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Final Environmental Impact Statement (FEIS) - Meliadine Gold Project, Nunavut

REPORT

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9-ᒥᔅᓂᑦ – ᐃᓄᐃᑦ ᓇᓴᖅᑕᖏᓐᓂᒃ ᐅᓂᒡᓗᒃᑑᒧᑦ ᓇᐃᔨᖅᓯᒪᔪᖅ

ᐱᓴᑎᑎᕆᐅᔪᖅ

9-ᒥᔅᓂᑦ ᑭᖑᓪᓕᖅᑰᓕᐹᑎᑦ ᓄᓇᑦ ᐊᒪᓗ ᐊᒃᑐᖅᓯᓂᖅᓗᑦ ᐅᖅᑲᐅᓯᐅᔪᖅ (FEIS) ᑕᓯᔾᔪᐊᖅ ᔫᓗᒧᑦ ᐅᔅᓴᖅᑕᕆᐊᒧᑦ ᐱᓕᕆᐊᒧᑦ (ᐱᓕᕆᐊᖅ) ᐃᓱᒪᒃᖅᓯᐅᑭᑎᖅᑲᖅᑐᖅ ᐃᓄᐃᑦ ᓇᔾᕋᖅᑕᖏᓐᓂᒃᓂᓂ. ᐱᔾᔪᑎᑎᕐᐅᔪᖅ 9-ᒥᔅᓂᑦ ᐱᓕᕆᐊᕆᔪᒪᓕᕐᓗᑎᑦ ᒪᓕᒃᑕᐅᔪᖅᓴᐃᑦ ᓴᖅᑭᑦᑕᐅᔪᑦ ᓄᓇᕗᒻᒥᑦ ᐊᐅᒡᕕᓕᕆᓚᐅᒋᑦ ᑲᑎᒪᔨᖏᑦᓂᓐᓄᑦ (NIRB) ᐱᔾᔪᑎᖅᑲᐊᖅᓱᓂᒃ ᐊᒃᑐᖅᓯᔾᔪᑎᑎᐅᔪᓂᒃ ᐱᓕᕆᐊᒥᑦ ᐃᓕᓴᐅᒋᐊᖅᑐᖅᑐᑦ ᓄᓇᕗᑦ ᐊᑐᖅᑐᖏᓐᓂᒃ ᐊᒪᓗ ᖃᐅᔨᓴᓂᖏᓐᓂᒃ, ᐃᓄᐃᑦ ᐱᖅᒋᔪᓕᐅᔅᓴᖏᓪᓕᑦ ᐊᒪᓗ ᑕᐃᔾᔪᓕᓂ ᓂᔾᔪᑎᐅᓕᐅᖅᑐᑦ ᐊᒪᓗ ᐱᑭᖅᐸᓕᐅᖅᑐᓂᒃ ᐱᓕᕆᐊᖅᑐᒥᒃ ᐱᕐᓇᐃᐅᓇᖅᑐᓂᒃ, ᐊᒪᓗ ᐃᓄᐃᑦᓗ ᐱᓕᕐᓕᐊᔾᓗ ᐱᓕᕆᖃᑎᒌᖏᓪᓕᑦ, ᐃᓕᐅᔾᔨᓂᒃ ᐅᒋᐊᖅ:

- ᐃᓄᐃᑦ ᖃᔾᔪᐅᓂᖏᓪᓕᑦ ᐱᑭᖅᐸᒃᓕᕆᓂᓚᖏᓪᓕᑦ;
- ᐱᓕᕐᓕᐊᓂᖅᓗᑦ ᐱᑭᖅᐸᒃᓕᕆᓂᖅ ᐊᒪᓗ ᐱᐃᖃᐅᑎᓪᓕᑦ;
- ᐃᓕᓐᓂᐊᖅᓂᖅ ᐊᒪᓗ ᐱᔾᔪᓇᖅᑭᓚᖅᓗᑦ ᐃᓕᓐᓂᐊᖅᓂᖅ;
- ᐃᓄᒃ, ᖃᐅᓪᓚᑎᑎᓪᓕᑦ, ᐊᒪᓗ ᓄᓇᕗᖏᓪᓕᑦ ᐃᓅᑎᐊᖅᓂᖅ;
- ᓄᓇᕗᖏᓪᓕᑦ ᐊᑐᖅᑕᐅᔪᑦ ᓭᓇᑐᐃᓇᐃᑦ ᐊᒪᓗ ᐃᓄᐃᑦᑕᓄᑦ ᐱᔾᔪᑎᑎᐅᑦᓂᑦ;
- ᒪᕐᒪᕕᓂᖅ ᐊᒪᓗ ᓭᑲᕐᐅᖅᑎᕕᓂᖅ;
- ᐃᓄᐃᑦ ᐃᕐᓂᖅᑐᑐᖅᓯᖏᓪᓕᑦ ᓄᓇᒃ ᐊᑐᖅᓂᖅ ᐊᒪᓗ ᐱᐃᐅᑦᓇᖅᑐᓂᒃ ᐊᑐᖅᓂᖅ; ᐊᒪᓗ
- ᐃᓄᐃᑦᑕᓄᑦ ᐊᒪᓗ ᐱᕕᓇᓄᖅᓯᓚᐅᖅᓂᖅ ᐋᓐᓂᐊᖅᑕᐃᕕᒪᓂᖅᓗᑦ ᐋᓐᓂᖅᑕᐃᕕᒪᓂᖅᓗᑦᓗᓄ.

9-ᒥᔅᓂᑦ ᐅᖅᑲᐅᓯᖅᑲᖅᑐᖅ ᖃᓄᐃᓂᖅᓴᐅᓂᖏᓐᓄᑦ ᖃᓄᐃᓕᓴᐅᑦᐅᔪᓂᒃ ᐃᓄᐃᑦ ᓇᔾᕋᖅᑕᖏᓐᓂᒃ ᐊᒪᓗ ᖃᐅᔨᓴᐃᓂᐅᑦᐅᔪᓂᒃ ᐱᓕᕆᐊᒥᑦ ᑕᐅᐱᓕᓂᐅᑦᐅᔪᓂᒃ ᐊᐅᒡᕕᓕᕆᓚᐅᖅᑐᑦ ᐊᒪᓗ ᐱᓕᕆᐊᒧᑦ ᐊᐅᒡᕕᓕᕆᓚᐅᖅᑐᑦ ᐊᒪᓗ ᐱᓕᕆᖃᑎᒌᖏᓪᓕᑦ ᐊᐅᒡᕕᓕᕆᓚᐅᖅᑐᑦ ᓄᓇᕗᑦ (VSECs)ᒥᑦ. ᖃᐅᔨᓴᐃᓂᐅᑦᐅᔪᑦ ᐃᓕᐅᔾᔨᓂᒃ ᐊᓯᔾᔪᑎᑎᐅᑕᐅᑐᐃᓇᓕᓐᓂᒃ ᐱᓕᕆᐊᖅ ᐱᔾᔪᑎᑦᓴᐃᒍ ᐊᒪᓗ ᐱᓕᕆᐊᒧᑦ ᐊᐅᒡᕕᓕᕆᓂᓄᑦ ᖃᐅᔨᓴᐃᓂᐅᑦᐅᔪᓂᒃ, ᐊᒪᓗ ᖃᐅᔨᓴᐃᓂᖃᖅᑐᓂᒃ ᑕᓪᓕᐃᓂᒃ ᐱᓕᕆᐊᖅ ᓇᒧᓐᓄᐊᓕᐅᑦᑎᓂᖏᓪᓕᑦ, ᐃᓕᐅᔾᔨᓂᒃ ᓴᖅᑭᑦᑕᐅᔪᑦ ᐃᓄᐃᑦ ᐱᓕᕆᐊᒧᑦ ᐊᐅᒡᕕᓕᕆᓚᐅᖅᑐᑦ ᐊᒪᓗ ᐃᓄᐃᑦᑕᓄᑦ ᐊᐅᒡᕕᓕᕆᓚᐅᖅᑐᑦ ᐊᒪᓗ ᐅᓇᓕᖅᑐᑦ, ᐊᒪᓗ ᐅᓇᓕᖅᑐᑦ ᐃᓕᐅᔾᔨᓂᒃ ᐊᒪᓗ ᐱᓕᕆᐊᒧᑦ ᐊᐅᒡᕕᓕᕆᓚᐅᖅᑐᑦ ᐊᒪᓗ ᐱᓕᕆᖃᑎᒌᖏᓪᓕᑦ ᐊᐅᒡᕕᓕᕆᓚᐅᖅᑐᑦ ᐊᒪᓗ ᐃᓄᐃᑦᑕᓄ

