Contrary to its caption, Figure 8-8 only shows the low and moderate dust isopleth upper limits.	There is no upper limit for the high isopleth (> 50g/m²/year)

#	Document Name	Section Reference	Comment	Baffinland Response
31	EDI (2021a)	s. 8.1.3.1, Figure 8-12, p. 81	In each month of 2020 the average daily dustfall was higher than in the same month of 2019. Why, given the increased dustfall suppression in 2020 (see s. 8.3, p. 103)?	The reasons for this are currently unknown. In light of the 2020 results, Baffinland engaged Cypher Environmental to determine if modifications to the application of dust suppressants along the Tote Road were required. Additional data from 2021 monitoring will better inform understanding of the efficacy of the Tote Road dust suppressant and the addition of dust suppressants to the Milne Port stockpile.
32	EDI (2021a)	Section 8 Dustfall subsection 8.1.3.2 Total Annual Dustfall p. 82	"Dustfall deposition in 2020 was within ranges observed in previous years across the Project area (Figure 8-14)." Table 8-4 (p. 75) shows annual dustfall data and how it compares to predicted levels. Only 5 out of 26 data points are within predicted levels. Of these 5, three were predicted to be "High", a categorization that has no upper limit, and therefore will never be out of compliance. In some cases, such as measurements at DF-RS-04, measured levels are more than 10 times the predicted amount. This is concerning. While BIM has been implementing dust suppression mitigations, dust levels are not consistent with predictions. Furthermore, as stated above, it seems unlikely that current dust monitoring methodology is capturing the actual amount of dust on the landscape. In each month of the year the daily dustfall has increased each year since 2016 at the South crossing despite	Baffinland acknowledges the current levels of dustfall and has been actively working throughout 2020 and 2021 to implement/improve dust suppression. See also response to Comment No. 31.

#	Document Name	Section Reference	Comment	Baffinland Response
			increasing dust control efforts. Why is this continuing to occur?	
33	EDI (2021a)	s. 8.1.3.2, Figure 8-14, p. 83.	The annual shipping data in Figure 8-14 are interesting but are a pretty blunt tool for understanding why the annual dustfall is changing as it has. QIA recommends Baffinland instead examine the relationships between dustfall, truck transits (i.e., ore trucks only, and all trucks), and dust suppression efforts to better understand and present how well those efforts are working. Factoring in precipitation might also be worthwhile.	Investigations of relationships with vehicle transits as well as with precipitation were undertaken in 2019 and 2020, however, no meaningful correlations have been identified.
34	EDI (2021a)	Section 8 Dustfall subsection 8.2 Dustfall Extent Imagery Analysis, p. 84	This subsection gives a helpful visual for how dust is dispersed across the landscape. The analysis shows areas where dust is relatively high, relatively low, and in between. This information should be used to inform passive dust monitoring, or other programs developed to measure dust levels. 1. Are the findings from the passive dustfall monitoring consistent with the findings from the imagery analysis? 2a. QIA recommends Baffinland conduct ground truthing for correlation with the satellite imagery, collecting snow and ice cores to establish the magnitude of winter dustfall onto the snow and ice of Milne Inlet; b. These data	1. Dustfall magnitudes as determined by satellite imagery will be compared with the dustfall measurements from the passive dustfall collectors to calibrate the dustfall magnitude. This analysis will be considered for the 2021 TEAMR. Dustfall extents from satellite imagery are currently informing placement of new passive dustfall sites. 2a. The satellite imagery clearly shows extent of dustfall. While concentration is not known precisely, the information available is sufficient to inform Baffinland about mitigation requirements and attempts to reduce dustfall extent. 2b. Assessing the effects on spring melting of snow and sea is outside the scope of the TEMMP. However, Baffinland encourages the QIA to the Memo from Intrinsik regarding Baffinland's 2020 Pilot Snow Melt Water Assessment which has been available to QIA on the NIRB Registry since March 2021 as Attachment 1 to MHTO-12 in Baffinland's written responses to intervener questions for the P2 Hearing. The results of the memo were subsequently summarized in Baffinland's Dust Summary Report. It is also Baffinland's understanding QIA has been working to collect this information independent of

#	Document Name	Section Reference	Comment	Baffinland Response
			should also be used to assess the extent of effects on the quality of drinking water made from snow, and effects on the spring melting of snow and sea. 3. Are there any explanations for why the dust extent decreased between 2019 and 2020? Are there any predictions for what dustfall extent will look like in 2021?	Baffinland's efforts. On July 6 2021, Baffinland requested QIA to confirm via email that the combination of the QIA and BIM programs already address QIAs request. No response was received from QIA on this inquiry. 3. Preliminary 2021 results show a continued decrease in dustfall extent. Baffinland will investigate metrics such as ore production rate, traffic levels on the Tote Road, and weather (if available) in the 2021 TEAMR.
35	EDI (2021a)	s. 8.2, p. 84.	a. How sensitive is the satellite detection of dust to recent snowfall and snowmelt? B. How might these have affected the baseline?	a. Only visible dust can be extracted by this analysis. Images of recent snowfall may have minimal dust as snow covers the dust and images of recent snowmelt may have more dust as dust accumulates on the surface. Processing parameters and steps have been put into place to help mitigate the effects of recent snowfall and exposed ground from snowmelt: • All viable (cloud free) Landsat and Sentinel-2 images between mid-March and mid-May were used, resulting in multiple images from different dates over the same area. • Snow cover masks were used to limit the extraction of bare ground. • The maximum extent and magnitude from all the images (for a single year) is extracted, so the effect of images with recent snowfall should be minimal unless it is the only image for that area. b. The baseline dataset is a combination of six years which would further reduce the effect of recent snowfall.
36	EDI (2021a)	s. 8.2.1, p. 87	"To represent the maximum dustfall extent, a composite dataset for each year was calculated by taking the maximum value of all raster layers in the same year." (p. 87). QIA requests that Baffinland clarify whether this approach was used	The approach quoted from the report was used for calculating the baseline dataset. The baseline dataset was created from six years (2004–2007, 2009, and 2013) based on available data. The six years were combined, taking the maximum value from all the years to determine the maximum dustfall extent and magnitude prior to the Project. It is assumed that this is the maximum background dustfall deposition. The iron band ratio is limited to the extent only. If

#	Document Name	Section Reference	Comment	Baffinland Response
			for calculating the baseline that was subtracted from subsequent years and, if so, how this may bias estimates of the relative magnitude of dustfall from the Project.	dustfall is present in the baseline it will be removed in subsequent years. For the Snow Darkening Index (SDI), the baseline magnitude is removed. Future analysis may investigate using a baseline from the average value of the six years instead of the maximum value. A future focus on solely on the SDI may be found to be more appropriate.
37	EDI (2021a)	s.8.2.2.2, Map 8-2, p. 93.	So, the baseline serves as a mask for removing existing natural deposition! Given the extent of increased dustfall on Milne Inlet, and prevailing winds, how can the lack of similar increases in dustfall in terrestrial areas be explained? [Map 8-3, p. 94 with the snow darkening index seems more plausible in terms of additions of Project-related dustfall on land, but is still pretty limited in comparison to the ice surface.]	The iron band ratio shown in Map 8-2 extracts dustfall extent only, so if dustfall is present in the baseline it will be removed in the subsequent years. For the baseline dataset, the dustfall extent is more extensive on the terrain than on Milne Inlet, therefore when the baseline is removed, Milne Inlet will show a greater change. For the Snow Darkening Index (Map 8-3), the baseline magnitude is subtracted from subsequent years. Again, the baseline dustfall magnitude and extent are more extensive on the terrain than on Milne Inlet, therefore when the baseline is removed, Milne Inlet will show a greater change.
38	EDI (2021a)	s.8.4, p. 104	"Dustfall continued to remain relatively constant at most year-round sampling locations throughout the Project area." (p. 104). Given that dustfall is exceeding predictions at most year-round sampling locations this is not a positive outcome.	Baffinland acknowledges the current levels of dustfall and has been actively working throughout 2020 and 2021 to implement/improve dust suppression. See also response to Comment No. 31.
39	EDI (2021a)	Section 9 Vegetation subsection 9.1.1 Methods, p. 107	1. It is helpful to have this list, which describes changes to the monitoring program in response to TEWG recommendations over time. 2. QIA has outstanding concerns that the sites used for soil/lichen/vegetation sampling are perhaps not sites	1. Acknowledged. 2. Site sampling locations have been selected, refined and updated to capture Project effects on soil, vegetation and lichen. This includes "reported high dustfall" areas and "areas with sensitive [and/or] important plants". The sampling design (that is supported by statistical power analysis) is robust and representative of potential sensitive environments. There is

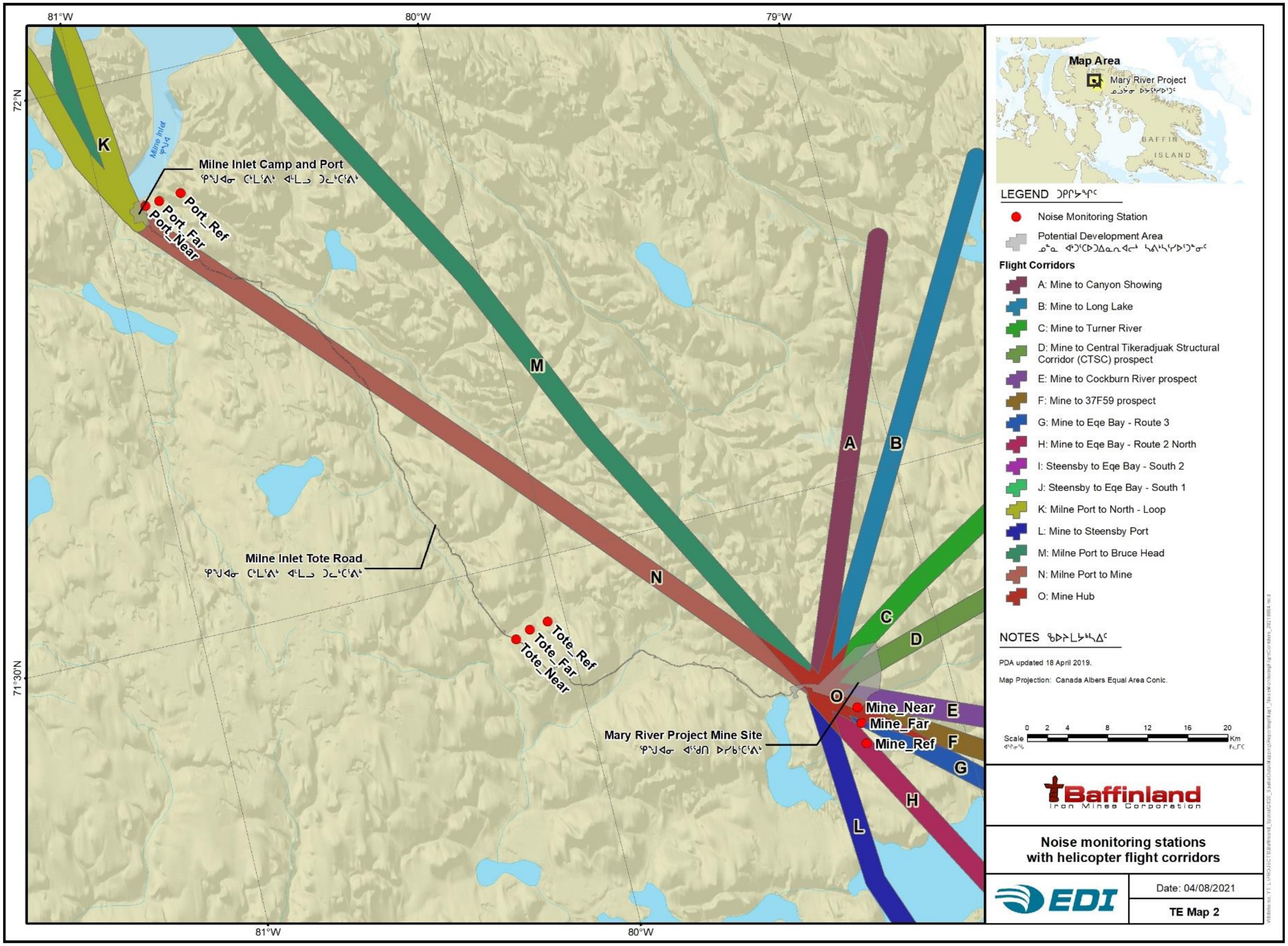
#	Document Name	Section Reference	Comment	Baffinland Response
			where dustfall is highest. It is important that sampling occurs in the areas with the highest levels of dustfall. 3. Additionally, as there tends to be low density of lichen in vegetation plots, different methods may be required to detect changes in lichen productivity due to dustfall. Lichen distribution in vegetation plots tends to be low and Project effects could be masked due to the larger number of samples with low exposure to dustfall and low lichen density.	presently no reason to revisit sampling design and/or sampling locations. 3. QIA questions/concerns have been raised previously and addressed during previous meetings of the TEWG.
40	EDI (2021a)	Section 9 Vegetation subsection 9.1.2.2. Lichen-Metal Concentrations, p. 125	1. The tables in this section show a comparison of CoPC concentrations between 2020 and Baseline. Several sites showed elevated CoPC concentrations. The subsection states that increases in As, Cd, Cu, Pb and Se at the Project "have been flagged for further characterization and should be the focus of further monitoring." QIA suggests that areas with elevated levels of CoPCs should have an increased number of samples to confirm and characterize the extent of the contamination. 2. Additionally, BIM should conduct a revised literature review to	1. Given that soil and lichen metal concentrations are either below or within an acceptable range, we consider that continuing to monitor these endpoints (in alignment with the Terrestrial Environmental Monitoring Program) is both reasonable and appropriate. The sampling design is rigorous and supported/informed by statistical power analysis. Based on findings to-date there is no rationale for revisiting the study design. 2. Results to-date do not justify the efforts to conduct an additional literature review. Although some discrete increases were observed, most lichen metals concentrations were near the lower analytical detection limits and within an acceptable range.

#	Document Name	Section Reference	Comment	Baffinland Response
			update the indicator values for lichen (Table 9-2, p. 113). This is important given the number of samples that showed increases in the six contaminants of potential concern (COPCs) (Table 9-2, p. 125).	
41	EDI (2021a)	Section 10 subsection 10.4 Incidental Observations, p. 163	The observations reported in this subsection were used in the executive summary to conclude that the road is not acting as a barrier to movement of caribou. QIA commented on this in comments on the Executive Summary. On the subject of movement barriers, it is important to be collecting data now regarding caribou use of the proposed dogleg in the railroad alignment as this area has been identified as important calving habitat.	Acknowledged.
42	EDI (2021a)	Section 10 Mammals subsection 10.3 Height of Land Surveys 10.3.1 Height of Land Surveys, p. 159	"Stations 1 to 16 are generally accessible by foot under suitable conditions, and Stations 17 to 24 would be inaccessible if not for helicopter support due to water bodies and long travel time by foot." a. QIA is concerned that the use of helicopters would cause caribou to move out of areas that are under surveillance. A 20 minute scan for caribou may not be long enough	a. This potentially confounding issue of helicopter use for the HOL surveys has been discussed during previous occasions within the TEWG. Ultimately given the location of some of the sampling stations, use of the helicopter cannot be avoided. b. As noted in the methods section, the original 20-minute observation time was developed in consultation with the MHTO when an elder participated in the survey sin 2017. Regardless, the observation time was doubled in 2021 to accommodate the QIA's inquiry. The cameras were included in the HOL survey in 2021 to address further issues as the QIA notes in their comments.

#	Document Name	Section Reference	Comment	Baffinland Response
			for caribou to return to the surveillance area. b. It is not clear why 20 minutes was chosen as the prescribed survey time. It may be beneficial to increase this time, especially when helicopters are used. QIA understands that this concern may be addressed by the effort to implement wildlife camera monitoring at selected HOL sites.	
43	2EDI (2021a)	Section 10 Mammals, and Section 9 Vegetation and Section 5 Noise	A comprehensive estimation of the zone of influence around the mine footprint for caribou has not been developed, but should be. This ZOI should include effects of noise, lichen disturbance/contamination and overall presence of the mine, and can be built using adapted monitoring programs already in place. Based on IQ, it is clear that caribou are avoiding the area. This avoidance needs to be documented to establish the ZOI. In the absence of a method for accurately establishing the ZOI, BIM should assume that avoidance is occurring and enact protection measures accordingly (i.e., avoiding noise and vibration during calving / post-calving periods)	See responses to Comment No. 10, 11 and 19.
44	EDI (2021a)	Section 10 Mammals pg 149	Caribou calving habitat in proximity to Project areas should be identified through IQ and mapped. This map should be used to further	Fundamental work to identify caribou calving habitat in proximity to Project areas with knowledge holders has already been conducted in numerous workshops leading up to the FEIS, and in follow-up work (e.g., Prno, J. 2017. Mary River Project — Phase 2

#	Document Name	Section Reference	Comment	Baffinland Response
			refine monitoring programs including noise, dustfall, and contaminants. It should also inform restrictions on helicopter timing, altitude, and flight paths.	Proposal, Technical Supporting Document No. 03: Results of Community Workshops Conducted for Baffinland Iron Mines Corporation's Phase 2 Proposal. NIRB File No. 181003-08MN053, NIRB Registry No. 320557. Prepared for Baffinland Iron Mines Corporation by Jason Prno Consulting Services Ltd., Peterborough, Ontario.). It is unclear what or why the QIA is requesting further work.
45	EDI (2021a)	Section 10 Mammals, subsection 10.7, p. 172	This summary should include limitations associated with data collected since the data do not provide a complete understanding or tracking of changes regarding interactions between the project and wildlife. Snow track surveys and HOL surveys continue to provide very little information to help inform mitigations and adaptive management. a. Overall, we suggest the annual report include recommendations for improvements of monitoring programs by the TEWG, and describe how they will be addressed in subsequent years. b. In particular, an improved approach for understanding the ZOI around the Project and the potential to monitor caribou avoidance of the Project area must be developed in collaboration with the TEWG and the MHTO.	a. See Baffinland's response to Comment No. 2… This repeat comment from 2019 was specifically addressed in the 2020 TEAMR. See Appendix A — *Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback.* b. The issue of "an improved approach for understanding the ZOI around the Project" is already a topic of discussion within the TEWG, including the QIA and MHTO. Baffinland has addressed this topic through two TEWG discussions (June and December 2020) and has drafted a report specifically addressing the utility of caribou collar data, expected uses of the data, and probable timelines when caribou density may be sufficient to acquire Project-related effects data to inform on the issue of a ZOI. This report is currently scheduled for delivery to the TEWG in Q3 2021.
46	EDI (2021a)	Section 11 Birds subsection 11.2.6.3 Occupancy	a. This graph indicates a steady decline in Peregrine Falcon occupancy since 2015. There is no relationship between occupancy	a.b. The occupancy trend (λ) from 2012–2020 for Peregrine Falcons was stable, with low among-year variation, and among the environmental covariates tested, NDVI had the greatest explanatory power. No evidence was found to

#	Document Name	Section Reference	Comment		Baffinland Response
		Figure 11-5 Annual estimates of nesting territory occupancy for Peregrine Falcons within the Raptor Monitoring area, p. 191	and distance to disturbance (Table 11-5). It appears as though the co-variates considered were distance to nearest occupied nesting site, distance to disturbance, and vegetative productivity (NDVI). Weather and prey availability were not considered. b. What data on variation in prey availability and weather conditions are available through Project monitoring? How has the influence of these variables been considered in assessments of influence of anthropogenic disturbance on Peregrine Falcons?		suggest that Peregrine Falcon and Rough-legged Hawk demography has been affected by distance to disturbance. (Section 11.2). The findings of the raptor occupancy and productivity monitoring are clearly communicated in the Terrestrial Environment Annual Monitoring Reports.
47	EDI (2021a)	Section 11 Birds subsection 11.2.6.5 Small Mammal Monitoring, p. 197	"Total captures increased from previous years (1 in 2019 and 0 in 2018) and indicated higher lemming abundance." a. What information on lemming trends is available? Has the cyclic pattern changed?	a	What is requested by QIA is a research program for regulatory bodies with the mandate to oversee these species. If these data become available to Baffinland in the future, this information could be used to supplement current monitoring methods and analyses for the Project.


81°W
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Mary River Project Mine Site
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Map Area
Mary River Project
BAFFIN ISLAND
LEGEND
● Noise Monitoring Station
Potential Development Area
Flight Corridors
A: Mine to Canyon Showing
B: Mine to Long Lake
C: Mine to Turner River
D: Mine to Central Tikeradjuak Structural Corridor (CTSC) prospect
E: Mine to Cockburn River prospect
F: Mine to 37F59 prospect
G: Mine to Eqe Bay - Route 3
H: Mine to Eqe Bay - Route 2 North
I: Steensby to Eqe Bay - South 2
J: Steensby to Eqe Bay - South 1
K: Milne Port to North - Loop
L: Mine to Steensby Port
M: Milne Port to Bruce Head
N: Milne Port to Mine
O: Mine Hub
NOTES
PDA updated 18 April 2019.
Map Projection: Canada Albers Equal Area Conic.
Scale
0 2 4 8 12 16 20
Km
Baffinland
Iron Mines Corporation
Noise monitoring stations with helicopter flight corridors
EDI
Date: 04/08/2021
TE Map 2

APPENDIX C WEATHER STATION DATA FROM THE MARY RIVER PROJECT BETWEEN 2005–2010 AND 2013–2020.

Appendix Table C-1. Monthly summaries of minimum, mean, and maximum air temperatures and total precipitation at the Mary River site between 2005–2010 and 2013–2020.*

Year	Month	Min. Temp. (°C)	Avg. Temp (°C)	Max. Temp. (°C)	Total Precip. (mm)
2005	May	–	–	–	–
2005	Jun	–	–	–	13.9
2005	Jul	–	8.43	–	112.5
2005	Aug	–	8.61	–	37.1
2005	Sep	–	-0.15	–	5.1
2005	Oct	–	–	–	–
2005	Nov	–	–	–	–
2005	Dec	–	–	–	–
2006	Jan	–	–	–	–
2006	Feb	–	–	–	–
2006	Mar	–	–	–	–
2006	Apr	–	–	–	–
2006	May	–	–	–	–
2006	Jun	–	3.48	–	22.1
2006	Jul	–	9.65	–	94.8
2006	Aug	–	9.1	–	74.5
2006	Sep	–	2.37	–	25.4
2006	Oct	–	-4.76	–	4.2
2006	Nov	–	-19.75	–	0
2006	Dec	–	-29.71	–	0
2007	Jan	–	-32.27	–	0
2007	Feb	–	-26.17	–	0
2007	Mar	–	-30.98	–	0
2007	Apr	–	-20.02	–	0
2007	May	–	-11.71	–	0.1
2007	Jun	–	3.62	–	0.9
2007	Jul	–	13.22	–	37.8
2007	Aug	–	9.59	–	57.4
2007	Sep	–	-0.87	–	9.3
2007	Oct	–	-12.4	–	0.1
2007	Nov	–	-21.51	–	0
2007	Dec	–	-30.64	–	0.1
2008	Jan	–	-29.56	–	0
2008	Feb	–	-35.33	–	0
2008	Mar	–	-27.8	–	0
2008	Apr	–	-15.2	–	0
2008	May	–	-0.79	–	23.8
2008	Jun	–	–	–	0
2008	Jul	–	–	–	11.4
2008	Aug	–	–	–	30.4

Appendix Table C-1. Monthly summaries of minimum, mean, and maximum air temperatures and total precipitation at the Mary River site between 2005–2010 and 2013–2020.*

Year	Month	Min. Temp. (°C)	Avg. Temp (°C)	Max. Temp. (°C)	Total Precip. (mm)
2008	Sep	–	–	–	8.8
2008	Oct	–	-11.83	–	0.1
2008	Nov	–	-22.4	–	0
2008	Dec	–	-29.86	–	0
2009	Jan	–	-27.84	–	0
2009	Feb	–	-31.32	–	0
2009	Mar	–	-27.75	–	0
2009	Apr	–	-17.76	–	3.1
2009	May	–	-6.42	–	3.1
2009	Jun	–	4.32	–	35.2
2009	Jul	–	12.48	–	28.4
2009	Aug	–	8.63	–	36.2
2009	Sep	–	–	–	26.6
2009	Oct	–	–	–	0.1
2009	Nov	–	–	–	0
2009	Dec	–	–	–	0
2010	Jan	–	-32.13	–	0
2010	Feb	–	–	–	0
2010	Mar	–	–	–	0
2010	Apr	–	–	–	1
2010	May	–	–	–	8.4
2010	Jun	–	–	–	8.2
2010	Jul	–	–	–	1.9
2013	Aug	0.25	2.03	5.31	0.4
2013	Sep	-10.96	-1.81	3.38	4.0
2013	Oct	-21.71	-8.37	2.48	1.1
2013	Nov	-39.45	-27.19	-8.83	0.0
2013	Dec	-42.19	-31.22	-16.00	0.0
2014	Jan	-41.77	-28.55	-3.96	0.0
2014	Feb	-45.51	-31.66	-7.60	0.0
2014	Mar	-40.67	-29.05	-8.80	0.0
2014	Apr	-29.10	-18.19	-3.81	0.1
2014	May	-26.63	-7.76	2.41	7.5
2014	Jun	-9.15	2.66	11.68	43.8
2014	Jul	3.24	11.51	20.71	36.1
2014	Aug	0.15	5.95	17.25	67.8
2014	Sep	-73.24	-2.12	11.23	3.1
2014	Oct	-25.48	-10.65	3.64	0.4
2014	Nov	-36.50	-20.89	-6.20	0.0
2014	Dec	-39.34	-29.85	-15.09	0.0

Appendix Table C-1. **Monthly summaries of minimum, mean, and maximum air temperatures and total precipitation at the Mary River site between 2005–2010 and 2013–2020.***

Year	Month	Min. Temp. (°C)	Avg. Temp (°C)	Max. Temp. (°C)	Total Precip. (mm)
2015	Jan	-46.58	-35.38	-19.57	0.0
2015	Feb	-45.97	-36.99	-18.24	0.0
2015	Mar	-45.84	-30.29	-5.80	0.2
2015	Apr	-35.96	-22.62	-5.12	0.0
2015	May	-15.50	-6.07	2.10	3.2
2015	Jun	-2.19	4.33	15.33	18.2
2015	Jul	2.63	12.19	24.48	34.6
2015	Aug	-1.78	7.05	15.15	41.8
2015	Sep	-9.80	0.16	8.10	48.5
2015	Oct	-31.16	-10.33	0.86	5.0
2015	Nov	-38.59	-23.53	-3.50	0.0
2015	Dec	-45.22	-31.95	-14.00	0.0
2016	Jan	-39.86	-25.92	0.94	0.0
2016	Feb	-43.19	-31.63	-4.73	0.0
2016	Mar	-41.83	-29.42	-14.20	0.0
2016	Apr	-33.21	-15.43	-3.72	2.8
2016	May	-20.84	-4.17	4.52	6.0
2016	Jun	-4.51	5.82	18.40	17.4
2016	Jul	4.45	11.82	22.58	31.8
2016	Aug	0.37	10.63	19.83	59.9
2016	Sep	-12.41	-1.86	5.29	51.5
2016	Oct	-24.28	-11.22	-2.21	0.2
2016	Nov	-32.69	-16.77	-3.81	0.0
2016	Dec	-40.19	-29.36	-8.92	0.0
2017	Jan	-38.06	-26.37	-9.35	0.0
2017	Feb	-40.19	-31.23	-17.79	0.0
2017	Mar	-40.19	-30.58	-16.37	0.0
2017	Apr	-34.73	-15.38	-1.46	1.0
2017	May	-16.46	-5.61	1.81	1.4
2017	Jun	-4.02	4.16	15.63	21.9
2017	Jul	1.51	7.18	17.92	67.8
2017	Aug	0.09	8.61	17.21	56.7
2017	Sep	-10.07	-0.30	6.31	1.6
2018	Jan	-40.32	-32.21	-14.55	0.0
2018	Feb	-45.78	-34.56	-8.02	0.0
2018	Mar	-42.37	-25.26	-7.51	0.0
2018	Apr	-30.23	-17.57	0.73	1.7
2018	May	-23.94	-8.50	1.85	0.6
2018	Jun	-3.00	4.83	14.52	26.0
2018	Jul	0.50	7.55	19.42	51.3

Appendix Table C-1. Monthly summaries of minimum, mean, and maximum air temperatures and total precipitation at the Mary River site between 2005–2010 and 2013–2020.*

Year	Month	Min. Temp. (°C)	Avg. Temp (°C)	Max. Temp. (°C)	Total Precip. (mm)
2018	Aug	0.03	6.39	12.00	2.0
2018	Sep	-13.38	-2.05	8.78	25.1
2018	Oct	-28.95	-14.19	-2.65	0.0
2018	Nov	-39.91	-25.38	-10.15	0.0
2018	Dec	-40.27	-26.45	-9.74	0.0
2019	Jan	-40.28	-31.40	-14.07	0.0
2019	Feb	-40.28	-33.63	-13.85	0.0
2019	Mar	-40.26	-27.80	-10.33	0.0
2019	Apr	-37.46	-20.60	-0.40	0.1
2019	May	-10.87	-0.14	9.18	7.1
2019	Jun	-2.30	6.42	19.81	45.2
2019	Jul	4.76	11.04	21.28	54.4
2019	Aug	1.09	11.20	20.04	22.6
2019	Sep	-7.21	2.44	14.14	20.6
2019	Oct	-45.43	3.04	11.83	2.4
2019	Nov	-22.76	-8.85	6.04	0.1
2019	Dec	-32.87	-14.88	3.92	0.0
2020	Jan	–	-33.14	–	0.0
2020	Feb	–	-32.43	–	0.0
2020	Mar	–	-25.85	–	0.0
2020	Apr	–	-13.86	–	0.0
2020	May	–	-6.06	–	–
2020	Jun	–	5.78	–	46.8
2020	Jul	–	14.11	–	0.0
2020	Aug	–	8.52	–	0.0
2020	Sep	–	5.33	–	0.8
2020	Oct	–	–	–	0.0
2020	Nov	–	–	–	0.0
2020	Dec	–	-19.64	–	0.0

* Original temperature results for the Mine Site in 2020 were likely erroneous and are replaced here with temperature data collected at the Mary River Camp in 2020. Minimum and Maximum temperatures were unavailable for the Mary River Camp data. Precipitation data are missing for May 2020 due to a sensor malfunction.

Appendix Table C-2. Monthly summaries of minimum, mean, and maximum air temperatures and total precipitation at the Milne Inlet site between 2006–2010 and 2013–2020.

Year	Month	Min. Temp. (°C)	Avg. Temp (°C)	Max. Temp. (°C)	Total Precip. (mm)
2006	Jun	–	–	–	1.50
2006	Jul	–	8.61	–	76.50
2006	Aug	–	8.09	–	35.80
2006	Sep	–	1.63	–	52.30
2006	Oct	–	-4.84	–	0.30
2006	Nov	–	-19.07	–	0.00
2006	Dec	–	-28.22	–	0.00
2007	Jan	–	-30.59	–	0.00
2007	Feb	–	-25.30	–	0.00
2007	Mar	–	-30.88	–	0.00
2007	Apr	–	-18.56	–	0.00
2007	May	–	-10.68	–	0.00
2007	Jun	–	2.80	–	0.00
2007	Jul	–	9.87	–	16.10
2007	Aug	–	7.77	–	24.70
2007	Sep	–	-1.03	–	7.20
2007	Oct	–	-10.47	–	0.00
2007	Nov	–	-22.91	–	0.00
2007	Dec	–	-29.67	–	0.00
2008	Jan	–	-28.04	–	0.00
2008	Feb	–	-34.19	–	0.00
2008	Mar	–	-29.87	–	0.00
2008	Apr	–	-17.29	–	0.00
2008	May	–	-4.58	–	0.00
2008	Jun	–	–	–	14.40
2008	Jul	–	9.91	–	82.20
2008	Aug	–	–	–	3.90
2008	Sep	–	–	–	0.00
2008	Oct	–	-11.26	–	0.00
2008	Nov	–	-21.91	–	0.00
2008	Dec	–	-28.75	–	0.00
2009	Jan	–	-27.67	–	0.00
2009	Feb	–	-31.04	–	0.00
2009	Mar	–	-27.91	–	0.00
2009	Apr	–	-17.92	–	0.00
2009	May	–	-7.46	–	0.00
2009	Jun	–	3.46	–	0.00

Appendix Table C-2. Monthly summaries of minimum, mean, and maximum air temperatures and total precipitation at the Milne Inlet site between 2006–2010 and 2013–2020.

Year	Month	Min. Temp. (°C)	Avg. Temp (°C)	Max. Temp. (°C)	Total Precip. (mm)
2009	Jul	–	11.51	–	0.00
2009	Aug	–	–	–	0.00
2009	Sep	–	–	–	0.00
2009	Oct	–	–	–	0.00
2009	Nov	–	–	–	0.00
2009	Dec	–	–	–	0.00
2010	Jan	–	–	–	–
2010	Feb	–	–	–	–
2010	Mar	–	–	–	26.20
2010	Apr	–	–	–	–
2010	May	–	–	–	–
2010	Jun	–	–	–	–
2010	Jul	–	–	–	–
2013	Aug	-1.29	2.11	8.78	37.4
2013	Sep	-8.65	-1.79	2.04	0.6
2013	Oct	-19.33	-7.86	2.38	1.4
2013	Nov	-38.31	-25.69	-8.91	0.0
2013	Dec	-38.68	-30.17	-15.34	0.0
2014	Jan	-40.21	-29.22	-14.77	0.0
2014	Feb	-41.36	-31.15	-14.26	0.0
2014	Mar	-38.62	-29.02	-8.76	0.0
2014	Apr	-31.23	-19.42	-2.82	1.0
2014	May	-23.53	-7.46	1.92	1.8
2014	Jun	-10.99	1.76	11.23	13.9
2014	Jul	3.66	10.55	19.58	8.9
2014	Aug	0.86	5.35	17.47	10.3
2014	Sep	-11.39	-2.29	10.76	3.0
2014	Oct	-23.72	-10.59	3.67	0.2
2014	Nov	-35.83	-21.26	-6.93	0.0
2014	Dec	-37.40	-29.20	-15.03	0.0
2015	Jan	-44.11	-33.84	-23.86	0.0
2015	Feb	-44.44	-35.26	-25.38	0.0
2015	Mar	-42.40	-29.46	-5.78	0.0
2015	Apr	-33.49	-23.66	-9.89	0.0
2015	May	-16.67	-8.32	1.29	1.1
2015	Jun	-4.33	2.52	12.65	10.1
2015	Jul	3.23	10.02	22.08	8.0

Appendix Table C-2. Monthly summaries of minimum, mean, and maximum air temperatures and total precipitation at the Milne Inlet site between 2006–2010 and 2013–2020.

Year	Month	Min. Temp. (°C)	Avg. Temp (°C)	Max. Temp. (°C)	Total Precip. (mm)
2015	Aug	0.78	5.97	15.21	7.7
2015	Sep	-8.16	-0.08	6.94	10.1
2015	Oct	-23.38	-9.52	1.16	6.5
2015	Nov	-36.84	-21.60	-3.83	0.0
2015	Dec	-42.35	-30.47	-14.29	0.0
2016	Jan	-38.02	-25.32	0.15	0.0
2016	Feb	-41.12	-31.60	-11.28	0.2
2016	Mar	-36.51	-29.33	-15.06	0.0
2016	Apr	-31.03	-16.85	-5.38	1.2
2016	May	-20.61	-5.77	0.86	5.3
2016	Jun	-5.21	4.01	17.97	8.8
2016	Jul	2.12	9.91	22.36	22.7
2016	Aug	0.03	8.66	19.10	39.8
2016	Sep	-7.59	-1.55	5.11	18.5
2016	Oct	-23.08	-10.59	-1.82	0.1
2016	Nov	-24.42	-16.81	-4.47	0.0
2016	Dec	-37.15	-26.96	-8.83	0.0
2017	Jan	-36.73	-25.73	-11.85	0.0
2017	Feb	-40.24	-30.74	-19.69	0.0
2017	Mar	-40.22	-30.44	-18.61	0.0
2017	Apr	-28.33	-16.73	-4.62	0.0
2017	May	-18.39	-6.94	2.45	0.0
2017	Jun	-4.33	3.10	13.69	0.0
2017	Jul	0.60	6.87	16.27	34.1
2017	Aug	-0.95	7.00	16.00	10.8
2017	Sep	-7.59	-0.73	4.33	8.9
2018	Jan	-40.64	-31.02	-21.27	0.0
2018	Feb	-44.44	-35.13	-14.83	0.0
2018	Mar	-37.83	-26.90	-11.28	0.0
2018	Apr	-28.72	-19.42	-6.78	0.1
2018	May	-22.55	-9.84	1.80	0.0
2018	Jun	-3.93	3.33	12.40	19.3
2018	Jul	-0.21	6.74	18.68	74.8
2018	Aug	0.43	4.92	10.77	52.5
2018	Sep	-19.37	-11.83	-4.03	18.1
2018	Oct	-35.07	-23.44	-11.67	0.0
2018	Nov	-49.11	-35.30	-21.14	0.0

Appendix Table C-2. Monthly summaries of minimum, mean, and maximum air temperatures and total precipitation at the Milne Inlet site between 2006–2010 and 2013–2020.

Year	Month	Min. Temp. (°C)	Avg. Temp (°C)	Max. Temp. (°C)	Total Precip. (mm)
2018	Dec	-43.83	-34.16	-22.48	0.0
2019	Jan	-50.22	-40.92	-22.67	0.0
2019	Feb	-49.50	-41.13	-30.38	0.0
2019	Mar	-46.45	-36.18	-24.74	0.0
2019	Apr	-43.82	-31.32	-11.83	0.5
2019	May	-20.67	-12.05	-2.54	2.8
2019	Jun	-12.28	-4.43	6.55	30.5
2019	Jul	-6.62	-0.30	10.67	50.1
2019	Aug	-8.08	0.28	8.78	30.4
2019	Sep	-15.60	-8.05	0.76	41.3
2019	Oct	-20.52	-8.21	2.31	1.0
2019	Nov	-27.91	-19.06	-3.98	0.0
2019	Dec	-37.97	-25.08	-6.23	0.0
2020	Jan	-45.47	-35.26	-26.08	0.0
2020	Feb	-41.22	-34.74	-28.53	0.0
2020	Mar	-39.39	-29.35	-15.74	0.0
2020	Apr	-34.69	-17.92	-7.51	0.0
2020	May	-20.78	-7.92	1.52	0.2
2020	Jun	-5.11	4.36	13.74	31.0
2020	Jul	5.13	11.47	22.67	20.9
2020	Aug	1.64	6.55	14.22	0.0
2020	Sep	-9.03	-1.42	6.45	0.3
2020	Oct	-23.19	-6.82	3.47	0.0
2020	Nov	-31.40	-22.12	-8.95	0.0
2020	Dec	-36.67	-22.39	-9.29	0.0

APPENDIX D 2017–2019 HELICOPTER FLIGHT REANALYSIS

Memorandum

To: Genevieve Morinville

From: Christina Tennant

Date: February 10, 2021

Project No: 20Y0019

Re: 2017-2019 Helicopter Flight Reanalysis

Additional details concerning helicopter pilot rationale and flight time at the Mary River Project were requested during the 2020 Terrestrial Environmental Working Group (TEWG) meetings. To address this request, the helicopter flight database used for assessing compliance has been re-analyzed from 2017 to 2019. The 2020 results are included in the 2020 EDI Environmental Dynamics Inc. (EDI) Terrestrial Environmental Annual Monitoring Report along with inter-annual trend analysis. Baffinland Iron Mines (BIM) was consulted on pilot log data and details regarding flight rationale, in addition to providing the data required for analysis.

Project Certificate No. 005 includes three Project Conditions to ensure that disturbance to birds and wildlife caused by aircraft is minimized whenever possible. The conditions are as follows:

- Project Condition #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…"*
- Project Condition #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 1500 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."*
- Project Condition #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."*

Methods

Overview of Helicopter Compliance Analysis Steps

1. Helicopter pilots complete daily flight tickets to record flight times, flight purpose, and rationale if flight height requirements cannot be met. Helicopter flight tracklogs (GPS points along the flight path) are automatically recorded using the helicopter's GPS system. Flight tickets and flight tracklogs are sent to BIM.

2. BIM compiles flight tickets into pilot log database. Flight tracklogs and pilot log database are sent to EDI.

3. EDI converts the flight tracklogs into individual points (latitude/longitude) and calculates flight height above ground level at each point.

4. EDI joins the flight tracklog points with the pilot log database based on helicopter, date, and time.

5. EDI converts the joined points to line segments (i.e., one line segment connects two consecutive points within a flight) for each transit (engine start to engine stop).

6. EDI assigns compliance based on whether the minimum line segment elevation meets the flight height requirements.

7. If line segments do not meet the flight height requirements, EDI incorporates pilot rationale (if provided) into compliance assessment.

8. EDI summarizes helicopter flight height compliance in annual reports, including maps of helicopter flight paths and compliance assessment.

Step 1

Helicopter pilots from Canadian Helicopters were informed of the flight height requirements and horizontal guidelines prior to arrival at Mary River. They were provided with the spatial boundaries of identified concentrations of migratory birds, buffered by the required 1,500 m, and asked to avoid flying in these areas. Between 2017 and 2020, the only area identified for avoidance was the Snow Goose moulting area, which must be avoided when possible during the mounting season (July and August; Map 1).

Pilots recorded their flight times for each shift on daily flight tickets. Rationale for flights were also recorded to provide context and explain the need for transits that did not adhere to flight height requirements, generally for operational or safety reasons. See Appendix A for examples of flight tickets and Table 1 for rationale descriptions. The helicopter flight track was also recorded automatically for each transit, from engine start to engine stop. These data were provided as GPS coordinates in a spreadsheet and were grouped by transit. Canadian Helicopters sent the pilot flight tickets and helicopter flight tracklog to BIM.

Table 1. Descriptions of pilot rationales given for low-level flights. Descriptions are stated with a flight height requirement of 650 magl but also apply to a flight height requirement of 1,100 magl.

Rationale	Description
Drop off/pick up	The distance between take-off and landing sites does not allow enough time to gain 650 magl; the topography between sites, particularly around the drill locations, has large elevation changes over a short distance which does not allow the helicopter to reach 650 magl, or it is not practical for the helicopter to climb to 650 magl (e.g., when descending from Nuluujaak Mountain).
Survey	Surveys can involve short duration flights between survey points which does not allow enough time to gain 650 magl; some surveys require low level flying as part of the survey methodology such as flying a low-level grid pattern for a geotechnical survey, keeping a sensor at a constant elevation relative to the ground.
Slinging	Helicopters slinging heavy loads fly low for safety purposes; if necessary, the load can be quickly lowered to the ground in a controlled manner or dropped and maintain visual reference of the landing location.
Short distance	The short distance between take-off and landing sites does not allow enough time to gain 650 magl.
Sampling	Sampling can involve short duration flights between sampling points which does not allow enough time to gain 650 magl.
Staking	Very low-level flying is required while staking out a grid as stakes are deployed from the helicopter during transit and crew members are in and out of the helicopter at grid corners.
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.
Mobilization/Demobilization	Ferrying of the aircraft to and from Mary River where operational constraints (e.g., fuel capacity and flight range) were a factor.
Other	The nature of the flight requires low-level flying or short distances/durations (e.g., tours, maintenance flights, evacuations, and search and rescue).

Step 2

BIM compiled the pilot flight tickets into a pilot log database including the date, start and end times, helicopter ID, ticket number, rationale, and comments. The pilot log database along with the helicopter flight tracklog data were sent to EDI to perform the compliance analysis.

Step 3

EDI converted the helicopter flight tracklog data into geospatial points. Point data were provided in feet above sea level and converted to metres above sea level (masl). A Digital Elevation Model (DEM) was used to estimate ground-level elevation above sea level. To calculate the flight height above ground level in metres (i.e., magl), the masl from the DEM was subtracted from the masl from the flight tracklog at each point (Figure 1).

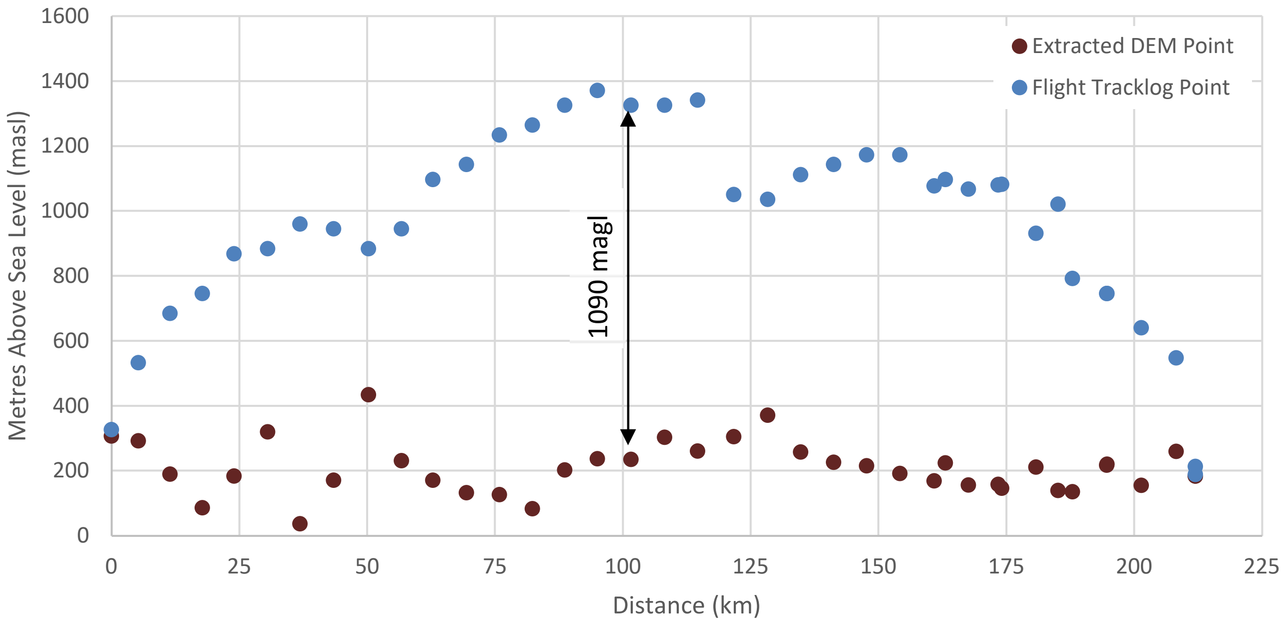


Figure 1. Helicopter flight tracklog points and corresponding ground points from a digital elevation model for a single transit. The difference between the two points indicated by the black line is 1090 metres above ground level.

To assure the calculated magl values were correct, a Quality Assurance/Quality Control procedure was completed on the data by querying the status field of the point data for a value of "wheels off" or wheels on". It was assumed that when the helicopter status was "wheels off" or "wheels on", the helicopter was on the ground and the elevation would be at or close to 0.0 magl (Table 2).

Table 2. Quality Assurance/Quality Control values from 2017 to 2019.

Year	Number of Sample Points	Average Elevation (magl)	Standard Deviation
2017	4,699	3.2	±10.2
2018	12,503	-1.6	±16.4
2019	11,884	4.5	±12.5

Step 4 and 5

The flight tracklog points were joined with the pilot log database based on helicopter ID, date, and time. The joined points were then converted to flight line segments for analysis. Each line segment represents a straight line between two consecutive flight tracklog points within the same transit. The flight time and minimum flight height were calculated for each flight line segment.

Step 6 and 7

Data were split into two categories: 1) data within the Snow Goose area during moulting season (July and August) in relation to the 1,100 magl elevation requirement and 2) data outside the Snow Goose area during moulting season and in all areas in all other months in relation to the 650 magl elevation requirement. The datasets were then analyzed separately to assess specific flight height allowances using the different areas and minimum flight height values.

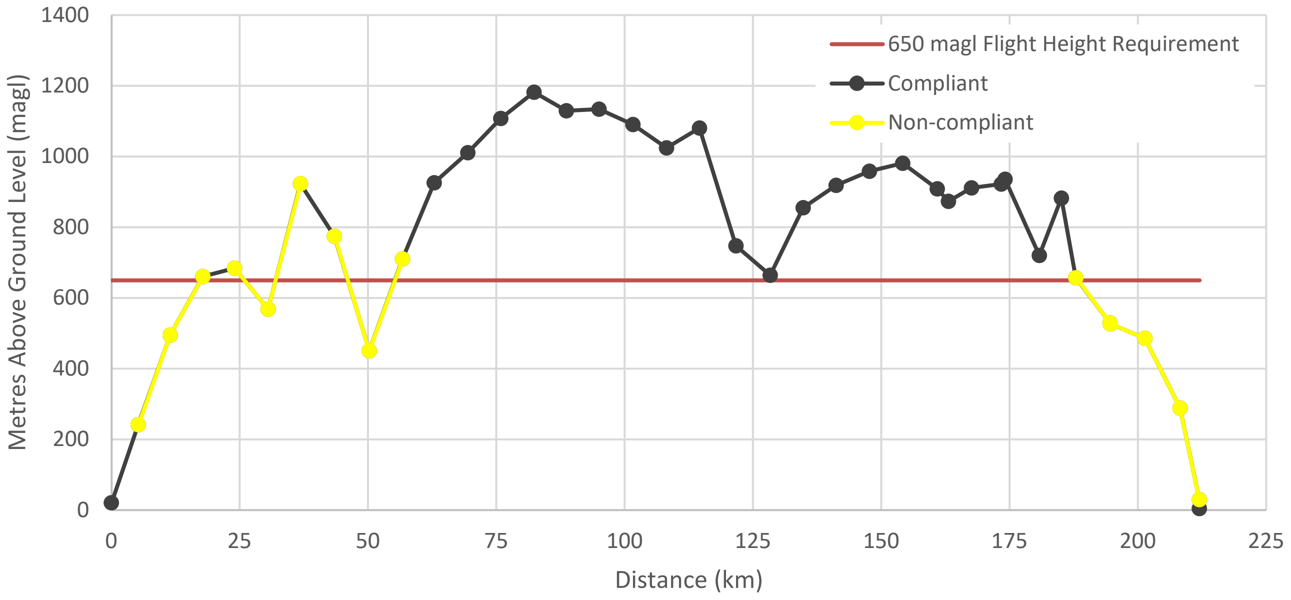


Figure 2. **Flight height elevations for a single transit in relation to the 650 metres above ground level flight height requirement.**

Initially, flight line segments above the flight height requirements were considered compliant, while line segments below the flight height requirements were considered non-compliant (Figure 2). The first and last flight line segments of a flight as the helicopter takes off or lands were considered compliant, despite being under the elevation requirement for these portions. Non-compliant flight line segments that had pilot rationale recorded in the flight ticket for flying at lower elevations than required were changed to compliant with rationale. Based on these criteria, flight data were organized into the following six categories:

- data within the Snow Goose area in July and August, where the 1,100 magl elevation requirement was achieved (compliant);
- data within the Snow Goose area in July and August where the 1,100 magl elevation requirement was not achieved, but the rationale for low-level flying was given (compliant with rationale);
- data within the Snow Goose area in July and August where the 1,100 magl elevation requirement was not achieved and no rationale for low-level flying was given (non-compliant);
- data outside the Snow Goose area during moulting season and in all areas in all other months where the 650 magl elevation requirement was achieved (compliant);

- data outside the Snow Goose area during moulting season and in all areas in all other months where the 650 magl elevation requirement was not achieved, but the rationale for low-level flying was given (compliant with rationale); and
- data outside the Snow Goose area during moulting season and in all areas in all other months where the 650 magl elevation requirement was not achieved and no rationale for low-level flying was given (non-compliant).

Results and Discussion

The following sections compare the original analysis based on individual flight points for 2017 to 2019 with the reanalysis introduced in 2020 based on flight line segments and flight time. This reanalysis was based directly on feedback provided by TEWG members during TEWG meetings requesting additional detail in pilot rationale and compliance analysis, and compliance reporting broken down by flight duration instead of proportion of flight points. An example of the data can be seen in Map 1, which is focused on a single day for clarity.

2017 Reanalysis

For the 2017 flight height reanalysis, the number and percentage of transits remained the almost the same, with a slight decrease of 4 transits outside the Snow Goose area (Table 3 and Table 4). A total of 73% of transits were flown outside the Snow Goose area accounting for 89% of the flight hours while 27% of transits were flow over the Snow Goose area totalling 10.55% of the flight hours within the Snow Goose area (Table 4 and Table 5).

Table 3. ORIGINAL Number of transits flown per month with a breakdown of transits (№ and %) flown over and outside of the Snow Goose area, June 1– September 30, 2017.

Month	Total № transits	№ transits over Snow Goose area	% transits over Snow Goose area	№ transits outside Snow Goose area	% transits outside Snow Goose area
June	212	98	46	114	54
July	336	88	26	248	74
August	556	117	21	439	79
September	245	55	22	190	78
Total	**1,349**	**358**	**27**	**991**	**73**

Table 4. REANALYSIS Number of transits flown per month with a breakdown of transits (№ and %) flown over and outside of the Snow Goose area, June 1– September 30, 2017.

Month	Total № of Transits	№ of Transits Over Snow Goose Area	% Transits Over Snow Goose Area	№ of Transits Outside Snow Goose Area	% Transits Outside Snow Goose Area
June	211	98	46	113	54
July	336	88	26	248	74

Table 4. REANALYSIS Number of transits flown per month with a breakdown of transits (№ and %) flown over and outside of the Snow Goose area, June 1– September 30, 2017.

Month	Total № of Transits	№ of Transits Over Snow Goose Area	% Transits Over Snow Goose Area	№ of Transits Outside Snow Goose Area	% Transits Outside Snow Goose Area
August	553	117	21	436	79
September	245	55	22	190	78
Total	**1,345**	**358**	**27**	**987**	**73**

Table 5. NEW Number of flight hours per month with a breakdown of flight time (hrs and %) flown within and outside of the Snow Goose area, June 1– September 30, 2017.

Month	Total Flight Hours	Flight Hours Over Snow Goose Area	% Flight Time Over Snow Goose Area	Flight Hours Outside Snow Goose Area	% Flight Time Outside Snow Goose Area
June	140.10	20.68	14.76	119.41	85.24
July	160.94	14.77	9.18	146.17	90.82
August	313.95	30.54	9.73	283.41	90.27
September	147.16	14.41	9.79	132.76	90.21
Total	**762.15**	**80.40**	**10.55**	**681.75**	**89.45**

Compliance within the Snow Goose area during moulting season (July and August) decreased when compared to the original elevation point analysis to the flight hours from line segments (Table 6 and Table 7). Compliance (including compliant with rationale) by flight hours was 82.02% and non-compliance was 17.98%.

Table 6. ORIGINAL Elevation points calculated to obtain flight height compliance over the Snow Goose area, June 1– September 30, 2017.

Month	Area	Total points	Total № compliant points	% compliance	Total № non–compliant points	% non–compliance
June	Not applicable (n/a)			n/a		
July	Within SNGO Area	410	381	93	29	7
August	Within SNGO Area	827	792	96	35	4
September	Not applicable (n/a)			n/a		
Total		**1,237**	**1,173**	**95**	**64**	**5**

Table 7. REANALYSIS Number of flight hours of flight height compliance within the Snow Goose area during moulting season, July 1 – August 31, 2017.

Month	Area	Total Flight Hours	Compliant Flight Hours ≥ 1,100 magl		Compliant Flight Hours <1,100 magl with Rationale		Combined Compliance	Non-compliant Flight Hours	Non-compliance
			hrs	%	hrs	%	%		%
June	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
July	Within SNGO Area	14.77	3.45	23.35	8.94	60.55	83.90	2.38	16.10
August	Within SNGO Area	30.54	8.44	27.63	16.33	53.48	81.11	5.77	18.89
September	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total		**45.30**	**11.89**	**26.24**	**25.27**	**55.78**	**82.02**	**8.15**	**17.98**

For areas outside the Snow Goose area during moulting season and in all areas for all other months, compliance (including compliant with rationale) was similar between the original elevation point analysis and the flight hours from line segments (Table 8 and Table 9). Percent compliance was higher in June and July but lower in August and September for the analysis by flight hours compared to the analysis by elevation points.

Table 8. ORIGINAL Elevation points calculated to obtain flight height compliance outside the Snow Goose area, June 1– September 30, 2017.

Month	Area	Total points	Total № compliant points	% compliance	Total № non–compliant points	% non–compliance
June	All Areas	3,368	2,368	70	1,000	30
July	Outside SNGO Area	3,831	2,355	61	1,476	39
August	Outside SNGO Area	7,384	6,576	89	808	11
September	All Areas	3,646	2,644	73	1,002	27
Total		**18,229**	**13,943**	**76**	**4,286**	**24**

Table 9. REANALYSIS Number of flight hours of flight height compliance outside the Snow Goose area during moulting season and in all areas in all other months between June 1 – September 30, 2017.

Month	Area	Total Flight Hours	Compliant Flight Hours ≥ 650 magl		Compliant Flight Hours <650 magl with Rationale		Combined Compliance	Non-compliant Flight Hours	Non-compliance
			hrs	%	hrs	%	%		%
June	All Areas	140.10	29.42	21.00	71.55	51.07	72.07	39.13	27.93
July	Outside SNGO Area	146.17	56.67	38.77	42.07	28.78	67.55	47.44	32.45
August	Outside SNGO Area	283.41	110.52	38.99	129.58	45.72	84.72	43.32	15.28
September	All Areas	147.16	49.36	33.54	50.27	34.16	67.70	47.54	32.30
Total		**716.85**	**245.96**	**34.31**	**293.47**	**40.94**	**75.25**	**177.42**	**24.75**

Additional analysis was conducted for flight hours and compliance by rationale (Table 10). Flights with rationale from pilot logs accounted for 41.82% of the total flight hours. Within the Snow Goose area during moulting season, where the flight height requirement is ≥1100 magl, 3.32% of total flight hours were compliant with rationale. Outside the Snow Goose area and in all areas in all other months where the flight height requirement is ≥650 magl, 38.51% of total flight hours were compliant with rationale. The top reasons given for low level flights were slinging, drop off/pick up and weather.

Table 10. NEW Helicopter flight hours summarized according to pilot rationale for flights within the ≥1,100 magl and ≥650 magl flight height requirements, June 1 – September 30, 2017.

			≥1100 magl Flight Height Requirement		≥650 magl Flight Height Requirement	
Rationale	**Flight Hours**	**% of Total Flight Hours**	**Flight Hours**	**% of Total Flight hours**	**Flight Hours**	**% of Total Flight Hours**
Slinging	114.58	15.03	3.52	0.46	111.07	14.57
Drop off/Pick up	63.20	8.29	9.57	1.26	53.62	7.04
Weather	57.65	7.56	10.41	1.37	47.24	6.20
Survey	36.12	4.74	1.20	0.16	34.91	4.58
Staking	32.03	4.20	0.00	0.00	32.03	4.20
Demobilization	12.65	1.66	0.00	0.00	12.65	1.66
Sampling	2.17	0.29	0.38	0.05	1.79	0.24
Short Distance	0.35	0.05	0.19	0.02	0.16	0.02
Total	**318.74**	**41.82**	**25.27**	**3.32**	**293.47**	**38.51**

2018 Reanalysis

For the 2018 flight height reanalysis, the number of transits decreased, possibly due to changes in processing, however, the percent of transits is similar (Table 11 and Table 12). A total of 88% of transits were flown outside the Snow Goose area accounting for 94.33% of the flight hours while 12% of transits were flown over the Snow Goose area totalling 5.67% of the flight hours within the Snow Goose Area (Table 12 and Table 13).

Table 11. **ORIGINAL** Number of transits flown per month with a breakdown of transits (№ and %) flown over and outside of the Snow Goose area, May 1– September 30, 2018.

Month	Total № transits	№ transits over Snow Goose area	% transits over Snow Goose area	№ transits outside Snow Goose area	% transits outside Snow Goose area
May	57	30	53	27	47
June	564	50	9	514	91
July	766	89	12	677	88
August	955	105	11	850	89
September	246	20	8	226	92
Total	**2,588**	**294**	**11**	**2294**	**89**

Table 12. **REANALYSIS** Number of transits flown per month with a breakdown of transits (№ and %) flown over and outside of the Snow Goose area, May 1– September 30, 2018.

Month	Total № of Transits	№ of Transits Over Snow Goose Area	% Transits Over Snow Goose Area	№ of Transits Outside Snow Goose Area	% Transits Outside Snow Goose Area
May	48	31	65	17	35
June	541	51	9	490	91
July	746	91	12	655	88
August	922	107	12	815	88
September	233	20	9	213	91
Total	**2,490**	**300**	**12**	**2,190**	**88**

Table 13. **NEW** Number of flight hours per month with a breakdown of flight time (hrs and %) flown within and outside of the Snow Goose area, May 1– September 30, 2018.

Month	Total Flight Hours	Flight Hours Over Snow Goose Area	% Flight Time Over Snow Goose Area	Flight Hours Outside Snow Goose Area	% Flight Time Outside Snow Goose Area
May	112.12	35.23	31.42	76.89	68.58

Table 13. **NEW** **Number of flight hours per month with a breakdown of flight time (hrs and %) flown within and outside of the Snow Goose area, May 1– September 30, 2018.**

Month	Total Flight Hours	Flight Hours Over Snow Goose Area	% Flight Time Over Snow Goose Area	Flight Hours Outside Snow Goose Area	% Flight Time Outside Snow Goose Area
June	358.23	20.09	5.61	338.14	94.39
July	508.86	17.62	3.46	491.24	96.54
August	591.03	17.69	2.99	573.34	97.01
September	131.36	5.93	4.52	125.42	95.48
Total	**1,701.60**	**96.56**	**5.67**	**1,605.04**	**94.33**

Compliance within the Snow Goose area during moulting season (July and August) decreased when comparing the original elevation point analysis to the flight hours from line segments (Table 14 and Table 15). Compliance (including compliant with rationale) by flight hours was 89.60% and non-compliance was 10.40%.

Table 14. **ORIGINAL** **Elevation points calculated to obtain flight height compliance over the Snow Goose area, May 1– September 30, 2018.**

Month	Area	Total points	Total compliant points ≥ 1,100 magl	Total compliant points < 1,100 magl with rationale	% compliance	Total non–compliant points	% non–compliance
May	Not applicable (n/a)			n/a			
June	Not applicable (n/a)			n/a			
July	Within SNGO Area	535	39	469	95	27	5
August	Within SNGO Area	553	47	471	94	35	6
September	Not applicable (n/a)			n/a			
Total		**1,088**	**86**	**940**	**94**	**62**	**6**

Table 15. **REANALYSIS** **Number of flight hours of flight height compliance within the Snow Goose area during moulting season, July 1 – August 31, 2018.**

Month	Area	Total Flight Hours	Compliant Flight Hours ≥ 1,100 magl		Compliant Flight Hours <1,100 magl with Rationale		Combined Compliance	Non-compliant Flight Hours	Non-compliance
			hrs	**%**	**hrs**	**%**	**%**		**%**
May	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
June	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
July	Within SNGO Area	17.62	1.30	7.39	14.46	82.07	89.46	1.86	10.54

Table 15. REANALYSIS Number of flight hours of flight height compliance within the Snow Goose area during moulting season, July 1 – August 31, 2018.

Month	Area	Total Flight Hours	Compliant Flight Hours ≥ 1,100 magl		Compliant Flight Hours <1,100 magl with Rationale		Combined Compliance	Non-compliant Flight Hours	Non-compliance
			hrs	%	hrs	%	%		%
May	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
August	Within SNGO Area	17.69	2.43	13.72	13.44	76.01	89.73	1.82	10.27
September	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total		**35.31**	**3.73**	**10.56**	**27.90**	**79.03**	**89.60**	**3.67**	**10.40**

For areas outside the Snow Goose area during moulting season and in all areas for all other months, compliance (including compliant with rationale) was approximately 2% lower for the flight hours from line segments compared to the original elevation point analysis and (Table 16 and Table 17). Percent compliance was lower for all months except May for the analysis by flight hours compared to the analysis by elevation points.

Table 16. ORIGINAL Elevation points calculated to obtain flight height compliance outside the Snow Goose area, May 1– September 30, 2018.

Month	Area	Total points	Total compliant points≥ 650 magl	Total compliant points < 650 magl with rationale	% compliance	Total non–compliant points	% non–compliance
May	All Areas	3,676	64	3,323	92	289	8
June	All Areas	11,895	915	10,918	99.4	62	0.5
July	Outside SNGO Area	16,892	1,126	15,462	98	304	2
August	Outside SNGO Area	19,860	846	18,611	98	403	2
September	All Areas	4,524	147	4,159	95	218	5
Total		**56,847**	**3,098**	**52,473**	**98**	**1,276**	**2**

Table 17. REANALYSIS Number of flight hours of flight height compliance outside the Snow Goose area during moulting season and in all areas in all other months between May 1 – September 30, 2018.

Month	Area	Total Flight Hours	Compliant Flight Hours ≥ 650 magl		Compliant Flight Hours <650 magl with Rationale		Combined Compliance	Non-compliant Flight Hours	Non-compliance
			hrs	%	hrs	%	%		%
May	All Areas	112.12	22.62	20.18	85.43	76.19	96.37	4.07	3.63
June	All Areas	358.23	106.01	29.59	247.57	69.11	98.70	4.64	1.30
July	Outside SNGO Area	491.24	156.31	31.82	322.81	65.71	97.53	12.13	2.47
August	Outside SNGO Area	573.34	175.18	30.55	369.78	64.50	95.05	28.39	4.95
September	All Areas	131.36	26.36	20.07	90.03	68.54	88.61	14.96	11.39
Total		**1,666.30**	**486.49**	**29.20**	**1,115.62**	**66.95**	**96.15**	**64.19**	**3.85**

Additional analysis was conducted for flight hours and compliance by rationale (Table 18). Flights with rationale from pilot logs accounted for 67.20% of the total flight hours. Within the Snow Goose area during moulting season, where the flight height requirement is ≥1100 magl, 1.64% of total flight hours were compliant with rationale. Outside the Snow Goose area and in all areas in all other months where the flight height requirement is ≥650 magl, 65.56% of total flight hours were compliant with rationale. The top reasons given for low level flights were slinging, surveys, and drop off/pick up.

Table 18. NEW Helicopter flight hours summarized according to pilot rationale for flights within the ≥1,100 magl and ≥650 magl flight height requirements, May 1 – September 30, 2018.

			≥1100 magl Flight Height Requirement		≥650 magl Flight Height Requirement	
Rationale	Flight Hours	% of Total Flight Hours	Flight Hours	% Flight Hours by Rationale	Flight Hours	% Flight Hours by Rationale
Slinging	486.91	28.62	1.94	0.11	484.98	28.50
Survey	288.85	16.98	4.22	0.25	284.63	16.73
Drop off/Pick up	277.22	16.29	16.08	0.95	261.14	15.35
Weather	55.12	3.24	5.33	0.31	49.80	2.93
Other	21.63	1.27	0.00	0.00	21.63	1.27
Sampling	11.35	0.67	0.34	0.02	11.01	0.65
Evacuation	2.44	0.14	0.00	0.00	2.44	0.14
Total	**1,143.52**	**67.20**	**27.90**	**1.64**	**1,115.62**	**65.56**

2019 Reanalysis

For the 2019 flight height reanalysis, the number of transits decreased, possibly due to changes in processing, however, the percent of transits is similar (Table 19 and Table 20). A total of 91% of transits were flown outside the Snow Goose area accounting for 97.08% of the flight hours while 9% of transits were flow over the Snow Goose area totalling 2.92% of the flight hours within the Snow Goose area (Table 20 and Table 21).

Table 19. ORIGINAL Number of transits flown per month with a breakdown of transits (№ and %) flown over and outside of the Snow Goose area, May 1– September 30, 2019.

Month	Total Number of Transits	Number of Transits Over Snow Goose Area	% Transits Over Snow Goose Area	Number of Transits Outside Snow Goose Area	% Transits Outside Snow Goose Area
May	88	0	0	88	100
June	737	74	10	663	90
July	1,223	99	8	1,124	92
August	1,047	108	10	939	90
September	284	6	2	278	98
Total	**3,426**	**292**	**8.5**	**3,134**	**91**

Table 20. REANALYSIS Number of transits flown per month with a breakdown of transits (№ and %) flown over and outside of the Snow Goose area, May 1– September 30, 2019.

Month	Total № of Transits	№ of Transits Over Snow Goose Area	% Transits Over Snow Goose Area	№ of Transits Outside Snow Goose Area	% Transits Outside Snow Goose Area
May	50	0	0	50	100
June	674	74	11	600	89
July	1,165	99	8	1,066	92
August	987	108	11	879	89
September	235	6	3	229	97
Total	**3,111**	**287**	**9**	**2,824**	**91**

Table 21. NEW Number of flight hours per month with a breakdown of flight time (hrs and %) flown within and outside of the Snow Goose area, May 1– September 30, 2019.

Month	Total Flight Hours	Flight Hours Over Snow Goose Area	% Flight Time Over Snow Goose Area	Flight Hours Outside Snow Goose Area	% Flight Time Outside Snow Goose Area
May	10.04	0.00	0.00	10.04	100.00
June	298.81	13.13	4.39	285.68	95.61
July	533.97	11.56	2.17	522.40	97.83
August	473.85	15.25	3.22	458.60	96.78
September	94.96	1.23	1.30	93.73	98.70
Total	**1,411.63**	**41.18**	**2.92**	**1,370.45**	**97.08**

Compliance within the Snow Goose area during moulting season (July and August) for the flight hours analysis was similar to the original elevation point analysis (Table 22 and Table 23). Compliance (including compliant with rationale) by flight hours was 93.8 % and non-compliance was 6.20%.

Table 22. ORIGINAL Elevation points calculated to obtain flight height compliance over the Snow Goose area, May 1– September 30, 2019.

Month	Area	Total Points	Total Compliant Points ≥1,100 magl	Total Compliant Points <1,100 magl with Rationale	% Compliance	Total Non–Compliant Points	% Non–Compliance
May	Not applicable (n/a)			n/a			
June	Not applicable (n/a)			n/a			
July	Within Snow Goose Area	344	72	240	91	32	9
August	Within Snow Goose Area	470	204	244	95	22	5
September	Not applicable (n/a)			n/a			
Total		**814**	**276**	**484**	**93**	**54**	**7**

magl = metres above ground level.

Table 23. REANALYSIS Number of flight hours of flight height compliance within the Snow Goose area during moulting season, July 1 – August 31, 2019.

Month	Area	Total Flight Hours	Compliant Flight Hours ≥ 1,100 magl		Compliant Flight Hours <1,100 magl with Rationale		Combined Compliance	Non-compliant Flight Hours	Non-compliance
			hrs	**%**	**hrs**	**%**	**%**		**%**
May	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
June	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
July	Within SNGO Area	11.56	3.16	27.36	8.33	72.00	99.36	0.07	0.64
August	Within SNGO Area	15.25	7.15	46.86	6.52	42.72	89.58	1.59	10.42
September	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total		**26.82**	**10.31**	**38.45**	**14.84**	**55.35**	**93.80**	**1.66**	**6.20**

For areas outside the Snow Goose area during moulting season and in all areas for all other months, compliance (including compliant with rationale) was approximately 2% higher for the flight hours from line segments compared to the original elevation point analysis (Table 24 and Table 25). Percent compliance was higher for all months except May for the analysis by flight hours compared to the analysis by elevation points.

Table 24. ORIGINAL Elevation points calculated to obtain flight height compliance outside the Snow Goose area, May 1– September 30, 2019.

Month	Area	Total Points	Total Compliant Points ≥650 magl	Total Compliant Points <650 magl with Rationale	% Compliance	Total Non–Compliant Points	% Non–Compliance
May	All Areas	381	25	327	92	29	8
June	All Areas	10,427	1,191	8,604	94	632	6
July	Outside Snow Goose Area	18,510	1,807	15,576	94	1,127	6
August	Outside Snow Goose Area	16,193	2,283	11,688	86	2,222	14
September	All Areas	3,314	212	2,863	93	239	7
Total		**48,825**	**5,518**	**39,058**	**91**	**4,249**	**9**

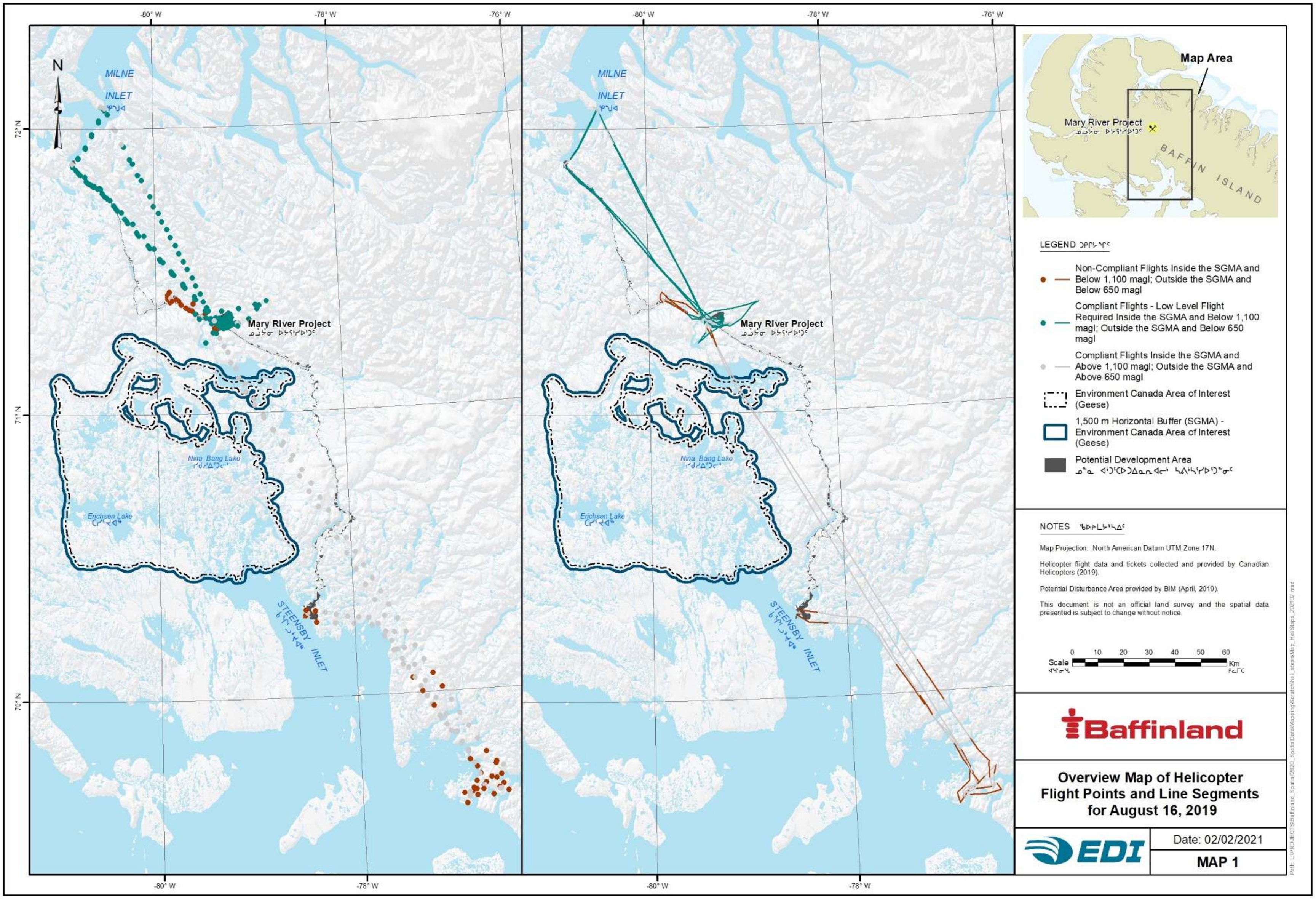
Table 25. REANALYSIS Number of flight hours of flight height compliance outside the Snow Goose area during moulting season and in all areas in all other months between May 1 – September 30, 2018.

Month	Area	Total Flight Hours	Compliant Flight Hours ≥ 650 magl		Compliant Flight Hours <650 magl with Rationale		Combined Compliance	Non-compliant Flight Hours	Non-compliance
			hrs	%	hrs	%	%		%
May	All Areas	10.04	3.40	33.83	4.81	47.88	81.71	1.84	18.29
June	All Areas	298.81	103.97	34.79	185.76	62.17	96.96	9.08	3.04
July	Outside SNGO Area	522.40	179.69	34.40	318.05	60.88	95.28	24.66	4.72
August	Outside SNGO Area	458.60	178.39	38.90	224.80	49.02	87.92	55.41	12.08
September	All Areas	94.96	24.27	25.55	64.99	68.44	93.99	5.71	6.01
Total		**1,384.81**	**489.71**	**35.36**	**798.40**	**57.65**	**93.02**	**96.70**	**6.98**

Additional analysis was conducted for flight hours and compliance by rationale (Table 26). Flights with rationale from pilot logs accounted for 57.61% of the total flight hours. Within the Snow Goose area during moulting season, where the flight height requirement is ≥1100 magl, 1.05% of total flight hours were compliant with rationale. Outside the Snow Goose area and in all areas in all other months where the flight height requirement is ≥650 magl, 56.56% of total flight hours were compliant with rationale. The top reasons given for low level flights were drop off/pick up, slinging and survey.

Table 26. NEW Number of flight hours for flights by rationale (both compliant and compliant with rationale line segments) flown within the ≥1100 magl and ≥650 magl flight height requirements, May 1 – September 30, 2019.

			≥1100 magl Flight Height Requirement		≥650 magl Flight Height Requirement	
Rationale	**Flight Hours**	**% of Total Flight Hours**	**Flight Hours**	**% Flight Hours by Rationale**	**Flight Hours**	**% Flight Hours by Rationale**
Drop off/Pick up	326.26	23.11	6.04	0.43	320.22	22.68
Slinging	227.87	16.14	3.22	0.23	224.65	15.91
Survey	176.21	12.48	3.56	0.25	172.65	12.23
Mobilization/Demobilization	21.22	1.50	0.00	0.00	21.22	1.50
Weather	18.55	1.31	1.51	0.11	17.04	1.21
Staking	17.12	1.21	0.00	0.00	17.12	1.21
Other	14.18	1.00	0.00	0.00	14.18	1.00
Sampling	10.94	0.77	0.51	0.04	10.43	0.74
Evacuation	0.83	0.06	0.00	0.00	0.83	0.06
Short Distance	0.07	0.00	0.00	0.00	0.07	0.00
Total	**813.25**	**57.61**	**14.84**	**1.05**	**798.40**	**56.56**



NOTES

Map Projection: North American Datum UTM Zone 17N.

Helicopter flight data and tickets collected and provided by Canadian Helicopters (2019).

Potential Disturbance Area provided by BIM (April, 2019).

This document is not an official land survey and the spatial data presented is subject to change without notice.

Overview Map of Helicopter Flight Points and Line Segments for August 16, 2019

Date: 02/02/2021

MAP 1

APPENDIX A SAMPLE PILOT TICKETS

CANADIAN HELICOPTERS
AN HNZ COMPANY

FLIGHT DATE	DAY	MO.	YR.
	22	06	19

P 435563

CONTRACT NO. (IF APPLICABLE) 7272-01

SUB. NO.

TYPE OF CONTRACT - X: HOURLY / DAILY MINIMUMS / 30 DAYS OR MORE

A/C SUBSTITUTED: ☐ YES ☐ NO TYPE:

BASE NO.	BASE NAME	AIRCRAFT TYPE	A/C CALL	FLIGHT LOCATION	NON REV. TYPE
733	Goose Bay	AS350B2	GATX	Mary River	

CUSTOMER NAME AND ADDRESS
Baffinland Exploration
Drill

POSTAL CODE

ATTENTION TO

TEL #

FAX #

	NAME	NUMBER
PILOT 1	Julien Labruyere	02768
PILOT 2		
ENG. 1	Paul Mary River	
ENG. 2		
ENG. 3		

CUSTOMER NO.	P.O. NUMBER	SUB. ORDER NO.
	4500063479	

	REMARKS	DG	# LDGS	# NAV. FEES	# PASS	PASSENGER NAME	START	STOP	FLIGHT TIME
1	Mary River	N/A				Manifest	17h26		
2	Deposit 1-3								
3	↳ crew move								
4	↳ Support								
5	↳ Drill move							6h00	3,2
6									
7	Night shift								
8	low altitude slinging								
	DANGEROUS GOODS TRANSPORTED (X)						TOTAL HOURS ▶		3,2

AIRCREW EXPENSES (IF APPLICABLE) R/C: ✓ IF RECHARGEABLE TO CUSTOMER

	HOTEL	R/C	BREAK	R/C	LUNCH	R/C	SUPPER	R/C
PILOT 1								
PILOT 2								
ENG. 1								
ENG.2								
ENG.3								

PILOT EXP. #

ENG. EXP. #

TOTAL CREW EXPENSES ▶ $

EXTRA CHARGES DESCRIPTION	✓GST INCL.	AMOUNT
LANDING / NAV CANADA / AIRPORT FEES		

TYPE OF WORK SPEC = 2,4H / Exploration

NON REV. HRS.	REV. HRS.	DAILY MINS.	HOURS CHARGEABLE
	3,2	2,0 ☐ DAILY ☒ AVG'D	3,2 H

CUSTOMER FUEL HRS/LTRS	TARIFF RATE	AMOUNT
		$

OUR FUEL - LITRES @

OUR FUEL - LITRES @

OUR FUEL - LITRES @

EXTRA CHARGES @

SUB TOTAL

G.S.T. / H.S.T. TAX NO.: 898699814-RT0001

TOTAL ▶ $

Customer acknowledges and agrees that the carriage of customer's baggage and cargo by Canadian Helicopters is subject to the terms, conditions and limitations of liability in its tariff, a copy of which is available at the office of Canadian Helicopters. Liability for loss or damage to baggage and cargo is limited to $1.00 per kilogram. Canadian Helicopters shall have no further liability whatsoever.