ᐊᒃᑐᐊᓯᑦ ᓄᓇᒧᑦ (VSECs)ᓄᑦ ᐃᓕᐅᖏᓐᓄᑐᓂᖅ ᑭᓇᐅᔨᖅᑎᒋᔭᖅ ᐊᒪᓗ ᐱᖁᐃᓕᓴᖅᑕᖏᑦᑐᑦ ᓄᓇᕗᑦ (ᒥᓘᓇ (LSA) ᖃᓄᑕᒥᑦ ᓄᓇᕗᓴᒃᑲ ᖃᐅᔨᓴᐃᓂᖅ ᖃᖏᑎᑕᖅ ᓇᓗᓇᐃᖅᓯᒪᓴᒃᑲ), ᐃᓕᖅᑯᓯᑐᖃᖅ ᓄᓇᒥᑦ ᐊᑐᖅᓂᖅᓯᑦ ᐊᒪᓗ ᐃᓄᐃᑦ ᐃᓕᖅᑯᓯᑐᖃᓇᓕᒫᑦᑐᑎᒍᑦ ᓄᓇᒥᐅᑲ ᐊᑐᖅᓂᕐᕕᓴᑦ.

(RSA) – ᐊᖏᕐᓂᖅᓴᒃᑲ ᓄᓇᒥᐅᑲ ᖃᐅᔨᓴᐃᓂᖅ ᐃᓄᐃᑦᓗ ᐱᓕᕆᓴᕐᕕᓴᑦᓗ ᐱᓕᕆᖃᑎᒌᓂᖏᓐᓄᑐᓄᓇᖅ ᓂᕈᐊᖅᑕᐅᓕᐅᖅᑐᖅ ᓄᓇᕗᔪᓂᖅᓯᒪᔪᑦ, ᐊᒃᑐᖅᓯᓂᖅ ᓄᓇᕗᓕᒧᑦ ᐊᒃᑐᐊᓂᖃᓇᐃᖅᑐᖅ ᐃᑲᔪᑕᐅᔨᓴᖅᑐᖅᓂᖅ ᓄᓇᕗᑦ ᐊᑐᖅᓂᖅᓯᒪᔪᑦ ᐱᕈᐅᑎᒃᓴᖅᑐᖅ (ᐊᒪᓗ ᒪᓕᒃᑐᖅ ᐃᓄᖓᓄᑦ ᑐᑭᖓᖅᓯᒪᔪᑦ) ᐊᒃᑐᖅᓯᓂᖅ ᐊᒃᑐᐊᓂᖃᖅᑐᖅ ᑲᕐᓗᒪᒃᑯᑦ ᓄᓇᕗᑦ ᑐᖓᔪᓐᓇᖅᑐᖅ ᐱᕈᐅᑎᒃᓴᖅᑐᖅ ᐊᑐᖅᓂᖅᓯᒪᔪᑦ.

(LSA) – ᖃᓄᑕᒥᑦ ᓄᓇᕗᔨᖅᑐᒃ ᖃᐅᔨᓴᐃᓂᕐᕕᔨᖅᑐᖅ ᐃᓕᖅᑯᓯᑐᖃᖅ ᓄᓇᕗᑦ ᐊᑐᖅᓂᖅᓴᐃᓂᕐᕕᔨᑦᑎᓂ ᐃᓕᕐᕕᔨᑦ ᐅᔾᖃᑕᒪᓕᕆᔨᖅᑎᖅ, (AWAR) – ᐅᑭᐅᓗᓴᒋᑦᓴ ᐊᑐᖅᑕᕐᕕᔨᖅᑎᖅ ᐊᖏᔪᑎᑎᖅᑕᒃ, ᐊᒪᓗ 500 ᒥᑕᒃᑲ ᐅᖓᓯᓂᖅᓯᒪᔪᖅᓴᓂ ᑭᓯᓕᕐᕕᖅᑕᕐᓯᒪᔪᖅ ᒡᓪᔨᓇᖓᓕᒃ. (RSA) – ᐊᖏᕐᓂᖅᓴᒃᑲ ᓄᓇᕗᒃ ᖃᐅᔨᓴᐃᓂᖅ ᓴᖅᑭᑕᕐᓂᕐᕕᖅᑕᖅ ᐃᓕᕐᕕᑎᑐᓗᓴᓗ ᐅᔾᖃᑕᒪᓕᕆᔨᖅᑎᖅ, (AWAR) – ᐅᑭᐅᓗᓴᒋᑦᓴ ᐊᑐᖅᑕᕐᕕᔨᖅᑎᖅ, ᓄᓇᓕᒃ ᑲᖏᖅᓯᓂᖅ, ᐃᓚᓕᑎᕐᔪᖅ, ᐊᒪᓗ ᑎᑭᕐᕕᐊᖅ, ᐊᒪᓗ ᑐᓴᐃᓂᑦ ᐊᒃᑐᖅᓯᓂᕐᓄᑦ ᖃᐅᔨᓴᐃᓂᖅ (ᑕᔪᓗᐊᑐ ᑲᑎᕐᓂᖓᑦ). ᑐᓴᐃᓂᑦ ᐊᒃᑐᖅᓯᓂᕐᓄᑦ ᖃᐅᔨᓴᐃᓂᖅ ᐃᓕᕐᕕᕐᕕᖅᑕᖅ (RSA)ᒥᑦ – ᐊᖏᕐᓂᖅᓴᒃᑲ ᓄᓇᕗᒃ ᖃᐅᔨᓴᐃᓂᕐᕕᖅᑐᑦ ᑐᓴᐃᓂᑦ ᐃᓕᓴᕐᓯᒪᔪᓕᑕ ᐱᓪᓚᕐᕕᓂᖓᓄᑦ ᐃᓄᐃᑦᓗ ᐃᒃᓴᓪᓕᐊᑎᑎᓂᖏᓐᓄᑐᓄᓇᖅ ᐱᖁᔨᓴᖅᑎᖅᓯᒪᔪᑦ.

ᐱᔨᔪᑎᖏᑦ ᐃᓄᐃᑦ ᐃᓕᖅᑯᓯᑐᖃᓇᓕᒫᑦᑐᑎᒍᑦ ᓄᓇᕗᒃ ᐊᑐᖅᓂᕐᕕᔨᔪᑦ ᖃᐅᔨᓴᐃᓂᖅ, ᓄᓇᕗᑦ ᐱᖁᔨᓴᖅᑕᕐᕕᖅᑐᑦ (LSA) ᖃᓄᑕᒥᑦ ᓄᓇᕗᔨᖅᑐᒃ ᖃᐅᔨᓴᐃᓂᖅ (ᑕᔪᓗᐊᑐ FEIS 6ᑎᓪᓚᕆᑦ), ᑭᓯᓕᕐᕕᖅᓯᒪᔪᓕᑕᓂ ᐁᖅᑭᑎᐊᖅᑕᕐᕕᓯᒪᔪᕕᒃ ᐃᓕᕐᕕᑎᑐᓗᓴᓗ ᑭᖑᓂᖓᓂᓚᐅᑦᑐᖅ, ᐊᑐᖅᑕᕐᕕᓕᕐᕕᖅᑐᖅ. ᑐᓴᐃᓂᒃ ᐊᒃᑐᖅᓯᔪᕐᓗᓂᑦ ᖃᐅᔨᓴᐃᓂᖅ ᐊᑐᖅᑕᕐᕕᓕᕐᕕᖅᑐᖅ ᐅᖃᖅᑎᑦᑎᓯᒪᔪᓕᑕᓗ ᐃᓕᕐᕕᑎᑐᓗᓴᓗ ᑭᖑᓂᖓᓂᓚᐅᑦᑐᖅ ᐊᑐᖅᓂᕐᕕᓕᕐᕕᖅᑐᑦ ᓄᓇᕗᒃ ᐊᑐᖅᓂᖅᓯᒪᔪᑦ, ᐃᓕᕐᕕᑎᑐᓗᓴᓗ ᐃᓕᓴᕐᓯᒪᔪᓕᑕᓂ ᐱᖁᔨᓴᖅᑕᕐᕕᖅᑐᑦ ᓄᓇᕗᒃ ᐊᑐᖅᓂᖅᓯᒪᔪᑦ ᐃᓕᕐᕕᑎᑐᓗᓴᓗ ᐅᖃᖅᑎᑦᑎᓯᒪᔪᓕᑕᓂ ᐃᓕᕐᕕᑎᑐᓗᓴᓗ ᐱᖁᔨᓴᖅᑕᕐᕕᖅᑐᑦ

ᐊᑲᑐᖅᓯᓂᓐᓄᑦ ᖃᐅᔨᓴᐃᓂᖅ

ᐊᑲᑐᖅᓯᓂᖅᓄᑦ ᖃᐅᔨᓴᐃᓂᐅᑦᑕᖃᖅᑎᑎᕐᓂᖅ ᐊᑲᑐᖅᓯᓂᐅᑐᐃᓇᓚᐅᕐᓂᐅᒃ ᐱᓕᓚᐊᒥᓱᓴᖅᑐᒃ ᐊᒪᓕ ᐊᖏᓪᓗᓐᓂᐅᕐᓂᒃ (ᐊᑐᓚᐊᖃᖅᐸᑦ) ᐊᑲᑐᖅᓯᓂᐅᕐᓄᑦ ᐃᓄᐃᑦ ᓇᕐᓂᑕᖓᓄᐅᒃ. ᐊᑲᑐᖅᓯᓂᖅᓄᑦ ᖃᐅᔨᓴᐃᓂᖅ ᐃᓕᓴᐃᓂᖅᑐᖅᖃᖅ ᓄᓇᒪᓂᖅ ᐊᑐᔪᓐᓇᖅᑐᑦ ᐱᓇᓱᐊᓂᖅ; ᐱᔪᓐᓇᖅ, ᑕᐃᒪᓕᓂ ᓂᕐᕿᑎᐅᓕᖅᑐᑦ ᐊᒪᓕ ᐱᑕᖅᐸᓕᐅᖅᑐᑦ ᐱᓯᒪᐅᕐᓇᖅᑐᒃ; ᐊᑲᑐᖅᓯᓂᐅᕐᓄᑦ ᐃᓄᐃᑦ ᓇᕐᓂᑕᖓᓄᐅᒃ ᐃᓚᖓᓕᕐᓂᓗ ᐱᖓᓕᒪᕐᓂᓗ ᐱᓕᓚᖃᖅᑎᑦᓯᓂᖅᓂᑦ ᐊᑲᑐᕐᓂᖅ ᓄᓇᒪᓂ (VSECs) ᒪᓕᖅᑎᑦᕿᖅᑐᑦ ᖃᐅᔨᓴᐃᓂᖅᓄᑦ ᐊᑐᖅᑕᐅᖅᑎᑦᕿᖅᑐᒃ ᐅᖃᐅᓯᐅᕐᓂᖅᑎᑦ 4ᑎᖅᓱᑦ ᑭᖑᓪᓕᖅᐸᓪᓕᐊᑦ ᐊᑲᑐᖅᓯᓂᖅᓄᑦ ᐅᖃᐅᓯᐅᕐᓂᑦ (FEIS)ᑦ. ᑭᓯᐊᓂ, ᐊᔨᔪᑎᑭᓂᒃᑯᑦᑎᐊᖅᑐᑦ ᓂᕈᐊᖓᓂᖅᓄᑦ ᐊᒪᓕ/ᐅᖓᔪᓂᒃᑯᑦ ᑐᑭᓯᐅᖅᑕᐅᓂᒃᑯᑦᑎᓴᖓᓄ ᐊᑐᖅᑕᐅᓂᖅᓄᓪᓕᐊᓘᓐᓃᑦ ᖃᐅᔨᓴᐃᓂᖅᓂᑦ, ᐊᑐᖅᑕᐅᕐᓂ ᖃᐅᔨᓴᐅᒪᓂᖅᓄᓪᓕᐊᑦ ᐅᔨᓴᖅᓇᖅᓂᐅᕐᓂᑦ, ᐊᒪᓕ ᓇᓪᓕᐅᑦᖅᓂᖅᓂᖅᑲᐅ ᓇᓗᓇᐅᓂᖅᓂᖅᑲᑦ. ᐊᔨᔪᑎᑭᓂᒃᑯᑦᑎᐊᖅᑐᑦ ᐅᖃᐅᓯᐅᕐᓂᑦ ᐃᓕᑦᑕᐅᕐᓂᑦ 9.5.

ᐊᑲᑐᖅᓯᓂᒃ ᐱᓕᓚᐅᒥᑦ ᐃᓄᐃᑦ ᓇᕐᓂᑕᖓᓄᓂᑦ

ᐃᓕᖅᑯᓯᑐᖅᐃᑦ ᖃᓄᐃᓕᓚᐅᖅᓯᓂᒃ ᐊᒪᓕ ᖃᐅᔨᓴᒪᓂᖅ

ᖃᑭᒪᖅᓂᐅᔪᓄᑦ ᐊᑲᑐᖅᓯᓂᒃ ᒪᓂᒪᓂᓕᖏᑎᓄᑦ ᓂᕐᕿᑎᑦ ᐃᓕᓴᐃᓯᓚᐅᕐᓂᖅ ᒪᖃᖅᐃᓂᖅᓗᑦ ᐃᓱᒪᑎᖅᐅᕐᓂᑦ ᐃᓱᒪᓕᕐᓂᖅᓄᑦ ᐅᓴᖅᑎᑦᓯᓂᒃ ᐱᐅᓯᖅᓯᒪᓂᖅ (AWAR) – ᐅᑭᐅᓗᒃᑑᖃᖅ ᐊᑐᖅᑕᐅᔪᒪᖃᖅ ᐊᖏᔪᖅ ᐊᒪᓕ ᐱᖓᐅᔪᒪᓂ ᒪᖃᖅᐃᑎᓄᑦ ᐊᔪᖁᑎᑦᓯᓂᒃ ᓂᕈᐊᖓᓂᖅᓄᓪᓕᐊᑦ ᐃᓱᒪᑎᖅᐅᕐᓂᑦ ᐃᓄᖓᓂᖅᓄᑦᓯᓂᒃ ᐊᑐᖅᑕᐅᓂᖅ. ᐊᑐᖅᑕᐅᓂᖅ ᑎᑭᑕᐅᔪᓐᓇᖅᓯᓂᖅᓄᑦ ᐊᑐᖅᑕᐅᑎᔪᓂᖅᓄᑦᓯᓂᒃ (LSA) ᖃᐅᓕᑐᖅ ᓄᓇᒪᓂᖅᓄᑦ ᖃᐅᔨᓴᐃᓂᖅᓂᑦ, ᐊᒪᓕ ᐃᓱᒪᑎᖅᐅᔪᓂᒃ ᑭᖑᓪᓕᐊᓘᓐᓃᑦ ᐊᑐᖅᓂᖅ. ᐊᑲᑐᖅᓯᓂᖅᓄᑦ ᑕᑯᔪᑎᐅᓂᖅᓄᖅᓯᓂᖅᓄᑦ ᐊᒪᓕ ᑲᑎᕐᓂᖅᓄᑦ. (AWAR) – ᐅᑭᐅᓗᒃᑑᖃᖅ ᐊᑐᖅᑕᐅᔪᒪᖃᖅ ᐊᔪᖁᑎᑦ ᓂᓚᐅᑎᖅᐅᑎᓪᓗᒍ ᐋᖅᑕᐅᓂᐊᓂᖅᓯᓂᖅᓄᑦ ᐅᓄᖅᓯᐊᓂᖅᓂᖅᓯᓂᒃ ᐃᓕᖅᑯᓯᑐᖅᑕᐅᓂᖅᓄᓪᓕᐊᑦ ᐃᓱᒪᑎᖅᐅᔪᖅ ᐅᑎᖅᓯᐊᓂᖅᓂᖅᓯᓂᒃ ᐃᓕᖅᑯᓯᑐᖅᑕᐅᓂᖅᓄᓪᓕᐊᑦ ᐃᓱᒪᑎᖅᐅᔪᖅ ᑕᐃᒪᓐᓇᐃᓚᖓᓂᖅᓄᑦ ᐊᑲᑐᖅᓯᓂᒃ ᐊᖏᔪᖅ ᐊᒪᓕ ᐱᖓᐅᔪᒪᓂ ᐃᓱᒪᑎᖅᐅᔪᖅ ᐅᑎᖅᓯᐊᓂᖅᓂᖅᓯᓂᒃ ᐃᓕᖅᑯᓯᑐᖅᑕᐅᓂᖅᓄᓪᓕᐊᑦ ᐃᓱᒪᑎᖅᐅᔪᖅ ᑕᐃᒪᓐᓇᐃᓚᖓᓂᖅᓄᑦ.