CUSTOMER MASSOUD ROBATIAN / M. Robat
PRINT NAME SIGNATURE

SIGNED FOR CARRIER

BY:

CUSTOMER COPY

CANADIAN HELICOPTERS

FLIGHT DATE	DAY	MO.	YR.	
	23	09	19	P 451030

CONTRACT NO. (IF APPLICABLE)	SUB. NO.
7272 - 01	

TYPE OF CONTRACT - X: HOURLY | DAILY MINIMUMS | 30 DAYS OR MORE

A/C SUBSTITUTED: ☐ YES ☐ NO TYPE:

BASE NO.	BASE NAME	AIRCRAFT TYPE	A/C CALL	FLIGHT LOCATION	NON REV. TYPE
73B	Goose Bay	AS350B2	GATX	Mary River	

CUSTOMER NAME AND ADDRESS
Baffinland
Exploration

POSTAL CODE

ATTENTION TO

TEL #

FAX #

	NAME	NUMBER
PILOT 1	Julien Labruyère	02768
PILOT 2		
ENG. 1	Pod Mary River	
ENG. 2		
ENG. 3		

CUSTOMER NO.	P.O. NUMBER	SUB. ORDER NO.
	4500063474	

REMARKS	DG	# LDGS	# NAV. FEES	# PASS	PASSENGER NAME	START	STOP	FLIGHT TIME
1 CMR2 → Magnetite Hill	N/A			2	Tam Post	7h01		
2 Magnetite Hill → CMR2							19h02	8,0
3								
4								
5								
6								
7								
8 Low flying Altitudes Survey								
DANGEROUS GOODS TRANSPORTED (X)						**TOTAL HOURS ▶**		8,0

AIRCREW EXPENSES (IF APPLICABLE) R/C: ✓ IF RECHARGEABLE TO CUSTOMER

	HOTEL	R/C	BREAK	R/C	LUNCH	R/C	SUPPER	R/C
PILOT 1								
PILOT 2								
ENG. 1								
ENG.2								
ENG.3								

PILOT EXP. #

ENG. EXP. #

TOTAL CREW EXPENSES ▶ $

EXTRA CHARGES DESCRIPTION	✓GST INCL	AMOUNT
LANDING / NAV CANADA / AIRPORT FEES		

TYPE OF WORK STAKING

NON REV. HRS.	REV. HRS.	DAILY MINS.	HOURS CHARGEABLE
	8,0	2,0 ✓ ☐ DAILY ☑ AVG'D	8,0

	TARIFF RATE	AMOUNT
CUSTOMER FUEL HRS/LTRS		$
OUR FUEL - LITRES @		
OUR FUEL - LITRES @		
OUR FUEL - LITRES @		
EXTRA CHARGES @		
SUB TOTAL		
G.S.T. / H.S.T. TAX NO.: 898699814-RT0001		

TOTAL ▶ $

SIGNED FOR CARRIER

BY:

Customer acknowledges and agrees that the carriage of customer's baggage and cargo by Canadian Helicopters is subject to the terms, conditions and limitations of liability in its tariff, a copy of which is available at the office of Canadian Helicopters. Liability for loss or damage to baggage and cargo is limited to $1.00 per kilogram. Canadian Helicopters shall have no further liability whatsoever.

CUSTOMER MASSOUD ROBATIAN / M. Robatian
PRINT NAME SIGNATURE

CUSTOMER COPY

CANADIAN HELICOPTERS

FLIGHT DATE	DAY	MO.	YR.	
	12	08	19	P 451161

CONTRACT NO. (IF APPLICABLE)	SUB. NO.	TYPE OF CONTRACT - X	A/C SUBSTITUTED
7272-4		HOURLY / DAILY MINIMUMS / 30 DAYS OR MORE	☐ YES ☐ NO TYPE:

BASE NO.	BASE NAME	AIRCRAFT TYPE	A/C CALL	FLIGHT LOCATION	NON REV. TYPE
7BB	Nunavut	350B3e	FNZZ	Mary River	

CUSTOMER NAME AND ADDRESS
Baffinland
Exploration

POSTAL CODE

ATTENTION TO

TEL #

FAX #

CUSTOMER NO.	P.O. NUMBER	SUB. ORDER NO.
	4500063233	

	NAME	NUMBER
PILOT 1	Martin Denommee	2774
PILOT 2		
ENG. 1	Pool Mary River	
ENG. 2		
ENG. 3		

	REMARKS	DG	# LDGS	# NAV. FEES	# PASS	PASSENGER NAME	START	STOP	FLIGHT TIME
1	CMR2 → Ege Bay					manifest	8:04	9:13	1.2
2	Ege Bay local					"	11:19	11:28	0.2
3	Ege Bay local					"	13:51	14:18	0.5
4	Ege Bay local					"	14:44	14:54	0.2
5	Ege Bay local					"	15:55	16:04	0.2
6	Ege Bay → CMR2					"	16:23	17:31	1.1
7									
8	low level flight due to pick up/drop off								
	DANGEROUS GOODS TRANSPORTED (X)						TOTAL HOURS ▶		3.4

AIRCREW EXPENSES (IF APPLICABLE) R/C: ✓ IF RECHARGEABLE TO CUSTOMER

	HOTEL	R/C	BREAK	R/C	LUNCH	R/C	SUPPER	R/C
PILOT 1								
PILOT 2								
ENG. 1								
ENG.2								
ENG.3								

PILOT EXP. #

ENG. EXP. #

TOTAL CREW EXPENSES ▶ $

EXTRA CHARGES DESCRIPTION	✓GST INCL.	AMOUNT
LANDING / NAV CANADA / AIRPORT FEES		

TYPE OF WORK

NON REV. HRS.	REV. HRS.	DAILY MINS.	HOURS CHARGEABLE
	3.4	☐ DAILY ☐ AVG'D	

	TARIFF RATE	AMOUNT
CUSTOMER FUEL HRS/LTRS		$
OUR FUEL - LITRES @		
OUR FUEL - LITRES @		
OUR FUEL - LITRES @		
EXTRA CHARGES @		
SUB TOTAL		
G.S.T. / H.S.T. TAX NO.: 898699814-RT0001		

TOTAL ▶ $

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CUSTOMER Luke Howitt / Luke Howitt
PRINT NAME SIGNATURE

SIGNED FOR CARRIER

BY:

CUSTOMER COPY

CANADIAN HELICOPTERS

P 455653

FLIGHT DATE	DAY	MO.	YR.
	16	07	2019

CONTRACT NO. (IF APPLICABLE)

SUB. NO.

TYPE OF CONTRACT - X: HOURLY / DAILY MINIMUMS / 30 DAYS OR MORE

A/C SUBSTITUTED: ☐ YES ☐ NO TYPE:

BASE NO.	BASE NAME	AIRCRAFT TYPE	A/C CALL	FLIGHT LOCATION	NON REV. TYPE
733	Goose Bay	AS350 B3e	FN22	Mary River	

CUSTOMER NAME AND ADDRESS
Baffinland Exploration

POSTAL CODE

ATTENTION TO

TEL #

FAX #

CUSTOMER NO.	P.O. NUMBER	SUB. ORDER NO.
7272-4	450 006 3233	

	NAME	NUMBER
PILOT 1	Jonah Renford	02230
PILOT 2		
ENG. 1	Pool Mary River	
ENG. 2		
ENG. 3		

	REMARKS	DG	# LDGS	# NAV. FEES	# PASS	PASSENGER NAME	START	STOP	FLIGHT TIME
1	Mary River → Eye Bay					manifest	09:43	10:55	1.2
2	Eye Bay → Mary River						15:31	16:43	1.2
3									
4									
5									
6	flew through snow goose zone								
7	below 4600 ASL ceiling not								
8	high enough.								

DANGEROUS GOODS TRANSPORTED (X)

TOTAL HOURS ▶ 2.4

AIRCREW EXPENSES (IF APPLICABLE) R/C: ✓ IF RECHARGEABLE TO CUSTOMER

	HOTEL	R/C	BREAK	R/C	LUNCH	R/C	SUPPER	R/C
PILOT 1								
PILOT 2								
ENG. 1								
ENG.2								
ENG.3								

PILOT EXP. #

ENG. EXP. #

TOTAL CREW EXPENSES ▶ $

EXTRA CHARGES DESCRIPTION	✓GST INCL.	AMOUNT
LANDING / NAV CANADA / AIRPORT FEES		

TYPE OF WORK
Exploration

NON REV. HRS.	REV. HRS.	DAILY MINS.	HOURS CHARGEABLE
	2.4	2.5 ☐ DAILY ☐ AVG'D	

	TARIFF RATE	AMOUNT
CUSTOMER FUEL HRS/LTRS 330L		$
OUR FUEL - LITRES @		
OUR FUEL - LITRES @		
OUR FUEL - LITRES @		
EXTRA CHARGES @		
SUB TOTAL		
G.S.T. / H.S.T. TAX NO.: 898699814-RT0001		

TOTAL ▶ $

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CUSTOMER Luke Howitt / Luke Howitt
PRINT NAME SIGNATURE

SIGNED FOR CARRIER
BY: Jonah Renford

CUSTOMER COPY

CANADIAN HELICOPTERS

FLIGHT DATE: DAY 21 MO. 07 YR. 14

P 455724

CONTRACT NO. (IF APPLICABLE): 7272-01

SUB. NO.:

TYPE OF CONTRACT - X: HOURLY DAILY MINIMUMS 30 DAYS OR MORE

A/C SUBSTITUTED: ☐ YES ☐ NO TYPE:

BASE NO.	BASE NAME	AIRCRAFT TYPE	A/C CALL	FLIGHT LOCATION	NON REV. TYPE
733	Goose Bay	AS350B2	FQNS	Mary River	

CUSTOMER NAME AND ADDRESS: Baffinland Exploration

POSTAL CODE:

ATTENTION TO:

TEL #:

FAX #:

CUSTOMER NO.	P.O. NUMBER	SUB. ORDER NO.
	4500063479	

	NAME	NUMBER
PILOT 1	LABRUYERE J	02768
PILOT 2		
ENG. 1	Pool Mary River	
ENG. 2		
ENG. 3		

	REMARKS	DG	# LDGS	# NAV. FEES	# PASS	PASSENGER NAME	START	STOP	FLIGHT TIME
1	CMR2 → New sites	N/A				Massoud/Tim/Tom	7h49		
2	New sites → CMR2	N/A						17h06	3,0
3									
4									
5									
6	low altitude flying								
7	→ photo → survey								
8									

DANGEROUS GOODS TRANSPORTED (X)

TOTAL HOURS ▶ 3,0

AIRCREW EXPENSES (IF APPLICABLE) R/C: ✓ IF RECHARGEABLE TO CUSTOMER

	HOTEL	R/C	BREAK	R/C	LUNCH	R/C	SUPPER	R/C
PILOT 1								
PILOT 2								
ENG. 1								
ENG.2								
ENG.3								

PILOT EXP. #

ENG. EXP. #

TOTAL CREW EXPENSES ▶ $

EXTRA CHARGES DESCRIPTION	✓GST INCL.	AMOUNT
LANDING / NAV CANADA / AIRPORT FEES		

TYPE OF WORK: Exploration New sites

NON REV. HRS.	REV. HRS.	DAILY MINS.	HOURS CHARGEABLE
	3,0	2,0 ☐ DAILY ☑ AVG'D	3,0

CUSTOMER FUEL HRS/LTRS

TARIFF RATE:

AMOUNT: $

OUR FUEL - LITRES @

OUR FUEL - LITRES @

OUR FUEL - LITRES @

EXTRA CHARGES @

SUB TOTAL

G.S.T. / H.S.T. TAX NO.: 898699814-RT0001

TOTAL ▶ $

SIGNED FOR CARRIER

BY:

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CUSTOMER: MASSOUD ROBATIAN /
PRINT NAME SIGNATURE

CUSTOMER COPY

APPENDIX E VEGETATION AND SOILS BASE METALS MONITORING SITES, 2012–2020

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
MP-01	Near	2014	L-56	1	1	1		0.00	DF-P-04	14.25	71.8709	-80.8824
		2020	MP-01_2020	1	1			0.00	DF-P-04	37.40	71.8710	-80.8817
MP-02	Near	2016	L-101	1	1			50.93	DF-P-04	594.69	71.8761	-80.8778
		2019	L-118	1	1			50.12	DF-P-04	573.38	71.8759	-80.8778
		2020	MP-02_2020	1	1			49.39	DF-P-04	572.11	71.8759	-80.8778
MP-03	Near	2016	L-100	1	1			36.01	DF-P-04	654.69	71.8767	-80.8783
		2019	L-119	1	1			39.89	DF-P-04	666.35	71.8768	-80.8782
		2020	MP-03_2020	1	1			35.72	DF-P-04	665.37	71.8768	-80.8783
MP-04	Near	2016	L-97	1	1			63.31	DF-P-04	833.29	71.8783	-80.8777
		2019	L-121	1	1			57.18	DF-P-06	817.54	71.8785	-80.8779
		2020	MP-04_2020	1	1			66.90	DF-P-06	837.00	71.8783	-80.8776
MP-05	Near	2016	L-96	1	1			45.74	DF-P-06	750.13	71.8791	-80.8783
		2019	L-122	1	1			46.14	DF-P-06	738.98	71.8792	-80.8783
		2020	MP-05_2020	1	1			46.84	DF-P-06	739.01	71.8792	-80.8783
MP-06	Near	2016	L-94	1	1			25.28	DF-P-06	549.02	71.8809	-80.8791
		2019	L-144	1	1			35.28	DF-P-06	560.19	71.8808	-80.8788
		2020	MP-06_2020	1	1			33.83	DF-P-06	552.37	71.8809	-80.8789
MP-07	Near	2016	L-91	1	1			66.59	DF-P-06	438.74	71.8819	-80.8780
		2019	L-145	1	1			44.35	DF-P-06	426.50	71.8820	-80.8786
		2020	MP-07_2020	1	1			43.67	DF-P-06	426.48	71.8820	-80.8786
MP-08	Near	2014	L-57	1		1		0.00	DF-P-06	6.37	71.8858	-80.8790
		2020	MP-08_2020	1	1			0.00	DF-P-06	12.14	71.8859	-80.8790
MP-09	Far	2019	L-147	1	1			104.15	DF-P-06	247.90	71.8838	-80.8760
		2020	MP-09_2020	1	1			119.47	DF-P-06	250.19	71.8838	-80.8755
MP-10	Near	2019	L-146	1	1			82.92	DF-P-06	322.07	71.8830	-80.8770
		2020	MP-10_2020	1	1			71.19	DF-P-06	303.79	71.8832	-80.8773

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
MP-11	Far	2016	L-93	1	1			171.14	DF-P-06	469.25	71.8818	-80.8750
		2020	MP-11_2020	1	1			171.37	DF-P-06	472.55	71.8818	-80.8750
MP-12	Far	2016	L-102	1	1			424.04	DF-P-04	758.30	71.8757	-80.8670
		2020	MP-12_2020	1	1			425.51	DF-P-04	760.84	71.8757	-80.8670
MP-13	Far	2019	L-142	1	1			841.35	DF-P-04	1034.94	71.8742	-80.8548
		2020	MP-13_2020	1	1			839.30	DF-P-04	1033.37	71.8742	-80.8549
MP-14	Far	2019	L-136	1	1			755.54	DF-P-04	1003.25	71.8753	-80.8574
		2020	MP-14_2020	1	1			755.34	DF-P-04	1000.59	71.8752	-80.8574
MP-15	Far	2016	L-103	1	1			649.33	DF-P-04	984.57	71.8765	-80.8606
		2020	MP-15_2020	1	1			647.47	DF-P-04	981.13	71.8765	-80.8607
MP-16	Reference	2013	L-02	1	1	1		3269.31	DF-P-03	0.84	71.8996	-80.7884
		2019	L-135	1	1			3266.82	DF-P-03	25.58	71.8994	-80.7882
		2020	MP-16_2020	1	1			3268.13	DF-P-03	18.93	71.8995	-80.7882
MP-17	Reference	2019	L-141	1	1			2168.16	DF-P-03	1744.01	71.8865	-80.8157
		2020	MP-17_2020	1	1			2164.88	DF-P-03	1742.16	71.8865	-80.8158
MP-18	Reference	2016	L-105	1	1			1824.06	DF-P-04	2055.62	71.8770	-80.8268
		2020	MP-18_2020	1	1			1822.94	DF-P-04	2053.91	71.8770	-80.8268
MP-19	Near	2016	L-92	1	1			44.65	DF-P-06	493.40	71.8814	-80.8786
		2019	L-143	1	1			34.25	DF-P-06	493.24	71.8814	-80.8789
MP-20	Near	2016	L-98	1	1			40.07	DF-P-04	763.50	71.8777	-80.8783
		2019	L-120	1	1			19.25	DF-P-04	759.54	71.8777	-80.8789
MP-21	Near	2013	L-01	1	1			0.00	DF-P-05	139.00	71.8850	-80.8912
MP-22	Reference	2019	L-140	1	1			2303.95	DF-P-03	1842.41	71.8848	-80.8118
MP-23	Near	2014	L-58	1	1			0.00	DF-P-07	324.09	71.8838	-80.9159
MP-24	Near	2016	L-95	1	1			28.98	DF-P-06	638.24	71.8801	-80.8789
MP-25	Near	2016	L-99	1	1			17.22	DF-P-04	704.72	71.8772	-80.8789

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
MP-26	Far	2019	L-137	1	1			726.06	DF-P-04	1051.98	71.8766	-80.8584
MP-27	Near	2013	L-03	1	1		1	0.00	DF-P-04	103.98	71.8702	-80.8844
MP-28	Reference	2019	L-139	1	1			3157.83	DF-P-03	127.06	71.8988	-80.7909
MP-29	Far	2016	L-104	1	1			805.58	DF-P-04	1024.99	71.8748	-80.8559
MP-30	Reference	2016	L-106	1	1			3217.83	DF-P-03	70.63	71.8999	-80.7902
MS-01	Near	2020	MS-01_2020	1	1			0.00	DF-M-01	42.23	71.3243	-79.3759
MS-02	Near	2019	L-128	1	1			30.95	DF-M-01	709.06	71.3202	-79.3595
		2020	MS-02_2020	1	1			38.52	DF-M-01	710.67	71.3201	-79.3596
MS-03	Near	2016	L-83	1	1			92.95	DF-M-07	1142.60	71.3101	-79.2012
		2019	L-154	1	1			87.41	DF-M-07	1144.64	71.3101	-79.2015
		2020	MS-03_2020	1	1			90.23	DF-M-07	1142.10	71.3101	-79.2014
MS-04	Near	2016	L-85	1	1			63.14	DF-M-03	1189.10	71.3102	-79.2114
		2019	L-155	1	1			74.36	DF-M-03	1192.90	71.3101	-79.2112
		2020	MS-04_2020	1	1			71.50	DF-M-03	1198.63	71.3101	-79.2111
MS-05	Near	2016	L-86	1	1			46.83	DF-M-03	817.49	71.3094	-79.2215
		2019	L-156	1	1			55.68	DF-M-03	803.94	71.3093	-79.2218
		2020	MS-05_2020	1	1			59.59	DF-M-03	806.40	71.3093	-79.2217
MS-06	Near	2016	L-88	1	1			53.84	DF-M-03	313.01	71.3075	-79.2346
		2019	L-157	1	1			53.23	DF-M-03	335.66	71.3076	-79.2340
		2020	MS-06_2020	1	1			53.58	DF-M-03	336.72	71.3076	-79.2340
MS-07	Near	2019	L-153	1	1			18.73	DF-M-02	1103.30	71.3004	-79.2729
		2020	MS-07_2020	1	1			26.40	DF-M-02	1109.90	71.3003	-79.2729
MS-08	Near	2016	L-82	1	1			69.06	DF-M-03	1214.29	71.2997	-79.2679
		2019	L-131	1	1			71.21	DF-M-03	1224.70	71.2997	-79.2683
		2020	MS-08_2020	1	1			66.38	DF-M-03	1219.61	71.2997	-79.2682
MS-09	Near	2019	L-130	1	1			33.83	DF-M-03	1094.74	71.2998	-79.2634

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blueberry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
		2020	MS-09_2020	1	1			27.76	DF-M-03	1092.06	71.2999	-79.2635
MS-10	Near	2019	L-132	1	1			1.56	DF-M-03	1033.91	71.3000	-79.2615
		2020	MS-10_2020	1	1			0.00	DF-M-03	1027.77	71.3000	-79.2614
MS-11	Far	2019	L-134	1	1			238.26	DF-M-01	867.31	71.3181	-79.3600
		2020	MS-11_2020	1	1			242.25	DF-M-01	866.72	71.3181	-79.3601
MS-12	Far	2020	MS-12_2020	1	1			335.08	DF-M-01	669.35	71.3187	-79.3679
MS-13	Far	2019	L-159	1	1			367.31	DF-M-07	1150.49	71.3103	-79.1922
		2020	MS-13_2020	1	1			365.40	DF-M-07	1149.14	71.3103	-79.1923
MS-14	Far	2016	L-115	1	1			451.95	DF-M-07	1186.34	71.3105	-79.1894
		2020	MS-14_2020	1	1			451.78	DF-M-07	1188.66	71.3105	-79.1894
MS-15	Far	2020	MS-15_2020	1	1			162.69	DF-M-03	479.82	71.3070	-79.2299
MS-16	Far	2020	MS-16_2021	1	1			353.30	DF-M-02	1302.34	71.2976	-79.2774
MS-17	Far	2020	MS-17_2021	1	1			655.56	DF-M-07	755.76	71.3043	-79.2116
MS-18	Far	2020	MS-18_2020	1	1			781.12	DF-M-02	1501.15	71.2951	-79.2891
MS-19	Far	2020	MS-19_2020	1	1			537.87	DF-M-02	1302.74	71.2969	-79.2854
MS-20	Far	2019	L-129	1	1			744.82	DF-M-01	1043.56	71.3150	-79.3712
		2020	MS-20_2020	1	1			740.84	DF-M-01	1040.50	71.3150	-79.3711
MS-21	Far	2020	MS-21_2020	1	1			947.46	DF-M-01	1173.86	71.3138	-79.3757
MS-22	Reference	2013	L-29	1	1	1		9228.31	DF-M-04	0.84	71.2197	-79.3277
MS-22	Reference	2019	L-165	1	1			9227.39	DF-M-04	3.28	71.2197	-79.3276
		2020	MS-22_2020	1	1			9233.41	DF-M-04	12.88	71.2196	-79.3274
MS-23	Reference	2019	L-138	1	1			4139.17	DF-M-08	303.03	71.2968	-79.0955
		2020	MS-23_2020	1	1			4143.27	DF-M-08	299.61	71.2968	-79.0954
MS-24	Reference	2019	L-166	1	1			10254.11	DF-M-05	1403.66	71.3843	-78.9051
		2020	MS-24_2020	1	1			10235.26	DF-M-05	1393.70	71.3843	-78.9057
MS-25	Reference	2014	L-65	1	1	1		1230.76	DF-M-07	2.38	71.3000	-79.1953

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
		2019	L-170	1	1			1221.17	DF-M-07	7.48	71.3001	-79.1953
		2020	MS-25_2020	1	1			1219.94	DF-M-07	22.60	71.3001	-79.1959
MS-26	Reference	2014	L-64	1	1			1186.92	DF-M-06	4.26	71.3196	-79.1559
		2016	L-113	1	1			1182.06	DF-M-06	5.49	71.3196	-79.1560
		2019	L-174	1	1			1215.24	DF-M-06	36.63	71.3196	-79.1550
MS-27	Reference	2014	L-66	1	1	1		4092.75	DF-M-08	2.87	71.2945	-79.1001
MS-28	Reference	2012	L-20	1	1			32532.26	DF-RS-08	28077.06	71.6457	-79.2153
MS-29	Reference	2012	L-28	1	1			39601.07	DF-M-05	30884.62	71.5403	-78.2296
MS-30	Reference	2016	L-111	1	1			10383.88	DF-M-05	1600.41	71.3860	-78.9034
MS-31	Reference	2012	L-27	1	-			2447.89	DF-M-06	7062.32	71.3758	-79.2471
MS-32	Reference	2012	L-26	1	1			2880.93	DF-M-06	3122.46	71.3391	-79.0935
MS-33	Far	2012	L-24	1	1			128.79	DF-M-01	979.85	71.3331	-79.3766
MS-34	Near	2019	L-133	1	1			18.65	DF-M-01	357.19	71.3220	-79.3677
MS-35	Far	2016	L-90	1	1			403.25	DF-M-01	707.93	71.3182	-79.3691
MS-36	Near	2016	L-84	1	1			83.75	DF-M-07	1168.22	71.3101	-79.2043
MS-37	Near	2016	L-87	1	1			62.94	DF-M-03	636.98	71.3089	-79.2263
MS-38	Near	2013	L-25	1	1	1		0.00	DF-M-03	2.44	71.3072	-79.2433
MS-39	Near	2019	L-158	1	1			92.01	DF-M-03	252.95	71.3060	-79.2373
MS-40	Near	2016	L-89	1	1			90.01	DF-M-03	339.23	71.3047	-79.2379
MS-41	Near	2016	L-117	1	1			46.20	DF-M-03	1150.47	71.2998	-79.2657
MS-42	Reference	2016	L-110	1	1			3869.16	DF-M-08	402.83	71.2981	-79.1020
MS-43	Reference	2014	L-67	1	1	1	1	3346.77	DF-M-09	5.01	71.2936	-79.4128
MS-44	Reference	2016	L-109	1	1			9105.87	DF-M-04	124.22	71.2208	-79.3274
MS-45	Reference	2016	L-112	1	1			1044.33	DF-M-06	141.07	71.3202	-79.1594
MS-46	Far	2016	L-114	1	1			391.40	DF-M-07	1095.36	71.3098	-79.1921
MS-47	Far	2019	L-160	1	1			417.07	DF-M-07	1250.49	71.3111	-79.1897

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
MS-48	Near	2013	L-23	1	1		1	0.00	DF-M-01	4.33	71.3243	-79.3747
MS-49	Near	2016	L-81	1	1			56.11	DF-M-02	1115.09	71.3001	-79.2737
TR-01	Near	2019	L-152	1	1			17.83	DF-RS-03	1549.83	71.3913	-79.7827
		2020	TR-01_2020	1	1			20.28	DF-RS-03	1554.86	71.3913	-79.7826
TR-02	Near	2020	TR-02_2020	1	1			92.93	DF-RS-03	1015.34	71.3920	-79.7984
TR-03	Near	2013	L-16	1	1	1		0.00	DF-RS-06	1.46	71.3986	-79.8234
		2019	L-151	1	1			0.00	DF-RS-06	3.56	71.3986	-79.8235
		2020	TR-03_2020	1	1			0.00	DF-RS-06	1.07	71.3986	-79.8234
TR-04	Near	2016	L-79	1	1			0.00	DF-RS-03	1554.84	71.3891	-79.7862
		2020	TR-04_2020	1	1			0.00	DF-RS-03	1530.50	71.3893	-79.7867
TR-05	Near	2013	L-15	1	1		1	67.05	DF-RS-03	0.53	71.3967	-79.8228
		2019	L-124	1	1			66.03	DF-RS-03	7.12	71.3967	-79.8230
		2020	TR-05_2020	1	1			83.57	DF-RS-03	31.38	71.3965	-79.8234
TR-06	Near	2019	L-125	1	1			75.11	DF-RS-03	207.05	71.3962	-79.8284
		2020	TR-06_2020	1	1			79.38	DF-RS-03	216.10	71.3961	-79.8286
TR-07	Near	2019	L-149	1	1			36.10	DF-RS-03	786.23	71.3958	-79.8447
		2020	TR-07_2020	1	1			38.12	DF-RS-03	789.90	71.3958	-79.8448
TR-08	Near	2019	L-172	1	1			19.48	DF-RN-05	11.16	71.7186	-80.4414
		2020	TR-08_2020	1	1			25.63	DF-RN-05	34.50	71.7188	-80.4416
TR-09	Near	2013	L-07	1	1			86.51	DF-RN-06	1.15	71.7189	-80.4397
		2020	TR-09_2020	1	1			90.05	DF-RN-06	3.50	71.7189	-80.4397
TR-10	Near	2013	L-06	1	1	1		73.72	DF-RN-03	3.79	71.7186	-80.4473
		2020	TR-10_2020	1	1			70.77	DF-RN-03	1.79	71.7186	-80.4473
TR-11	Far	2019	L-123	1	1			246.74	DF-RS-03	205.76	71.3954	-79.8187
		2020	TR-11_2020	1	1			245.67	DF-RS-03	204.98	71.3954	-79.8187
TR-12	Far	2016	L-116	1	1			449.12	DF-RS-02	2032.15	71.3833	-79.8862

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
		2020	TR-12_2020	1	1			446.80	DF-RS-02	2032.08	71.3833	-79.8862
TR-13	Far	2013	L-17	1	1	1		954.74	DF-RS-07	1.28	71.4077	-79.8182
		2016	L-77	1	1			976.34	DF-RS-07	28.53	71.4079	-79.8187
		2019	L-162	1	1			943.12	DF-RS-07	11.15	71.4076	-79.8182
		2020	TR-13_2020	1	1			945.14	DF-RS-07	16.80	71.4076	-79.8186
TR-14	Far	2013	L-14	1	1			627.65	DF-RS-02	4.26	71.3893	-79.8324
		2016	L-76	1	1			599.30	DF-RS-02	27.96	71.3896	-79.8326
		2019	L-161	1	1			611.19	DF-RS-02	14.93	71.3894	-79.8328
		2020	TR-14_2020	1	1			600.00	DF-RS-02	25.11	71.3896	-79.8327
TR-15	Reference	2013	L-12	1	1	1	1	13986.35	DF-RR-01	2.77	71.2805	-80.2450
		2019	L-169	1	1			13978.40	DF-RR-01	14.09	71.2806	-80.2451
		2020	TR-15_2020	1	1			13975.85	DF-RR-01	17.45	71.2806	-80.2451
TR-16	Reference	2013	L-22	1	-	1		6022.58	DF-RS-01	1.78	71.3275	-79.8001
		2019	L-168	1	1			6032.35	DF-RS-01	20.36	71.3275	-79.8007
		2020	TR-16_2020	1	1			6002.17	DF-RS-01	35.52	71.3278	-79.8006
TR-17	Reference	2013	L-19	1	-	1		6672.12	DF-RS-08	1.33	71.4489	-79.7106
		2019	L-167	1	1			6663.09	DF-RS-08	19.48	71.4489	-79.7112
		2020	TR-17_2020	1	1			6648.29	DF-RS-08	38.95	71.4486	-79.7103
TR-18	Reference	2014	L-63	1	1	1		10692.18	DF-P-03	11616.77	71.8805	-80.4592
TR-19	Reference	2014	L-59	1	1	1		13242.00	DF-RN-08	7368.60	71.7752	-80.1047
TR-20	Reference	2013	L-09	1	1	1		5925.58	DF-RN-08	1.78	71.7435	-80.2898
TR-21	Far	2013	L-08	1	1	1		979.87	DF-RN-07	0.84	71.7226	-80.4165
TR-22	Near	2019	L-173	1	1			13.98	DF-RN-04	48.43	71.7192	-80.4466
TR-23	Far	2016	L-75	1	1			282.93	DF-RS-03	215.51	71.3948	-79.8217
TR-24	Near	2016	L-72	1	1			63.07	DF-RS-03	712.12	71.3967	-79.8428
TR-25	Far	2013	L-05	1	1	1		998.63	DF-RN-02	0.84	71.7145	-80.4704

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
TR-26	Reference	2013	L-04	1	1	1		4544.76	DF-RN-01	1.48	71.6882	-80.5363
TR-27	Reference	2012	L-11	1	1			3019.46	DF-TR-56E	5924.75	71.5628	-80.2148
TR-28	Reference	2013	L-10	1	-	1		14000.46	DF-RR-02	2.30	71.5189	-80.6923
TR-29	Reference	2016	L-108	1	1			6899.43	DF-RS-08	293.17	71.4515	-79.7117
TR-30	Reference	2012	L-18	1	1			1494.38	DF-RS-07	820.09	71.4113	-79.7981
TR-31	Reference	2019	L-164	1	1			6723.69	DF-RS-08	50.97	71.4493	-79.7100
TR-32	Far	2019	L-163	1	1			587.64	DF-RS-06	1034.30	71.4004	-79.8519
TR-33	Near	2016	L-73	1	1			79.93	DF-RS-06	324.75	71.3984	-79.8325
TR-34	Near	2019	L-171	1	1			0.00	DF-RS-05	13.24	71.3981	-79.8230
TR-35	Near	2019	L-150	1	1			2.79	DF-RS-06	240.90	71.3980	-79.8299
TR-36	Near	2019	L-126	1	1			10.97	DF-RS-04	163.68	71.3978	-79.8177
TR-37	Near	2019	L-127	1	1			0.00	DF-RS-04	15.44	71.3974	-79.8225
TR-38	Near	2016	L-74	1	1			122.81	DF-RS-03	55.88	71.3962	-79.8227
TR-39	Near	2016	L-71	1	1			115.29	DF-RS-02	1011.26	71.3944	-79.8560
TR-40	Near	2019	L-148	1	1			53.92	DF-RS-02	910.20	71.3941	-79.8532
TR-41	Near	2016	L-70	1	1			151.45	DF-RS-02	1311.70	71.3933	-79.8671
TR-42	Near	2016	L-69	1	1			82.69	DF-RS-02	1191.70	71.3904	-79.8657
TR-43	Near	2016	L-80	1	1			135.29	DF-RS-03	1812.00	71.3904	-79.7759
TR-44	Near	2016	L-68	1	1			113.77	DF-RS-02	1577.96	71.3884	-79.8766
TR-45	Near	2014	L-60	1	1	1	1	22.33	DF-M-01	6617.87	71.3423	-79.5512
TR-46	Reference	2012	L-13	1	1			8657.51	DF-RR-01	6532.74	71.3387	-80.2239
TR-47	Reference	2012	L-21	1	1			15563.78	DF-RS-01	11813.00	71.2216	-79.7948
TR-48	Far	2014	L-61	1	1	1	1	474.82	DF-M-01	5580.24	71.3383	-79.5246
TR-49	Reference	2016	L-107	1	1			6196.55	DF-RS-01	179.61	71.3259	-79.8008
TR-50	Near	2016	L-78	1	1			96.48	DF-RS-03	969.72	71.3922	-79.7995
SP[3]-01	Near	2012	L-52	1	1			114648.66	DF-M-04	106703.48	70.3044	-78.4834

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude
SP-02	Reference	2012	L-53	1	1			116160.98	DF-M-04	108425.81	70.3025	-78.3506
SP-03	Reference	2012	L-54	1	1			122627.02	DF-M-04	114788.92	70.2413	-78.3607
SP-04	Reference	2012	L-51	1	1			108650.57	DF-M-04	100549.82	70.3491	-78.6165
SR[4]-01	Reference	2012	L-30	1	1			13826.31	DF-M-08	10252.60	71.2144	-78.9602
SR-02	Near	2012	L-31	1	1			17505.65	DF-M-08	13534.96	71.2128	-78.8212
SR-03	Reference	2012	L-32	1	1			32466.09	DF-M-05	24196.07	71.3204	-78.2655
SR-04	Reference	2012	L-33	1	1			23731.69	DF-M-04	14793.63	71.0875	-79.2946
SR-05	Reference	2012	L-34	1	1			36223.15	DF-M-08	32282.17	71.0966	-78.4455
SR-06	Near	2012	L-35	1	1			40222.23	DF-M-08	36202.87	71.0947	-78.3074
SR-07	Reference	2012	L-36	1	1			44424.52	DF-M-08	40362.82	71.0926	-78.1693
SR-08	Reference	2012	L-37	1	1			49880.53	DF-M-05	43090.31	71.1990	-77.8489
SR-09	Reference	2012	L-38	1	1			61126.19	DF-M-05	54910.40	71.1263	-77.5989
SR-10	Reference	2012	L-39	1	1			46027.24	DF-M-04	37303.99	70.8878	-79.2013
SR-11	Reference	2012	L-40	1	1			56697.25	DF-M-04	51289.90	70.8778	-78.3816
SR-12	Near	2012	L-41	1	1			59477.26	DF-M-04	54729.82	70.8763	-78.2491
SR-13	Reference	2012	L-42	1	1			62698.21	DF-M-04	58552.22	70.8734	-78.1139
SR-14	Reference	2012	L-43	1	1			85517.56	DF-M-08	81479.30	70.8591	-77.2928
SR-15	Reference	2012	L-44	1	1			66939.34	DF-M-04	58475.05	70.7046	-79.0278
SR-16	Reference	2012	L-45	1	1			75851.59	DF-M-04	69487.49	70.7024	-78.2643
SR-17	Far	2012	L-46	1	1			79833.16	DF-M-04	73738.24	70.6845	-78.1393
SR-18	Reference	2012	L-47	1	1			90414.17	DF-M-04	81810.38	70.4932	-79.0190
SR-19	Far	2012	L-48	1	1			97006.40	DF-M-04	89650.45	70.4844	-78.3384
SR-20	Reference	2012	L-49	1	1			98863.91	DF-M-04	91743.17	70.4813	-78.2233
SR-21	Reference	2012	L-50	1	1			114424.91	DF-M-04	109190.26	70.4673	-77.4203
SR-22	Reference	2012	L-55	1	1			128982.36	DF-M-04	122594.05	70.2890	-77.5545
SR-23	Near	2014	L-62	1	1	1	1	36343.66	DF-M-08	32283.33	71.1324	-78.3563

Appendix Table E-1. Vegetation and Soil Base Metals Monitoring Sites, 2012–2020.

Site ID	Distance Category	Year	Visit ID[1]	Soil	Lichen	Willow	Blue-berry	Distance to PDA (m)	Associated Dustfall Site[2]	Distance to Dustfall Site (m)	Latitude	Longitude

[1] Visit ID represents the specific position that the sample was taken for a particular sampling year. All Visit IDs have an associated Site ID.

[2] Dustfall collectors and metals sampling sites were considered 'associated' if Near sites (0–100 m of the Mine Site, Tote Road, Milne Port PDA) were within 0 – 12 m of a dustfall collector, Far sites (100–1,000 m from the PDA) were associated if up to 13–60 m of a dustfall collector, and Reference sites (≥1,000 m from the PDA) were associated if up to 60–150 m of a dustfall collector.

[34] SB = Steensby Inlet Port; SR = South Rail.

APPENDIX F VEGETATION AND SOILS BASE METALS MONITORING LAB RESULTS FOR CONTAMINANTS OF POTENTIAL CONCERN, 2012–2020

Appendix Table F-1. **Soil Metal Analysis of Chemicals of Potential Concern (2012 to 2020).**

Site	Distance Category	Year	Visit ID	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MP-01	Near	2014	L-56	1.01	0.119	4.55	4.73	0.5	22.7	71.8709	-80.8824
		2020	MP-01_2020	0.46	0.025	2.28	2.12	0.2	13.6	71.8710	-80.8817
MP-02	Near	2016	L-101	1	0.06	5.25	5.22	0.5	14.2	71.8761	-80.8778
		2019	L-118	0.69	0.02	3.73	3.69	0.2	9.7	71.8759	-80.8778
		2020	MP-02_2020	1.25	0.067	6.65	4.11	0.2	179	71.8759	-80.8778
MP-03	Near	2016	L-100	0.81	0.085	5.85	7.27	0.5	22.7	71.8767	-80.8783
		2019	L-119	0.94	0.024	3.41	5.77	0.2	17.3	71.8768	-80.8782
		2020	MP-03_2020	1.17	0.032	4.46	5.3	0.2	19	71.8768	-80.8783
MP-04	Near	2016	L-97	0.73	0.091	11.1	4.46	0.5	15.9	71.8783	-80.8777
		2019	L-121	1.44	0.028	7.13	6.65	0.2	20.5	71.8785	-80.8779
		2020	MP-04_2020	2.15	0.056	8.29	7.06	0.2	24.2	71.8783	-80.8776
MP-05	Near	2016	L-96	1.1	0.082	5.27	6.5	0.5	20.9	71.8791	-80.8783
		2019	L-122	0.96	0.025	5.27	5.2	0.2	14.3	71.8792	-80.8783
		2020	MP-05_2020	1.05	0.028	5.51	5.67	0.2	15.7	71.8792	-80.8783
MP-06	Near	2016	L-94	0.69	0.05	5.72	7.72	0.5	15.8	71.8809	-80.8791
		2019	L-144	1.52	0.029	8.48	8.23	0.2	23.4	71.8808	-80.8788
		2020	MP-06_2020	1.07	0.023	6.32	6.65	0.2	18.9	71.8809	-80.8789
MP-07	Near	2017	L-91	2.78	0.075	27.2	22.5	0.2	35.3	71.8819	-80.8780
		2019	L-145	4.38	0.073	18.1	14	0.2	31.1	71.8820	-80.8786
		2020	MP-07_2020	3.59	0.066	14.6	12.3	0.2	27.7	71.8820	-80.8786
MP-08	Near	2014	L-57	1.82	0.147	4.44	4.43	0.5	10.2	71.8858	-80.8790
		2020	MP-08_2020	1.33	0.045	5.86	4.11	0.2	15.9	71.8859	-80.8790
MP-09	Near	2019	L-146	4.09	0.064	16.1	13.9	0.2	31.9	71.8838	-80.8760
		2020	MP-09_2020	1.5	0.04	6.73	5.93	0.2	16.8	71.8838	-80.8755
MP-10	Near	2019	L-147	3.5	0.065	14.2	12.4	0.2	32	71.8830	-80.8770
		2020	MP-10_2020	2.31	0.077	12.4	10.7	0.21	28.3	71.8832	-80.8773
MP-11	Near	2016	L-93	0.5	0.074	3.69	3.48	0.5	23.9	71.8818	-80.8750
		2020	MP-11_2020	1.48	0.048	8.09	11.5	0.2	31.9	71.8818	-80.8750
MP-12	Far	2016	L-102	0.75	0.101	4.56	4.52	0.5	13.7	71.8757	-80.8670
		2020	MP-12_2020	1.21	0.024	5.37	5.63	0.2	22.8	71.8757	-80.8670

Appendix Table F-1. Soil Metal Analysis of Chemicals of Potential Concern (2012 to 2020).

Site	Distance Category	Year	Visit ID	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MP-13	Far	2019	L-142	2.46	0.052	12	19	0.2	31	71.8742	-80.8548
		2020	MP-13_2020	1.75	0.185	15.4	11.6	0.4	49.6	71.8742	-80.8549
MP-14	Far	2016	L-104	0.5	0.05	1.55	1.82	0.5	4.2	71.8753	-80.8574
		2020	MP-14_2020	1.13	0.043	6.06	6.79	0.2	20.3	71.8752	-80.8574
MP-15	Far	2016	L-103	0.5	0.076	3.17	3.55	0.5	9.9	71.8765	-80.8606
		2020	MP-15_2020	1.41	0.036	6.23	7.05	0.2	22.9	71.8765	-80.8607
MP-16	Reference	2013	L-02	0.57	0.08	4.2	2.92	0.5	11.4	71.8996	-80.7884
		2019	L-135	1.65	0.026	7.8	6.65	0.2	21.1	71.8994	-80.7882
		2020	MP-16_2020	1.55	0.036	7.9	5.89	0.2	22.3	71.8995	-80.7882
MP-17	Reference	2019	L-141	0.71	0.04	4.88	3.92	0.2	16.7	71.8865	-80.8157
		2020	MP-17_2020	0.97	0.02	3.53	3.74	0.2	10.4	71.8865	-80.8158
MP-18	Reference	2016	L-105	0.89	0.121	9.6	4.41	0.5	19.6	71.8770	-80.8268
		2020	MP-18_2020	1.09	0.02	4.12	4.32	0.2	20.3	71.8770	-80.8268
MP-19	Near	2016	L-92	0.5	0.05	2.02	3.69	0.5	12.1	71.8814	-80.8786
		2019	L-143	0.74	0.02	3.75	5.74	0.2	17	71.8814	-80.8789
MP-20	Near	2016	L-98	0.59	0.057	4.13	4.32	0.5	15.5	71.8777	-80.8783
		2019	L-120	1.17	0.04	5.47	5.92	0.2	18	71.8777	-80.8789
MP-21	Near	2013	L-01	0.5	0.05	1.56	1.64	0.5	4.1	71.8850	-80.8912
MP-22	Reference	2019	L-140	0.34	0.02	2.65	1.39	0.2	5.8	71.8848	-80.8118
MP-23	Near	2014	L-58	1.01	0.05	1.92	1.97	0.5	5.6	71.8838	-80.9159
MP-24	Near	2016	L-95	0.74	0.067	4.13	4.09	0.5	12.6	71.8801	-80.8789
MP-25	Near	2016	L-99	1.19	0.136	8.49	8.31	0.5	25.1	71.8772	-80.8789
MP-26	Far	2019	L-137	1.02	0.026	4.92	5.17	0.2	16.9	71.8766	-80.8584
MP-27	Near	2013	L-03	0.5	0.081	6.17	5.6	0.5	34.3	71.8702	-80.8844
MP-28	Reference	2019	L-139	1.11	0.021	5.71	4.34	0.2	12.9	71.8988	-80.7909
MP-29	Far	2019	L-136	1.79	0.048	7.69	9.31	0.2	30.6	71.8748	-80.8559
MP-30	Reference	2016	L-106	0.83	0.064	3.55	2.98	0.5	9.5	71.8999	-80.7902
MS-01	Near	2020	MS-01_2020	0.63	0.042	3.86	3.6	0.2	12.3	71.3243	-79.3759
MS-02	Near	2019	L-128	0.33	0.02	2.25	1.84	0.2	4.2	71.3202	-79.3595
		2020	MS-02_2020	0.39	0.06	4.04	1.72	0.2	8.8	71.3201	-79.3596
MS-03	Near	2016	L-83	1.53	0.152	19.1	10.8	0.5	29.7	71.3101	-79.2012

Appendix Table F-1. Soil Metal Analysis of Chemicals of Potential Concern (2012 to 2020).

Site	Distance Category	Year	Visit ID	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
		2019	L-154	3.35	0.069	49.6	17.9	0.36	45.8	71.3101	-79.2015
		2020	MS-03_2020	1.84	0.109	26.9	10.7	0.4	39.1	71.3101	-79.2014
MS-04	Near	2016	L-85	0.77	0.05	6.56	4.02	0.5	13.8	71.3102	-79.2114
		2019	L-155	1.59	0.036	8.16	7.7	0.2	22.6	71.3101	-79.2112
		2020	MS-04_2020	1.56	0.051	13.4	6.53	0.2	29.9	71.3101	-79.2111
MS-05	Near	2016	L-86	1.06	0.093	11.7	10.5	0.5	18.5	71.3094	-79.2215
		2019	L-156	1.52	0.025	8.06	4.62	0.25	14.9	71.3093	-79.2218
		2020	MS-05_2020	2.41	0.037	15.4	6.89	0.2	18	71.3093	-79.2217
MS-06	Near	2016	L-88	0.5	0.05	2.31	2.61	0.5	8.3	71.3075	-79.2346
		2019	L-157	0.79	0.085	81.2	13.3	0.2	88.4	71.3076	-79.2340
		2020	MS-06_2020	3.29	0.557	370	38.5	0.24	152	71.3076	-79.2340
MS-07	Near	2019	L-153	0.36	0.02	2.32	2.7	0.2	9.2	71.3004	-79.2729
		2020	MS-07_2020	0.29	0.02	2.09	2.41	0.2	10.1	71.3003	-79.2729
MS-08	Near	2016	L-82	0.5	0.064	2.67	3.91	0.5	11.8	71.2997	-79.2679
		2019	L-131	0.67	0.024	2.57	5.43	0.2	16.8	71.2997	-79.2683
		2020	MS-08_2020	0.66	0.05	7.09	3.84	0.2	9.8	71.2997	-79.2682
MS-09	Near	2019	L-130	0.25	0.025	3.74	2.11	0.25	7.4	71.2998	-79.2634
		2020	MS-09_2020	0.39	0.02	2.21	2.98	0.2	8.1	71.2999	-79.2635
MS-10	Near	2019	L-132	0.35	0.02	2.13	2.4	0.2	8.3	71.3000	-79.2615
		2020	MS-10_2020	0.65	0.039	4.78	5.11	0.2	13.5	71.3000	-79.2614
MS-11	Far	2019	L-134	1.3	0.02	4.77	5.42	0.2	11.7	71.3181	-79.3600
		2020	MS-11_2020	0.74	0.027	6.07	3.46	0.2	10	71.3181	-79.3601
MS-12	Far	2020	MS-12_2020	0.42	0.083	5.39	2.53	0.2	11.4	71.3187	-79.3679
MS-13	Far	2019	L-159	0.4	0.02	1.86	2.95	0.2	7.5	71.3103	-79.1922
		2020	MS-13_2020	0.43	0.02	1.86	2.64	0.2	9.1	71.3103	-79.1923
MS-14	Far	2016	L-115	0.5	0.06	3.01	3.45	0.5	10.1	71.3105	-79.1894
		2020	MS-14_2020	0.62	0.02	2.58	3.37	0.2	9.4	71.3105	-79.1894
MS-15	Far	2020	MS-15_2020	0.97	0.021	5.19	5.15	0.2	13.9	71.3070	-79.2299
MS-16	Far	2020	MS-16_2021	0.31	0.03	3.19	2.23	0.2	10.9	71.2976	-79.2774
MS-17	Far	2020	MS-17_2021	1.52	0.04	5.62	4.45	0.2	15	71.3043	-79.2116
MS-18	Far	2020	MS-18_2020	0.25	0.026	2.15	1.66	0.2	9.6	71.2951	-79.2891

Appendix Table F-1. Soil Metal Analysis of Chemicals of Potential Concern (2012 to 2020).

Site	Distance Category	Year	Visit ID	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MS-19	Far	2020	MS-19_2020	0.32	0.032	2.96	2.2	0.2	6.3	71.2969	-79.2854
MS-20	Far	2019	L-129	0.76	0.02	3.86	2.75	0.2	2.9	71.3150	-79.3712
		2020	MS-20_2020	0.73	0.02	4.29	2.43	0.2	2.9	71.3150	-79.3711
MS-21	Far	2020	MS-21_2020	0.24	0.02	3.15	2.53	0.2	11.8	71.3138	-79.3757
MS-22	Far	2013	L-29	0.5	0.05	2.73	3.22	0.5	16.5	71.2197	-79.3277
		2019	L-165	0.36	0.02	4.07	2.35	0.2	10.3	71.2197	-79.3276
		2020	MS-22_2020	0.73	0.024	12.6	5.98	0.2	26.9	71.2196	-79.3274
MS-23	Reference	2019	L-138	0.71	0.02	2.19	4.5	0.2	8.1	71.2968	-79.0955
		2020	MS-23_2020	0.31	0.02	1.3	2.12	0.2	5.4	71.2968	-79.0954
MS-24	Reference	2019	L-166	0.25	0.02	2.32	2.43	0.2	10.3	71.3843	-78.9051
		2020	MS-24_2020	0.75	0.022	8	5.78	0.2	22.2	71.3843	-78.9057
MS-25	Far	2014	L-65	0.81	0.05	4.85	4.84	0.5	12.3	71.3000	-79.1953
		2019	L-170	0.37	0.02	2.03	2.96	0.2	6.9	71.3001	-79.1953
		2020	MS-25_2020	1.09	0.033	7.13	5.57	0.2	15.8	71.3001	-79.1959
MS-26	Reference	2014	L-64	1.86	0.05	5.66	2.77	0.5	12.5	71.3196	-79.1559
		2016	L-113	0.57	0.126	5.96	4.56	0.5	15.7	71.3196	-79.1560
		2019	L-174	0.59	0.029	3.42	4.72	0.2	19.9	71.3196	-79.1550
MS-27	Reference	2014	L-66	0.83	0.158	8.79	4.89	0.5	16.3	71.2945	-79.1001
MS-28	Reference	2012	L-20	0.5	0.055	4.29	4.13	0.5	15.9	71.6457	-79.2153
MS-29	Reference	2012	L-28	0.5	0.103	10.1	4.75	0.5	39.1	71.5403	-78.2296
MS-30	Reference	2016	L-111	0.5	0.084	2.99	2.83	0.5	12.4	71.3860	-78.9034
MS-31	Reference	2012	L-27	0.91	0.275	10.2	6.83	0.5	23.1	71.3758	-79.2471
MS-32	Reference	2012	L-26	0.5	0.072	3.58	3.02	0.5	8.1	71.3391	-79.0935
MS-33	Far	2012	L-24	0.5	0.066	2.78	2.02	0.5	10.5	71.3331	-79.3766
MS-34	Near	2019	L-133	0.39	0.02	2.99	2	0.2	4.6	71.3220	-79.3677
MS-35	Near	2016	L-90	0.5	0.05	2.09	2.24	0.5	7.9	71.3182	-79.3691
MS-36	Near	2016	L-84	0.84	0.07	6.94	7.4	0.5	24.4	71.3101	-79.2043
MS-37	Near	2016	L-87	0.5	0.05	1.54	2.99	0.5	7.1	71.3089	-79.2263
MS-38	Near	2013	L-25	0.61	0.102	7.27	4.55	0.5	17.1	71.3072	-79.2433
MS-39	Near	2019	L-158	0.49	0.029	4.64	6.66	0.2	8.7	71.3060	-79.2373
MS-40	Near	2016	L-89	0.5	0.061	2.4	3.02	0.5	11.7	71.3047	-79.2379

Appendix Table F-1. **Soil Metal Analysis of Chemicals of Potential Concern (2012 to 2020).**

Site	Distance Category	Year	Visit ID	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MS-41	Near	2016	L-117	1.2	0.108	8.05	6.09	0.5	16.2	71.2998	-79.2657
MS-42	Near	2016	L-110	0.75	0.05	3.42	4.16	0.5	13.7	71.2981	-79.1020
MS-43	Near	2014	L-67	0.5	0.05	0.86	1.4	0.5	4.1	71.2936	-79.4128
MS-44	Near	2016	L-109	0.5	0.05	2.65	1.73	0.5	8.1	71.2208	-79.3274
MS-45	Near	2016	L-112	0.87	0.152	16.9	6.62	0.5	39.6	71.3202	-79.1594
MS-46	Far	2016	L-114	0.56	0.05	3.97	4.34	0.5	10.1	71.3098	-79.1921
MS-47	Far	2019	L-160	0.25	0.02	0.9	1.6	0.2	3.3	71.3111	-79.1897
MS-48	Far	2013	L-23	0.5	0.05	2.41	3.31	0.5	11.4	71.3243	-79.3747
MS-49	Near	2016	L-81	0.5	0.05	2.76	11.2	0.5	6.4	71.3001	-79.2737
TR-01	Near	2019	L-152	0.2	0.02	1.18	1.43	0.2	3.8	71.3913	-79.7827
		2020	TR-01_2020	0.16	0.02	1.05	1.15	0.2	3.5	71.3913	-79.7826
TR-02	Near	2020	TR-02_2020	0.22	0.02	1.79	1.69	0.2	5.2	71.3920	-79.7984
TR-03	Near	2013	L-16	0.5	0.05	1.17	0.89	0.5	2.3	71.3986	-79.8234
		2019	L-151	0.25	0.02	1.71	1.12	0.2	3.4	71.3986	-79.8235
		2020	TR-03_2020	0.21	0.02	2.38	1.6	0.2	5.1	71.3986	-79.8234
TR-04	Near	2016	L-79	0.5	0.05	0.5	0.77	0.5	1	71.3891	-79.7862
		2020	TR-04_2020	0.1	0.02	0.51	0.8	0.2	2	71.3893	-79.7867
TR-05	Near	2013	L-15	0.5	0.05	0.96	0.82	0.5	3.2	71.3967	-79.8228
		2019	L-124	0.17	0.02	0.89	1	0.2	2.8	71.3967	-79.8230
		2020	TR-05_2020	0.21	0.02	2.82	1.45	0.2	6.4	71.3965	-79.8234
TR-06	Near	2019	L-125	0.15	0.02	1.03	1.05	0.2	3.1	71.3962	-79.8284
		2020	TR-06_2020	0.21	0.022	1.85	1.69	0.2	6.7	71.3961	-79.8286
TR-07	Near	2019	L-149	0.2	0.02	1.56	1.41	0.2	3.9	71.3958	-79.8447
		2020	TR-07_2020	0.11	0.02	0.75	0.9	0.2	3.3	71.3958	-79.8448
TR-08	Near	2019	L-172	1.08	0.021	4.06	3.4	0.2	9.2	71.7186	-80.4414
		2020	TR-08_2020	1.56	0.042	5.85	4.9	0.2	316	71.7188	-80.4416
TR-09	Near	2013	L-07	1.25	0.061	7.03	6.51	0.5	16.2	71.7189	-80.4397
		2020	TR-09_2020	1.48	0.031	5.26	4.31	0.2	10.9	71.7189	-80.4397
TR-10	Near	2013	L-06	1.19	0.075	6.03	5.26	0.5	11.6	71.7186	-80.4473
		2020	TR-10_2020	0.95	0.024	4.05	3.27	0.2	11	71.7186	-80.4473
TR-11	Far	2019	L-123	0.14	0.02	1.07	1.26	0.2	3.5	71.3954	-79.8187

Appendix Table F-1. Soil Metal Analysis of Chemicals of Potential Concern (2012 to 2020).

Site	Distance Category	Year	Visit ID	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
		2020	TR-11_2020	0.3	0.02	2.37	1.97	0.2	7.4	71.3954	-79.8187
TR-12	Far	2016	L-116	0.5	0.07	0.52	0.85	0.5	2	71.3833	-79.8862
		2020	TR-12_2020	0.16	0.02	0.74	0.86	0.2	2.6	71.3833	-79.8862
TR-13	Far	2013	L-17	0.5	0.05	1.77	1.29	0.5	4.4	71.4077	-79.8182
		2016	L-77	0.5	0.05	1.47	1.11	0.5	4.8	71.4079	-79.8187
		2019	L-162	0.12	0.02	0.96	1.11	0.2	2.5	71.4076	-79.8182
		2020	TR-13_2020	0.13	0.02	1.36	0.92	0.2	3.8	71.4076	-79.8186
TR-14	Far	2013	L-14	1.26	0.08	3.97	2.11	0.5	17	71.3893	-79.8324
		2016	L-76	0.5	0.05	0.57	0.82	0.5	2.5	71.3896	-79.8326
		2019	L-161	0.1	0.02	0.5	0.96	0.2	2	71.3894	-79.8328
		2020	TR-14_2020	0.23	0.023	2.69	2.16	0.2	4.4	71.3896	-79.8327
TR-15	Reference	2013	L-12	0.71	0.063	5.04	3.16	0.5	8.9	71.2805	-80.2450
		2019	L-169	0.33	0.02	1.04	1.78	0.2	4.2	71.2806	-80.2451
		2020	TR-15_2020	0.29	0.024	1.42	1.26	0.2	4.5	71.2806	-80.2451
TR-16	Reference	2013	L-22	0.5	0.252	5.82	4.95	0.5	15.9	71.3275	-79.8001
		2019	L-168	1.03	0.02	5.96	4.91	0.2	14.9	71.3275	-79.8007
		2020	TR-16_2020	1.65	0.02	10.2	6.9	0.2	22.6	71.3278	-79.8006
TR-17	Reference	2013	L-19	0.5	0.073	4.51	1.96	0.5	7.5	71.4489	-79.7106
		2019	L-167	1.52	0.046	15.1	6.89	0.4	27.2	71.4489	-79.7112
		2020	TR-17_2020	0.98	0.02	9.13	3.64	0.2	14.3	71.4486	-79.7103
TR-18	Near	2014	L-63	0.9	0.15	5.82	5.16	0.5	16.9	71.8805	-80.4592
TR-19	Near	2014	L-59	0.86	0.05	3.43	4.91	0.5	19.4	71.7752	-80.1047
TR-20	Near	2013	L-09	0.5	0.05	2.03	2.94	0.5	6.9	71.7435	-80.2898
TR-21	Near	2013	L-08	0.6	0.05	3.99	2.3	0.5	6.2	71.7226	-80.4165
TR-22	Near	2019	L-173	0.95	0.207	49.8	28.2	0.2	86.2	71.7192	-80.4466
TR-23	Far	2016	L-75	0.5	0.05	0.73	0.94	0.5	2.5	71.3948	-79.8217
TR-24	Near	2016	L-72	0.5	0.05	1.26	1.21	0.5	3.7	71.3967	-79.8428
TR-25	Far	2013	L-05	0.78	0.066	4.45	3.89	0.5	8.1	71.7145	-80.4704
TR-26	Far	2013	L-04	0.9	0.134	8.38	6.97	0.5	15.9	71.6882	-80.5363
TR-27	Far	2012	L-11	1.43	0.132	8.77	7.85	0.5	13.9	71.5628	-80.2148
TR-28	Far	2013	L-10	0.5	0.25	6.14	7.74	0.5	16.4	71.5189	-80.6923

Appendix Table F-1. Soil Metal Analysis of Chemicals of Potential Concern (2012 to 2020).

Site	Distance Category	Year	Visit ID	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
TR-29	Far	2016	L-108	0.53	0.057	5.53	3.86	0.5	14.5	71.4515	-79.7117
TR-30	Far	2012	L-18	4.14	0.05	4.53	1.93	0.5	6.6	71.4113	-79.7981
TR-31	Reference	2019	L-164	0.84	0.02	5.73	3	0.5	2	71.4493	-79.7100
TR-32	Far	2019	L-163	0.14	0.02	0.99	1.08	0.2	3.2	71.4004	-79.8519
TR-33	Far	2016	L-73	0.5	0.05	1.19	1.18	0.5	4.3	71.3984	-79.8325
TR-34	Reference	2019	L-171	0.24	0.02	1.84	1.41	0.2	4.1	71.3981	-79.8230
TR-35	Reference	2019	L-150	0.23	0.02	1.44	1.47	0.2	3.5	71.3980	-79.8299
TR-36	Reference	2019	L-126	0.11	0.02	1.58	0.8	0.2	2.9	71.3978	-79.8177
TR-37	Reference	2019	L-127	0.14	0.02	1.3	0.97	0.2	3.9	71.3974	-79.8225
TR-38	Reference	2016	L-74	0.5	0.05	1.06	1.53	0.5	3.9	71.3962	-79.8227
TR-39	Reference	2017	L-71	0.22	0.02	1.02	1.61	0.2	2.6	71.3944	-79.8560
TR-40	Reference	2019	L-148	0.17	0.02	1.05	1.08	0.2	2.4	71.3941	-79.8532
TR-41	Reference	2016	L-70	0.5	0.05	0.64	0.97	0.5	3.3	71.3933	-79.8671
TR-42	Reference	2016	L-69	0.5	0.05	1.09	1.54	0.5	3.7	71.3904	-79.8657
TR-43	Reference	2016	L-80	0.5	0.05	0.5	0.54	0.5	1.2	71.3904	-79.7759
TR-44	Reference	2016	L-68	0.5	0.05	0.76	1.05	0.5	2.2	71.3884	-79.8766
TR-45	Reference	2014	L-60	0.61	0.05	2.42	2.12	0.5	8.4	71.3423	-79.5512
TR-46	Reference	2012	L-13	0.5	0.05	0.67	1.18	0.5	2.4	71.3387	-80.2239
TR-47	Reference	2012	L-21	0.5	0.05	2.21	4.03	0.5	16.9	71.2216	-79.7948
TR-48	Far	2014	L-61	0.5	0.05	2.34	1.76	0.5	9.8	71.3383	-79.5246
TR-49	Reference	2016	L-107	1.17	0.05	2.96	2.65	0.5	10	71.3259	-79.8008
TR-50	Near	2016	L-78	0.5	0.05	0.8	0.78	0.5	2.1	71.3922	-79.7995

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MP-01	Near	2014	L-56	0.187	0.094	2.12	2.6	0.142	16.2	71.8709	-80.8824
		2020	MP-01_2020	0.084	0.0341	1.29	1.6	0.062	13.5	71.8710	-80.8817
MP-02	Near	2016	L-101	0.055	0.036	0.739	0.931	0.077	7.16	71.8761	-80.8778
		2019	L-118	0.174	0.0707	1.84	2.9	0.15	7.97	71.8759	-80.8778
		2020	MP-02_2020	0.084	0.0311	0.92	1.65	0.08	7.92	71.8759	-80.8778
MP-03	Near	2016	L-100	0.068	0.035	0.785	0.902	0.056	7.85	71.8767	-80.8783
		2019	L-119	0.096	0.0394	0.91	1.67	0.08	8.93	71.8768	-80.8782
		2020	MP-03_2020	0.114	0.0452	1.14	3.18	0.075	9.58	71.8768	-80.8783
MP-04	Near	2016	L-97	0.05	0.024	0.68	0.532	0.058	8.26	71.8783	-80.8777
		2019	L-121	0.206	0.0618	2.07	3.14	0.144	9.16	71.8785	-80.8779
		2020	MP-04_2020	0.075	0.0249	0.91	1.66	0.05	8.71	71.8783	-80.8776
MP-05	Near	2016	L-96	0.074	0.038	0.821	1.23	0.074	9.16	71.8791	-80.8783
		2019	L-122	0.132	0.0376	1.11	1.94	0.067	10.1	71.8792	-80.8783
		2020	MP-05_2020	0.122	0.037	1.16	2.71	0.061	10.4	71.8792	-80.8783
MP-06	Near	2016	L-94	0.05	0.037	0.835	1.2	0.058	10.7	71.8809	-80.8791
		2019	L-144	0.094	0.0373	1.15	2.71	0.066	11.6	71.8808	-80.8788
		2020	MP-06_2020	0.099	0.0357	1.13	2.18	0.087	10.2	71.8809	-80.8789
MP-07	Near	2017	L-91	0.14	0.0864	2.23	2.05	0.143	13.7	71.8819	-80.8780
		2019	L-145	0.245	0.0486	2	2.94	0.111	8.87	71.8820	-80.8786
		2020	MP-07_2020	0.352	0.0657	2.81	4.39	0.119	11.4	71.8820	-80.8786
MP-08	Near	2020	MP-08_2020	0.124	0.0413	1.03	1.11	0.071	11.2	71.8859	-80.8790
MP-09	Near	2019	L-147	0.16	0.037	1.41	1.45	0.068	10.3	71.8838	-80.8760
		2020	MP-09_2020	0.167	0.0293	1.04	1.38	0.077	9.17	71.8838	-80.8755

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MP-10	Near	2019	L-146	0.137	0.0318	0.96	1.01	0.061	8.62	71.8830	-80.8770
		2020	MP-10_2020	0.13	0.0397	1.01	1.18	0.074	9.3	71.8832	-80.8773
MP-11	Near	2016	L-93	0.074	0.037	1.06	1.19	0.056	11	71.8818	-80.8750
		2020	MP-11_2020	0.147	0.0376	1.28	1.83	0.07	9.94	71.8818	-80.8750
MP-12	Far	2016	L-102	0.05	0.045	0.877	0.785	0.07	10.3	71.8757	-80.8670
		2020	MP-12_2020	0.157	0.0468	1.31	2.1	0.076	8.02	71.8757	-80.8670
MP-13	Far	2019	L-142	0.058	0.025	0.84	0.405	0.05	8.49	71.8742	-80.8548
		2020	MP-13_2020	0.053	0.0366	0.8	0.568	0.054	8.99	71.8742	-80.8549
MP-14	Far	2016	L-104	0.075	0.0307	0.9	0.973	0.064	7.9	71.8753	-80.8574
		2020	MP-14_2020	0.078	0.0321	0.93	0.935	0.071	9.61	71.8752	-80.8574
MP-15	Far	2016	L-103	0.05	0.021	0.797	0.51	0.069	7.7	71.8765	-80.8606
		2020	MP-15_2020	0.064	0.016	0.67	0.263	0.05	6.41	71.8765	-80.8607
MP-16	Reference	2013	L-02	0.075	0.059	0.816	0.906	0.066	9.4	71.8996	-80.7884
		2019	L-135	0.048	0.0421	0.87	0.527	0.057	8.86	71.8994	-80.7882
		2020	MP-16_2020	0.055	0.0402	0.84	0.457	0.074	9.41	71.8995	-80.7882
MP-17	Reference	2019	L-141	0.083	0.0373	1.26	0.518	0.111	7.69	71.8865	-80.8157
		2020	MP-17_2020	0.044	0.0192	0.63	0.337	0.055	7.67	71.8865	-80.8158
MP-18	Reference	2016	L-105	0.05	0.031	0.932	0.401	0.051	12.7	71.8770	-80.8268
		2020	MP-18_2020	0.038	0.0243	0.74	0.338	0.05	10.7	71.8770	-80.8268
MP-19	Near	2016	L-92	0.057	0.034	0.897	0.73	0.061	9.9	71.8814	-80.8786
		2019	L-143	0.079	0.0536	0.92	1.33	0.061	10.5	71.8814	-80.8789
MP-20	Near	2016	L-98	0.072	0.05	0.874	1.19	0.058	11.4	71.8777	-80.8783
		2019	L-120	0.146	0.0421	1.29	2.7	0.077	9.41	71.8777	-80.8789

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MP-21	Near	2013	L-01	0.145	0.032	1.22	0.856	0.066	10.4	71.8850	-80.8912
MP-22	Reference	2019	L-140	0.043	0.06	0.81	0.332	0.057	11.7	71.8848	-80.8118
MP-23	Near	2014	L-58	0.225	0.042	1.83	1.81	0.095	14.2	71.8838	-80.9159
MP-24	Near	2016	L-95	0.05	0.033	0.809	0.881	0.05	11.6	71.8801	-80.8789
MP-25	Near	2016	L-99	0.076	0.043	0.843	1.46	0.072	9	71.8772	-80.8789
MP-26	Far	2019	L-137	0.136	0.0568	1.54	1.41	0.119	6.32	71.8766	-80.8584
MP-27	Near	2013	L-03	0.081	0.046	1.23	0.817	0.065	12.1	71.8702	-80.8844
MP-28	Reference	2019	L-139	0.04	0.0196	0.73	0.307	0.05	6.37	71.8988	-80.7909
MP-29	Far	2019	L-136	0.05	0.031	0.764	0.414	0.05	11	71.8748	-80.8559
MP-30	Reference	2016	L-106	0.06	0.034	0.772	0.446	0.051	12.1	71.8999	-80.7902
MS-01	Near	2020	MS-01_2020	0.193	0.0832	3.68	4.1	0.069	16.2	71.3243	-79.3759
MS-02	Near	2019	L-128	0.303	0.122	8.35	8.49	0.138	14.8	71.3202	-79.3595
		2020	MS-02_2020	0.168	0.0631	2.47	4.77	0.076	12.5	71.3201	-79.3596
MS-03	Near	2016	L-83	0.055	0.04	1.29	0.576	0.056	13.5	71.3101	-79.2012
		2019	L-154	0.109	0.0759	2.11	1.22	0.077	17	71.3101	-79.2015
		2020	MS-03_2020	0.155	0.0836	2.42	1.91	0.092	16.6	71.3101	-79.2014
MS-04	Near	2016	L-85	0.101	0.034	1.9	0.954	0.079	11.2	71.3102	-79.2114
		2019	L-155	0.178	0.0641	2.3	2.03	0.108	17.6	71.3101	-79.2112
		2020	MS-04_2020	0.158	0.0795	2.49	2.4	0.083	16.4	71.3101	-79.2111
MS-05	Near	2016	L-86	0.116	0.051	3.02	1.31	0.054	11.1	71.3094	-79.2215
		2019	L-156	0.339	0.1109	5.64	4.89	0.181	18.3	71.3093	-79.2218
		2020	MS-05_2020	0.188	0.0643	3.44	2.79	0.086	15.8	71.3093	-79.2217
MS-06	Near	2016	L-88	0.095	0.063	2.98	1.56	0.056	15.3	71.3075	-79.2346
		2019	L-157	0.328	0.739	12.7	4.82	0.105	25.5	71.3076	-79.2340
		2020	MS-06_2020	0.225	1.09	4.58	4.46	0.107	29.4	71.3076	-79.2340

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MS-07	Near	2019	L-153	0.257	0.127	3.07	2.19	0.108	21.1	71.3004	-79.2729
		2020	MS-07_2020	0.386	0.2	3.45	3.34	0.182	19.8	71.3003	-79.2729
MS-08	Near	2016	L-82	0.068	0.032	1.56	0.593	0.05	11.1	71.2997	-79.2679
		2019	L-131	0.111	0.0446	1.89	1.41	0.062	13.3	71.2997	-79.2683
		2020	MS-08_2020	0.139	0.0457	2.11	1.49	0.067	14.1	71.2997	-79.2682
MS-09	Near	2019	L-130	0.263	0.1051	5.09	3.92	0.139	21.5	71.2998	-79.2634
		2020	MS-09_2020	0.165	0.0404	2.37	1.64	0.071	15.2	71.2999	-79.2635
MS-10	Near	2019	L-132	0.136	0.0475	2.2	1.65	0.072	15.6	71.3000	-79.2615
		2020	MS-10_2020	0.367	0.095	4.45	3.04	0.169	15.3	71.3000	-79.2614
MS-11	Far	2019	L-134	0.152	0.0388	2.25	2.38	0.062	12.6	71.3181	-79.3600
		2020	MS-11_2020	0.166	0.0401	2.76	2.43	0.07	11.3	71.3181	-79.3601
MS-12	Far	2020	MS-12_2020	0.174	0.0958	2.86	3.32	0.079	18.3	71.3187	-79.3679
MS-13	Far	2019	L-159	0.091	0.0525	1.45	0.807	0.059	12.3	71.3103	-79.1922
	Far	2020	MS-13_2020	0.197	0.1109	3.1	1.768	0.113	15.6	71.3103	-79.1923
MS-14	Far	2016	L-115	0.05	0.036	1.03	0.563	0.05	12.2	71.3105	-79.1894
		2020	MS-14_2020	0.083	0.0457	1.36	0.908	0.05	12.6	71.3105	-79.1894
MS-15	Far	2020	MS-15_2020	0.164	0.0705	2.6	2.14	0.106	16	71.3070	-79.2299
MS-16	Far	2020	MS-16_2021	0.189	0.0557	2	1.64	0.092	15.5	71.2976	-79.2774
MS-17	Far	2020	MS-17_2021	0.36	0.2146	3.81	2.89	0.168	21	71.3043	-79.2116
MS-18	Far	2020	MS-18_2020	0.142	0.069	1.56	1.2	0.099	19	71.2951	-79.2891

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MS-19	Far	2020	MS-19_2020	0.091	0.087	1.41	1.14	0.078	16.1	71.2969	-79.2854
MS-20	Far	2019	L-129	0.151	0.0602	2.88	1.87	0.073	20.5	71.3150	-79.3712
		2020	MS-20_2020	0.16	0.0589	2.48	1.4	0.065	22.1	71.3150	-79.3711
MS-21	Far	2020	MS-21_2020	0.294	0.0618	3.25	2.89	0.156	10.1	71.3138	-79.3757
MS-22	Far	2013	L-29	0.05	0.189	0.975	0.62	0.058	29.1	71.2197	-79.3277
		2019	L-165	0.123	0.247	2.13	0.817	0.164	16.9	71.2197	-79.3276
		2020	MS-22_2020	0.045	0.164	0.9	0.477	0.088	24.1	71.2196	-79.3274
MS-23	Reference	2019	L-138	0.049	0.189	0.84	0.821	0.075	27.5	71.2968	-79.0955
		2020	MS-23_2020	0.14	0.446	2.38	2.3	0.178	36.2	71.2968	-79.0954
MS-24	Reference	2019	L-166	0.042	0.0778	0.87	0.623	0.065	21.1	71.3843	-78.9051
		2020	MS-24_2020	0.034	0.197	0.77	1.07	0.067	31.1	71.3843	-78.9057
MS-25	Far	2014	L-65	0.108	0.095	2.24	1.42	0.079	15.9	71.3000	-79.1953
		2019	L-170	0.129	0.0705	1.64	1.6	0.091	13.7	71.3001	-79.1953
		2020	MS-25_2020	0.141	0.0736	2.2	1.53	0.105	14.4	71.3001	-79.1959
MS-26	Reference	2014	L-64	1.1	0.263	3.18	6.71	0.197	23.8	71.3196	-79.1559
		2016	L-113	0.112	0.166	1.03	1.73	0.1	19.5	71.3196	-79.1560
		2019	L-174	0.362	0.143	1.32	2.11	0.124	19	71.3196	-79.1550
MS-27	Reference	2014	L-66	0.053	0.09	1.27	0.749	0.063	19.4	71.2945	-79.1001
MS-28	Reference	2012	L-20	0.123	0.241	1.14	2.93	0.075	14.1	71.6457	-79.2153
MS-29	Reference	2012	L-28	0.122	0.178	1.1	2.57	0.077	13.6	71.5403	-78.2296
MS-30	Reference	2016	L-111	0.05	0.072	0.888	0.279	0.05	18.5	71.3860	-78.9034
MS-32	Reference	2012	L-26	0.234	0.192	1.79	4.29	0.105	11.8	71.3391	-79.0935
MS-33	Far	2012	L-24	0.05	0.04	0.928	0.751	0.05	9.1	71.3331	-79.3766
MS-34	Near	2019	L-133	0.725	0.1186	12.8	8.86	0.161	13.4	71.3220	-79.3677

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
MS-35	Near	2016	L-90	0.107	0.031	4.49	1.67	0.05	15.5	71.3182	-79.3691
MS-36	Near	2016	L-84	0.077	0.04	1.59	0.713	0.071	10.8	71.3101	-79.2043
MS-37	Near	2016	L-87	0.108	0.055	2.5	1.34	0.068	14.3	71.3089	-79.2263
MS-38	Near	2013	L-25	0.089	0.166	1.71	1.94	0.093	19.2	71.3072	-79.2433
MS-39	Near	2019	L-158	0.177	0.185	3.38	3.03	0.09	21	71.3060	-79.2373
MS-40	Near	2016	L-89	0.095	0.049	2.36	1.2	0.054	14.2	71.3047	-79.2379
MS-41	Near	2016	L-117	0.066	0.088	1.83	1.1	0.063	19.6	71.2998	-79.2657
MS-42	Near	2016	L-110	0.05	0.095	0.9	0.566	0.071	18	71.2981	-79.1020
MS-43	Near	2014	L-67	0.094	0.042	1.4	1.05	0.05	9.82	71.2936	-79.4128
MS-44	Near	2016	L-109	0.05	0.086	0.806	0.411	0.065	15.2	71.2208	-79.3274
MS-45	Near	2016	L-112	0.076	0.114	1.3	1.41	0.115	22.4	71.3202	-79.1594
MS-46	Far	2016	L-114	0.067	0.039	1.11	1.03	0.066	9.08	71.3098	-79.1921
MS-47	Far	2019	L-160	0.109	0.0583	1.5	1.17	0.078	15.9	71.3111	-79.1897
MS-48	Far	2013	L-23	0.244	0.136	3.44	3.47	0.09	20.4	71.3243	-79.3747
MS-49	Near	2016	L-81	0.113	0.045	2.15	1.25	0.074	14.8	71.3001	-79.2737
TR-01	Near	2019	L-152	0.232	0.0781	8.94	5.57	0.071	23.5	71.3913	-79.7827
		2020	TR-01_2020	0.139	0.144	4	7.89	0.088	21.4	71.3913	-79.7826
TR-02	Near	2020	TR-02_2020	0.132	0.0991	2.26	4.55	0.066	20.9	71.3920	-79.7984
TR-03	Near	2013	L-16	0.175	0.084	2.65	2.57	0.065	20.5	71.3986	-79.8234
		2019	L-151	0.193	0.106	4.29	6.18	0.066	21	71.3986	-79.8235
		2020	TR-03_2020	0.171	0.0819	2.83	5.93	0.071	15.6	71.3986	-79.8234
TR-04	Near	2016	L-79	0.165	0.028	3.8	1.76	0.052	15.9	71.3891	-79.7862
		2020	TR-04_2020	0.149	0.184	3.28	6.35	0.085	20.9	71.3893	-79.7867
TR-05	Near	2013	L-15	0.121	0.047	2.3	0.526	0.064	21	71.3967	-79.8228
		2019	L-124	0.26	0.115	4.31	6.69	0.063	23.9	71.3967	-79.8230

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
		2020	TR-05_2020	0.291	0.228	6.19	15.99	0.127	19	71.3965	-79.8234
TR-06	Near	2019	L-125	0.373	0.263	8.02	16.77	0.128	21.3	71.3962	-79.8284
		2020	TR-06_2020	0.125	0.137	2.66	8.72	0.067	17.6	71.3961	-79.8286
TR-07	Near	2019	L-149	0.415	0.1579	10.17	9.74	0.127	15.4	71.3958	-79.8447
TR-07	Near	2020	TR-07_2020	0.154	0.155	2.19	6.85	0.089	17.4	71.3958	-79.8448
TR-08	Near	2019	L-172	0.287	0.073	3.32	5.05	0.079	16.6	71.7186	-80.4414
		2020	TR-08_2020	0.231	0.0586	2.51	4.85	0.066	13.6	71.7188	-80.4416
TR-09	Near	2013	L-07	0.215	0.032	1.53	1.06	0.08	9.84	71.7189	-80.4397
		2020	TR-09_2020	0.236	0.0358	2.32	3.21	0.061	13.1	71.7189	-80.4397
TR-10	Near	2013	L-06	0.192	0.038	1.16	1.11	0.082	8.57	71.7186	-80.4473
		2020	TR-10_2020	0.169	0.0404	2.08	3.17	0.066	12.6	71.7186	-80.4473
TR-11	Far	2019	L-123	0.192	0.0933	2.72	4.53	0.071	20.3	71.3954	-79.8187
		2020	TR-11_2020	0.113	0.0946	2.05	5.15	0.059	16.6	71.3954	-79.8187
TR-12	Far	2016	L-116	0.071	0.057	1.22	1.12	0.056	13.9	71.3833	-79.8862
		2020	TR-12_2020	0.184	0.1515	3.91	6.23	0.145	17.5	71.3833	-79.8862
TR-13	Far	2013	L-17	0.075	0.048	1.28	1.04	0.057	11.7	71.4077	-79.8182
		2016	L-77	0.071	0.026	1.14	0.571	0.05	9.35	71.4079	-79.8187
		2019	L-162	0.08	0.0509	1.42	1.14	0.06	12.2	71.4076	-79.8182
		2020	TR-13_2020	0.106	0.0545	2.19	1.55	0.119	10.3	71.4076	-79.8186
TR-14	Far	2013	L-14	0.06	0.025	0.764	0.218	0.05	12.3	71.3893	-79.8324
		2016	L-76	0.11	0.026	1.87	0.932	0.061	16	71.3896	-79.8326
		2019	L-161	0.084	0.039	1.73	1.36	0.05	15.8	71.3894	-79.8328

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
		2020	TR-14_2020	0.096	0.111	1.66	2.8	0.07	23.4	71.3896	-79.8327
TR-15	Reference	2013	L-12	0.05	0.067	0.798	0.809	0.056	16	71.2805	-80.2450
		2019	L-169	0.032	0.0434	0.74	0.431	0.052	16.7	71.2806	-80.2451
		2020	TR-15_2020	0.082	0.1146	1.6	0.79	0.116	20.6	71.2806	-80.2451
TR-16	Reference	2019	L-168	0.091	0.243	1.7	1.107	0.153	22.7	71.3275	-79.8007
		2020	TR-16_2020	0.047	0.13	1.04	0.525	0.083	25.1	71.3278	-79.8006
TR-17	Reference	2019	L-167	0.066	0.0285	1.03	0.534	0.063	8.76	71.4489	-79.7112
		2020	TR-17_2020	0.049	0.0364	1.05	0.448	0.068	9.94	71.4486	-79.7103
TR-18	Near	2014	L-63	0.05	0.048	2.14	0.681	0.069	18.9	71.8805	-80.4592
TR-19	Near	2014	L-59	0.05	0.054	0.87	0.399	0.05	12.6	71.7752	-80.1047
TR-20	Near	2013	L-09	0.05	0.174	0.834	0.699	0.055	20.6	71.7435	-80.2898
TR-21	Near	2013	L-08	0.112	0.045	1.02	0.783	0.061	10.8	71.7226	-80.4165
TR-22	Near	2019	L-173	0.211	0.0716	3.45	5.59	0.077	14.4	71.7192	-80.4466
TR-23	Far	2016	L-75	0.104	0.025	2.11	1.26	0.05	13.5	71.3948	-79.8217
TR-24	Near	2016	L-72	0.146	0.041	3.38	2.56	0.068	18	71.3967	-79.8428
TR-25	Far	2013	L-05	0.055	0.025	0.691	0.427	0.05	7.14	71.7145	-80.4704
TR-26	Far	2013	L-04	0.153	0.039	1.15	1.18	0.062	9.74	71.6882	-80.5363
TR-27	Far	2012	L-11	0.05	0.068	0.941	0.539	0.071	15.3	71.5628	-80.2148
TR-29	Far	2016	L-108	0.075	0.037	0.753	0.836	0.05	6.47	71.4515	-79.7117
TR-30	Far	2012	L-18	0.05	0.044	0.661	0.391	0.05	12.4	71.4113	-79.7981
TR-31	Reference	2019	L-164	0.035	0.0429	0.92	0.443	0.059	9.72	71.4493	-79.7100
TR-32	Far	2019	L-163	0.074	0.184	1.31	2.12	0.077	18.4	71.4004	-79.8519
TR-33	Far	2016	L-73	0.191	0.029	3.87	2.81	0.064	16.5	71.3984	-79.8325
TR-34	Reference	2019	L-171	0.231	0.0607	5.36	6.18	0.05	18.8	71.3981	-79.8230
TR-35	Reference	2019	L-150	0.228	0.0918	6.88	6.91	0.064	24.3	71.3980	-79.8299
TR-36	Reference	2019	L-126	0.301	0.125	5.87	10.1	0.07	22.5	71.3978	-79.8177

Appendix Table F-2. Lichen Analysis of Chemicals of Potential Concern (Baseline to 2020).