ᐱᖓᓱᓕᕐᓂᐅᓪᓗᑦ ᐱᓕᕐᓂᐊᓂᒃ ᐊᒪᓕ ᐱᐃᓴᖅᑲᑎᑦ

ᓂᓚᐅᑎᖅᐅᔪᖅ ᐱᓂᓚᐊᖅ ᐊᖏᔪᓪᓚᐅᖅ ᐱᓂᑕᐅᔪᓪᓚᐅᖅ ᐱᖓᓱᓕᕐᓂᐊᓂᖅᓄᓪᓚᐅᖅ ᐊᑲᑐᖅᓯᓂᐅᑦᖃᖅᓯᓂᖅᓄᖅᓯᓂᒃ ᓄᓇᕗᒻᒥᑦ. ᐱᓂᓚᑎᑎᓂᖅ ᐊᒪᓕ ᑲᓐᖓᑦᖃᖅᑎᑎᓂᖅ, ᐃᓕᓴᐅᓂᖅᓂᖅ ᐊᒪᓕ ᐱᔪᓐᓇᖅᓯᐊᓂᖅᓄᓪᓕᐊᑦ ᐃᓕᓴᐅᓂᖅᓂᖅᑎᑎᓂᖅ, ᐊᒪᓕ ᐊᔪᖁᑎᑦ ᐃᓄᐃᑦ ᐱᓇᓱᐊᓂᖅᓄᓪᓕᐊᑦ ᐱᓂᓚᖃᖅᑎᑎᓂᖅᓄᑦ ᐊᐅᓚᑦᑎᓂ, ᐃᓚᖓᑎᓚᐅ (RSA) – ᐊᖏᓂᖅᓯᒪᒃ ᓄᓇᒃ ᖃᐅᔨᓴᐃᓂᖅᓄᑦ ᐊᒪᓕ (LSA) ᖃᐅᓕᑐᖅ ᓄᓇᒪᓂᖅᓄᑦ ᖃᐅᔨᓴᐃᓂᖅᓄᑦ ᐱᐅᔾᓇᐅᖅᓯᒪᓂᖅᓄᑦ ᐊᒪᓕ ᐊᑯᓂ ᑲᓐᖓᑦᖃᖅᑎᑎᓂᖅ ᐱᐅᓯᖅᓯᒪᓂᖅᓄᑦ.

ᐊᖏᑭᓪᓗᐊᖅᑎᑎᐅᓯᓪᓗᐊᓘᔪᖅᑐᑦ ᐱᑭᖅᐸᓪᓗᐊᑎᖏᑦᑕᒃ ᐱᓯᓪᓗᐊᔨᑎᒃ ᐊᔪᐠᖏᑭᑐᑎᒃ ᓴᖅᑭᑎᑦᑎᑎᖏᑦᑕᒃ, ᐱᑭᖅᐸᓪᓗᐊᑎᐅᔨᖅᓴ ᐅᑎᖅᑕᖅᑕᖅᑐᓪᓗᒍ ᐊᓯᐊᖓᖅᑕᖅᑐᓪᓗᒍ ᐱᑭᖅᐸᓪᓗᐊᑎᖅᓴ ᐊᒪᓗ ᐱᐅᖏᑕᑐᑦ ᑎᑭᖅᑕᖅᑎᑎᓪᓗᒍ, ᓄᓪᓗᒍ ᐅᖃᓕᒫᖅᑕᐅᑎᓪᓗᑎᑦ ᐱᖓᐃᓕᐅᑐᑦ. ᐊᒪᑐᖅᓄᓂᒃ ᐱᐅᔨᔪᑦ ᐊᒪᓗ ᐅᔪᓇᖏᓐᓇᖅᑐᑦ ᑭᓕᓪᓗᖏᑦᑕ ᓄᓇᓕᐅᔨᓄᑦ, ᐊᒪᓗ ᑕᐃᒪᐃᓐᓇᐃᓐᓇᖅᑐᖅᓴ ᓄᓇᕗᒻᒥᓗᓂᒃᑕᖅ. ᐊᒪᓗ, ᐊᒃᑐᖅᓄᓂᐅᔨᓗᓂᒃᑕᖅᓴᐃᓕᑦ ᐊᑯᓂ ᑲᔪᓄᐃᓐᓇᖅᑐᑦ.

ᐃᓄᖓᒍᑦ ᐊᒪᓗ ᓄᓇᓕᖓᓕᑦ ᐃᓅᑎᐊᖏᓐᓂᖅ

ᐊᒃᑐᖅᓄᓂᐅᔨᖏᓇᖅᑐᑦ ᐃᓄᖓᒍᑦ, ᖃᐅᓪᖯᑎᑎᑦᓄᑦ, ᐊᒪᓗ ᓄᓇᕗᑦᐳ ᖃᓄᐃᖏᑦᓂᓕᕆᖓᓄᑦ ᐊᔪᐠᖏᑦᓂᓕᕆᖓᑦᑕ ᐊᒥᓱᔨᑦ, ᐊᖏᑦᔨᑦᓯᓂᓐᓂ, ᐊᓇᕗᑦᑕᒫᓂᖅᖏᓐᓄᑦᓯᓂᓗ. ᐃᓅᑎᐊᖏᓐᓂᖅ ᐊᒃᑐᐊᓂᖃᖅᑐᖅᓴ ᐊᒃᑐᖅᓄᓂᐅᔨᖏᓇᖅᑐᓂᒃ ᓄᓇᕗᑦᐳ ᐱᑭᖅᐸᓪᓗᐊᓂᕆᖓᓄᑦ ᐊᒪᓗ ᐃᓅᓂᑦ ᐱᖏᓂᑐᖅᖃᓪᓚᑦᑕ ᐃᓕᓂᓂᐊᖏᓐᓂᖅᑐᑦ. ᐃᓅᖓᓂᑦ ᐊᒥᓱᓂᖃᖅᓂᓂᑦ ᓄᓇᕗᖓᓂᑦ, ᐊᑲᓂᐊᕐᑕᐃᓕᓚᓂᖅᖃᖅᑐᖅᓴ, ᖃᐅᓪᖯᑎᑎᑦᓂ ᐱᖓᖏᓇᖅᑐᖅᓴ ᐊᒃᑐᖅᓄᓂᐅᔨᖏᓇᖅᑐᓂᒃ ᓄᓇᕗᑦᐳ ᓴᓕᖏᓐᓂᖅᖃᖅᑐᖅᓴ ᐱᖓᓱᓂᖅᑐᑦ ᐱᖓᓱᓂᖅᑐᑦ ᐊᒪᓗ ᐃᓅᓂᑦ ᐱᖏᓂᑐᖅᖃᖅᑐᖅᓴ ᐃᓕᓴᕐ

ᐊᐳᑐᖏᓂᖅ (AWAR) – ᐅᑭᐅᓗᐳᑦᑕᖅ ᐊᑐᖅᑕᐅᔪᒃᖢᖅ ᐊᐠᖁᔨᑎᒃ ᐃᖅᑎᕋᓂᖅᓗᑦ ᐊᐠᖁᔨᑎᑎᑦᑐᖅᑐᑦᑕᖅᑐᓄᑦ ᐃᓕᒪᑦᐅᐅᔪᖅ ᐱᐅᔪᖅᑐᑎᓂᐅᐅᓂᖅᓗᑦ ᑎᑭᑕᐅᔪᖅᓯᓂᖅᑐᓄᑦ ᑲᑎᒪᔨᖅ ᑕᐃᒪᐃᖅᓯᓂᖅ ᐃᓕᓴᐃᖅᓯᓂᖅᑐᓄᑦ. ᐊᐳᑐᖏᓂᖅ ᑕᐃᓕᒪᔨᖅᓯᓂᖅᑐᓄᑦ ᐱᓕᕆᔨᖅᑐᑦ ᐊᑐᖅᑕᐅᔪᖅᑐᑦᑕᖅᑐᓄᑦ ᐱᓕᕆᔨᖅᑐᑦᑕᖅᑐᓄ

ᖃᐅᔨᓴᐃᓂᖅᑎᑦ, ᐱᓕᕆᔨᖅ ᐊᖏᑭᓕᖅᓯᓕᕆᓂᖃᕈᒪᓇᖅᑐᖅ ᐃᓂᑐᐸᑦ ᓄᓇᕗᓚᒍ ᐊᐠᖁᓯᐅᖅᑕᐅᔪᓚᒍ, ᐊᒪᓗ ᐊᖑᓕᖅᓇᖅᑐᒍᒍ ᑯᓚᔪᓇᖅᑎᓗ ᓯᑎᔪᓂᒃ ᐅᓴᕆᕆᓂᕈᓂᖅᓚᒍ ᐱᓕᕆᔨᒍ ᐱᖓᓕᖅᓯᓕᕆᓂᖃᕐᓂ ᐊᑐᑐᐃᓇᓕᕆᖃᖅᓯᖅᑐᖅ ᐊᐠᖁᓯᐅᖅᑕᐅᔪᓚᒍ ᐃᓄᐃᑦᑐᖅ ᐱᓕᕆᔨᒍ ᐱᖓᓕᖅᓯᓕᕆᓂᖃᕐᓂ ᑐᓴᖃᖅᑐᖅ ᐊᓯᖏᓐᓂᖅ ᐱᓕᕆᔨᒍ ᐱᖓᓕᖅᓯᓕᕆᓂᖃᕐᓂ ᑐᓴᖃᖅᑐᖅ ᐊᖑᓕᖅᓇᖅᑐᒍᒍ ᐃᓄᐃᑦ

ᐱᓕᕆᔨᑦ ᐱᖅᑕᖏᑐᓂᒃ ᐊᒪᓗ ᐱᓕᕆᔨᖅᑐᖅᓯᒪᓂᕆᔨᖏᑐᓂᒃ ᐃᓐᓂᐊᖅᑲᖅᑕᐃᓕᓕᒫᓂᖅᓱᓐᓄᑦ ᐊᒪᓗ ᐃᓐᓂᖅᑕᐃᓕᓕᒫᓂᖅᓱᓐᓄᐊᕐᓂᑦ ᐱᓕᕆᐊᕋᖏᑐᓄᐊᕐᓱᓐᓂᑦ, ᐃᑎᕋᐅᓯᐅᓯᒪᔪᖏᓐᓇᖅᑐᑦ ᓯᑭᔨᕋᖏᓐᓂᒃ, ᐊᒪᓗ ᒪᓕᖏᓂᖏᓪᓗᑦ ᑲᓇᑕᐅᔨᑐᓗ ᓄᓇᕗᑦᓗ ᐱᓕᕆᔨᖏᑐᓄᑦ ᐃᓐᓂᐊᖅᑲᖅᑕᐃᓕᓕᒫᓂᖅᓱᓐᓄᑦ ᐊᒪᓗ ᐃᓐᓂᖅᑕᐃᓕᓕᒫᓂᖅᓱᓐᓄᐊᕐᓂᑦ ᒪᓕᓴᐅᔪᓄᑦ.

ᐊᖏᕐᕋᑕᐅᖅᑯᑦ ᐱᓕᕆᐊᖅ, ᐃᓕᓴᐃᓯᓕᕆᔨᑦ ᐱᖓᓐᓄᐅᔪᓂᖏᓐᓇᖅᑐᑦ ᒥᐊᓂᖅᓯᓂᖏᓪᓗᑦ ᑮᖏᓐᓇᖅᑐᑦ ᐊᑐᓕᖅᑎᑕᐅᓂᐊᖅᑐᖅ ᐊᖅᑐᖅᓯᓂᒃ ᐊᖏᕈᓐᓇᖅᑐᓴᓕᓂᑦ ᐃᓕᓴᐃᓯᓄᑦ ᐱᓐᓄᐅᔪᓂᖏᓐᓇᖅᑐᓄᑦ. ᑐᖃᓚᕆᓐᓇᖅᑕᖏᓚᑦ ᐃᓕᓴᐃᓯᓕᕆᔨᑦ ᐱᖓᓐᓄᐅᔪᓂᖏᓐᓇᖅᑐᑦ ᒥᐊᓂᖅᓯᓂᖏᓪᓗᑦ ᑮᖏᓐᓇᖅᑐᓴᓕᓂᑦᓗ ᑲᔪᓯᑎᑐᑐᒍᑦ ᐊᐅᓚᕎᓂᖅ ᐊᖅᑐᖅᓯᓂᐅᔪᓂᖏᓐᓇᖅᑐᓄᖅ ᐃᓕᓴᐃᓯᓕᕆᐊᔪᐅᓂᖅ ᐱᓐᓄᐅᔪᓂᖏᓐᓇᖅᑐᑦ.

VOLUME 9 SOCIAL ENVIRONMENT
EXECUTIVE SUMMARY

Purpose

Volume 9 of the Final Environmental Impact Statement (FEIS) for the Meliadine Gold Project (Project) considers the social environment. The purpose of Volume 9 is to address the Guidelines issued by the Nunavut Impact Review Board for the Project specifically relating to the impact of the Project on traditional land use (TLU) and traditional activities and knowledge, cultural archaeological and paleontological resources, and socio-economics, which includes the following:

- population demographics;
- economic development and opportunities;
- education and training;
- individual, family, and community wellbeing;
- community infrastructure and public services;
- governance and leadership;
- non-traditional land use and resource use; and
- public and worker health and safety.

This Volume describes the baseline conditions for the social environment and assesses the effects of the Project on the above valued socio-economic components (VSECs). The assessment includes potential changes resulting from Project-related components and associated activities, and evaluates all Project phases, including construction, operation, maintenance, and temporary, final, and post-closure. Indirect and cumulative effects have been incorporated throughout Volume 9, where applicable.

Study Areas

Spatial and boundaries have been defined to facilitate the assessment and interpretation of potential effects associated with the Project on the above VSECs. It is recognized that different spatial boundaries are required for the socio-economic environment, as well as the traditional and non-traditional land use areas, and cultural archaeological and paleontological resources. Spatial boundaries were delineated based on the predicted spatial extent of the Project-related effects.

The local study area (LSA) is comprised of Kivalliq Region and the five communities of Rankin Inlet, Chesterfield Inlet, Whale Cove, Baker Lake and Arviat for all VSECs with the exception the economy of Nunavut (which did not have a LSA defined), TLU, and non-Traditional Land Use (NTLU).

The regional study area (RSA) for the socio-economic component was selected as the Nunavut territory, as effects on Nunavut are primarily related to the potential for benefit to the territory's economy. In addition, the potential for cumulative economic (and consequent social) effects has implications for government and Nunavut Tunngavik Incorporated policy and programs in Nunavut.