Site ID	Distance Category	Year	Visit ID[1]	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Latitude	Longitude
TR-37	Reference	2019	L-127	0.194	0.187	4.36	15.3	0.065		71.3974	-79.8225
TR-38	Reference	2016	L-74	0.233	0.035	4.09	2.98	0.078		71.3962	-79.8227
TR-39	Reference	2017	L-71	0.455	0.1165	11.98	6.38	0.161		71.3944	-79.8560
TR-40	Reference	2019	L-148	0.313	0.0692	6.03	4.05	0.07		71.3941	-79.8532
TR-41	Reference	2016	L-70	0.166	0.048	2.96	1.43	0.067		71.3933	-79.8671
TR-42	Reference	2016	L-69	0.352	0.038	5.34	2.58	0.081		71.3904	-79.8657
TR-43	Reference	2016	L-80	0.135	0.042	3.33	1.6	0.062		71.3904	-79.7759
TR-44	Reference	2016	L-68	0.193	0.054	4.06	2.24	0.071		71.3884	-79.8766
TR-45	Reference	2014	L-60	0.104	0.099	3.28	0.97	0.055		71.3423	-79.5512
TR-46	Reference	2012	L-13	0.112	0.064	1.23	1.76	0.05		71.3387	-80.2239
TR-47	Reference	2012	L-21	0.05	0.116	0.738	0.784	0.05		71.2216	-79.7948
TR-48	Far	2014	L-61	0.053	0.082	3.82	0.675	0.071		71.3383	-79.5246
TR-49	Reference	2016	L-107	0.05	0.044	0.875	0.286	0.057		71.3259	-79.8008
TR-50	Near	2016	L-78	0.216	0.028	4.29	1.7	0.083		71.3922	-79.7995

APPENDIX G VEGETATION AND SOILS BASE METALS MONITORING LABORATORY RESULTS, 2020

Appendix Table G-1. 2020 Lichen Metal Analysis (n=60), sample sites MP-01 to MP-04.

Parameter[1]	LDL[2]	MP-01-UNWASHED	MP-01-WASHED	MP-02-UNWASHED	MP-02-WASHED	MP-03-UNWASHED	MP-03-WASHED	MP-04-UNWASHED	MP-04-WASHED
		L2478696-95[3]	L2478696-96	L2478696-98	L2478696-99	L2478696-101	L2478696-102	L2478696-104	L2478696-105
Aluminum	2.0	415	401	271	271	373	309	250	228
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.084	0.085	0.084	0.080	0.114	0.099	0.075	0.067
Barium	0.050	10.1	9.10	6.19	6.06	7.81	6.83	5.62	5.23
Beryllium	0.010	0.027	0.026	0.018	0.021	0.026	0.023	0.018	0.018
Bismuth	0.010	0.023	0.016	0.023	0.017	0.023	0.024	0.016	0.015
Boron	1.0	<1.0	1.4	1.0	1.1	<1.0	1.1	<1.0	<1.0
Cadmium	0.0050	0.0341	0.0298	0.0311	0.0349	0.0452	0.0427	0.0249	0.0262
Calcium	20	14600	13700	35800	36100	40300	37700	25900	23300
Cesium	0.0050	0.177	0.160	0.132	0.127	0.211	0.168	0.144	0.140
Chromium	0.050	0.706	0.821	0.592	0.661	0.647	0.686	0.603	0.541
Cobalt	0.020	0.226	0.213	0.143	0.151	0.200	0.173	0.148	0.136
Copper	0.10	1.29	1.50	0.92	0.94	1.14	0.98	0.91	0.88
Iron	3.0	1360	1180	867	815	1490	1100	909	979
Lead	0.020	1.60	1.30	1.65	1.68	3.18	2.44	1.66	1.57
Lithium	0.50	0.86	0.87	0.60	0.70	0.87	0.76	0.61	0.55
Magnesium	2.0	1350	1290	997	1080	1400	1220	1130	1060
Manganese	0.050	27.3	25.1	19.1	18.9	27.6	24.2	19.1	18.1
Mercury	0.0050	0.0620	0.0595	0.0528	0.0502	0.0516	0.0492	0.0443	0.0401
Molybdenum	0.020	0.246	0.206	0.157	0.135	0.150	0.126	0.140	0.116
Nickel	0.20	0.72	0.57	0.46	0.45	0.57	0.51	0.40	0.40
Phosphorus	10	436	386	282	296	326	292	321	338
Potassium	20	1680	1470	1230	1220	1360	1150	1310	1300
Rubidium	0.050	6.32	5.80	3.54	3.66	5.33	4.61	4.66	5.11
Selenium	0.050	0.062	0.070	0.080	0.071	0.075	0.080	<0.050	0.059
Silver	0.0050	0.0166	0.0145	0.0170	0.0178	0.0244	0.0230	0.0179	0.0174
Sodium	20	366	295	240	227	258	201	267	268
Strontium	0.050	14.9	13.7	21.7	21.1	24.2	22.1	17.2	15.7
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-1. 2020 Lichen Metal Analysis (n=60), sample sites MP-01 to MP-04.

Parameter[1]	LDL[2]	MP-01-UNWASHED	MP-01-WASHED	MP-02-UNWASHED	MP-02-WASHED	MP-03-UNWASHED	MP-03-WASHED	MP-04-UNWASHED	MP-04-WASHED
		L2478696-95[3]	L2478696-96	L2478696-98	L2478696-99	L2478696-101	L2478696-102	L2478696-104	L2478696-105
Thallium	0.0020	0.0147	0.0111	0.0072	0.0061	0.0113	0.0079	0.0080	0.0065
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	23.2	22.0	15.2	14.5	18.6	15.7	11.4	11.2
Uranium	0.0020	0.303	0.293	0.362	0.385	0.515	0.442	0.430	0.425
Vanadium	0.10	0.63	0.65	0.50	0.51	0.64	0.58	0.43	0.41
Zinc	0.50	13.5	11.9	7.92	8.46	9.58	8.44	8.71	8.46
Zirconium	0.20	1.08	0.80	0.83	0.79	1.41	1.05	0.84	0.78

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-2. 2020 Lichen Metal Analysis (n=60), sample sites MP-05 to MP-07.

Parameter[1]	LDL[2]	MP-05-UNWASHED	MP-05-WASHED	MP-06-UNWASHED	MP-06-WASHED	MP-07-R[4]-UNWASHED	MP-07-R-WASHED	MP-07-UNWASHED	MP-07-WASHED
		L2478696-107[3]	L2478696-108	L2478696-110	L2478696-111	L2478696-119	L2478696-120	L2478696-116	L2478696-117
Aluminum	2.0	338	323	345	317	500	666	616	453
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.122	0.104	0.099	0.105	0.165	0.189	0.187	0.149
Barium	0.050	6.66	6.15	7.99	7.14	5.97	6.07	6.14	4.91
Beryllium	0.010	0.024	0.022	0.027	0.022	0.036	0.047	0.042	0.031
Bismuth	0.010	0.019	0.024	0.020	0.020	0.024	0.024	0.024	0.021
Boron	1.0	<1.0	1.1	1.0	<1.0	2.0	2.9	2.9	1.6
Cadmium	0.0050	0.0370	0.0356	0.0357	0.0354	0.0269	0.0291	0.0388	0.0310
Calcium	20	37800	32700	20500	20000	22600	22700	29000	23600
Cesium	0.0050	0.196	0.184	0.172	0.158	0.158	0.173	0.189	0.143
Chromium	0.050	0.619	0.809	0.844	0.779	1.17	1.55	1.41	1.16
Cobalt	0.020	0.221	0.200	0.232	0.219	0.324	0.445	0.394	0.286
Copper	0.10	1.16	1.13	1.13	1.06	1.33	1.73	1.48	1.19
Iron	3.0	1750	1630	1860	2080	2050	2550	2760	1960
Lead	0.020	2.71	2.33	2.18	2.29	2.06	2.07	2.33	1.81
Lithium	0.50	0.80	0.76	0.80	0.71	1.31	1.88	1.61	1.19
Magnesium	2.0	1410	1380	1230	1370	1600	1900	1720	1430
Manganese	0.050	26.8	24.9	26.6	27.1	31.2	35.7	35.6	26.2
Mercury	0.0050	0.0453	0.0379	0.0512	0.0493	0.0388	0.0409	0.0372	0.0287
Molybdenum	0.020	0.186	0.164	0.234	0.215	0.204	0.248	0.225	0.192
Nickel	0.20	0.60	0.58	0.65	0.64	0.93	1.31	1.07	0.81
Phosphorus	10	376	400	354	396	441	536	417	418
Potassium	20	1360	1310	1390	1400	1420	1480	1430	1340
Rubidium	0.050	5.19	5.23	5.37	5.59	3.55	4.09	4.02	3.72
Selenium	0.050	0.061	0.064	0.087	0.078	0.056	0.065	0.063	0.060
Silver	0.0050	0.0214	0.0217	0.0191	0.0198	0.0151	0.0163	0.0190	0.0161
Sodium	20	347	318	279	316	338	301	325	291
Strontium	0.050	25.5	23.4	20.5	21.8	23.2	23.1	28.1	24.3
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-2. **2020 Lichen Metal Analysis (n=60), sample sites MP-05 to MP-07.**

Parameter[1]	LDL[2]	MP-05-UNWASHED	MP-05-WASHED	MP-06-UNWASHED	MP-06-WASHED	MP-07-R[4]-UNWASHED	MP-07-R-WASHED	MP-07-UNWASHED	MP-07-WASHED
		L2478696-107[3]	L2478696-108	L2478696-110	L2478696-111	L2478696-119	L2478696-120	L2478696-116	L2478696-117
Thallium	0.0020	0.0098	0.0072	0.0084	0.0086	0.0095	0.0122	0.0111	0.0078
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	16.0	15.7	16.1	15.2	17.6	21.9	22.5	15.3
Uranium	0.0020	0.711	0.711	0.451	0.430	0.442	0.562	0.538	0.450
Vanadium	0.10	0.67	0.62	0.62	0.59	0.95	1.32	1.18	0.84
Zinc	0.50	10.4	10.1	10.2	10.7	9.82	11.2	11.4	9.61
Zirconium	0.20	1.25	1.18	1.07	1.08	1.31	1.63	1.74	1.13

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-3. 2020 Lichen Metal Analysis (n=60), sample sites MP-08 to MP-11.

Parameter[1]	LDL[2]	MP-08-UNWASHED	MP-08-WASHED	MP-09-UNWASHED	MP-09-WASHED	MP-10-UNWASHED	MP-10-WASHED	MP-11-UNWASHED	MP-11-WASHED
		L2478696-122[3]	L2478696-123	L2478696-170	L2478696-171	L2478696-167	L2478696-168	L2478696-113	L2478696-114
Aluminum	2.0	290	495	501	662	297	418	391	366
Antimony	0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.124	0.157	0.167	0.189	0.130	0.161	0.147	0.154
Barium	0.050	3.86	4.36	4.28	4.32	4.04	4.85	5.46	5.22
Beryllium	0.010	0.019	0.031	0.036	0.043	0.020	0.030	0.026	0.024
Bismuth	0.010	0.015	0.015	0.023	0.023	0.016	0.022	0.020	0.021
Boron	1.0	2.1	3.6	2.0	2.6	1.1	1.5	1.2	1.2
Cadmium	0.0050	0.0413	0.0445	0.0293	0.0302	0.0397	0.0445	0.0376	0.0381
Calcium	20	24500	25600	26300	25700	26100	27400	19200	16000
Cesium	0.0050	0.106	0.114	0.140	0.147	0.103	0.128	0.140	0.136
Chromium	0.050	0.820	1.23	1.29	1.51	0.797	1.13	0.929	0.892
Cobalt	0.020	0.170	0.323	0.295	0.382	0.208	0.277	0.273	0.251
Copper	0.10	1.03	1.41	1.04	1.26	1.01	1.20	1.28	1.14
Iron	3.0	1250	1810	2500	3050	1850	3030	2790	2560
Lead	0.020	1.11	1.21	1.38	1.41	1.18	1.45	1.83	1.73
Lithium	0.50	0.94	1.51	1.25	1.71	0.65	0.97	0.83	0.77
Magnesium	2.0	1690	2110	1570	1810	1070	1160	1190	1170
Manganese	0.050	16.7	23.5	25.4	27.5	19.5	24.3	25.0	22.9
Mercury	0.0050	0.0479	0.0510	0.0508	0.0464	0.0448	0.0456	0.0523	0.0487
Molybdenum	0.020	0.162	0.174	0.178	0.197	0.187	0.193	0.250	0.208
Nickel	0.20	0.67	0.96	0.88	1.09	0.63	0.88	0.82	0.77
Phosphorus	10	450	474	356	341	343	355	369	366
Potassium	20	1440	1470	1280	1250	1230	1350	1300	1340
Rubidium	0.050	2.47	2.90	2.93	3.32	2.79	3.68	3.41	3.70
Selenium	0.050	0.071	0.073	0.077	0.071	0.074	0.072	0.070	0.066
Silver	0.0050	0.0124	0.0131	0.0156	0.0166	0.0123	0.0151	0.0166	0.0172
Sodium	20	416	288	352	325	395	378	370	371
Strontium	0.050	32.8	34.1	42.0	38.7	30.7	27.5	36.9	31.1
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-3. 2020 Lichen Metal Analysis (n=60), sample sites MP-08 to MP-11.

Parameter[1]	LDL[2]	MP-08-UNWASHED	MP-08-WASHED	MP-09-UNWASHED	MP-09-WASHED	MP-10-UNWASHED	MP-10-WASHED	MP-11-UNWASHED	MP-11-WASHED
		L2478696-122[3]	L2478696-123	L2478696-170	L2478696-171	L2478696-167	L2478696-168	L2478696-113	L2478696-114
Thallium	0.0020	0.0062	0.0077	0.0088	0.0109	0.0058	0.0080	0.0077	0.0079
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	14.4	21.8	20.5	26.9	11.5	17.1	15.8	14.4
Uranium	0.0020	0.170	0.248	0.234	0.292	0.523	0.550	0.313	0.279
Vanadium	0.10	0.65	1.28	0.96	1.31	0.53	0.84	0.67	0.62
Zinc	0.50	11.2	13.4	9.17	10.1	9.30	9.83	9.94	10.2
Zirconium	0.20	0.83	1.12	1.09	1.44	0.68	1.05	1.03	0.86

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-4. 2020 Lichen Metal Analysis (n=60), sample sites MP-12 to MP-15.

Parameter[1]	LDL[2]	MP-12-UNWASHED	MP-12-WASHED	MP-13-UNWASHED	MP-13-WASHED	MP-14-UNWASHED	MP-14-WASHED	MP-15-UNWASHED	MP-15-WASHED
		L2478696-164[3]	L2478696-165	L2478696-59	L2478696-60	L2478696-62	L2478696-63	L2478696-161	L2478696-162
Aluminum	2.0	907	572	159	181	257	373	221	327
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.157	0.124	0.053	0.053	0.078	0.094	0.064	0.079
Barium	0.050	6.76	5.82	3.61	3.92	6.43	6.81	3.66	4.41
Beryllium	0.010	0.052	0.034	<0.010	0.011	0.016	0.020	0.014	0.020
Bismuth	0.010	0.019	0.020	0.012	0.013	0.013	0.016	<0.010	0.012
Boron	1.0	2.2	1.6	<1.0	1.1	<1.0	1.6	<1.0	1.3
Cadmium	0.0050	0.0468	0.0411	0.0366	0.0333	0.0321	0.0310	0.0160	0.0216
Calcium	20	35400	41200	25100	23900	27200	26800	21300	31900
Cesium	0.0050	0.202	0.159	0.0660	0.0658	0.0958	0.106	0.0733	0.0891
Chromium	0.050	2.01	1.37	0.384	0.455	0.617	0.906	0.474	0.781
Cobalt	0.020	0.480	0.336	0.102	0.111	0.155	0.201	0.125	0.174
Copper	0.10	1.31	1.09	0.80	0.95	0.93	1.03	0.67	0.94
Iron	3.0	2410	2340	666	819	1060	1400	519	1090
Lead	0.020	2.10	1.69	0.568	0.548	0.935	0.988	0.263	0.781
Lithium	0.50	2.04	1.35	<0.50	<0.50	0.53	0.80	0.56	0.79
Magnesium	2.0	1260	1660	929	1040	925	1080	882	1090
Manganese	0.050	34.7	28.7	12.9	13.8	17.8	20.4	13.3	17.1
Mercury	0.0050	0.0396	0.0386	0.0381	0.0441	0.0458	0.0478	0.0214	0.0496
Molybdenum	0.020	0.143	0.130	0.148	0.168	0.113	0.135	0.085	0.139
Nickel	0.20	1.34	0.94	0.33	0.36	0.46	0.64	0.36	0.53
Phosphorus	10	241	257	302	357	306	332	234	325
Potassium	20	952	1070	1310	1440	1300	1350	1070	1280
Rubidium	0.050	4.53	4.53	2.77	3.23	3.90	4.43	2.38	2.97
Selenium	0.050	0.076	0.078	0.054	0.062	0.071	0.085	0.050	0.057
Silver	0.0050	0.0158	0.0173	0.0092	0.0121	0.0148	0.0152	0.0070	0.0104
Sodium	20	177	202	298	279	292	276	210	239
Strontium	0.050	21.2	25.2	13.7	13.7	16.5	17.8	14.3	18.8
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-4. 2020 Lichen Metal Analysis (n=60), sample sites MP-12 to MP-15.

Parameter[1]	LDL[2]	MP-12-UNWASHED	MP-12-WASHED	MP-13-UNWASHED	MP-13-WASHED	MP-14-UNWASHED	MP-14-WASHED	MP-15-UNWASHED	MP-15-WASHED
		L2478696-164[3]	**L2478696-165**	**L2478696-59**	**L2478696-60**	**L2478696-62**	**L2478696-63**	**L2478696-161**	**L2478696-162**
Thallium	0.0020	0.0167	0.0107	0.0030	0.0038	0.0077	0.0077	0.0027	0.0070
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	48.1	32.0	8.11	9.49	13.1	19.9	7.86	18.3
Uranium	0.0020	1.14	0.691	0.208	0.227	0.206	0.240	0.119	0.187
Vanadium	0.10	2.09	1.29	0.33	0.38	0.55	0.81	0.39	0.67
Zinc	0.50	8.02	7.92	8.99	9.68	9.61	9.89	6.41	8.12
Zirconium	0.20	1.75	1.35	0.34	0.36	0.64	0.77	<0.20	0.68

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-5. 2020 Lichen Metal Analysis (n=60), sample sites MP-16 to MS-01.

Parameter[1]	LDL[2]	MP-16-UNWASHED	MP-16-WASHED	MP-17-UNWASHED	MP-17-WASHED	MP-18-UNWASHED	MP-18-WASHED	MS-01-UNWASHED	MS-01-WASHED
		L2478696-50[3]	L2478696-51	L2478696-53	L2478696-54	L2478696-56	L2478696-57	L2478696-7	L2478696-8
Aluminum	2.0	184	284	95.6	93.7	124	164	2030	1750
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.036	0.028
Arsenic	0.020	0.055	0.057	0.044	0.030	0.038	0.047	0.193	0.222
Barium	0.050	4.33	4.59	3.22	2.66	2.38	2.79	20.0	23.1
Beryllium	0.010	0.011	0.017	<0.010	<0.010	<0.010	<0.010	0.106	0.100
Bismuth	0.010	<0.010	<0.010	<0.010	<0.010	0.014	0.016	0.093	0.116
Boron	1.0	1.1	1.5	<1.0	<1.0	<1.0	1.1	1.7	2.1
Cadmium	0.0050	0.0402	0.0408	0.0192	0.0131	0.0243	0.0263	0.0832	0.105
Calcium	20	20200	19100	26400	17700	11800	13100	9100	11200
Cesium	0.0050	0.0388	0.0528	0.0309	0.0215	0.0397	0.0431	0.262	0.261
Chromium	0.050	0.580	0.918	0.261	0.225	0.294	0.376	5.42	5.15
Cobalt	0.020	0.112	0.166	0.063	0.058	0.072	0.089	1.39	1.44
Copper	0.10	0.84	1.08	0.63	0.51	0.74	0.95	3.68	4.23
Iron	3.0	292	487	357	279	315	415	5490	4980
Lead	0.020	0.457	0.538	0.337	0.231	0.338	0.375	4.10	5.09
Lithium	0.50	<0.50	0.67	<0.50	<0.50	<0.50	<0.50	2.27	2.07
Magnesium	2.0	1060	1100	1230	928	1240	1400	2890	2980
Manganese	0.050	13.6	15.1	9.74	7.43	9.22	10.3	66.2	68.9
Mercury	0.0050	0.0561	0.0667	0.0354	0.0102	0.0500	0.0587	0.0348	0.0489
Molybdenum	0.020	0.064	0.070	0.101	0.067	0.079	0.101	0.625	0.692
Nickel	0.20	0.46	0.74	0.20	0.20	0.21	0.28	5.95	7.43
Phosphorus	10	397	427	310	224	392	479	475	674
Potassium	20	1440	1400	1240	886	1430	1590	2060	2380
Rubidium	0.050	2.32	2.53	1.78	1.33	1.94	2.20	11.0	12.7
Selenium	0.050	0.074	0.060	0.055	<0.050	<0.050	<0.050	0.069	0.094
Silver	0.0050	0.0071	0.0059	0.0070	0.0067	0.0051	0.0050	0.0432	0.0403
Sodium	20	330	323	302	192	359	372	164	190
Strontium	0.050	11.8	11.4	17.0	11.8	5.87	6.59	8.51	11.1
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-5. 2020 Lichen Metal Analysis (n=60), sample sites MP-16 to MS-01.

Parameter[1]	LDL[2]	MP-16-UNWASHED	MP-16-WASHED	MP-17-UNWASHED	MP-17-WASHED	MP-18-UNWASHED	MP-18-WASHED	MS-01-UNWASHED	MS-01-WASHED
		L2478696-50[3]	L2478696-51	L2478696-53	L2478696-54	L2478696-56	L2478696-57	L2478696-7	L2478696-8
Thallium	0.0020	0.0034	0.0053	<0.0020	<0.0020	0.0028	0.0036	0.0474	0.0478
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.16	0.14
Titanium	0.25	8.33	14.3	4.44	3.86	6.37	9.19	120	106
Uranium	0.0020	0.0717	0.125	0.0541	0.0412	0.0568	0.0835	0.703	0.839
Vanadium	0.10	0.41	0.65	0.20	0.20	0.28	0.38	3.79	3.43
Zinc	0.50	9.41	9.53	7.67	5.36	10.7	12.2	16.2	19.8
Zirconium	0.20	0.24	0.37	0.23	<0.20	0.24	0.32	3.10	3.07

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-6. 2020 Lichen Metal Analysis (n=60), sample sites MS-02 to MS-05.

Parameter[1]	LDL[2]	MS-02-UNWASHED	MS-02-WASHED	MS-03-UNWASHED	MS-03-WASHED	MS-04-UNWASHED	MS-04-WASHED	MS-05-UNWASHED	MS-05-WASHED
		L2478696-4[3]	L2478696-5	L2478696-74	L2478696-75	L2478696-77	L2478696-78	L2478696-80	L2478696-81
Aluminum	2.0	1220	1600	1070	797	1170	954	1520	1080
Antimony	0.010	0.012	0.014	<0.010	<0.010	<0.010	<0.010	0.012	<0.010
Arsenic	0.020	0.168	0.230	0.155	0.120	0.158	0.139	0.188	0.156
Barium	0.050	13.9	17.2	14.2	10.9	16.1	14.3	15.5	13.0
Beryllium	0.010	0.072	0.087	0.052	0.039	0.059	0.056	0.074	0.060
Bismuth	0.010	0.102	0.125	0.046	0.035	0.065	0.062	0.067	0.050
Boron	1.0	1.3	2.0	<1.0	1.2	<1.0	1.4	1.2	1.5
Cadmium	0.0050	0.0631	0.0811	0.0836	0.0770	0.0795	0.0763	0.0643	0.0662
Calcium	20	14300	17100	16100	11500	10700	11200	16900	15700
Cesium	0.0050	0.193	0.245	0.190	0.151	0.194	0.179	0.259	0.208
Chromium	0.050	2.74	3.53	2.41	2.50	4.01	2.99	3.66	3.12
Cobalt	0.020	0.871	1.14	0.802	0.613	0.910	0.757	0.979	0.746
Copper	0.10	2.47	3.40	2.42	1.95	2.49	2.19	3.44	2.27
Iron	3.0	4300	5660	3890	2950	3870	3150	5400	3930
Lead	0.020	4.77	5.57	1.91	1.53	2.40	2.21	2.79	2.44
Lithium	0.50	1.45	1.93	1.03	0.83	1.16	1.05	1.50	1.15
Magnesium	2.0	1980	2560	2600	2030	2150	1990	2710	2300
Manganese	0.050	50.2	64.5	43.7	35.3	55.5	49.8	53.4	41.6
Mercury	0.0050	0.0343	0.0513	0.0677	0.0555	0.0703	0.0640	0.0596	0.0544
Molybdenum	0.020	0.381	0.507	0.371	0.278	0.442	0.370	0.686	0.520
Nickel	0.20	2.30	3.12	3.58	2.62	3.56	3.12	3.13	2.43
Phosphorus	10	387	605	426	473	446	483	522	562
Potassium	20	1810	2410	1750	1920	1890	1940	2090	2130
Rubidium	0.050	8.90	12.5	8.14	7.56	8.24	8.38	10.6	10.2
Selenium	0.050	0.076	0.114	0.092	0.085	0.083	0.097	0.086	0.092
Silver	0.0050	0.0437	0.0379	0.0221	0.0205	0.0249	0.0263	0.0331	0.0286
Sodium	20	174	236	310	301	278	335	231	250
Strontium	0.050	7.76	9.70	7.20	5.15	5.18	5.41	6.43	5.98
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-6. 2020 Lichen Metal Analysis (n=60), sample sites MS-02 to MS-05.

Parameter[1]	LDL[2]	MS-02-UNWASHED	MS-02-WASHED	MS-03-UNWASHED	MS-03-WASHED	MS-04-UNWASHED	MS-04-WASHED	MS-05-UNWASHED	MS-05-WASHED
		L2478696-4[3]	**L2478696-5**	**L2478696-74**	**L2478696-75**	**L2478696-77**	**L2478696-78**	**L2478696-80**	**L2478696-81**
Thallium	0.0020	0.0329	0.0423	0.0254	0.0187	0.0303	0.0238	0.0392	0.0291
Tin	0.10	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	68.5	93.5	69.7	52.6	75.1	63.3	98.3	73.4
Uranium	0.0020	0.635	0.870	0.255	0.182	0.287	0.246	0.379	0.286
Vanadium	0.10	2.19	2.91	1.85	1.39	2.15	1.71	2.64	1.91
Zinc	0.50	12.5	17.5	16.6	17.0	16.4	15.7	15.8	15.2
Zirconium	0.20	2.34	3.24	1.55	0.98	1.66	1.31	2.25	1.57

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-7. 2020 Lichen Metal Analysis (n=60), sample sites MS-06 to MS-08.

Parameter[1]	LDL[2]	MS-06-UNWASHED	MS-06-WASHED	MS-07-R[4]-UNWASHED	MS-07-R-WASHED	MS-07-UNWASHED	MS-07-WASHED	MS-08-UNWASHED	MS-08-WASHED
		L2478696-83[3]	L2478696-84	L2478696-137	L2478696-138	L2478696-134	L2478696-135	L2478696-140	L2478696-141
Aluminum	2.0	1970	1420	649	693	484	438	783	801
Antimony	0.010	0.010	<0.010	0.013	<0.010	0.011	<0.010	<0.010	<0.010
Arsenic	0.020	0.225	0.197	0.225	0.214	0.161	0.146	0.139	0.136
Barium	0.050	26.1	22.5	16.3	15.9	14.4	14.9	12.2	12.1
Beryllium	0.010	0.104	0.079	0.043	0.048	0.034	0.031	0.042	0.044
Bismuth	0.010	0.094	0.079	0.035	0.037	0.026	0.026	0.071	0.052
Boron	1.0	1.6	1.5	<1.0	1.2	<1.0	<1.0	1.1	1.3
Cadmium	0.0050	1.09	1.19	0.100	0.110	0.100	0.0994	0.0457	0.0470
Calcium	20	10200	8460	8480	9870	6140	5960	7020	7030
Cesium	0.0050	0.294	0.225	0.127	0.128	0.105	0.0966	0.124	0.114
Chromium	0.050	5.17	3.74	2.00	1.99	1.54	1.29	2.14	2.22
Cobalt	0.020	1.37	1.08	0.776	0.743	0.549	0.518	0.629	0.624
Copper	0.10	4.58	4.78	1.94	2.70	1.51	1.53	2.11	2.16
Iron	3.0	7190	5920	5400	5910	4110	2810	3280	4160
Lead	0.020	4.46	4.54	1.83	1.93	1.51	1.43	1.49	1.34
Lithium	0.50	1.96	1.45	0.66	0.70	0.51	<0.50	0.79	0.82
Magnesium	2.0	2820	2170	1780	1850	1360	1450	1660	1630
Manganese	0.050	83.4	75.3	79.6	80.1	51.5	49.2	43.8	42.4
Mercury	0.0050	0.0501	0.0428	0.0355	0.0415	0.0318	0.0082	0.0526	0.0524
Molybdenum	0.020	0.949	0.790	0.456	0.460	0.323	0.288	0.400	0.374
Nickel	0.20	4.35	3.30	2.05	2.21	1.58	1.57	2.08	2.14
Phosphorus	10	505	486	489	541	462	453	515	533
Potassium	20	2200	2050	1720	1920	1760	1790	1890	1720
Rubidium	0.050	11.8	10.8	7.62	8.94	6.69	7.38	6.63	6.39
Selenium	0.050	0.107	0.094	0.096	0.098	0.086	0.085	0.067	0.070
Silver	0.0050	0.0563	0.0556	0.0322	0.0313	0.0314	0.0257	0.0212	0.0194
Sodium	20	282	234	412	403	296	281	402	344
Strontium	0.050	6.82	5.72	6.15	6.95	5.38	5.66	4.06	4.08
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-7. 2020 Lichen Metal Analysis (n=60), sample sites MS-06 to MS-08.

Parameter[1]	LDL[2]	MS-06-UNWASHED	MS-06-WASHED	MS-07-R[4]-UNWASHED	MS-07-R-WASHED	MS-07-UNWASHED	MS-07-WASHED	MS-08-UNWASHED	MS-08-WASHED
		L2478696-83[3]	L2478696-84	L2478696-137	L2478696-138	L2478696-134	L2478696-135	L2478696-140	L2478696-141
Thallium	0.0020	0.0456	0.0366	0.0171	0.0156	0.0125	0.0059	0.0180	0.0175
Tin	0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	126	88.2	37.3	37.2	28.6	22.0	49.2	47.7
Uranium	0.0020	0.487	0.391	0.221	0.238	0.174	0.136	0.222	0.224
Vanadium	0.10	3.48	2.48	1.04	1.11	0.81	0.62	1.31	1.38
Zinc	0.50	29.4	25.8	20.0	20.7	19.8	19.1	14.1	14.2
Zirconium	0.20	2.48	1.84	0.98	1.02	0.83	0.59	0.97	1.14

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-8. 2020 Lichen Metal Analysis (n=60), sample sites MS-09 to MS-11.

Parameter[1]	LDL[2]	MS-09-UNWASHED	MS-09-WASHED	MS-10-R[4]-UNWASHED	MS-10-R-WASHED	MS-10-UNWASHED	MS-10-WASHED	MS-11-UNWASHED	MS-11-WASHED
		L2478696-143[3]	L2478696-144	L2478696-149	L2478696-150	L2478696-146	L2478696-147	L2478696-1	L2478696-2
Aluminum	2.0	908	828	849	601	821	754	1180	1380
Antimony	0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.165	0.155	0.191	0.133	0.176	0.162	0.166	0.157
Barium	0.050	10.8	10.4	11.6	8.18	10.9	8.98	11.0	12.5
Beryllium	0.010	0.046	0.049	0.045	0.034	0.045	0.043	0.065	0.068
Bismuth	0.010	0.036	0.029	0.040	0.028	0.037	0.026	0.065	0.063
Boron	1.0	1.4	1.6	1.2	<1.0	1.2	1.0	1.4	2.2
Cadmium	0.0050	0.0404	0.0356	0.0477	0.0377	0.0473	0.0418	0.0401	0.0500
Calcium	20	9250	7700	10800	8320	11800	8930	9330	12400
Cesium	0.0050	0.134	0.122	0.130	0.0858	0.133	0.113	0.154	0.167
Chromium	0.050	2.67	2.22	2.34	1.66	2.28	2.21	2.68	2.38
Cobalt	0.020	0.685	0.614	0.668	0.463	0.663	0.586	0.852	0.853
Copper	0.10	2.37	2.30	2.16	1.57	2.29	1.91	2.76	2.82
Iron	3.0	4040	4110	4300	3860	4360	4390	4680	4440
Lead	0.020	1.64	1.53	1.49	1.00	1.55	1.32	2.43	2.70
Lithium	0.50	0.96	0.89	0.86	0.59	0.84	0.75	1.25	1.84
Magnesium	2.0	1530	1460	1800	1280	1460	1410	2030	2460
Manganese	0.050	39.0	35.5	43.3	29.7	41.9	40.0	48.7	46.4
Mercury	0.0050	0.0597	0.0561	0.0479	0.0148	0.0513	0.0371	0.0549	0.0643
Molybdenum	0.020	0.408	0.377	0.424	0.306	0.392	0.368	0.340	0.391
Nickel	0.20	2.27	2.03	2.08	1.49	2.00	1.91	2.34	2.33
Phosphorus	10	549	574	483	380	516	520	401	485
Potassium	20	1930	1760	1750	1320	1910	1700	1600	1750
Rubidium	0.050	6.91	6.75	7.57	5.73	7.96	7.69	7.23	8.54
Selenium	0.050	0.071	0.072	0.089	0.061	0.080	0.072	0.070	0.080
Silver	0.0050	0.0257	0.0228	0.0226	0.0196	0.0220	0.0185	0.0275	0.0219
Sodium	20	337	319	326	235	309	301	194	213
Strontium	0.050	4.64	4.55	6.16	4.52	5.23	4.48	5.15	6.36
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-8. 2020 Lichen Metal Analysis (n=60), sample sites MS-09 to MS-11.

Parameter[1]	LDL[2]	MS-09-UNWASHED	MS-09-WASHED	MS-10-R[4]-UNWASHED	MS-10-R-WASHED	MS-10-UNWASHED	MS-10-WASHED	MS-11-UNWASHED	MS-11-WASHED
		L2478696-143[3]	L2478696-144	L2478696-149	L2478696-150	L2478696-146	L2478696-147	L2478696-1	L2478696-2
Thallium	0.0020	0.0205	0.0182	0.0190	0.0118	0.0202	0.0174	0.0276	0.0314
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	54.6	50.5	49.8	32.1	47.8	40.8	66.6	65.8
Uranium	0.0020	0.293	0.439	0.279	0.176	0.267	0.234	0.474	0.526
Vanadium	0.10	1.59	1.51	1.42	0.98	1.34	1.21	2.03	2.14
Zinc	0.50	15.2	14.9	14.4	10.7	15.3	13.4	11.3	14.9
Zirconium	0.20	1.22	1.20	1.07	0.81	1.17	1.17	1.84	2.14

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-9. 2020 Lichen Metal Analysis (n=60), sample sites MS-12 to MS-14.

Parameter[1]	LDL[2]	MS-12-UNWASHED	MS-12-WASHED	MS-13-R[4]-UNWASHED	MS-13-R-WASHED	MS-13-UNWASHED	MS-13-WASHED	MS-14-UNWASHED	MS-14-WASHED
		L2478696-10[3]	L2478696-11	L2478696-68	L2478696-69	L2478696-65	L2478696-66	L2478696-71	L2478696-72
Aluminum	2.0	1110	1580	658	513	668	617	615	467
Antimony	0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.174	0.192	0.097	0.082	0.100	0.096	0.083	0.066
Barium	0.050	14.1	16.9	8.06	7.47	8.99	9.37	8.77	8.19
Beryllium	0.010	0.071	0.088	0.030	0.025	0.032	0.030	0.030	0.024
Bismuth	0.010	0.080	0.078	0.021	0.019	0.016	0.019	0.019	0.017
Boron	1.0	1.5	1.5	<1.0	<1.0	<1.0	1.3	<1.0	<1.0
Cadmium	0.0050	0.0958	0.0950	0.0535	0.0461	0.0574	0.0847	0.0457	0.0410
Calcium	20	10400	10400	9750	9020	8260	15400	6460	5910
Cesium	0.0050	0.170	0.194	0.105	0.0904	0.105	0.103	0.0961	0.0787
Chromium	0.050	2.68	3.50	1.60	1.45	1.68	1.86	1.61	1.40
Cobalt	0.020	1.00	1.21	0.479	0.380	0.530	0.459	0.480	0.357
Copper	0.10	2.86	3.76	1.54	1.28	1.56	1.63	1.36	1.19
Iron	3.0	4800	5190	2340	1820	2490	2380	1940	1570
Lead	0.020	3.32	3.58	0.854	0.701	0.914	0.971	0.908	0.674
Lithium	0.50	1.21	1.77	0.61	0.52	0.73	0.66	0.61	<0.50
Magnesium	2.0	2300	2480	2020	1890	1890	2210	1710	1960
Manganese	0.050	58.2	70.5	29.8	24.6	36.6	33.1	38.5	37.1
Mercury	0.0050	0.0512	0.0294	0.0507	0.0445	0.0435	0.0403	0.0656	0.0604
Molybdenum	0.020	0.476	0.541	0.246	0.181	0.177	0.203	0.208	0.158
Nickel	0.20	5.97	3.82	1.45	1.10	1.48	1.38	1.33	1.01
Phosphorus	10	537	631	499	454	533	555	556	575
Potassium	20	1910	2070	2060	1880	2040	1920	1720	1740
Rubidium	0.050	8.66	9.84	5.97	5.62	6.28	6.50	5.72	5.47
Selenium	0.050	0.079	0.087	0.056	0.071	0.057	0.090	<0.050	0.061
Silver	0.0050	0.0325	0.0315	0.0112	0.0098	0.0142	0.0162	0.0106	0.0089
Sodium	20	221	201	323	321	329	332	461	525
Strontium	0.050	6.79	7.17	4.30	4.18	4.25	6.42	4.10	4.39
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-9. **2020 Lichen Metal Analysis (n=60), sample sites MS-12 to MS-14.**

Parameter[1]	LDL[2]	MS-12-UNWASHED	MS-12-WASHED	MS-13-R[4]-UNWASHED	MS-13-R-WASHED	MS-13-UNWASHED	MS-13-WASHED	MS-14-UNWASHED	MS-14-WASHED
		L2478696-10[3]	L2478696-11	L2478696-68	L2478696-69	L2478696-65	L2478696-66	L2478696-71	L2478696-72
Thallium	0.0020	0.0286	0.0290	0.0155	0.0108	0.0156	0.0129	0.0152	0.0109
Tin	0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	59.6	83.6	42.6	34.5	46.4	42.8	43.7	34.1
Uranium	0.0020	0.501	0.676	0.141	0.107	0.139	0.130	0.146	0.104
Vanadium	0.10	1.93	2.75	1.09	0.85	1.24	1.14	1.17	0.82
Zinc	0.50	18.3	18.7	15.3	14.8	15.6	19.6	12.6	12.7
Zirconium	0.20	1.85	2.00	0.83	0.64	0.94	0.83	0.77	0.55

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-10. 2020 Lichen Metal Analysis (n=60), sample sites MS-15 to MS-17.

Parameter[1]	LDL[2]	MS-15-UNWASHED	MS-15-WASHED	MS-16-UNWASHED	MS-16-WASHED	MS-17-R[4]-UNWASHED	MS-17-R-WASHED	MS-17-UNWASHED	MS-17-WASHED
		L2478696-86[3]	L2478696-87	L2478696-131	L2478696-132	L2478696-92	L2478696-93	L2478696-89	L2478696-90
Aluminum	2.0	1110	729	691	783	824	483	714	506
Antimony	0.010	<0.010	<0.010	0.012	<0.010	0.011	<0.010	<0.010	<0.010
Arsenic	0.020	0.164	0.146	0.189	0.198	0.157	0.119	0.203	0.135
Barium	0.050	13.5	12.1	12.4	13.5	11.2	9.61	10.3	9.38
Beryllium	0.010	0.055	0.045	0.043	0.049	0.042	0.031	0.035	0.029
Bismuth	0.010	0.061	0.038	0.034	0.040	0.031	0.026	0.032	0.024
Boron	1.0	1.3	1.4	1.0	1.4	<1.0	1.0	1.1	<1.0
Cadmium	0.0050	0.0705	0.0699	0.0557	0.0603	0.118	0.0908	0.0966	0.0934
Calcium	20	14000	13600	7600	8050	11000	7770	10200	9020
Cesium	0.0050	0.205	0.167	0.131	0.129	0.135	0.120	0.131	0.113
Chromium	0.050	3.12	2.16	2.03	2.15	2.16	1.43	2.13	1.56
Cobalt	0.020	0.797	0.567	0.657	0.748	0.655	0.485	0.557	0.407
Copper	0.10	2.60	1.91	2.00	2.37	1.99	1.36	1.82	1.40
Iron	3.0	3790	3210	4910	5860	3620	2280	2790	2090
Lead	0.020	2.14	2.03	1.64	1.69	1.49	1.07	1.40	1.02
Lithium	0.50	1.13	0.78	0.71	0.82	0.82	0.54	0.73	0.59
Magnesium	2.0	2390	2140	1460	1670	2050	1930	1730	1750
Manganese	0.050	46.8	38.2	52.4	60.3	41.9	33.4	33.9	29.7
Mercury	0.0050	0.0419	0.0425	0.0372	0.0457	0.0557	0.0507	0.0600	0.0545
Molybdenum	0.020	0.660	0.424	0.476	0.492	0.281	0.186	0.262	0.190
Nickel	0.20	2.56	1.70	1.82	2.11	2.25	1.47	1.87	1.36
Phosphorus	10	505	570	590	649	459	438	419	489
Potassium	20	1970	2010	1830	1980	1850	1810	1760	1970
Rubidium	0.050	9.04	9.11	7.91	8.95	7.96	7.93	7.19	7.97
Selenium	0.050	0.106	0.096	0.092	0.096	0.084	0.072	0.084	0.089
Silver	0.0050	0.0289	0.0278	0.0265	0.0282	0.0176	0.0149	0.0176	0.0149
Sodium	20	230	257	312	283	259	314	245	273
Strontium	0.050	6.00	5.97	3.77	4.29	5.19	4.46	5.02	4.98
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-10. 2020 Lichen Metal Analysis (n=60), sample sites MS-15 to MS-17.

Parameter[1]	LDL[2]	MS-15-UNWASHED	MS-15-WASHED	MS-16-UNWASHED	MS-16-WASHED	MS-17-R[4]-UNWASHED	MS-17-R-WASHED	MS-17-UNWASHED	MS-17-WASHED
		L2478696-86[3]	L2478696-87	L2478696-131	L2478696-132	L2478696-92	L2478696-93	L2478696-89	L2478696-90
Thallium	0.0020	0.0271	0.0190	0.0176	0.0161	0.0198	0.0132	0.0166	0.0129
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	71.5	47.2	38.4	42.7	51.5	34.4	48.0	37.2
Uranium	0.0020	0.276	0.206	0.277	0.299	0.184	0.115	0.162	0.113
Vanadium	0.10	1.96	1.28	1.12	1.25	1.42	0.81	1.34	0.92
Zinc	0.50	16.0	15.7	15.5	18.1	20.4	15.6	21.0	22.0
Zirconium	0.20	1.38	1.07	1.05	1.18	1.10	0.56	0.97	0.70

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-11. 2020 Lichen Metal Analysis (n=60), sample sites MS-18 to MS-21-R.

Parameter[1]	LDL[2]	MS-18-UNWASHED	MS-18-WASHED	MS-19-UNWASHED	MS-19-WASHED	MS-20-UNWASHED	MS-20-WASHED	MS-21-R[4]-UNWASHED	MS-21-R-WASHED
		L2478696-125[3]	L2478696-126	L2478696-128	L2478696-129	L2478696-152	L2478696-153	L2478696-158	L2478696-159
Aluminum	2.0	470	478	446	493	920	888	948	754
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.142	0.127	0.091	0.101	0.160	0.164	0.174	0.171
Barium	0.050	11.0	11.1	10.1	12.5	9.80	9.89	9.51	11.1
Beryllium	0.010	0.030	0.029	0.024	0.029	0.050	0.049	0.049	0.045
Bismuth	0.010	0.026	0.030	0.021	0.024	0.043	0.036	0.038	0.040
Boron	1.0	<1.0	1.2	<1.0	1.1	1.3	1.0	1.2	1.0
Cadmium	0.0050	0.0690	0.0625	0.0870	0.0779	0.0589	0.0594	0.0299	0.0390
Calcium	20	7540	7940	10300	8600	6720	7240	8880	10400
Cesium	0.0050	0.110	0.109	0.101	0.102	0.140	0.119	0.149	0.144
Chromium	0.050	1.51	1.39	1.23	1.30	2.17	2.11	2.37	1.98
Cobalt	0.020	0.488	0.470	0.346	0.389	0.740	0.701	0.703	0.667
Copper	0.10	1.56	1.69	1.41	1.80	2.48	2.12	1.86	1.76
Iron	3.0	3320	3630	1890	2380	4450	4870	4850	4620
Lead	0.020	1.20	1.20	1.14	1.24	1.40	1.39	1.58	1.56
Lithium	0.50	<0.50	0.53	<0.50	0.51	0.97	0.95	1.10	0.89
Magnesium	2.0	1650	1670	1220	1350	2000	1980	1890	2020
Manganese	0.050	53.5	50.3	74.8	84.8	79.5	79.4	36.7	36.7
Mercury	0.0050	0.0405	0.0429	0.0483	0.0526	0.0476	0.0403	0.0402	0.0449
Molybdenum	0.020	0.279	0.286	0.238	0.238	0.318	0.501	0.265	0.282
Nickel	0.20	1.36	1.37	1.29	1.42	1.87	1.89	1.86	1.60
Phosphorus	10	497	545	431	561	699	686	381	479
Potassium	20	1730	1870	1690	1820	2130	2000	1510	1810
Rubidium	0.050	6.83	7.64	7.88	8.14	10.6	9.21	6.32	7.54
Selenium	0.050	0.099	0.092	0.078	0.088	0.065	0.059	0.080	0.086
Silver	0.0050	0.0226	0.0228	0.0180	0.0198	0.0166	0.0190	0.0170	0.0205
Sodium	20	288	269	276	264	282	238	186	249
Strontium	0.050	4.03	4.29	5.56	5.36	4.45	4.51	4.78	5.95
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-11. 2020 Lichen Metal Analysis (n=60), sample sites MS-18 to MS-21-R.

Parameter[1]	LDL[2]	MS-18-UNWASHED	MS-18-WASHED	MS-19-UNWASHED	MS-19-WASHED	MS-20-UNWASHED	MS-20-WASHED	MS-21-R[4]-UNWASHED	MS-21-R-WASHED
		L2478696-125[3]	L2478696-126	L2478696-128	L2478696-129	L2478696-152	L2478696-153	L2478696-158	L2478696-159
Thallium	0.0020	0.0132	0.0121	0.0118	0.0124	0.0219	0.0196	0.0213	0.0187
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	26.9	26.8	27.3	28.4	48.5	47.8	60.8	47.4
Uranium	0.0020	0.167	0.172	0.130	0.161	0.304	0.287	0.284	0.240
Vanadium	0.10	0.74	0.78	0.71	0.78	1.49	1.39	1.72	1.36
Zinc	0.50	19.0	19.0	16.1	17.8	22.1	21.5	11.3	12.7
Zirconium	0.20	0.81	0.82	0.63	0.81	1.42	1.23	1.36	1.21

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-12. 2020 Lichen Metal Analysis (n=60), sample sites MS-21 to MS-23.

Parameter[1]	LDL[2]	MS-21-UNWASHED	MS-21-WASHED	MS-22-UNWASHED	MS-22-WASHED	MS-23-R-UNWASHED	MS-23-R-WASHED	MS-23-UNWASHED	MS-23-WASHED
		L2478696-155[3]	L2478696-156	L2478696-13	L2478696-14	L2478696-19	L2478696-20	L2478696-16	L2478696-17
Aluminum	2.0	573	649	112	116	525	469	418	345
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.120	0.157	0.045	0.047	0.077	0.072	0.063	0.059
Barium	0.050	8.12	9.11	9.60	9.75	11.0	10.9	9.99	10.3
Beryllium	0.010	0.033	0.040	<0.010	<0.010	0.026	0.023	0.018	0.018
Bismuth	0.010	0.062	0.054	0.013	0.014	0.034	0.026	0.032	0.054
Boron	1.0	<1.0	<1.0	<1.0	<1.0	1.1	1.2	<1.0	1.0
Cadmium	0.0050	0.0319	0.0381	0.164	0.156	0.221	0.294	0.225	0.223
Calcium	20	8190	11200	10100	9770	13300	12000	11800	11500
Cesium	0.0050	0.114	0.127	0.0300	0.0328	0.0840	0.0804	0.0619	0.0549
Chromium	0.050	1.54	1.74	0.325	0.323	1.30	1.10	1.02	0.852
Cobalt	0.020	0.476	0.593	0.149	0.136	0.358	0.366	0.306	0.286
Copper	0.10	1.39	1.88	0.90	1.01	1.27	2.03	1.11	1.26
Iron	3.0	3170	4120	438	447	1050	953	786	727
Lead	0.020	1.31	1.42	0.477	0.468	1.27	1.11	1.03	0.876
Lithium	0.50	0.66	0.75	<0.50	<0.50	0.58	0.54	<0.50	<0.50
Magnesium	2.0	1470	1900	1380	1380	1440	1430	1630	1710
Manganese	0.050	27.3	32.8	58.2	51.0	45.6	45.0	40.2	39.9
Mercury	0.0050	0.0459	0.0430	0.0438	0.0471	0.0503	0.0483	0.0474	0.0454
Molybdenum	0.020	0.228	0.297	0.071	0.075	0.084	0.112	0.070	0.068
Nickel	0.20	1.33	1.50	0.32	0.34	0.82	0.92	0.66	0.59
Phosphorus	10	400	486	296	342	519	627	541	614
Potassium	20	1460	1800	1440	1550	1890	1760	1970	1940
Rubidium	0.050	5.22	7.14	3.36	3.71	6.94	7.19	5.79	5.96
Selenium	0.050	0.076	0.078	0.088	0.083	0.099	0.083	0.079	0.081
Silver	0.0050	0.0158	0.0202	0.0112	0.0115	0.0114	0.0117	0.0109	0.0092
Sodium	20	212	265	274	265	335	280	366	341
Strontium	0.050	4.34	5.70	9.98	10.2	8.34	8.02	7.30	7.63
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-12. 2020 Lichen Metal Analysis (n=60), sample sites MS-21 to MS-23.

Parameter[1]	LDL[2]	MS-21-UNWASHED	MS-21-WASHED	MS-22-UNWASHED	MS-22-WASHED	MS-23-R-UNWASHED	MS-23-R-WASHED	MS-23-UNWASHED	MS-23-WASHED
		L2478696-155[3]	**L2478696-156**	**L2478696-13**	**L2478696-14**	**L2478696-19**	**L2478696-20**	**L2478696-16**	**L2478696-17**
Thallium	0.0020	0.0162	0.0165	0.0025	0.0028	0.0090	0.0079	0.0063	0.0061
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	34.1	36.8	7.98	8.52	36.4	29.7	27.5	23.4
Uranium	0.0020	0.222	0.283	0.0344	0.0387	0.0774	0.0808	0.0512	0.0539
Vanadium	0.10	0.97	1.08	0.19	0.20	1.07	0.90	0.80	0.70
Zinc	0.50	10.1	13.6	24.1	24.1	32.5	49.6	36.2	38.9
Zirconium	0.20	0.91	1.01	0.20	<0.20	0.99	0.78	0.80	0.61

[1] Total metals (units = mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-13. 2020 Lichen Metal Analysis (n=60), sample sites MS-24 to TR-02.

Parameter[1]	LDL[2]	MS-24-UNWASHED	MS-24-WASHED	MS-25-UNWASHED	MS-25-WASHED	TR-01-UNWASHED	TR-01-WASHED	TR-02-UNWASHED	TR-02-WASHED
		L2478696-22[3]	L2478696-23	L2478696-25	L2478696-26	L2478696-173	L2478696-174	L2478696-176	L2478696-177
Aluminum	2.0	228	173	893	846	2150	1720	991	1410
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.034	0.037	0.141	0.132	0.139	0.123	0.132	0.148
Barium	0.050	25.5	27.2	12.2	12.7	22.4	24.1	19.6	20.9
Beryllium	0.010	0.030	0.032	0.038	0.045	0.103	0.086	0.057	0.075
Bismuth	0.010	<0.010	0.011	0.029	0.025	0.173	0.169	0.112	0.128
Boron	1.0	<1.0	<1.0	1.6	2.1	1.9	1.8	1.3	1.8
Cadmium	0.0050	0.197	0.188	0.0736	0.0662	0.144	0.144	0.0991	0.115
Calcium	20	9030	9270	16600	15100	22600	23200	19400	21000
Cesium	0.0050	0.124	0.113	0.160	0.160	0.384	0.311	0.241	0.278
Chromium	0.050	0.497	0.370	4.86	3.57	5.02	4.12	3.26	4.32
Cobalt	0.020	0.468	0.491	0.646	0.659	1.17	0.957	0.670	0.898
Copper	0.10	0.77	0.75	2.20	2.27	4.00	3.55	2.26	3.01
Iron	3.0	297	250	2480	2450	4410	3910	2590	3780
Lead	0.020	1.07	1.08	1.53	1.54	7.89	7.73	4.55	4.97
Lithium	0.50	<0.50	<0.50	1.08	1.15	3.00	2.50	1.45	2.13
Magnesium	2.0	1270	1280	2060	2030	2440	2310	1900	2290
Manganese	0.050	123	127	32.0	33.5	86.8	83.0	58.8	70.3
Mercury	0.0050	0.0471	0.0445	0.0601	0.0773	0.0392	0.0310	0.0340	0.0387
Molybdenum	0.020	0.035	0.038	0.266	0.488	0.758	0.754	0.541	0.678
Nickel	0.20	0.73	0.68	4.25	4.27	3.62	3.10	2.38	3.18
Phosphorus	10	346	358	467	540	653	697	711	788
Potassium	20	1580	1600	1660	1750	2740	2720	2330	2590
Rubidium	0.050	6.88	7.08	5.30	5.67	13.7	13.0	9.95	11.8
Selenium	0.050	0.067	0.068	0.105	0.104	0.088	0.070	0.066	0.077
Silver	0.0050	0.0131	0.0132	0.0178	0.0188	0.0698	0.0710	0.0475	0.0581
Sodium	20	407	409	255	261	345	297	397	400
Strontium	0.050	18.7	19.8	6.81	7.16	23.4	27.2	26.5	28.4
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-13. 2020 Lichen Metal Analysis (n=60), sample sites MS-24 to TR-02.

Parameter[1]	LDL[2]	MS-24-UNWASHED	MS-24-WASHED	MS-25-UNWASHED	MS-25-WASHED	TR-01-UNWASHED	TR-01-WASHED	TR-02-UNWASHED	TR-02-WASHED
		L2478696-22[3]	L2478696-23	L2478696-25	L2478696-26	L2478696-173	L2478696-174	L2478696-176	L2478696-177
Thallium	0.0020	0.0046	0.0040	0.0175	0.0178	0.0618	0.0505	0.0333	0.0399
Tin	0.10	<0.10	<0.10	<0.10	<0.10	0.15	0.11	<0.10	<0.10
Titanium	0.25	19.4	17.1	54.3	55.9	122	103	58.4	84.6
Uranium	0.0020	0.0409	0.0459	0.146	0.151	0.912	0.804	0.492	0.658
Vanadium	0.10	0.41	0.31	1.82	1.86	3.91	3.18	1.80	2.59
Zinc	0.50	31.1	30.1	14.4	14.2	21.4	21.2	20.9	21.2
Zirconium	0.20	0.29	0.23	1.33	1.31	3.98	3.98	2.14	3.22

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-14. 2020 Lichen Metal Analysis (n=60), sample sites TR-03 to TR-05.

Parameter[1]	LDL[2]	TR-03-UNWASHED	TR-03-WASHED	TR-04-UNWASHED	TR-04-WASHED	TR-05-R[4]-UNWASHED	TR-05-R-WASHED	TR-05-UNWASHED	TR-05-WASHED
		L2478696-194[3]	L2478696-195	L2478696-182	L2478696-183	L2478696-188	L2478696-189	L2478696-185	L2478696-186
Aluminum	2.0	1570	1360	1500	1390	1840	1350	1910	1280
Antimony	0.010	0.010	<0.010	0.011	<0.010	<0.010	<0.010	0.011	0.010
Arsenic	0.020	0.171	0.162	0.149	0.134	0.145	0.122	0.146	0.117
Barium	0.050	23.8	27.1	24.9	22.6	22.7	20.8	21.4	18.6
Beryllium	0.010	0.085	0.085	0.082	0.078	0.094	0.083	0.097	0.076
Bismuth	0.010	0.120	0.132	0.163	0.170	0.126	0.131	0.144	0.147
Boron	1.0	1.8	1.7	1.8	1.8	2.1	1.7	2.0	1.7
Cadmium	0.0050	0.0819	0.0949	0.184	0.194	0.115	0.113	0.113	0.128
Calcium	20	16500	18400	24200	25100	22100	23600	20800	23700
Cesium	0.0050	0.312	0.284	0.298	0.282	0.377	0.326	0.387	0.311
Chromium	0.050	3.51	3.02	3.99	3.66	3.29	2.55	3.31	2.50
Cobalt	0.020	0.855	0.762	0.854	0.813	0.890	0.690	0.942	0.678
Copper	0.10	2.83	2.85	3.28	3.14	2.94	2.65	3.25	2.55
Iron	3.0	3320	2980	3290	3160	3700	2920	3850	2780
Lead	0.020	5.93	6.66	6.35	6.71	7.95	8.97	8.04	8.63
Lithium	0.50	2.29	2.02	2.19	2.03	2.78	2.20	3.11	1.98
Magnesium	2.0	1840	1900	2200	2030	2040	1670	2050	1550
Manganese	0.050	55.7	55.6	90.5	89.5	87.8	77.9	86.7	80.5
Mercury	0.0050	0.0363	0.0426	0.0434	0.0435	0.0474	0.0458	0.0438	0.0429
Molybdenum	0.020	0.575	0.559	0.674	0.651	0.624	0.519	0.645	0.525
Nickel	0.20	2.43	2.20	2.88	2.77	2.50	2.13	2.59	2.11
Phosphorus	10	678	899	611	605	626	700	597	657
Potassium	20	1990	2310	2200	2300	2330	2480	2480	2510
Rubidium	0.050	9.81	10.0	10.8	11.1	12.6	11.6	12.6	12.1
Selenium	0.050	0.071	0.080	0.085	0.080	0.065	0.063	0.062	0.058
Silver	0.0050	0.0736	0.0711	0.0749	0.0695	0.0750	0.0769	0.0738	0.0727
Sodium	20	269	315	263	264	310	316	299	357
Strontium	0.050	18.7	19.8	6.81	7.16	23.4	27.2	26.5	28.4
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-14. **2020 Lichen Metal Analysis (n=60), sample sites TR-03 to TR-05.**

Parameter[1]	LDL[2]	TR-03-UNWASHED	TR-03-WASHED	TR-04-UNWASHED	TR-04-WASHED	TR-05-R[4]-UNWASHED	TR-05-R-WASHED	TR-05-UNWASHED	TR-05-WASHED
		L2478696-194[3]	L2478696-195	L2478696-182	L2478696-183	L2478696-188	L2478696-189	L2478696-185	L2478696-186
Thallium	0.0020	0.0046	0.0040	0.0175	0.0178	0.0618	0.0505	0.0333	0.0399
Tin	0.10	<0.10	<0.10	<0.10	<0.10	0.15	0.11	<0.10	<0.10
Titanium	0.25	19.4	17.1	54.3	55.9	122	103	58.4	84.6
Uranium	0.0020	0.0409	0.0459	0.146	0.151	0.912	0.804	0.492	0.658
Vanadium	0.10	0.41	0.31	1.82	1.86	3.91	3.18	1.80	2.59
Zinc	0.50	31.1	30.1	14.4	14.2	21.4	21.2	20.9	21.2
Zirconium	0.20	0.29	0.23	1.33	1.31	3.98	3.98	2.14	3.22

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-15. 2020 Lichen Metal Analysis (n=60), sample sites TR-06 to TR-09.

Parameter[1]	LDL[2]	TR-06-UNWASHED	TR-06-WASHED	TR-07-UNWASHED	TR-07-WASHED	TR-08-UNWASHED	TR-08-WASHED	TR-09-UNWASHED	TR-09-WASHED
		L2478696-191[3]	L2478696-192	L2478696-203	L2478696-204	L2478696-206	L2478696-207	L2478696-209	L2478696-210
Aluminum	2.0	1460	1350	1180	981	1340	994	1210	801
Antimony	0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.125	0.117	0.154	0.140	0.231	0.198	0.236	0.187
Barium	0.050	20.1	19.1	29.5	27.9	23.1	20.8	19.6	16.5
Beryllium	0.010	0.080	0.079	0.066	0.053	0.079	0.062	0.071	0.057
Bismuth	0.010	0.127	0.135	0.207	0.163	0.115	0.088	0.067	0.052
Boron	1.0	1.7	1.7	1.6	1.4	2.9	2.3	3.1	2.6
Cadmium	0.0050	0.137	0.154	0.155	0.151	0.0586	0.0515	0.0358	0.0322
Calcium	20	23900	23700	27700	28200	72800	67000	39200	38500
Cesium	0.0050	0.330	0.319	0.279	0.237	0.379	0.302	0.361	0.277
Chromium	0.050	2.49	2.39	2.40	2.18	3.07	2.36	2.65	1.85
Cobalt	0.020	0.717	0.716	0.642	0.538	0.655	0.514	0.642	0.412
Copper	0.10	2.66	2.75	2.19	1.96	2.51	2.13	2.32	1.73
Iron	3.0	2970	2780	2600	1990	2830	2080	2440	1610
Lead	0.020	8.72	9.33	6.85	6.84	4.85	4.53	3.21	2.77
Lithium	0.50	2.26	2.17	1.81	1.47	4.08	2.95	3.32	2.34
Magnesium	2.0	1620	1600	2100	1770	3200	2740	3230	2700
Manganese	0.050	74.6	75.3	66.8	58.0	71.4	59.2	59.1	45.5
Mercury	0.0050	0.0437	0.0476	0.0411	0.0393	0.0283	0.0256	0.0407	0.0422
Molybdenum	0.020	0.544	0.495	0.589	0.530	0.546	0.508	0.472	0.354
Nickel	0.20	2.16	2.19	2.11	1.75	1.90	1.60	1.71	1.16
Phosphorus	10	656	708	647	691	476	570	512	544
Potassium	20	2480	2520	1990	2110	1910	2060	2010	2070
Rubidium	0.050	11.6	12.4	8.68	8.76	9.46	8.73	10.0	9.15
Selenium	0.050	0.067	0.073	0.089	0.077	0.066	0.066	0.061	0.059
Silver	0.0050	0.0724	0.0658	0.0759	0.0717	0.0880	0.0757	0.0429	0.0446
Sodium	20	252	297	198	232	168	198	175	186
Strontium	0.050	27.8	27.4	38.2	37.5	84.4	84.7	38.2	38.2
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-15. 2020 Lichen Metal Analysis (n=60), sample sites TR-06 to TR-09.

Parameter[1]	LDL[2]	TR-06-UNWASHED	TR-06-WASHED	TR-07-UNWASHED	TR-07-WASHED	TR-08-UNWASHED	TR-08-WASHED	TR-09-UNWASHED	TR-09-WASHED
		L2478696-191[3]	L2478696-192	L2478696-203	L2478696-204	L2478696-206	L2478696-207	L2478696-209	L2478696-210
Thallium	0.0020	0.0429	0.0422	0.0364	0.0304	0.0373	0.0282	0.0339	0.0218
Tin	0.10	0.10	0.10	<0.10	<0.10	0.13	<0.10	<0.10	<0.10
Titanium	0.25	91.1	87.1	75.2	60.6	79.2	54.3	67.0	41.0
Uranium	0.0020	0.788	0.804	0.591	0.535	1.27	1.12	0.635	0.513
Vanadium	0.10	2.29	2.16	1.86	1.57	2.17	1.56	2.05	1.36
Zinc	0.50	17.6	19.3	17.4	16.8	13.6	13.3	13.1	12.6
Zirconium	0.20	3.60	3.46	2.93	2.83	3.73	3.09	2.58	2.17

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-16. 2020 Lichen Metal Analysis (n=60), sample sites TR-10 to TR-12.

Parameter[1]	LDL[2]	TR-10-UNWASHED	TR-10-WASHED	TR-11-UNWASHED	TR-11-WASHED	TR-12-R[4]-UNWASHED	TR-12-R-WASHED	TR-12-UNWASHED	TR-12-WASHED
		L2478696-212[3]	L2478696-213	L2478696-179	L2478696-180	L2478696-200	L2478696-201	L2478696-197	L2478696-198
Aluminum	2.0	857	725	1020	1210	896	866	757	521
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.169	0.155	0.113	0.124	0.098	0.085	0.086	0.060
Barium	0.050	18.1	17.0	14.2	17.6	21.8	20.7	21.9	18.6
Beryllium	0.010	0.058	0.048	0.053	0.063	0.046	0.043	0.041	0.030
Bismuth	0.010	0.090	0.071	0.107	0.088	0.096	0.093	0.081	0.046
Boron	1.0	2.4	2.2	1.2	1.1	1.1	1.3	1.0	<1.0
Cadmium	0.0050	0.0404	0.0438	0.0946	0.0808	0.0708	0.0712	0.0807	0.0557
Calcium	20	41600	39600	14600	14800	14700	13300	12300	10500
Cesium	0.0050	0.299	0.280	0.256	0.246	0.223	0.226	0.215	0.168
Chromium	0.050	1.99	1.78	2.20	2.52	1.90	1.77	1.57	1.07
Cobalt	0.020	0.467	0.387	0.559	0.672	0.546	0.502	0.459	0.316
Copper	0.10	2.08	1.85	2.05	2.24	2.13	2.14	1.78	1.29
Iron	3.0	1770	1510	2240	2560	1740	1730	1500	850
Lead	0.020	3.17	3.12	5.15	4.51	3.34	3.19	2.89	2.30
Lithium	0.50	2.28	1.94	1.51	1.87	1.37	1.29	1.11	0.79
Magnesium	2.0	2460	2090	1460	2080	2050	1750	1930	1410
Manganese	0.050	47.9	42.2	56.6	67.0	57.1	49.9	59.1	42.6
Mercury	0.0050	0.0406	0.0445	0.0395	0.0272	0.0378	0.0429	0.0387	0.0104
Molybdenum	0.020	0.410	0.352	0.438	0.461	0.340	0.340	0.357	0.232
Nickel	0.20	1.34	1.12	1.75	1.99	1.21	1.22	1.01	0.73
Phosphorus	10	491	589	456	545	429	436	486	394
Potassium	20	2010	2020	2040	2180	1700	1800	1740	1650
Rubidium	0.050	8.64	8.71	11.3	10.9	8.86	8.99	8.49	7.61
Selenium	0.050	0.066	0.079	0.059	0.058	0.073	0.076	0.072	0.069
Silver	0.0050	0.0523	0.0548	0.0497	0.0481	0.0362	0.0360	0.0332	0.0317
Sodium	20	180	206	267	257	194	210	204	212
Strontium	0.050	43.9	43.5	13.5	14.7	10.5	9.84	10.3	9.01
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-16. 2020 Lichen Metal Analysis (n=60), sample sites TR-10 to TR-12.

Parameter[1]	LDL[2]	TR-10-UNWASHED	TR-10-WASHED	TR-11-UNWASHED	TR-11-WASHED	TR-12-R[4]-UNWASHED	TR-12-R-WASHED	TR-12-UNWASHED	TR-12-WASHED
		L2478696-212[3]	L2478696-213	L2478696-179	L2478696-180	L2478696-200	L2478696-201	L2478696-197	L2478696-198
Thallium	0.0020	0.0255	0.0217	0.0315	0.0325	0.0295	0.0307	0.0280	0.0156
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	48.5	38.3	64.0	69.9	63.2	59.1	53.2	31.6
Uranium	0.0020	0.614	0.548	0.476	0.477	0.342	0.326	0.299	0.185
Vanadium	0.10	1.39	1.16	1.67	1.90	1.47	1.44	1.23	0.76
Zinc	0.50	12.6	13.1	16.6	18.0	16.3	16.2	17.5	13.7
Zirconium	0.20	2.14	2.18	2.26	2.20	1.48	1.72	1.31	0.91

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-17. 2020 Lichen Metal Analysis (n=60), sample sites TR-13-R to TR-15-R.

Parameter[1]	LDL[2]	TR-13-R[4]-UNWASHED	TR-13-R-WASHED	TR-13-UNWASHED	TR-13-WASHED	TR-14-UNWASHED	TR-14-WASHED	TR-15-R-UNWASHED	TR-15-R-WASHED
		L2478696-41[3]	L2478696-42	L2478696-38	L2478696-39	L2478696-44	L2478696-45	L2478696-31	L2478696-32
Aluminum	2.0	430	313	374	277	789	655	147	164
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.054	0.045	0.052	0.050	0.096	0.092	0.045	0.045
Barium	0.050	7.31	7.60	7.61	7.50	21.0	19.8	6.84	7.02
Beryllium	0.010	0.022	0.017	0.018	0.015	0.043	0.037	<0.010	<0.010
Bismuth	0.010	0.017	0.020	0.019	0.018	0.058	0.051	<0.010	<0.010
Boron	1.0	<1.0	<1.0	<1.0	<1.0	1.0	1.0	<1.0	<1.0
Cadmium	0.0050	0.0264	0.0302	0.0281	0.0328	0.111	0.109	0.0445	0.0445
Calcium	20	9030	8560	7560	7570	11600	10800	11600	10300
Cesium	0.0050	0.0960	0.0838	0.0954	0.0770	0.225	0.195	0.0411	0.0460
Chromium	0.050	1.27	0.837	1.08	0.764	1.81	1.47	0.548	0.492
Cobalt	0.020	0.258	0.199	0.251	0.192	0.630	0.541	0.094	0.107
Copper	0.10	1.13	1.14	1.06	1.10	1.66	1.51	0.82	0.99
Iron	3.0	926	728	849	670	1980	1750	378	433
Lead	0.020	0.816	0.680	0.734	0.657	2.80	2.54	0.408	0.427
Lithium	0.50	0.74	<0.50	<0.50	<0.50	1.09	0.93	<0.50	<0.50
Magnesium	2.0	1310	1250	1220	1170	1800	1650	1330	1510
Manganese	0.050	18.0	16.2	18.9	16.4	124	111	92.7	96.3
Mercury	0.0050	0.0412	0.0412	0.0412	0.0378	0.0319	0.0391	0.0347	0.0386
Molybdenum	0.020	0.106	0.096	0.099	0.105	0.351	0.290	0.093	0.093
Nickel	0.20	0.78	0.61	0.71	0.54	1.60	1.38	0.37	0.42
Phosphorus	10	364	384	370	385	493	531	284	380
Potassium	20	1510	1490	1510	1570	1940	1900	1360	1560
Rubidium	0.050	4.06	3.66	3.94	3.70	11.6	11.5	4.11	4.36
Selenium	0.050	0.056	0.060	0.063	0.056	0.070	0.073	0.050	0.066
Silver	0.0050	0.0099	0.0107	0.0107	0.0104	0.0316	0.0315	0.0064	0.0080
Sodium	20	242	231	230	247	339	324	272	261
Strontium	0.050	5.97	6.12	5.57	5.92	12.9	12.8	5.80	5.63
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-17. 2020 Lichen Metal Analysis (n=60), sample sites TR-13-R to TR-15-R.

Parameter[1]	LDL[2]	TR-13-R[4]-UNWASHED	TR-13-R-WASHED	TR-13-UNWASHED	TR-13-WASHED	TR-14-UNWASHED	TR-14-WASHED	TR-15-R-UNWASHED	TR-15-R-WASHED
		L2478696-41[3]	L2478696-42	L2478696-38	L2478696-39	L2478696-44	L2478696-45	L2478696-31	L2478696-32
Thallium	0.0020	0.0103	0.0084	0.0095	0.0077	0.0248	0.0208	0.0023	0.0027
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	26.4	21.5	25.2	20.3	49.3	42.7	9.61	10.9
Uranium	0.0020	0.103	0.0936	0.107	0.0880	0.287	0.261	0.0275	0.0324
Vanadium	0.10	0.74	0.55	0.75	0.49	1.23	1.05	0.29	0.34
Zinc	0.50	9.79	11.1	10.3	11.3	23.4	22.7	24.2	26.4
Zirconium	0.20	0.61	0.60	0.56	0.48	1.53	1.30	0.31	0.26

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID
[4] R = Replicate sample

Appendix Table G-18. 2020 Lichen Metal Analysis (n=60), sample sites TR-15 to TR-17.

Parameter[1]	LDL[2]	TR-15-UNWASHED	TR-15-WASHED	TR-16-UNWASHED	TR-16-WASHED	TR-17-UNWASHED	TR-17-WASHED
		L2478696-28[3]	L2478696-29	L2478696-34	L2478696-35	L2478696-47	L2478696-48
Aluminum	2.0	110	123	194	169	255	262
Antimony	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	0.020	0.037	0.038	0.047	0.042	0.049	0.054
Barium	0.050	4.71	5.61	7.01	7.37	6.82	6.69
Beryllium	0.010	<0.010	<0.010	<0.010	<0.010	0.014	0.016
Bismuth	0.010	0.026	0.021	0.011	<0.010	0.010	0.016
Boron	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	0.0050	0.0701	0.0645	0.130	0.109	0.0364	0.0308
Calcium	20	9150	8820	12700	11500	13300	10200
Cesium	0.0050	0.0478	0.0498	0.0580	0.0487	0.0663	0.0586
Chromium	0.050	0.365	0.368	0.485	0.416	0.725	0.560
Cobalt	0.020	0.091	0.101	0.134	0.131	0.159	0.160
Copper	0.10	0.78	0.97	1.04	1.05	1.05	1.00
Iron	3.0	331	370	459	494	524	489
Lead	0.020	0.382	0.394	0.525	0.520	0.448	0.478
Lithium	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	2.0	960	1160	898	915	1810	1760
Manganese	0.050	89.3	92.0	19.8	22.0	16.5	14.4
Mercury	0.0050	0.0354	0.0399	0.0433	0.0441	0.0559	0.0565
Molybdenum	0.020	0.048	0.073	0.090	0.071	0.086	0.062
Nickel	0.20	0.28	0.29	0.40	0.39	0.45	0.40
Phosphorus	10	317	405	424	422	443	444
Potassium	20	1440	1580	1640	1600	1560	1460
Rubidium	0.050	4.41	4.87	5.01	4.79	2.20	2.39
Selenium	0.050	0.066	0.059	0.083	0.081	0.068	0.052
Silver	0.0050	0.0098	0.0097	0.0083	0.0074	0.0072	0.0068
Sodium	20	277	257	336	349	355	354
Strontium	0.050	4.21	4.38	8.41	8.01	5.60	4.90
Tellurium	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Appendix Table G-18. 2020 Lichen Metal Analysis (n=60), sample sites TR-15 to TR-17.