The LSA for TLU includes the proposed mine footprint, the proposed All-weather Access Road (AWAR) footprint, and a 500-metre (m) buffer surrounding these footprints. The RSA was developed to include the proposed mine, the proposed Project AWAR, the communities of Rankin Inlet, Chesterfield Inlet, and Whale Cove, and the

caribou effects study area (see Volume 6). The caribou effects study area was included in the RSA as caribou are considered an important species by Inuit for sustenance and cultural purposes.

For the purposes of the NTLU assessment, the terrestrial resources LSA (see FEIS Volume 6), with a boundary modification to include the entire municipality of Rankin Inlet, was used as the study area. The caribou effects study area was used to discuss regional effects to NTLU, with the inclusion of Chesterfield Inlet and the surrounding lands bounded by the coast and the south shore of the inlet.

The LSA boundary for cultural, archaeological, and paleontological resources was defined as the proposed Project footprint and a buffer of 500 m surrounding the footprint so that coordinates of sites surveyed in the 1970s could be assessed. The LSA for Project infrastructure in Rankin Inlet was limited to the Project footprint only and did not include a buffer beyond the legislated 30 m protection zone so as to assess potential effects from the Project in isolation of potential from effects due to hamlet.

The RSA for cultural, archaeological, and paleontological resources was the Project lease area plus a 7-km buffer. The 7-km buffer was applied to ensure that the Iqalugaarjuup Nunanga Territorial Park was included in the RSA. The inclusion of the Iqalugaarjuup Nunanga Territorial Park was important because of its relevance to culture and heritage resources, and because Meliadine River, the focus of the Iqalugaarjuup Nunanga Territorial Park, is a location with high potential for archaeological sites.

The temporal boundaries for the socio-economic assessment includes the proposed mine life from construction to final closure. However it is recognized that socio-economic conditions are continually evolving in response to other projects, government initiatives, improved technologies and multiple other factors that are both unknown and unpredictable. Therefore, the assessment conclusions are not necessarily predictive, but rather indicative of the potential for effects, both positive and negative.

Effects Analysis

An effects analysis provides the general approach to analyzing potential Project-specific and cumulative (where applicable) effects on the social environment. The effects analysis for TLU and traditional activities and knowledge; cultural, archaeological and paleontological resources; and socio-economic VSECs generally followed the assessment methodology described in Volume 4 of the FEIS. However, there are some differences in the choice and/or the definition of criteria used in the assessment, in the methods used to determine significance, and in the prediction confidence. The differences are described in Section 9.5.

Effects from the Project on the Social Environment

Traditional Activities and Knowledge

Residual impacts to the availability of wildlife for traditional harvesting are considered to be positive, as access to harvesting areas is expected to improve as a result of the AWAR, and is desired by hunters and other harvesters. The change in access to harvesting areas is considered positive in direction and moderate in magnitude. The increased access will extend beyond the LSA, and is therefore considered regional in extent. The effect will be of long-term duration and will occur continuously. As the AWAR is expected to be removed during closure, the change in access is considered reversible. The effects of the change in access are considered highly likely.

The effects of the Project on the availability of birds and plants for traditional harvesting are considered to be negative. The effects are of negligible to moderate magnitude, long duration, local (for plants) to regional (for birds) in extent.

Low magnitude, local residual effects to marine mammal behaviour as a result of the Project are likely to occur over the medium term; however, these effects are considered reversible. Given the low frequency of vessel transits in the LSA and the low intensity of sensory disturbance that is expected, all Project effects on the marine environment are predicted to be not significant.

Economic Development and Opportunities

It is expected that the Project will have significant positive economic effects to Nunavut. Preferential employment and contracting, education and training, and other Project socio-economic management measures are expected to maximize the retention of economic benefits in Nunavut.

Education and Training

The effects analysis results indicate that effects on education, training, and capacity in the RSA and LSA should be positive and long lasting. Increased local capacity should lead to increased economic development and diversification, making the economy more resilient to economic fluctuations and negative events, such as closure of resource projects. The effects are positive and significant in all Kivalliq communities, and this should also be true for Nunavut as a whole. Moreover, most of the effects should be long-term.

Individual, Family and Community Wellbeing

Potential effects on individual, family, and community wellbeing are complex, far reaching, and unpredictable. Wellbeing is intimately associated with potential effects on community economies and traditional culture. For most people in communities, health status will improve, families may have more resources and can potentially function better, and households will have more opportunities to save. These are all considered significant benefits.

It is noted that there will be an adjustment period during which negative effects may be expected until people learn to manage life changes associated with wage employment, such as income, diet and nutrition, and stresses. Negative effects on individuals are not expected to occur with such frequency that overall community wellbeing suffers.

Community level effects are expected to be positive, and both Inuit and non-Inuit will benefit. The most prominent potential negative effects at the individual and family level are challenges associated with the transition to the wage economy, and possible exacerbations of existing socio-economic health and education conditions for Inuit who are unable to benefit from the Project. While these effects extend to the non-Inuit population, this group typically has more resources with which to cope.

Community Infrastructure and Public Services

The effects analysis results indicate that effects of Project on housing, schools, and health and financial services in the LSA are considered to be negative due to the increased demand placed on these services. The magnitudes of these effects, however, are assessed to be negligible to moderate, as the majority of in-migration is expected to occur in Rankin Inlet, where the supply of public services would accommodate increased demand. Due to the negligible negative impact of the effect on quality of life, the Project's effect on housing, schools, and health and financial services are considered not significant.

The effect of the Project on social and police services in the LSA is considered to be negative due to the potential for increased crime and the associated increased demand for services. The magnitude of this effect is assessed to be low to moderate as the large majority of in-migration will occur in Rankin Inlet, and because demand for some social services (i.e., social assistance) may reduce as a result of the Project. Due to the

moderate, long duration, negative impact of this effect on quality of life, the Project's effect on police and social services is considered significant.

The effect of the AWAR on traffic infrastructure is considered to be positive as this will allow for enhanced access to areas around Rankin Inlet for the purposes of traditional and non-traditional land uses. The effect will persist throughout Project construction and operations and thus has been assessed as long-term (i.e., lasting longer than 10 years) in duration. Despite the fact that the road will be removed in the interest of reclamation post-closure, this effect is considered significant given its moderately positive long-term nature.

Governance and Leadership

Residual effects on governments and leadership in both Nunavut and the Kivalliq region should be positive and long lasting. Increased local capacity and experience may lead to more cost-effective public services and increased service levels. This would make government better equipped to handle any future industrial projects and other economic activities. However, if resource extraction does not continue in the area, there is a risk of over-capacity of government when the Project ramps down. This could potentially lead to staff reductions and other cost cuts. Given the number of pending resource extraction applications, this is considered a highly unlikely scenario.

Non-Traditional Land Use and Resource Use

The effects analysis results indicate that effects of Project on access to non-traditional hunting and fishing, outfitting, and guiding in the RSA via the AWAR is considered to be positive as increased access to resources enhances opportunities for NTLU. The magnitude of this effect is considered to be negligible to low as NTLU (e.g. hunting and fishing) in the area is very limited, and thus few non-traditional land users would be affected. The effect extends beyond the LSA, and so is considered to be regional.

Project effects on the availability of wildlife for hunting and fishing in the RSA is assessed as being negative. Given that the effects extend beyond the LSA, they are considered to be regional. The effect to wildlife and fish abundance is considered to be of low to moderate magnitude.

Noise-related Project effects will have a negative effect on hunting, fishing and tourism. These effects will be regional in extent and are considered to be of negligible to moderate magnitude.

The effect of the Project on access to the Iqalugaarjuup Nunanga Territorial Park and surrounding areas via the AWAR is considered to be positive as increased access to resources enhances opportunities for NTLU.

There are no other developments in the vicinity of the Project. Cumulative effects on NTLU are not expected in the LSA, with the exception of potential cumulative effects to the acoustic environment. In the RSA, the Project may act cumulatively with the Manitoba to Nunavut road itself, and the Ferguson Lake and Churchill Diamond projects in that all developments would potentially use the Manitoba to Nunavut road to transport goods and personnel. Project traffic would act cumulatively with traffic from other developments to increase noise levels in the LSA where the Manitoba to Nunavut road enters Rankin Inlet. Given the unlikelihood of this scenario, this effect is not considered to be significant.