Parameter[1]	LDL[2]	TR-15-UNWASHED	TR-15-WASHED	TR-16-UNWASHED	TR-16-WASHED	TR-17-UNWASHED	TR-17-WASHED
		L2478696-28[3]	L2478696-29	L2478696-34	L2478696-35	L2478696-47	L2478696-48
Thallium	0.0020	<0.0020	0.0026	0.0043	0.0047	0.0045	0.0057
Tin	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	0.25	7.20	8.40	12.4	11.9	13.8	12.6
Uranium	0.0020	0.0211	0.0271	0.0548	0.0562	0.0462	0.0457
Vanadium	0.10	0.21	0.24	0.30	0.29	0.53	0.47
Zinc	0.50	20.6	22.0	25.1	25.2	9.94	10.1
Zirconium	0.20	<0.20	<0.20	0.28	0.26	0.42	0.63

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] LDL = Lowest Detection Limit reported by the laboratory
[3] L2478696- x = Lab Sample ID

Appendix Table G-19. 2020 Soil Metal Analysis (n=60), sample sites MP-01 to MP-09.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MP-01	MP-02	MP-03	MP-04	MP-05	MP-06	MP-07	MP-07-R[5]	MP-08	MP-09
				L2478696-94[4]	L2478696-97	L2478696-100	L2478696-103	L2478696-106	L2478696-109	L2478696-115	L2478696-118	L2478696-121	L2478696-169
pH	6-8	6-8	0.10	6.67	6.99	6.72	6.65	7.31	6.01	7.63	7.58	7.60	7.62
Aluminum	NA	NA	50	1970	3090	5110	5290	4330	5370	15000	16100	4640	6160
Antimony	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10
Arsenic	12	12	0.10	0.46	1.25	1.17	2.15	1.05	1.07	3.59	3.82	1.33	1.50
Barium	750	2000	0.50	8.51	15.8	11.9	17.7	11.9	17.2	29.6	31.4	11.0	14.8
Beryllium	4	8	0.10	0.14	0.23	0.31	0.34	0.28	0.34	0.88	0.87	0.31	0.39
Bismuth	NA	NA	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	2	NA	5.0	6.1	10.6	8.5	10.3	10.2	8.8	60.6	61.0	35.7	33.2
Cadmium	1.4	22	0.020	0.025	0.067	0.032	0.056	0.028	0.023	0.066	0.071	0.045	0.040
Calcium	NA	NA	50	2190	48500	2550	8720	4490	2660	91400	88300	61300	148000
Chromium	64	87	0.50	7.30	6.92	10.0	10.6	11.9	17.1	35.3	37.7	16.2	14.1
Cobalt	40	300	0.10	1.46	2.47	2.76	3.33	2.63	3.98	7.41	7.68	2.93	3.50
Copper	63	91	0.50	2.28	6.65	4.46	8.29	5.51	6.32	14.6	15.4	5.86	6.73
Iron	NA	NA	50	5140	7810	9460	10200	8950	10900	19600	20500	8210	10200
Lead	70	600	0.50	2.12	4.11	5.30	7.06	5.67	6.65	12.3	12.3	4.11	5.93
Lithium	NA	NA	2.0	5.1	8.6	15.8	14.6	12.2	14.5	59.1	60.5	22.2	24.1
Magnesium	NA	NA	20	1520	25200	3600	5740	3960	3900	34800	35100	36200	35700
Manganese	NA	NA	1.0	55.2	393	136	267	123	171	263	269	115	196
Mercury	6.6	50	0.005	0.0169	0.0391	0.0142	0.0280	0.0145	0.0167	0.0210	0.0224	0.0238	0.0159
Molybdenum	5	40	0.10	0.11	0.29	0.21	0.42	0.34	0.42	0.48	0.48	0.57	0.28
Nickel	45	89	0.50	3.62	5.42	5.56	6.54	6.75	9.31	21.7	22.8	8.67	9.33
Phosphorus	NA	NA	50	171	389	208	386	234	241	470	491	407	254
Potassium	NA	NA	100	440	540	650	750	780	980	5420	5940	1830	1840
Selenium	1	2.9	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NA	NA	50	<50	68	<50	59	52	<50	136	141	419	126
Strontium	NA	NA	0.50	3.75	13.2	3.65	6.69	5.36	6.45	54.6	54.3	32.1	81.6
Sulfur	NA	NA	1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000

Appendix Table G-19. 2020 Soil Metal Analysis (n=60), sample sites MP-01 to MP-09.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MP-01	MP-02	MP-03	MP-04	MP-05	MP-06	MP-07	MP-07-R[5]	MP-08	MP-09
				L2478696-94[4]	L2478696-97	L2478696-100	L2478696-103	L2478696-106	L2478696-109	L2478696-115	L2478696-118	L2478696-121	L2478696-169
Thallium	1	1	0.050	<0.050	0.087	0.091	0.125	0.117	0.114	0.245	0.260	0.090	0.133
Tin	5	300	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NA	NA	1.0	113	97.0	210	240	240	323	443	459	210	270
Tungsten	NA	NA	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	23	300	0.050	0.808	1.40	1.52	4.54	1.97	4.42	1.05	1.06	0.642	0.792
Vanadium	130	130	0.20	7.14	12.2	13.6	14.9	13.8	16.4	33.6	35.5	15.2	15.9
Zinc	250	410	2.0	13.6	179	19.0	24.2	15.7	18.9	27.7	29.6	15.9	16.8
Zirconium	NA	NA	1.0	<1.0	1.7	<1.0	1.1	1.1	1.4	18.1	17.0	2.7	6.0

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] CCME Agri = Canadian Council of Ministers of the Environment Agriculture and Industrial Soil Quality Guidelines
[3] LDL = Lowest Detection Limit reported by the laboratory
[4] L2478696- x = Lab Sample ID
[5] R = Replicate sample

Appendix Table G-20. 2020 Soil Metal Analysis (n=60), sample sites MP-10 to MP-18.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MP-10	MP-11	MP-12	MP-13	MP-14	MP-15	MP-16	MP-17	MP-18
				L2478696-166[4]	L2478696-112	L2478696-163	L2478696-58	L2478696-61	L2478696-160	L2478696-49	L2478696-52	L2478696-55
pH	6-8	6-8	0.10	7.02	6.55	7.50	6.54	6.48	7.34	7.04	7.03	6.31
Aluminum	NA	NA	50	10300	8780	4870	5740	5860	6240	7820	3440	3380
Antimony	20	40	0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	12	12	0.10	2.31	1.48	1.21	1.75	1.13	1.41	1.55	0.97	1.09
Barium	750	2000	0.50	24.2	26.7	13.8	27.1	20.1	16.8	18.1	8.86	9.25
Beryllium	4	8	0.10	0.61	0.62	0.32	0.36	0.31	0.38	0.48	0.22	0.22
Bismuth	NA	NA	0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	2	NA	5.0	32.1	12.8	19.6	21	11.6	16.2	23.4	11.2	6.3
Cadmium	1.4	22	0.020	0.077	0.048	0.024	0.185	0.043	0.036	0.036	<0.020	<0.020
Calcium	NA	NA	50	14000	5150	99300	25100	6520	16200	13600	19400	1880
Chromium	64	87	0.50	25.6	21.4	11.0	12.4	15.6	17.6	41.3	10.5	7.40
Cobalt	40	300	0.10	5.75	5.52	2.83	4.21	3.68	3.71	5.96	2.35	2.16
Copper	63	91	0.50	12.4	8.09	5.37	15.4	6.06	6.23	7.90	3.53	4.12
Iron	NA	NA	50	16300	16600	8820	9900	10600	11500	14800	6350	6630
Lead	70	600	0.50	10.7	11.5	5.63	11.6	6.79	7.05	5.89	3.74	4.32
Lithium	NA	NA	2.0	32.4	27.0	16.3	13.8	14.0	17.6	25.1	11.5	10.3
Magnesium	NA	NA	20	6810	6260	30100	4690	3380	8860	13300	12200	2610
Manganese	NA	NA	1.0	234	333	159	375	240	176	243	101	98.1
Mercury	6.6	50	0.005	0.0464	0.0385	0.0311	0.119	0.0328	0.0245	0.0282	0.0118	0.0120
Molybdenum	5	40	0.10	0.48	0.40	0.26	0.64	0.33	0.28	0.26	0.12	0.17
Nickel	45	89	0.50	13.8	11.5	6.72	8.2	8.13	9.74	31.3	6.54	3.54
Phosphorus	NA	NA	50	615	524	223	820	397	392	365	252	197
Potassium	NA	NA	100	2660	1850	890	860	910	1260	1970	920	860
Selenium	1	2.9	0.20	0.21	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20
Silver	20	40	0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NA	NA	50	197	63	99	<100	<50	60	<50	<50	<50
Strontium	NA	NA	0.50	28.8	9.60	52.6	19.6	6.71	12.2	9.70	8.51	2.82
Sulfur	NA	NA	1000	<1000	<1000	<1000	<2000	<1000	<1000	<1000	<1000	<1000

Appendix Table G-20. 2020 Soil Metal Analysis (n=60), sample sites MP-10 to MP-18.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MP-10	MP-11	MP-12	MP-13	MP-14	MP-15	MP-16	MP-17	MP-18
				L2478696-166[4]	L2478696-112	L2478696-163	L2478696-58	L2478696-61	L2478696-160	L2478696-49	L2478696-52	L2478696-55
Thallium	1	1	0.050	0.164	0.236	0.106	0.17	0.113	0.112	0.140	0.074	0.069
Tin	5	300	2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NA	NA	1.0	245	419	277	188	200	263	303	184	210
Tungsten	NA	NA	0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	0.65	<0.50	<0.50
Uranium	23	300	0.050	3.00	4.03	0.897	23.8	5.19	0.908	0.773	0.436	2.04
Vanadium	130	130	0.20	25.6	25.7	13.8	16.1	16.1	17.1	21.7	9.58	11.1
Zinc	250	410	2.0	28.3	31.9	22.8	49.6	20.3	22.9	22.3	10.4	20.3
Zirconium	NA	NA	1.0	4.9	1.6	2.7	3.4	1.2	1.4	1.6	1.8	1.3

[1] Total metals (units mg/kg dry weight) unless otherwise indicated

[2] CCME Agri = Canadian Council of Ministers of the Environment Agriculture and Industrial Soil Quality Guidelines

[3] LDL = Lowest Detection Limit reported by the laboratory

[4] L2478696- x = Lab Sample ID

Appendix Table G-21. 2020 Soil Metal Analysis (n=60), sample sites MS-01 to MS-09.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MS-01	MS-02	MS-03	MS-04	MS-05	MS-06	MS-07	MS-07-R[5]	MS-08	MS-09
				L2478696-9[4]	L2478696-6	L2478696-73	L2478696-76	L2478696-79	L2478696-82	L2478696-133	L2478696-136	L2478696-139	L2478696-142
pH	6-8	6-8	0.10	6.35	6.20	5.63	6.49	6.94	5.04	4.94	5.10	6.22	5.65
Aluminum	NA	NA	50	4090	1380	6960	8100	6260	26800	2300	2040	2700	2550
Antimony	20	40	0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	12	12	0.10	0.63	0.39	1.84	1.56	2.41	3.29	0.29	0.33	0.66	0.39
Barium	750	2000	0.50	17.2	5.93	53.5	27.3	23.0	159	10.8	10.1	20.5	12.3
Beryllium	4	8	0.10	0.17	<0.10	0.36	0.27	0.32	1.25	0.11	0.10	0.18	0.16
Bismuth	NA	NA	0.20	<0.20	<0.20	<0.40	<0.20	<0.20	8.27	<0.20	<0.20	<0.20	<0.20
Boron	2	NA	5.0	<5.0	<5.0	15	6.2	9.6	11.0	<5.0	<5.0	<5.0	<5.0
Cadmium	1.4	22	0.020	0.042	0.060	0.109	0.051	0.037	0.557	<0.020	<0.020	0.050	0.020
Calcium	NA	NA	50	1830	6170	14500	5120	9210	4020	995	1150	2180	1170
Chromium	64	87	0.50	51.4	8.73	35.3	98.3	29.7	55.0	9.95	11.0	13.8	10.5
Cobalt	40	300	0.10	7.05	1.41	8.33	14.2	5.88	14.1	1.92	1.83	3.02	2.25
Copper	63	91	0.50	3.86	4.04	26.9	13.4	15.4	370	2.09	2.26	7.09	2.21
Iron	NA	NA	50	13200	4350	12700	20500	13600	40200	5980	7740	9410	6820
Lead	70	600	0.50	3.60	1.72	10.7	6.53	6.89	38.5	2.41	2.54	3.84	2.98
Lithium	NA	NA	2.0	6.5	2.1	12.4	17.4	12.7	26.1	3.9	3.6	4.9	4.5
Magnesium	NA	NA	20	6540	1910	6360	10900	8810	21700	1700	1450	2300	1470
Manganese	NA	NA	1.0	163	75.0	286	435	226	617	71.9	69.2	363	193
Mercury	6.6	50	0.005	0.0266	0.0389	0.131	0.0385	0.0146	0.0480	0.0181	0.0186	0.0198	0.0161
Molybdenum	5	40	0.10	0.30	0.16	0.33	0.20	0.20	31.2	<0.10	<0.10	0.13	0.19
Nickel	45	89	0.50	49.8	7.88	66.4	108	23.2	59.1	6.45	6.10	15.5	6.25
Phosphorus	NA	NA	50	268	272	800	512	365	666	224	310	281	325
Potassium	NA	NA	100	1020	250	1500	1470	1590	5760	450	400	560	640
Selenium	1	2.9	0.20	<0.20	<0.20	<0.40	<0.20	<0.20	0.24	<0.20	<0.20	<0.20	<0.20
Silver	20	40	0.10	<0.10	<0.10	<0.20	<0.10	<0.10	0.58	<0.10	<0.10	<0.10	<0.10
Sodium	NA	NA	50	<50	<50	<100	50	80	122	<50	<50	<50	<50
Strontium	NA	NA	0.50	3.20	3.56	10.0	3.84	6.02	7.68	2.43	2.74	2.62	2.70
Sulfur	NA	NA	1000	<1000	<1000	<2000	<1000	<1000	<1000	<1000	<1000	<1000	<1000

Appendix Table G-21. 2020 Soil Metal Analysis (n=60), sample sites MS-01 to MS-09.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MS-01	MS-02	MS-03	MS-04	MS-05	MS-06	MS-07	MS-07-R[5]	MS-08	MS-09
				L2478696-9[4]	L2478696-6	L2478696-73	L2478696-76	L2478696-79	L2478696-82	L2478696-133	L2478696-136	L2478696-139	L2478696-142
Thallium	1	1	0.050	0.059	<0.050	0.22	0.150	0.135	0.541	<0.050	<0.050	0.060	0.051
Tin	5	300	2.0	<2.0	<2.0	<4.0	<2.0	<2.0	8.8	<2.0	<2.0	<2.0	<2.0
Titanium	NA	NA	1.0	312	91.8	362	642	458	1090	281	246	242	233
Tungsten	NA	NA	0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	23	300	0.050	0.713	0.314	3.28	1.02	0.686	3.05	0.418	0.402	1.57	1.61
Vanadium	130	130	0.20	15.1	5.68	22.0	29.6	21.1	46.7	9.22	11.6	13.2	10.0
Zinc	250	410	2.0	12.3	8.8	39.1	29.9	18.0	152	10.1	9.1	9.8	8.1
Zirconium	NA	NA	1.0	<1.0	1.1	4.1	1.4	3.8	9.1	<1.0	<1.0	<1.0	<1.0

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] CCME Agri = Canadian Council of Ministers of the Environment Agriculture and Industrial Soil Quality Guidelines
[3] LDL = Lowest Detection Limit reported by the laboratory
[4] L2478696- x = Lab Sample ID
[5] R = Replicate sample

Appendix Table G-22. 2020 Soil Metal Analysis (n=60), sample sites MS-10 to MS-17.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL [3]	MS-10	MS-10-R[5]	MS-11	MS-12	MS-13	MS-13R	MS-14	MS-15	MS-16	MS-17
				L2478696-145[4]	L2478696-148	L2478696-3	L2478696-12	L2478696-64	L2478696-67	L2478696-70	L2478696-85	L2478696-130	L2478696-88
pH	6-8	6-8	0.10	5.64	5.72	6.85	5.56	5.35	5.13	5.12	6.61	5.52	5.66
Aluminum	NA	NA	50	3960	2190	3680	2400	2650	2710	2860	5060	2110	4060
Antimony	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	12	12	0.10	0.65	0.37	0.74	0.42	0.43	0.44	0.62	0.97	0.31	1.52
Barium	750	2000	0.50	19.0	9.11	10.9	18.9	7.24	7.48	7.58	13.7	14.3	18.1
Beryllium	4	8	0.10	0.18	0.10	0.19	0.10	0.15	0.16	0.14	0.26	0.10	0.17
Bismuth	NA	NA	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	2	NA	5.0	6.3	<5.0	5.7	5.7	<5.0	<5.0	<5.0	7.9	<5.0	<5.0
Cadmium	1.4	22	0.020	0.039	<0.020	0.027	0.083	<0.020	<0.020	<0.020	0.021	0.030	0.040
Calcium	NA	NA	50	4080	1930	1370	6240	1350	1520	2090	4350	3350	2540
Chromium	64	87	0.50	20.2	11.9	27.5	15.8	11.8	12.3	12.0	21.3	9.33	25.7
Cobalt	40	300	0.10	3.65	2.04	3.83	3.00	2.15	2.22	2.40	4.05	1.75	4.53
Copper	63	91	0.50	4.78	2.45	6.07	5.39	1.86	1.88	2.58	5.19	3.19	5.62
Iron	NA	NA	50	11200	7120	15100	7310	8240	8500	7360	9520	5500	10300
Lead	70	600	0.50	5.11	2.48	3.46	2.53	2.64	2.67	3.37	5.15	2.23	4.45
Lithium	NA	NA	2.0	5.7	3.5	7.5	3.7	6.5	6.9	5.8	9.9	4.0	6.6
Magnesium	NA	NA	20	2620	1620	4140	3010	1800	1860	1930	5040	1860	2950
Manganese	NA	NA	1.0	172	80.0	145	95.6	79.1	88.0	80.0	139	53.2	218
Mercury	6.6	50	0.005	0.0501	0.0268	0.0102	0.0975	0.0085	0.0122	0.0182	0.0088	0.0259	0.0404
Molybdenum	5	40	0.10	0.27	0.14	0.14	0.27	<0.10	<0.10	0.27	0.14	0.14	0.15
Nickel	45	89	0.50	11.8	6.57	21.1	20.3	5.46	5.40	5.68	14.2	6.29	17.2
Phosphorus	NA	NA	50	467	240	230	464	421	473	539	217	347	396
Potassium	NA	NA	100	710	430	780	780	480	560	570	1040	360	710
Selenium	1	2.9	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NA	NA	50	<50	<50	<50	<50	<50	<50	<50	61	<50	<50
Strontium	NA	NA	0.50	5.00	2.72	2.43	5.53	2.70	2.94	3.53	3.88	3.81	2.69
Sulfur	NA	NA	1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000

Appendix Table G-22. 2020 Soil Metal Analysis (n=60), sample sites MS-10 to MS-17.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL [3]	MS-10	MS-10-R[5]	MS-11	MS-12	MS-13	MS-13R	MS-14	MS-15	MS-16	MS-17
				L2478696-145[4]	L2478696-148	L2478696-3	L2478696-12	L2478696-64	L2478696-67	L2478696-70	L2478696-85	L2478696-130	L2478696-88
Thallium	1	1	0.050	0.073	<0.050	0.074	0.058	<0.050	<0.050	0.058	0.086	<0.050	0.075
Tin	5	300	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NA	NA	1.0	331	222	255	197	303	304	389	363	216	282
Tungsten	NA	NA	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	23	300	0.050	0.766	0.449	0.490	0.463	0.513	0.508	1.22	0.487	0.405	0.505
Vanadium	130	130	0.20	16.3	10.3	18.3	8.51	13.9	14.7	15.9	15.3	9.04	16.0
Zinc	250	410	2.0	13.5	7.6	10.0	11.4	9.1	9.2	9.4	13.9	10.9	15.0
Zirconium	NA	NA	1.0	1.1	<1.0	<1.0	1.0	<1.0	<1.0	1.1	2.4	1.5	<1.0

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] CCME Agri = Canadian Council of Ministers of the Environment Agriculture and Industrial Soil Quality Guidelines
[3] LDL = Lowest Detection Limit reported by the laboratory
[4] L2478696- x = Lab Sample ID
[5] R = Replicate sample

Appendix Table G-23. 2020 Soil Metal Analysis (n=60), sample sites MS-17-R to MS-24.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MS-17-R[5]	MS-18	MS-19	MS-20	MS-21	MS-21-R[4]	MS-22	MS-23	MS-23-R	MS-24
				L2478696-91[4]	L2478696-124	L2478696-127	L2478696-151	L2478696-154	L2478696-157	L2478696-15	L2478696-18	L2478696-21	L2478696-24
pH	6-8	6-8	.10	5.63	5.43	5.10	6.26	5.83	6.29	5.01	5.55	5.05	4.19
Aluminum	NA	NA	50	4640	1760	1950	740	3210	2440	10900	1460	1460	8790
Antimony	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	12	12	0.10	2.15	0.25	0.32	0.73	0.24	0.23	0.73	0.31	0.30	0.75
Barium	750	2000	0.50	19.1	7.40	17.3	2.88	11.4	7.47	43.1	3.85	3.98	31.9
Beryllium	4	8	0.10	0.19	<0.10	0.10	<0.10	0.16	0.12	0.47	<0.10	<0.10	0.39
Bismuth	NA	NA	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	2	NA	5.0	5.1	<5.0	<5.0	<5.0	<5.0	<5.0	19.6	<5.0	<5.0	19.9
Cadmium	1.4	22	0.020	0.037	0.026	0.032	<0.020	<0.020	<0.020	0.024	<0.020	<0.020	0.022
Calcium	NA	NA	50	2840	1560	2130	679	1300	701	2240	485	493	915
Chromium	64	87	0.50	26.6	8.24	11.6	2.35	14.1	11.8	30.9	4.23	3.90	24.0
Cobalt	40	300	0.10	4.95	1.51	4.29	1.38	2.87	2.10	6.21	1.19	1.13	4.12
Copper	63	91	0.50	6.81	2.15	2.96	4.29	3.15	3.24	12.6	1.30	1.32	8.00
Iron	NA	NA	50	11200	4830	8810	1900	8690	7830	16900	3040	2760	13100
Lead	70	600	0.50	5.01	1.66	2.20	2.43	2.53	2.85	5.98	2.12	2.11	5.78
Lithium	NA	NA	2.0	8.5	3.8	2.7	<2.0	9.0	7.2	19.5	2.4	2.6	15.6
Magnesium	NA	NA	20	3520	1580	1420	423	2390	1820	6350	615	621	4310
Manganese	NA	NA	1.0	258	49.5	167	41.5	86.4	60.1	204	53.7	55.5	119
Mercury	6.6	50	0.005	0.0332	0.0124	0.0329	0.0064	0.0109	0.0146	0.0233	0.0053	0.0082	0.0075
Molybdenum	5	40	0.10	0.15	<0.10	0.23	<0.10	<0.10	<0.10	0.27	<0.10	<0.10	0.11
Nickel	45	89	0.50	18.8	5.61	10.0	2.20	6.58	5.40	15.6	2.25	2.35	11.6
Phosphorus	NA	NA	50	406	241	316	78	357	156	461	131	127	337
Potassium	NA	NA	100	790	350	250	260	690	530	2570	280	270	2070
Selenium	1	2.9	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NA	NA	50	<50	<50	<50	<50	<50	<50	67	<50	<50	58
Strontium	NA	NA	0.50	3.10	2.68	3.08	0.92	2.33	1.78	5.31	1.44	1.42	4.52
Sulfur	NA	NA	1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000

Appendix Table G-23. 2020 Soil Metal Analysis (n=60), sample sites MS-17-R to MS-24.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MS-17-R[5]	MS-18	MS-19	MS-20	MS-21	MS-21-R[4]	MS-22	MS-23	MS-23-R	MS-24
				L2478696-91[4]	L2478696-124	L2478696-127	L2478696-151	L2478696-154	L2478696-157	L2478696-15	L2478696-18	L2478696-21	L2478696-24
Thallium	1	1	0.050	0.084	<0.050	<0.050	<0.050	0.052	<0.050	0.182	<0.050	<0.050	0.167
Tin	5	300	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NA	NA	1.0	340	206	158	37.1	378	295	596	96.0	96.7	605
Tungsten	NA	NA	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	23	300	0.050	0.514	0.347	0.477	0.134	0.385	0.553	0.934	0.158	0.154	1.18
Vanadium	130	130	0.20	17.2	7.44	11.1	2.68	15.0	12.4	30.3	4.53	4.32	22.3
Zinc	250	410	2.0	17.4	9.6	6.3	2.9	11.8	19.7	26.9	5.4	6.1	22.2
Zirconium	NA	NA	1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	3.1	<1.0	<1.0	2.6

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[1] Total metals (units mg/kg dry weight) unless otherwise indicated

[2] CCME Agri = Canadian Council of Ministers of the Environment Agriculture and Industrial Soil Quality Guidelines

[3] LDL = Lowest Detection Limit reported by the laboratory

[4] L2478696- x = Lab Sample ID

[5] R = Replicate sample

Appendix Table G-24. 2020 Soil Metal Analysis (n=60), sample sites MS-25-R to TR-08.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MS-25	TR-01	TR-02	TR-03	TR-04	TR-05	TR-05-R[5]	TR-06	TR-07	TR-08
				L2478696-27[4]	L2478696-172	L2478696-175	L2478696-193	L2478696-181	L2478696-184	L2478696-187	L2478696-190	L2478696-202	L2478696-205
pH	6-8	6-8	0.10	6.25	5.50	6.52	6.60	4.74	5.74	5.63	5.39	4.09	7.66
Aluminum	NA	NA	50	6160	1020	1690	1760	593	1440	1310	1510	738	4600
Antimony	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	12	12	0.10	1.09	0.16	0.22	0.21	<0.10	0.21	0.20	0.21	0.11	1.56
Barium	750	2000	0.50	20.4	3.71	9.21	9.17	3.24	6.09	5.66	9.43	2.98	20.4
Beryllium	4	8	0.10	0.31	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.14	<0.10	0.28
Bismuth	NA	NA	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	2	NA	5.0	9.9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	25.0
Cadmium	1.4	22	0.020	0.033	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.022	<0.020	0.042
Calcium	NA	NA	50	2100	339	842	585	225	486	414	1060	144	71200
Chromium	64	87	0.50	26.4	5.51	9.11	8.75	3.26	7.60	6.92	5.88	7.21	10.5
Cobalt	40	300	0.10	4.98	0.85	1.45	1.31	0.32	1.30	1.28	2.36	0.47	2.87
Copper	63	91	0.50	7.13	1.05	1.79	2.38	0.51	2.82	1.63	1.85	0.75	5.85
Iron	NA	NA	50	11900	2910	5530	5370	1600	4210	4220	4400	3400	9740
Lead	70	600	0.50	5.57	1.15	1.69	1.60	0.80	1.45	1.28	1.69	0.90	4.90
Lithium	NA	NA	2.0	11.9	2.3	2.7	3.8	<2.0	2.9	2.7	2.8	<2.0	18.3
Magnesium	NA	NA	20	4280	799	1370	1510	350	1200	1040	1340	369	31700
Manganese	NA	NA	1.0	172	16.7	67.3	40.0	5.7	41.8	48.1	122	13.2	185
Mercury	6.6	50	0.005	0.0109	<0.0050	0.0094	<0.0050	0.0100	0.0204	0.0142	0.0300	0.0104	0.0265
Molybdenum	5	40	0.10	0.13	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.58
Nickel	45	89	0.50	25.3	3.04	4.52	4.17	1.34	3.90	3.39	4.37	1.83	7.15
Phosphorus	NA	NA	50	350	110	165	123	91	132	110	164	80	249
Potassium	NA	NA	100	1320	220	520	550	110	290	290	450	140	1700
Selenium	1	2.9	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NA	NA	50	62	<50	<50	<50	<50	<50	<50	<50	<50	80
Strontium	NA	NA	0.50	3.86	1.67	2.60	2.35	1.33	1.80	1.77	2.71	1.02	35.4
Sulfur	NA	NA	1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000

Appendix Table G-24. 2020 Soil Metal Analysis (n=60), sample sites MS-25-R to TR-08.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	MS-25	TR-01	TR-02	TR-03	TR-04	TR-05	TR-05-R[5]	TR-06	TR-07	TR-08
				L2478696-27[4]	L2478696-172	L2478696-175	L2478696-193	L2478696-181	L2478696-184	L2478696-187	L2478696-190	L2478696-202	L2478696-205
Thallium	1	1	0.050	0.106	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.086
Tin	5	300	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NA	NA	1.0	447	83.6	120	134	50.0	96.5	95.9	107	70.4	164
Tungsten	NA	NA	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	23	300	0.050	0.640	0.178	0.298	0.271	0.167	0.226	0.196	0.230	0.181	0.494
Vanadium	130	130	0.20	19.5	4.33	6.18	6.57	2.17	5.90	6.17	5.38	5.39	11.3
Zinc	250	410	2.0	15.8	3.5	5.2	5.1	<2.0	6.4	6.2	6.7	3.3	316
Zirconium	NA	NA	1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] CCME Agri = Canadian Council of Ministers of the Environment Agriculture and Industrial Soil Quality Guidelines
[3] LDL = Lowest Detection Limit reported by the laboratory
[4] L2478696- x = Lab Sample ID
[5] R = Replicate sample

Appendix Table G-25. 2020 Soil Metal Analysis (n=60), sample sites TR-09 to TR-15-R.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	TR-09	TR-10	TR-11	TR-12	TR-12-R[5]	TR-13	TR-13-R	TR-14	TR-15	TR-15-R
				L2478696 -208[4]	L2478696 -211	L2478696 -178	L2478696 -196	L2478696 -199	L2478696 -37	L2478696 -40	L2478696 -43	L24786 96-30	L2478696- 33
pH	6-8	6-8	0.10	7.79	7.57	4.75	6.17	5.67	5.08	5.32	4.39	5.50	5.57
Aluminum	NA	NA	50	3750	3160	2300	739	1070	892	1320	2240	1220	1030
Antimony	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	12	12	0.10	1.48	0.95	0.30	0.16	0.18	0.13	0.26	0.23	0.29	0.23
Barium	750	2000	0.50	12.9	10.9	10.5	2.40	3.39	3.66	5.95	11.1	17.3	20.5
Beryllium	4	8	0.10	0.26	0.19	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bismuth	NA	NA	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	2	NA	5.0	28.5	16.4	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium	1.4	22	0.020	0.031	0.024	<0.020	<0.020	<0.020	<0.020	<0.020	0.023	0.024	0.029
Calcium	NA	NA	50	75000	8270	858	402	517	548	1050	519	1950	1670
Chromium	64	87	0.50	11.0	8.85	11.4	3.33	6.24	7.78	11.3	12.2	4.89	3.82
Cobalt	40	300	0.10	2.69	1.99	1.62	0.53	0.70	0.93	1.29	0.84	2.21	2.46
Copper	63	91	0.50	5.26	4.05	2.37	0.74	1.17	1.36	1.73	2.69	1.42	1.22
Iron	NA	NA	50	7800	6760	6320	2020	3460	4950	7970	2520	4340	3340
Lead	70	600	0.50	4.31	3.27	1.97	0.86	1.16	0.92	1.50	2.16	1.26	1.12
Lithium	NA	NA	2.0	22.0	12.0	4.1	<2.0	2.1	<2.0	2.5	2.4	2.7	2.3
Magnesium	NA	NA	20	34400	4900	1610	464	615	673	978	893	938	823
Manganese	NA	NA	1.0	146	123	36.2	14.0	19.3	25.2	40.4	15.1	408	505
Mercury	6.6	50	0.005	0.0136	0.0177	0.0294	0.0057	0.0078	0.0089	0.0169	0.0237	0.0207	0.0196
Molybdenum	5	40	0.10	0.29	0.23	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	45	89	0.50	6.77	4.61	6.29	1.56	2.30	2.51	3.87	5.22	3.83	3.78
Phosphorus	NA	NA	50	258	208	197	66	100	85	143	249	167	160
Potassium	NA	NA	100	1380	870	390	190	280	200	280	260	220	170
Selenium	1	2.9	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver	20	40	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	NA	NA	50	78	<50	<50	<50	<50	<50	<50	<50	<50	<50
Strontium	NA	NA	0.50	37.0	6.00	2.99	1.10	1.38	1.45	2.21	2.26	2.36	1.95
Sulfur	NA	NA	1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000

Appendix Table G-25. 2020 Soil Metal Analysis (n=60), sample sites TR-09 to TR-15-R.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	TR-09	TR-10	TR-11	TR-12	TR-12-R[5]	TR-13	TR-13-R	TR-14	TR-15	TR-15-R
				L2478696 -208[4]	L2478696 -211	L2478696 -178	L2478696 -196	L2478696 -199	L2478696 -37	L2478696 -40	L2478696 -43	L24786 96-30	L2478696- 33
Thallium	1	1	0.050	0.088	0.057	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tin	5	300	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	NA	NA	1.0	121	101	162	52.1	71.2	76.9	115	155	83.6	70.5
Tungsten	NA	NA	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	23	300	0.050	0.309	0.238	0.287	0.102	0.184	0.152	0.212	0.400	0.215	0.176
Vanadium	130	130	0.20	11.2	9.28	8.97	3.08	4.92	6.02	9.12	8.31	4.18	3.29
Zinc	250	410	2.0	10.9	11.0	7.4	2.6	3.5	3.8	5.9	4.4	4.5	4.8
Zirconium	NA	NA	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] CCME Agri = Canadian Council of Ministers of the Environment Agriculture and Industrial Soil Quality Guidelines
[3] LDL = Lowest Detection Limit reported by the laboratory
[4] L2478696- x = Lab Sample ID
[5] R = Replicate sample

Appendix Table G-26. 2020 Soil Metal Analysis (n=60), sample sites TR-16 to TR-17.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	TR-16	TR-17
				L247869 6-36[4]	L247869 6-46
pH	6-8	6-8	0.10	6.34	6.55
Aluminum	NA	NA	50	9490	6050
Antimony	20	40	0.10	<0.10	<0.10
Arsenic	12	12	0.10	1.65	0.98
Barium	750	2000	0.50	30.4	31.1
Beryllium	4	8	0.10	0.43	0.34
Bismuth	NA	NA	0.20	<0.20	<0.20
Boron	2	NA	5.0	8.0	8.0
Cadmium	1.4	22	0.020	<0.020	<0.020
Calcium	NA	NA	50	2710	1550
Chromium	64	87	0.50	34.5	26.1
Cobalt	40	300	0.10	6.68	4.95
Copper	63	91	0.50	10.2	9.13
Iron	NA	NA	50	18200	13000
Lead	70	600	0.50	6.90	3.64
Lithium	NA	NA	2.0	19.3	11.1
Magnesium	NA	NA	20	5220	4820
Manganese	NA	NA	1.0	238	182
Mercury	6.6	50	0.005	0.0070	0.0081
Molybdenum	5	40	0.10	0.18	0.12
Nickel	45	89	0.50	19.6	14.2
Phosphorus	NA	NA	50	458	185
Potassium	NA	NA	100	1830	1620
Selenium	1	2.9	0.20	<0.20	<0.20
Silver	20	40	0.10	<0.10	<0.10
Sodium	NA	NA	50	59	<50
Strontium	NA	NA	0.50	4.68	5.04
Sulfur	NA	NA	1000	<1000	<1000

Appendix Table G-26. 2020 Soil Metal Analysis (n=60), sample sites TR-16 to TR-17.

Parameter[1]	CCME Agri[2]	CCME Ind[2]	LDL[3]	TR-16	TR-17
				L247869 6-36[4]	L247869 6-46
Thallium	1	1	0.050	0.216	0.105
Tin	5	300	2.0	<2.0	<2.0
Titanium	NA	NA	1.0	873	382
Tungsten	NA	NA	0.50	<0.50	<0.50
Uranium	23	300	0.050	0.746	0.469
Vanadium	130	130	0.20	27.9	17.3
Zinc	250	410	2.0	22.6	14.3
Zirconium	NA	NA	1.0	13.7	3.4

[1] Total metals (units mg/kg dry weight) unless otherwise indicated
[2] CCME Agri = Canadian Council of Ministers of the Environment Agriculture and Industrial Soil Quality Guidelines
[3] LDL = Lowest Detection Limit reported by the laboratory
[4] L2478696- x = Lab Sample ID
[5] R = Replicate sample

APPENDIX H VEGETATION AND SOILS BASE METALS MONITORING CERTIFICATE OF ANALYSIS, QUALITY ASSURANCE REPORT, AND RAW LABORATORY RESULTS, 2020

EDI ENVIRONMENTAL DYNAMICS INC.
ATTN: Heather Toews
2911A Cleveland Ave
Saskatoon SK S7K 8A9

Date Received: 23-JUL-20
Report Date: 05-SEP-20 10:00 (MT)
Version: FINAL

Client Phone: 306-373-0594

Certificate of Analysis

Lab Work Order #: L2478696

Project P.O. #: 4500073372
Job Reference: BIM SOIL AND LICHEN TISSUE - TRACE METALS
C of C Numbers:
Legal Site Desc:

Rick Hawthorne

Rick Hawthorne
Account Manager

ANALYTICAL REPORT

Summary of Guideline Exceedances

Guideline ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Federal CCME Canadian Environmental Quality Guidelines (JUN, 2018) - CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected						
L2478696-76	MS-L-155-2020	Metals	Chromium (Cr)	98.3	87	ug/g
			Nickel (Ni)	108	89	ug/g
L2478696-82	MS-L-157-2020	Metals	Copper (Cu)	370	91	ug/g

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

Lab ID				L2478696-3	L2478696-6	L2478696-9	L2478696-12	L2478696-15	L2478696-18	L2478696-21	L2478696-24	L2478696-27
Sample Date				08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20
Sample ID				MS-L-134-2020	MS-L-128-2020	MS-L-023-2020	MS-L-175-2020	MS-L-165-2020	MS-L-138-2020	MS-L-138-2020-R	MS-L-166-2020	MS-L-170-2020
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	4.04	36.8	7.27	40.0	21.9	3.28	2.76	11.1	4.44
pH	pH units	-	-	6.85	6.20	6.35	5.56	5.01	5.55	5.05	4.19	6.25

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

Lab ID				L2478696-30	L2478696-33	L2478696-36	L2478696-37	L2478696-40	L2478696-43	L2478696-46	L2478696-49	L2478696-52
Sample Date				09-JUL-20	09-JUL-20	09-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
Sample ID				TR-L-169-2020	TR-L-169-2020-R	TR-L-168-2020	TR-L-162-2020	TR-L-162-2020-R	TR-L-161-2020	TR-L-167-2020	MP-L-135-2020	MP-L-141-2020
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	30.4	30.8	8.82	9.87	9.64	30.1	7.62	10.3	8.88
pH	pH units	-	-	5.50	5.57	6.34	5.08	5.32	4.39	6.55	7.04	7.03

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - SOIL

			Lab ID	L2478696-55	L2478696-58	L2478696-61	L2478696-64	L2478696-67	L2478696-70	L2478696-73	L2478696-76	L2478696-79
			Sample Date	10-JUL-20	10-JUL-20	10-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
			Sample ID	MP-L-105-2020	MP-L-137-2020	MP-L-136-2020	MS-L-159-2020	MS-L-159-2020-R	MS-L-115-2020	MS-L-154-2020	MS-L-155-2020	MS-L-156-2020
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
% Moisture	%	-	-	18.3	68.4	30.4	13.3	12.4	19.2	53.2	12.6	12.0
pH	pH units	-	-	6.31	6.54	6.48	5.35	5.13	5.12	5.63	6.49	6.94

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

		Guide Limits		**Lab ID**	L2478696-82	L2478696-85	L2478696-88	L2478696-91	L2478696-94	L2478696-97	L2478696-100	L2478696-103	L2478696-106
				Sample Date	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
				Sample ID	MS-L-157-2020	MS-L-200-2020	MS-L-204-2020	MS-L-204-2020-R	MP-L-56-2020	MP-L-118-2020	MP-L-119-2020	MP-L-121-2020	MP-L-122-2020
Analyte	**Unit**	**#1**	**#2**										
% Moisture	%	-	-		46.4	13.2	16.0	14.7	16.5	18.9	11.9	22.2	7.36
pH	pH units	-	-		5.04	6.61	5.66	5.63	6.67	6.99	6.72	6.65	7.31

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

			Lab ID	L2478696-109	L2478696-112	L2478696-115	L2478696-118	L2478696-121	L2478696-124	L2478696-127	L2478696-130	L2478696-133
			Sample Date	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20
			Sample ID	MP-L-144-2020	MP-L-93-2020	MP-L-145-2020	MP-L-145-2020-R	MP-L-57-2020	MS-L-205-2020	MS-L-203-2020	MS-L-202-2020	MS-L-153-2020
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	16.6	3.91	3.89	5.04	9.10	12.9	26.4	29.8	9.48
pH	pH units	-	-	6.01	6.55	7.63	7.58	7.60	5.43	5.10	5.52	4.94

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

Lab ID				L2478696-136	L2478696-139	L2478696-142	L2478696-145	L2478696-148	L2478696-151	L2478696-154	L2478696-157	L2478696-160
Sample Date				13-JUL-20	13-JUL-20	13-JUL-20	14-JUL-20	14-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	16-JUL-20
Sample ID				MS-L-153-2020-R	MS-L-131-2020	MS-L-130-2020	MS-L-132-2020	MS-L-132-2020-R	MS-L-129-2020	MS-L-206-2020	MS-L-206-2020-R	MP-L-103-2020
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	9.06	6.52	7.19	15.7	15.2	19.8	11.1	13.8	13.2
pH	pH units	-	-	5.10	6.22	5.65	5.64	5.72	6.26	5.83	6.29	7.34

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

			Lab ID	L2478696-163	L2478696-166	L2478696-169	L2478696-172	L2478696-175	L2478696-178	L2478696-181	L2478696-184	L2478696-187
			Sample Date	16-JUL-20	16-JUL-20	16-JUL-20	17-JUL-20	17-JUL-20	17-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
			Sample ID	MP-L-102-2020	MP-L-147-2020	MP-L-146-2020	TR-L-152-2020	TR-L-78-2020	TR-L-123-2020	TR-L-79-2020	TR-L-124-2020	TR-L-124-2020-R
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
% Moisture	%	-	-	11.1	53.6	13.2	6.38	8.01	25.4	23.3	18.8	23.9
pH	pH units	-	-	7.50	7.02	7.62	5.50	6.52	4.75	4.74	5.74	5.63

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨	Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥	Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

		Guide Limits									
			Lab ID	L2478696-190	L2478696-193	L2478696-196	L2478696-199	L2478696-202	L2478696-205	L2478696-208	L2478696-211
			Sample Date	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20
			Sample ID	TR-L-125-2020	TR-L-151-2020	TR-L-116-2020	TR-L-116-2020-R	TR-L-149-2020	TR-L-172-2020	TR-L-207-2020	TR-L-208-2020
Analyte	**Unit**	**#1**	**#2**								
% Moisture	%	-	-	22.6	3.18	7.40	5.85	13.5	9.83	16.0	19.0
pH	pH units	-	-	5.39	6.60	6.17	5.67	4.09	7.66	7.79	7.57

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - TISSUE

			Lab ID	L2478696-1	L2478696-2	L2478696-4	L2478696-5	L2478696-7	L2478696-8	L2478696-10	L2478696-11	L2478696-13
			Sample Date	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	09-JUL-20
			Sample ID	MS-L-134-2020 UNWASHED	MS-L-134-2020 WASHED	MS-L-128-2020 UNWASHED	MS-L-128-2020 WASHED	MS-L-023-2020 UNWASHED	MS-L-023-2020 WASHED	MS-L-175-2020 UNWASHED	MS-L-175-2020 WASHED	MS-L-165-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
% Moisture	%	-	-	9.48	72.3	7.42	70.8	4.80	67.2	8.47	57.0	8.40

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - TISSUE

			Lab ID	L2478696-14	L2478696-16	L2478696-17	L2478696-19	L2478696-20	L2478696-22	L2478696-23	L2478696-25	L2478696-26
			Sample Date	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20
			Sample ID	MS-L-165-2020 WASHED	MS-L-138-2020 UNWASHED	MS-L-138-2020 WASHED	MS-L-138-2020-R UNWASHED	MS-L-138-2020-R WASHED	MS-L-166-2020 UNWASHED	MS-L-166-2020 WASHED	MS-L-170-2020 UNWASHED	MS-L-170-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
% Moisture	%	-	-	51.8	8.91	68.6	7.85	57.6	7.68	76.4	2.17	68.1

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - TISSUE

Lab ID				L2478696-28	L2478696-29	L2478696-31	L2478696-32	L2478696-34	L2478696-35	L2478696-38	L2478696-39	L2478696-41
Sample Date				09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
Sample ID				TR-L-169-2020 UNWASHED	TR-L-169-2020 WASHED	TR-L-169-2020-R UNWASHED	TR-L-169-2020-R WASHED	TR-L-168-2020 UNWASHED	TR-L-168-2020 WASHED	TR-L-162-2020 UNWASHED	TR-L-162-2020 WASHED	TR-L-162-2020-R UNWASHED
Analyte	Unit	Guide Limits #1	Guide Limits #2									
% Moisture	%	-	-	4.61	71.1	5.39	58.0	7.03	64.1	7.83	66.6	11.8

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Physical Tests - TISSUE

Lab ID				L2478696-42	L2478696-44	L2478696-45	L2478696-47	L2478696-48	L2478696-50	L2478696-51	L2478696-53	L2478696-54
Sample Date				10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
Sample ID				TR-L-162-2020-R WASHED	TR-L-161-2020 UNWASHED	TR-L-161-2020 WASHED	TR-L-167-2020 UNWASHED	TR-L-167-2020 WASHED	MP-L-135-2020 UNWASHED	MP-L-135-2020 WASHED	MP-L-141-2020 UNWASHED	MP-L-141-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	70.1	8.02	68.0	40.0	68.0	4.44	73.2	3.93	74.5

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - TISSUE

			Lab ID	L2478696-56	L2478696-57	L2478696-59	L2478696-60	L2478696-62	L2478696-63	L2478696-65	L2478696-66	L2478696-68
			Sample Date	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
			Sample ID	MP-L-105-2020 UNWASHED	MP-L-105-2020 WASHED	MP-L-137-2020 UNWASHED	MP-L-137-2020 WASHED	MP-L-136-2020 UNWASHED	MP-L-136-2020 WASHED	MS-L-159-2020 UNWASHED	MS-L-159-2020 WASHED	MS-L-159-2020-R UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
% Moisture	%	-	-	5.04	69.6	3.38	70.8	5.85	69.6	34.7	56.8	32.7

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - TISSUE

			Lab ID	L2478696-69	L2478696-71	L2478696-72	L2478696-74	L2478696-75	L2478696-77	L2478696-78	L2478696-80	L2478696-81
			Sample Date	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
			Sample ID	MS-L-159-2020-R WASHED	MS-L-115-2020 UNWASHED	MS-L-115-2020 WASHED	MS-L-154-2020 UNWASHED	MS-L-154-2020 WASHED	MS-L-155-2020 UNWASHED	MS-L-155-2020 WASHED	MS-L-156-2020 UNWASHED	MS-L-156-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	79.1	40.4	66.2	28.0	67.4	19.2	71.8	25.1	75.6

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨	Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥	Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - TISSUE

			Lab ID	L2478696-83	L2478696-84	L2478696-86	L2478696-87	L2478696-89	L2478696-90	L2478696-92	L2478696-93	L2478696-95
			Sample Date	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	12-JUL-20
			Sample ID	MS-L-157-2020 UNWASHED	MS-L-157-2020 WASHED	MS-L-200-2020 UNWASHED	MS-L-200-2020 WASHED	MS-L-204-2020 UNWASHED	MS-L-204-2020 WASHED	MS-L-204-2020-R UNWASHED	MS-L-204-2020-R WASHED	MP-L-56-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
% Moisture	%	-	-	19.6	61.0	10.5	72.4	62.7	83.8	62.8	83.0	9.64

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - TISSUE

Lab ID				L2478696-96	L2478696-98	L2478696-99	L2478696-101	L2478696-102	L2478696-104	L2478696-105	L2478696-107	L2478696-108
Sample Date				12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
Sample ID				MP-L-56-2020 WASHED	MP-L-118-2020 UNWASHED	MP-L-118-2020 WASHED	MP-L-119-2020 UNWASHED	MP-L-119-2020 WASHED	MP-L-121-2020 UNWASHED	MP-L-121-2020 WASHED	MP-L-122-2020 UNWASHED	MP-L-122-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	66.6	8.62	75.1	8.71	69.7	7.31	71.2	6.35	69.7

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - TISSUE

			Lab ID	L2478696-110	L2478696-111	L2478696-113	L2478696-114	L2478696-116	L2478696-117	L2478696-119	L2478696-120	L2478696-122
			Sample Date	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
			Sample ID	MP-L-144-2020 UNWASHED	MP-L-144-2020 WASHED	MP-L-93-2020 UNWASHED	MP-L-93-2020 WASHED	MP-L-145-2020 UNWASHED	MP-L-145-2020 WASHED	MP-L-145-2020-R UNWASHED	MP-L-145-2020-R WASHED	MP-L-57-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
% Moisture	%	-	-	8.59	69.1	7.72	78.8	4.97	71.2	5.25	74.7	10.5

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - TISSUE

Lab ID				L2478696-123	L2478696-125	L2478696-126	L2478696-128	L2478696-129	L2478696-131	L2478696-132	L2478696-134	L2478696-135
Sample Date				12-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20
Sample ID				MP-L-57-2020 WASHED	MS-L-205-2020 UNWASHED	MS-L-205-2020 WASHED	MS-L-203-2020 UNWASHED	MS-L-203-2020 WASHED	MS-L-202-2020 UNWASHED	MS-L-202-2020 WASHED	MS-L-153-2020 UNWASHED	MS-L-153-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	72.2	10.9	72.7	9.90	69.8	7.00	74.0	7.90	71.2

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - TISSUE

Lab ID				L2478696-137	L2478696-138	L2478696-140	L2478696-141	L2478696-143	L2478696-144	L2478696-146	L2478696-147	L2478696-149
Sample Date				13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	14-JUL-20	14-JUL-20	14-JUL-20
Sample ID				MS-L-153-2020-R UNWASHED	MS-L-153-2020-R WASHED	MS-L-131-2020 UNWASHED	MS-L-131-2020 WASHED	MS-L-130-2020 UNWASHED	MS-L-130-2020 WASHED	MS-L-132-2020 UNWASHED	MS-L-132-2020 WASHED	MS-L-132-2020-R UNWASHED
Analyte	Unit	Guide Limits #1	Guide Limits #2									
% Moisture	%	-	-	7.90	80.6	9.60	68.8	8.80	78.7	29.0	77.8	30.2

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - TISSUE

			Lab ID	L2478696-150	L2478696-152	L2478696-153	L2478696-155	L2478696-156	L2478696-158	L2478696-159	L2478696-161	L2478696-162
			Sample Date	14-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	16-JUL-20	16-JUL-20
			Sample ID	MS-L-132-2020-R WASHED	MS-L-129-2020 UNWASHED	MS-L-129-2020 WASHED	MS-L-206-2020 UNWASHED	MS-L-206-2020 WASHED	MS-L-206-2020-R UNWASHED	MS-L-206-2020-R WASHED	MP-L-103-2020 UNWASHED	MP-L-103-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	53.4	22.0	65.1	16.1	71.5	16.9	73.0	23.2	68.5

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - TISSUE

			Lab ID	L2478696-164	L2478696-165	L2478696-167	L2478696-168	L2478696-170	L2478696-171	L2478696-173	L2478696-174	L2478696-176
			Sample Date	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	17-JUL-20	17-JUL-20	17-JUL-20
			Sample ID	MP-L-102-2020 UNWASHED	MP-L-102-2020 WASHED	MP-L-147-2020 UNWASHED	MP-L-147-2020 WASHED	MP-L-146-2020 UNWASHED	MP-L-146-2020 WASHED	TR-L-152-2020 UNWASHED	TR-L-152-2020 WASHED	TR-L-78-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
% Moisture	%	-	-	28.4	71.4	20.0	68.9	19.9	74.8	28.7	73.8	18.4

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - TISSUE

				Lab ID	L2478696-177	L2478696-179	L2478696-180	L2478696-182	L2478696-183	L2478696-185	L2478696-186	L2478696-188	L2478696-189
				Sample Date	17-JUL-20	17-JUL-20	17-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
				Sample ID	TR-L-78-2020 WASHED	TR-L-123-2020 UNWASHED	TR-L-123-2020 WASHED	TR-L-79-2020 UNWASHED	TR-L-79-2020 WASHED	TR-L-124-2020 UNWASHED	TR-L-124-2020 WASHED	TR-L-124-2020-R UNWASHED	TR-L-124-2020-R WASHED
		Guide Limits											
Analyte	**Unit**	**#1**	**#2**										
% Moisture	%	-	-		64.2	50.6	78.2	28.7	77.1	25.8	75.8	25.9	75.5

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - TISSUE

Lab ID				L2478696-191	L2478696-192	L2478696-194	L2478696-195	L2478696-197	L2478696-198	L2478696-200	L2478696-201	L2478696-203
Sample Date				18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
Sample ID				TR-L-125-2020 UNWASHED	TR-L-125-2020 WASHED	TR-L-151-2020 UNWASHED	TR-L-151-2020 WASHED	TR-L-116-2020 UNWASHED	TR-L-116-2020 WASHED	TR-L-116-2020-R UNWASHED	TR-L-116-2020-R WASHED	TR-L-149-2020 UNWASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
% Moisture	%	-	-	26.3	80.3	20.9	77.5	15.2	79.5	15.3	65.6	33.0

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - TISSUE

			Lab ID	L2478696-204	L2478696-206	L2478696-207	L2478696-209	L2478696-210	L2478696-212	L2478696-213
			Sample Date	18-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20
			Sample ID	TR-L-149-2020 WASHED	TR-L-172-2020 UNWASHED	TR-L-172-2020 WASHED	TR-L-207-2020 UNWASHED	TR-L-207-2020 WASHED	TR-L-208-2020 UNWASHED	TR-L-208-2020 WASHED
		Guide Limits								
Analyte	**Unit**	**#1**	**#2**							
% Moisture	%	-	-	77.6	22.6	82.0	18.6	82.2	12.6	76.3

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨	Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥	Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

			Lab ID	L2478696-3	L2478696-6	L2478696-9	L2478696-12	L2478696-15	L2478696-18	L2478696-21	L2478696-24	L2478696-27
			Sample Date	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20
			Sample ID	MS-L-134-2020	MS-L-128-2020	MS-L-023-2020	MS-L-175-2020	MS-L-165-2020	MS-L-138-2020	MS-L-138-2020-R	MS-L-166-2020	MS-L-170-2020
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Aluminum (Al)	ug/g	-	-	3680	1380	4090	2400	10900	1460	1460	8790	6160
Antimony (Sb)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	ug/g	12	-	0.74	0.39	0.63	0.42	0.73	0.31	0.30	0.75	1.09
Barium (Ba)	ug/g	2000	-	10.9	5.93	17.2	18.9	43.1	3.85	3.98	31.9	20.4
Beryllium (Be)	ug/g	8	-	0.19	<0.10	0.17	0.10	0.47	<0.10	<0.10	0.39	0.31
Bismuth (Bi)	ug/g	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	ug/g	-	-	5.7	<5.0	<5.0	5.7	19.6	<5.0	<5.0	19.9	9.9
Cadmium (Cd)	ug/g	22	-	0.027	0.060	0.042	0.083	0.024	<0.020	<0.020	0.022	0.033
Calcium (Ca)	ug/g	-	-	1370	6170	1830	6240	2240	485	493	915	2100
Chromium (Cr)	ug/g	87	-	27.5	8.73	51.4	15.8	30.9	4.23	3.90	24.0	26.4
Cobalt (Co)	ug/g	300	-	3.83	1.41	7.05	3.00	6.21	1.19	1.13	4.12	4.98
Copper (Cu)	ug/g	91	-	6.07	4.04	3.86	5.39	12.6	1.30	1.32	8.00	7.13
Iron (Fe)	ug/g	-	-	15100	4350	13200	7310	16900	3040	2760	13100	11900
Lead (Pb)	ug/g	260	-	3.46	1.72	3.60	2.53	5.98	2.12	2.11	5.78	5.57
Lithium (Li)	ug/g	-	-	7.5	2.1	6.5	3.7	19.5	2.4	2.6	15.6	11.9
Magnesium (Mg)	ug/g	-	-	4140	1910	6540	3010	6350	615	621	4310	4280
Manganese (Mn)	ug/g	-	-	145	75.0	163	95.6	204	53.7	55.5	119	172
Mercury (Hg)	ug/g	24	-	0.0102	0.0389	0.0266	0.0975	0.0233	0.0053	0.0082	0.0075	0.0109
Molybdenum (Mo)	ug/g	40	-	0.14	0.16	0.30	0.27	0.27	<0.10	<0.10	0.11	0.13
Nickel (Ni)	ug/g	89	-	21.1	7.88	49.8	20.3	15.6	2.25	2.35	11.6	25.3
Phosphorus (P)	ug/g	-	-	230	272	268	464	461	131	127	337	350
Potassium (K)	ug/g	-	-	780	250	1020	780	2570	280	270	2070	1320
Selenium (Se)	ug/g	2.9	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	ug/g	-	-	<50	<50	<50	<50	67	<50	<50	58	62
Strontium (Sr)	ug/g	-	-	2.43	3.56	3.20	5.53	5.31	1.44	1.42	4.52	3.86
Sulfur (S)	ug/g	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	ug/g	1	-	0.074	<0.050	0.059	0.058	0.182	<0.050	<0.050	0.167	0.106
Tin (Sn)	ug/g	300	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	ug/g	-	-	255	91.8	312	197	596	96.0	96.7	605	447

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	L2478696-30	L2478696-33	L2478696-36	L2478696-37	L2478696-40	L2478696-43	L2478696-46	L2478696-49	L2478696-52
Sample Date				09-JUL-20	09-JUL-20	09-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
Sample ID				TR-L-169-2020	TR-L-169-2020-R	TR-L-168-2020	TR-L-162-2020	TR-L-162-2020-R	TR-L-161-2020	TR-L-167-2020	MP-L-135-2020	MP-L-141-2020
Aluminum (Al)	ug/g	-	-	1220	1030	9490	892	1320	2240	6050	7820	3440
Antimony (Sb)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	ug/g	12	-	0.29	0.23	1.65	0.13	0.26	0.23	0.98	1.55	0.97
Barium (Ba)	ug/g	2000	-	17.3	20.5	30.4	3.66	5.95	11.1	31.1	18.1	8.86
Beryllium (Be)	ug/g	8	-	<0.10	<0.10	0.43	<0.10	<0.10	<0.10	0.34	0.48	0.22
Bismuth (Bi)	ug/g	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	ug/g	-	-	<5.0	<5.0	8.0	<5.0	<5.0	<5.0	8.0	23.4	11.2
Cadmium (Cd)	ug/g	22	-	0.024	0.029	<0.020	<0.020	<0.020	0.023	<0.020	0.036	<0.020
Calcium (Ca)	ug/g	-	-	1950	1670	2710	548	1050	519	1550	13600	19400
Chromium (Cr)	ug/g	87	-	4.89	3.82	34.5	7.78	11.3	12.2	26.1	41.3	10.5
Cobalt (Co)	ug/g	300	-	2.21	2.46	6.68	0.93	1.29	0.84	4.95	5.96	2.35
Copper (Cu)	ug/g	91	-	1.42	1.22	10.2	1.36	1.73	2.69	9.13	7.90	3.53
Iron (Fe)	ug/g	-	-	4340	3340	18200	4950	7970	2520	13000	14800	6350
Lead (Pb)	ug/g	260	-	1.26	1.12	6.90	0.92	1.50	2.16	3.64	5.89	3.74
Lithium (Li)	ug/g	-	-	2.7	2.3	19.3	<2.0	2.5	2.4	11.1	25.1	11.5
Magnesium (Mg)	ug/g	-	-	938	823	5220	673	978	893	4820	13300	12200
Manganese (Mn)	ug/g	-	-	408	505	238	25.2	40.4	15.1	182	243	101
Mercury (Hg)	ug/g	24	-	0.0207	0.0196	0.0070	0.0089	0.0169	0.0237	0.0081	0.0282	0.0118
Molybdenum (Mo)	ug/g	40	-	<0.10	<0.10	0.18	<0.10	<0.10	<0.10	0.12	0.26	0.12
Nickel (Ni)	ug/g	89	-	3.83	3.78	19.6	2.51	3.87	5.22	14.2	31.3	6.54
Phosphorus (P)	ug/g	-	-	167	160	458	85	143	249	185	365	252
Potassium (K)	ug/g	-	-	220	170	1830	200	280	260	1620	1970	920
Selenium (Se)	ug/g	2.9	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	ug/g	-	-	<50	<50	59	<50	<50	<50	<50	<50	<50
Strontium (Sr)	ug/g	-	-	2.36	1.95	4.68	1.45	2.21	2.26	5.04	9.70	8.51
Sulfur (S)	ug/g	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	ug/g	1	-	<0.050	<0.050	0.216	<0.050	<0.050	<0.050	0.105	0.140	0.074
Tin (Sn)	ug/g	300	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	ug/g	-	-	83.6	70.5	873	76.9	115	155	382	303	184

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

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ALS Environmental

ANALYTICAL REPORT

Metals - SOIL

Lab ID				L2478696-55	L2478696-58	L2478696-61	L2478696-64	L2478696-67	L2478696-70	L2478696-73	L2478696-76	L2478696-79
Sample Date				10-JUL-20	10-JUL-20	10-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
Sample ID				MP-L-105-2020	MP-L-137-2020	MP-L-136-2020	MS-L-159-2020	MS-L-159-2020-R	MS-L-115-2020	MS-L-154-2020	MS-L-155-2020	MS-L-156-2020
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Aluminum (Al)	ug/g	-	-	3380	5740 DLM	5860	2650	2710	2860	6960 DLM	8100	6260
Antimony (Sb)	ug/g	40	-	<0.10	<0.20 DLM	<0.10	<0.10	<0.10	<0.10	<0.20 DLM	<0.10	<0.10
Arsenic (As)	ug/g	12	-	1.09	1.75 DLM	1.13	0.43	0.44	0.62	1.84 DLM	1.56	2.41
Barium (Ba)	ug/g	2000	-	9.25	27.1 DLM	20.1	7.24	7.48	7.58	53.5 DLM	27.3	23.0
Beryllium (Be)	ug/g	8	-	0.22	0.36 DLM	0.31	0.15	0.16	0.14	0.36 DLM	0.27	0.32
Bismuth (Bi)	ug/g	-	-	<0.20	<0.40 DLM	<0.20	<0.20	<0.20	<0.20	<0.40 DLM	<0.20	<0.20
Boron (B)	ug/g	-	-	6.3	21 DLM	11.6	<5.0	<5.0	<5.0	15 DLM	6.2	9.6
Cadmium (Cd)	ug/g	22	-	<0.020	0.185 DLM	0.043	<0.020	<0.020	<0.020	0.109 DLM	0.051	0.037
Calcium (Ca)	ug/g	-	-	1880	25100 DLM	6520	1350	1520	2090	14500 DLM	5120	9210
Chromium (Cr)	ug/g	87	-	7.40	12.4 DLM	15.6	11.8	12.3	12.0	35.3 DLM	98.3	29.7
Cobalt (Co)	ug/g	300	-	2.16	4.21 DLM	3.68	2.15	2.22	2.40	8.33 DLM	14.2	5.88
Copper (Cu)	ug/g	91	-	4.12	15.4 DLM	6.06	1.86	1.88	2.58	26.9 DLM	13.4	15.4
Iron (Fe)	ug/g	-	-	6630	9900 DLM	10600	8240	8500	7360	12700 DLM	20500	13600
Lead (Pb)	ug/g	260	-	4.32	11.6 DLM	6.79	2.64	2.67	3.37	10.7 DLM	6.53	6.89
Lithium (Li)	ug/g	-	-	10.3	13.8 DLM	14.0	6.5	6.9	5.8	12.4 DLM	17.4	12.7
Magnesium (Mg)	ug/g	-	-	2610	4690 DLM	3380	1800	1860	1930	6360 DLM	10900	8810
Manganese (Mn)	ug/g	-	-	98.1	375 DLM	240	79.1	88.0	80.0	286 DLM	435	226
Mercury (Hg)	ug/g	24	-	0.0120	0.119 DLM	0.0328	0.0085	0.0122	0.0182	0.131 DLM	0.0385	0.0146
Molybdenum (Mo)	ug/g	40	-	0.17	0.64 DLM	0.33	<0.10	<0.10	0.27	0.33 DLM	0.20	0.20
Nickel (Ni)	ug/g	89	-	3.54	8.2 DLM	8.13	5.46	5.40	5.68	66.4 DLM	108	23.2
Phosphorus (P)	ug/g	-	-	197	820 DLM	397	421	473	539	800 DLM	512	365
Potassium (K)	ug/g	-	-	860	860 DLM	910	480	560	570	1500 DLM	1470	1590
Selenium (Se)	ug/g	2.9	-	<0.20	<0.40 DLM	<0.20	<0.20	<0.20	<0.20	<0.40 DLM	<0.20	<0.20
Silver (Ag)	ug/g	40	-	<0.10	<0.20 DLM	<0.10	<0.10	<0.10	<0.10	<0.20 DLM	<0.10	<0.10
Sodium (Na)	ug/g	-	-	<50	<100 DLM	<50	<50	<50	<50	<100 DLM	50	80
Strontium (Sr)	ug/g	-	-	2.82	19.6 DLM	6.71	2.70	2.94	3.53	10.0 DLM	3.84	6.02
Sulfur (S)	ug/g	-	-	<1000	<2000 DLM	<1000	<1000	<1000	<1000	<2000 DLM	<1000	<1000
Thallium (Tl)	ug/g	1	-	0.069	0.17 DLM	0.113	<0.050	<0.050	0.058	0.22 DLM	0.150	0.135
Tin (Sn)	ug/g	300	-	<2.0	<4.0 DLM	<2.0	<2.0	<2.0	<2.0	<4.0 DLM	<2.0	<2.0
Titanium (Ti)	ug/g	-	-	210	188 DLM	200	303	304	389	362 DLM	642	458

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

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ANALYTICAL REPORT

Metals - SOIL

			Lab ID	L2478696-82	L2478696-85	L2478696-88	L2478696-91	L2478696-94	L2478696-97	L2478696-100	L2478696-103	L2478696-106
			Sample Date	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
			Sample ID	MS-L-157-2020	MS-L-200-2020	MS-L-204-2020	MS-L-204-2020-R	MP-L-56-2020	MP-L-118-2020	MP-L-119-2020	MP-L-121-2020	MP-L-122-2020
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)	ug/g	-	-	26800	5060	4060	4640	1970	3090	5110	5290	4330
Antimony (Sb)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	ug/g	12	-	3.29	0.97	1.52	2.15	0.46	1.25	1.17	2.15	1.05
Barium (Ba)	ug/g	2000	-	159	13.7	18.1	19.1	8.51	15.8	11.9	17.7	11.9
Beryllium (Be)	ug/g	8	-	1.25	0.26	0.17	0.19	0.14	0.23	0.31	0.34	0.28
Bismuth (Bi)	ug/g	-	-	8.27	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	ug/g	-	-	11.0	7.9	<5.0	5.1	6.1	10.6	8.5	10.3	10.2
Cadmium (Cd)	ug/g	22	-	0.557	0.021	0.040	0.037	0.025	0.067	0.032	0.056	0.028
Calcium (Ca)	ug/g	-	-	4020	4350	2540	2840	2190	48500	2550	8720	4490
Chromium (Cr)	ug/g	87	-	55.0	21.3	25.7	26.6	7.30	6.92	10.0	10.6	11.9
Cobalt (Co)	ug/g	300	-	14.1	4.05	4.53	4.95	1.46	2.47	2.76	3.33	2.63
Copper (Cu)	ug/g	91	-	370	5.19	5.62	6.81	2.28	6.65	4.46	8.29	5.51
Iron (Fe)	ug/g	-	-	40200	9520	10300	11200	5140	7810	9460	10200	8950
Lead (Pb)	ug/g	260	-	38.5	5.15	4.45	5.01	2.12	4.11	5.30	7.06	5.67
Lithium (Li)	ug/g	-	-	26.1	9.9	6.6	8.5	5.1	8.6	15.8	14.6	12.2
Magnesium (Mg)	ug/g	-	-	21700	5040	2950	3520	1520	25200	3600	5740	3960
Manganese (Mn)	ug/g	-	-	617	139	218	258	55.2	393	136	267	123
Mercury (Hg)	ug/g	24	-	0.0480	0.0088	0.0404	0.0332	0.0169	0.0391	0.0142	0.0280	0.0145
Molybdenum (Mo)	ug/g	40	-	31.2	0.14	0.15	0.15	0.11	0.29	0.21	0.42	0.34
Nickel (Ni)	ug/g	89	-	59.1	14.2	17.2	18.8	3.62	5.42	5.56	6.54	6.75
Phosphorus (P)	ug/g	-	-	666	217	396	406	171	389	208	386	234
Potassium (K)	ug/g	-	-	5760	1040	710	790	440	540	650	750	780
Selenium (Se)	ug/g	2.9	-	0.24	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	ug/g	40	-	0.58	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	ug/g	-	-	122	61	<50	<50	<50	68	<50	59	52
Strontium (Sr)	ug/g	-	-	7.68	3.88	2.69	3.10	3.75	13.2	3.65	6.69	5.36
Sulfur (S)	ug/g	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	ug/g	1	-	0.541	0.086	0.075	0.084	<0.050	0.087	0.091	0.125	0.117
Tin (Sn)	ug/g	300	-	8.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	ug/g	-	-	1090	363	282	340	113	97.0	210	240	240

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

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ANALYTICAL REPORT

Metals - SOIL

Lab ID				L2478696-109	L2478696-112	L2478696-115	L2478696-118	L2478696-121	L2478696-124	L2478696-127	L2478696-130	L2478696-133
Sample Date				12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20
Sample ID				MP-L-144-2020	MP-L-93-2020	MP-L-145-2020	MP-L-145-2020-R	MP-L-57-2020	MS-L-205-2020	MS-L-203-2020	MS-L-202-2020	MS-L-153-2020
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Aluminum (Al)	ug/g	-	-	5370	8780	15000	16100	4640	1760	1950	2110	2300
Antimony (Sb)	ug/g	40	-	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	ug/g	12	-	1.07	1.48	3.59	3.82	1.33	0.25	0.32	0.31	0.29
Barium (Ba)	ug/g	2000	-	17.2	26.7	29.6	31.4	11.0	7.40	17.3	14.3	10.8
Beryllium (Be)	ug/g	8	-	0.34	0.62	0.88	0.87	0.31	<0.10	0.10	0.10	0.11
Bismuth (Bi)	ug/g	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	ug/g	-	-	8.8	12.8	60.6	61.0	35.7	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	ug/g	22	-	0.023	0.048	0.066	0.071	0.045	0.026	0.032	0.030	<0.020
Calcium (Ca)	ug/g	-	-	2660	5150	91400	88300	61300	1560	2130	3350	995
Chromium (Cr)	ug/g	87	-	17.1	21.4	35.3	37.7	16.2	8.24	11.6	9.33	9.95
Cobalt (Co)	ug/g	300	-	3.98	5.52	7.41	7.68	2.93	1.51	4.29	1.75	1.92
Copper (Cu)	ug/g	91	-	6.32	8.09	14.6	15.4	5.86	2.15	2.96	3.19	2.09
Iron (Fe)	ug/g	-	-	10900	16600	19600	20500	8210	4830	8810	5500	5980
Lead (Pb)	ug/g	260	-	6.65	11.5	12.3	12.3	4.11	1.66	2.20	2.23	2.41
Lithium (Li)	ug/g	-	-	14.5	27.0	59.1	60.5	22.2	3.8	2.7	4.0	3.9
Magnesium (Mg)	ug/g	-	-	3900	6260	34800	35100	36200	1580	1420	1860	1700
Manganese (Mn)	ug/g	-	-	171	333	263	269	115	49.5	167	53.2	71.9
Mercury (Hg)	ug/g	24	-	0.0167	0.0385	0.0210	0.0224	0.0238	0.0124	0.0329	0.0259	0.0181
Molybdenum (Mo)	ug/g	40	-	0.42	0.40	0.48	0.48	0.57	<0.10	0.23	0.14	<0.10
Nickel (Ni)	ug/g	89	-	9.31	11.5	21.7	22.8	8.67	5.61	10.0	6.29	6.45
Phosphorus (P)	ug/g	-	-	241	524	470	491	407	241	316	347	224
Potassium (K)	ug/g	-	-	980	1850	5420	5940	1830	350	250	360	450
Selenium (Se)	ug/g	2.9	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	ug/g	-	-	<50	63	136	141	419	<50	<50	<50	<50
Strontium (Sr)	ug/g	-	-	6.45	9.60	54.6	54.3	32.1	2.68	3.08	3.81	2.43
Sulfur (S)	ug/g	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	ug/g	1	-	0.114	0.236	0.245	0.260	0.090	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	ug/g	300	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	ug/g	-	-	323	419	443	459	210	206	158	216	281

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

Lab ID				L2478696-136	L2478696-139	L2478696-142	L2478696-145	L2478696-148	L2478696-151	L2478696-154	L2478696-157	L2478696-160
Sample Date				13-JUL-20	13-JUL-20	13-JUL-20	14-JUL-20	14-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	16-JUL-20
Sample ID				MS-L-153-2020-R	MS-L-131-2020	MS-L-130-2020	MS-L-132-2020	MS-L-132-2020-R	MS-L-129-2020	MS-L-206-2020	MS-L-206-2020-R	MP-L-103-2020
Analyte	Unit	Guide Limits #1	Guide Limits #2									
Aluminum (Al)	ug/g	-	-	2040	2700	2550	3960	2190	740	3210	2440	6240
Antimony (Sb)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	ug/g	12	-	0.33	0.66	0.39	0.65	0.37	0.73	0.24	0.23	1.41
Barium (Ba)	ug/g	2000	-	10.1	20.5	12.3	19.0	9.11	2.88	11.4	7.47	16.8
Beryllium (Be)	ug/g	8	-	0.10	0.18	0.16	0.18	0.10	<0.10	0.16	0.12	0.38
Bismuth (Bi)	ug/g	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	ug/g	-	-	<5.0	<5.0	<5.0	6.3	<5.0	<5.0	<5.0	<5.0	16.2
Cadmium (Cd)	ug/g	22	-	<0.020	0.050	0.020	0.039	<0.020	<0.020	<0.020	<0.020	0.036
Calcium (Ca)	ug/g	-	-	1150	2180	1170	4080	1930	679	1300	701	16200
Chromium (Cr)	ug/g	87	-	11.0	13.8	10.5	20.2	11.9	2.35	14.1	11.8	17.6
Cobalt (Co)	ug/g	300	-	1.83	3.02	2.25	3.65	2.04	1.38	2.87	2.10	3.71
Copper (Cu)	ug/g	91	-	2.26	7.09	2.21	4.78	2.45	4.29	3.15	3.24	6.23
Iron (Fe)	ug/g	-	-	7740	9410	6820	11200	7120	1900	8690	7830	11500
Lead (Pb)	ug/g	260	-	2.54	3.84	2.98	5.11	2.48	2.43	2.53	2.85	7.05
Lithium (Li)	ug/g	-	-	3.6	4.9	4.5	5.7	3.5	<2.0	9.0	7.2	17.6
Magnesium (Mg)	ug/g	-	-	1450	2300	1470	2620	1620	423	2390	1820	8860
Manganese (Mn)	ug/g	-	-	69.2	363	193	172	80.0	41.5	86.4	60.1	176
Mercury (Hg)	ug/g	24	-	0.0186	0.0198	0.0161	0.0501	0.0268	0.0064	0.0109	0.0146	0.0245
Molybdenum (Mo)	ug/g	40	-	<0.10	0.13	0.19	0.27	0.14	<0.10	<0.10	<0.10	0.28
Nickel (Ni)	ug/g	89	-	6.10	15.5	6.25	11.8	6.57	2.20	6.58	5.40	9.74
Phosphorus (P)	ug/g	-	-	310	281	325	467	240	78	357	156	392
Potassium (K)	ug/g	-	-	400	560	640	710	430	260	690	530	1260
Selenium (Se)	ug/g	2.9	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	ug/g	-	-	<50	<50	<50	<50	<50	<50	<50	<50	60
Strontium (Sr)	ug/g	-	-	2.74	2.62	2.70	5.00	2.72	0.92	2.33	1.78	12.2
Sulfur (S)	ug/g	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	ug/g	1	-	<0.050	0.060	0.051	0.073	<0.050	<0.050	0.052	<0.050	0.112
Tin (Sn)	ug/g	300	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	ug/g	-	-	246	242	233	331	222	37.1	378	295	263

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

			Lab ID	L2478696-163	L2478696-166	L2478696-169	L2478696-172	L2478696-175	L2478696-178	L2478696-181	L2478696-184	L2478696-187
			Sample Date	16-JUL-20	16-JUL-20	16-JUL-20	17-JUL-20	17-JUL-20	17-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
			Sample ID	MP-L-102-2020	MP-L-147-2020	MP-L-146-2020	TR-L-152-2020	TR-L-78-2020	TR-L-123-2020	TR-L-79-2020	TR-L-124-2020	TR-L-124-2020-R
Analyte	**Unit**	**Guide Limits #1**	**#2**									
Aluminum (Al)	ug/g	-	-	4870	10300	6160	1020	1690	2300	593	1440	1310
Antimony (Sb)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	ug/g	12	-	1.21	2.31	1.50	0.16	0.22	0.30	<0.10	0.21	0.20
Barium (Ba)	ug/g	2000	-	13.8	24.2	14.8	3.71	9.21	10.5	3.24	6.09	5.66
Beryllium (Be)	ug/g	8	-	0.32	0.61	0.39	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bismuth (Bi)	ug/g	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	ug/g	-	-	19.6	32.1	33.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	ug/g	22	-	0.024	0.077	0.040	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Calcium (Ca)	ug/g	-	-	99300	14000	148000	339	842	858	225	486	414
Chromium (Cr)	ug/g	87	-	11.0	25.6	14.1	5.51	9.11	11.4	3.26	7.60	6.92
Cobalt (Co)	ug/g	300	-	2.83	5.75	3.50	0.85	1.45	1.62	0.32	1.30	1.28
Copper (Cu)	ug/g	91	-	5.37	12.4	6.73	1.05	1.79	2.37	0.51	2.82	1.63
Iron (Fe)	ug/g	-	-	8820	16300	10200	2910	5530	6320	1600	4210	4220
Lead (Pb)	ug/g	260	-	5.63	10.7	5.93	1.15	1.69	1.97	0.80	1.45	1.28
Lithium (Li)	ug/g	-	-	16.3	32.4	24.1	2.3	2.7	4.1	<2.0	2.9	2.7
Magnesium (Mg)	ug/g	-	-	30100	6810	35700	799	1370	1610	350	1200	1040
Manganese (Mn)	ug/g	-	-	159	234	196	16.7	67.3	36.2	5.7	41.8	48.1
Mercury (Hg)	ug/g	24	-	0.0311	0.0464	0.0159	<0.0050	0.0094	0.0294	0.0100	0.0204	0.0142
Molybdenum (Mo)	ug/g	40	-	0.26	0.48	0.28	<0.10	0.13	<0.10	<0.10	<0.10	<0.10
Nickel (Ni)	ug/g	89	-	6.72	13.8	9.33	3.04	4.52	6.29	1.34	3.90	3.39
Phosphorus (P)	ug/g	-	-	223	615	254	110	165	197	91	132	110
Potassium (K)	ug/g	-	-	890	2660	1840	220	520	390	110	290	290
Selenium (Se)	ug/g	2.9	-	<0.20	0.21	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	ug/g	-	-	99	197	126	<50	<50	<50	<50	<50	<50
Strontium (Sr)	ug/g	-	-	52.6	28.8	81.6	1.67	2.60	2.99	1.33	1.80	1.77
Sulfur (S)	ug/g	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	ug/g	1	-	0.106	0.164	0.133	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	ug/g	300	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	ug/g	-	-	277	245	270	83.6	120	162	50.0	96.5	95.9