Public and Worker Health and Safety

The assessment of public and worker health and safety does not require a residual impact classification. No significant negative effects are expected on public health and safety, although risk cannot be completely eliminated. Rather, worker health and safety training can result in a benefit of improved public health and safety.

Cultural and Archaeological and Paleontological Resources

The Project is anticipated to have negligible residual effect on cultural, archaeological and paleontological resources relative to baseline conditions. Therefore a residual effects assessment and classification was not required.

Monitoring and Follow-up

The monitoring of socio-economic effects in Nunavut and Kivalliq will largely be the responsibility of the Kivalliq Socio-Economic Monitoring Committee (SEMC) and the Nunavut General Monitoring Plan Secretariat (NGMP). However, AEM intends to take part in this collaboration by taking part in the planning of monitoring initiatives, contributing with data and other input, and/or providing support to the Kivalliq SEMC and NGMP Secretariat. In addition, AEM would collaborate with other resource companies towards a consistent and useful approach for data collection.

The monitoring of wellbeing can be challenging because it is oftentimes difficult to accurately collect quantitative data that directly correlates to wellbeing VSECs. In addition, it can be intrusive to ask people personal information about their wellbeing to collate qualitative monitoring results. AEM will develop a monitoring schedule to regularly monitor aggregate employee use of counselling, job retention rates, and other social wellbeing data. AEM will also work with the Kivalliq SEMC to collect regional statistics on health outcomes, crime rates, housing statistics, and other wellbeing indicators.

A monitoring program will be developed to ensure that there is compliance with the Project's public and worker health and safety commitments. The program will cover aspects such as employee uptake and attendance at health and safety related training, recordable incidents, and compliance with Canadian and Nunavut occupational health and safety regulations.

Upon approval of the Project, the Cultural and Heritage Resources Protection Plan will be implemented to limit effects to heritage resources. The principal objective of the Cultural and Heritage Resources Protection Plan is to continue to actively manage potential impacts to heritage resources.

Abbreviation and Acronym List

AANDC	Aboriginal Affairs and Northern Development Canada
AEM	Agnico Eagle Mines Limited
AIA	Archaeological Impact Assessments
ASTt	Arctic Small Tool Tradition
ATV	All-terrain Vehicle
AWAR	All-weather Access Road
CINE	Centre for Indigenous Peoples' Nutrition and Environment
COPC	Chemicals of Potential Concern
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EFAP	Employee and Family Assistance Program
FEIS	Final Environmental Impact Statement

FY/FT	full time for a full year
GDP	Gross Domestic Product
GN	Government of Nunavut
GNBS	Government of Nunavut Bureau of Statistics
GN-CH	Government of Nunavut, Department of Culture and Heritage
Golder	Golder Associates Ltd.
H&S	Health and Safety
HHRA	Human Health Risk Assessment
HTO	Hunters and Trappers Organization
IHTI	Inuit Heritage Trust Incorporated
IIBA	Inuit Impact Benefit Agreement
INAC	Indian and Northern Affairs Canada
IQ	Inuit Qaujimajatuqangit (see note [1])
KIA	Kivalliq Inuit Association
LSA	Local Study Area
MOU	Memorandum of Understanding
MIEG	Minimum Inuit Employment Goal
NCJ	Nunavut Court of Justice
NGMP	Nunavut General Monitoring Plan Secretariat
NIRB	Nunavut Impact Review Board
NLCA	Nunavut Land Claims Agreement
NPC	Nunavut Planning Commission
NT	Northwest Territories
NTI	Nunavut Tunngavik Incorporated
NTLU	Non-Traditional Land Use
NWMB	Nunavut Wildlife Management Board
Project	Meliadine Gold Project
RCMP	Royal Canadian Mounted Police
RSA	Regional Study Area
SEMC	Socio-Economic Monitoring Committee
STI	Sexually Transmitted Infection
TEK	Traditional Ecological Knowledge
TFF	Territorial Formula Financing
TLU	Traditional Land Use
VEC	Valued Environmental Component
VSEC	Valued Socio-Economic Component

*Note: [1] IQ symbol appearing in right hand margin denotes where IQ is referenced in the assessment.

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APPENDICES

Appendix 9.1-A
Research Licenses issued by Nunavut Research Institute for Project Socio-Economic and Traditional Knowledge Studies

Appendix 9.3-A
Results of Inuit Qaujimajatuqangit interviews and focus groups held in Rankin Inlet, Chesterfield Inlet and Whale Cove (Nanuk Enterprises 2011)

Appendix 9.3-B
Inuit Qaujimajatuqangit Traditional Ecological Knowledge of Plant Use: Summary Report, Elders' Workshop in Rankin Inlet (Burt 2010)

Appendix 9.3-C
Meliadine Gold Project Traditional Knowledge, Marine Approaches to Rankin Inlet Report (Burt and Hickes 2012)

Appendix 9.11-A
Detailed Archaeological Site Description

9.0 SOCIAL ENVIRONMENT

Volume 9 of the Final Environmental Impact Statement (FEIS) for the Meliadine Gold Project (Project) considers the social environment. The purpose of Volume 9 is to address the Guidelines issued by the Nunavut Impact Review Board (NIRB) for the Project (NIRB 2012) specifically relating to the impact of the Project on traditional land use (TLU) and traditional activities and knowledge, cultural archaeological and paleontological resources, and socio-economics, which includes the following:

- population demographics;
- economic development and opportunities;
- education and training;
- individual, family, and community wellbeing;
- community infrastructure and public services;
- governance and leadership;
- non-traditional land use and resource use; and
- public and worker health and safety.

9.1 Methodology

The effects assessment for the social environment considers baseline information on the functioning and stability of the socio-economic environment in the Local Study Area (LSA), which consists of 5 hamlets nearest the Project (Arviat, Baker Lake, Chesterfield Inlet, Rankin Inlet, and Whale Cove). The LSA for traditional and non-traditional land use assessed the 3 closest communities to the Project; Rankin Inlet, Chesterfield Inlet, and Whale Cove. The Regional Study Area (RSA) for both the socio-economic and land use assessments was Nunavut. The impact assessment covers all Project phases of development (construction, operations, temporary closure, final closure [decommission & reclamation], and post-closure). The assessment also describes the components of the socio-economic environment and the processes affecting them as they exist without the Project. This will serve as a baseline against which the potential changes and impacts of the Project can be measured and will also justify selection of Valued Socio-Economic Components (VSECs) and indicators.

The rationale for the selection of communities, the public consultation carried out, and relevant reference studies and reports from which baseline data are collected is described below. The socio-economic assessment also describes and assesses the interactions between the socio-economic and biophysical environments[1], including the roles of the land- and wage-based economies, and the nature of the mixed economy of the North.

Whenever relevant and appropriate, data have been disaggregated by age, gender, and ethnic affiliation. Socio-economic indicators are used to present baseline information and subsequently measure impacts related to the Project. The assessment also identifies and justifies selection of indicators and considers the temporal aspect of when potential impacts on each relevant VSEC could reasonably be expected to manifest. Finally, the limitations and knowledge gaps encountered in the collection of information are identified where applicable.

[1] Table 9.3-17 shows pathways between Project changes to the biophysical environment and potential changes in traditional use. For example the Project "interacts" with terrestrial wildlife, and that interaction could result in changes to traditional land use. .

9.1.1 Baseline Data Collection

9.1.1.1 Socio-Economic Baseline Data Collection

The baseline methodology for the local study area, Kivalliq and the 5 LSA communities included the following components:

- literature review and secondary data collection;
- identification of data gaps, and design and implementation of a primary data collection program to fill those gaps;
- integration with Inuit Qaujimajatuqangit (IQ); and
- data entry, analysis and reporting.