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

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Metals - SOIL

			Lab ID	L2478696-190	L2478696-193	L2478696-196	L2478696-199	L2478696-202	L2478696-205	L2478696-208	L2478696-211
			Sample Date	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20
			Sample ID	TR-L-125-2020	TR-L-151-2020	TR-L-116-2020	TR-L-116-2020-R	TR-L-149-2020	TR-L-172-2020	TR-L-207-2020	TR-L-208-2020
Analyte	**Unit**	**Guide Limits #1**	**#2**								
Aluminum (Al)	ug/g	-	-	1510	1760	739	1070	738	4600	3750	3160
Antimony (Sb)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	ug/g	12	-	0.21	0.21	0.16	0.18	0.11	1.56	1.48	0.95
Barium (Ba)	ug/g	2000	-	9.43	9.17	2.40	3.39	2.98	20.4	12.9	10.9
Beryllium (Be)	ug/g	8	-	0.14	<0.10	<0.10	<0.10	<0.10	0.28	0.26	0.19
Bismuth (Bi)	ug/g	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	ug/g	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	25.0	28.5	16.4
Cadmium (Cd)	ug/g	22	-	0.022	<0.020	<0.020	<0.020	<0.020	0.042	0.031	0.024
Calcium (Ca)	ug/g	-	-	1060	585	402	517	144	71200	75000	8270
Chromium (Cr)	ug/g	87	-	5.88	8.75	3.33	6.24	7.21	10.5	11.0	8.85
Cobalt (Co)	ug/g	300	-	2.36	1.31	0.53	0.70	0.47	2.87	2.69	1.99
Copper (Cu)	ug/g	91	-	1.85	2.38	0.74	1.17	0.75	5.85	5.26	4.05
Iron (Fe)	ug/g	-	-	4400	5370	2020	3460	3400	9740	7800	6760
Lead (Pb)	ug/g	260	-	1.69	1.60	0.86	1.16	0.90	4.90	4.31	3.27
Lithium (Li)	ug/g	-	-	2.8	3.8	<2.0	2.1	<2.0	18.3	22.0	12.0
Magnesium (Mg)	ug/g	-	-	1340	1510	464	615	369	31700	34400	4900
Manganese (Mn)	ug/g	-	-	122	40.0	14.0	19.3	13.2	185	146	123
Mercury (Hg)	ug/g	24	-	0.0300	<0.0050	0.0057	0.0078	0.0104	0.0265	0.0136	0.0177
Molybdenum (Mo)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	0.58	0.29	0.23
Nickel (Ni)	ug/g	89	-	4.37	4.17	1.56	2.30	1.83	7.15	6.77	4.61
Phosphorus (P)	ug/g	-	-	164	123	66	100	80	249	258	208
Potassium (K)	ug/g	-	-	450	550	190	280	140	1700	1380	870
Selenium (Se)	ug/g	2.9	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	ug/g	40	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	ug/g	-	-	<50	<50	<50	<50	<50	80	78	<50
Strontium (Sr)	ug/g	-	-	2.71	2.35	1.10	1.38	1.02	35.4	37.0	6.00
Sulfur (S)	ug/g	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	ug/g	1	-	<0.050	<0.050	<0.050	<0.050	<0.050	0.086	0.088	0.057
Tin (Sn)	ug/g	300	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	ug/g	-	-	107	134	52.1	71.2	70.4	164	121	101

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

		Guide Limits										
			Lab ID	L2478696-3	L2478696-6	L2478696-9	L2478696-12	L2478696-15	L2478696-18	L2478696-21	L2478696-24	L2478696-27
			Sample Date	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20
			Sample ID	MS-L-134-2020	MS-L-128-2020	MS-L-023-2020	MS-L-175-2020	MS-L-165-2020	MS-L-138-2020	MS-L-138-2020-R	MS-L-166-2020	MS-L-170-2020
Analyte	**Unit**	**#1**	**#2**									
Tungsten (W)	ug/g	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	-	0.490	0.314	0.713	0.463	0.934	0.158	0.154	1.18	0.640
Vanadium (V)	ug/g	130	-	18.3	5.68	15.1	8.51	30.3	4.53	4.32	22.3	19.5
Zinc (Zn)	ug/g	410	-	10.0	8.8	12.3	11.4	26.9	5.4	6.1	22.2	15.8
Zirconium (Zr)	ug/g	-	-	<1.0	1.1	<1.0	1.0	3.1	<1.0	<1.0	2.6	2.0

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - SOIL

			Lab ID	L2478696-30	L2478696-33	L2478696-36	L2478696-37	L2478696-40	L2478696-43	L2478696-46	L2478696-49	L2478696-52
			Sample Date	09-JUL-20	09-JUL-20	09-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
			Sample ID	TR-L-169-2020	TR-L-169-2020-R	TR-L-168-2020	TR-L-162-2020	TR-L-162-2020-R	TR-L-161-2020	TR-L-167-2020	MP-L-135-2020	MP-L-141-2020
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tungsten (W)	ug/g	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.65	<0.50
Uranium (U)	ug/g	33	-	0.215	0.176	0.746	0.152	0.212	0.400	0.469	0.773	0.436
Vanadium (V)	ug/g	130	-	4.18	3.29	27.9	6.02	9.12	8.31	17.3	21.7	9.58
Zinc (Zn)	ug/g	410	-	4.5	4.8	22.6	3.8	5.9	4.4	14.3	22.3	10.4
Zirconium (Zr)	ug/g	-	-	<1.0	<1.0	13.7	<1.0	<1.0	<1.0	3.4	1.6	1.8

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

			Lab ID	L2478696-55	L2478696-58	L2478696-61	L2478696-64	L2478696-67	L2478696-70	L2478696-73	L2478696-76	L2478696-79
			Sample Date	10-JUL-20	10-JUL-20	10-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
			Sample ID	MP-L-105-2020	MP-L-137-2020	MP-L-136-2020	MS-L-159-2020	MS-L-159-2020-R	MS-L-115-2020	MS-L-154-2020	MS-L-155-2020	MS-L-156-2020
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tungsten (W)	ug/g	-	-	<0.50	<1.0 DLM	<0.50	<0.50	<0.50	<0.50	<1.0 DLM	<0.50	<0.50
Uranium (U)	ug/g	33	-	2.04	23.8 DLM	5.19	0.513	0.508	1.22	3.28 DLM	1.02	0.686
Vanadium (V)	ug/g	130	-	11.1	16.1 DLM	16.1	13.9	14.7	15.9	22.0 DLM	29.6	21.1
Zinc (Zn)	ug/g	410	-	20.3	49.6 DLM	20.3	9.1	9.2	9.4	39.1 DLM	29.9	18.0
Zirconium (Zr)	ug/g	-	-	1.3	3.4 DLM	1.2	<1.0	<1.0	1.1	4.1 DLM	1.4	3.8

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

			Lab ID	L2478696-82	L2478696-85	L2478696-88	L2478696-91	L2478696-94	L2478696-97	L2478696-100	L2478696-103	L2478696-106
			Sample Date	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
			Sample ID	MS-L-157-2020	MS-L-200-2020	MS-L-204-2020	MS-L-204-2020-R	MP-L-56-2020	MP-L-118-2020	MP-L-119-2020	MP-L-121-2020	MP-L-122-2020
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tungsten (W)	ug/g	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	-	3.05	0.487	0.505	0.514	0.808	1.40	1.52	4.54	1.97
Vanadium (V)	ug/g	130	-	46.7	15.3	16.0	17.2	7.14	12.2	13.6	14.9	13.8
Zinc (Zn)	ug/g	410	-	152	13.9	15.0	17.4	13.6	179	19.0	24.2	15.7
Zirconium (Zr)	ug/g	-	-	9.1	2.4	<1.0	<1.0	<1.0	1.7	<1.0	1.1	1.1

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - SOIL

Lab ID				L2478696-109	L2478696-112	L2478696-115	L2478696-118	L2478696-121	L2478696-124	L2478696-127	L2478696-130	L2478696-133
Sample Date				12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20
Sample ID				MP-L-144-2020	MP-L-93-2020	MP-L-145-2020	MP-L-145-2020-R	MP-L-57-2020	MS-L-205-2020	MS-L-203-2020	MS-L-202-2020	MS-L-153-2020
Analyte	**Unit**	**Guide Limits #1**	**#2**									
Tungsten (W)	ug/g	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	-	4.42	4.03	1.05	1.06	0.642	0.347	0.477	0.405	0.418
Vanadium (V)	ug/g	130	-	16.4	25.7	33.6	35.5	15.2	7.44	11.1	9.04	9.22
Zinc (Zn)	ug/g	410	-	18.9	31.9	27.7	29.6	15.9	9.6	6.3	10.9	10.1
Zirconium (Zr)	ug/g	-	-	1.4	1.6	18.1	17.0	2.7	1.2	<1.0	1.5	<1.0

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ALS Environmental

ANALYTICAL REPORT

Metals - SOIL

			Lab ID	L2478696-136	L2478696-139	L2478696-142	L2478696-145	L2478696-148	L2478696-151	L2478696-154	L2478696-157	L2478696-160
			Sample Date	13-JUL-20	13-JUL-20	13-JUL-20	14-JUL-20	14-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	16-JUL-20
			Sample ID	MS-L-153-2020-R	MS-L-131-2020	MS-L-130-2020	MS-L-132-2020	MS-L-132-2020-R	MS-L-129-2020	MS-L-206-2020	MS-L-206-2020-R	MP-L-103-2020
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Tungsten (W)	ug/g	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	-	0.402	1.57	1.61	0.766	0.449	0.134	0.385	0.553	0.908
Vanadium (V)	ug/g	130	-	11.6	13.2	10.0	16.3	10.3	2.68	15.0	12.4	17.1
Zinc (Zn)	ug/g	410	-	9.1	9.8	8.1	13.5	7.6	2.9	11.8	19.7	22.9
Zirconium (Zr)	ug/g	-	-	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	1.4

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - SOIL

			Lab ID	L2478696-163	L2478696-166	L2478696-169	L2478696-172	L2478696-175	L2478696-178	L2478696-181	L2478696-184	L2478696-187
			Sample Date	16-JUL-20	16-JUL-20	16-JUL-20	17-JUL-20	17-JUL-20	17-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
			Sample ID	MP-L-102-2020	MP-L-147-2020	MP-L-146-2020	TR-L-152-2020	TR-L-78-2020	TR-L-123-2020	TR-L-79-2020	TR-L-124-2020	TR-L-124-2020-R
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tungsten (W)	ug/g	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	-	0.897	3.00	0.792	0.178	0.298	0.287	0.167	0.226	0.196
Vanadium (V)	ug/g	130	-	13.8	25.6	15.9	4.33	6.18	8.97	2.17	5.90	6.17
Zinc (Zn)	ug/g	410	-	22.8	28.3	16.8	3.5	5.2	7.4	<2.0	6.4	6.2
Zirconium (Zr)	ug/g	-	-	2.7	4.9	6.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	L2478696-190	L2478696-193	L2478696-196	L2478696-199	L2478696-202	L2478696-205	L2478696-208	L2478696-211
Sample Date				18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20
Sample ID				TR-L-125-2020	TR-L-151-2020	TR-L-116-2020	TR-L-116-2020-R	TR-L-149-2020	TR-L-172-2020	TR-L-207-2020	TR-L-208-2020
Tungsten (W)	ug/g	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	-	0.230	0.271	0.102	0.184	0.181	0.494	0.309	0.238
Vanadium (V)	ug/g	130	-	5.38	6.57	3.08	4.92	5.39	11.3	11.2	9.28
Zinc (Zn)	ug/g	410	-	6.7	5.1	2.6	3.5	3.3	316	10.9	11.0
Zirconium (Zr)	ug/g	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-1	L2478696-2	L2478696-4	L2478696-5	L2478696-7	L2478696-8	L2478696-10	L2478696-11	L2478696-13
			Sample Date	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	09-JUL-20
			Sample ID	MS-L-134-2020 UNWASHED	MS-L-134-2020 WASHED	MS-L-128-2020 UNWASHED	MS-L-128-2020 WASHED	MS-L-023-2020 UNWASHED	MS-L-023-2020 WASHED	MS-L-175-2020 UNWASHED	MS-L-175-2020 WASHED	MS-L-165-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	1180	1380	1220	1600	2030	1750	1110	1580	112
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	0.012	0.014	0.036	0.028	0.011	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.166	0.157	0.168	0.230	0.193	0.222	0.174	0.192	0.045
Barium (Ba)-Total	mg/kg	2000	-	11.0	12.5	13.9	17.2	20.0	23.1	14.1	16.9	9.60
Beryllium (Be)-Total	mg/kg	8	-	0.065	0.068	0.072	0.087	0.106	0.100	0.071	0.088	<0.010
Bismuth (Bi)-Total	mg/kg	-	-	0.065	0.063	0.102	0.125	0.093	0.116	0.080	0.078	0.013
Boron (B)-Total	mg/kg	-	-	1.4	2.2	1.3	2.0	1.7	2.1	1.5	1.5	<1.0
Cadmium (Cd)-Total	mg/kg	22	-	0.0401	0.0500	0.0631	0.0811	0.0832	0.105	0.0958	0.0950	0.164
Calcium (Ca)-Total	mg/kg	-	-	9330	12400	14300	17100	9100	11200	10400	10400	10100
Cesium (Cs)-Total	mg/kg	-	-	0.154	0.167	0.193	0.245	0.262	0.261	0.170	0.194	0.0300
Chromium (Cr)-Total	mg/kg	87	-	2.68	2.38	2.74	3.53	5.42	5.15	2.68	3.50	0.325
Cobalt (Co)-Total	mg/kg	300	-	0.852	0.853	0.871	1.14	1.39	1.44	1.00	1.21	0.149
Copper (Cu)-Total	mg/kg	91	-	2.76	2.82	2.47	3.40	3.68	4.23	2.86	3.76	0.90
Iron (Fe)-Total	mg/kg	-	-	4680	4440	4300	5660	5490	4980	4800	5190	438
Lead (Pb)-Total	mg/kg	260	-	2.43	2.70	4.77	5.57	4.10	5.09	3.32	3.58	0.477
Lithium (Li)-Total	mg/kg	-	-	1.25	1.84	1.45	1.93	2.27	2.07	1.21	1.77	<0.50
Magnesium (Mg)-Total	mg/kg	-	-	2030	2460	1980	2560	2890	2980	2300	2480	1380
Manganese (Mn)-Total	mg/kg	-	-	48.7	46.4	50.2	64.5	66.2	68.9	58.2	70.5	58.2
Mercury (Hg)-Total	mg/kg	24	-	0.0549	0.0643	0.0343	0.0513	0.0348	0.0489	0.0512	0.0294	0.0438
Molybdenum (Mo)-Total	mg/kg	40	-	0.340	0.391	0.381	0.507	0.625	0.692	0.476	0.541	0.071
Nickel (Ni)-Total	mg/kg	89	-	2.34	2.33	2.30	3.12	5.95	7.43	5.97	3.82	0.32
Phosphorus (P)-Total	mg/kg	-	-	401	485	387	605	475	674	537	631	296
Potassium (K)-Total	mg/kg	-	-	1600	1750	1810	2410	2060	2380	1910	2070	1440
Rubidium (Rb)-Total	mg/kg	-	-	7.23	8.54	8.90	12.5	11.0	12.7	8.66	9.84	3.36
Selenium (Se)-Total	mg/kg	2.9	-	0.070	0.080	0.076	0.114	0.069	0.094	0.079	0.087	0.088
Silver (Ag)-Total	mg/kg	40	-	0.0275	0.0219	0.0437	0.0379	0.0432	0.0403	0.0325	0.0315	0.0112
Sodium (Na)-Total	mg/kg	-	-	194	213	174	236	164	190	221	201	274
Strontium (Sr)-Total	mg/kg	-	-	5.15	6.36	7.76	9.70	8.51	11.1	6.79	7.17	9.98
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0276	0.0314	0.0329	0.0423	0.0474	0.0478	0.0286	0.0290	0.0025

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

Lab ID				L2478696-14	L2478696-16	L2478696-17	L2478696-19	L2478696-20	L2478696-22	L2478696-23	L2478696-25	L2478696-26
Sample Date				09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20
Sample ID				MS-L-165-2020 WASHED	MS-L-138-2020 UNWASHED	MS-L-138-2020 WASHED	MS-L-138-2020-R UNWASHED	MS-L-138-2020-R WASHED	MS-L-166-2020 UNWASHED	MS-L-166-2020 WASHED	MS-L-170-2020 UNWASHED	MS-L-170-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	116	418	345	525	469	228	173	893	846
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.047	0.063	0.059	0.077	0.072	0.034	0.037	0.141	0.132
Barium (Ba)-Total	mg/kg	2000	-	9.75	9.99	10.3	11.0	10.9	25.5	27.2	12.2	12.7
Beryllium (Be)-Total	mg/kg	8	-	<0.010	0.018	0.018	0.026	0.023	0.030	0.032	0.038	0.045
Bismuth (Bi)-Total	mg/kg	-	-	0.014	0.032	0.054	0.034	0.026	<0.010	0.011	0.029	0.025
Boron (B)-Total	mg/kg	-	-	<1.0	<1.0	1.0	1.1	1.2	<1.0	<1.0	1.6	2.1
Cadmium (Cd)-Total	mg/kg	22	-	0.156	0.225	0.223	0.221	0.294	0.197	0.188	0.0736	0.0662
Calcium (Ca)-Total	mg/kg	-	-	9770	11800	11500	13300	12000	9030	9270	16600	15100
Cesium (Cs)-Total	mg/kg	-	-	0.0328	0.0619	0.0549	0.0840	0.0804	0.124	0.113	0.160	0.160
Chromium (Cr)-Total	mg/kg	87	-	0.323	1.02	0.852	1.30	1.10	0.497	0.370	4.86	3.57
Cobalt (Co)-Total	mg/kg	300	-	0.136	0.306	0.286	0.358	0.366	0.468	0.491	0.646	0.659
Copper (Cu)-Total	mg/kg	91	-	1.01	1.11	1.26	1.27	2.03	0.77	0.75	2.20	2.27
Iron (Fe)-Total	mg/kg	-	-	447	786	727	1050	953	297	250	2480	2450
Lead (Pb)-Total	mg/kg	260	-	0.468	1.03	0.876	1.27	1.11	1.07	1.08	1.53	1.54
Lithium (Li)-Total	mg/kg	-	-	<0.50	<0.50	<0.50	0.58	0.54	<0.50	<0.50	1.08	1.15
Magnesium (Mg)-Total	mg/kg	-	-	1380	1630	1710	1440	1430	1270	1280	2060	2030
Manganese (Mn)-Total	mg/kg	-	-	51.0	40.2	39.9	45.6	45.0	123	127	32.0	33.5
Mercury (Hg)-Total	mg/kg	24	-	0.0471	0.0474	0.0454	0.0503	0.0483	0.0471	0.0445	0.0601	0.0773
Molybdenum (Mo)-Total	mg/kg	40	-	0.075	0.070	0.068	0.084	0.112	0.035	0.038	0.266	0.488
Nickel (Ni)-Total	mg/kg	89	-	0.34	0.66	0.59	0.82	0.92	0.73	0.68	4.25	4.27
Phosphorus (P)-Total	mg/kg	-	-	342	541	614	519	627	346	358	467	540
Potassium (K)-Total	mg/kg	-	-	1550	1970	1940	1890	1760	1580	1600	1660	1750
Rubidium (Rb)-Total	mg/kg	-	-	3.71	5.79	5.96	6.94	7.19	6.88	7.08	5.30	5.67
Selenium (Se)-Total	mg/kg	2.9	-	0.083	0.079	0.081	0.099	0.083	0.067	0.068	0.105	0.104
Silver (Ag)-Total	mg/kg	40	-	0.0115	0.0109	0.0092	0.0114	0.0117	0.0131	0.0132	0.0178	0.0188
Sodium (Na)-Total	mg/kg	-	-	265	366	341	335	280	407	409	255	261
Strontium (Sr)-Total	mg/kg	-	-	10.2	7.30	7.63	8.34	8.02	18.7	19.8	6.81	7.16
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0028	0.0063	0.0061	0.0090	0.0079	0.0046	0.0040	0.0175	0.0178

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

Lab ID				L2478696-28	L2478696-29	L2478696-31	L2478696-32	L2478696-34	L2478696-35	L2478696-38	L2478696-39	L2478696-41
Sample Date				09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
Sample ID				TR-L-169-2020 UNWASHED	TR-L-169-2020 WASHED	TR-L-169-2020-R UNWASHED	TR-L-169-2020-R WASHED	TR-L-168-2020 UNWASHED	TR-L-168-2020 WASHED	TR-L-162-2020 UNWASHED	TR-L-162-2020 WASHED	TR-L-162-2020-R UNWASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Aluminum (Al)-Total	mg/kg	-	-	110	123	147	164	194	169	374	277	430
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.037	0.038	0.045	0.045	0.047	0.042	0.052	0.050	0.054
Barium (Ba)-Total	mg/kg	2000	-	4.71	5.61	6.84	7.02	7.01	7.37	7.61	7.50	7.31
Beryllium (Be)-Total	mg/kg	8	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.018	0.015	0.022
Bismuth (Bi)-Total	mg/kg	-	-	0.026	0.021	<0.010	<0.010	0.011	<0.010	0.019	0.018	0.017
Boron (B)-Total	mg/kg	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium (Cd)-Total	mg/kg	22	-	0.0701	0.0645	0.0445	0.0445	0.130	0.109	0.0281	0.0328	0.0264
Calcium (Ca)-Total	mg/kg	-	-	9150	8820	11600	10300	12700	11500	7560	7570	9030
Cesium (Cs)-Total	mg/kg	-	-	0.0478	0.0498	0.0411	0.0460	0.0580	0.0487	0.0954	0.0770	0.0960
Chromium (Cr)-Total	mg/kg	87	-	0.365	0.368	0.548	0.492	0.485	0.416	1.08	0.764	1.27
Cobalt (Co)-Total	mg/kg	300	-	0.091	0.101	0.094	0.107	0.134	0.131	0.251	0.192	0.258
Copper (Cu)-Total	mg/kg	91	-	0.78	0.97	0.82	0.99	1.04	1.05	1.06	1.10	1.13
Iron (Fe)-Total	mg/kg	-	-	331	370	378	433	459	494	849	670	926
Lead (Pb)-Total	mg/kg	260	-	0.382	0.394	0.408	0.427	0.525	0.520	0.734	0.657	0.816
Lithium (Li)-Total	mg/kg	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.74
Magnesium (Mg)-Total	mg/kg	-	-	960	1160	1330	1510	898	915	1220	1170	1310
Manganese (Mn)-Total	mg/kg	-	-	89.3	92.0	92.7	96.3	19.8	22.0	18.9	16.4	18.0
Mercury (Hg)-Total	mg/kg	24	-	0.0354	0.0399	0.0347	0.0386	0.0433	0.0441	0.0412	0.0378	0.0412
Molybdenum (Mo)-Total	mg/kg	40	-	0.048	0.073	0.093	0.093	0.090	0.071	0.099	0.105	0.106
Nickel (Ni)-Total	mg/kg	89	-	0.28	0.29	0.37	0.42	0.40	0.39	0.71	0.54	0.78
Phosphorus (P)-Total	mg/kg	-	-	317	405	284	380	424	422	370	385	364
Potassium (K)-Total	mg/kg	-	-	1440	1580	1360	1560	1640	1600	1510	1570	1510
Rubidium (Rb)-Total	mg/kg	-	-	4.41	4.87	4.11	4.36	5.01	4.79	3.94	3.70	4.06
Selenium (Se)-Total	mg/kg	2.9	-	0.066	0.059	0.050	0.066	0.083	0.081	0.063	0.056	0.056
Silver (Ag)-Total	mg/kg	40	-	0.0098	0.0097	0.0064	0.0080	0.0083	0.0074	0.0107	0.0104	0.0099
Sodium (Na)-Total	mg/kg	-	-	277	257	272	261	336	349	230	247	242
Strontium (Sr)-Total	mg/kg	-	-	4.21	4.38	5.80	5.63	8.41	8.01	5.57	5.92	5.97
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	<0.0020	0.0026	0.0023	0.0027	0.0043	0.0047	0.0095	0.0077	0.0103

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-42	L2478696-44	L2478696-45	L2478696-47	L2478696-48	L2478696-50	L2478696-51	L2478696-53	L2478696-54
			Sample Date	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
			Sample ID	TR-L-162-2020-R WASHED	TR-L-161-2020 UNWASHED	TR-L-161-2020 WASHED	TR-L-167-2020 UNWASHED	TR-L-167-2020 WASHED	MP-L-135-2020 UNWASHED	MP-L-135-2020 WASHED	MP-L-141-2020 UNWASHED	MP-L-141-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	313	789	655	255	262	184	284	95.6	93.7
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.045	0.096	0.092	0.049	0.054	0.055	0.057	0.044	0.030
Barium (Ba)-Total	mg/kg	2000	-	7.60	21.0	19.8	6.82	6.69	4.33	4.59	3.22	2.66
Beryllium (Be)-Total	mg/kg	8	-	0.017	0.043	0.037	0.014	0.016	0.011	0.017	<0.010	<0.010
Bismuth (Bi)-Total	mg/kg	-	-	0.020	0.058	0.051	0.010	0.016	<0.010	<0.010	<0.010	<0.010
Boron (B)-Total	mg/kg	-	-	<1.0	1.0	1.0	<1.0	<1.0	1.1	1.5	<1.0	<1.0
Cadmium (Cd)-Total	mg/kg	22	-	0.0302	0.111	0.109	0.0364	0.0308	0.0402	0.0408	0.0192	0.0131
Calcium (Ca)-Total	mg/kg	-	-	8560	11600	10800	13300	10200	20200	19100	26400	17700
Cesium (Cs)-Total	mg/kg	-	-	0.0838	0.225	0.195	0.0663	0.0586	0.0388	0.0528	0.0309	0.0215
Chromium (Cr)-Total	mg/kg	87	-	0.837	1.81	1.47	0.725	0.560	0.580	0.918	0.261	0.225
Cobalt (Co)-Total	mg/kg	300	-	0.199	0.630	0.541	0.159	0.160	0.112	0.166	0.063	0.058
Copper (Cu)-Total	mg/kg	91	-	1.14	1.66	1.51	1.05	1.00	0.84	1.08	0.63	0.51
Iron (Fe)-Total	mg/kg	-	-	728	1980	1750	524	489	292	487	357	279
Lead (Pb)-Total	mg/kg	260	-	0.680	2.80	2.54	0.448	0.478	0.457	0.538	0.337	0.231
Lithium (Li)-Total	mg/kg	-	-	<0.50	1.09	0.93	<0.50	<0.50	<0.50	0.67	<0.50	<0.50
Magnesium (Mg)-Total	mg/kg	-	-	1250	1800	1650	1810	1760	1060	1100	1230	928
Manganese (Mn)-Total	mg/kg	-	-	16.2	124	111	16.5	14.4	13.6	15.1	9.74	7.43
Mercury (Hg)-Total	mg/kg	24	-	0.0412	0.0319	0.0391	0.0559	0.0565	0.0561	0.0667	0.0354	0.0102
Molybdenum (Mo)-Total	mg/kg	40	-	0.096	0.351	0.290	0.086	0.062	0.064	0.070	0.101	0.067
Nickel (Ni)-Total	mg/kg	89	-	0.61	1.60	1.38	0.45	0.40	0.46	0.74	0.20	0.20
Phosphorus (P)-Total	mg/kg	-	-	384	493	531	443	444	397	427	310	224
Potassium (K)-Total	mg/kg	-	-	1490	1940	1900	1560	1460	1440	1400	1240	886
Rubidium (Rb)-Total	mg/kg	-	-	3.66	11.6	11.5	2.20	2.39	2.32	2.53	1.78	1.33
Selenium (Se)-Total	mg/kg	2.9	-	0.060	0.070	0.073	0.068	0.052	0.074	0.060	0.055	<0.050
Silver (Ag)-Total	mg/kg	40	-	0.0107	0.0316	0.0315	0.0072	0.0068	0.0071	0.0059	0.0070	0.0067
Sodium (Na)-Total	mg/kg	-	-	231	339	324	355	354	330	323	302	192
Strontium (Sr)-Total	mg/kg	-	-	6.12	12.9	12.8	5.60	4.90	11.8	11.4	17.0	11.8
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0084	0.0248	0.0208	0.0045	0.0057	0.0034	0.0053	<0.0020	<0.0020

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

Lab ID				L2478696-56	L2478696-57	L2478696-59	L2478696-60	L2478696-62	L2478696-63	L2478696-65	L2478696-66	L2478696-68
Sample Date				10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
Sample ID				MP-L-105-2020 UNWASHED	MP-L-105-2020 WASHED	MP-L-137-2020 UNWASHED	MP-L-137-2020 WASHED	MP-L-136-2020 UNWASHED	MP-L-136-2020 WASHED	MS-L-159-2020 UNWASHED	MS-L-159-2020 WASHED	MS-L-159-2020-R UNWASHED
Analyte	Unit	Guide Limits #1	Guide Limits #2									
Aluminum (Al)-Total	mg/kg	-	-	124	164	159	181	257	373	668	617	658
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.038	0.047	0.053	0.053	0.078	0.094	0.100	0.096	0.097
Barium (Ba)-Total	mg/kg	2000	-	2.38	2.79	3.61	3.92	6.43	6.81	8.99	9.37	8.06
Beryllium (Be)-Total	mg/kg	8	-	<0.010	<0.010	<0.010	0.011	0.016	0.020	0.032	0.030	0.030
Bismuth (Bi)-Total	mg/kg	-	-	0.014	0.016	0.012	0.013	0.013	0.016	0.016	0.019	0.021
Boron (B)-Total	mg/kg	-	-	<1.0	1.1	<1.0	1.1	<1.0	1.6	<1.0	1.3	<1.0
Cadmium (Cd)-Total	mg/kg	22	-	0.0243	0.0263	0.0366	0.0333	0.0321	0.0310	0.0574	0.0847	0.0535
Calcium (Ca)-Total	mg/kg	-	-	11800	13100	25100	23900	27200	26800	8260	15400	9750
Cesium (Cs)-Total	mg/kg	-	-	0.0397	0.0431	0.0660	0.0658	0.0958	0.106	0.105	0.103	0.105
Chromium (Cr)-Total	mg/kg	87	-	0.294	0.376	0.384	0.455	0.617	0.906	1.68	1.86	1.60
Cobalt (Co)-Total	mg/kg	300	-	0.072	0.089	0.102	0.111	0.155	0.201	0.530	0.459	0.479
Copper (Cu)-Total	mg/kg	91	-	0.74	0.95	0.80	0.95	0.93	1.03	1.56	1.63	1.54
Iron (Fe)-Total	mg/kg	-	-	315	415	666	819	1060	1400	2490	2380	2340
Lead (Pb)-Total	mg/kg	260	-	0.338	0.375	0.568	0.548	0.935	0.988	0.914	0.971	0.854
Lithium (Li)-Total	mg/kg	-	-	<0.50	<0.50	<0.50	<0.50	0.53	0.80	0.73	0.66	0.61
Magnesium (Mg)-Total	mg/kg	-	-	1240	1400	929	1040	925	1080	1890	2210	2020
Manganese (Mn)-Total	mg/kg	-	-	9.22	10.3	12.9	13.8	17.8	20.4	36.6	33.1	29.8
Mercury (Hg)-Total	mg/kg	24	-	0.0500	0.0587	0.0381	0.0441	0.0458	0.0478	0.0435	0.0403	0.0507
Molybdenum (Mo)-Total	mg/kg	40	-	0.079	0.101	0.148	0.168	0.113	0.135	0.177	0.203	0.246
Nickel (Ni)-Total	mg/kg	89	-	0.21	0.28	0.33	0.36	0.46	0.64	1.48	1.38	1.45
Phosphorus (P)-Total	mg/kg	-	-	392	479	302	357	306	332	533	555	499
Potassium (K)-Total	mg/kg	-	-	1430	1590	1310	1440	1300	1350	2040	1920	2060
Rubidium (Rb)-Total	mg/kg	-	-	1.94	2.20	2.77	3.23	3.90	4.43	6.28	6.50	5.97
Selenium (Se)-Total	mg/kg	2.9	-	<0.050	<0.050	0.054	0.062	0.071	0.085	0.057	0.090	0.056
Silver (Ag)-Total	mg/kg	40	-	0.0051	0.0050	0.0092	0.0121	0.0148	0.0152	0.0142	0.0162	0.0112
Sodium (Na)-Total	mg/kg	-	-	359	372	298	279	292	276	329	332	323
Strontium (Sr)-Total	mg/kg	-	-	5.87	6.59	13.7	13.7	16.5	17.8	4.25	6.42	4.30
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0028	0.0036	0.0030	0.0038	0.0077	0.0077	0.0156	0.0129	0.0155

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-69	L2478696-71	L2478696-72	L2478696-74	L2478696-75	L2478696-77	L2478696-78	L2478696-80	L2478696-81
			Sample Date	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
			Sample ID	MS-L-159-2020-R WASHED	MS-L-115-2020 UNWASHED	MS-L-115-2020 WASHED	MS-L-154-2020 UNWASHED	MS-L-154-2020 WASHED	MS-L-155-2020 UNWASHED	MS-L-155-2020 WASHED	MS-L-156-2020 UNWASHED	MS-L-156-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	513	615	467	1070	797	1170	954	1520	1080
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.082	0.083	0.066	0.155	0.120	0.158	0.139	0.188	0.156
Barium (Ba)-Total	mg/kg	2000	-	7.47	8.77	8.19	14.2	10.9	16.1	14.3	15.5	13.0
Beryllium (Be)-Total	mg/kg	8	-	0.025	0.030	0.024	0.052	0.039	0.059	0.056	0.074	0.060
Bismuth (Bi)-Total	mg/kg	-	-	0.019	0.019	0.017	0.046	0.035	0.065	0.062	0.067	0.050
Boron (B)-Total	mg/kg	-	-	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	1.4	1.2	1.5
Cadmium (Cd)-Total	mg/kg	22	-	0.0461	0.0457	0.0410	0.0836	0.0770	0.0795	0.0763	0.0643	0.0662
Calcium (Ca)-Total	mg/kg	-	-	9020	6460	5910	16100	11500	10700	11200	16900	15700
Cesium (Cs)-Total	mg/kg	-	-	0.0904	0.0961	0.0787	0.190	0.151	0.194	0.179	0.259	0.208
Chromium (Cr)-Total	mg/kg	87	-	1.45	1.61	1.40	2.41	2.50	4.01	2.99	3.66	3.12
Cobalt (Co)-Total	mg/kg	300	-	0.380	0.480	0.357	0.802	0.613	0.910	0.757	0.979	0.746
Copper (Cu)-Total	mg/kg	91	-	1.28	1.36	1.19	2.42	1.95	2.49	2.19	3.44	2.27
Iron (Fe)-Total	mg/kg	-	-	1820	1940	1570	3890	2950	3870	3150	5400	3930
Lead (Pb)-Total	mg/kg	260	-	0.701	0.908	0.674	1.91	1.53	2.40	2.21	2.79	2.44
Lithium (Li)-Total	mg/kg	-	-	0.52	0.61	<0.50	1.03	0.83	1.16	1.05	1.50	1.15
Magnesium (Mg)-Total	mg/kg	-	-	1890	1710	1960	2600	2030	2150	1990	2710	2300
Manganese (Mn)-Total	mg/kg	-	-	24.6	38.5	37.1	43.7	35.3	55.5	49.8	53.4	41.6
Mercury (Hg)-Total	mg/kg	24	-	0.0445	0.0656	0.0604	0.0677	0.0555	0.0703	0.0640	0.0596	0.0544
Molybdenum (Mo)-Total	mg/kg	40	-	0.181	0.208	0.158	0.371	0.278	0.442	0.370	0.686	0.520
Nickel (Ni)-Total	mg/kg	89	-	1.10	1.33	1.01	3.58	2.62	3.56	3.12	3.13	2.43
Phosphorus (P)-Total	mg/kg	-	-	454	556	575	426	473	446	483	522	562
Potassium (K)-Total	mg/kg	-	-	1880	1720	1740	1750	1920	1890	1940	2090	2130
Rubidium (Rb)-Total	mg/kg	-	-	5.62	5.72	5.47	8.14	7.56	8.24	8.38	10.6	10.2
Selenium (Se)-Total	mg/kg	2.9	-	0.071	<0.050	0.061	0.092	0.085	0.083	0.097	0.086	0.092
Silver (Ag)-Total	mg/kg	40	-	0.0098	0.0106	0.0089	0.0221	0.0205	0.0249	0.0263	0.0331	0.0286
Sodium (Na)-Total	mg/kg	-	-	321	461	525	310	301	278	335	231	250
Strontium (Sr)-Total	mg/kg	-	-	4.18	4.10	4.39	7.20	5.15	5.18	5.41	6.43	5.98
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0108	0.0152	0.0109	0.0254	0.0187	0.0303	0.0238	0.0392	0.0291

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

Lab ID				L2478696-83	L2478696-84	L2478696-86	L2478696-87	L2478696-89	L2478696-90	L2478696-92	L2478696-93	L2478696-95
Sample Date				11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	12-JUL-20
Sample ID				MS-L-157-2020 UNWASHED	MS-L-157-2020 WASHED	MS-L-200-2020 UNWASHED	MS-L-200-2020 WASHED	MS-L-204-2020 UNWASHED	MS-L-204-2020 WASHED	MS-L-204-2020-R UNWASHED	MS-L-204-2020-R WASHED	MP-L-56-2020 UNWASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Aluminum (Al)-Total	mg/kg	-	-	1970	1420	1110	729	714	506	824	483	415
Antimony (Sb)-Total	mg/kg	40	-	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.225	0.197	0.164	0.146	0.203	0.135	0.157	0.119	0.084
Barium (Ba)-Total	mg/kg	2000	-	26.1	22.5	13.5	12.1	10.3	9.38	11.2	9.61	10.1
Beryllium (Be)-Total	mg/kg	8	-	0.104	0.079	0.055	0.045	0.035	0.029	0.042	0.031	0.027
Bismuth (Bi)-Total	mg/kg	-	-	0.094	0.079	0.061	0.038	0.032	0.024	0.031	0.026	0.023
Boron (B)-Total	mg/kg	-	-	1.6	1.5	1.3	1.4	1.1	<1.0	<1.0	1.0	<1.0
Cadmium (Cd)-Total	mg/kg	22	-	1.09	1.19	0.0705	0.0699	0.0966	0.0934	0.118	0.0908	0.0341
Calcium (Ca)-Total	mg/kg	-	-	10200	8460	14000	13600	10200	9020	11000	7770	14600
Cesium (Cs)-Total	mg/kg	-	-	0.294	0.225	0.205	0.167	0.131	0.113	0.135	0.120	0.177
Chromium (Cr)-Total	mg/kg	87	-	5.17	3.74	3.12	2.16	2.13	1.56	2.16	1.43	0.706
Cobalt (Co)-Total	mg/kg	300	-	1.37	1.08	0.797	0.567	0.557	0.407	0.655	0.485	0.226
Copper (Cu)-Total	mg/kg	91	-	4.58	4.78	2.60	1.91	1.82	1.40	1.99	1.36	1.29
Iron (Fe)-Total	mg/kg	-	-	7190	5920	3790	3210	2790	2090	3620	2280	1360
Lead (Pb)-Total	mg/kg	260	-	4.46	4.54	2.14	2.03	1.40	1.02	1.49	1.07	1.60
Lithium (Li)-Total	mg/kg	-	-	1.96	1.45	1.13	0.78	0.73	0.59	0.82	0.54	0.86
Magnesium (Mg)-Total	mg/kg	-	-	2820	2170	2390	2140	1730	1750	2050	1930	1350
Manganese (Mn)-Total	mg/kg	-	-	83.4	75.3	46.8	38.2	33.9	29.7	41.9	33.4	27.3
Mercury (Hg)-Total	mg/kg	24	-	0.0501	0.0428	0.0419	0.0425	0.0600	0.0545	0.0557	0.0507	0.0620
Molybdenum (Mo)-Total	mg/kg	40	-	0.949	0.790	0.660	0.424	0.262	0.190	0.281	0.186	0.246
Nickel (Ni)-Total	mg/kg	89	-	4.35	3.30	2.56	1.70	1.87	1.36	2.25	1.47	0.72
Phosphorus (P)-Total	mg/kg	-	-	505	486	505	570	419	489	459	438	436
Potassium (K)-Total	mg/kg	-	-	2200	2050	1970	2010	1760	1970	1850	1810	1680
Rubidium (Rb)-Total	mg/kg	-	-	11.8	10.8	9.04	9.11	7.19	7.97	7.96	7.93	6.32
Selenium (Se)-Total	mg/kg	2.9	-	0.107	0.094	0.106	0.096	0.084	0.089	0.084	0.072	0.062
Silver (Ag)-Total	mg/kg	40	-	0.0563	0.0556	0.0289	0.0278	0.0176	0.0149	0.0176	0.0149	0.0166
Sodium (Na)-Total	mg/kg	-	-	282	234	230	257	245	273	259	314	366
Strontium (Sr)-Total	mg/kg	-	-	6.82	5.72	6.00	5.97	5.02	4.98	5.19	4.46	14.9
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0456	0.0366	0.0271	0.0190	0.0166	0.0129	0.0198	0.0132	0.0147

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-96	L2478696-98	L2478696-99	L2478696-101	L2478696-102	L2478696-104	L2478696-105	L2478696-107	L2478696-108
			Sample Date	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
			Sample ID	MP-L-56-2020 WASHED	MP-L-118-2020 UNWASHED	MP-L-118-2020 WASHED	MP-L-119-2020 UNWASHED	MP-L-119-2020 WASHED	MP-L-121-2020 UNWASHED	MP-L-121-2020 WASHED	MP-L-122-2020 UNWASHED	MP-L-122-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	401	271	271	373	309	250	228	338	323
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.085	0.084	0.080	0.114	0.099	0.075	0.067	0.122	0.104
Barium (Ba)-Total	mg/kg	2000	-	9.10	6.19	6.06	7.81	6.83	5.62	5.23	6.66	6.15
Beryllium (Be)-Total	mg/kg	8	-	0.026	0.018	0.021	0.026	0.023	0.018	0.018	0.024	0.022
Bismuth (Bi)-Total	mg/kg	-	-	0.016	0.023	0.017	0.023	0.024	0.016	0.015	0.019	0.024
Boron (B)-Total	mg/kg	-	-	1.4	1.0	1.1	<1.0	1.1	<1.0	<1.0	<1.0	1.1
Cadmium (Cd)-Total	mg/kg	22	-	0.0298	0.0311	0.0349	0.0452	0.0427	0.0249	0.0262	0.0370	0.0356
Calcium (Ca)-Total	mg/kg	-	-	13700	35800	36100	40300	37700	25900	23300	37800	32700
Cesium (Cs)-Total	mg/kg	-	-	0.160	0.132	0.127	0.211	0.168	0.144	0.140	0.196	0.184
Chromium (Cr)-Total	mg/kg	87	-	0.821	0.592	0.661	0.647	0.686	0.603	0.541	0.619	0.809
Cobalt (Co)-Total	mg/kg	300	-	0.213	0.143	0.151	0.200	0.173	0.148	0.136	0.221	0.200
Copper (Cu)-Total	mg/kg	91	-	1.50	0.92	0.94	1.14	0.98	0.91	0.88	1.16	1.13
Iron (Fe)-Total	mg/kg	-	-	1180	867	815	1490	1100	909	979	1750	1630
Lead (Pb)-Total	mg/kg	260	-	1.30	1.65	1.68	3.18	2.44	1.66	1.57	2.71	2.33
Lithium (Li)-Total	mg/kg	-	-	0.87	0.60	0.70	0.87	0.76	0.61	0.55	0.80	0.76
Magnesium (Mg)-Total	mg/kg	-	-	1290	997	1080	1400	1220	1130	1060	1410	1380
Manganese (Mn)-Total	mg/kg	-	-	25.1	19.1	18.9	27.6	24.2	19.1	18.1	26.8	24.9
Mercury (Hg)-Total	mg/kg	24	-	0.0595	0.0528	0.0502	0.0516	0.0492	0.0443	0.0401	0.0453	0.0379
Molybdenum (Mo)-Total	mg/kg	40	-	0.206	0.157	0.135	0.150	0.126	0.140	0.116	0.186	0.164
Nickel (Ni)-Total	mg/kg	89	-	0.57	0.46	0.45	0.57	0.51	0.40	0.40	0.60	0.58
Phosphorus (P)-Total	mg/kg	-	-	386	282	296	326	292	321	338	376	400
Potassium (K)-Total	mg/kg	-	-	1470	1230	1220	1360	1150	1310	1300	1360	1310
Rubidium (Rb)-Total	mg/kg	-	-	5.80	3.54	3.66	5.33	4.61	4.66	5.11	5.19	5.23
Selenium (Se)-Total	mg/kg	2.9	-	0.070	0.080	0.071	0.075	0.080	<0.050	0.059	0.061	0.064
Silver (Ag)-Total	mg/kg	40	-	0.0145	0.0170	0.0178	0.0244	0.0230	0.0179	0.0174	0.0214	0.0217
Sodium (Na)-Total	mg/kg	-	-	295	240	227	258	201	267	268	347	318
Strontium (Sr)-Total	mg/kg	-	-	13.7	21.7	21.1	24.2	22.1	17.2	15.7	25.5	23.4
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0111	0.0072	0.0061	0.0113	0.0079	0.0080	0.0065	0.0098	0.0072

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-110	L2478696-111	L2478696-113	L2478696-114	L2478696-116	L2478696-117	L2478696-119	L2478696-120	L2478696-122
			Sample Date	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
			Sample ID	MP-L-144-2020 UNWASHED	MP-L-144-2020 WASHED	MP-L-93-2020 UNWASHED	MP-L-93-2020 WASHED	MP-L-145-2020 UNWASHED	MP-L-145-2020 WASHED	MP-L-145-2020-R UNWASHED	MP-L-145-2020-R WASHED	MP-L-57-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	345	317	391	366	616	453	500	666	290
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010
Arsenic (As)-Total	mg/kg	12	-	0.099	0.105	0.147	0.154	0.187	0.149	0.165	0.189	0.124
Barium (Ba)-Total	mg/kg	2000	-	7.99	7.14	5.46	5.22	6.14	4.91	5.97	6.07	3.86
Beryllium (Be)-Total	mg/kg	8	-	0.027	0.022	0.026	0.024	0.042	0.031	0.036	0.047	0.019
Bismuth (Bi)-Total	mg/kg	-	-	0.020	0.020	0.020	0.021	0.024	0.021	0.024	0.024	0.015
Boron (B)-Total	mg/kg	-	-	1.0	<1.0	1.2	1.2	2.9	1.6	2.0	2.9	2.1
Cadmium (Cd)-Total	mg/kg	22	-	0.0357	0.0354	0.0376	0.0381	0.0388	0.0310	0.0269	0.0291	0.0413
Calcium (Ca)-Total	mg/kg	-	-	20500	20000	19200	16000	29000	23600	22600	22700	24500
Cesium (Cs)-Total	mg/kg	-	-	0.172	0.158	0.140	0.136	0.189	0.143	0.158	0.173	0.106
Chromium (Cr)-Total	mg/kg	87	-	0.844	0.779	0.929	0.892	1.41	1.16	1.17	1.55	0.820
Cobalt (Co)-Total	mg/kg	300	-	0.232	0.219	0.273	0.251	0.394	0.286	0.324	0.445	0.170
Copper (Cu)-Total	mg/kg	91	-	1.13	1.06	1.28	1.14	1.48	1.19	1.33	1.73	1.03
Iron (Fe)-Total	mg/kg	-	-	1860	2080	2790	2560	2760	1960	2050	2550	1250
Lead (Pb)-Total	mg/kg	260	-	2.18	2.29	1.83	1.73	2.33	1.81	2.06	2.07	1.11
Lithium (Li)-Total	mg/kg	-	-	0.80	0.71	0.83	0.77	1.61	1.19	1.31	1.88	0.94
Magnesium (Mg)-Total	mg/kg	-	-	1230	1370	1190	1170	1720	1430	1600	1900	1690
Manganese (Mn)-Total	mg/kg	-	-	26.6	27.1	25.0	22.9	35.6	26.2	31.2	35.7	16.7
Mercury (Hg)-Total	mg/kg	24	-	0.0512	0.0493	0.0523	0.0487	0.0372	0.0287	0.0388	0.0409	0.0479
Molybdenum (Mo)-Total	mg/kg	40	-	0.234	0.215	0.250	0.208	0.225	0.192	0.204	0.248	0.162
Nickel (Ni)-Total	mg/kg	89	-	0.65	0.64	0.82	0.77	1.07	0.81	0.93	1.31	0.67
Phosphorus (P)-Total	mg/kg	-	-	354	396	369	366	417	418	441	536	450
Potassium (K)-Total	mg/kg	-	-	1390	1400	1300	1340	1430	1340	1420	1480	1440
Rubidium (Rb)-Total	mg/kg	-	-	5.37	5.59	3.41	3.70	4.02	3.72	3.55	4.09	2.47
Selenium (Se)-Total	mg/kg	2.9	-	0.087	0.078	0.070	0.066	0.063	0.060	0.056	0.065	0.071
Silver (Ag)-Total	mg/kg	40	-	0.0191	0.0198	0.0166	0.0172	0.0190	0.0161	0.0151	0.0163	0.0124
Sodium (Na)-Total	mg/kg	-	-	279	316	370	371	325	291	338	301	416
Strontium (Sr)-Total	mg/kg	-	-	20.5	21.8	36.9	31.1	28.1	24.3	23.2	23.1	32.8
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0084	0.0086	0.0077	0.0079	0.0111	0.0078	0.0095	0.0122	0.0062

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

Lab ID				L2478696-123	L2478696-125	L2478696-126	L2478696-128	L2478696-129	L2478696-131	L2478696-132	L2478696-134	L2478696-135
Sample Date				12-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20
Sample ID				MP-L-57-2020 WASHED	MS-L-205-2020 UNWASHED	MS-L-205-2020 WASHED	MS-L-203-2020 UNWASHED	MS-L-203-2020 WASHED	MS-L-202-2020 UNWASHED	MS-L-202-2020 WASHED	MS-L-153-2020 UNWASHED	MS-L-153-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	495	470	478	446	493	691	783	484	438
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	0.011	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.157	0.142	0.127	0.091	0.101	0.189	0.198	0.161	0.146
Barium (Ba)-Total	mg/kg	2000	-	4.36	11.0	11.1	10.1	12.5	12.4	13.5	14.4	14.9
Beryllium (Be)-Total	mg/kg	8	-	0.031	0.030	0.029	0.024	0.029	0.043	0.049	0.034	0.031
Bismuth (Bi)-Total	mg/kg	-	-	0.015	0.026	0.030	0.021	0.024	0.034	0.040	0.026	0.026
Boron (B)-Total	mg/kg	-	-	3.6	<1.0	1.2	<1.0	1.1	1.0	1.4	<1.0	<1.0
Cadmium (Cd)-Total	mg/kg	22	-	0.0445	0.0690	0.0625	0.0870	0.0779	0.0557	0.0603	0.100	0.0994
Calcium (Ca)-Total	mg/kg	-	-	25600	7540	7940	10300	8600	7600	8050	6140	5960
Cesium (Cs)-Total	mg/kg	-	-	0.114	0.110	0.109	0.101	0.102	0.131	0.129	0.105	0.0966
Chromium (Cr)-Total	mg/kg	87	-	1.23	1.51	1.39	1.23	1.30	2.03	2.15	1.54	1.29
Cobalt (Co)-Total	mg/kg	300	-	0.323	0.488	0.470	0.346	0.389	0.657	0.748	0.549	0.518
Copper (Cu)-Total	mg/kg	91	-	1.41	1.56	1.69	1.41	1.80	2.00	2.37	1.51	1.53
Iron (Fe)-Total	mg/kg	-	-	1810	3320	3630	1890	2380	4910	5860	4110	2810
Lead (Pb)-Total	mg/kg	260	-	1.21	1.20	1.20	1.14	1.24	1.64	1.69	1.51	1.43
Lithium (Li)-Total	mg/kg	-	-	1.51	<0.50	0.53	<0.50	0.51	0.71	0.82	0.51	<0.50
Magnesium (Mg)-Total	mg/kg	-	-	2110	1650	1670	1220	1350	1460	1670	1360	1450
Manganese (Mn)-Total	mg/kg	-	-	23.5	53.5	50.3	74.8	84.8	52.4	60.3	51.5	49.2
Mercury (Hg)-Total	mg/kg	24	-	0.0510	0.0405	0.0429	0.0483	0.0526	0.0372	0.0457	0.0318	0.0082
Molybdenum (Mo)-Total	mg/kg	40	-	0.174	0.279	0.286	0.238	0.238	0.476	0.492	0.323	0.288
Nickel (Ni)-Total	mg/kg	89	-	0.96	1.36	1.37	1.29	1.42	1.82	2.11	1.58	1.57
Phosphorus (P)-Total	mg/kg	-	-	474	497	545	431	561	590	649	462	453
Potassium (K)-Total	mg/kg	-	-	1470	1730	1870	1690	1820	1830	1980	1760	1790
Rubidium (Rb)-Total	mg/kg	-	-	2.90	6.83	7.64	7.88	8.14	7.91	8.95	6.69	7.38
Selenium (Se)-Total	mg/kg	2.9	-	0.073	0.099	0.092	0.078	0.088	0.092	0.096	0.086	0.085
Silver (Ag)-Total	mg/kg	40	-	0.0131	0.0226	0.0228	0.0180	0.0198	0.0265	0.0282	0.0314	0.0257
Sodium (Na)-Total	mg/kg	-	-	288	288	269	276	264	312	283	296	281
Strontium (Sr)-Total	mg/kg	-	-	34.1	4.03	4.29	5.56	5.36	3.77	4.29	5.38	5.66
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0077	0.0132	0.0121	0.0118	0.0124	0.0176	0.0161	0.0125	0.0059

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-137	L2478696-138	L2478696-140	L2478696-141	L2478696-143	L2478696-144	L2478696-146	L2478696-147	L2478696-149
			Sample Date	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	14-JUL-20	14-JUL-20	14-JUL-20
			Sample ID	MS-L-153-2020-R UNWASHED	MS-L-153-2020-R WASHED	MS-L-131-2020 UNWASHED	MS-L-131-2020 WASHED	MS-L-130-2020 UNWASHED	MS-L-130-2020 WASHED	MS-L-132-2020 UNWASHED	MS-L-132-2020 WASHED	MS-L-132-2020-R UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	649	693	783	801	908	828	821	754	849
Antimony (Sb)-Total	mg/kg	40	-	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
Arsenic (As)-Total	mg/kg	12	-	0.225	0.214	0.139	0.136	0.165	0.155	0.176	0.162	0.191
Barium (Ba)-Total	mg/kg	2000	-	16.3	15.9	12.2	12.1	10.8	10.4	10.9	8.98	11.6
Beryllium (Be)-Total	mg/kg	8	-	0.043	0.048	0.042	0.044	0.046	0.049	0.045	0.043	0.045
Bismuth (Bi)-Total	mg/kg	-	-	0.035	0.037	0.071	0.052	0.036	0.029	0.037	0.026	0.040
Boron (B)-Total	mg/kg	-	-	<1.0	1.2	1.1	1.3	1.4	1.6	1.2	1.0	1.2
Cadmium (Cd)-Total	mg/kg	22	-	0.100	0.110	0.0457	0.0470	0.0404	0.0356	0.0473	0.0418	0.0477
Calcium (Ca)-Total	mg/kg	-	-	8480	9870	7020	7030	9250	7700	11800	8930	10800
Cesium (Cs)-Total	mg/kg	-	-	0.127	0.128	0.124	0.114	0.134	0.122	0.133	0.113	0.130
Chromium (Cr)-Total	mg/kg	87	-	2.00	1.99	2.14	2.22	2.67	2.22	2.28	2.21	2.34
Cobalt (Co)-Total	mg/kg	300	-	0.776	0.743	0.629	0.624	0.685	0.614	0.663	0.586	0.668
Copper (Cu)-Total	mg/kg	91	-	1.94	2.70	2.11	2.16	2.37	2.30	2.29	1.91	2.16
Iron (Fe)-Total	mg/kg	-	-	5400	5910	3280	4160	4040	4110	4360	4390	4300
Lead (Pb)-Total	mg/kg	260	-	1.83	1.93	1.49	1.34	1.64	1.53	1.55	1.32	1.49
Lithium (Li)-Total	mg/kg	-	-	0.66	0.70	0.79	0.82	0.96	0.89	0.84	0.75	0.86
Magnesium (Mg)-Total	mg/kg	-	-	1780	1850	1660	1630	1530	1460	1460	1410	1800
Manganese (Mn)-Total	mg/kg	-	-	79.6	80.1	43.8	42.4	39.0	35.5	41.9	40.0	43.3
Mercury (Hg)-Total	mg/kg	24	-	0.0355	0.0415	0.0526	0.0524	0.0597	0.0561	0.0513	0.0371	0.0479
Molybdenum (Mo)-Total	mg/kg	40	-	0.456	0.460	0.400	0.374	0.408	0.377	0.392	0.368	0.424
Nickel (Ni)-Total	mg/kg	89	-	2.05	2.21	2.08	2.14	2.27	2.03	2.00	1.91	2.08
Phosphorus (P)-Total	mg/kg	-	-	489	541	515	533	549	574	516	520	483
Potassium (K)-Total	mg/kg	-	-	1720	1920	1890	1720	1930	1760	1910	1700	1750
Rubidium (Rb)-Total	mg/kg	-	-	7.62	8.94	6.63	6.39	6.91	6.75	7.96	7.69	7.57
Selenium (Se)-Total	mg/kg	2.9	-	0.096	0.098	0.067	0.070	0.071	0.072	0.080	0.072	0.089
Silver (Ag)-Total	mg/kg	40	-	0.0322	0.0313	0.0212	0.0194	0.0257	0.0228	0.0220	0.0185	0.0226
Sodium (Na)-Total	mg/kg	-	-	412	403	402	344	337	319	309	301	326
Strontium (Sr)-Total	mg/kg	-	-	6.15	6.95	4.06	4.08	4.64	4.55	5.23	4.48	6.16
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0171	0.0156	0.0180	0.0175	0.0205	0.0182	0.0202	0.0174	0.0190

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-150	L2478696-152	L2478696-153	L2478696-155	L2478696-156	L2478696-158	L2478696-159	L2478696-161	L2478696-162
			Sample Date	14-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	16-JUL-20	16-JUL-20
			Sample ID	MS-L-132-2020-R WASHED	MS-L-129-2020 UNWASHED	MS-L-129-2020 WASHED	MS-L-206-2020 UNWASHED	MS-L-206-2020 WASHED	MS-L-206-2020-R UNWASHED	MS-L-206-2020-R WASHED	MP-L-103-2020 UNWASHED	MP-L-103-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	601	920	888	573	649	948	754	221	327
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.133	0.160	0.164	0.120	0.157	0.174	0.171	0.064	0.079
Barium (Ba)-Total	mg/kg	2000	-	8.18	9.80	9.89	8.12	9.11	9.51	11.1	3.66	4.41
Beryllium (Be)-Total	mg/kg	8	-	0.034	0.050	0.049	0.033	0.040	0.049	0.045	0.014	0.020
Bismuth (Bi)-Total	mg/kg	-	-	0.028	0.043	0.036	0.062	0.054	0.038	0.040	<0.010	0.012
Boron (B)-Total	mg/kg	-	-	<1.0	1.3	1.0	<1.0	<1.0	1.2	1.0	<1.0	1.3
Cadmium (Cd)-Total	mg/kg	22	-	0.0377	0.0589	0.0594	0.0319	0.0381	0.0299	0.0390	0.0160	0.0216
Calcium (Ca)-Total	mg/kg	-	-	8320	6720	7240	8190	11200	8880	10400	21300	31900
Cesium (Cs)-Total	mg/kg	-	-	0.0858	0.140	0.119	0.114	0.127	0.149	0.144	0.0733	0.0891
Chromium (Cr)-Total	mg/kg	87	-	1.66	2.17	2.11	1.54	1.74	2.37	1.98	0.474	0.781
Cobalt (Co)-Total	mg/kg	300	-	0.463	0.740	0.701	0.476	0.593	0.703	0.667	0.125	0.174
Copper (Cu)-Total	mg/kg	91	-	1.57	2.48	2.12	1.39	1.88	1.86	1.76	0.67	0.94
Iron (Fe)-Total	mg/kg	-	-	3860	4450	4870	3170	4120	4850	4620	519	1090
Lead (Pb)-Total	mg/kg	260	-	1.00	1.40	1.39	1.31	1.42	1.58	1.56	0.263	0.781
Lithium (Li)-Total	mg/kg	-	-	0.59	0.97	0.95	0.66	0.75	1.10	0.89	0.56	0.79
Magnesium (Mg)-Total	mg/kg	-	-	1280	2000	1980	1470	1900	1890	2020	882	1090
Manganese (Mn)-Total	mg/kg	-	-	29.7	79.5	79.4	27.3	32.8	36.7	36.7	13.3	17.1
Mercury (Hg)-Total	mg/kg	24	-	0.0148	0.0476	0.0403	0.0459	0.0430	0.0402	0.0449	0.0214	0.0496
Molybdenum (Mo)-Total	mg/kg	40	-	0.306	0.318	0.501	0.228	0.297	0.265	0.282	0.085	0.139
Nickel (Ni)-Total	mg/kg	89	-	1.49	1.87	1.89	1.33	1.50	1.86	1.60	0.36	0.53
Phosphorus (P)-Total	mg/kg	-	-	380	699	686	400	486	381	479	234	325
Potassium (K)-Total	mg/kg	-	-	1320	2130	2000	1460	1800	1510	1810	1070	1280
Rubidium (Rb)-Total	mg/kg	-	-	5.73	10.6	9.21	5.22	7.14	6.32	7.54	2.38	2.97
Selenium (Se)-Total	mg/kg	2.9	-	0.061	0.065	0.059	0.076	0.078	0.080	0.086	0.050	0.057
Silver (Ag)-Total	mg/kg	40	-	0.0196	0.0166	0.0190	0.0158	0.0202	0.0170	0.0205	0.0070	0.0104
Sodium (Na)-Total	mg/kg	-	-	235	282	238	212	265	186	249	210	239
Strontium (Sr)-Total	mg/kg	-	-	4.52	4.45	4.51	4.34	5.70	4.78	5.95	14.3	18.8
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0118	0.0219	0.0196	0.0162	0.0165	0.0213	0.0187	0.0027	0.0070

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-164	L2478696-165	L2478696-167	L2478696-168	L2478696-170	L2478696-171	L2478696-173	L2478696-174	L2478696-176
			Sample Date	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	17-JUL-20	17-JUL-20	17-JUL-20
			Sample ID	MP-L-102-2020 UNWASHED	MP-L-102-2020 WASHED	MP-L-147-2020 UNWASHED	MP-L-147-2020 WASHED	MP-L-146-2020 UNWASHED	MP-L-146-2020 WASHED	TR-L-152-2020 UNWASHED	TR-L-152-2020 WASHED	TR-L-78-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	907	572	297	418	501	662	2150	1720	991
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.157	0.124	0.130	0.161	0.167	0.189	0.139	0.123	0.132
Barium (Ba)-Total	mg/kg	2000	-	6.76	5.82	4.04	4.85	4.28	4.32	22.4	24.1	19.6
Beryllium (Be)-Total	mg/kg	8	-	0.052	0.034	0.020	0.030	0.036	0.043	0.103	0.086	0.057
Bismuth (Bi)-Total	mg/kg	-	-	0.019	0.020	0.016	0.022	0.023	0.023	0.173	0.169	0.112
Boron (B)-Total	mg/kg	-	-	2.2	1.6	1.1	1.5	2.0	2.6	1.9	1.8	1.3
Cadmium (Cd)-Total	mg/kg	22	-	0.0468	0.0411	0.0397	0.0445	0.0293	0.0302	0.144	0.144	0.0991
Calcium (Ca)-Total	mg/kg	-	-	35400	41200	26100	27400	26300	25700	22600	23200	19400
Cesium (Cs)-Total	mg/kg	-	-	0.202	0.159	0.103	0.128	0.140	0.147	0.384	0.311	0.241
Chromium (Cr)-Total	mg/kg	87	-	2.01	1.37	0.797	1.13	1.29	1.51	5.02	4.12	3.26
Cobalt (Co)-Total	mg/kg	300	-	0.480	0.336	0.208	0.277	0.295	0.382	1.17	0.957	0.670
Copper (Cu)-Total	mg/kg	91	-	1.31	1.09	1.01	1.20	1.04	1.26	4.00	3.55	2.26
Iron (Fe)-Total	mg/kg	-	-	2410	2340	1850	3030	2500	3050	4410	3910	2590
Lead (Pb)-Total	mg/kg	260	-	2.10	1.69	1.18	1.45	1.38	1.41	7.89	7.73	4.55
Lithium (Li)-Total	mg/kg	-	-	2.04	1.35	0.65	0.97	1.25	1.71	3.00	2.50	1.45
Magnesium (Mg)-Total	mg/kg	-	-	1260	1660	1070	1160	1570	1810	2440	2310	1900
Manganese (Mn)-Total	mg/kg	-	-	34.7	28.7	19.5	24.3	25.4	27.5	86.8	83.0	58.8
Mercury (Hg)-Total	mg/kg	24	-	0.0396	0.0386	0.0448	0.0456	0.0508	0.0464	0.0392	0.0310	0.0340
Molybdenum (Mo)-Total	mg/kg	40	-	0.143	0.130	0.187	0.193	0.178	0.197	0.758	0.754	0.541
Nickel (Ni)-Total	mg/kg	89	-	1.34	0.94	0.63	0.88	0.88	1.09	3.62	3.10	2.38
Phosphorus (P)-Total	mg/kg	-	-	241	257	343	355	356	341	653	697	711
Potassium (K)-Total	mg/kg	-	-	952	1070	1230	1350	1280	1250	2740	2720	2330
Rubidium (Rb)-Total	mg/kg	-	-	4.53	4.53	2.79	3.68	2.93	3.32	13.7	13.0	9.95
Selenium (Se)-Total	mg/kg	2.9	-	0.076	0.078	0.074	0.072	0.077	0.071	0.088	0.070	0.066
Silver (Ag)-Total	mg/kg	40	-	0.0158	0.0173	0.0123	0.0151	0.0156	0.0166	0.0698	0.0710	0.0475
Sodium (Na)-Total	mg/kg	-	-	177	202	395	378	352	325	345	297	397
Strontium (Sr)-Total	mg/kg	-	-	21.2	25.2	30.7	27.5	42.0	38.7	23.4	27.2	26.5
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0167	0.0107	0.0058	0.0080	0.0088	0.0109	0.0618	0.0505	0.0333

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

		Guide Limits										
			Lab ID	L2478696-177	L2478696-179	L2478696-180	L2478696-182	L2478696-183	L2478696-185	L2478696-186	L2478696-188	L2478696-189
			Sample Date	17-JUL-20	17-JUL-20	17-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
			Sample ID	TR-L-78-2020 WASHED	TR-L-123-2020 UNWASHED	TR-L-123-2020 WASHED	TR-L-79-2020 UNWASHED	TR-L-79-2020 WASHED	TR-L-124-2020 UNWASHED	TR-L-124-2020 WASHED	TR-L-124-2020-R UNWASHED	TR-L-124-2020-R WASHED
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	1410	1020	1210	1500	1390	1910	1280	1840	1350
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	0.011	<0.010	0.011	0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.148	0.113	0.124	0.149	0.134	0.146	0.117	0.145	0.122
Barium (Ba)-Total	mg/kg	2000	-	20.9	14.2	17.6	24.9	22.6	21.4	18.6	22.7	20.8
Beryllium (Be)-Total	mg/kg	8	-	0.075	0.053	0.063	0.082	0.078	0.097	0.076	0.094	0.083
Bismuth (Bi)-Total	mg/kg	-	-	0.128	0.107	0.088	0.163	0.170	0.144	0.147	0.126	0.131
Boron (B)-Total	mg/kg	-	-	1.8	1.2	1.1	1.8	1.8	2.0	1.7	2.1	1.7
Cadmium (Cd)-Total	mg/kg	22	-	0.115	0.0946	0.0808	0.184	0.194	0.113	0.128	0.115	0.113
Calcium (Ca)-Total	mg/kg	-	-	21000	14600	14800	24200	25100	20800	23700	22100	23600
Cesium (Cs)-Total	mg/kg	-	-	0.278	0.256	0.246	0.298	0.282	0.387	0.311	0.377	0.326
Chromium (Cr)-Total	mg/kg	87	-	4.32	2.20	2.52	3.99	3.66	3.31	2.50	3.29	2.55
Cobalt (Co)-Total	mg/kg	300	-	0.898	0.559	0.672	0.854	0.813	0.942	0.678	0.890	0.690
Copper (Cu)-Total	mg/kg	91	-	3.01	2.05	2.24	3.28	3.14	3.25	2.55	2.94	2.65
Iron (Fe)-Total	mg/kg	-	-	3780	2240	2560	3290	3160	3850	2780	3700	2920
Lead (Pb)-Total	mg/kg	260	-	4.97	5.15	4.51	6.35	6.71	8.04	8.63	7.95	8.97
Lithium (Li)-Total	mg/kg	-	-	2.13	1.51	1.87	2.19	2.03	3.11	1.98	2.78	2.20
Magnesium (Mg)-Total	mg/kg	-	-	2290	1460	2080	2200	2030	2050	1550	2040	1670
Manganese (Mn)-Total	mg/kg	-	-	70.3	56.6	67.0	90.5	89.5	86.7	80.5	87.8	77.9
Mercury (Hg)-Total	mg/kg	24	-	0.0387	0.0395	0.0272	0.0434	0.0435	0.0438	0.0429	0.0474	0.0458
Molybdenum (Mo)-Total	mg/kg	40	-	0.678	0.438	0.461	0.674	0.651	0.645	0.525	0.624	0.519
Nickel (Ni)-Total	mg/kg	89	-	3.18	1.75	1.99	2.88	2.77	2.59	2.11	2.50	2.13
Phosphorus (P)-Total	mg/kg	-	-	788	456	545	611	605	597	657	626	700
Potassium (K)-Total	mg/kg	-	-	2590	2040	2180	2200	2300	2480	2510	2330	2480
Rubidium (Rb)-Total	mg/kg	-	-	11.8	11.3	10.9	10.8	11.1	12.6	12.1	12.6	11.6
Selenium (Se)-Total	mg/kg	2.9	-	0.077	0.059	0.058	0.085	0.080	0.062	0.058	0.065	0.063
Silver (Ag)-Total	mg/kg	40	-	0.0581	0.0497	0.0481	0.0749	0.0695	0.0738	0.0727	0.0750	0.0769
Sodium (Na)-Total	mg/kg	-	-	400	267	257	263	264	299	357	310	316
Strontium (Sr)-Total	mg/kg	-	-	28.4	13.5	14.7	27.5	28.0	23.0	25.6	24.3	28.1
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0399	0.0315	0.0325	0.0437	0.0418	0.0524	0.0431	0.0519	0.0451

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-191	L2478696-192	L2478696-194	L2478696-195	L2478696-197	L2478696-198	L2478696-200	L2478696-201	L2478696-203
			Sample Date	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
			Sample ID	TR-L-125-2020 UNWASHED	TR-L-125-2020 WASHED	TR-L-151-2020 UNWASHED	TR-L-151-2020 WASHED	TR-L-116-2020 UNWASHED	TR-L-116-2020 WASHED	TR-L-116-2020-R UNWASHED	TR-L-116-2020-R WASHED	TR-L-149-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Aluminum (Al)-Total	mg/kg	-	-	1460	1350	1570	1360	757	521	896	866	1180
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010
Arsenic (As)-Total	mg/kg	12	-	0.125	0.117	0.171	0.162	0.086	0.060	0.098	0.085	0.154
Barium (Ba)-Total	mg/kg	2000	-	20.1	19.1	23.8	27.1	21.9	18.6	21.8	20.7	29.5
Beryllium (Be)-Total	mg/kg	8	-	0.080	0.079	0.085	0.085	0.041	0.030	0.046	0.043	0.066
Bismuth (Bi)-Total	mg/kg	-	-	0.127	0.135	0.120	0.132	0.081	0.046	0.096	0.093	0.207
Boron (B)-Total	mg/kg	-	-	1.7	1.7	1.8	1.7	1.0	<1.0	1.1	1.3	1.6
Cadmium (Cd)-Total	mg/kg	22	-	0.137	0.154	0.0819	0.0949	0.0807	0.0557	0.0708	0.0712	0.155
Calcium (Ca)-Total	mg/kg	-	-	23900	23700	16500	18400	12300	10500	14700	13300	27700
Cesium (Cs)-Total	mg/kg	-	-	0.330	0.319	0.312	0.284	0.215	0.168	0.223	0.226	0.279
Chromium (Cr)-Total	mg/kg	87	-	2.49	2.39	3.51	3.02	1.57	1.07	1.90	1.77	2.40
Cobalt (Co)-Total	mg/kg	300	-	0.717	0.716	0.855	0.762	0.459	0.316	0.546	0.502	0.642
Copper (Cu)-Total	mg/kg	91	-	2.66	2.75	2.83	2.85	1.78	1.29	2.13	2.14	2.19
Iron (Fe)-Total	mg/kg	-	-	2970	2780	3320	2980	1500	850	1740	1730	2600
Lead (Pb)-Total	mg/kg	260	-	8.72	9.33	5.93	6.66	2.89	2.30	3.34	3.19	6.85
Lithium (Li)-Total	mg/kg	-	-	2.26	2.17	2.29	2.02	1.11	0.79	1.37	1.29	1.81
Magnesium (Mg)-Total	mg/kg	-	-	1620	1600	1840	1900	1930	1410	2050	1750	2100
Manganese (Mn)-Total	mg/kg	-	-	74.6	75.3	55.7	55.6	59.1	42.6	57.1	49.9	66.8
Mercury (Hg)-Total	mg/kg	24	-	0.0437	0.0476	0.0363	0.0426	0.0387	0.0104	0.0378	0.0429	0.0411
Molybdenum (Mo)-Total	mg/kg	40	-	0.544	0.495	0.575	0.559	0.357	0.232	0.340	0.340	0.589
Nickel (Ni)-Total	mg/kg	89	-	2.16	2.19	2.43	2.20	1.01	0.73	1.21	1.22	2.11
Phosphorus (P)-Total	mg/kg	-	-	656	708	678	899	486	394	429	436	647
Potassium (K)-Total	mg/kg	-	-	2480	2520	1990	2310	1740	1650	1700	1800	1990
Rubidium (Rb)-Total	mg/kg	-	-	11.6	12.4	9.81	10.0	8.49	7.61	8.86	8.99	8.68
Selenium (Se)-Total	mg/kg	2.9	-	0.067	0.073	0.071	0.080	0.072	0.069	0.073	0.076	0.089
Silver (Ag)-Total	mg/kg	40	-	0.0724	0.0658	0.0736	0.0711	0.0332	0.0317	0.0362	0.0360	0.0759
Sodium (Na)-Total	mg/kg	-	-	252	297	269	315	204	212	194	210	198
Strontium (Sr)-Total	mg/kg	-	-	27.8	27.4	26.6	31.4	10.3	9.01	10.5	9.84	38.2
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0429	0.0422	0.0431	0.0401	0.0280	0.0156	0.0295	0.0307	0.0364

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-204	L2478696-206	L2478696-207	L2478696-209	L2478696-210	L2478696-212	L2478696-213
			Sample Date	18-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20
			Sample ID	TR-L-149-2020 WASHED	TR-L-172-2020 UNWASHED	TR-L-172-2020 WASHED	TR-L-207-2020 UNWASHED	TR-L-207-2020 WASHED	TR-L-208-2020 UNWASHED	TR-L-208-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**#2**							
Aluminum (Al)-Total	mg/kg	-	-	981	1340	994	1210	801	857	725
Antimony (Sb)-Total	mg/kg	40	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic (As)-Total	mg/kg	12	-	0.140	0.231	0.198	0.236	0.187	0.169	0.155
Barium (Ba)-Total	mg/kg	2000	-	27.9	23.1	20.8	19.6	16.5	18.1	17.0
Beryllium (Be)-Total	mg/kg	8	-	0.053	0.079	0.062	0.071	0.057	0.058	0.048
Bismuth (Bi)-Total	mg/kg	-	-	0.163	0.115	0.088	0.067	0.052	0.090	0.071
Boron (B)-Total	mg/kg	-	-	1.4	2.9	2.3	3.1	2.6	2.4	2.2
Cadmium (Cd)-Total	mg/kg	22	-	0.151	0.0586	0.0515	0.0358	0.0322	0.0404	0.0438
Calcium (Ca)-Total	mg/kg	-	-	28200	72800	67000	39200	38500	41600	39600
Cesium (Cs)-Total	mg/kg	-	-	0.237	0.379	0.302	0.361	0.277	0.299	0.280
Chromium (Cr)-Total	mg/kg	87	-	2.18	3.07	2.36	2.65	1.85	1.99	1.78
Cobalt (Co)-Total	mg/kg	300	-	0.538	0.655	0.514	0.642	0.412	0.467	0.387
Copper (Cu)-Total	mg/kg	91	-	1.96	2.51	2.13	2.32	1.73	2.08	1.85
Iron (Fe)-Total	mg/kg	-	-	1990	2830	2080	2440	1610	1770	1510
Lead (Pb)-Total	mg/kg	260	-	6.84	4.85	4.53	3.21	2.77	3.17	3.12
Lithium (Li)-Total	mg/kg	-	-	1.47	4.08	2.95	3.32	2.34	2.28	1.94
Magnesium (Mg)-Total	mg/kg	-	-	1770	3200	2740	3230	2700	2460	2090
Manganese (Mn)-Total	mg/kg	-	-	58.0	71.4	59.2	59.1	45.5	47.9	42.2
Mercury (Hg)-Total	mg/kg	24	-	0.0393	0.0283	0.0256	0.0407	0.0422	0.0406	0.0445
Molybdenum (Mo)-Total	mg/kg	40	-	0.530	0.546	0.508	0.472	0.354	0.410	0.352
Nickel (Ni)-Total	mg/kg	89	-	1.75	1.90	1.60	1.71	1.16	1.34	1.12
Phosphorus (P)-Total	mg/kg	-	-	691	476	570	512	544	491	589
Potassium (K)-Total	mg/kg	-	-	2110	1910	2060	2010	2070	2010	2020
Rubidium (Rb)-Total	mg/kg	-	-	8.76	9.46	8.73	10.0	9.15	8.64	8.71
Selenium (Se)-Total	mg/kg	2.9	-	0.077	0.066	0.066	0.061	0.059	0.066	0.079
Silver (Ag)-Total	mg/kg	40	-	0.0717	0.0880	0.0757	0.0429	0.0446	0.0523	0.0548
Sodium (Na)-Total	mg/kg	-	-	232	168	198	175	186	180	206
Strontium (Sr)-Total	mg/kg	-	-	37.5	84.4	84.7	38.2	38.2	43.9	43.5
Tellurium (Te)-Total	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	mg/kg	1	-	0.0304	0.0373	0.0282	0.0339	0.0218	0.0255	0.0217

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-1	L2478696-2	L2478696-4	L2478696-5	L2478696-7	L2478696-8	L2478696-10	L2478696-11	L2478696-13
			Sample Date	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	08-JUL-20	09-JUL-20
			Sample ID	MS-L-134-2020 UNWASHED	MS-L-134-2020 WASHED	MS-L-128-2020 UNWASHED	MS-L-128-2020 WASHED	MS-L-023-2020 UNWASHED	MS-L-023-2020 WASHED	MS-L-175-2020 UNWASHED	MS-L-175-2020 WASHED	MS-L-165-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	0.12	0.16	0.14	<0.10	0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	66.6	65.8	68.5	93.5	120	106	59.6	83.6	7.98
Uranium (U)-Total	mg/kg	33	-	0.474	0.526	0.635	0.870	0.703	0.839	0.501	0.676	0.0344
Vanadium (V)-Total	mg/kg	130	-	2.03	2.14	2.19	2.91	3.79	3.43	1.93	2.75	0.19
Zinc (Zn)-Total	mg/kg	410	-	11.3	14.9	12.5	17.5	16.2	19.8	18.3	18.7	24.1
Zirconium (Zr)-Total	mg/kg	-	-	1.84	2.14	2.34	3.24	3.10	3.07	1.85	2.00	0.20

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-14	L2478696-16	L2478696-17	L2478696-19	L2478696-20	L2478696-22	L2478696-23	L2478696-25	L2478696-26
			Sample Date	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20
			Sample ID	MS-L-165-2020 WASHED	MS-L-138-2020 UNWASHED	MS-L-138-2020 WASHED	MS-L-138-2020-R UNWASHED	MS-L-138-2020-R WASHED	MS-L-166-2020 UNWASHED	MS-L-166-2020 WASHED	MS-L-170-2020 UNWASHED	MS-L-170-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	8.52	27.5	23.4	36.4	29.7	19.4	17.1	54.3	55.9
Uranium (U)-Total	mg/kg	33	-	0.0387	0.0512	0.0539	0.0774	0.0808	0.0409	0.0459	0.146	0.151
Vanadium (V)-Total	mg/kg	130	-	0.20	0.80	0.70	1.07	0.90	0.41	0.31	1.82	1.86
Zinc (Zn)-Total	mg/kg	410	-	24.1	36.2	38.9	32.5	49.6	31.1	30.1	14.4	14.2
Zirconium (Zr)-Total	mg/kg	-	-	<0.20	0.80	0.61	0.99	0.78	0.29	0.23	1.33	1.31

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

Lab ID				L2478696-28	L2478696-29	L2478696-31	L2478696-32	L2478696-34	L2478696-35	L2478696-38	L2478696-39	L2478696-41
Sample Date				09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	09-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
Sample ID				TR-L-169-2020 UNWASHED	TR-L-169-2020 WASHED	TR-L-169-2020-R UNWASHED	TR-L-169-2020-R WASHED	TR-L-168-2020 UNWASHED	TR-L-168-2020 WASHED	TR-L-162-2020 UNWASHED	TR-L-162-2020 WASHED	TR-L-162-2020-R UNWASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	7.20	8.40	9.61	10.9	12.4	11.9	25.2	20.3	26.4
Uranium (U)-Total	mg/kg	33	-	0.0211	0.0271	0.0275	0.0324	0.0548	0.0562	0.107	0.0880	0.103
Vanadium (V)-Total	mg/kg	130	-	0.21	0.24	0.29	0.34	0.30	0.29	0.75	0.49	0.74
Zinc (Zn)-Total	mg/kg	410	-	20.6	22.0	24.2	26.4	25.1	25.2	10.3	11.3	9.79
Zirconium (Zr)-Total	mg/kg	-	-	<0.20	<0.20	0.31	0.26	0.28	0.26	0.56	0.48	0.61

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-42	L2478696-44	L2478696-45	L2478696-47	L2478696-48	L2478696-50	L2478696-51	L2478696-53	L2478696-54
			Sample Date	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20
			Sample ID	TR-L-162-2020-R WASHED	TR-L-161-2020 UNWASHED	TR-L-161-2020 WASHED	TR-L-167-2020 UNWASHED	TR-L-167-2020 WASHED	MP-L-135-2020 UNWASHED	MP-L-135-2020 WASHED	MP-L-141-2020 UNWASHED	MP-L-141-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	21.5	49.3	42.7	13.8	12.6	8.33	14.3	4.44	3.86
Uranium (U)-Total	mg/kg	33	-	0.0936	0.287	0.261	0.0462	0.0457	0.0717	0.125	0.0541	0.0412
Vanadium (V)-Total	mg/kg	130	-	0.55	1.23	1.05	0.53	0.47	0.41	0.65	0.20	0.20
Zinc (Zn)-Total	mg/kg	410	-	11.1	23.4	22.7	9.94	10.1	9.41	9.53	7.67	5.36
Zirconium (Zr)-Total	mg/kg	-	-	0.60	1.53	1.30	0.42	0.63	0.24	0.37	0.23	<0.20

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-56	L2478696-57	L2478696-59	L2478696-60	L2478696-62	L2478696-63	L2478696-65	L2478696-66	L2478696-68
			Sample Date	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	10-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
			Sample ID	MP-L-105-2020 UNWASHED	MP-L-105-2020 WASHED	MP-L-137-2020 UNWASHED	MP-L-137-2020 WASHED	MP-L-136-2020 UNWASHED	MP-L-136-2020 WASHED	MS-L-159-2020 UNWASHED	MS-L-159-2020 WASHED	MS-L-159-2020-R UNWASHED
		Guide Limits										
Analyte	Unit	#1	#2									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	6.37	9.19	8.11	9.49	13.1	19.9	46.4	42.8	42.6
Uranium (U)-Total	mg/kg	33	-	0.0568	0.0835	0.208	0.227	0.206	0.240	0.139	0.130	0.141
Vanadium (V)-Total	mg/kg	130	-	0.28	0.38	0.33	0.38	0.55	0.81	1.24	1.14	1.09
Zinc (Zn)-Total	mg/kg	410	-	10.7	12.2	8.99	9.68	9.61	9.89	15.6	19.6	15.3
Zirconium (Zr)-Total	mg/kg	-	-	0.24	0.32	0.34	0.36	0.64	0.77	0.94	0.83	0.83

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-69	L2478696-71	L2478696-72	L2478696-74	L2478696-75	L2478696-77	L2478696-78	L2478696-80	L2478696-81
			Sample Date	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20
			Sample ID	MS-L-159-2020-R WASHED	MS-L-115-2020 UNWASHED	MS-L-115-2020 WASHED	MS-L-154-2020 UNWASHED	MS-L-154-2020 WASHED	MS-L-155-2020 UNWASHED	MS-L-155-2020 WASHED	MS-L-156-2020 UNWASHED	MS-L-156-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	34.5	43.7	34.1	69.7	52.6	75.1	63.3	98.3	73.4
Uranium (U)-Total	mg/kg	33	-	0.107	0.146	0.104	0.255	0.182	0.287	0.246	0.379	0.286
Vanadium (V)-Total	mg/kg	130	-	0.85	1.17	0.82	1.85	1.39	2.15	1.71	2.64	1.91
Zinc (Zn)-Total	mg/kg	410	-	14.8	12.6	12.7	16.6	17.0	16.4	15.7	15.8	15.2
Zirconium (Zr)-Total	mg/kg	-	-	0.64	0.77	0.55	1.55	0.98	1.66	1.31	2.25	1.57

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-83	L2478696-84	L2478696-86	L2478696-87	L2478696-89	L2478696-90	L2478696-92	L2478696-93	L2478696-95
			Sample Date	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	11-JUL-20	12-JUL-20
			Sample ID	MS-L-157-2020 UNWASHED	MS-L-157-2020 WASHED	MS-L-200-2020 UNWASHED	MS-L-200-2020 WASHED	MS-L-204-2020 UNWASHED	MS-L-204-2020 WASHED	MS-L-204-2020-R UNWASHED	MS-L-204-2020-R WASHED	MP-L-56-2020 UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	126	88.2	71.5	47.2	48.0	37.2	51.5	34.4	23.2
Uranium (U)-Total	mg/kg	33	-	0.487	0.391	0.276	0.206	0.162	0.113	0.184	0.115	0.303
Vanadium (V)-Total	mg/kg	130	-	3.48	2.48	1.96	1.28	1.34	0.92	1.42	0.81	0.63
Zinc (Zn)-Total	mg/kg	410	-	29.4	25.8	16.0	15.7	21.0	22.0	20.4	15.6	13.5
Zirconium (Zr)-Total	mg/kg	-	-	2.48	1.84	1.38	1.07	0.97	0.70	1.10	0.56	1.08

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-96	L2478696-98	L2478696-99	L2478696-101	L2478696-102	L2478696-104	L2478696-105	L2478696-107	L2478696-108
			Sample Date	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
			Sample ID	MP-L-56-2020 WASHED	MP-L-118-2020 UNWASHED	MP-L-118-2020 WASHED	MP-L-119-2020 UNWASHED	MP-L-119-2020 WASHED	MP-L-121-2020 UNWASHED	MP-L-121-2020 WASHED	MP-L-122-2020 UNWASHED	MP-L-122-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	22.0	15.2	14.5	18.6	15.7	11.4	11.2	16.0	15.7
Uranium (U)-Total	mg/kg	33	-	0.293	0.362	0.385	0.515	0.442	0.430	0.425	0.711	0.711
Vanadium (V)-Total	mg/kg	130	-	0.65	0.50	0.51	0.64	0.58	0.43	0.41	0.67	0.62
Zinc (Zn)-Total	mg/kg	410	-	11.9	7.92	8.46	9.58	8.44	8.71	8.46	10.4	10.1
Zirconium (Zr)-Total	mg/kg	-	-	0.80	0.83	0.79	1.41	1.05	0.84	0.78	1.25	1.18

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-110	L2478696-111	L2478696-113	L2478696-114	L2478696-116	L2478696-117	L2478696-119	L2478696-120	L2478696-122
			Sample Date	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20	12-JUL-20
			Sample ID	MP-L-144-2020 UNWASHED	MP-L-144-2020 WASHED	MP-L-93-2020 UNWASHED	MP-L-93-2020 WASHED	MP-L-145-2020 UNWASHED	MP-L-145-2020 WASHED	MP-L-145-2020-R UNWASHED	MP-L-145-2020-R WASHED	MP-L-57-2020 UNWASHED
Analyte	**Unit**	**Guide Limits #1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	16.1	15.2	15.8	14.4	22.5	15.3	17.6	21.9	14.4
Uranium (U)-Total	mg/kg	33	-	0.451	0.430	0.313	0.279	0.538	0.450	0.442	0.562	0.170
Vanadium (V)-Total	mg/kg	130	-	0.62	0.59	0.67	0.62	1.18	0.84	0.95	1.32	0.65
Zinc (Zn)-Total	mg/kg	410	-	10.2	10.7	9.94	10.2	11.4	9.61	9.82	11.2	11.2
Zirconium (Zr)-Total	mg/kg	-	-	1.07	1.08	1.03	0.86	1.74	1.13	1.31	1.63	0.83

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-123	L2478696-125	L2478696-126	L2478696-128	L2478696-129	L2478696-131	L2478696-132	L2478696-134	L2478696-135
			Sample Date	12-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20
			Sample ID	MP-L-57-2020 WASHED	MS-L-205-2020 UNWASHED	MS-L-205-2020 WASHED	MS-L-203-2020 UNWASHED	MS-L-203-2020 WASHED	MS-L-202-2020 UNWASHED	MS-L-202-2020 WASHED	MS-L-153-2020 UNWASHED	MS-L-153-2020 WASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	21.8	26.9	26.8	27.3	28.4	38.4	42.7	28.6	22.0
Uranium (U)-Total	mg/kg	33	-	0.248	0.167	0.172	0.130	0.161	0.277	0.299	0.174	0.136
Vanadium (V)-Total	mg/kg	130	-	1.28	0.74	0.78	0.71	0.78	1.12	1.25	0.81	0.62
Zinc (Zn)-Total	mg/kg	410	-	13.4	19.0	19.0	16.1	17.8	15.5	18.1	19.8	19.1
Zirconium (Zr)-Total	mg/kg	-	-	1.12	0.81	0.82	0.63	0.81	1.05	1.18	0.83	0.59

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-137	L2478696-138	L2478696-140	L2478696-141	L2478696-143	L2478696-144	L2478696-146	L2478696-147	L2478696-149
			Sample Date	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	13-JUL-20	14-JUL-20	14-JUL-20	14-JUL-20
			Sample ID	MS-L-153-2020-R UNWASHED	MS-L-153-2020-R WASHED	MS-L-131-2020 UNWASHED	MS-L-131-2020 WASHED	MS-L-130-2020 UNWASHED	MS-L-130-2020 WASHED	MS-L-132-2020 UNWASHED	MS-L-132-2020 WASHED	MS-L-132-2020-R UNWASHED
		Guide Limits										
Analyte	**Unit**	**#1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	37.3	37.2	49.2	47.7	54.6	50.5	47.8	40.8	49.8
Uranium (U)-Total	mg/kg	33	-	0.221	0.238	0.222	0.224	0.293	0.439	0.267	0.234	0.279
Vanadium (V)-Total	mg/kg	130	-	1.04	1.11	1.31	1.38	1.59	1.51	1.34	1.21	1.42
Zinc (Zn)-Total	mg/kg	410	-	20.0	20.7	14.1	14.2	15.2	14.9	15.3	13.4	14.4
Zirconium (Zr)-Total	mg/kg	-	-	0.98	1.02	0.97	1.14	1.22	1.20	1.17	1.17	1.07

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

Lab ID				L2478696-150	L2478696-152	L2478696-153	L2478696-155	L2478696-156	L2478696-158	L2478696-159	L2478696-161	L2478696-162
Sample Date				14-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	16-JUL-20	16-JUL-20
Sample ID				MS-L-132-2020-R WASHED	MS-L-129-2020 UNWASHED	MS-L-129-2020 WASHED	MS-L-206-2020 UNWASHED	MS-L-206-2020 WASHED	MS-L-206-2020-R UNWASHED	MS-L-206-2020-R WASHED	MP-L-103-2020 UNWASHED	MP-L-103-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	32.1	48.5	47.8	34.1	36.8	60.8	47.4	7.86	18.3
Uranium (U)-Total	mg/kg	33	-	0.176	0.304	0.287	0.222	0.283	0.284	0.240	0.119	0.187
Vanadium (V)-Total	mg/kg	130	-	0.98	1.49	1.39	0.97	1.08	1.72	1.36	0.39	0.67
Zinc (Zn)-Total	mg/kg	410	-	10.7	22.1	21.5	10.1	13.6	11.3	12.7	6.41	8.12
Zirconium (Zr)-Total	mg/kg	-	-	0.81	1.42	1.23	0.91	1.01	1.36	1.21	<0.20	0.68

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Metals - TISSUE

			Lab ID	L2478696-164	L2478696-165	L2478696-167	L2478696-168	L2478696-170	L2478696-171	L2478696-173	L2478696-174	L2478696-176
			Sample Date	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	16-JUL-20	17-JUL-20	17-JUL-20	17-JUL-20
			Sample ID	MP-L-102-2020 UNWASHED	MP-L-102-2020 WASHED	MP-L-147-2020 UNWASHED	MP-L-147-2020 WASHED	MP-L-146-2020 UNWASHED	MP-L-146-2020 WASHED	TR-L-152-2020 UNWASHED	TR-L-152-2020 WASHED	TR-L-78-2020 UNWASHED
Analyte	**Unit**	**Guide Limits #1**	**#2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.15	0.11	<0.10
Titanium (Ti)-Total	mg/kg	-	-	48.1	32.0	11.5	17.1	20.5	26.9	122	103	58.4
Uranium (U)-Total	mg/kg	33	-	1.14	0.691	0.523	0.550	0.234	0.292	0.912	0.804	0.492
Vanadium (V)-Total	mg/kg	130	-	2.09	1.29	0.53	0.84	0.96	1.31	3.91	3.18	1.80
Zinc (Zn)-Total	mg/kg	410	-	8.02	7.92	9.30	9.83	9.17	10.1	21.4	21.2	20.9
Zirconium (Zr)-Total	mg/kg	-	-	1.75	1.35	0.68	1.05	1.09	1.44	3.98	3.98	2.14

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-177	L2478696-179	L2478696-180	L2478696-182	L2478696-183	L2478696-185	L2478696-186	L2478696-188	L2478696-189
			Sample Date	17-JUL-20	17-JUL-20	17-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
			Sample ID	TR-L-78-2020 WASHED	TR-L-123-2020 UNWASHED	TR-L-123-2020 WASHED	TR-L-79-2020 UNWASHED	TR-L-79-2020 WASHED	TR-L-124-2020 UNWASHED	TR-L-124-2020 WASHED	TR-L-124-2020-R UNWASHED	TR-L-124-2020-R WASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Tin (Sn)-Total	mg/kg	300	-	<0.10	<0.10	<0.10	0.11	0.11	0.14	0.11	0.13	0.11
Titanium (Ti)-Total	mg/kg	-	-	84.6	64.0	69.9	91.0	83.5	122	81.7	117	87.2
Uranium (U)-Total	mg/kg	33	-	0.658	0.476	0.477	0.701	0.672	0.858	0.727	0.822	0.796
Vanadium (V)-Total	mg/kg	130	-	2.59	1.67	1.90	2.61	2.48	3.07	2.06	2.89	2.21
Zinc (Zn)-Total	mg/kg	410	-	21.2	16.6	18.0	20.9	21.8	19.0	18.3	18.8	17.7
Zirconium (Zr)-Total	mg/kg	-	-	3.22	2.26	2.20	3.11	3.62	3.94	3.50	3.82	3.81

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Metals - TISSUE

			Lab ID	L2478696-191	L2478696-192	L2478696-194	L2478696-195	L2478696-197	L2478696-198	L2478696-200	L2478696-201	L2478696-203
			Sample Date	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20	18-JUL-20
			Sample ID	TR-L-125-2020 UNWASHED	TR-L-125-2020 WASHED	TR-L-151-2020 UNWASHED	TR-L-151-2020 WASHED	TR-L-116-2020 UNWASHED	TR-L-116-2020 WASHED	TR-L-116-2020-R UNWASHED	TR-L-116-2020-R WASHED	TR-L-149-2020 UNWASHED
Analyte	**Unit**	**Guide Limits #1**	**Guide Limits #2**									
Tin (Sn)-Total	mg/kg	300	-	0.10	0.10	0.11	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	91.1	87.1	99.8	81.0	53.2	31.6	63.2	59.1	75.2
Uranium (U)-Total	mg/kg	33	-	0.788	0.804	0.724	0.770	0.299	0.185	0.342	0.326	0.591
Vanadium (V)-Total	mg/kg	130	-	2.29	2.16	2.66	2.24	1.23	0.76	1.47	1.44	1.86
Zinc (Zn)-Total	mg/kg	410	-	17.6	19.3	15.6	20.0	17.5	13.7	16.3	16.2	17.4
Zirconium (Zr)-Total	mg/kg	-	-	3.60	3.46	3.23	3.18	1.31	0.91	1.48	1.72	2.93

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - TISSUE

			Lab ID	L2478696-204	L2478696-206	L2478696-207	L2478696-209	L2478696-210	L2478696-212	L2478696-213
			Sample Date	18-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20	19-JUL-20
			Sample ID	TR-L-149-2020 WASHED	TR-L-172-2020 UNWASHED	TR-L-172-2020 WASHED	TR-L-207-2020 UNWASHED	TR-L-207-2020 WASHED	TR-L-208-2020 UNWASHED	TR-L-208-2020 WASHED
Analyte	**Unit**	**Guide Limits #1**	**#2**							
Tin (Sn)-Total	mg/kg	300	-	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)-Total	mg/kg	-	-	60.6	79.2	54.3	67.0	41.0	48.5	38.3
Uranium (U)-Total	mg/kg	33	-	0.535	1.27	1.12	0.635	0.513	0.614	0.548
Vanadium (V)-Total	mg/kg	130	-	1.57	2.17	1.56	2.05	1.36	1.39	1.16
Zinc (Zn)-Total	mg/kg	410	-	16.8	13.6	13.3	13.1	12.6	12.6	13.1
Zirconium (Zr)-Total	mg/kg	-	-	2.83	3.73	3.09	2.58	2.17	2.14	2.18

Guide Limit #1: CCME - Soil(coarse)-IACR 1 in 100000-CL-Groundwater Unprotected

🟨 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
🟥 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
AG-DRY-CCMS-N-VA	Tissue	Silver in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAAS (DRY)	EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020B (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	Puget Sound WQ Authority, Apr 1997

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

ALS Test Code	Matrix	Test Description	Method Reference**
TI-DRY-CCMS-N-VA	Tissue	Ti in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2478696 Report Date: 05-SEP-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-WT	**Soil**							
Batch R5167647								
WG3370751-2 CRM		**WT-SS-1**						
Mercury (Hg)			108.6		%		70-130	27-JUL-20
WG3370751-6 DUP		**WG3370751-5**						
Mercury (Hg)		0.0070	0.0092		ug/g	27	40	27-JUL-20
WG3370751-3 LCS								
Mercury (Hg)			111.0		%		80-120	27-JUL-20
WG3370751-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	27-JUL-20
Batch R5168293								
WG3371436-2 CRM		**WT-SS-1**						
Mercury (Hg)			114.3		%		70-130	28-JUL-20
WG3371436-6 DUP		**WG3371436-5**						
Mercury (Hg)		0.0224	0.0222		ug/g	0.8	40	28-JUL-20
WG3371436-3 LCS								
Mercury (Hg)			118.0		%		80-120	28-JUL-20
WG3371436-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	28-JUL-20
Batch R5168294								
WG3371474-2 CRM		**WT-SS-1**						
Mercury (Hg)			110.3		%		70-130	28-JUL-20
WG3371474-6 DUP		**WG3371474-5**						
Mercury (Hg)		0.0088	0.0110		ug/g	22	40	28-JUL-20
WG3371474-3 LCS								
Mercury (Hg)			118.5		%		80-120	28-JUL-20
WG3371474-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	28-JUL-20
Batch R5171296								
WG3372020-2 CRM		**WT-SS-1**						
Mercury (Hg)			108.0		%		70-130	29-JUL-20
WG3372020-6 DUP		**WG3372020-5**						
Mercury (Hg)		0.0214	0.0231		ug/g	8.0	40	29-JUL-20
WG3372020-3 LCS								
Mercury (Hg)			108.5		%		80-120	29-JUL-20
WG3372020-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	29-JUL-20
MET-200.2-CCMS-WT	**Soil**							

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5167798								
WG3370751-2 CRM		**WT-SS-1**						
Aluminum (Al)			108.6		%		70-130	27-JUL-20
Antimony (Sb)			117.2		%		70-130	27-JUL-20
Arsenic (As)			105.1		%		70-130	27-JUL-20
Beryllium (Be)			104.3		%		70-130	27-JUL-20
Boron (B)			98.3		%		70-130	27-JUL-20
Cadmium (Cd)			99.2		%		70-130	27-JUL-20
Calcium (Ca)			97.5		%		70-130	27-JUL-20
Chromium (Cr)			94.7		%		70-130	27-JUL-20
Cobalt (Co)			95.0		%		70-130	27-JUL-20
Copper (Cu)			96.0		%		70-130	27-JUL-20
Iron (Fe)			96.5		%		70-130	27-JUL-20
Lead (Pb)			98.0		%		70-130	27-JUL-20
Lithium (Li)			101.7		%		70-130	27-JUL-20
Magnesium (Mg)			97.2		%		70-130	27-JUL-20
Manganese (Mn)			103.5		%		70-130	27-JUL-20
Molybdenum (Mo)			99.9		%		70-130	27-JUL-20
Nickel (Ni)			98.6		%		70-130	27-JUL-20
Phosphorus (P)			97.4		%		70-130	27-JUL-20
Potassium (K)			112.0		%		70-130	27-JUL-20
Selenium (Se)			96.1		%		70-130	27-JUL-20
Silver (Ag)			94.1		%		70-130	27-JUL-20
Sodium (Na)			97.0		%		70-130	27-JUL-20
Strontium (Sr)			99.4		%		70-130	27-JUL-20
Thallium (Tl)			85.1		%		70-130	27-JUL-20
Tin (Sn)			107.3		%		70-130	27-JUL-20
Titanium (Ti)			93.2		%		70-130	27-JUL-20
Vanadium (V)			106.4		%		70-130	27-JUL-20
Zinc (Zn)			87.9		%		70-130	27-JUL-20
WG3370751-6 DUP		**WG3370751-5**						
Aluminum (Al)		9490	10200		ug/g	7.5	40	27-JUL-20
Antimony (Sb)		<0.10	<0.10	RPD-NA	ug/g	N/A	30	27-JUL-20
Arsenic (As)		1.65	1.72		ug/g	3.9	30	27-JUL-20
Barium (Ba)		30.4	33.4		ug/g	9.3	40	27-JUL-20
Beryllium (Be)		0.43	0.46					

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5167798								
WG3370751-6 DUP		**WG3370751-5**						
Beryllium (Be)		0.43	0.46		ug/g	6.0	30	27-JUL-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	27-JUL-20
Boron (B)		8.0	8.4		ug/g	5.0	30	27-JUL-20
Cadmium (Cd)		<0.020	0.023	RPD-NA	ug/g	N/A	30	27-JUL-20
Calcium (Ca)		2710	2930		ug/g	7.7	30	27-JUL-20
Chromium (Cr)		34.5	37.1		ug/g	7.2	30	27-JUL-20
Cobalt (Co)		6.68	7.24		ug/g	8.1	30	27-JUL-20
Copper (Cu)		10.2	11.0		ug/g	7.5	30	27-JUL-20
Iron (Fe)		18200	19400		ug/g	6.2	30	27-JUL-20
Lead (Pb)		6.90	7.65		ug/g	10	40	27-JUL-20
Lithium (Li)		19.3	21.3		ug/g	9.8	30	27-JUL-20
Magnesium (Mg)		5220	5650		ug/g	8.0	30	27-JUL-20
Manganese (Mn)		238	264		ug/g	10	30	27-JUL-20
Molybdenum (Mo)		0.18	0.21		ug/g	15	40	27-JUL-20
Nickel (Ni)		19.6	20.9		ug/g	6.6	30	27-JUL-20
Phosphorus (P)		458	476		ug/g	3.8	30	27-JUL-20
Potassium (K)		1830	1970		ug/g	7.2	40	27-JUL-20
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	27-JUL-20
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	27-JUL-20
Sodium (Na)		59	62		ug/g	4.4	40	27-JUL-20
Strontium (Sr)		4.68	5.22		ug/g	11	40	27-JUL-20
Sulfur (S)		<1000	<1000	RPD-NA	ug/g	N/A	30	27-JUL-20
Thallium (Tl)		0.216	0.236		ug/g	9.0	30	27-JUL-20
Tin (Sn)		<2.0	<2.0	RPD-NA	ug/g	N/A	40	27-JUL-20
Titanium (Ti)		873	951		ug/g	8.6	40	27-JUL-20
Tungsten (W)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	27-JUL-20
Uranium (U)		0.746	0.827		ug/g	10	30	27-JUL-20
Vanadium (V)		27.9	29.9		ug/g	6.9	30	27-JUL-20
Zinc (Zn)		22.6	25.2		ug/g	11	30	27-JUL-20
Zirconium (Zr)		13.7	15.1		ug/g	9.8	30	27-JUL-20
WG3370751-4 LCS								
Aluminum (Al)			101.8		%		80-120	27-JUL-20
Antimony (Sb)			103.4		%		80-120	27-JUL-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch **R5167798**								
WG3370751-4 **LCS**								
Arsenic (As)			98.6		%		80-120	27-JUL-20
Barium (Ba)			94.8		%		80-120	27-JUL-20
Beryllium (Be)			100.8		%		80-120	27-JUL-20
Bismuth (Bi)			96.9		%		80-120	27-JUL-20
Boron (B)			97.7		%		80-120	27-JUL-20
Cadmium (Cd)			94.3		%		80-120	27-JUL-20
Calcium (Ca)			98.9		%		80-120	27-JUL-20
Chromium (Cr)			97.9		%		80-120	27-JUL-20
Cobalt (Co)			93.0		%		80-120	27-JUL-20
Copper (Cu)			92.4		%		80-120	27-JUL-20
Iron (Fe)			96.6		%		80-120	27-JUL-20
Lead (Pb)			95.3		%		80-120	27-JUL-20
Lithium (Li)			102.5		%		80-120	27-JUL-20
Magnesium (Mg)			102.4		%		80-120	27-JUL-20
Manganese (Mn)			96.7		%		80-120	27-JUL-20
Molybdenum (Mo)			98.8		%		80-120	27-JUL-20
Nickel (Ni)			94.8		%		80-120	27-JUL-20
Phosphorus (P)			98.3		%		80-120	27-JUL-20
Potassium (K)			102.6		%		80-120	27-JUL-20
Selenium (Se)			95.2		%		80-120	27-JUL-20
Silver (Ag)			95.7		%		80-120	27-JUL-20
Sodium (Na)			99.5		%		80-120	27-JUL-20
Strontium (Sr)			99.6		%		80-120	27-JUL-20
Sulfur (S)			96.5		%		80-120	27-JUL-20
Thallium (Tl)			97.8		%		80-120	27-JUL-20
Tin (Sn)			95.2		%		80-120	27-JUL-20
Titanium (Ti)			96.1		%		80-120	27-JUL-20
Tungsten (W)			95.6		%		80-120	27-JUL-20
Uranium (U)			95.4		%		80-120	27-JUL-20
Vanadium (V)			98.5		%		80-120	27-JUL-20
Zinc (Zn)			84.8		%		80-120	27-JUL-20
Zirconium (Zr)			101.5		%		80-120	27-JUL-20
WG3370751-1 **MB**								
Aluminum (Al)			<50		mg/kg		50	27-JUL-20

Quality Control Report

Workorder: L2478696 Report Date: 05-SEP-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5167798								
WG3370751-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	27-JUL-20
Arsenic (As)			<0.10		mg/kg		0.1	27-JUL-20
Barium (Ba)			<0.50		mg/kg		0.5	27-JUL-20
Beryllium (Be)			<0.10		mg/kg		0.1	27-JUL-20
Bismuth (Bi)			<0.20		mg/kg		0.2	27-JUL-20
Boron (B)			<5.0		mg/kg		5	27-JUL-20
Cadmium (Cd)			<0.020		mg/kg		0.02	27-JUL-20
Calcium (Ca)			<50		mg/kg		50	27-JUL-20
Chromium (Cr)			<0.50		mg/kg		0.5	27-JUL-20
Cobalt (Co)			<0.10		mg/kg		0.1	27-JUL-20
Copper (Cu)			<0.50		mg/kg		0.5	27-JUL-20
Iron (Fe)			<50		mg/kg		50	27-JUL-20
Lead (Pb)			<0.50		mg/kg		0.5	27-JUL-20
Lithium (Li)			<2.0		mg/kg		2	27-JUL-20
Magnesium (Mg)			<20		mg/kg		20	27-JUL-20
Manganese (Mn)			<1.0		mg/kg		1	27-JUL-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	27-JUL-20
Nickel (Ni)			<0.50		mg/kg		0.5	27-JUL-20
Phosphorus (P)			<50		mg/kg		50	27-JUL-20
Potassium (K)			<100		mg/kg		100	27-JUL-20
Selenium (Se)			<0.20		mg/kg		0.2	27-JUL-20
Silver (Ag)			<0.10		mg/kg		0.1	27-JUL-20
Sodium (Na)			<50		mg/kg		50	27-JUL-20
Strontium (Sr)			<0.50		mg/kg		0.5	27-JUL-20
Sulfur (S)			<1000		mg/kg		1000	27-JUL-20
Thallium (Tl)			<0.050		mg/kg		0.05	27-JUL-20
Tin (Sn)			<2.0		mg/kg		2	27-JUL-20
Titanium (Ti)			<1.0		mg/kg		1	27-JUL-20
Tungsten (W)			<0.50		mg/kg		0.5	27-JUL-20
Uranium (U)			<0.050		mg/kg		0.05	27-JUL-20
Vanadium (V)			<0.20		mg/kg		0.2	27-JUL-20
Zinc (Zn)			<2.0		mg/kg		2	27-JUL-20
Zirconium (Zr)			<1.0		mg/kg		1	27-JUL-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170139								
WG3371474-2 CRM		**WT-SS-1**						
Aluminum (Al)			102.0		%		70-130	28-JUL-20
Antimony (Sb)			115.3		%		70-130	28-JUL-20
Arsenic (As)			111.3		%		70-130	28-JUL-20
Beryllium (Be)			100.2		%		70-130	28-JUL-20
Boron (B)			86.5		%		70-130	28-JUL-20
Cadmium (Cd)			101.1		%		70-130	28-JUL-20
Calcium (Ca)			103.7		%		70-130	28-JUL-20
Chromium (Cr)			93.8		%		70-130	28-JUL-20
Cobalt (Co)			99.5		%		70-130	28-JUL-20
Copper (Cu)			103.8		%		70-130	28-JUL-20
Iron (Fe)			103.2		%		70-130	28-JUL-20
Lead (Pb)			98.7		%		70-130	28-JUL-20
Lithium (Li)			96.9		%		70-130	28-JUL-20
Magnesium (Mg)			96.5		%		70-130	28-JUL-20
Manganese (Mn)			111.3		%		70-130	28-JUL-20
Molybdenum (Mo)			97.3		%		70-130	28-JUL-20
Nickel (Ni)			101.4		%		70-130	28-JUL-20
Phosphorus (P)			100.3		%		70-130	28-JUL-20
Potassium (K)			111.0		%		70-130	28-JUL-20
Selenium (Se)			83.0		%		70-130	28-JUL-20
Silver (Ag)			91.3		%		70-130	28-JUL-20
Sodium (Na)			102.9		%		70-130	28-JUL-20
Strontium (Sr)			97.6		%		70-130	28-JUL-20
Thallium (Tl)			75.8		%		70-130	28-JUL-20
Tin (Sn)			106.1		%		70-130	28-JUL-20
Titanium (Ti)			82.0		%		70-130	28-JUL-20
Vanadium (V)			104.6		%		70-130	28-JUL-20
Zinc (Zn)			107.8		%		70-130	28-JUL-20
WG3371474-6 DUP		**WG3371474-5**						
Aluminum (Al)		5060	5200		ug/g	2.8	40	28-JUL-20
Antimony (Sb)		<0.10	<0.10	RPD-NA	ug/g	N/A	30	28-JUL-20
Arsenic (As)		0.97	1.05		ug/g	7.9	30	28-JUL-20
Barium (Ba)		13.7	13.9		ug/g	1.4	40	28-JUL-20
Beryllium (Be)		0.26	0.26					

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170139								
WG3371474-6 DUP		**WG3371474-5**						
Beryllium (Be)		0.26	0.26		ug/g	2.5	30	28-JUL-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	28-JUL-20
Boron (B)		7.9	8.6		ug/g	9.1	30	28-JUL-20
Cadmium (Cd)		0.021	0.024		ug/g	14	30	28-JUL-20
Calcium (Ca)		4350	4610		ug/g	5.8	30	28-JUL-20
Chromium (Cr)		21.3	22.0		ug/g	3.3	30	28-JUL-20
Cobalt (Co)		4.05	4.17		ug/g	2.8	30	28-JUL-20
Copper (Cu)		5.19	5.43		ug/g	4.5	30	28-JUL-20
Iron (Fe)		9520	10100		ug/g	5.7	30	28-JUL-20
Lead (Pb)		5.15	5.55		ug/g	7.6	40	28-JUL-20
Lithium (Li)		9.9	10.2		ug/g	3.2	30	28-JUL-20
Magnesium (Mg)		5040	5400		ug/g	6.7	30	28-JUL-20
Manganese (Mn)		139	147		ug/g	5.6	30	28-JUL-20
Molybdenum (Mo)		0.14	0.15		ug/g	7.7	40	28-JUL-20
Nickel (Ni)		14.2	14.8		ug/g	3.7	30	28-JUL-20
Phosphorus (P)		217	230		ug/g	5.9	30	28-JUL-20
Potassium (K)		1040	1140		ug/g	9.4	40	28-JUL-20
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	28-JUL-20
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	28-JUL-20
Sodium (Na)		61	77		ug/g	23	40	28-JUL-20
Strontium (Sr)		3.88	4.25		ug/g	9.0	40	28-JUL-20
Sulfur (S)		<1000	<1000	RPD-NA	ug/g	N/A	30	28-JUL-20
Thallium (Tl)		0.086	0.084		ug/g	2.3	30	28-JUL-20
Tin (Sn)		<2.0	<2.0	RPD-NA	ug/g	N/A	40	28-JUL-20
Titanium (Ti)		363	397		ug/g	9.0	40	28-JUL-20
Tungsten (W)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	28-JUL-20
Uranium (U)		0.487	0.563		ug/g	14	30	28-JUL-20
Vanadium (V)		15.3	16.1		ug/g	5.6	30	28-JUL-20
Zinc (Zn)		13.9	14.3		ug/g	2.9	30	28-JUL-20
Zirconium (Zr)		2.4	2.5		ug/g	2.0	30	28-JUL-20
WG3371474-4 LCS								
Aluminum (Al)			97.8		%		80-120	28-JUL-20
Antimony (Sb)			106.5		%		80-120	28-JUL-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170139								
WG3371474-4 LCS								
Arsenic (As)			99.7		%		80-120	28-JUL-20
Barium (Ba)			97.0		%		80-120	28-JUL-20
Beryllium (Be)			96.0		%		80-120	28-JUL-20
Bismuth (Bi)			101.3		%		80-120	28-JUL-20
Boron (B)			93.9		%		80-120	28-JUL-20
Cadmium (Cd)			100.5		%		80-120	28-JUL-20
Calcium (Ca)			98.8		%		80-120	28-JUL-20
Chromium (Cr)			98.1		%		80-120	28-JUL-20
Cobalt (Co)			97.2		%		80-120	28-JUL-20
Copper (Cu)			96.3		%		80-120	28-JUL-20
Iron (Fe)			116.8		%		80-120	28-JUL-20
Lead (Pb)			97.0		%		80-120	28-JUL-20
Lithium (Li)			98.4		%		80-120	28-JUL-20
Magnesium (Mg)			102.0		%		80-120	28-JUL-20
Manganese (Mn)			98.7		%		80-120	28-JUL-20
Molybdenum (Mo)			97.9		%		80-120	28-JUL-20
Nickel (Ni)			96.8		%		80-120	28-JUL-20
Phosphorus (P)			101.0		%		80-120	28-JUL-20
Potassium (K)			103.7		%		80-120	28-JUL-20
Selenium (Se)			99.2		%		80-120	28-JUL-20
Silver (Ag)			95.3		%		80-120	28-JUL-20
Sodium (Na)			102.4		%		80-120	28-JUL-20
Strontium (Sr)			101.3		%		80-120	28-JUL-20
Sulfur (S)			90.8		%		80-120	28-JUL-20
Thallium (Tl)			98.1		%		80-120	28-JUL-20
Tin (Sn)			96.9		%		80-120	28-JUL-20
Titanium (Ti)			97.3		%		80-120	28-JUL-20
Tungsten (W)			91.9		%		80-120	28-JUL-20
Uranium (U)			96.5		%		80-120	28-JUL-20
Vanadium (V)			101.4		%		80-120	28-JUL-20
Zinc (Zn)			97.3		%		80-120	28-JUL-20
Zirconium (Zr)			96.3		%		80-120	28-JUL-20
WG3371474-1 MB								
Aluminum (Al)			<50		mg/kg		50	28-JUL-20

Quality Control Report

Workorder: L2478696 Report Date: 05-SEP-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170139								
WG3371474-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	28-JUL-20
Arsenic (As)			<0.10		mg/kg		0.1	28-JUL-20
Barium (Ba)			<0.50		mg/kg		0.5	28-JUL-20
Beryllium (Be)			<0.10		mg/kg		0.1	28-JUL-20
Bismuth (Bi)			<0.20		mg/kg		0.2	28-JUL-20
Boron (B)			<5.0		mg/kg		5	28-JUL-20
Cadmium (Cd)			<0.020		mg/kg		0.02	28-JUL-20
Calcium (Ca)			<50		mg/kg		50	28-JUL-20
Chromium (Cr)			<0.50		mg/kg		0.5	28-JUL-20
Cobalt (Co)			<0.10		mg/kg		0.1	28-JUL-20
Copper (Cu)			<0.50		mg/kg		0.5	28-JUL-20
Iron (Fe)			<50		mg/kg		50	28-JUL-20
Lead (Pb)			<0.50		mg/kg		0.5	28-JUL-20
Lithium (Li)			<2.0		mg/kg		2	28-JUL-20
Magnesium (Mg)			<20		mg/kg		20	28-JUL-20
Manganese (Mn)			<1.0		mg/kg		1	28-JUL-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	28-JUL-20
Nickel (Ni)			<0.50		mg/kg		0.5	28-JUL-20
Phosphorus (P)			<50		mg/kg		50	28-JUL-20
Potassium (K)			<100		mg/kg		100	28-JUL-20
Selenium (Se)			<0.20		mg/kg		0.2	28-JUL-20
Silver (Ag)			<0.10		mg/kg		0.1	28-JUL-20
Sodium (Na)			<50		mg/kg		50	28-JUL-20
Strontium (Sr)			<0.50		mg/kg		0.5	28-JUL-20
Sulfur (S)			<1000		mg/kg		1000	28-JUL-20
Thallium (Tl)			<0.050		mg/kg		0.05	28-JUL-20
Tin (Sn)			<2.0		mg/kg		2	28-JUL-20
Titanium (Ti)			<1.0		mg/kg		1	28-JUL-20
Tungsten (W)			<0.50		mg/kg		0.5	28-JUL-20
Uranium (U)			<0.050		mg/kg		0.05	28-JUL-20
Vanadium (V)			<0.20		mg/kg		0.2	28-JUL-20
Zinc (Zn)			<2.0		mg/kg		2	28-JUL-20
Zirconium (Zr)			<1.0		mg/kg		1	28-JUL-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170556								
WG3371436-2 CRM		**WT-SS-1**						
Aluminum (Al)			106.8		%		70-130	28-JUL-20
Antimony (Sb)			115.2		%		70-130	28-JUL-20
Arsenic (As)			115.2		%		70-130	28-JUL-20
Beryllium (Be)			103.9		%		70-130	28-JUL-20
Boron (B)			90.6		%		70-130	28-JUL-20
Cadmium (Cd)			102.3		%		70-130	28-JUL-20
Calcium (Ca)			100.0		%		70-130	28-JUL-20
Chromium (Cr)			97.3		%		70-130	28-JUL-20
Cobalt (Co)			101.8		%		70-130	28-JUL-20
Copper (Cu)			100.6		%		70-130	28-JUL-20
Iron (Fe)			99.8		%		70-130	28-JUL-20
Lead (Pb)			98.8		%		70-130	28-JUL-20
Lithium (Li)			97.7		%		70-130	28-JUL-20
Magnesium (Mg)			100.2		%		70-130	28-JUL-20
Manganese (Mn)			106.2		%		70-130	28-JUL-20
Molybdenum (Mo)			101.0		%		70-130	28-JUL-20
Nickel (Ni)			105.0		%		70-130	28-JUL-20
Phosphorus (P)			107.8		%		70-130	28-JUL-20
Potassium (K)			103.8		%		70-130	28-JUL-20
Selenium (Se)			88.3		%		70-130	28-JUL-20
Silver (Ag)			108.9		%		70-130	28-JUL-20
Sodium (Na)			105.6		%		70-130	28-JUL-20
Strontium (Sr)			102.2		%		70-130	28-JUL-20
Thallium (Tl)			80.8		%		70-130	28-JUL-20
Tin (Sn)			107.4		%		70-130	28-JUL-20
Titanium (Ti)			93.0		%		70-130	28-JUL-20
Vanadium (V)			109.1		%		70-130	28-JUL-20
Zinc (Zn)			103.0		%		70-130	28-JUL-20
WG3371436-6 DUP		**WG3371436-5**						
Aluminum (Al)		16100	16200		ug/g	0.6	40	28-JUL-20
Antimony (Sb)		0.10	<0.10	RPD-NA	ug/g	N/A	30	28-JUL-20
Arsenic (As)		3.82	3.70		ug/g	3.0	30	28-JUL-20
Barium (Ba)		31.4	31.1		ug/g	0.9	40	28-JUL-20
Beryllium (Be)		0.87	0.93					

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170556								
WG3371436-6 DUP		**WG3371436-5**						
Beryllium (Be)		0.87	0.93		ug/g	6.2	30	28-JUL-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	28-JUL-20
Boron (B)		61.0	66.8		ug/g	9.1	30	28-JUL-20
Cadmium (Cd)		0.071	0.068		ug/g	4.3	30	28-JUL-20
Calcium (Ca)		88300	90600		ug/g	2.5	30	28-JUL-20
Chromium (Cr)		37.7	37.8		ug/g	0.3	30	28-JUL-20
Cobalt (Co)		7.68	7.66		ug/g	0.2	30	28-JUL-20
Copper (Cu)		15.4	15.4		ug/g	0.0	30	28-JUL-20
Iron (Fe)		20500	20300		ug/g	0.9	30	28-JUL-20
Lead (Pb)		12.3	12.7		ug/g	2.5	40	28-JUL-20
Lithium (Li)		60.5	62.4		ug/g	3.1	30	28-JUL-20
Magnesium (Mg)		35100	34700		ug/g	1.2	30	28-JUL-20
Manganese (Mn)		269	266		ug/g	1.2	30	28-JUL-20
Molybdenum (Mo)		0.48	0.50		ug/g	4.6	40	28-JUL-20
Nickel (Ni)		22.8	22.9		ug/g	0.4	30	28-JUL-20
Phosphorus (P)		491	471		ug/g	4.2	30	28-JUL-20
Potassium (K)		5940	6220		ug/g	4.5	40	28-JUL-20
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	28-JUL-20
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	28-JUL-20
Sodium (Na)		141	142		ug/g	0.7	40	28-JUL-20
Strontium (Sr)		54.3	55.3		ug/g	1.7	40	28-JUL-20
Sulfur (S)		<1000	<1000	RPD-NA	ug/g	N/A	30	28-JUL-20
Thallium (Tl)		0.260	0.268		ug/g	2.8	30	28-JUL-20
Tin (Sn)		<2.0	<2.0	RPD-NA	ug/g	N/A	40	28-JUL-20
Titanium (Ti)		459	460		ug/g	0.1	40	28-JUL-20
Tungsten (W)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	28-JUL-20
Uranium (U)		1.06	1.10		ug/g	3.9	30	28-JUL-20
Vanadium (V)		35.5	35.4		ug/g	0.3	30	28-JUL-20
Zinc (Zn)		29.6	29.6		ug/g	0.1	30	28-JUL-20
Zirconium (Zr)		17.0	17.7		ug/g	4.6	30	28-JUL-20
WG3371436-4 LCS								
Aluminum (Al)			99.3		%		80-120	28-JUL-20
Antimony (Sb)			101.5		%		80-120	28-JUL-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170556								
WG3371436-4 LCS								
Arsenic (As)			96.6		%		80-120	28-JUL-20
Barium (Ba)			96.4		%		80-120	28-JUL-20
Beryllium (Be)			99.8		%		80-120	28-JUL-20
Bismuth (Bi)			99.4		%		80-120	28-JUL-20
Boron (B)			95.4		%		80-120	28-JUL-20
Cadmium (Cd)			95.5		%		80-120	28-JUL-20
Calcium (Ca)			97.8		%		80-120	28-JUL-20
Chromium (Cr)			96.5		%		80-120	28-JUL-20
Cobalt (Co)			93.8		%		80-120	28-JUL-20
Copper (Cu)			92.9		%		80-120	28-JUL-20
Iron (Fe)			96.7		%		80-120	28-JUL-20
Lead (Pb)			96.3		%		80-120	28-JUL-20
Lithium (Li)			100.4		%		80-120	28-JUL-20
Magnesium (Mg)			97.2		%		80-120	28-JUL-20
Manganese (Mn)			96.2		%		80-120	28-JUL-20
Molybdenum (Mo)			98.6		%		80-120	28-JUL-20
Nickel (Ni)			93.5		%		80-120	28-JUL-20
Phosphorus (P)			98.7		%		80-120	28-JUL-20
Potassium (K)			101.3		%		80-120	28-JUL-20
Selenium (Se)			96.7		%		80-120	28-JUL-20
Silver (Ag)			97.5		%		80-120	28-JUL-20
Sodium (Na)			98.2		%		80-120	28-JUL-20
Strontium (Sr)			99.1		%		80-120	28-JUL-20
Sulfur (S)			94.1		%		80-120	28-JUL-20
Thallium (Tl)			97.4		%		80-120	28-JUL-20
Tin (Sn)			96.1		%		80-120	28-JUL-20
Titanium (Ti)			98.2		%		80-120	28-JUL-20
Tungsten (W)			93.9		%		80-120	28-JUL-20
Uranium (U)			94.5		%		80-120	28-JUL-20
Vanadium (V)			98.2		%		80-120	28-JUL-20
Zinc (Zn)			92.4		%		80-120	28-JUL-20
Zirconium (Zr)			106.7		%		80-120	28-JUL-20
WG3371436-1 MB								
Aluminum (Al)			<50		mg/kg		50	28-JUL-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch **R5170556**								
WG3371436-1 **MB**								
Antimony (Sb)			<0.10		mg/kg		0.1	28-JUL-20
Arsenic (As)			<0.10		mg/kg		0.1	28-JUL-20
Barium (Ba)			<0.50		mg/kg		0.5	28-JUL-20
Beryllium (Be)			<0.10		mg/kg		0.1	28-JUL-20
Bismuth (Bi)			<0.20		mg/kg		0.2	28-JUL-20
Boron (B)			<5.0		mg/kg		5	28-JUL-20
Cadmium (Cd)			<0.020		mg/kg		0.02	28-JUL-20
Calcium (Ca)			<50		mg/kg		50	28-JUL-20
Chromium (Cr)			<0.50		mg/kg		0.5	28-JUL-20
Cobalt (Co)			<0.10		mg/kg		0.1	28-JUL-20
Copper (Cu)			<0.50		mg/kg		0.5	28-JUL-20
Iron (Fe)			<50		mg/kg		50	28-JUL-20
Lead (Pb)			<0.50		mg/kg		0.5	28-JUL-20
Lithium (Li)			<2.0		mg/kg		2	28-JUL-20
Magnesium (Mg)			<20		mg/kg		20	28-JUL-20
Manganese (Mn)			<1.0		mg/kg		1	28-JUL-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	28-JUL-20
Nickel (Ni)			<0.50		mg/kg		0.5	28-JUL-20
Phosphorus (P)			<50		mg/kg		50	28-JUL-20
Potassium (K)			<100		mg/kg		100	28-JUL-20
Selenium (Se)			<0.20		mg/kg		0.2	28-JUL-20
Silver (Ag)			<0.10		mg/kg		0.1	28-JUL-20
Sodium (Na)			<50		mg/kg		50	28-JUL-20
Strontium (Sr)			<0.50		mg/kg		0.5	28-JUL-20
Sulfur (S)			<1000		mg/kg		1000	28-JUL-20
Thallium (Tl)			<0.050		mg/kg		0.05	28-JUL-20
Tin (Sn)			<2.0		mg/kg		2	28-JUL-20
Titanium (Ti)			<1.0		mg/kg		1	28-JUL-20
Tungsten (W)			<0.50		mg/kg		0.5	28-JUL-20
Uranium (U)			<0.050		mg/kg		0.05	28-JUL-20
Vanadium (V)			<0.20		mg/kg		0.2	28-JUL-20
Zinc (Zn)			<2.0		mg/kg		2	28-JUL-20
Zirconium (Zr)			<1.0		mg/kg		1	28-JUL-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170717								
WG3372020-2	**CRM**	**WT-SS-1**						
Aluminum (Al)			98.7		%		70-130	29-JUL-20
Antimony (Sb)			106.2		%		70-130	29-JUL-20
Arsenic (As)			107.7		%		70-130	29-JUL-20
Beryllium (Be)			97.6		%		70-130	29-JUL-20
Boron (B)			91.8		%		70-130	29-JUL-20
Cadmium (Cd)			100.4		%		70-130	29-JUL-20
Calcium (Ca)			96.7		%		70-130	29-JUL-20
Chromium (Cr)			94.7		%		70-130	29-JUL-20
Cobalt (Co)			99.2		%		70-130	29-JUL-20
Copper (Cu)			96.5		%		70-130	29-JUL-20
Iron (Fe)			98.8		%		70-130	29-JUL-20
Lead (Pb)			97.1		%		70-130	29-JUL-20
Lithium (Li)			97.1		%		70-130	29-JUL-20
Magnesium (Mg)			94.8		%		70-130	29-JUL-20
Manganese (Mn)			100.5		%		70-130	29-JUL-20
Molybdenum (Mo)			97.2		%		70-130	29-JUL-20
Nickel (Ni)			100.3		%		70-130	29-JUL-20
Phosphorus (P)			95.7		%		70-130	29-JUL-20
Potassium (K)			103.5		%		70-130	29-JUL-20
Selenium (Se)			86.3		%		70-130	29-JUL-20
Silver (Ag)			94.5		%		70-130	29-JUL-20
Sodium (Na)			98.5		%		70-130	29-JUL-20
Strontium (Sr)			96.5		%		70-130	29-JUL-20
Thallium (Tl)			79.9		%		70-130	29-JUL-20
Tin (Sn)			103.4		%		70-130	29-JUL-20
Titanium (Ti)			79.7		%		70-130	29-JUL-20
Vanadium (V)			103.6		%		70-130	29-JUL-20
Zinc (Zn)			101.7		%		70-130	29-JUL-20
WG3372020-6	**DUP**	**WG3372020-5**						
Aluminum (Al)		14700	16200		ug/g	9.6	40	29-JUL-20
Antimony (Sb)		0.87	0.87		ug/g	0.3	30	29-JUL-20
Arsenic (As)		11.1	11.1		ug/g	0.3	30	29-JUL-20
Barium (Ba)		102	104		ug/g	2.0	40	29-JUL-20
Beryllium (Be)		0.86	0.88					

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170717								
WG3372020-6 DUP		**WG3372020-5**						
Beryllium (Be)		0.86	0.88		ug/g	2.6	30	29-JUL-20
Bismuth (Bi)		0.24	0.23		ug/g	2.9	30	29-JUL-20
Boron (B)		21.4	27.9		ug/g	26	30	29-JUL-20
Cadmium (Cd)		0.650	0.565		ug/g	14	30	29-JUL-20
Calcium (Ca)		51600	50900		ug/g	1.2	30	29-JUL-20
Chromium (Cr)		26.3	27.9		ug/g	5.9	30	29-JUL-20
Cobalt (Co)		14.1	14.1		ug/g	0.1	30	29-JUL-20
Copper (Cu)		23.9	23.4		ug/g	2.5	30	29-JUL-20
Iron (Fe)		29900	30700		ug/g	2.5	30	29-JUL-20
Lead (Pb)		11.4	11.0		ug/g	3.1	40	29-JUL-20
Lithium (Li)		35.9	38.7		ug/g	7.4	30	29-JUL-20
Magnesium (Mg)		15200	15000		ug/g	1.2	30	29-JUL-20
Manganese (Mn)		501	497		ug/g	0.8	30	29-JUL-20
Molybdenum (Mo)		13.2	13.3		ug/g	1.4	40	29-JUL-20
Nickel (Ni)		45.9	45.7		ug/g	0.4	30	29-JUL-20
Phosphorus (P)		373	395		ug/g	5.6	30	29-JUL-20
Potassium (K)		3230	3790		ug/g	16	40	29-JUL-20
Selenium (Se)		0.76	0.76		ug/g	0.1	30	29-JUL-20
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	29-JUL-20
Sodium (Na)		266	279		ug/g	4.9	40	29-JUL-20
Strontium (Sr)		92.8	95.4		ug/g	2.8	40	29-JUL-20
Sulfur (S)		5200	5200		ug/g	0.8	30	29-JUL-20
Thallium (Tl)		0.449	0.468		ug/g	4.0	30	29-JUL-20
Tin (Sn)		<2.0	<2.0	RPD-NA	ug/g	N/A	40	29-JUL-20
Titanium (Ti)		58.6	86.1		ug/g	38	40	29-JUL-20
Tungsten (W)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	29-JUL-20
Uranium (U)		3.03	2.98		ug/g	1.8	30	29-JUL-20
Vanadium (V)		37.3	43.3		ug/g	15	30	29-JUL-20
Zinc (Zn)		79.8	77.0		ug/g	3.6	30	29-JUL-20
Zirconium (Zr)		10.3	9.7		ug/g	6.4	30	29-JUL-20
WG3372020-4 LCS								
Aluminum (Al)			97.6		%		80-120	29-JUL-20
Antimony (Sb)			98.6		%		80-120	29-JUL-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170717								
WG3372020-4 LCS								
Arsenic (As)			96.4		%		80-120	29-JUL-20
Barium (Ba)			100.9		%		80-120	29-JUL-20
Beryllium (Be)			96.2		%		80-120	29-JUL-20
Bismuth (Bi)			89.6		%		80-120	29-JUL-20
Boron (B)			97.4		%		80-120	29-JUL-20
Cadmium (Cd)			96.0		%		80-120	29-JUL-20
Calcium (Ca)			96.9		%		80-120	29-JUL-20
Chromium (Cr)			96.1		%		80-120	29-JUL-20
Cobalt (Co)			95.6		%		80-120	29-JUL-20
Copper (Cu)			93.5		%		80-120	29-JUL-20
Iron (Fe)			97.2		%		80-120	29-JUL-20
Lead (Pb)			92.9		%		80-120	29-JUL-20
Lithium (Li)			98.5		%		80-120	29-JUL-20
Magnesium (Mg)			97.2		%		80-120	29-JUL-20
Manganese (Mn)			95.0		%		80-120	29-JUL-20
Molybdenum (Mo)			94.0		%		80-120	29-JUL-20
Nickel (Ni)			94.3		%		80-120	29-JUL-20
Phosphorus (P)			99.2		%		80-120	29-JUL-20
Potassium (K)			97.8		%		80-120	29-JUL-20
Selenium (Se)			96.9		%		80-120	29-JUL-20
Silver (Ag)			92.7		%		80-120	29-JUL-20
Sodium (Na)			98.6		%		80-120	29-JUL-20
Strontium (Sr)			94.5		%		80-120	29-JUL-20
Sulfur (S)			93.4		%		80-120	29-JUL-20
Thallium (Tl)			93.2		%		80-120	29-JUL-20
Tin (Sn)			92.5		%		80-120	29-JUL-20
Titanium (Ti)			94.6		%		80-120	29-JUL-20
Tungsten (W)			93.0		%		80-120	29-JUL-20
Uranium (U)			90.3		%		80-120	29-JUL-20
Vanadium (V)			98.3		%		80-120	29-JUL-20
Zinc (Zn)			93.1		%		80-120	29-JUL-20
Zirconium (Zr)			93.3		%		80-120	29-JUL-20
WG3372020-1 MB								
Aluminum (Al)			<50		mg/kg		50	29-JUL-20

Quality Control Report

Workorder: L2478696 Report Date: 05-SEP-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5170717								
WG3372020-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	29-JUL-20
Arsenic (As)			<0.10		mg/kg		0.1	29-JUL-20
Barium (Ba)			<0.50		mg/kg		0.5	29-JUL-20
Beryllium (Be)			<0.10		mg/kg		0.1	29-JUL-20
Bismuth (Bi)			<0.20		mg/kg		0.2	29-JUL-20
Boron (B)			<5.0		mg/kg		5	29-JUL-20
Cadmium (Cd)			<0.020		mg/kg		0.02	29-JUL-20
Calcium (Ca)			<50		mg/kg		50	29-JUL-20
Chromium (Cr)			<0.50		mg/kg		0.5	29-JUL-20
Cobalt (Co)			<0.10		mg/kg		0.1	29-JUL-20
Copper (Cu)			<0.50		mg/kg		0.5	29-JUL-20
Iron (Fe)			<50		mg/kg		50	29-JUL-20
Lead (Pb)			<0.50		mg/kg		0.5	29-JUL-20
Lithium (Li)			<2.0		mg/kg		2	29-JUL-20
Magnesium (Mg)			<20		mg/kg		20	29-JUL-20
Manganese (Mn)			<1.0		mg/kg		1	29-JUL-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	29-JUL-20
Nickel (Ni)			<0.50		mg/kg		0.5	29-JUL-20
Phosphorus (P)			<50		mg/kg		50	29-JUL-20
Potassium (K)			<100		mg/kg		100	29-JUL-20
Selenium (Se)			<0.20		mg/kg		0.2	29-JUL-20
Silver (Ag)			<0.10		mg/kg		0.1	29-JUL-20
Sodium (Na)			<50		mg/kg		50	29-JUL-20
Strontium (Sr)			<0.50		mg/kg		0.5	29-JUL-20
Sulfur (S)			<1000		mg/kg		1000	29-JUL-20
Thallium (Tl)			<0.050		mg/kg		0.05	29-JUL-20
Tin (Sn)			<2.0		mg/kg		2	29-JUL-20
Titanium (Ti)			<1.0		mg/kg		1	29-JUL-20
Tungsten (W)			<0.50		mg/kg		0.5	29-JUL-20
Uranium (U)			<0.050		mg/kg		0.05	29-JUL-20
Vanadium (V)			<0.20		mg/kg		0.2	29-JUL-20
Zinc (Zn)			<2.0		mg/kg		2	29-JUL-20
Zirconium (Zr)			<1.0		mg/kg		1	29-JUL-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R5166930								
WG3369433-3 DUP		**L2478696-82**						
% Moisture		46.4	43.8		%	5.8	20	25-JUL-20
WG3369433-2 LCS								
% Moisture			99.3		%		90-110	25-JUL-20
WG3369433-1 MB								
% Moisture			<0.25		%		0.25	25-JUL-20
Batch R5166931								
WG3369500-3 DUP		**L2478696-3**						
% Moisture		4.04	3.78		%	6.8	20	25-JUL-20
WG3369500-2 LCS								
% Moisture			99.5		%		90-110	25-JUL-20
WG3369500-1 MB								
% Moisture			<0.25		%		0.25	25-JUL-20
Batch R5166934								
WG3369415-3 DUP		**L2478696-24**						
% Moisture		11.1	11.6		%	4.4	20	25-JUL-20
WG3369415-2 LCS								
% Moisture			98.4		%		90-110	25-JUL-20
WG3369415-1 MB								
% Moisture			<0.25		%		0.25	25-JUL-20
Batch R5166937								
WG3369791-6 DUP		**L2477885-1**						
% Moisture		7.67	7.86		%	2.4	20	25-JUL-20
WG3369791-5 LCS								
% Moisture			98.8		%		90-110	25-JUL-20
WG3369791-4 MB								
% Moisture			<0.25		%		0.25	25-JUL-20
Batch R5167829								
WG3370828-3 DUP		**L2477684-1**						
% Moisture		80.5	80.7		%	0.3	20	28-JUL-20
WG3370828-2 LCS								
% Moisture			99.7		%		90-110	28-JUL-20
WG3370828-1 MB								
% Moisture			<0.25		%		0.25	28-JUL-20
Batch R5167875								
WG3370764-3 DUP		**L2478000-14**						
% Moisture		5.73	5.38		%	6.2	20	27-JUL-20
WG3370764-2 LCS								

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R5167875								
WG3370764-2 LCS								
% Moisture			97.0		%		90-110	27-JUL-20
WG3370764-1 MB								
% Moisture			<0.25		%		0.25	27-JUL-20
Batch R5167882								
WG3370975-3 DUP		**L2478842-1**						
% Moisture		11.8	11.8		%	0.0	20	28-JUL-20
WG3370975-2 LCS								
% Moisture			100.2		%		90-110	28-JUL-20
WG3370975-1 MB								
% Moisture			<0.25		%		0.25	28-JUL-20
PH-WT	**Soil**							
Batch R5167779								
WG3370748-1 DUP		**L2476545-1**						
pH		7.12	7.08	J	pH units	0.04	0.3	27-JUL-20
WG3370906-1 LCS								
pH			6.94		pH units		6.9-7.1	27-JUL-20
Batch R5169919								
WG3369428-1 DUP		**L2478696-3**						
pH		6.85	6.82	J	pH units	0.03	0.3	28-JUL-20
WG3372236-1 LCS								
pH			6.96		pH units		6.9-7.1	28-JUL-20
Batch R5169923								
WG3369429-1 DUP		**L2478696-61**						
pH		6.48	6.46	J	pH units	0.02	0.3	28-JUL-20
WG3372233-1 LCS								
pH			6.97		pH units		6.9-7.1	28-JUL-20
Batch R5171706								
WG3369467-1 DUP		**L2478696-121**						
pH		7.60	7.51	J	pH units	0.09	0.3	29-JUL-20
WG3372689-1 LCS								
pH			7.01		pH units		6.9-7.1	29-JUL-20
AG-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			129.3		%		70-130	24-AUG-20
WG3388321-2 DUP		**L2478696-68**						

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
AG-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-2 DUP		**L2478696-68**						
Silver (Ag)-Total		0.0112	0.0103		mg/kg	7.9	40	24-AUG-20
WG3388321-4 LCS								
Silver (Ag)-Total			98.4		%		80-120	24-AUG-20
WG3388321-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	24-AUG-20
Batch R5202274								
WG3388310-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			119.3		%		70-130	26-AUG-20
WG3389643-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			118.3		%		70-130	26-AUG-20
WG3389651-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			116.1		%		70-130	26-AUG-20
WG3389643-2 DUP		**L2478696-98**						
Silver (Ag)-Total		0.0170	0.0169		mg/kg	0.6	40	26-AUG-20
WG3389651-2 DUP		**L2478696-164**						
Silver (Ag)-Total		0.0158	0.0196		mg/kg	21	40	26-AUG-20
WG3388310-4 LCS								
Silver (Ag)-Total			69.3	LCS-L	%		80-120	26-AUG-20
WG3389643-4 LCS								
Silver (Ag)-Total			84.3		%		80-120	26-AUG-20
WG3389651-4 LCS								
Silver (Ag)-Total			79.5	MES	%		80-120	26-AUG-20
WG3388310-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	26-AUG-20
WG3389643-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	26-AUG-20
WG3389651-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Batch R5203943								
WG3390496-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			109.0		%		70-130	28-AUG-20
WG3392427-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			105.5		%		70-130	28-AUG-20
WG3392441-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			106.8		%		70-130	28-AUG-20
WG3392427-2 DUP		**L2478696-120**						
Silver (Ag)-Total		0.0163	0.0187		mg/kg	13	40	28-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
AG-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392441-2 DUP		**L2478696-126**						
Silver (Ag)-Total		0.0228	0.0212		mg/kg	7.3	40	28-AUG-20
WG3392427-4 LCS								
Silver (Ag)-Total			96.2		%		80-120	28-AUG-20
WG3392441-4 LCS								
Silver (Ag)-Total			94.9		%		80-120	28-AUG-20
WG3390496-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	28-AUG-20
WG3392427-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	28-AUG-20
WG3392441-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	28-AUG-20
Batch R5206776								
WG3393422-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			115.7		%		70-130	31-AUG-20
WG3393442-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			111.8		%		70-130	31-AUG-20
WG3394360-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			126.9		%		70-130	31-AUG-20
WG3393422-2 DUP		**L2478696-13**						
Silver (Ag)-Total		0.0112	0.0125		mg/kg	11	40	31-AUG-20
WG3393442-2 DUP		**L2478696-207**						
Silver (Ag)-Total		0.0757	0.0784		mg/kg	3.6	40	31-AUG-20
WG3394360-2 DUP		**L2478696-20**						
Silver (Ag)-Total		0.0117	0.0116		mg/kg	0.2	40	31-AUG-20
WG3393422-4 LCS								
Silver (Ag)-Total			102.2		%		80-120	31-AUG-20
WG3393442-4 LCS								
Silver (Ag)-Total			94.4		%		80-120	31-AUG-20
WG3394360-4 LCS								
Silver (Ag)-Total			112.8		%		80-120	31-AUG-20
WG3393422-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	31-AUG-20
WG3393442-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	31-AUG-20
WG3394360-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	31-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
AG-DRY-CCMS-N-VA	**Tissue**							
Batch R5211183								
WG3395485-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			100.8		%		70-130	04-SEP-20
WG3396425-3 CRM		**VA-NRC-DORM4**						
Silver (Ag)-Total			115.5		%		70-130	04-SEP-20
WG3395485-2 DUP		**L2478696-60**						
Silver (Ag)-Total		0.0121	0.0106		mg/kg	13	40	04-SEP-20
WG3396425-2 DUP		**L2478696-206**						
Silver (Ag)-Total		0.0880	0.0834		mg/kg	5.3	40	04-SEP-20
WG3395485-4 LCS								
Silver (Ag)-Total			72.3	MES	%		80-120	04-SEP-20
WG3396425-4 LCS								
Silver (Ag)-Total			96.6		%		80-120	04-SEP-20
WG3395485-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	04-SEP-20
WG3396425-1 MB								
Silver (Ag)-Total			<0.0050		mg/kg		0.005	04-SEP-20
HG-DRY-CVAFS-N-VA	**Tissue**							
Batch R5199941								
WG3388321-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			115.0		%		70-130	25-AUG-20
WG3388321-2 DUP		**L2478696-68**						
Mercury (Hg)-Total		0.0507	0.0491		mg/kg	3.4	40	25-AUG-20
WG3388321-4 LCS								
Mercury (Hg)-Total			103.0		%		80-120	25-AUG-20
WG3388321-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	25-AUG-20
Batch R5202811								
WG3388310-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			104.2		%		70-130	27-AUG-20
WG3389643-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			108.9		%		70-130	27-AUG-20
WG3389651-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			103.6		%		70-130	27-AUG-20
WG3388310-2 DUP		**L2478696-13**						
Mercury (Hg)-Total		0.0438	0.0399		mg/kg	9.2	40	27-AUG-20
WG3389643-2 DUP		**L2478696-98**						
Mercury (Hg)-Total		0.0528	0.0453		mg/kg	15	40	27-AUG-20
WG3389651-2 DUP		**L2478696-164**						

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DRY-CVAFS-N-VA	**Tissue**							
Batch R5202811								
WG3389651-2 DUP		**L2478696-164**						
Mercury (Hg)-Total		0.0396	0.0448		mg/kg	13	40	27-AUG-20
WG3388310-4 LCS								
Mercury (Hg)-Total			92.2		%		80-120	27-AUG-20
WG3389643-4 LCS								
Mercury (Hg)-Total			95.9		%		80-120	27-AUG-20
WG3389651-4 LCS								
Mercury (Hg)-Total			94.1		%		80-120	27-AUG-20
WG3388310-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	27-AUG-20
WG3389643-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	27-AUG-20
WG3389651-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	27-AUG-20
Batch R5203984								
WG3390496-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			87.7		%		70-130	29-AUG-20
WG3392427-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			90.6		%		70-130	29-AUG-20
WG3392441-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			80.3		%		70-130	29-AUG-20
WG3390496-2 DUP		**L2478696-20**						
Mercury (Hg)-Total		0.0483	0.0460		mg/kg	4.8	40	29-AUG-20
WG3392427-2 DUP		**L2478696-120**						
Mercury (Hg)-Total		0.0409	0.0440		mg/kg	7.2	40	29-AUG-20
WG3392441-2 DUP		**L2478696-126**						
Mercury (Hg)-Total		0.0429	0.0430		mg/kg	0.3	40	29-AUG-20
WG3390496-4 LCS								
Mercury (Hg)-Total			93.3		%		80-120	29-AUG-20
WG3392427-4 LCS								
Mercury (Hg)-Total			92.2		%		80-120	29-AUG-20
WG3392441-4 LCS								
Mercury (Hg)-Total			84.7		%		80-120	29-AUG-20
WG3390496-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	29-AUG-20
WG3392427-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	29-AUG-20
WG3392441-1 MB								

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DRY-CVAFS-N-VA	**Tissue**							
Batch R5203984								
WG3392441-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	29-AUG-20
Batch R5207158								
WG3393442-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			81.4		%		70-130	01-SEP-20
WG3393442-2 DUP		**L2478696-207**						
Mercury (Hg)-Total		0.0256	0.0281		mg/kg	9.0	40	01-SEP-20
WG3393442-4 LCS								
Mercury (Hg)-Total			86.4		%		80-120	01-SEP-20
WG3393442-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	01-SEP-20
Batch R5209193								
WG3392431-3 CRM		**VA-NRC-DORM4**						
Mercury (Hg)-Total			93.9		%		70-130	02-SEP-20
WG3392431-2 DUP		**L2478696-206**						
Mercury (Hg)-Total		0.0283	0.0308		mg/kg	8.4	40	02-SEP-20
WG3392431-4 LCS								
Mercury (Hg)-Total			82.1		%		80-120	02-SEP-20
WG3392431-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	02-SEP-20
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			109.7		%		70-130	24-AUG-20
Arsenic (As)-Total			95.8		%		70-130	24-AUG-20
Barium (Ba)-Total			111.3		%		70-130	24-AUG-20
Beryllium (Be)-Total			0.016		mg/kg		0.005-0.025	24-AUG-20
Bismuth (Bi)-Total			0.010		mg/kg		0.002-0.022	24-AUG-20
Boron (B)-Total			93.5		%		70-130	24-AUG-20
Cadmium (Cd)-Total			98.6		%		70-130	24-AUG-20
Calcium (Ca)-Total			104.8		%		70-130	24-AUG-20
Cesium (Cs)-Total			95.7		%		70-130	24-AUG-20
Cobalt (Co)-Total			102.8		%		70-130	24-AUG-20
Copper (Cu)-Total			99.2		%		70-130	24-AUG-20
Iron (Fe)-Total			110.2		%		70-130	24-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-3 CRM		**VA-NRC-DORM4**						
Lead (Pb)-Total			111.6		%		70-130	24-AUG-20
Lithium (Li)-Total			1.13		mg/kg		0.71-1.71	24-AUG-20
Magnesium (Mg)-Total			98.3		%		70-130	24-AUG-20
Manganese (Mn)-Total			102.0		%		70-130	24-AUG-20
Molybdenum (Mo)-Total			104.5		%		70-130	24-AUG-20
Nickel (Ni)-Total			91.2		%		70-130	24-AUG-20
Phosphorus (P)-Total			97.8		%		70-130	24-AUG-20
Potassium (K)-Total			103.0		%		70-130	24-AUG-20
Rubidium (Rb)-Total			103.6		%		70-130	24-AUG-20
Selenium (Se)-Total			102.4		%		70-130	24-AUG-20
Sodium (Na)-Total			105.9		%		70-130	24-AUG-20
Strontium (Sr)-Total			94.0		%		70-130	24-AUG-20
Thallium (Tl)-Total			104.4		%		70-130	24-AUG-20
Uranium (U)-Total			104.9		%		70-130	24-AUG-20
Vanadium (V)-Total			104.9		%		70-130	24-AUG-20
Zinc (Zn)-Total			109.1		%		70-130	24-AUG-20
Zirconium (Zr)-Total			0.29		mg/kg		0.05-0.45	24-AUG-20
WG3388321-2 DUP		**L2478696-68**						
Aluminum (Al)-Total		658	579		mg/kg	13	40	24-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	24-AUG-20
Arsenic (As)-Total		0.097	0.085		mg/kg	13	40	24-AUG-20
Barium (Ba)-Total		8.06	8.01		mg/kg	0.5	40	24-AUG-20
Beryllium (Be)-Total		0.030	0.025		mg/kg	16	40	24-AUG-20
Bismuth (Bi)-Total		0.021	0.020		mg/kg	1.6	40	24-AUG-20
Boron (B)-Total		<1.0	<1.0	RPD-NA	mg/kg	N/A	40	24-AUG-20
Cadmium (Cd)-Total		0.0535	0.0553		mg/kg	3.3	40	24-AUG-20
Calcium (Ca)-Total		9750	9690		mg/kg	0.6	60	24-AUG-20
Cesium (Cs)-Total		0.105	0.102		mg/kg	3.3	40	24-AUG-20
Cobalt (Co)-Total		0.479	0.427		mg/kg	11	40	24-AUG-20
Copper (Cu)-Total		1.54	1.56		mg/kg	1.5	40	24-AUG-20
Iron (Fe)-Total		2340	1920		mg/kg	20	40	24-AUG-20
Lead (Pb)-Total		0.854	0.790		mg/kg	7.8	40	24-AUG-20
Lithium (Li)-Total		0.61	0.55		mg/kg	10	40	24-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-2 DUP		**L2478696-68**						
Magnesium (Mg)-Total		2020	1960		mg/kg	3.1	40	24-AUG-20
Manganese (Mn)-Total		29.8	27.8		mg/kg	7.2	40	24-AUG-20
Molybdenum (Mo)-Total		0.246	0.215		mg/kg	13	40	24-AUG-20
Nickel (Ni)-Total		1.45	1.29		mg/kg	11	40	24-AUG-20
Phosphorus (P)-Total		499	497		mg/kg	0.3	40	24-AUG-20
Potassium (K)-Total		2060	2060		mg/kg	0.2	40	24-AUG-20
Rubidium (Rb)-Total		5.97	5.94		mg/kg	0.4	40	24-AUG-20
Selenium (Se)-Total		0.056	0.061		mg/kg	8.0	40	24-AUG-20
Sodium (Na)-Total		323	324		mg/kg	0.5	40	24-AUG-20
Strontium (Sr)-Total		4.30	4.12		mg/kg	4.4	60	24-AUG-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	24-AUG-20
Thallium (Tl)-Total		0.0155	0.0141		mg/kg	9.7	40	24-AUG-20
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	24-AUG-20
Uranium (U)-Total		0.141	0.127		mg/kg	11	40	24-AUG-20
Vanadium (V)-Total		1.09	0.97		mg/kg	12	40	24-AUG-20
Zinc (Zn)-Total		15.3	15.7		mg/kg	2.2	40	24-AUG-20
Zirconium (Zr)-Total		0.83	0.68		mg/kg	21	40	24-AUG-20
WG3388321-4 LCS								
Aluminum (Al)-Total			114.3		%		80-120	24-AUG-20
Antimony (Sb)-Total			106.5		%		80-120	24-AUG-20
Arsenic (As)-Total			111.7		%		80-120	24-AUG-20
Barium (Ba)-Total			112.4		%		80-120	24-AUG-20
Beryllium (Be)-Total			104.1		%		80-120	24-AUG-20
Bismuth (Bi)-Total			103.9		%		80-120	24-AUG-20
Boron (B)-Total			107.2		%		80-120	24-AUG-20
Cadmium (Cd)-Total			102.2		%		80-120	24-AUG-20
Calcium (Ca)-Total			104.6		%		80-120	24-AUG-20
Cesium (Cs)-Total			106.0		%		80-120	24-AUG-20
Cobalt (Co)-Total			112.5		%		80-120	24-AUG-20
Copper (Cu)-Total			111.1		%		80-120	24-AUG-20
Iron (Fe)-Total			116.2		%		80-120	24-AUG-20
Lead (Pb)-Total			106.1		%		80-120	24-AUG-20
Lithium (Li)-Total			107.9		%		80-120	24-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-4 LCS								
Magnesium (Mg)-Total			115.1		%		80-120	24-AUG-20
Manganese (Mn)-Total			114.3		%		80-120	24-AUG-20
Molybdenum (Mo)-Total			106.0		%		80-120	24-AUG-20
Nickel (Ni)-Total			111.9		%		80-120	24-AUG-20
Phosphorus (P)-Total			119.7		%		80-120	24-AUG-20
Potassium (K)-Total			118.2		%		80-120	24-AUG-20
Rubidium (Rb)-Total			113.2		%		80-120	24-AUG-20
Selenium (Se)-Total			110.6		%		80-120	24-AUG-20
Sodium (Na)-Total			116.7		%		80-120	24-AUG-20
Strontium (Sr)-Total			110.1		%		80-120	24-AUG-20
Tellurium (Te)-Total			102.1		%		80-120	24-AUG-20
Thallium (Tl)-Total			104.6		%		80-120	24-AUG-20
Tin (Sn)-Total			103.9		%		80-120	24-AUG-20
Uranium (U)-Total			104.7		%		80-120	24-AUG-20
Vanadium (V)-Total			114.8		%		80-120	24-AUG-20
Zinc (Zn)-Total			109.4		%		80-120	24-AUG-20
Zirconium (Zr)-Total			103.5		%		80-120	24-AUG-20
WG3388321-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	24-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	24-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	24-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	24-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	24-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	24-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	24-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	24-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	24-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	24-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	24-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	24-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	24-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	24-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	24-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	24-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-1 MB								
Manganese (Mn)-Total			<0.050		mg/kg		0.05	24-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	24-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	24-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	24-AUG-20
Potassium (K)-Total			<20		mg/kg		20	24-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	24-AUG-20
Selenium (Se)-Total			<0.050		mg/kg		0.05	24-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	24-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	24-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	24-AUG-20
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	24-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	24-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	24-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	24-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	24-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	24-AUG-20
Batch R5202274								
WG3388310-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			110.8		%		70-130	26-AUG-20
Arsenic (As)-Total			95.0		%		70-130	26-AUG-20
Barium (Ba)-Total			106.2		%		70-130	26-AUG-20
Beryllium (Be)-Total			0.016		mg/kg		0.005-0.025	26-AUG-20
Bismuth (Bi)-Total			0.012		mg/kg		0.002-0.022	26-AUG-20
Boron (B)-Total			87.8		%		70-130	26-AUG-20
Cadmium (Cd)-Total			97.8		%		70-130	26-AUG-20
Calcium (Ca)-Total			100.3		%		70-130	26-AUG-20
Cesium (Cs)-Total			96.6		%		70-130	26-AUG-20
Chromium (Cr)-Total			110.9		%		70-130	26-AUG-20
Cobalt (Co)-Total			99.4		%		70-130	26-AUG-20
Copper (Cu)-Total			97.1		%		70-130	26-AUG-20
Iron (Fe)-Total			105.4		%		70-130	26-AUG-20
Lead (Pb)-Total			108.4		%		70-130	26-AUG-20
Lithium (Li)-Total			1.10		mg/kg		0.71-1.71	26-AUG-20
Magnesium (Mg)-Total			97.9		%		70-130	26-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3388310-3 CRM		**VA-NRC-DORM4**						
Manganese (Mn)-Total			99.9		%		70-130	26-AUG-20
Molybdenum (Mo)-Total			89.0		%		70-130	26-AUG-20
Nickel (Ni)-Total			93.7		%		70-130	26-AUG-20
Phosphorus (P)-Total			92.8		%		70-130	26-AUG-20
Potassium (K)-Total			101.1		%		70-130	26-AUG-20
Rubidium (Rb)-Total			99.7		%		70-130	26-AUG-20
Selenium (Se)-Total			107.2		%		70-130	26-AUG-20
Sodium (Na)-Total			101.9		%		70-130	26-AUG-20
Strontium (Sr)-Total			94.4		%		70-130	26-AUG-20
Thallium (Tl)-Total			94.5		%		70-130	26-AUG-20
Uranium (U)-Total			95.1		%		70-130	26-AUG-20
Vanadium (V)-Total			104.0		%		70-130	26-AUG-20
Zinc (Zn)-Total			107.1		%		70-130	26-AUG-20
Zirconium (Zr)-Total			0.28		mg/kg		0.05-0.45	26-AUG-20
WG3389643-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			110.0		%		70-130	26-AUG-20
Arsenic (As)-Total			97.5		%		70-130	26-AUG-20
Barium (Ba)-Total			106.7		%		70-130	26-AUG-20
Beryllium (Be)-Total			0.014		mg/kg		0.005-0.025	26-AUG-20
Bismuth (Bi)-Total			0.014		mg/kg		0.002-0.022	26-AUG-20
Boron (B)-Total			94.0		%		70-130	26-AUG-20
Cadmium (Cd)-Total			100.3		%		70-130	26-AUG-20
Calcium (Ca)-Total			104.0		%		70-130	26-AUG-20
Cesium (Cs)-Total			95.7		%		70-130	26-AUG-20
Chromium (Cr)-Total			109.1		%		70-130	26-AUG-20
Cobalt (Co)-Total			101.4		%		70-130	26-AUG-20
Copper (Cu)-Total			100.1		%		70-130	26-AUG-20
Iron (Fe)-Total			111.1		%		70-130	26-AUG-20
Lead (Pb)-Total			102.8		%		70-130	26-AUG-20
Lithium (Li)-Total			1.12		mg/kg		0.71-1.71	26-AUG-20
Magnesium (Mg)-Total			102.7		%		70-130	26-AUG-20
Manganese (Mn)-Total			102.9		%		70-130	26-AUG-20
Molybdenum (Mo)-Total			97.0		%		70-130	26-AUG-20
Nickel (Ni)-Total			102.1		%		70-130	26-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3389643-3 CRM		**VA-NRC-DORM4**						
Phosphorus (P)-Total			96.9		%		70-130	26-AUG-20
Potassium (K)-Total			100.1		%		70-130	26-AUG-20
Rubidium (Rb)-Total			106.1		%		70-130	26-AUG-20
Selenium (Se)-Total			109.4		%		70-130	26-AUG-20
Sodium (Na)-Total			105.9		%		70-130	26-AUG-20
Strontium (Sr)-Total			98.2		%		70-130	26-AUG-20
Thallium (Tl)-Total			89.0		%		70-130	26-AUG-20
Uranium (U)-Total			95.8		%		70-130	26-AUG-20
Vanadium (V)-Total			106.5		%		70-130	26-AUG-20
Zinc (Zn)-Total			107.1		%		70-130	26-AUG-20
Zirconium (Zr)-Total			0.27		mg/kg		0.05-0.45	26-AUG-20
WG3389651-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			108.2		%		70-130	26-AUG-20
Arsenic (As)-Total			95.1		%		70-130	26-AUG-20
Barium (Ba)-Total			104.2		%		70-130	26-AUG-20
Beryllium (Be)-Total			0.016		mg/kg		0.005-0.025	26-AUG-20
Bismuth (Bi)-Total			0.011		mg/kg		0.002-0.022	26-AUG-20
Boron (B)-Total			90.8		%		70-130	26-AUG-20
Cadmium (Cd)-Total			96.3		%		70-130	26-AUG-20
Calcium (Ca)-Total			102.2		%		70-130	26-AUG-20
Cesium (Cs)-Total			94.6		%		70-130	26-AUG-20
Chromium (Cr)-Total			102.3		%		70-130	26-AUG-20
Cobalt (Co)-Total			99.5		%		70-130	26-AUG-20
Copper (Cu)-Total			96.0		%		70-130	26-AUG-20
Iron (Fe)-Total			107.0		%		70-130	26-AUG-20
Lead (Pb)-Total			109.0		%		70-130	26-AUG-20
Lithium (Li)-Total			1.10		mg/kg		0.71-1.71	26-AUG-20
Magnesium (Mg)-Total			98.4		%		70-130	26-AUG-20
Manganese (Mn)-Total			96.5		%		70-130	26-AUG-20
Molybdenum (Mo)-Total			94.2		%		70-130	26-AUG-20
Nickel (Ni)-Total			90.0		%		70-130	26-AUG-20
Phosphorus (P)-Total			94.5		%		70-130	26-AUG-20
Potassium (K)-Total			100.7		%		70-130	26-AUG-20
Rubidium (Rb)-Total			101.3		%		70-130	26-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3389651-3 CRM		**VA-NRC-DORM4**						
Selenium (Se)-Total			104.7		%		70-130	26-AUG-20
Sodium (Na)-Total			102.4		%		70-130	26-AUG-20
Strontium (Sr)-Total			96.0		%		70-130	26-AUG-20
Thallium (Tl)-Total			91.0		%		70-130	26-AUG-20
Uranium (U)-Total			97.3		%		70-130	26-AUG-20
Vanadium (V)-Total			101.9		%		70-130	26-AUG-20
Zinc (Zn)-Total			106.0		%		70-130	26-AUG-20
Zirconium (Zr)-Total			0.26		mg/kg		0.05-0.45	26-AUG-20
WG3390399-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			114.9		%		70-130	26-AUG-20
Arsenic (As)-Total			99.3		%		70-130	26-AUG-20
Barium (Ba)-Total			115.4		%		70-130	26-AUG-20
Beryllium (Be)-Total			0.015		mg/kg		0.005-0.025	26-AUG-20
Bismuth (Bi)-Total			0.011		mg/kg		0.002-0.022	26-AUG-20
Boron (B)-Total			91.0		%		70-130	26-AUG-20
Cadmium (Cd)-Total			100.7		%		70-130	26-AUG-20
Calcium (Ca)-Total			105.0		%		70-130	26-AUG-20
Cesium (Cs)-Total			97.5		%		70-130	26-AUG-20
Chromium (Cr)-Total			138.1	MES	%		70-130	26-AUG-20
Cobalt (Co)-Total			102.5		%		70-130	26-AUG-20
Copper (Cu)-Total			100.2		%		70-130	26-AUG-20
Iron (Fe)-Total			116.1		%		70-130	26-AUG-20
Lead (Pb)-Total			119.3		%		70-130	26-AUG-20
Lithium (Li)-Total			1.15		mg/kg		0.71-1.71	26-AUG-20
Magnesium (Mg)-Total			99.0		%		70-130	26-AUG-20
Manganese (Mn)-Total			103.7		%		70-130	26-AUG-20
Molybdenum (Mo)-Total			97.1		%		70-130	26-AUG-20
Nickel (Ni)-Total			108.6		%		70-130	26-AUG-20
Phosphorus (P)-Total			97.8		%		70-130	26-AUG-20
Potassium (K)-Total			105.1		%		70-130	26-AUG-20
Rubidium (Rb)-Total			105.7		%		70-130	26-AUG-20
Selenium (Se)-Total			112.7		%		70-130	26-AUG-20
Sodium (Na)-Total			106.2		%		70-130	26-AUG-20
Strontium (Sr)-Total			101.3		%		70-130	26-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3390399-3 CRM		**VA-NRC-DORM4**						
Thallium (Tl)-Total			86.0		%		70-130	26-AUG-20
Uranium (U)-Total			103.9		%		70-130	26-AUG-20
Vanadium (V)-Total			110.8		%		70-130	26-AUG-20
Zinc (Zn)-Total			111.1		%		70-130	26-AUG-20
Zirconium (Zr)-Total			0.29		mg/kg		0.05-0.45	26-AUG-20
WG3388310-2 DUP		**L2478696-13**						
Aluminum (Al)-Total		112	91.4		mg/kg	21	40	26-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	26-AUG-20
Arsenic (As)-Total		0.045	0.041		mg/kg	9.0	40	26-AUG-20
Barium (Ba)-Total		9.60	8.99		mg/kg	6.5	40	26-AUG-20
Beryllium (Be)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	26-AUG-20
Bismuth (Bi)-Total		0.013	0.010		mg/kg	27	40	26-AUG-20
Boron (B)-Total		<1.0	<1.0	RPD-NA	mg/kg	N/A	40	26-AUG-20
Cadmium (Cd)-Total		0.164	0.166		mg/kg	1.8	40	26-AUG-20
Calcium (Ca)-Total		10100	9360		mg/kg	7.1	60	26-AUG-20
Cesium (Cs)-Total		0.0300	0.0311		mg/kg	3.7	40	26-AUG-20
Chromium (Cr)-Total		0.325	0.265		mg/kg	20	40	26-AUG-20
Cobalt (Co)-Total		0.149	0.127		mg/kg	16	40	26-AUG-20
Copper (Cu)-Total		0.90	0.78		mg/kg	14	40	26-AUG-20
Iron (Fe)-Total		438	350		mg/kg	22	40	26-AUG-20
Lead (Pb)-Total		0.477	0.438		mg/kg	8.6	40	26-AUG-20
Lithium (Li)-Total		<0.50	<0.50	RPD-NA	mg/kg	N/A	40	26-AUG-20
Magnesium (Mg)-Total		1380	1270		mg/kg	8.1	40	26-AUG-20
Manganese (Mn)-Total		58.2	53.9		mg/kg	7.7	40	26-AUG-20
Molybdenum (Mo)-Total		0.071	0.054		mg/kg	27	40	26-AUG-20
Nickel (Ni)-Total		0.32	0.27		mg/kg	16	40	26-AUG-20
Phosphorus (P)-Total		296	289		mg/kg	2.5	40	26-AUG-20
Potassium (K)-Total		1440	1500		mg/kg	4.1	40	26-AUG-20
Rubidium (Rb)-Total		3.36	3.47		mg/kg	3.3	40	26-AUG-20
Selenium (Se)-Total		0.088	0.088		mg/kg	0.7	40	26-AUG-20
Sodium (Na)-Total		274	286		mg/kg	4.3	40	26-AUG-20
Strontium (Sr)-Total		9.98	10.2		mg/kg	2.2	60	26-AUG-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	26-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3388310-2 DUP		**L2478696-13**						
Thallium (Tl)-Total		0.0025	<0.0020	RPD-NA	mg/kg	N/A	40	26-AUG-20
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	26-AUG-20
Uranium (U)-Total		0.0344	0.0275		mg/kg	22	40	26-AUG-20
Vanadium (V)-Total		0.19	0.15		mg/kg	23	40	26-AUG-20
Zinc (Zn)-Total		24.1	21.8		mg/kg	10	40	26-AUG-20
Zirconium (Zr)-Total		0.20	<0.20	RPD-NA	mg/kg	N/A	40	26-AUG-20
WG3389643-2 DUP		**L2478696-98**						
Aluminum (Al)-Total		271	296		mg/kg	9.1	40	26-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	26-AUG-20
Arsenic (As)-Total		0.084	0.081		mg/kg	3.2	40	26-AUG-20
Barium (Ba)-Total		6.19	6.26		mg/kg	1.1	40	26-AUG-20
Beryllium (Be)-Total		0.018	0.020		mg/kg	13	40	26-AUG-20
Bismuth (Bi)-Total		0.023	0.018		mg/kg	26	40	26-AUG-20
Boron (B)-Total		1.0	1.1		mg/kg	6.3	40	26-AUG-20
Cadmium (Cd)-Total		0.0311	0.0354		mg/kg	13	40	26-AUG-20
Calcium (Ca)-Total		35800	36200		mg/kg	1.1	60	26-AUG-20
Cesium (Cs)-Total		0.132	0.133		mg/kg	1.2	40	26-AUG-20
Chromium (Cr)-Total		0.592	0.659		mg/kg	11	40	26-AUG-20
Cobalt (Co)-Total		0.143	0.164		mg/kg	13	40	26-AUG-20
Copper (Cu)-Total		0.92	0.97		mg/kg	4.7	40	26-AUG-20
Iron (Fe)-Total		867	897		mg/kg	3.4	40	26-AUG-20
Lead (Pb)-Total		1.65	1.71		mg/kg	3.7	40	26-AUG-20
Lithium (Li)-Total		0.60	0.69		mg/kg	14	40	26-AUG-20
Magnesium (Mg)-Total		997	1090		mg/kg	9.0	40	26-AUG-20
Manganese (Mn)-Total		19.1	19.6		mg/kg	2.3	40	26-AUG-20
Molybdenum (Mo)-Total		0.157	0.142		mg/kg	9.6	40	26-AUG-20
Nickel (Ni)-Total		0.46	0.48		mg/kg	4.4	40	26-AUG-20
Phosphorus (P)-Total		282	268		mg/kg	5.4	40	26-AUG-20
Potassium (K)-Total		1230	1170		mg/kg	5.3	40	26-AUG-20
Rubidium (Rb)-Total		3.54	3.48		mg/kg	1.6	40	26-AUG-20
Selenium (Se)-Total		0.080	0.081		mg/kg	2.0	40	26-AUG-20
Sodium (Na)-Total		240	233		mg/kg	2.7	40	26-AUG-20
Strontium (Sr)-Total		21.7	20.9		mg/kg	3.5	60	26-AUG-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3389643-2 DUP		**L2478696-98**						
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	26-AUG-20
Thallium (Tl)-Total		0.0072	0.0077		mg/kg	6.5	40	26-AUG-20
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	26-AUG-20
Uranium (U)-Total		0.362	0.417		mg/kg	14	40	26-AUG-20
Vanadium (V)-Total		0.50	0.56		mg/kg	12	40	26-AUG-20
Zinc (Zn)-Total		7.92	7.79		mg/kg	1.6	40	26-AUG-20
Zirconium (Zr)-Total		0.83	0.87		mg/kg	4.6	40	26-AUG-20
WG3389651-2 DUP		**L2478696-164**						
Aluminum (Al)-Total		907	467	DUP-H	mg/kg	64	40	26-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	26-AUG-20
Arsenic (As)-Total		0.157	0.096	DUP-H	mg/kg	49	40	26-AUG-20
Barium (Ba)-Total		6.76	5.92		mg/kg	13	40	26-AUG-20
Beryllium (Be)-Total		0.052	0.033	J	mg/kg	0.019	0.02	26-AUG-20
Bismuth (Bi)-Total		0.019	0.014		mg/kg	31	40	26-AUG-20
Boron (B)-Total		2.2	1.3	J	mg/kg	1.0	2	26-AUG-20
Cadmium (Cd)-Total		0.0468	0.0477		mg/kg	1.9	40	26-AUG-20
Calcium (Ca)-Total		35400	37900		mg/kg	6.7	60	26-AUG-20
Cesium (Cs)-Total		0.202	0.153		mg/kg	28	40	26-AUG-20
Chromium (Cr)-Total		2.01	1.04	DUP-H	mg/kg	64	40	26-AUG-20
Cobalt (Co)-Total		0.480	0.281	DUP-H	mg/kg	52	40	26-AUG-20
Copper (Cu)-Total		1.31	1.15		mg/kg	13	40	26-AUG-20
Iron (Fe)-Total		2410	1440	DUP-H	mg/kg	51	40	26-AUG-20
Lead (Pb)-Total		2.10	1.81		mg/kg	15	40	26-AUG-20
Lithium (Li)-Total		2.04	1.04	DUP-H,J	mg/kg	1.00	1	26-AUG-20
Magnesium (Mg)-Total		1260	979		mg/kg	25	40	26-AUG-20
Manganese (Mn)-Total		34.7	25.4		mg/kg	31	40	26-AUG-20
Molybdenum (Mo)-Total		0.143	0.117		mg/kg	20	40	26-AUG-20
Nickel (Ni)-Total		1.34	0.77	DUP-H	mg/kg	53	40	26-AUG-20
Phosphorus (P)-Total		241	290		mg/kg	18	40	26-AUG-20
Potassium (K)-Total		952	1220		mg/kg	25	40	26-AUG-20
Rubidium (Rb)-Total		4.53	4.61		mg/kg	1.8	40	26-AUG-20
Selenium (Se)-Total		0.076	0.076		mg/kg	0.3	40	26-AUG-20
Sodium (Na)-Total		177	255		mg/kg	36	40	26-AUG-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3389651-2 DUP		**L2478696-164**						
Strontium (Sr)-Total		21.2	22.8		mg/kg	7.4	60	26-AUG-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	26-AUG-20
Thallium (Tl)-Total		0.0167	0.0087	DUP-H	mg/kg	63	40	26-AUG-20
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	26-AUG-20
Uranium (U)-Total		1.14	0.799		mg/kg	36	40	26-AUG-20
Vanadium (V)-Total		2.09	1.05	DUP-H	mg/kg	67	40	26-AUG-20
Zinc (Zn)-Total		8.02	8.34		mg/kg	3.9	40	26-AUG-20
Zirconium (Zr)-Total		1.75	1.03	DUP-H	mg/kg	52	40	26-AUG-20
WG3390399-2 DUP		**L2478696-68**						
Aluminum (Al)-Total		658	518		mg/kg	8.4	40	26-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	26-AUG-20
Arsenic (As)-Total		0.097	0.082		mg/kg	2.2	40	26-AUG-20
Barium (Ba)-Total		8.06	7.38		mg/kg	3.4	40	26-AUG-20
Beryllium (Be)-Total		0.030	0.022		mg/kg	3.8	40	26-AUG-20
Bismuth (Bi)-Total		0.021	0.019		mg/kg	9.4	40	26-AUG-20
Boron (B)-Total		<1.0	<1.0	RPD-NA	mg/kg	N/A	40	26-AUG-20
Cadmium (Cd)-Total		0.0535	0.0504		mg/kg	7.1	40	26-AUG-20
Calcium (Ca)-Total		9750	8550		mg/kg	1.0	60	26-AUG-20
Cesium (Cs)-Total		0.105	0.0948		mg/kg	0.7	40	26-AUG-20
Chromium (Cr)-Total		1.60	1.48		mg/kg	8.1	40	26-AUG-20
Cobalt (Co)-Total		0.479	0.381		mg/kg	6.0	40	26-AUG-20
Copper (Cu)-Total		1.54	1.30		mg/kg	6.7	40	26-AUG-20
Iron (Fe)-Total		2340	1950		mg/kg	5.1	40	26-AUG-20
Lead (Pb)-Total		0.854	0.691		mg/kg	5.3	40	26-AUG-20
Lithium (Li)-Total		0.61	<0.50	RPD-NA	mg/kg	N/A	40	26-AUG-20
Magnesium (Mg)-Total		2020	1730		mg/kg	5.3	40	26-AUG-20
Manganese (Mn)-Total		29.8	25.9		mg/kg	3.5	40	26-AUG-20
Molybdenum (Mo)-Total		0.246	0.180		mg/kg	8.2	40	26-AUG-20
Nickel (Ni)-Total		1.45	1.18		mg/kg	10	40	26-AUG-20
Phosphorus (P)-Total		499	441		mg/kg	1.4	40	26-AUG-20
Potassium (K)-Total		2060	2040		mg/kg	1.7	40	26-AUG-20
Rubidium (Rb)-Total		5.97	5.60		mg/kg	0.5	40	26-AUG-20
Selenium (Se)-Total		0.056	0.077		mg/kg	18	40	26-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3390399-2 DUP		**L2478696-68**						
Sodium (Na)-Total		323	308		mg/kg	4.5	40	26-AUG-20
Strontium (Sr)-Total		4.30	3.81		mg/kg	3.4	60	26-AUG-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	26-AUG-20
Thallium (Tl)-Total		0.0155	0.0111		mg/kg	2.9	40	26-AUG-20
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	26-AUG-20
Uranium (U)-Total		0.141	0.119		mg/kg	4.8	40	26-AUG-20
Vanadium (V)-Total		1.09	0.83		mg/kg	13	40	26-AUG-20
Zinc (Zn)-Total		15.3	13.2		mg/kg	2.8	40	26-AUG-20
Zirconium (Zr)-Total		0.83	0.67		mg/kg	15	40	26-AUG-20
WG3388310-4 LCS								
Aluminum (Al)-Total			112.5		%		80-120	26-AUG-20
Antimony (Sb)-Total			106.4		%		80-120	26-AUG-20
Arsenic (As)-Total			104.7		%		80-120	26-AUG-20
Barium (Ba)-Total			110.4		%		80-120	26-AUG-20
Beryllium (Be)-Total			102.9		%		80-120	26-AUG-20
Bismuth (Bi)-Total			106.6		%		80-120	26-AUG-20
Boron (B)-Total			100.2		%		80-120	26-AUG-20
Cadmium (Cd)-Total			103.5		%		80-120	26-AUG-20
Calcium (Ca)-Total			104.3		%		80-120	26-AUG-20
Cesium (Cs)-Total			107.5		%		80-120	26-AUG-20
Chromium (Cr)-Total			106.7		%		80-120	26-AUG-20
Cobalt (Co)-Total			106.5		%		80-120	26-AUG-20
Copper (Cu)-Total			114.3		%		80-120	26-AUG-20
Iron (Fe)-Total			108.8		%		80-120	26-AUG-20
Lead (Pb)-Total			107.1		%		80-120	26-AUG-20
Lithium (Li)-Total			103.8		%		80-120	26-AUG-20
Magnesium (Mg)-Total			109.3		%		80-120	26-AUG-20
Manganese (Mn)-Total			109.7		%		80-120	26-AUG-20
Molybdenum (Mo)-Total			104.1		%		80-120	26-AUG-20
Nickel (Ni)-Total			106.4		%		80-120	26-AUG-20
Phosphorus (P)-Total			111.7		%		80-120	26-AUG-20
Potassium (K)-Total			110.3		%		80-120	26-AUG-20
Rubidium (Rb)-Total			104.2		%		80-120	26-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3388310-4 LCS								
Selenium (Se)-Total			109.5		%		80-120	26-AUG-20
Sodium (Na)-Total			108.4		%		80-120	26-AUG-20
Strontium (Sr)-Total			106.6		%		80-120	26-AUG-20
Tellurium (Te)-Total			105.8		%		80-120	26-AUG-20
Thallium (Tl)-Total			105.4		%		80-120	26-AUG-20
Tin (Sn)-Total			104.3		%		80-120	26-AUG-20
Uranium (U)-Total			98.5		%		80-120	26-AUG-20
Vanadium (V)-Total			109.7		%		80-120	26-AUG-20
Zinc (Zn)-Total			110.2		%		80-120	26-AUG-20
Zirconium (Zr)-Total			100.9		%		80-120	26-AUG-20
WG3389643-4 LCS								
Aluminum (Al)-Total			105.4		%		80-120	26-AUG-20
Antimony (Sb)-Total			103.2		%		80-120	26-AUG-20
Arsenic (As)-Total			99.6		%		80-120	26-AUG-20
Barium (Ba)-Total			105.3		%		80-120	26-AUG-20
Beryllium (Be)-Total			99.6		%		80-120	26-AUG-20
Bismuth (Bi)-Total			101.3		%		80-120	26-AUG-20
Boron (B)-Total			101.6		%		80-120	26-AUG-20
Cadmium (Cd)-Total			101.8		%		80-120	26-AUG-20
Calcium (Ca)-Total			101.2		%		80-120	26-AUG-20
Cesium (Cs)-Total			104.8		%		80-120	26-AUG-20
Chromium (Cr)-Total			104.2		%		80-120	26-AUG-20
Cobalt (Co)-Total			102.5		%		80-120	26-AUG-20
Copper (Cu)-Total			101.3		%		80-120	26-AUG-20
Iron (Fe)-Total			110.3		%		80-120	26-AUG-20
Lead (Pb)-Total			103.3		%		80-120	26-AUG-20
Lithium (Li)-Total			99.6		%		80-120	26-AUG-20
Magnesium (Mg)-Total			104.1		%		80-120	26-AUG-20
Manganese (Mn)-Total			105.9		%		80-120	26-AUG-20
Molybdenum (Mo)-Total			102.9		%		80-120	26-AUG-20
Nickel (Ni)-Total			101.6		%		80-120	26-AUG-20
Phosphorus (P)-Total			103.1		%		80-120	26-AUG-20
Potassium (K)-Total			103.9		%		80-120	26-AUG-20
Rubidium (Rb)-Total			104.8		%		80-120	26-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3389643-4 LCS								
Selenium (Se)-Total			106.6		%		80-120	26-AUG-20
Sodium (Na)-Total			104.7		%		80-120	26-AUG-20
Strontium (Sr)-Total			105.0		%		80-120	26-AUG-20
Tellurium (Te)-Total			103.3		%		80-120	26-AUG-20
Thallium (Tl)-Total			100.2		%		80-120	26-AUG-20
Tin (Sn)-Total			101.0		%		80-120	26-AUG-20
Uranium (U)-Total			98.7		%		80-120	26-AUG-20
Vanadium (V)-Total			106.4		%		80-120	26-AUG-20
Zinc (Zn)-Total			98.1		%		80-120	26-AUG-20
Zirconium (Zr)-Total			98.6		%		80-120	26-AUG-20
WG3389651-4 LCS								
Aluminum (Al)-Total			105.5		%		80-120	26-AUG-20
Antimony (Sb)-Total			99.9		%		80-120	26-AUG-20
Arsenic (As)-Total			100.0		%		80-120	26-AUG-20
Barium (Ba)-Total			101.0		%		80-120	26-AUG-20
Beryllium (Be)-Total			97.8		%		80-120	26-AUG-20
Bismuth (Bi)-Total			98.7		%		80-120	26-AUG-20
Boron (B)-Total			96.8		%		80-120	26-AUG-20
Cadmium (Cd)-Total			98.7		%		80-120	26-AUG-20
Calcium (Ca)-Total			100.8		%		80-120	26-AUG-20
Cesium (Cs)-Total			100.5		%		80-120	26-AUG-20
Chromium (Cr)-Total			101.8		%		80-120	26-AUG-20
Cobalt (Co)-Total			102.4		%		80-120	26-AUG-20
Copper (Cu)-Total			99.7		%		80-120	26-AUG-20
Iron (Fe)-Total			106.7		%		80-120	26-AUG-20
Lead (Pb)-Total			102.1		%		80-120	26-AUG-20
Lithium (Li)-Total			98.4		%		80-120	26-AUG-20
Magnesium (Mg)-Total			103.3		%		80-120	26-AUG-20
Manganese (Mn)-Total			103.7		%		80-120	26-AUG-20
Molybdenum (Mo)-Total			101.6		%		80-120	26-AUG-20
Nickel (Ni)-Total			101.0		%		80-120	26-AUG-20
Phosphorus (P)-Total			108.8		%		80-120	26-AUG-20
Potassium (K)-Total			103.3		%		80-120	26-AUG-20
Rubidium (Rb)-Total			100.6		%		80-120	26-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3389651-4 LCS								
Selenium (Se)-Total			103.9		%		80-120	26-AUG-20
Sodium (Na)-Total			103.8		%		80-120	26-AUG-20
Strontium (Sr)-Total			103.2		%		80-120	26-AUG-20
Tellurium (Te)-Total			101.7		%		80-120	26-AUG-20
Thallium (Tl)-Total			98.0		%		80-120	26-AUG-20
Tin (Sn)-Total			98.0		%		80-120	26-AUG-20
Uranium (U)-Total			99.7		%		80-120	26-AUG-20
Vanadium (V)-Total			104.9		%		80-120	26-AUG-20
Zinc (Zn)-Total			96.7		%		80-120	26-AUG-20
Zirconium (Zr)-Total			96.3		%		80-120	26-AUG-20
WG3390399-4 LCS								
Aluminum (Al)-Total			107.3		%		80-120	26-AUG-20
Antimony (Sb)-Total			103.0		%		80-120	26-AUG-20
Arsenic (As)-Total			102.3		%		80-120	26-AUG-20
Barium (Ba)-Total			109.9		%		80-120	26-AUG-20
Beryllium (Be)-Total			103.8		%		80-120	26-AUG-20
Bismuth (Bi)-Total			101.3		%		80-120	26-AUG-20
Boron (B)-Total			99.4		%		80-120	26-AUG-20
Cadmium (Cd)-Total			100.4		%		80-120	26-AUG-20
Calcium (Ca)-Total			105.3		%		80-120	26-AUG-20
Cesium (Cs)-Total			104.9		%		80-120	26-AUG-20
Chromium (Cr)-Total			107.6		%		80-120	26-AUG-20
Cobalt (Co)-Total			104.8		%		80-120	26-AUG-20
Copper (Cu)-Total			102.5		%		80-120	26-AUG-20
Iron (Fe)-Total			110.2		%		80-120	26-AUG-20
Lead (Pb)-Total			104.5		%		80-120	26-AUG-20
Lithium (Li)-Total			104.9		%		80-120	26-AUG-20
Magnesium (Mg)-Total			106.5		%		80-120	26-AUG-20
Manganese (Mn)-Total			109.3		%		80-120	26-AUG-20
Molybdenum (Mo)-Total			103.1		%		80-120	26-AUG-20
Nickel (Ni)-Total			104.1		%		80-120	26-AUG-20
Phosphorus (P)-Total			110.5		%		80-120	26-AUG-20
Potassium (K)-Total			107.9		%		80-120	26-AUG-20
Rubidium (Rb)-Total			104.0		%		80-120	26-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3390399-4 LCS								
Selenium (Se)-Total			104.8		%		80-120	26-AUG-20
Sodium (Na)-Total			107.2		%		80-120	26-AUG-20
Strontium (Sr)-Total			108.5		%		80-120	26-AUG-20
Tellurium (Te)-Total			101.3		%		80-120	26-AUG-20
Thallium (Tl)-Total			100.9		%		80-120	26-AUG-20
Tin (Sn)-Total			101.7		%		80-120	26-AUG-20
Uranium (U)-Total			101.4		%		80-120	26-AUG-20
Vanadium (V)-Total			109.1		%		80-120	26-AUG-20
Zinc (Zn)-Total			99.4		%		80-120	26-AUG-20
Zirconium (Zr)-Total			99.1		%		80-120	26-AUG-20
WG3388310-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	26-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	26-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	26-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	26-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	26-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	26-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	26-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	26-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Chromium (Cr)-Total			<0.050		mg/kg		0.05	26-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	26-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	26-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	26-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	26-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	26-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	26-AUG-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	26-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	26-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	26-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	26-AUG-20
Potassium (K)-Total			<20		mg/kg		20	26-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	26-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3388310-1 MB								
Selenium (Se)-Total			<0.050		mg/kg		0.05	26-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	26-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	26-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	26-AUG-20
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	26-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	26-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	26-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	26-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	26-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	26-AUG-20
WG3389643-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	26-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	26-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	26-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	26-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	26-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	26-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	26-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	26-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Chromium (Cr)-Total			<0.050		mg/kg		0.05	26-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	26-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	26-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	26-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	26-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	26-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	26-AUG-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	26-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	26-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	26-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	26-AUG-20
Potassium (K)-Total			<20		mg/kg		20	26-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	26-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3389643-1 MB								
Selenium (Se)-Total			<0.050		mg/kg		0.05	26-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	26-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	26-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	26-AUG-20
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	26-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	26-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	26-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	26-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	26-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	26-AUG-20
WG3389651-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	26-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	26-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	26-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	26-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	26-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	26-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	26-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	26-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Chromium (Cr)-Total			<0.050		mg/kg		0.05	26-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	26-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	26-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	26-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	26-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	26-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	26-AUG-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	26-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	26-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	26-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	26-AUG-20
Potassium (K)-Total			<20		mg/kg		20	26-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	26-AUG-20

Quality Control Report

Workorder: L2478696 Report Date: 05-SEP-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3389651-1 MB								
Selenium (Se)-Total			<0.050		mg/kg		0.05	26-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	26-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	26-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	26-AUG-20
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	26-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	26-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	26-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	26-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	26-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	26-AUG-20
WG3390399-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	26-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	26-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	26-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	26-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	26-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	26-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	26-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	26-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	26-AUG-20
Chromium (Cr)-Total			<0.050		mg/kg		0.05	26-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	26-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	26-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	26-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	26-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	26-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	26-AUG-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	26-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	26-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	26-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	26-AUG-20
Potassium (K)-Total			<20		mg/kg		20	26-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	26-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5202274								
WG3390399-1 MB								
Selenium (Se)-Total			<0.050		mg/kg		0.05	26-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	26-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	26-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	26-AUG-20
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	26-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	26-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	26-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	26-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	26-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	26-AUG-20
Batch R5203943								
WG3390496-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			114.3		%		70-130	28-AUG-20
Arsenic (As)-Total			97.8		%		70-130	28-AUG-20
Barium (Ba)-Total			108.6		%		70-130	28-AUG-20
Beryllium (Be)-Total			0.016		mg/kg		0.005-0.025	28-AUG-20
Bismuth (Bi)-Total			0.011		mg/kg		0.002-0.022	28-AUG-20
Boron (B)-Total			96.7		%		70-130	28-AUG-20
Cadmium (Cd)-Total			98.0		%		70-130	28-AUG-20
Calcium (Ca)-Total			100.1		%		70-130	28-AUG-20
Cesium (Cs)-Total			92.9		%		70-130	28-AUG-20
Chromium (Cr)-Total			112.8		%		70-130	28-AUG-20
Cobalt (Co)-Total			102.4		%		70-130	28-AUG-20
Copper (Cu)-Total			100.9		%		70-130	28-AUG-20
Iron (Fe)-Total			110.1		%		70-130	28-AUG-20
Lead (Pb)-Total			116.2		%		70-130	28-AUG-20
Lithium (Li)-Total			1.18		mg/kg		0.71-1.71	28-AUG-20
Magnesium (Mg)-Total			105.1		%		70-130	28-AUG-20
Manganese (Mn)-Total			96.6		%		70-130	28-AUG-20
Molybdenum (Mo)-Total			96.5		%		70-130	28-AUG-20
Nickel (Ni)-Total			99.9		%		70-130	28-AUG-20
Phosphorus (P)-Total			102.9		%		70-130	28-AUG-20
Potassium (K)-Total			107.4		%		70-130	28-AUG-20
Rubidium (Rb)-Total			107.5		%		70-130	28-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3390496-3 CRM		**VA-NRC-DORM4**						
Selenium (Se)-Total			105.4		%		70-130	28-AUG-20
Sodium (Na)-Total			104.9		%		70-130	28-AUG-20
Strontium (Sr)-Total			98.6		%		70-130	28-AUG-20
Thallium (Tl)-Total			84.7		%		70-130	28-AUG-20
Uranium (U)-Total			103.0		%		70-130	28-AUG-20
Vanadium (V)-Total			109.1		%		70-130	28-AUG-20
Zinc (Zn)-Total			108.9		%		70-130	28-AUG-20
Zirconium (Zr)-Total			0.27		mg/kg		0.05-0.45	28-AUG-20
WG3392427-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			106.9		%		70-130	28-AUG-20
Arsenic (As)-Total			94.4		%		70-130	28-AUG-20
Barium (Ba)-Total			103.2		%		70-130	28-AUG-20
Beryllium (Be)-Total			0.015		mg/kg		0.005-0.025	28-AUG-20
Bismuth (Bi)-Total			0.010		mg/kg		0.002-0.022	28-AUG-20
Boron (B)-Total			91.5		%		70-130	28-AUG-20
Cadmium (Cd)-Total			95.0		%		70-130	28-AUG-20
Calcium (Ca)-Total			99.7		%		70-130	28-AUG-20
Cesium (Cs)-Total			91.6		%		70-130	28-AUG-20
Chromium (Cr)-Total			112.6		%		70-130	28-AUG-20
Cobalt (Co)-Total			102.4		%		70-130	28-AUG-20
Copper (Cu)-Total			95.3		%		70-130	28-AUG-20
Iron (Fe)-Total			107.9		%		70-130	28-AUG-20
Lead (Pb)-Total			104.0		%		70-130	28-AUG-20
Lithium (Li)-Total			1.15		mg/kg		0.71-1.71	28-AUG-20
Magnesium (Mg)-Total			98.0		%		70-130	28-AUG-20
Manganese (Mn)-Total			95.9		%		70-130	28-AUG-20
Molybdenum (Mo)-Total			86.9		%		70-130	28-AUG-20
Nickel (Ni)-Total			89.9		%		70-130	28-AUG-20
Phosphorus (P)-Total			97.4		%		70-130	28-AUG-20
Potassium (K)-Total			101.1		%		70-130	28-AUG-20
Rubidium (Rb)-Total			104.5		%		70-130	28-AUG-20
Selenium (Se)-Total			94.6		%		70-130	28-AUG-20
Sodium (Na)-Total			97.9		%		70-130	28-AUG-20
Strontium (Sr)-Total			94.0		%		70-130	28-AUG-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392427-3 CRM		**VA-NRC-DORM4**						
Thallium (Tl)-Total			89.3		%		70-130	28-AUG-20
Uranium (U)-Total			102.6		%		70-130	28-AUG-20
Vanadium (V)-Total			104.1		%		70-130	28-AUG-20
Zinc (Zn)-Total			104.1		%		70-130	28-AUG-20
Zirconium (Zr)-Total			0.23		mg/kg		0.05-0.45	28-AUG-20
WG3392441-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			111.6		%		70-130	28-AUG-20
Arsenic (As)-Total			93.6		%		70-130	28-AUG-20
Barium (Ba)-Total			105.4		%		70-130	28-AUG-20
Beryllium (Be)-Total			0.016		mg/kg		0.005-0.025	28-AUG-20
Bismuth (Bi)-Total			0.012		mg/kg		0.002-0.022	28-AUG-20
Boron (B)-Total			94.3		%		70-130	28-AUG-20
Cadmium (Cd)-Total			95.4		%		70-130	28-AUG-20
Calcium (Ca)-Total			102.5		%		70-130	28-AUG-20
Cesium (Cs)-Total			96.1		%		70-130	28-AUG-20
Chromium (Cr)-Total			104.6		%		70-130	28-AUG-20
Cobalt (Co)-Total			102.0		%		70-130	28-AUG-20
Copper (Cu)-Total			96.0		%		70-130	28-AUG-20
Iron (Fe)-Total			110.5		%		70-130	28-AUG-20
Lead (Pb)-Total			109.9		%		70-130	28-AUG-20
Lithium (Li)-Total			1.18		mg/kg		0.71-1.71	28-AUG-20
Magnesium (Mg)-Total			99.9		%		70-130	28-AUG-20
Manganese (Mn)-Total			100.3		%		70-130	28-AUG-20
Molybdenum (Mo)-Total			92.8		%		70-130	28-AUG-20
Nickel (Ni)-Total			94.2		%		70-130	28-AUG-20
Phosphorus (P)-Total			103.4		%		70-130	28-AUG-20
Potassium (K)-Total			103.0		%		70-130	28-AUG-20
Rubidium (Rb)-Total			106.2		%		70-130	28-AUG-20
Selenium (Se)-Total			96.2		%		70-130	28-AUG-20
Sodium (Na)-Total			102.1		%		70-130	28-AUG-20
Strontium (Sr)-Total			98.5		%		70-130	28-AUG-20
Thallium (Tl)-Total			83.2		%		70-130	28-AUG-20
Uranium (U)-Total			99.6		%		70-130	28-AUG-20
Vanadium (V)-Total			105.4		%		70-130	28-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392441-3 CRM		**VA-NRC-DORM4**						
Zinc (Zn)-Total			107.8		%		70-130	28-AUG-20
Zirconium (Zr)-Total			0.29		mg/kg		0.05-0.45	28-AUG-20
WG3390496-2 DUP		**L2478696-20**						
Aluminum (Al)-Total		469	343		mg/kg	31	40	28-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	28-AUG-20
Arsenic (As)-Total		0.072	0.058		mg/kg	21	40	28-AUG-20
Barium (Ba)-Total		10.9	10.1		mg/kg	7.1	40	28-AUG-20
Beryllium (Be)-Total		0.023	0.019		mg/kg	19	40	28-AUG-20
Bismuth (Bi)-Total		0.026	0.026		mg/kg	2.1	40	28-AUG-20
Boron (B)-Total		1.2	<1.0	RPD-NA	mg/kg	N/A	40	28-AUG-20
Cadmium (Cd)-Total		0.294	0.252		mg/kg	15	40	28-AUG-20
Calcium (Ca)-Total		12000	11200		mg/kg	6.5	60	28-AUG-20
Cesium (Cs)-Total		0.0804	0.0691		mg/kg	15	40	28-AUG-20
Chromium (Cr)-Total		1.10	0.839		mg/kg	27	40	28-AUG-20
Cobalt (Co)-Total		0.366	0.297		mg/kg	21	40	28-AUG-20
Copper (Cu)-Total		2.03	1.60		mg/kg	24	40	28-AUG-20
Iron (Fe)-Total		953	746		mg/kg	24	40	28-AUG-20
Lead (Pb)-Total		1.11	1.05		mg/kg	6.1	40	28-AUG-20
Lithium (Li)-Total		0.54	<0.50	RPD-NA	mg/kg	N/A	40	28-AUG-20
Magnesium (Mg)-Total		1430	1340		mg/kg	6.3	40	28-AUG-20
Manganese (Mn)-Total		45.0	42.0		mg/kg	7.0	40	28-AUG-20
Molybdenum (Mo)-Total		0.112	0.079		mg/kg	35	40	28-AUG-20
Nickel (Ni)-Total		0.92	0.71		mg/kg	26	40	28-AUG-20
Phosphorus (P)-Total		627	564		mg/kg	11	40	28-AUG-20
Potassium (K)-Total		1760	1840		mg/kg	4.5	40	28-AUG-20
Rubidium (Rb)-Total		7.19	6.87		mg/kg	4.6	40	28-AUG-20
Selenium (Se)-Total		0.083	0.086		mg/kg	3.1	40	28-AUG-20
Sodium (Na)-Total		280	300		mg/kg	6.8	40	28-AUG-20
Strontium (Sr)-Total		8.02	7.88		mg/kg	1.9	60	28-AUG-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	28-AUG-20
Thallium (Tl)-Total		0.0079	0.0062		mg/kg	24	40	28-AUG-20
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	28-AUG-20
Uranium (U)-Total		0.0808	0.0704		mg/kg	14	40	28-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3390496-2 DUP		**L2478696-20**						
Vanadium (V)-Total		0.90	0.75		mg/kg	19	40	28-AUG-20
Zinc (Zn)-Total		49.6	41.4		mg/kg	18	40	28-AUG-20
Zirconium (Zr)-Total		0.78	0.60		mg/kg	26	40	28-AUG-20
WG3392427-2 DUP		**L2478696-120**						
Aluminum (Al)-Total		666	811		mg/kg	20	40	28-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	28-AUG-20
Arsenic (As)-Total		0.189	0.222		mg/kg	16	40	28-AUG-20
Barium (Ba)-Total		6.07	6.40		mg/kg	5.4	40	28-AUG-20
Beryllium (Be)-Total		0.047	0.057		mg/kg	18	40	28-AUG-20
Bismuth (Bi)-Total		0.024	0.034		mg/kg	35	40	28-AUG-20
Boron (B)-Total		2.9	3.6		mg/kg	22	40	28-AUG-20
Cadmium (Cd)-Total		0.0291	0.0340		mg/kg	15	40	28-AUG-20
Calcium (Ca)-Total		22700	24400		mg/kg	7.3	60	28-AUG-20
Cesium (Cs)-Total		0.173	0.197		mg/kg	13	40	28-AUG-20
Chromium (Cr)-Total		1.55	1.88		mg/kg	19	40	28-AUG-20
Cobalt (Co)-Total		0.445	0.504		mg/kg	12	40	28-AUG-20
Copper (Cu)-Total		1.73	1.94		mg/kg	12	40	28-AUG-20
Iron (Fe)-Total		2550	3400		mg/kg	29	40	28-AUG-20
Lead (Pb)-Total		2.07	2.34		mg/kg	12	40	28-AUG-20
Lithium (Li)-Total		1.88	2.22		mg/kg	16	40	28-AUG-20
Magnesium (Mg)-Total		1900	2080		mg/kg	8.8	40	28-AUG-20
Manganese (Mn)-Total		35.7	39.1		mg/kg	9.0	40	28-AUG-20
Molybdenum (Mo)-Total		0.248	0.289		mg/kg	15	40	28-AUG-20
Nickel (Ni)-Total		1.31	1.39		mg/kg	6.1	40	28-AUG-20
Phosphorus (P)-Total		536	585		mg/kg	8.6	40	28-AUG-20
Potassium (K)-Total		1480	1600		mg/kg	7.8	40	28-AUG-20
Rubidium (Rb)-Total		4.09	4.47		mg/kg	8.8	40	28-AUG-20
Selenium (Se)-Total		0.065	0.074		mg/kg	13	40	28-AUG-20
Sodium (Na)-Total		301	322		mg/kg	6.6	40	28-AUG-20
Strontium (Sr)-Total		23.1	24.8		mg/kg	6.8	60	28-AUG-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	28-AUG-20
Thallium (Tl)-Total		0.0122	0.0148		mg/kg	19	40	28-AUG-20
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	28-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392427-2 DUP		**L2478696-120**						
Uranium (U)-Total		0.562	0.622		mg/kg	10	40	28-AUG-20
Vanadium (V)-Total		1.32	1.58		mg/kg	18	40	28-AUG-20
Zinc (Zn)-Total		11.2	11.9		mg/kg	6.3	40	28-AUG-20
Zirconium (Zr)-Total		1.63	2.03		mg/kg	22	40	28-AUG-20
WG3392441-2 DUP		**L2478696-126**						
Aluminum (Al)-Total		478	532		mg/kg	11	40	28-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	28-AUG-20
Arsenic (As)-Total		0.127	0.133		mg/kg	4.4	40	28-AUG-20
Barium (Ba)-Total		11.1	11.0		mg/kg	1.0	40	28-AUG-20
Beryllium (Be)-Total		0.029	0.033		mg/kg	13	40	28-AUG-20
Bismuth (Bi)-Total		0.030	0.027		mg/kg	8.0	40	28-AUG-20
Boron (B)-Total		1.2	1.1		mg/kg	3.2	40	28-AUG-20
Cadmium (Cd)-Total		0.0625	0.0585		mg/kg	6.6	40	28-AUG-20
Calcium (Ca)-Total		7940	7610		mg/kg	4.2	60	28-AUG-20
Cesium (Cs)-Total		0.109	0.112		mg/kg	3.2	40	28-AUG-20
Chromium (Cr)-Total		1.39	1.53		mg/kg	9.4	40	28-AUG-20
Cobalt (Co)-Total		0.470	0.498		mg/kg	5.7	40	28-AUG-20
Copper (Cu)-Total		1.69	1.68		mg/kg	0.3	40	28-AUG-20
Iron (Fe)-Total		3630	3920		mg/kg	7.8	40	28-AUG-20
Lead (Pb)-Total		1.20	1.18		mg/kg	1.7	40	28-AUG-20
Lithium (Li)-Total		0.53	0.61		mg/kg	15	40	28-AUG-20
Magnesium (Mg)-Total		1670	1720		mg/kg	2.7	40	28-AUG-20
Manganese (Mn)-Total		50.3	51.6		mg/kg	2.5	40	28-AUG-20
Molybdenum (Mo)-Total		0.286	0.287		mg/kg	0.5	40	28-AUG-20
Nickel (Ni)-Total		1.37	1.47		mg/kg	7.2	40	28-AUG-20
Phosphorus (P)-Total		545	572		mg/kg	4.8	40	28-AUG-20
Potassium (K)-Total		1870	1850		mg/kg	1.2	40	28-AUG-20
Rubidium (Rb)-Total		7.64	7.66		mg/kg	0.2	40	28-AUG-20
Selenium (Se)-Total		0.092	0.094		mg/kg	2.5	40	28-AUG-20
Sodium (Na)-Total		269	275		mg/kg	2.3	40	28-AUG-20
Strontium (Sr)-Total		4.29	4.21		mg/kg	2.0	60	28-AUG-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	28-AUG-20
Thallium (Tl)-Total		0.0121	0.0116		mg/kg	3.8	40	28-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392441-2 DUP		**L2478696-126**						
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	28-AUG-20
Uranium (U)-Total		0.172	0.179		mg/kg	3.9	40	28-AUG-20
Vanadium (V)-Total		0.78	0.89		mg/kg	13	40	28-AUG-20
Zinc (Zn)-Total		19.0	18.8		mg/kg	1.3	40	28-AUG-20
Zirconium (Zr)-Total		0.82	0.88		mg/kg	7.6	40	28-AUG-20
WG3390496-4 LCS								
Aluminum (Al)-Total			110.4		%		80-120	28-AUG-20
Antimony (Sb)-Total			100.1		%		80-120	28-AUG-20
Arsenic (As)-Total			105.6		%		80-120	28-AUG-20
Barium (Ba)-Total			109.8		%		80-120	28-AUG-20
Beryllium (Be)-Total			102.5		%		80-120	28-AUG-20
Bismuth (Bi)-Total			104.3		%		80-120	28-AUG-20
Boron (B)-Total			101.1		%		80-120	28-AUG-20
Cadmium (Cd)-Total			102.0		%		80-120	28-AUG-20
Calcium (Ca)-Total			102.7		%		80-120	28-AUG-20
Cesium (Cs)-Total			105.3		%		80-120	28-AUG-20
Chromium (Cr)-Total			110.1		%		80-120	28-AUG-20
Cobalt (Co)-Total			105.9		%		80-120	28-AUG-20
Copper (Cu)-Total			106.3		%		80-120	28-AUG-20
Iron (Fe)-Total			109.9		%		80-120	28-AUG-20
Lead (Pb)-Total			101.2		%		80-120	28-AUG-20
Lithium (Li)-Total			111.8		%		80-120	28-AUG-20
Magnesium (Mg)-Total			108.7		%		80-120	28-AUG-20
Manganese (Mn)-Total			107.7		%		80-120	28-AUG-20
Molybdenum (Mo)-Total			107.3		%		80-120	28-AUG-20
Nickel (Ni)-Total			105.2		%		80-120	28-AUG-20
Phosphorus (P)-Total			117.2		%		80-120	28-AUG-20
Potassium (K)-Total			114.9		%		80-120	28-AUG-20
Rubidium (Rb)-Total			112.5		%		80-120	28-AUG-20
Selenium (Se)-Total			100.7		%		80-120	28-AUG-20
Sodium (Na)-Total			110.0		%		80-120	28-AUG-20
Strontium (Sr)-Total			114.3		%		80-120	28-AUG-20
Tellurium (Te)-Total			99.8		%		80-120	28-AUG-20

Quality Control Report

Workorder: L2478696 Report Date: 05-SEP-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3390496-4 LCS								
Thallium (Tl)-Total			98.7		%		80-120	28-AUG-20
Tin (Sn)-Total			99.6		%		80-120	28-AUG-20
Uranium (U)-Total			102.4		%		80-120	28-AUG-20
Vanadium (V)-Total			112.0		%		80-120	28-AUG-20
Zinc (Zn)-Total			105.0		%		80-120	28-AUG-20
Zirconium (Zr)-Total			102.7		%		80-120	28-AUG-20
WG3392427-4 LCS								
Aluminum (Al)-Total			109.6		%		80-120	28-AUG-20
Antimony (Sb)-Total			95.4		%		80-120	28-AUG-20
Arsenic (As)-Total			103.5		%		80-120	28-AUG-20
Barium (Ba)-Total			106.8		%		80-120	28-AUG-20
Beryllium (Be)-Total			103.7		%		80-120	28-AUG-20
Bismuth (Bi)-Total			100.2		%		80-120	28-AUG-20
Boron (B)-Total			105.4		%		80-120	28-AUG-20
Cadmium (Cd)-Total			97.3		%		80-120	28-AUG-20
Calcium (Ca)-Total			101.6		%		80-120	28-AUG-20
Cesium (Cs)-Total			101.1		%		80-120	28-AUG-20
Chromium (Cr)-Total			108.4		%		80-120	28-AUG-20
Cobalt (Co)-Total			105.8		%		80-120	28-AUG-20
Copper (Cu)-Total			104.9		%		80-120	28-AUG-20
Iron (Fe)-Total			107.8		%		80-120	28-AUG-20
Lead (Pb)-Total			98.5		%		80-120	28-AUG-20
Lithium (Li)-Total			108.8		%		80-120	28-AUG-20
Magnesium (Mg)-Total			112.0		%		80-120	28-AUG-20
Manganese (Mn)-Total			106.1		%		80-120	28-AUG-20
Molybdenum (Mo)-Total			102.6		%		80-120	28-AUG-20
Nickel (Ni)-Total			105.3		%		80-120	28-AUG-20
Phosphorus (P)-Total			111.9		%		80-120	28-AUG-20
Potassium (K)-Total			112.4		%		80-120	28-AUG-20
Rubidium (Rb)-Total			107.9		%		80-120	28-AUG-20
Selenium (Se)-Total			100.4		%		80-120	28-AUG-20
Sodium (Na)-Total			108.3		%		80-120	28-AUG-20
Strontium (Sr)-Total			108.9		%		80-120	28-AUG-20
Tellurium (Te)-Total			96.7		%		80-120	28-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392427-4 LCS								
Thallium (Tl)-Total			97.5		%		80-120	28-AUG-20
Tin (Sn)-Total			97.2		%		80-120	28-AUG-20
Uranium (U)-Total			101.0		%		80-120	28-AUG-20
Vanadium (V)-Total			110.4		%		80-120	28-AUG-20
Zinc (Zn)-Total			101.6		%		80-120	28-AUG-20
Zirconium (Zr)-Total			100.2		%		80-120	28-AUG-20
WG3392441-4 LCS								
Aluminum (Al)-Total			112.6		%		80-120	28-AUG-20
Antimony (Sb)-Total			99.9		%		80-120	28-AUG-20
Arsenic (As)-Total			103.3		%		80-120	28-AUG-20
Barium (Ba)-Total			106.3		%		80-120	28-AUG-20
Beryllium (Be)-Total			106.7		%		80-120	28-AUG-20
Bismuth (Bi)-Total			98.8		%		80-120	28-AUG-20
Boron (B)-Total			101.9		%		80-120	28-AUG-20
Cadmium (Cd)-Total			98.8		%		80-120	28-AUG-20
Calcium (Ca)-Total			104.7		%		80-120	28-AUG-20
Cesium (Cs)-Total			104.4		%		80-120	28-AUG-20
Chromium (Cr)-Total			106.9		%		80-120	28-AUG-20
Cobalt (Co)-Total			106.3		%		80-120	28-AUG-20
Copper (Cu)-Total			104.2		%		80-120	28-AUG-20
Iron (Fe)-Total			112.3		%		80-120	28-AUG-20
Lead (Pb)-Total			98.9		%		80-120	28-AUG-20
Lithium (Li)-Total			110.0		%		80-120	28-AUG-20
Magnesium (Mg)-Total			112.4		%		80-120	28-AUG-20
Manganese (Mn)-Total			107.9		%		80-120	28-AUG-20
Molybdenum (Mo)-Total			107.2		%		80-120	28-AUG-20
Nickel (Ni)-Total			105.3		%		80-120	28-AUG-20
Phosphorus (P)-Total			122.5	MES	%		80-120	28-AUG-20
Potassium (K)-Total			115.2		%		80-120	28-AUG-20
Rubidium (Rb)-Total			110.4		%		80-120	28-AUG-20
Selenium (Se)-Total			100.7		%		80-120	28-AUG-20
Sodium (Na)-Total			109.6		%		80-120	28-AUG-20
Strontium (Sr)-Total			109.1		%		80-120	28-AUG-20
Tellurium (Te)-Total			101.6		%		80-120	28-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392441-4 LCS								
Thallium (Tl)-Total			96.7		%		80-120	28-AUG-20
Tin (Sn)-Total			96.4		%		80-120	28-AUG-20
Uranium (U)-Total			98.7		%		80-120	28-AUG-20
Vanadium (V)-Total			110.9		%		80-120	28-AUG-20
Zinc (Zn)-Total			103.3		%		80-120	28-AUG-20
Zirconium (Zr)-Total			102.5		%		80-120	28-AUG-20
WG3390496-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	28-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	28-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	28-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	28-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	28-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	28-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	28-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	28-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	28-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	28-AUG-20
Chromium (Cr)-Total			<0.050		mg/kg		0.05	28-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	28-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	28-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	28-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	28-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	28-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	28-AUG-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	28-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	28-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	28-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	28-AUG-20
Potassium (K)-Total			<20		mg/kg		20	28-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	28-AUG-20
Selenium (Se)-Total			<0.050		mg/kg		0.05	28-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	28-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	28-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	28-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3390496-1 MB								
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	28-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	28-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	28-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	28-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	28-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	28-AUG-20
WG3392427-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	28-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	28-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	28-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	28-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	28-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	28-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	28-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	28-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	28-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	28-AUG-20
Chromium (Cr)-Total			<0.050		mg/kg		0.05	28-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	28-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	28-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	28-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	28-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	28-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	28-AUG-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	28-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	28-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	28-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	28-AUG-20
Potassium (K)-Total			<20		mg/kg		20	28-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	28-AUG-20
Selenium (Se)-Total			<0.050		mg/kg		0.05	28-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	28-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	28-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	28-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392427-1 MB								
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	28-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	28-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	28-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	28-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	28-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	28-AUG-20
WG3392441-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	28-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	28-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	28-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	28-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	28-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	28-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	28-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	28-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	28-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	28-AUG-20
Chromium (Cr)-Total			0.054	B	mg/kg		0.05	28-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	28-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	28-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	28-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	28-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	28-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	28-AUG-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	28-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	28-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	28-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	28-AUG-20
Potassium (K)-Total			<20		mg/kg		20	28-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	28-AUG-20
Selenium (Se)-Total			<0.050		mg/kg		0.05	28-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	28-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	28-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	28-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3392441-1 MB								
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	28-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	28-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	28-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	28-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	28-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	28-AUG-20
Batch R5206776								
WG3393442-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			105.9		%		70-130	31-AUG-20
Arsenic (As)-Total			95.1		%		70-130	31-AUG-20
Barium (Ba)-Total			105.7		%		70-130	31-AUG-20
Beryllium (Be)-Total			0.016		mg/kg		0.005-0.025	31-AUG-20
Bismuth (Bi)-Total			0.017		mg/kg		0.002-0.022	31-AUG-20
Boron (B)-Total			90.0		%		70-130	31-AUG-20
Cadmium (Cd)-Total			101.1		%		70-130	31-AUG-20
Calcium (Ca)-Total			97.2		%		70-130	31-AUG-20
Cesium (Cs)-Total			94.4		%		70-130	31-AUG-20
Chromium (Cr)-Total			110.1		%		70-130	31-AUG-20
Cobalt (Co)-Total			99.8		%		70-130	31-AUG-20
Copper (Cu)-Total			95.7		%		70-130	31-AUG-20
Iron (Fe)-Total			101.9		%		70-130	31-AUG-20
Lead (Pb)-Total			111.6		%		70-130	31-AUG-20
Lithium (Li)-Total			1.09		mg/kg		0.71-1.71	31-AUG-20
Magnesium (Mg)-Total			91.1		%		70-130	31-AUG-20
Manganese (Mn)-Total			91.8		%		70-130	31-AUG-20
Molybdenum (Mo)-Total			95.7		%		70-130	31-AUG-20
Nickel (Ni)-Total			111.7		%		70-130	31-AUG-20
Phosphorus (P)-Total			101.2		%		70-130	31-AUG-20
Potassium (K)-Total			99.9		%		70-130	31-AUG-20
Rubidium (Rb)-Total			102.8		%		70-130	31-AUG-20
Selenium (Se)-Total			101.9		%		70-130	31-AUG-20
Sodium (Na)-Total			100.7		%		70-130	31-AUG-20
Strontium (Sr)-Total			94.9		%		70-130	31-AUG-20
Thallium (Tl)-Total			87.1		%		70-130	31-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5206776								
WG3393442-3 CRM		**VA-NRC-DORM4**						
Uranium (U)-Total			94.5		%		70-130	31-AUG-20
Vanadium (V)-Total			103.1		%		70-130	31-AUG-20
Zinc (Zn)-Total			109.2		%		70-130	31-AUG-20
Zirconium (Zr)-Total			0.24		mg/kg		0.05-0.45	31-AUG-20
WG3393442-2 DUP		**L2478696-207**						
Aluminum (Al)-Total		994	963		mg/kg	3.2	40	31-AUG-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	31-AUG-20
Arsenic (As)-Total		0.198	0.205		mg/kg	3.2	40	31-AUG-20
Barium (Ba)-Total		20.8	21.0		mg/kg	1.0	40	31-AUG-20
Beryllium (Be)-Total		0.062	0.061		mg/kg	1.3	40	31-AUG-20
Bismuth (Bi)-Total		0.088	0.106		mg/kg	18	40	31-AUG-20
Boron (B)-Total		2.3	2.5		mg/kg	9.0	40	31-AUG-20
Cadmium (Cd)-Total		0.0515	0.0595		mg/kg	14	40	31-AUG-20
Calcium (Ca)-Total		67000	69900		mg/kg	4.2	60	31-AUG-20
Cesium (Cs)-Total		0.302	0.290		mg/kg	3.8	40	31-AUG-20
Chromium (Cr)-Total		2.36	2.25		mg/kg	5.0	40	31-AUG-20
Cobalt (Co)-Total		0.514	0.485		mg/kg	5.8	40	31-AUG-20
Copper (Cu)-Total		2.13	2.27		mg/kg	6.4	40	31-AUG-20
Iron (Fe)-Total		2080	2010		mg/kg	3.3	40	31-AUG-20
Lead (Pb)-Total		4.53	4.54		mg/kg	0.3	40	31-AUG-20
Lithium (Li)-Total		2.95	2.91		mg/kg	1.2	40	31-AUG-20
Magnesium (Mg)-Total		2740	2620		mg/kg	4.3	40	31-AUG-20
Manganese (Mn)-Total		59.2	59.7		mg/kg	1.0	40	31-AUG-20
Molybdenum (Mo)-Total		0.508	0.415		mg/kg	20	40	31-AUG-20
Nickel (Ni)-Total		1.60	1.53		mg/kg	4.7	40	31-AUG-20
Phosphorus (P)-Total		570	587		mg/kg	3.0	40	31-AUG-20
Potassium (K)-Total		2060	2090		mg/kg	1.4	40	31-AUG-20
Rubidium (Rb)-Total		8.73	9.10		mg/kg	4.1	40	31-AUG-20
Selenium (Se)-Total		0.066	0.068		mg/kg	3.6	40	31-AUG-20
Sodium (Na)-Total		198	197		mg/kg	0.7	40	31-AUG-20
Strontium (Sr)-Total		84.7	84.1		mg/kg	0.7	60	31-AUG-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	31-AUG-20
Thallium (Tl)-Total		0.0282	0.0263		mg/kg	6.8	40	31-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5206776								
WG3393442-2 DUP		**L2478696-207**						
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	31-AUG-20
Uranium (U)-Total		1.12	1.16		mg/kg	3.0	40	31-AUG-20
Vanadium (V)-Total		1.56	1.51		mg/kg	3.0	40	31-AUG-20
Zinc (Zn)-Total		13.3	13.5		mg/kg	1.3	40	31-AUG-20
Zirconium (Zr)-Total		3.09	3.10		mg/kg	0.2	40	31-AUG-20
WG3393442-4 LCS								
Aluminum (Al)-Total			104.8		%		80-120	31-AUG-20
Antimony (Sb)-Total			102.2		%		80-120	31-AUG-20
Arsenic (As)-Total			101.3		%		80-120	31-AUG-20
Barium (Ba)-Total			106.0		%		80-120	31-AUG-20
Beryllium (Be)-Total			101.9		%		80-120	31-AUG-20
Bismuth (Bi)-Total			101.7		%		80-120	31-AUG-20
Boron (B)-Total			99.8		%		80-120	31-AUG-20
Cadmium (Cd)-Total			100.4		%		80-120	31-AUG-20
Calcium (Ca)-Total			102.3		%		80-120	31-AUG-20
Cesium (Cs)-Total			101.1		%		80-120	31-AUG-20
Chromium (Cr)-Total			103.4		%		80-120	31-AUG-20
Cobalt (Co)-Total			102.4		%		80-120	31-AUG-20
Copper (Cu)-Total			101.7		%		80-120	31-AUG-20
Iron (Fe)-Total			104.2		%		80-120	31-AUG-20
Lead (Pb)-Total			102.6		%		80-120	31-AUG-20
Lithium (Li)-Total			101.2		%		80-120	31-AUG-20
Magnesium (Mg)-Total			102.1		%		80-120	31-AUG-20
Manganese (Mn)-Total			102.2		%		80-120	31-AUG-20
Molybdenum (Mo)-Total			103.8		%		80-120	31-AUG-20
Nickel (Ni)-Total			102.9		%		80-120	31-AUG-20
Phosphorus (P)-Total			109.9		%		80-120	31-AUG-20
Potassium (K)-Total			104.2		%		80-120	31-AUG-20
Rubidium (Rb)-Total			102.9		%		80-120	31-AUG-20
Selenium (Se)-Total			104.3		%		80-120	31-AUG-20
Sodium (Na)-Total			102.5		%		80-120	31-AUG-20
Strontium (Sr)-Total			108.2		%		80-120	31-AUG-20
Tellurium (Te)-Total			96.9		%		80-120	31-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5206776								
WG3393442-4 LCS								
Thallium (Tl)-Total			100.4		%		80-120	31-AUG-20
Tin (Sn)-Total			101.3		%		80-120	31-AUG-20
Uranium (U)-Total			100.3		%		80-120	31-AUG-20
Vanadium (V)-Total			103.7		%		80-120	31-AUG-20
Zinc (Zn)-Total			103.5		%		80-120	31-AUG-20
Zirconium (Zr)-Total			99.1		%		80-120	31-AUG-20
WG3393442-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	31-AUG-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	31-AUG-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	31-AUG-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	31-AUG-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	31-AUG-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	31-AUG-20
Boron (B)-Total			<1.0		mg/kg		1	31-AUG-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	31-AUG-20
Calcium (Ca)-Total			<20		mg/kg		20	31-AUG-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	31-AUG-20
Chromium (Cr)-Total			<0.050		mg/kg		0.05	31-AUG-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	31-AUG-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	31-AUG-20
Iron (Fe)-Total			<3.0		mg/kg		3	31-AUG-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	31-AUG-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	31-AUG-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	31-AUG-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	31-AUG-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	31-AUG-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	31-AUG-20
Phosphorus (P)-Total			<10		mg/kg		10	31-AUG-20
Potassium (K)-Total			<20		mg/kg		20	31-AUG-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	31-AUG-20
Selenium (Se)-Total			<0.050		mg/kg		0.05	31-AUG-20
Sodium (Na)-Total			<20		mg/kg		20	31-AUG-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	31-AUG-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	31-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5206776								
WG3393442-1 MB								
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	31-AUG-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	31-AUG-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	31-AUG-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	31-AUG-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	31-AUG-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	31-AUG-20
Batch R5208428								
WG3392431-3 CRM		**VA-NRC-DORM4**						
Aluminum (Al)-Total			105.7		%		70-130	01-SEP-20
Arsenic (As)-Total			94.3		%		70-130	01-SEP-20
Barium (Ba)-Total			111.2		%		70-130	01-SEP-20
Beryllium (Be)-Total			0.014		mg/kg		0.005-0.025	01-SEP-20
Bismuth (Bi)-Total			0.010		mg/kg		0.002-0.022	01-SEP-20
Boron (B)-Total			89.9		%		70-130	01-SEP-20
Cadmium (Cd)-Total			100.7		%		70-130	01-SEP-20
Calcium (Ca)-Total			96.4		%		70-130	01-SEP-20
Cesium (Cs)-Total			96.5		%		70-130	01-SEP-20
Chromium (Cr)-Total			108.4		%		70-130	01-SEP-20
Cobalt (Co)-Total			101.5		%		70-130	01-SEP-20
Copper (Cu)-Total			95.1		%		70-130	01-SEP-20
Iron (Fe)-Total			104.3		%		70-130	01-SEP-20
Lead (Pb)-Total			106.6		%		70-130	01-SEP-20
Lithium (Li)-Total			1.09		mg/kg		0.71-1.71	01-SEP-20
Magnesium (Mg)-Total			95.5		%		70-130	01-SEP-20
Manganese (Mn)-Total			94.2		%		70-130	01-SEP-20
Molybdenum (Mo)-Total			94.4		%		70-130	01-SEP-20
Nickel (Ni)-Total			92.5		%		70-130	01-SEP-20
Phosphorus (P)-Total			97.8		%		70-130	01-SEP-20
Potassium (K)-Total			94.3		%		70-130	01-SEP-20
Rubidium (Rb)-Total			103.2		%		70-130	01-SEP-20
Selenium (Se)-Total			103.4		%		70-130	01-SEP-20
Sodium (Na)-Total			98.7		%		70-130	01-SEP-20
Strontium (Sr)-Total			95.8		%		70-130	01-SEP-20
Thallium (Tl)-Total			95.4		%		70-130	01-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5208428								
WG3392431-3 CRM		**VA-NRC-DORM4**						
Uranium (U)-Total			97.7		%		70-130	01-SEP-20
Vanadium (V)-Total			102.9		%		70-130	01-SEP-20
Zinc (Zn)-Total			111.3		%		70-130	01-SEP-20
Zirconium (Zr)-Total			0.26		mg/kg		0.05-0.45	01-SEP-20
WG3392431-2 DUP		**L2478696-206**						
Aluminum (Al)-Total		1340	1060		mg/kg	23	40	01-SEP-20
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	01-SEP-20
Arsenic (As)-Total		0.231	0.231		mg/kg	0.1	40	01-SEP-20
Barium (Ba)-Total		23.1	20.5		mg/kg	12	40	01-SEP-20
Beryllium (Be)-Total		0.079	0.066		mg/kg	18	40	01-SEP-20
Bismuth (Bi)-Total		0.115	0.089		mg/kg	26	40	01-SEP-20
Boron (B)-Total		2.9	2.5		mg/kg	15	40	01-SEP-20
Cadmium (Cd)-Total		0.0586	0.0621		mg/kg	5.7	40	01-SEP-20
Calcium (Ca)-Total		72800	70100		mg/kg	3.8	60	01-SEP-20
Cesium (Cs)-Total		0.379	0.327		mg/kg	15	40	01-SEP-20
Chromium (Cr)-Total		3.07	2.49		mg/kg	21	40	01-SEP-20
Cobalt (Co)-Total		0.655	0.533		mg/kg	21	40	01-SEP-20
Copper (Cu)-Total		2.51	2.23		mg/kg	12	40	01-SEP-20
Iron (Fe)-Total		2830	2280		mg/kg	22	40	01-SEP-20
Lead (Pb)-Total		4.85	4.42		mg/kg	9.2	40	01-SEP-20
Lithium (Li)-Total		4.08	3.29		mg/kg	21	40	01-SEP-20
Magnesium (Mg)-Total		3200	2850		mg/kg	11	40	01-SEP-20
Manganese (Mn)-Total		71.4	63.6		mg/kg	12	40	01-SEP-20
Molybdenum (Mo)-Total		0.546	0.416		mg/kg	27	40	01-SEP-20
Nickel (Ni)-Total		1.90	1.64		mg/kg	15	40	01-SEP-20
Phosphorus (P)-Total		476	539		mg/kg	13	40	01-SEP-20
Potassium (K)-Total		1910	2020		mg/kg	5.4	40	01-SEP-20
Rubidium (Rb)-Total		9.46	9.45		mg/kg	0.1	40	01-SEP-20
Selenium (Se)-Total		0.066	0.070		mg/kg	5.5	40	01-SEP-20
Sodium (Na)-Total		168	194		mg/kg	15	40	01-SEP-20
Strontium (Sr)-Total		84.4	85.1		mg/kg	0.8	60	01-SEP-20
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	01-SEP-20
Thallium (Tl)-Total		0.0373	0.0296		mg/kg	23	40	01-SEP-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5208428								
WG3392431-2 DUP		**L2478696-206**						
Tin (Sn)-Total		0.13	<0.10	RPD-NA	mg/kg	N/A	40	01-SEP-20
Uranium (U)-Total		1.27	1.10		mg/kg	14	40	01-SEP-20
Vanadium (V)-Total		2.17	1.68		mg/kg	25	40	01-SEP-20
Zinc (Zn)-Total		13.6	13.3		mg/kg	2.4	40	01-SEP-20
Zirconium (Zr)-Total		3.73	3.11		mg/kg	18	40	01-SEP-20
WG3392431-4 LCS								
Aluminum (Al)-Total			114.1		%		80-120	01-SEP-20
Antimony (Sb)-Total			114.1		%		80-120	01-SEP-20
Arsenic (As)-Total			109.1		%		80-120	01-SEP-20
Barium (Ba)-Total			121.2	MES	%		80-120	01-SEP-20
Beryllium (Be)-Total			107.0		%		80-120	01-SEP-20
Bismuth (Bi)-Total			107.4		%		80-120	01-SEP-20
Boron (B)-Total			107.4		%		80-120	01-SEP-20
Cadmium (Cd)-Total			110.5		%		80-120	01-SEP-20
Calcium (Ca)-Total			104.2		%		80-120	01-SEP-20
Cesium (Cs)-Total			114.4		%		80-120	01-SEP-20
Chromium (Cr)-Total			113.6		%		80-120	01-SEP-20
Cobalt (Co)-Total			110.1		%		80-120	01-SEP-20
Copper (Cu)-Total			108.4		%		80-120	01-SEP-20
Iron (Fe)-Total			112.2		%		80-120	01-SEP-20
Lead (Pb)-Total			109.5		%		80-120	01-SEP-20
Lithium (Li)-Total			110.1		%		80-120	01-SEP-20
Magnesium (Mg)-Total			114.2		%		80-120	01-SEP-20
Manganese (Mn)-Total			110.1		%		80-120	01-SEP-20
Molybdenum (Mo)-Total			113.7		%		80-120	01-SEP-20
Nickel (Ni)-Total			107.9		%		80-120	01-SEP-20
Phosphorus (P)-Total			122.6	MES	%		80-120	01-SEP-20
Potassium (K)-Total			111.3		%		80-120	01-SEP-20
Rubidium (Rb)-Total			111.3		%		80-120	01-SEP-20
Selenium (Se)-Total			112.5		%		80-120	01-SEP-20
Sodium (Na)-Total			113.7		%		80-120	01-SEP-20
Strontium (Sr)-Total			118.6		%		80-120	01-SEP-20
Tellurium (Te)-Total			108.6		%		80-120	01-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5208428								
WG3392431-4 LCS								
Thallium (Tl)-Total			107.8		%		80-120	01-SEP-20
Tin (Sn)-Total			111.6		%		80-120	01-SEP-20
Uranium (U)-Total			102.2		%		80-120	01-SEP-20
Vanadium (V)-Total			113.6		%		80-120	01-SEP-20
Zinc (Zn)-Total			111.0		%		80-120	01-SEP-20
Zirconium (Zr)-Total			106.9		%		80-120	01-SEP-20
WG3392431-1 MB								
Aluminum (Al)-Total			<2.0		mg/kg		2	01-SEP-20
Antimony (Sb)-Total			<0.010		mg/kg		0.01	01-SEP-20
Arsenic (As)-Total			<0.020		mg/kg		0.02	01-SEP-20
Barium (Ba)-Total			<0.050		mg/kg		0.05	01-SEP-20
Beryllium (Be)-Total			<0.010		mg/kg		0.01	01-SEP-20
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	01-SEP-20
Boron (B)-Total			<1.0		mg/kg		1	01-SEP-20
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	01-SEP-20
Calcium (Ca)-Total			<20		mg/kg		20	01-SEP-20
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	01-SEP-20
Chromium (Cr)-Total			<0.050		mg/kg		0.05	01-SEP-20
Cobalt (Co)-Total			<0.020		mg/kg		0.02	01-SEP-20
Copper (Cu)-Total			<0.10		mg/kg		0.1	01-SEP-20
Iron (Fe)-Total			<3.0		mg/kg		3	01-SEP-20
Lead (Pb)-Total			<0.020		mg/kg		0.02	01-SEP-20
Lithium (Li)-Total			<0.50		mg/kg		0.5	01-SEP-20
Magnesium (Mg)-Total			<2.0		mg/kg		2	01-SEP-20
Manganese (Mn)-Total			<0.050		mg/kg		0.05	01-SEP-20
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	01-SEP-20
Nickel (Ni)-Total			<0.20		mg/kg		0.2	01-SEP-20
Phosphorus (P)-Total			<10		mg/kg		10	01-SEP-20
Potassium (K)-Total			<20		mg/kg		20	01-SEP-20
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	01-SEP-20
Selenium (Se)-Total			<0.050		mg/kg		0.05	01-SEP-20
Sodium (Na)-Total			<20		mg/kg		20	01-SEP-20
Strontium (Sr)-Total			<0.050		mg/kg		0.05	01-SEP-20
Tellurium (Te)-Total			<0.020		mg/kg		0.02	01-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA	**Tissue**							
Batch R5208428								
WG3392431-1 MB								
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	01-SEP-20
Tin (Sn)-Total			<0.10		mg/kg		0.1	01-SEP-20
Uranium (U)-Total			<0.0020		mg/kg		0.002	01-SEP-20
Vanadium (V)-Total			<0.10		mg/kg		0.1	01-SEP-20
Zinc (Zn)-Total			<0.50		mg/kg		0.5	01-SEP-20
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	01-SEP-20
MOISTURE-TISS-VA	**Tissue**							
Batch R5191490								
WG3385919-3 DUP		**L2478696-1**						
% Moisture		9.48	9.50		%	0.2	20	18-AUG-20
WG3385919-2 LCS								
% Moisture			100.2		%		90-110	18-AUG-20
WG3385919-1 MB								
% Moisture			<0.50		%		0.5	18-AUG-20
Batch R5191496								
WG3386171-3 DUP		**L2478696-62**						
% Moisture		5.85	5.56		%	5.1	20	18-AUG-20
WG3386171-2 LCS								
% Moisture			100.6		%		90-110	18-AUG-20
WG3386171-1 MB								
% Moisture			<0.50		%		0.5	18-AUG-20
Batch R5192573								
WG3386791-3 DUP		**L2478696-122**						
% Moisture		10.5	9.40		%	11	20	19-AUG-20
WG3386791-2 LCS								
% Moisture			100.2		%		90-110	19-AUG-20
WG3386791-1 MB								
% Moisture			<0.50		%		0.5	19-AUG-20
Batch R5198307								
WG3388790-3 DUP		**L2478696-8**						
% Moisture		67.2	65.0		%	3.3	20	21-AUG-20
WG3388790-2 LCS								
% Moisture			100.3		%		90-110	21-AUG-20
WG3388790-1 MB								
% Moisture			<0.50		%		0.5	21-AUG-20

Quality Control Report

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-TISS-VA	**Tissue**							
Batch R5198336								
WG3388876-3 DUP		**L2478696-117**						
% Moisture		71.2	74.1		%	4.0	20	21-AUG-20
WG3388876-2 LCS								
% Moisture			100.0		%		90-110	21-AUG-20
WG3388876-1 MB								
% Moisture			<0.50		%		0.5	21-AUG-20
Batch R5198344								
WG3388396-3 DUP		**L2478696-212**						
% Moisture		12.6	12.0		%	5.1	20	21-AUG-20
WG3388396-2 LCS								
% Moisture			100.5		%		90-110	21-AUG-20
WG3388396-1 MB								
% Moisture			<0.50		%		0.5	21-AUG-20
Batch R5200082								
WG3389916-2 LCS								
% Moisture			100.0		%		90-110	24-AUG-20
WG3389916-1 MB								
% Moisture			<0.50		%		0.5	24-AUG-20
Batch R5201158								
WG3391079-3 DUP		**L2478696-147**						
% Moisture		77.8	87.1		%	11	20	25-AUG-20
WG3391079-2 LCS								
% Moisture			100.2		%		90-110	25-AUG-20
WG3391079-1 MB								
% Moisture			<0.50		%		0.5	25-AUG-20
Batch R5201276								
WG3389940-3 DUP		**L2478696-213**						
% Moisture		76.3	72.3		%	5.4	20	25-AUG-20
WG3389940-2 LCS								
% Moisture			100.0		%		90-110	25-AUG-20
WG3389940-1 MB								
% Moisture			<0.50		%		0.5	25-AUG-20
TI-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			128.2		%		70-130	24-AUG-20
WG3388321-2 DUP		**L2478696-68**						
Titanium (Ti)-Total		42.6	37.2					

Quality Control Report

Workorder: L2478696 Report Date: 05-SEP-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TI-DRY-CCMS-N-VA	**Tissue**							
Batch R5199332								
WG3388321-2 DUP		**L2478696-68**						
Titanium (Ti)-Total		42.6	37.2		mg/kg	13	40	24-AUG-20
WG3388321-4 LCS								
Titanium (Ti)-Total			111.9		%		80-120	24-AUG-20
WG3388321-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	24-AUG-20
Batch R5202274								
WG3388310-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			107.8		%		70-130	26-AUG-20
WG3389643-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			99.6		%		70-130	26-AUG-20
WG3389651-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			101.2		%		70-130	26-AUG-20
WG3388310-2 DUP		**L2478696-13**						
Titanium (Ti)-Total		7.98	6.39		mg/kg	22	40	26-AUG-20
WG3389643-2 DUP		**L2478696-98**						
Titanium (Ti)-Total		15.2	16.7		mg/kg	8.9	40	26-AUG-20
WG3389651-2 DUP		**L2478696-164**						
Titanium (Ti)-Total		48.1	23.9	DUP-H	mg/kg	67	40	26-AUG-20
WG3388310-4 LCS								
Titanium (Ti)-Total			105.1		%		80-120	26-AUG-20
WG3389643-4 LCS								
Titanium (Ti)-Total			104.0		%		80-120	26-AUG-20
WG3389651-4 LCS								
Titanium (Ti)-Total			98.8		%		80-120	26-AUG-20
WG3388310-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	26-AUG-20
WG3389643-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	26-AUG-20
WG3389651-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	26-AUG-20
Batch R5203943								
WG3390496-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			130.7	MES	%		70-130	28-AUG-20
WG3392427-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			94.4		%		70-130	28-AUG-20
WG3392441-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			118.3		%		70-130	28-AUG-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TI-DRY-CCMS-N-VA	**Tissue**							
Batch R5203943								
WG3390496-2 DUP		**L2478696-20**						
Titanium (Ti)-Total		29.7	27.0		mg/kg	9.6	40	28-AUG-20
WG3392427-2 DUP		**L2478696-120**						
Titanium (Ti)-Total		21.9	27.8		mg/kg	24	40	28-AUG-20
WG3392441-2 DUP		**L2478696-126**						
Titanium (Ti)-Total		26.8	30.3		mg/kg	12	40	28-AUG-20
WG3390496-4 LCS								
Titanium (Ti)-Total			105.5		%		80-120	28-AUG-20
WG3392427-4 LCS								
Titanium (Ti)-Total			103.4		%		80-120	28-AUG-20
WG3392441-4 LCS								
Titanium (Ti)-Total			106.7		%		80-120	28-AUG-20
WG3390496-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	28-AUG-20
WG3392427-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	28-AUG-20
WG3392441-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	28-AUG-20
Batch R5206776								
WG3393442-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			114.9		%		70-130	31-AUG-20
WG3393442-2 DUP		**L2478696-207**						
Titanium (Ti)-Total		54.3	53.3		mg/kg	1.8	40	31-AUG-20
WG3393442-4 LCS								
Titanium (Ti)-Total			98.1		%		80-120	31-AUG-20
WG3393442-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	31-AUG-20
Batch R5208428								
WG3392431-3 CRM		**VA-NRC-DORM4**						
Titanium (Ti)-Total			120.7		%		70-130	01-SEP-20
WG3392431-2 DUP		**L2478696-206**						
Titanium (Ti)-Total		79.2	62.4		mg/kg	24	40	01-SEP-20
WG3392431-4 LCS								
Titanium (Ti)-Total			110.7		%		80-120	01-SEP-20
WG3392431-1 MB								
Titanium (Ti)-Total			<0.25		mg/kg		0.25	01-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
J	Duplicate results and limits are expressed in terms of absolute difference.
LCS-L	Lab Control Sample recovery was below ALS DQO. Reference Material and/or Matrix Spike results were acceptable. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2478696 Report Date: 05-SEP-20

Client: EDI ENVIRONMENTAL DYNAMICS INC.
2911A Cleveland Ave
Saskatoon SK S7K 8A9
Contact: Heather Toews

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
% Moisture							
	3	08-JUL-20 16:27	25-JUL-20 08:36	14	17	days	EHTR
	6	08-JUL-20 15:30	25-JUL-20 08:38	14	17	days	EHTR
	9	08-JUL-20 14:15	25-JUL-20 08:39	14	17	days	EHTR
	12	08-JUL-20 17:16	25-JUL-20 08:40	14	17	days	EHTR
	15	09-JUL-20 09:21	25-JUL-20 08:41	14	16	days	EHTR
	18	09-JUL-20 10:34	25-JUL-20 08:42	14	16	days	EHTR
	21	09-JUL-20 11:16	25-JUL-20 08:43	14	16	days	EHTR
	24	09-JUL-20 12:32	25-JUL-20 06:10	14	16	days	EHTL
	27	09-JUL-20 14:08	25-JUL-20 06:12	14	16	days	EHTL
	30	09-JUL-20 15:12	25-JUL-20 06:13	14	16	days	EHTL
	33	09-JUL-20 15:50	25-JUL-20 06:14	14	16	days	EHTL
	36	09-JUL-20 16:48	25-JUL-20 06:15	14	16	days	EHTL

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2478696 were received on 23-JUL-20 11:15.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 1 of 12

Report To Contact and company name below will appear on the final report

Company: EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine
Contact: Heather Toews
Phone: 306-716-8953

Company address below will appear on the final report

Street: 2911A Cleveland Ave
City/Province: Saskatoon, SK
Postal Code: S7K 8A9

Invoice To Same as Report To ☐ YES ☑ NO
Copy of Invoice with Report ☐ YES ☑ NO
Company: Baffinland Iron Mine
Contact:

Project Information

ALS Account # / Quote #: EDI100, Q78018
Job #: BIM Soil and Lichen Tissue - Trace Metals
PO / AFE: 4500073372
LSD:

ALS Lab Work Order # (lab use only): L2478696

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax
Email 2 bimcore@alsglobal.com
Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com,commercial@baffinland.com
Email 2

Oil and Gas Required Fields (client use)

AFE/Cost Center:
PO#
Major/Minor Code:
Routing Code:
Requisitioner:
Location:
ALS Contact:
Sampler: EK, JR

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)
4 day [P4-20%] ☐
3 day [P3-25%] ☐
2 day [P2-50%] ☐

EMERGENCY
1 Business day [E - 100%] ☐
Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
1 1,2	MS-L-134-2020	8-Jul-20	16:27	Tissue	1					R	R	R		
2 3	MS-L-134-2020	8-Jul-20	16:27	Soil	1	R	R	R	R					
3 4,5	MS-L-128-2020	8-Jul-20	15:30	Tissue	1					R	R	R		
4 6	MS-L-128-2020	8-Jul-20	15:30	Soil	1	R	R	R	R					
5 7,8	MS-L-023-2020	8-Jul-20	14:15	Tissue	1					R	R	R		
6 9	MS-L-023-2020	8-Jul-20	14:15	Soil	1	R	R	R	R					
7 10,11	MS-L-175-2020	8-Jul-20	17:16	Tissue	1					R	R	R		
8 12	MS-L-175-2020	8-Jul-20	17:16	Soil	1	R	R	R	R					
9 13,14	MS-L-165-2020	9-Jul-20	9:21	Tissue	1					R	R	R		
10 15	MS-L-165-2020	9-Jul-20	9:21	Soil	1	R	R	R	R					
11 16,17	MS-L-138-2020	9-Jul-20	10:34	Tissue	1					R	R	R		
12 18	MS-L-138-2020	9-Jul-20	10:34	Soil	1	R	R	R	R					

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☑ NO

Are samples for human consumption/ use?
☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre-washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.
Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-IL-GW-unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C 20.8

SHIPMENT RELEASE (client use)

Released by: Elaine Kennedy
Date: 20-Jul-2020
Time: 15:21

INITIAL SHIPMENT RECEPTION (lab use only)

Received by:
Date:
Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by:
Date: 7/23/20
Time: 1115

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NOV 2018 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 2 of 12

Report To	Contact and company name below will appear on the final report	
Company:	EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine	
Contact:	Heather Toews	
Phone:	306-716-8953	
	Company address below will appear on the final report	
Street:	2911A Cleveland Ave	
City/Province:	Saskatoon, SK	
Postal Code:	S7K 8A9	
Invoice To	Same as Report To	☐ YES ☑ NO
	Copy of Invoice with Report	☐ YES ☑ NO
Company:	Baffinland Iron Mine	
Contact:		

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2 bimcore@alsglobal.com

Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com,commercial@baffinland.com

Email 2

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)
- 4 day [P4-20%] ☐
- 3 day [P3-25%] ☐
- 2 day [P2-50%] ☐

EMERGENCY
- 1 Business day [E - 100%] ☐
- Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: EDI100, Q78018

Job #: BIM Soil and Lichen Tissue - Trace Metals

PO / AFE: 4500073372

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center:

PO#

Major/Minor Code:

Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only): L2478696

ALS Contact:

Sampler: EK,NR

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)									SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
13 19,20	MS-L-138-2020-R	9-Jul-20	11:16	Tissue	1					R	R	R										
14 21	MS-L-138-2020-R	9-Jul-20	11:16	Soil	1	R	R	R	R													
15 22,23	MS-L-166-2020	9-Jul-20	12:32	Tissue	1					R	R	R										
16 24	MS-L-166-2020	9-Jul-20	12:32	Soil	1	R	R	R	R													
17 25,26	MS-L-170-2020	9-Jul-20	14:08	Tissue	1					R	R	R										
18 27	MS-L-170-2020	9-Jul-20	14:08	Soil	1	R	R	R	R													
19 28,29	TR-L-169-2020	9-Jul-20	15:12	Tissue	1					R	R	R										
20 30	TR-L-169-2020	9-Jul-20	15:12	Soil	1	R	R	R	R													
21 31,32	TR-L-169-2020-R	9-Jul-20	15:50	Tissue	1					R	R	R										
22 33,	TR-L-169-2020-R	9-Jul-20	15:50	Soil	1	R	R	R	R													
23 34,35	TR-L-168-2020	9-Jul-20	16:46	Tissue	1					R	R	R										
24 36	TR-L-168-2020	9-Jul-20	16:48	Soil	1	R	R	R	R													

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre-washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected. Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-II -GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			20.8		

SHIPMENT RELEASE (client use)

Released by: Elan | Date: 20-Jul-2020 | Time: 15:21

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: | Date: | Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: | Date: 7/23/20 | Time: 1115

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Chain of Custody (COC) / Analytical Request Form

ALS www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 3 of 12

Report To Contact and company name below will appear on the final report
Company: EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine
Contact: Heather Toews
Phone: 306-716-8953
Company address below will appear on the final report
Street: 2911A Cleveland Ave
City/Province: Saskatoon, SK
Postal Code: S7K 8A9

Invoice To Same as Report To ☐ YES ☑ NO
Copy of Invoice with Report ☐ YES ☑ NO
Company: Baffinland Iron Mine
Contact:

Report Format / D
Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax
Email 2 bimcore@alsglobal.com
Email 3 htoews@edynamics.com

Invoice Distribution
Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com,commercial@baffinland.com
Email 2

ontact your AM to confirm all E&P TATs (surcharges may apply)
Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
PRIORITY (Business Days): 4 day [P4-20%] ☐ 3 day [P3-25%] ☐ 2 day [P2-50%] ☐
EMERGENCY: 1 Business day [E - 100%] ☐ Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
For tests that can not be performed according to the service level selected, you will be contacted.

Project Information
ALS Account # / Quote #: EDI100, Q78018
Job #: BIM Soil and Lichen Tissue - Trace Metals
PO / AFE: 4500073372
LSD:

Oil and Gas Required Fields (client use)
AFE/Cost Center:
PO#
Major/Minor Code:
Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only): L2478696
ALS Contact:
Sampler: EK, JR

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
25 37	TR-L-162-2020	10-Jul-20	9:32	Soil	1	R	R	R	R					
26 38,39	TR-L-162-2020	10-Jul-20	9:32	Tissue	1					R	R	R		
27 40	TR-L-162-2020-R	10-Jul-20	9:32	Soil	1	R	R	R	R					
28 41,42	TR-L-162-2020-R	10-Jul-20	9:32	Tissue	1					R	R	R		
29 43	TR-L-161-2020	10-Jul-20	10:42	Soil	1	R	R	R	R					
30 44,45	TR-L-161-2020	10-Jul-20	10:42	Tissue	1					R	R	R		
31 46	TR-L-167-2020	10-Jul-20	8:34	Soil	1	R	R	R	R					
32 47,48	TR-L-167-2020	10-Jul-20	8:34	Tissue	1					R	R	R		
33 49	MP-L-135-2020	10-Jul-20	12:58	Soil	1	R	R	R	R					
34 50,51	MP-L-135-2020	10-Jul-20	12:58	Tissue	1					R	R	R		
35 52	MP-L-141-2020	10-Jul-20	13:54	Soil	1	R	R	R	R					
36 53,54	MP-L-141-2020	10-Jul-20	13:54	Tissue	1					R	R	R		

Drinking Water (DW) Samples¹ (client use)
Are samples taken from a **Regulated DW System?**
☐ YES ☑ NO
Are samples for human consumption/ use?
☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below **(electronic COC only)**

Special Request: For select Tissue samples, the sample will be pre-washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.
Guideline report:CCME - Soil (coarse)-IACR 1 in 1000000-II -GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)
Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐
INITIAL COOLER TEMPERATURES °C
FINAL COOLER TEMPERATURES °C 20.8

SHIPMENT RELEASE (client use)
Released by: Elan Bland
Date: 20-Jul-2020
Time: 15:21

INITIAL SHIPMENT RECEPTION (lab use only)
Received by:
Date:
Time:

FINAL SHIPMENT RECEPTION (lab use only)
Received by:
Date: 7/23/20
Time: 1115

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 4 of 12

Report To Contact and company name below will appear on the final report
Company: EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine
Contact: Heather Toews
Phone: 306-716-8953
Company address below will appear on the final report
Street: 2911A Cleveland Ave
City/Province: Saskatoon, SK
Postal Code: S7K 8A9

Invoice To Same as Report To ☐ YES ☑ NO
Copy of Invoice with Report ☐ YES ☑ NO
Company: Baffinland Iron Mine
Contact:

Report Format / Distribution
Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax
Email 2 bimcore@alsglobal.com
Email 3 htoews@edynamics.com

Invoice Distribution
Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com,commercial@baffinland.com
Email 2

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
PRIORITY (Business Days): 4 day [P4-20%] ☐ 3 day [P3-25%] ☐ 2 day [P2-50%] ☐
EMERGENCY: 1 Business day [E - 100%] ☐ Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
For tests that can not be performed according to the service level selected, you will be contacted.

Project Information
ALS Account # / Quote #: EDI100, Q78018
Job #: BIM Soil and Lichen Tissue - Trace Metals
PO / AFE: 4500073372
LSD:

Oil and Gas Required Fields (client use)
AFE/Cost Center:
PO#
Major/Minor Code:
Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only): L2478696
ALS Contact:
Sampler: EK, JR

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
37 55	MP-L-105-2020	10-Jul-20	14:41	Soil	1	R	R	R	R					
38 56,57	MP-L-105-2020	10-Jul-20	14:41	Tissue	1					R	R	R		
39 58	MP-L-137-2020	10-Jul-20	15:46	Soil	1	R	R	R	R					
40 59,60	MP-L-137-2020	10-Jul-20	15:46	Tissue	1					R	R	R		
41 61	MP-L-136-2020	10-Jul-20	16:45	Soil	1	R	R	R	R					
42 62,63	MP-L-136-2020	10-Jul-20	16:45	Tissue	1					R	R	R		
43 64	MS-L-159-2020	11-Jul-20	8:36	Soil	1	R	R	R	R					
44 65,66	MS-L-159-2020	11-Jul-20	8:36	Tissue	1					R	R	R		
45 67	MS-L-159-2020-R	11-Jul-20	8:49	Soil	1	R	R	R	R					
46 68,69	MS-L-159-2020-R	11-Jul-20	8:49	Tissue	1					R	R	R		
47 70	MS-L-115-2020	11-Jul-20	9:13	Soil	1	R	R	R	R					
48 71,72	MS-L-115-2020	11-Jul-20	9:13	Tissue	1					R	R	R		

Drinking Water (DW) Samples[1] (client use)
Are samples taken from a Regulated DW System?
☐ YES ☑ NO
Are samples for human consumption/ use?
☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre-washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.
Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-IL-GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)
Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐
INITIAL COOLER TEMPERATURES °C
FINAL COOLER TEMPERATURES °C 20.8

SHIPMENT RELEASE (client use)
Released by: Elan. Kn
Date: 20-Jul-2020
Time: 15:21

INITIAL SHIPMENT RECEPTION (lab use only)
Received by:
Date:
Time:

FINAL SHIPMENT RECEPTION (lab use only)
Received by: 8N
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Time: 1115

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 5 of 12

Report To	Contact and company name below will appear on the final report	**Report Format / L**	
Company:	EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Contact:	Heather Toews	Quality Control (QC) Report with Report	☑ YES ☐ NO
Phone:	306-716-8953	☐ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Street:	2911A Cleveland Ave	Email 1 or Fax	
City/Province:	Saskatoon, SK	Email 2	bimcore@alsglobal.com
Postal Code:	S7K 8A9	Email 3	htoews@edynamics.com
Invoice To	Same as Report To ☐ YES ☑ NO	**Invoice Distribution**	
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Company:	Baffinland Iron Mine	Email 1 or Fax	ap@baffinland.com,commercial@baffinland.com
Contact:		Email 2	

Project Information	**Oil and Gas Required Fields (client use)**
ALS Account # / Quote #: EDI100, Q78018	AFE/Cost Center: / PO#
Job #: BIM Soil and Lichen Tissue - Trace Metals	Major/Minor Code: / Routing Code:
PO / AFE: 4500073372	Requisitioner:
LSD:	Location:
ALS Lab Work Order # (lab use only): L2478696	ALS Contact: / Sampler: EK, JR

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4-20%]	☐	1 Business day [E - 100%]	☐
3 day [P3-25%]	☐	Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)]	☐
2 day [P2-50%]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
49 73	MS-L-154-2020	11-Jul-20	10:18	Soil	1	R	R	R	R					
50 74,75	MS-L-154-2020	11-Jul-20	10:18	Tissue	1					R	R	R		
51 76	MS-L-155-2020	11-Jul-20	11:10	Soil	1	R	R	R	R					
52 77,78	MS-L-155-2020	11-Jul-20	11:10	Tissue	1					R	R	R		
53 79	MS-L-156-2020	11-Jul-20	12:08	Soil	1	R	R	R	R					
54 80,81	MS-L-156-2020	11-Jul-20	12:08	Tissue	1					R	R	R		
55 82	MS-L-157-2020	11-Jul-20	12:55	Soil	1	R	R	R	R					
56 83,84	MS-L-157-2020	11-Jul-20	12:55	Tissue	1					R	R	R		
57 85	MS-L-200-2020	11-Jul-20	14:55	Soil	1	R	R	R	R					
58 86,87	MS-L-200-2020	11-Jul-20	14:55	Tissue	1					R	R	R		
59 88	MS-L-204-2020	11-Jul-20	15:50	Soil	1	R	R	R	R					
60 89,90	MS-L-204-2020	11-Jul-20	15:50	Tissue	1					R	R	R		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre-washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.
Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-IL-GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	20.8

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Elan. Rund	Date: 20-Jul-2020	Time: 15:21	Received by:	Date:	Time:	Received by: SU	Date: 7/23/20	Time: 1115

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www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 6 of 12

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Contact:	Heather Toews	
Phone:	306-716-8953	
	Company address below will appear on the final report	
Street:	2911A Cleveland Ave	
City/Province:	Saskatoon, SK	
Postal Code:	S7K 8A9	
Invoice To	Same as Report To	☐ YES ☑ NO
	Copy of Invoice with Report	☐ YES ☑ NO
Company:	Baffinland Iron Mine	
Contact:		

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2 bimcore@alsglobal.com

Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com,commercial@baffinland.com

Email 2

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)
- 4 day [P4-20%] ☐
- 3 day [P3-25%] ☐
- 2 day [P2-50%] ☐

EMERGENCY
- 1 Business day [E - 100%] ☐
- Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: EDI100, Q78018

Job #: BIM Soil and Lichen Tissue - Trace Metals

PO / AFE: 4500073372

LSD:

ALS Lab Work Order # (lab use only): L2478696

Oil and Gas Required Fields (client use)

AFE/Cost Center:

PO#

Major/Minor Code:

Routing Code:

Requisitioner:

Location:

ALS Contact:

Sampler: EK, JR

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)								SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
61 91	MS-L-204-2020-R	11-Jul-20	15:50	Soil	1	R	R	R	R												
62 92,93	MS-L-204-2020-R	11-Jul-20	15:50	Tissue	1					R	R	R									
63 94	MP-L-56-2020	12-Jul-20	9:10	Soil	1	R	R	R	R												
64 95,96	MP-L-56-2020	12-Jul-20	9:10	Tissue	1					R	R	R									
65 97	MP-L-118-2020	12-Jul-20	10:14	Soil	1	R	R	R	R												
66 98,99	MP-L-118-2020	12-Jul-20	10:14	Tissue	1					R	R	R									
67 100	MP-L-119-2020	12-Jul-20	11:06	Soil	1	R	R	R	R												
68 101,102	MP-L-119-2020	12-Jul-20	11:06	Tissue	1					R	R	R									
69 103	MP-L-121-2020	12-Jul-20	11:48	Soil	1	R	R	R	R												
70 104,105	MP-L-121-2020	12-Jul-20	11:48	Tissue	1					R	R	R									
71 106	MP-L-122-2020	12-Jul-20	13:25	Soil	1	R	R	R	R												
72 107,108	MP-L-122-2020	12-Jul-20	13:25	Tissue	1					R	R	R									

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre-washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.

Guideline report:CCME - Soil (coarse)-IACR 1 in 1000000-II -GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	20.8

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 20-Jul-2020	Time: 15:21	Received by:	Date:	Time:	Received by: 8N	Date: 7/23/20	Time: 1115

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NOV 2018 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 7 of 12

Report To Contact and company name below will appear on the final report

Company: EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine
Contact: Heather Toews
Phone: 306-716-8953

Company address below will appear on the final report

Street: 2911A Cleveland Ave
City/Province: Saskatoon, SK
Postal Code: S7K 8A9

Invoice To Same as Report To ☐ YES ☑ NO
Copy of Invoice with Report ☐ YES ☑ NO
Company: Baffinland Iron Mine
Contact:

Report Format /

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax
Email 2 bimcore@alsglobal.com
Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com,commercial@baffinland.com
Email 2

- Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)
4 day [P4-20%] ☐
3 day [P3-25%] ☐
2 day [P2-50%] ☐

EMERGENCY
1 Business day [E - 100%] ☐
Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: EDI100, Q78018
Job #: BIM Soil and Lichen Tissue - Trace Metals
PO / AFE: 4500073372
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center:
PO#
Major/Minor Code:
Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only): L2478696

ALS Contact:

Sampler: EK, JR

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)								SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
73 109	MP-L-144-2020	12-Jul-20	14:12	Soil	1	R	R	R	R												
74 110,111	MP-L-144-2020	12-Jul-20	14:12	Tissue	1					R	R	R									
75 112	MP-L-93-2020	12-Jul-20	14:52	Soil	1	R	R	R	R												
76 113,114	MP-L-93-2020	12-Jul-20	14:52	Tissue	1					R	R	R									
77 115	MP-L-145-2020	12-Jul-20	15:36	Soil	1	R	R	R	R												
78 116,117	MP-L-145-2020	12-Jul-20	15:36	Tissue	1					R	R	R									
79 118	MP-L-145-2020-R	12-Jul-20	15:36	Soil	1	R	R	R	R												
80 119,120	MP-L-145-2020-R	12-Jul-20	15:36	Tissue	1					R	R	R									
81 121	MP-L-57-2020	12-Jul-20	16:27	Soil	1	R	R	R	R												
82 122,123	MP-L-57-2020	12-Jul-20	16:27	Tissue	1					R	R	R									
83 124	MS-L-205-2020	13-Jul-20	10:41	Soil	1	R	R	R	R												
84 125 /126	MS-L-205-2020	13-Jul-20	10:41	Tissue	1					R	R	R									

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☑ NO
Are samples for human consumption/ use?
☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre-washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.
Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-IL-GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			20.8		

SHIPMENT RELEASE (client use)

Released by: | Date: 20-Jul-2020 | Time: 15:21

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: | Date: | Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: | Date: 7/23/20 | Time: 1115

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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NOV 2018 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 8 of 12

Report To Contact and company name below will appear on the final report

Company:	EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine
Contact:	Heather Toews
Phone:	306-716-8953

Company address below will appear on the final report

Street:	2911A Cleveland Ave
City/Province:	Saskatoon, SK
Postal Code:	S7K 8A9

Invoice To Same as Report To ☐ YES ☑ NO

Copy of Invoice with Report ☐ YES ☑ NO

Company:	Baffinland Iron Mine
Contact:	

Project Information

ALS Account # / Quote #:	EDI100, Q78018
Job #:	BIM Soil and Lichen Tissue - Trace Metals
PO / AFE:	4500073372
LSD:	

ALS Lab Work Order # (lab use only): L2478696

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2 bimcore@alsglobal.com

Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com,commercial@baffinland.com

Email 2

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#

Major/Minor Code: | Routing Code:

Requisitioner:

Location:

ALS Contact: | Sampler: EK, JR

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)
- 4 day [P4-20%] ☐
- 3 day [P3-25%] ☐
- 2 day [P2-50%] ☐

EMERGENCY
- 1 Business day [E - 100%] ☐
- Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)								SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
85 127	MS-L-203-2020	13-Jul-20	11:35	Soil	1	R	R	R	R												
86 128,129	MS-L-203-2020	13-Jul-20	11:35	Tissue	1					R	R	R									
87 130	MS-L-202-2020	13-Jul-20	13:02	Soil	1	R	R	R	R												
88 131,132	MS-L-202-2020	13-Jul-20	13:02	Tissue	1					R	R	R									
89 133	MS-L-153-2020	13-Jul-20	14:00	Soil	1	R	R	R	R												
90 134,135	MS-L-153-2020	13-Jul-20	14:00	Tissue	1					R	R	R									
91 136	MS-L-153-2020-R	13-Jul-20	14:00	Soil	1	R	R	R	R												
92 137,138	MS-L-153-2020-R	13-Jul-20	14:00	Tissue	1					R	R	R									
93 139	MS-L-131-2020	13-Jul-20	15:15	Soil	1	R	R	R	R												
94 140,141	MS-L-131-2020	13-Jul-20	15:15	Tissue	1					R	R	R									
95 142	MS-L-130-2020	13-Jul-20	16:05	Soil	1	R	R	R	R												
96 143,144	MS-L-130-2020	13-Jul-20	16:05	Tissue	1					R	R	R									

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below **(electronic COC only)**

Special Request. For select Tissue samples, the sample will be pre washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected. Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-II -GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C 20.8

SHIPMENT RELEASE (client use)

Released by: | Date: 20-Jul-2020 | Time: 15:21

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: | Date: | Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: | Date: 7/23/20 | Time: 1115

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 9 of 12

Report To Contact and company name below will appear on the final report

Company: EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine
Contact: Heather Toews
Phone: 306-716-8953

Company address below will appear on the final report

Street: 2911A Cleveland Ave
City/Province: Saskatoon, SK
Postal Code: S7K 8A9

Invoice To Same as Report To ☐ YES ☑ NO
Copy of Invoice with Report ☐ YES ☑ NO
Company: Baffinland Iron Mine
Contact:

Report Format / L

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax
Email 2 bimcore@alsglobal.com
Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com,commercial@baffinland.com
Email 2

Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

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PRIORITY (Business Days)
4 day [P4-20%] ☐
3 day [P3-25%] ☐
2 day [P2-50%] ☐

EMERGENCY
1 Business day [E - 100%] ☐
Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: EDI100, Q78018
Job #: BIM Soil and Lichen Tissue - Trace Metals
PO / AFE: 4500073372
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center:
PO#
Major/Minor Code:
Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only): L2478696

ALS Contact:

Sampler: EK, JR

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
97 145	MS-L-132-2020	14-Jul-20	16:35	Soil	1	R	R	R	R					
98 146,147	MS-L-132-2020	14-Jul-20	16:35	Tissue	1					R	R	R		
99 148	MS-L-132-2020-R	14-Jul-20	16:35	Soil	1	R	R	R	R					
100 149,150	MS-L-132-2020-R	14-Jul-20	16:35	Tissue	1					R	R	R		
101 151	MS-L-129-2020	15-Jul-20	15:59	Soil	1	R	R	R	R					
102 152,153	MS-L-129-2020	15-Jul-20	15:59	Tissue	1					R	R	R		
103 154	MS-L-206-2020	15-Jul-20	16:35	Soil	1	R	R	R	R					
104 155,156	MS-L-206-2020	15-Jul-20	16:35	Tissue	1					R	R	R		
105 157	MS-L-206-2020-R	15-Jul-20	16:35	Soil	1	R	R	R	R					
106 158,159	MS-L-206-2020-R	15-Jul-20	16:35	Tissue	1					R	R	R		
107 160	MP-L-103-2020	16-Jul-20	14:00	Soil	1	R	R	R	R					
108 161,162	MP-L-103-2020	16-Jul-20	14:00	Tissue	1					R	R	R		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☑ NO

Are samples for human consumption/ use?
☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.
Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-II -GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C
FINAL COOLER TEMPERATURES °C
20.8

SHIPMENT RELEASE (client use)

Released by:
Date: 20-Jul-2020
Time: 15:21

INITIAL SHIPMENT RECEPTION (lab use only)

Received by:
Date:
Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: 89
Date: 7/23/20
Time: 1115

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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NOV 2018 FRONT

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[1] If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 10 of 12

Report To	Contact and company name below will appear on the final report
Company:	EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine
Contact:	Heather Toews
Phone:	306-716-8953
	Company address below will appear on the final report
Street:	2911A Cleveland Ave
City/Province:	Saskatoon, SK
Postal Code:	S7K 8A9
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Baffinland Iron Mine
Contact:	

Project Information

ALS Account # / Quote #:	EDI100, Q78018
Job #:	BIM Soil and Lichen Tissue - Trace Metals
PO / AFE:	4500073372
LSD:	

ALS Lab Work Order # (lab use only): L2478696

Report Format / I

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2 bimcore@alsglobal.com

Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com,commercial@baffinland.com

Email 2

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: EK, JR

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)
- 4 day [P4-20%] ☐
- 3 day [P3-25%] ☐
- 2 day [P2-50%] ☐

EMERGENCY
- 1 Business day [E - 100%] ☐
- Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
109 163	MP-L-102-2020	16-Jul-20	14:37	Soil	1	R	R	R	R					
110 164 165	MP-L-102-2020	16-Jul-20	14:37	Tissue	1					R	R	R		
111 166	MP-L-147-2020	16-Jul-20	16:05	Soil	1	R	R	R	R					
112 167 168	MP-L-147-2020	16-Jul-20	16:05	Tissue	1					R	R	R		
113 169	MP-L-146-2020	16-Jul-20	16:35	Soil	1	R	R	R	R					
114 170 171	MP-L-146-2020	16-Jul-20	16:35	Tissue	1					R	R	R		
115 172	TR-L-152-2020	17-Jul-20	11:30	Soil	1	R	R	R	R					
116 173 174	TR-L-152-2020	17-Jul-20	11:30	Tissue	1					R	R	R		
117 175	TR-L-78-2020	17-Jul-20	12:24	Soil	1	R	R	R	R					
118 176 177	TR-L-78-2020	17-Jul-20	12:24	Tissue	1					R	R	R		
119 178	TR-L-123-2020	17-Jul-20	14:02	Soil	1	R	R	R	R					
120 179 180	TR-L-123-2020	17-Jul-20	14:02	Tissue	1					R	R	R		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below **(electronic COC only)**

Special Request: For select Tissue samples, the sample will be pre-washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.

Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-II -GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				20.8			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 20-Jul-2020	Time: 15:21	Received by:	Date:	Time:	Received by: SH	Date: 7/23/20	Time: 1115

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[1] If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 11 of 12

Report To	Contact and company name below will appear on the final report	
Company:	EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine	
Contact:	Heather Toews	
Phone:	306-716-8953	
	Company address below will appear on the final report	
Street:	2911A Cleveland Ave	
City/Province:	Saskatoon, SK	
Postal Code:	S7K 8A9	
Invoice To	Same as Report To	☐ YES ☑ NO
	Copy of Invoice with Report	☐ YES ☑ NO
Company:	Baffinland Iron Mine	
Contact:		

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2 bimcore@alsglobal.com

Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com,commercial@baffinland.com

Email 2

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)
- 4 day [P4-20%] ☐
- 3 day [P3-25%] ☐
- 2 day [P2-50%] ☐

EMERGENCY
- 1 Business day [E - 100%] ☐
- Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: EDI100, Q78018

Job #: BIM Soil and Lichen Tissue - Trace Metals

PO / AFE: 4500073372

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center:

PO#

Major/Minor Code:

Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only): L2478696

ALS Contact:

Sampler: EK, JR

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
121 181	TR-L-79-2020	18-Jul-20	9:15	Soil	1	R	R	R	R					
122 182 183	TR-L-79-2020	18-Jul-20	9:15	Tissue	1					R	R	R		
123 184	TR-L-124-2020	18-Jul-20	10:30	Soil	1	R	R	R	R					
124 185 186	TR-L-124-2020	18-Jul-20	10:30	Tissue	1					R	R	R		
125 187	TR-L-124-2020-R	18-Jul-20	10:30	Soil	1	R	R	R	R					
126 188 189	TR-L-124-2020-R	18-Jul-20	10:30	Tissue	1					R	R	R		
127 190	TR-L-125-2020	18-Jul-20	11:19	Soil	1	R	R	R	R					
128 191 192	TR-L-125-2020	18-Jul-20	11:19	Tissue	1					R	R	R		
129 193	TR-L-151-2020	18-Jul-20	12:34	Soil	1	R	R	R	R					
130 194 195	TR-L-151-2020	18-Jul-20	12:34	Tissue	1					R	R	R		
131 196	TR-L-116-2020	18-Jul-20	13:47	Soil	1	R	R	R	R					
132 197 198	TR-L-116-2020	18-Jul-20	13:47	Tissue	1					R	R	R		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.
Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-IL-GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	20.8

SHIPMENT RELEASE (client use)

Released by: Elan Kennedy Date: 20-Jul-2020 Time: 15:21

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: SN Date: 7/23/20 Time: 1115

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2478696-COFC

COC Number: 17 -

Page 12 of 12

Report To	Contact and company name below will appear on the final report
Company:	EDI - Environmental Dynamics Inc c/o Baffinland Iron Mine
Contact:	Heather Toews
Phone:	306-716-8953
	Company address below will appear on the final report
Street:	2911A Cleveland Ave
City/Province:	Saskatoon, SK
Postal Code:	S7K 8A9
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Baffinland Iron Mine
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2 bimcore@alsglobal.com

Email 3 htoews@edynamics.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com,commercial@baffinland.com

Email 2

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)
- 4 day [P4-20%] ☐
- 3 day [P3-25%] ☐
- 2 day [P2-50%] ☐

EMERGENCY
- 1 Business day [E - 100%] ☐
- Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	EDI100, Q78018
Job #:	BIM Soil and Lichen Tissue - Trace Metals
PO / AFE:	4500073372
LSD:	

ALS Lab Work Order # (lab use only): L2478696

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: EK, JR

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	HG-200.2-CVAA-WT (Soil)	MET-200.2-CCMS-WT (Soil)	MOISTURE-WT (Soil)	PH-WT (Soil)	BIM-METHG-TISSUE1-WT (Metals incl Hg &	Moisture MOISTURE-MICR-VA (Tissue)	SPECIAL REQUEST-VA (Tissue - Washed)	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
133 199	TR-L-116-2020-R	18-Jul-20	13:47	Soil	1	R	R	R	R					
134 200 201	TR-L-116-2020-R	18-Jul-20	13:47	Tissue	1					R	R	R		
135 202	TR-L-149-2020	18-Jul-20	15:35	Soil	1	R	R	R	R					
136 203 204	TR-L-149-2020	18-Jul-20	15:35	Tissue	1					R	R	R		
137 205	TR-L-172-2020	19-Jul-20	12:49	Soil	1	R	R	R	R					
138 206 207	TR-L-172-2020	19-Jul-20	12:49	Tissue	1					R	R	R		
139 208	TR-L-207-2020	19-Jul-20	13:21	Soil	1	R	R	R	R					
140 209 210	TR-L-207-2020	19-Jul-20	13:21	Tissue	1					R	R	R		
141 211	TR-L-208-2020	19-Jul-20	13:56	Soil	1	R	R	R	R					
142 212 213	TR-L-208-2020	19-Jul-20	13:56	Tissue	1					R	R	R		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Special Request: For select Tissue samples, the sample will be pre washed prior to analysis. There will be a washed and unwashed component for the Tissue samples selected.
Guideline report:CCME -Soil (coarse)-IACR 1 in 1000000-II -GW unprotected

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	20.8

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 20-Jul-2020	Time: 15:21	Received by:	Date:	Time:	Received by: 8V	Date: 7/23/20	Time: 1115

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

APPENDIX I ANCILLARY INVESTIGATION: RELATIONSHIPS BETWEEN DUSTFALL AND SOIL-METAL AND LICHEN-METAL CONCENTRATIONS

Dust-deposited Metals on Lichen

Dustfall deposition is presumed to be the primary source of increased metals in soil and vegetation at the Project. In this respect, an additional objective of the vegetation and soil base metals monitoring program is to differentiate (to the extent possible) whether metals are being taken up by vegetation (via soil) or whether metals are being adsorbed to vegetative tissues (via deposition). Before laboratory analysis, lichen samples were divided into two equal subsamples: one subsample (metal uptake) was carefully washed, the other subsample (metal uptake + dust deposition) was not. Both samples were handled and analyzed as described in Section 7.1.3.2. An index was determined based on the difference of the subsample values to differentiate the fractions of the metal concentrations associated with metal uptake vs. dust deposition.

Two-way ANOVA's were used to identify significant statistical trends. So far, no cohesive or meaningful trends have emerged. It is anticipated that potential trends may emerge as data capture is increased.

Relationship Between Metals in Dustfall vs. Soil-Metals and Lichen-Metals

A strategic objective is to align and (where possible) correlate data from the dustfall monitoring program with outcomes from the vegetation and soil base metals monitoring program. Efforts have been made to streamline the sampling locations and study design to facilitate comparisons between these respective monitoring programs. For example, pairing vegetation and soil sample sites in proximity to permanent dustfall locations and conducting sampling concurrently. These steps are intended to bridge interpretations of the effects of dustfall on soil-metal and lichen-metal concentrations and align any triggers and corrective actions.

Dustfall monitoring data and soil-metals and lichen metals monitoring data were fit to a global model to explore potential interactions and relationships at the Project based on paired sample sites. Given the probability distributions of each respective dataset, data were handled and transformed (as necessary) to be the parametric analysis assumptions; for brevity, the description of these procedures has been abridged. All statistical analyses were conducted, and all plots were created in R statistical software, version 4.0.3 (R Development Core Team 2020).

The analysis focused on the CoPC's (Arsenic, Cadmium, Copper, Lead, Selenium, Zinc) and Aluminum. Ultimately, two-dimensional, and three-dimensional relationships were examined. Data summaries are presented hereafter. Although some metals indicated varying relationships, no cohesive trends have emerged among all metals. It is anticipated that potential trends may emerge as data capture is increased.

1) Dustfall Metals vs. Soil-Metals

Appendix Table I-1 summarizes the statistical relationships between dustfall metals and soil-metals. Significant interactions are highlighted (bold), and potential interactions with the 'distance to site' variable and pH variable. The following subsections provide a breakdown of CoPCs.

Appendix Table I-1. Summary of dustfall metals vs. soil-metals.

Trace Metal[1]	**Slope of Dustfall-Metals vs. Soil-Metals**[3]		**Interaction with pH Level**[4]		**Interaction with Distance to Site**[4]	
	Estimate	***P***	**Estimate**	***P***	**Estimate**	***P***
Aluminum (n = 60)	**-0.69**	**0.01**	**0.09**	**0.03**	0.10	0.31
Arsenic (n = 60)	**-0.85**	**0.0007**	**0.13**	**0.0005**	**0.11**	**0.04**
Cadmium (n = 60)	**-0.29**	**<0.0001**	-0.004	0.93	-0.12	0.07
Copper (n = 60)	**-2.36**	**0.0006**	**0.32**	**0.001**	-0.02	0.90
Lead (n = 60)	**-0.56**	**0.04**	0.07	0.09	0.05	0.67
Selenium (n = 56)[2]	—	—	—	—	—	—
Zinc (n = 56)	**-1.70**	**0.02**	**0.24**	**0.02**	0.08	0.50

[1] Sample sizes before analyses.

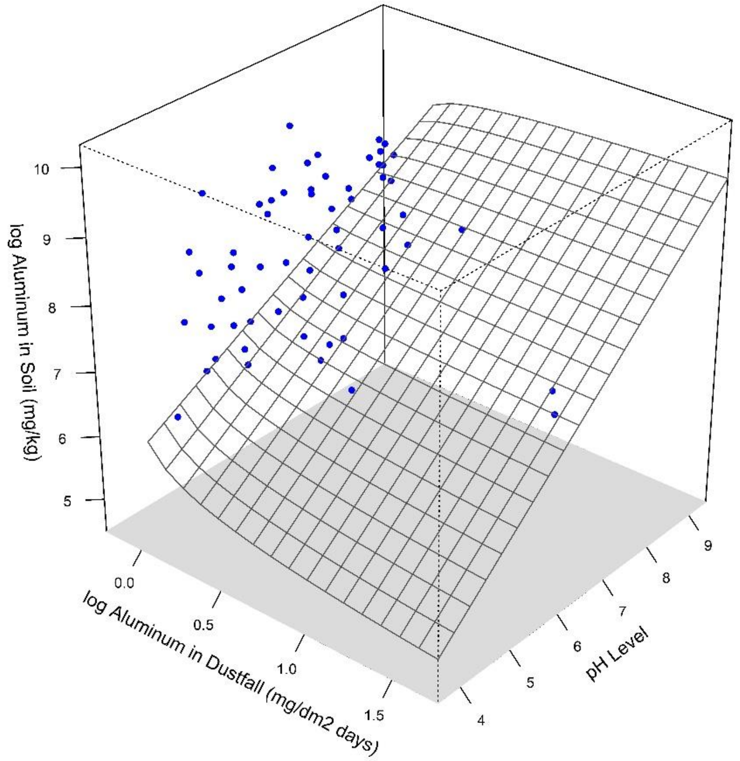
[2] No analyses were conducted on selenium due to many samples being below the reportable detection limit.

[3] If a significant interaction occurred with distance to site, then the marginal effect (slope) of dustfall is provided from the interaction model. The slope from a simple regression model is provided either if no significant interactions occurred with distance to site.

[4] Distance and pH were analyzed as continuous variables. Distance was standardized by subtracting the mean and dividing by the standard deviation.

a) Aluminum

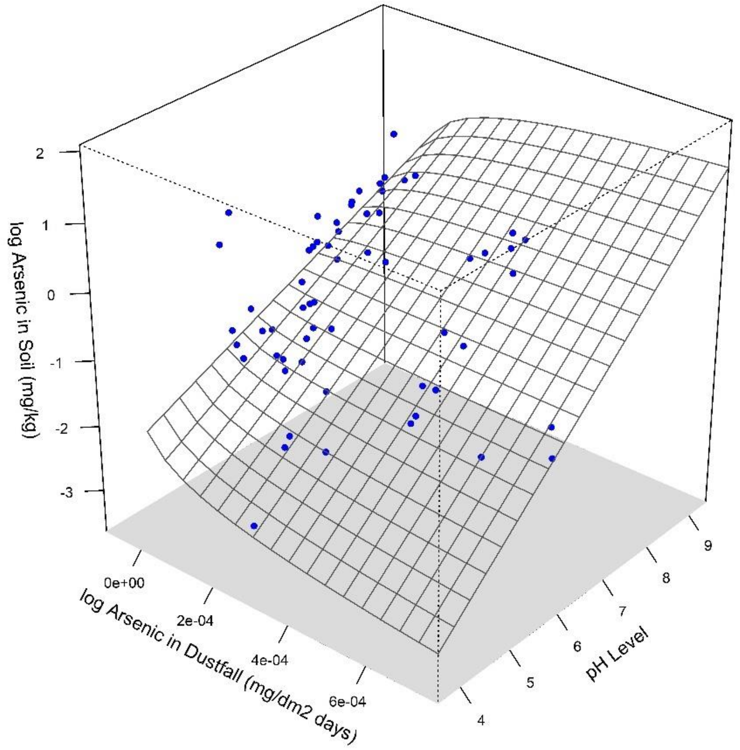
Initial examination of the data indicated a relationship between Al-dustfall deposition and soil-Al concentration ($F_{1,56} = 4.91$, $P = 0.03$). No interaction was identified with distance to site ($F_{1,56} = 2.23$, $P = 0.14$). A potential 3-way interaction in relation to pH was observed (Appendix Figure I-1)



Appendix Figure I-1. **Relationship between Al-dustfall deposition (mg/dm² days), soil-Al (mg/kg) and pH.**

b) Arsenic

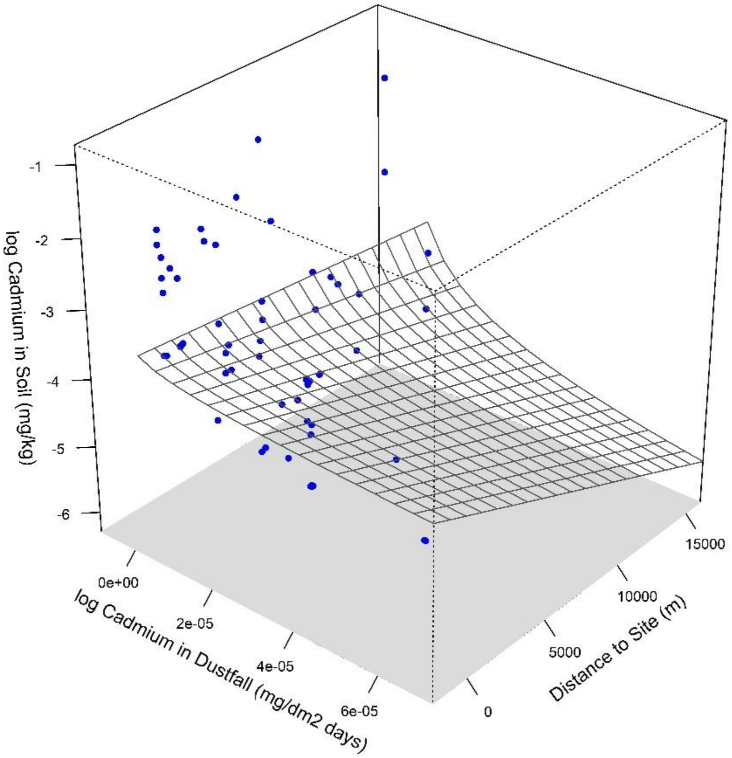
Initial examination of the data indicated a relationship between As-dustfall deposition and soil-As concentration ($F_{1,56}$ = 13.54, P = <0.001) and an interaction was identified with distance to site ($F_{1,56}$ = 4.43, P = 0.04). A potential 3-way interaction in relation to pH was observed (Appendix Figure I-2).



Appendix Figure I-2. Relationship between As-dustfall deposition (mg/dm^2 days), soil-As (mg/kg) and pH.

c) Cadmium

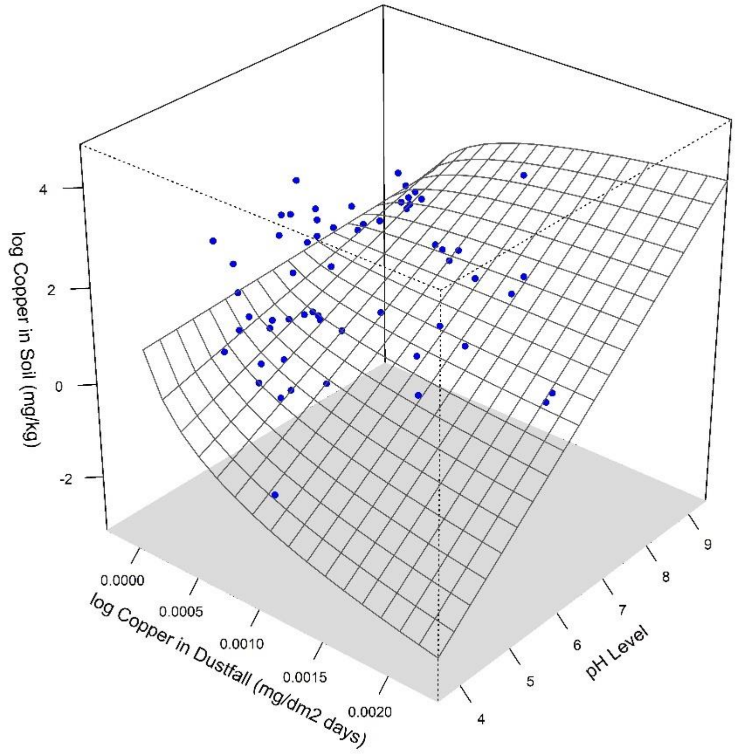
Initial examination of the data indicated no relationship between Cd-dustfall deposition and soil-Cd concentration ($F_{perm} = 3.30$, $P = 0.08$). A potential 3-way interaction in relation to distance from site was observed (Appendix Figure I-3).



Appendix Figure I-3. Relationship between Cd-dustfall deposition (mg/dm² days), soil-Cd (mg/kg) and distance to the Project.

d) Copper

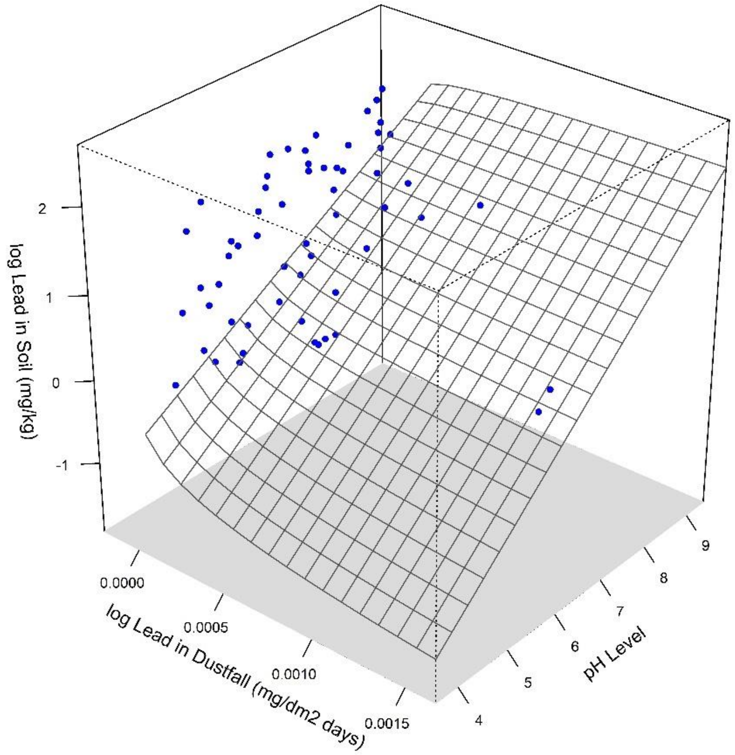
Initial examination of the data indicated a relationship between Cu-dustfall deposition and soil-Cu concentration ($F_{1,56}$ = 11.52, P = 0.001. No interaction was identified with distance to site ($F_{1,56}$ = 0.02, P = 0.90). A potential 3-way interaction in relation to pH was observed (Appendix Figure I-4).



Appendix Figure I-4. **Relationship between Cu-dustfall deposition (mg/dm² days), soil-Cu (mg/kg) and pH.**

e) Lead

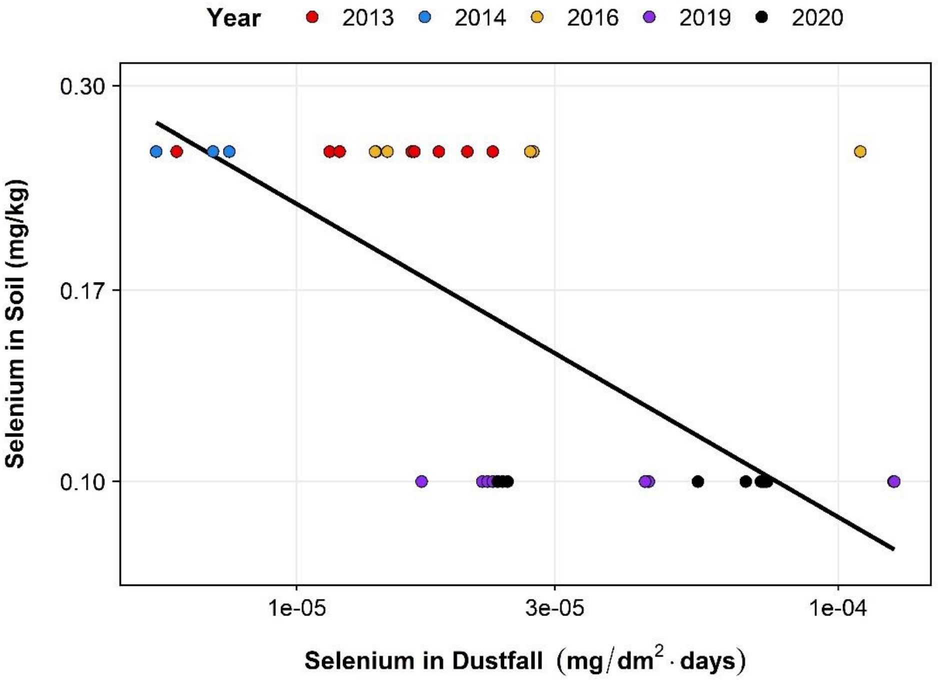
Initial examination of the data indicated no relationship between Pb-dustfall deposition and soil-Pb concentration. No interaction was identified with distance to site ($F_{1,55} = 3.06$, $P = 0.09$), and no interaction was identified with pH ($F_{1,55} = 2.23$, $P = 0.14$). No potential 3-way interaction was observed (Appendix Figure I-5).



Appendix Figure I-5. Relationship between Pb-dustfall deposition (mg/dm² days), soil-Pb (mg/kg) and pH.

f) Selenium

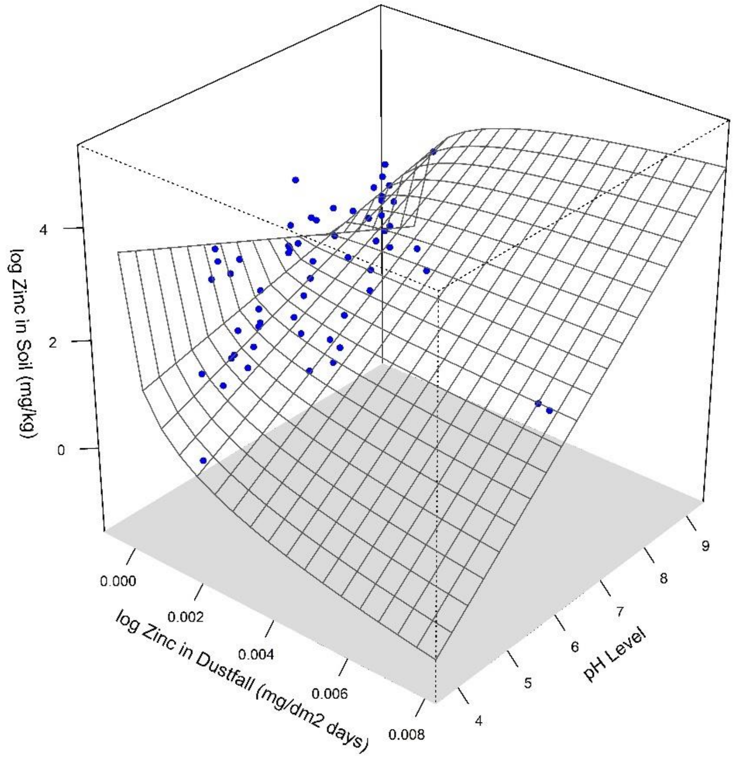
Data for Se-dustfall deposition and soil-Se was below or near the detection limit. This resulted in a truncated dataset that did not meet the assumptions of parametric analysis. No apparent trends were identified (Appendix Figure I-6). No formal analyses were completed.



Appendix Figure I-6. Relationship between Se-dustfall deposition (mg/dm² days) and soil-Se concentrations (mg/kg).

g) Zinc

Initial examination of the data indicated a relationship between Zn-dustfall deposition and soil-Zn concentration. No interaction was identified with distance to site ($F_{1,55} = 0.46$, $P = 0.50$), and no interaction was identified with pH ($F_{1,55} = 2.42$, $P = 0.02$). No potential 3-way interaction was observed (Appendix Figure I-7).



Appendix Figure I-7. **Relationship between Zn-dustfall deposition (mg/dm² days), soil-Zn (mg/kg) and pH.**

2) Dustfall Metals vs. Lichen-Metals

Appendix Table I-2 summarizes the statistical relationships between dustfall metals and lichen-metals. Significant interactions are highlighted (bold), as well as potential interactions with the 'distance to site' variable. The following subsections provide a break down CoPCs.

Appendix Table I-2. Summary of dustfall metals vs. lichen-metals.

Trace Metal[1]	**Slope of Dustfall-Metals vs. Lichen-Metals**[3]		**Interaction with Distance to Site**[4]	
	Estimate	*P*	Estimate	*P*
Aluminum (n = 56)	**0.38**	**<0.0001**	-0.04	0.50
Arsenic (n = 56)	**0.13**	**0.004**	-0.01	0.70
Cadmium (n = 56)	-0.02	0.60	-0.05	0.40
Copper (n = 56)	**0.12**	**0.05**	-0.12	0.06
Lead (n = 56)	**0.18**	**0.03**	-0.22	0.06
Selenium (n = 56)[2]	-0.05	0.50	0.15	0.23
Zinc (n = 56)	-0.02	0.76	**-0.15**	**0.04**

[1] Sample sizes prior to analyses.

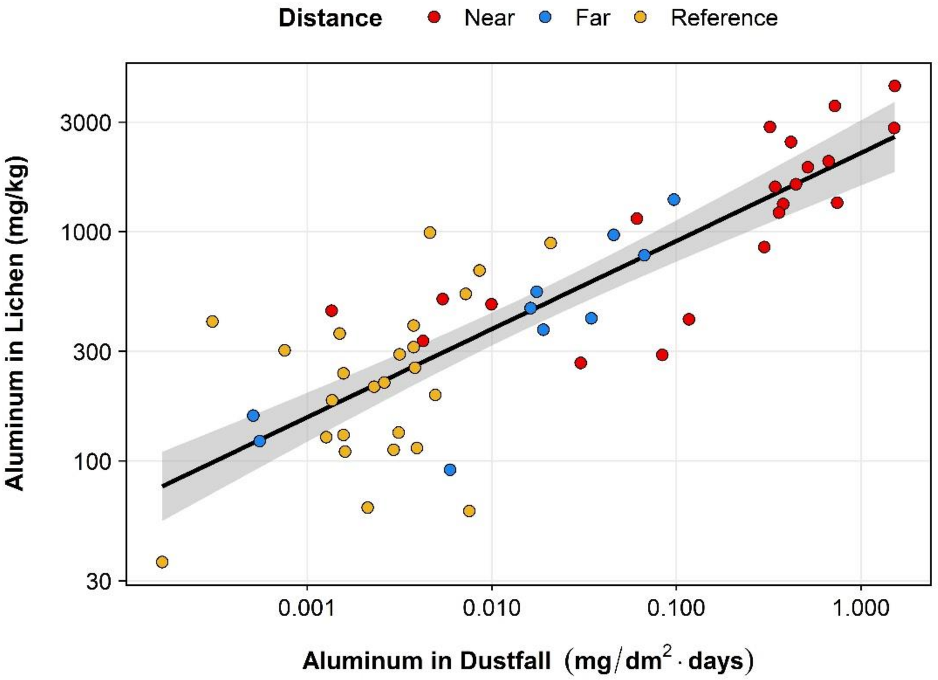
[2] No analysis was conducted on selenium due to many samples being below the reportable detection limit.

[3] If a significant interaction occurred with distance to site, then the marginal effect (slope) of dustfall is provided from the interaction model. The slope from a simple regression model is provided either if no significant interactions occurred with distance to site.

[4] Distance was analyzed as a continuous variable; standardized by subtracting the mean and dividing by the standard deviation.

a) Aluminum

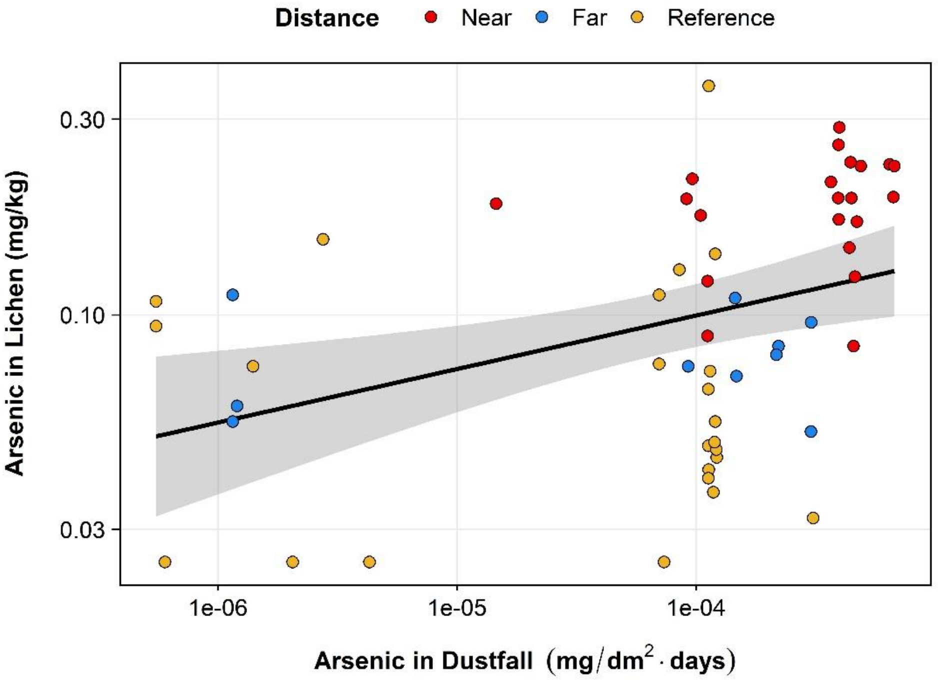
Appendix Figure I-8 illustrates the relationship between Al-dustfall deposition and lichen-Al concentration ($F_{1,54}$ = 124.01, $P < 0.0001$). No significant interaction was identified between dustfall and distance ($F_{1,52}$ = 0.38, $P = 0.5$).



Appendix Figure I-8. Relationship between Al-dustfall deposition (mg/dm² days) and lichen-Al (mg/kg).

b) Arsenic

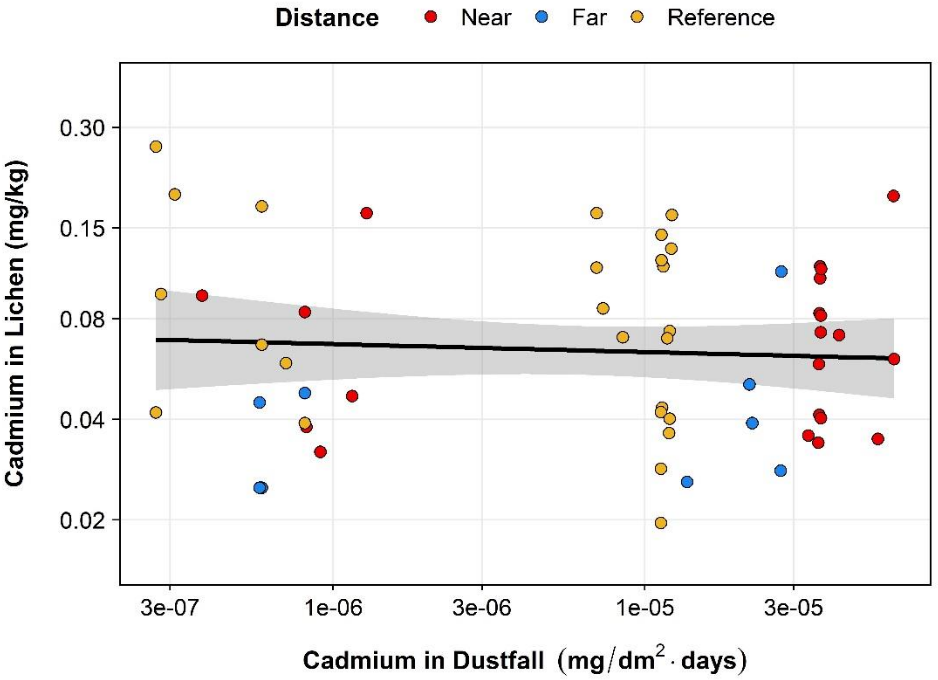
Appendix Figure I-9 illustrates a significant relationship between As-dustfall deposition and lichen-As concentration ($F_{1,53}$ = 9.23, P = 0.004). A single outlier data point was identified and removed from the analysis. No significant interaction was identified between dustfall and distance ($F_{1,51}$ = 0.13, P = 0.7).



Appendix Figure I-9. **Relationship between As-dustfall deposition (mg/dm² days) and lichen-As (mg/kg).**

c) Cadmium

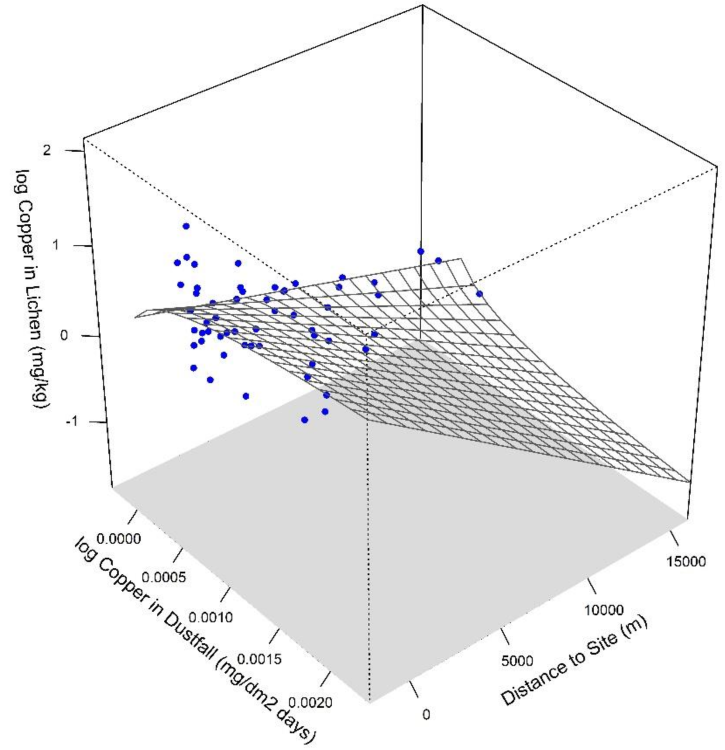
Appendix Figure I-10 illustrates no relationship between Cd-dustfall deposition and lichen-Cd concentration ($F_{1,54} = 0.23$, $P = 0.6$). No significant interaction was identified between dustfall and distance ($F_{1,52} = 0.81$, $P = 0.4$).



Appendix Figure I-10. Relationship between Cd-dustfall deposition (mg/dm² days) and lichen-Cd (mg/kg).

d) Copper

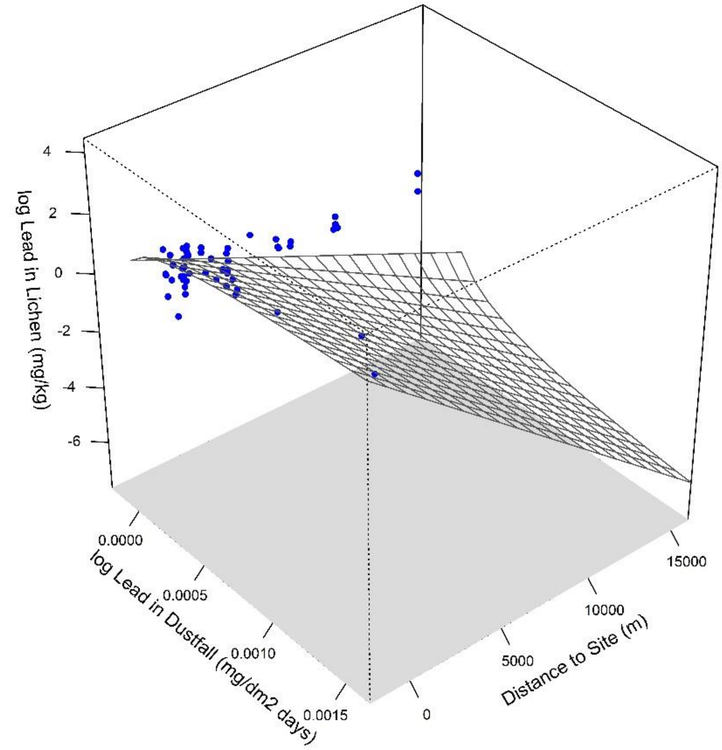
Initial examination of the data indicated no relationship between Cu-dustfall deposition and lichen-Cu concentration ($F_{1,52} = 3.61$, $P = 0.06$). A potential 3-way interaction in relation to distance from site was also observed (Appendix Figure I-11).



Appendix Figure I-11. Relationship between Cu-dustfall deposition (mg/dm² days), lichen-Cu (mg/kg) and distance to the Project (m).

e) Lead

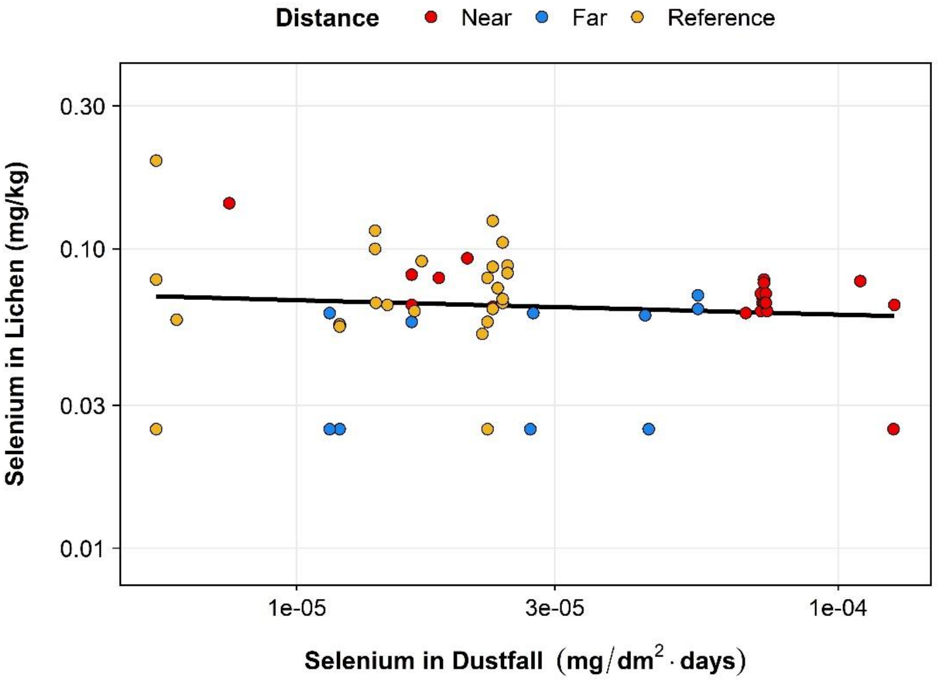
Initial examination of the data indicated a relationship between Pb-dustfall deposition and lichen-Pb concentration ($F_{1,50}$ = 6.19, P = 0.02). A potential 3-way interaction in relation to distance from site was also observed (Appendix Figure I-12).



Appendix Figure I-12. **Relationship between Pb-dustfall deposition (mg/dm² days), lichen-Pb (mg/kg) and distance to the Project (m).**

f) Selenium

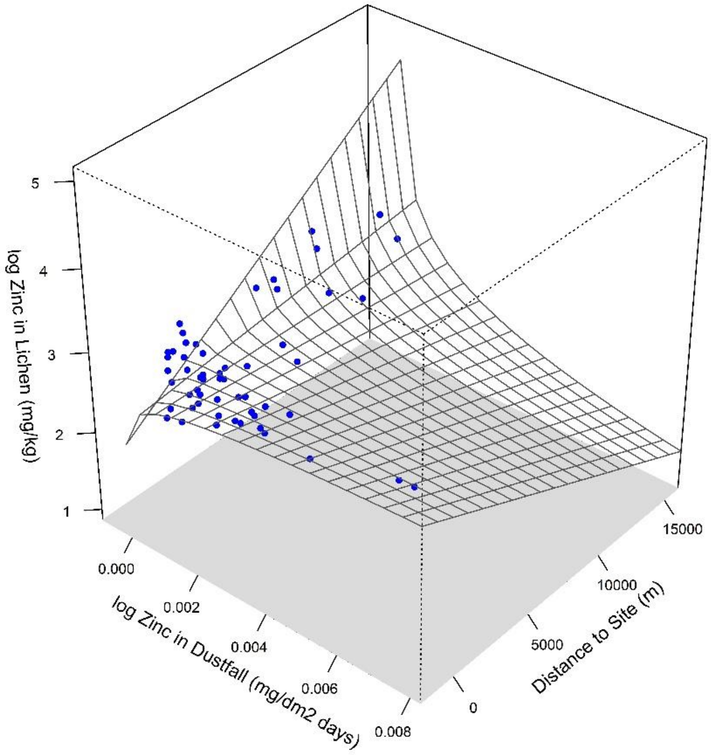
Initial examination of the data indicated a relationship between Se-dustfall deposition and lichen-Se concentration ($F_{1,54} = 0.47$, $P = 0.5$). No significant interaction was identified between dustfall and distance ($F_{1,52} = 1.47$, $P = 0.2$).



Appendix Figure I-13. Relationship between Se-dustfall deposition (mg/dm² days) and lichen-Se (mg/kg).

g) Zinc

Initial examination of the data indicated a relationship between Zn-dustfall deposition and lichen-Zn concentration ($F_{1,51}$ = 4.58, P = 0.04). A potential 3-way interaction in relation to distance from site was also observed (Appendix Figure I-14).



Appendix Figure I-14. Relationship between Zn-dustfall deposition (mg/dm² days), lichen-Zn (mg/kg) and distance to the Project (m).

APPENDIX J EXOTIC PLANT SPECIES KNOWN TO NUNAVUT

Appendix Table J-1 Exotic plant species known to Nunavut, provided by the Government of Nunavut in 2010.

Common name	Species name
Common barley	*Hordeum vulgare*
Common dandelion	*Taraxacum officinale*
Common plantain	*Plantago major*
Field pennycress	*Thlaspi arvense*
Field sow-thistle	*Sonchus arvensis*
Oxeye daisy	*Leucanthemum vulgare*
Opium poppy	*Papaver somniferum*
Prostrate knotweed	*Polygonum aviculare*
Redroot amaranth	*Amaranthus retroflexus*
Shepherd's purse	*Capsella bursa-pastoris*
Spreading alkali grass	*Puccinellia distans*
Tufted vetch	*Vicia cracca*
Wild caraway	*Carum carvi*
Yellow rocket	*Barbarea vulgaris*

*Personal communication with J. Saarela at the Museum of Nature on 13 November 2014 determined that *Hordeum jubatum* (foxtail barley) is the only known exotic species on Baffin Island. A few plants were found in Kimmirut, Nunavut in 2012 where it is not common, but likely persists.

APPENDIX K BIRD SPECIES OBSERVED WITHIN THE MARY RIVER PROJECT TERRESTRIAL RSA, 2006 TO 2020

Appendix Table K-1. Bird species observed within the Mary River Project Terrestrial RSA, 2006 — 2020.

Species	Latin name	2006	2007	2008	2012	2013	2014	2015	2016	2017	2018	2019	2020
Snow Goose	*Chen caerulescens*	B	B	B	S	S	B	S	S	B	B	B	S
Brant	*Branta bernicla*	S	-	-	-	-	-	-	-	-	-	-	-
Cackling Goose	*Branta hutchinsii*	-	-	-	-	B	S	S	-	B	B	B	S
Canada Goose	*Branta canadensis*	-	-	-	-	B	S	S	S	B	B	B	S
Canada/Cackling Goose	*Branta spp.*	B	B	B	B	-	-	-	-	-	B	B	S
Tundra Swan	*Cygnus columbianus*	-	-	B	S	-	-	-	-	S	S	S	-
King Eider	*Somateria spectabilis*	B	B	B	S	S	-	S	-	S	S	S	S
Common Eider	*Somateria mollissima*	S	S	S	S	S	-	-	-	-	S	-	S
Long-tailed Duck	*Clangula hyemalis*	B	B	B	S	B	S	S	S	B	B	B	S
Northern Pintail	*Anas acuta*	-	-	-	-	-	-	-	-	-	-	-	S
Red-breasted Merganser	*Mergus serrator*	B	B	B	S	S	-	S	-	S	S	S	S
Rock Ptarmigan	*Lagopus muta*	-	-	-	S	S	-	S	-	S	-	-	S
Willow Ptarmigan	*Lagopus lagopus*	-	-	-	-	-	-	-	-	S	-	-	-
Unspecified Ptarmigan	*Lagopus spp.*	-	-	S	-	-	S	-	S	-	S	S	S
Red-throated Loon	*Gavia stellata*	B	B	B	S	B	B	S	S	B	B	B	S
Pacific Loon	*Gavia pacifica*	B	B	B	S	S	S	-	-	-	-	S	S
Common Loon	*Gavia immer*	B	B	B	S	S	S	S	-	-	S	S	S
Yellow-billed Loon	*Gavia adamsii*	B	B	B	S	S	B	S	S	S	S	S	S
Northern Fulmar	*Fulmarus glacialis*	S	-	-	-	-	-	-	-	-	-	-	-
Rough-legged Hawk	*Buteo lagopus*	B	B	B	B	B	B	B	B	B	B	B	B
Gyrfalcon	*Falco rusticolus*	B	B	B	B	B	B	B	B	B	B	B	S
Peregrine Falcon	*Falco peregrinus tundris*	B	B	B	B	B	B	B	B	B	B	B	B
Sandhill Crane	*Grus canadensis*	B	B	B	S	B	B	S	S	S	S	S	S
American Golden-Plover	*Pluvialis dominica*	S	S	S	B	S	S	S	-	S	S	-	-
Semipalmated Plover	*Charadrius semipalmatus*	-	-	-	B	B	B	S	-	-	S	B	S
Common Ringed Plover	*Charadrius hiaticula*	S	-	-	-	S	B	S	-	-	-	-	-
Dunlin	*Calidris alpina*	-	-	-	S	-	-	-	-	-	-	-	-

Appendix Table K-1. Bird species observed within the Mary River Project Terrestrial RSA, 2006 — 2020.

Species	Latin name	2006	2007	2008	2012	2013	2014	2015	2016	2017	2018	2019	2020
White-rumped Sandpiper	*Calidris fuscicollis*	-	-	-	-	B	-	-	-	-	-	-	-
Baird's Sandpiper	*Calidris bairdii*	S	S	S	B	B	B	S	S	-	-	-	B
Pectoral Sandpiper	*Calidris melanotos*	-	-	-	S	-	-	-	-	-	-	-	-
Red Phalarope	*Phalaropus fulicarius*	-	-	-	S	S	-	-	-	-	-	-	-
Unspecified Phalarope	*Phalaropus spp.*	-	-	S	-	-	-	-	-	-	-	-	-
Herring Gull	*Larus argentatus*	-	-	-	B	-	-	-	S	-	-	-	-
Glaucous Gull	*Larus hyperboreus*	-	B	B	B	B	B	S	S	B	B	B	S
Thayer's Gull	*Larus thayeri*	-	-	-	-	B	-	S	-	-	U	-	-
Ivory Gull	*Pagophila eburnea*	-	-	-	-	-	-	-	-	-	-	-	U
Arctic Tern	*Sterna paradisaea*	-	S	S	-	-	-	-	-	-	-	-	S
Long-tailed Jaeger	*Stercorarius longicaudus*	-	-	-	S	-	-	S	-	-	-	-	S
Unspecified Jaeger	*Stercorarius spp.*	-	-	B	-	-	-	-	-	-	-	-	-
Snowy Owl	*Bubo scandiacus*	B	B	B	S	S	B	S	S	-	-	-	S
Short-eared Owl	*Asio flammeus*	-	-	S	-	-	-	-	-	-	-	-	-
Common Raven	*Corvus corax*	S	S	B	B	S	B	S	S	B	B	B	S
Horned Lark	*Eremophila alpestris*	S	S	S	B	S	S	S	S	S	S	S	B
Northern Wheatear	*Oenanthe oenanthe*	-	-	-	-	S	U	S	-	S	S	S	S
American Pipit	*Anthus rubescens*	S	S	S	B	B	-	S	-	B	B	B	B
Lapland Longspur	*Calcarius lapponicus*	S	S	S	B	B	S	S	S	B	S	B	B
Snow Bunting	*Plectrophenax nivalis*	S	S	S	B	B	S	S	S	B	B	B	B
Common Redpoll	*Carduelis flammea*	-	-	-	S	-	-	-	-	-	-	S	S
Hoary Redpoll	*Carduelis hornemanni*	-	-	-	S	-	-	-	-	-	-	-	-

Symbology: B = Confirmed Breeding; S = Confirmed Present; U = unconfirmed observation

*No formal bird surveys were conducted in 2020, and therefore all observations are incidental; from when qualified biologists were on site.