9.1.1.2 Literature Review and Secondary Data Collection

The socio-economic baseline study used a number of secondary data sources, as described in the methodology section for the Nunavut study area. In addition, reports and papers prepared by government, academics and consultants, which look specifically at key issues as defined in the previous section, were reviewed. For example, there is some reporting available on the socio-economic effects of mining projects in Nunavut and Northwest Territories (NT), on the effects of rotational work on families and communities, on the adaptability of people to climate change, and on the potential for cumulative effects of multiple resource extraction projects.

9.1.1.3 Primary Data Collection

The review of the literature and secondary data sources referenced above indicated significant data gaps, related largely to timeliness and completeness of available data. The most obvious example is the census data, which were collected in 2006. Not only are these data out of date for all communities, they were collected before the construction of Meadowbank was well underway. Thus changes in Kivalliq as a result of the large employment and business benefits resulting from Meadowbank are not reflected – changes of particular interest insofar as they would be relevant to an assessment of the potential impacts of a second large mining project.

Therefore this secondary information was supplemented with a primary data collection program. The data collection was done under the terms of a research license from the Nunavut Research Institute (Appendix 9.1-A).

Primary data collection enabled some qualitative updating of socio-economic conditions, as well as a better understanding of conditions and trends than census data are able to convey. The data collection program was implemented over the period March 2010 to December 2011. The planning of the program took into account the following considerations specific to the local study area:

- Differential potential for effects: Rankin Inlet, Chesterfield Inlet, and Whale Cove have more potential to experience Project effects because of their proximity to site and therefore data needs are different for these 3 communities.
- Experience of other mining projects (particularly the Meadowbank Mine): Given that Baker Lake and Chesterfield Inlet are the Meadowbank Mine's closest and most affected communities, there is a good opportunity to capture lessons learned for the Project.

- Issues of confidentiality: Research methods were needed to assure both the Nunavut Research Institute and participating community members that confidentiality would be fully respected.
- Language: Segments of the LSA population are not comfortable in English. Research methods were needed to facilitate good communication of information between community participants and those non-Inuktitut speaking members of the research team.
- Relationship between IQ and socio-economics: IQ and socio-economics are closely related and interdependent in the content that each focuses on. More importantly, people speak to both socio-economic and IQ in the course of their participation in data collection events, thus there is value in shared effort between IQ and socio-economic investigators. It is noted in this regard that engagement results also provide information of value to a socio-economic baseline.
- Heterogeneity within and between communities: Each of the communities in the Project LSA and Kivalliq, more generally, has a distinct history, experiences and characteristics. In addition, there are differences in needs and views between people, including between genders, generations, people with different livelihood strategies and people with different life experiences.
- Efforts were made to ensure that focus groups contained key information holders representing the community heterogeneity.
- As there will be no ice breaking activity, people living outside the NSA were not consulted. It was determined that the greatest impacts and most pertinent information would be obtained from NSA residents

Accordingly, primary data were collected using a mix of methods, to achieve efficiencies while allowing for triangulation[2] of data. Data collection methods were designed to be participatory and inclusive. Methods included informant interviews and focus group discussions. In addition, results of IQ interviews and engagement events were reviewed for data of value to understanding community baseline conditions.

Data collection was not always to the same level of detail, content or completeness for each community. Propensity to experience impacts, community perceptions of issues, community interest in participation and logistics were all factors affecting the distribution of interviews and focus group discussions in different communities.

Informant Interviews

Informants are people with specific sector and/or geographic expertise. Most informants were representatives of government and people employed in the delivery of government services. Informant interviews were undertaken with health, education and government service providers, particularly in Rankin Inlet.

Informant interviews try to encourage people to talk about what they know, including probing to discover where an informant may be particularly well informed in an unexpected area. The results not only complement the data

[2] Triangulation refers to the integration of two or more research methodologies. Typically, quantitative data from questionnaires is combined with qualitative data from focus group discussions, key informant interviews and observation. Triangulation puts the data into perspective and gives an added measure of validity to the study.

generated by other data collection methods, but also provide information, including quantitative data, on community attributes that cannot be obtained via other methods (for example, school enrolment levels, health service priorities, public security, institutional capacity, and local development plans).

Focus Group Discussions

Focus Group discussions were done in the Kivalliq communities of Chesterfield Inlet, Rankin Inlet, and Whale Cove between October 2010 and June 2011. Focus group discussions bring people of common experience together to discuss specific topics. Focus groups, usually of 6 to 8 participants, were primarily directed towards people who may not be as well represented to a mining project proponent as others. Women and youth would be examples of people who may experience the development of the Project differently than potential employees or suppliers, but are not always full participants in formal engagement events. Focus groups also are directed at groups of people with specialized knowledge, for example hunters and Elders.

Focus groups provide qualitative data from people describing their knowledge, histories, and expectations in response to directed discussion topics, or spontaneously. Semi-quantitative data can come from discussion and consensus on the part of focus group participants on ‘normal’ values, or ranges of values, that pertain to ‘most’ people. This can be a fairly efficient means to collect details on, for example, traditional activity, employment experiences and intergenerational relations. Focus group results are particularly helpful in understanding socio-economic dynamics and trends. Focus group practitioners used guides in order to facilitate discussions; however, it is not always possible or indeed useful to overly direct the discussion.

Focus groups were organized by researchers based in Rankin Inlet. They organised discussions in LSA communities with the assistance of the local government and Hunters and Trappers Organization (HTOs). Topics covered included access to government services, health, traditional activities including the harvesting of country foods, employment, and intra family relationships.

Integration of IQ and Engagement Results

Socio-economic work is inherently consultative. Socio-economic and IQ primary data collection in Kivalliq was done solely through contact with people, recognizing that the population of Kivalliq is over 90% Inuit. Although socio-economic data collection, IQ data collection and engagement are conceptually different and have different objectives, each engages affected people and all result in the expression of views about issues, descriptions of lives lived and experiences of, in this case, Meadowbank and its effects.

In addition to the socio-economic data, results from IQ interviews about traditional activities and ways of life were reviewed for comments of relevance to the socio-economic baseline. The results of IQ data collection have influenced the socio-economic baseline by:

- guiding the development and then refinement of the primary data collection program for the baseline;
- providing a context for the interpretation of secondary data; and
- providing much of the content for the baseline.

There are 2 additional points to make with regard to the primary data collection methods undertaken to establish the socio-economic baseline conditions. The first is related to language; whereas, most in the younger

generations were freely able to talk about the land and its resources, and Inuit values and characteristics, there were important data to be collected from unilingual Inuktitut speakers. Therefore, care was taken during socio-economic and IQ data collection events to ensure that people were able to speak in Inuktitut where this was their choice, either directly to Inuit data collectors or through translators. Translators were also available at all formal engagement events. Nevertheless, there are vocabulary and other translations issues that can lead to misunderstandings.

The second point is that people, including Inuit, vary widely in their perspectives. Differences in practices, knowledge and values between individuals, generations, genders and communities not only occur, they can be quite large. Although most socio-economic data are presented as average or median values for, usually, communities, regions and Nunavut as a whole, it is the combination of socio-economic and IQ results from various communities that allow this diversity to be captured.

9.1.1.4 Data Entry and Analysis

Traditional Knowledge was considered and integrated into the assessments and writing of the FEIS in conjunction with 'Western Science'. Because TK was included in the data used to undertake the socio-economic and traditional land use (TLU) assessments, there were no contrasting of viewpoints. Traditional knowledge from literature reviews and consultation results were discussed in the TLU baseline, and the resulting information was incorporated into the socio-economic and TLU assessment.

Socio-economic primary data were collected by a team of 3 people with expertise in environmental and socio-economic impact assessment and traditional use studies, working with assistants, and translators in each community.

Informants and focus group participants were advised that there was no obligation to participate and no obligation to speak to any particular subject. They were also advised that they were free to leave at any time and that neither their names nor any direct quotes would be reproduced in public environmental impact statement documents. No tape recordings were made. Confidentiality agreements were signed by all focus group participants. All participants who participated in group interviews as part of the primary data collection events were given a stipend and signed for receipt of the stipend.

Hand written notes were taken during interviews and focus groups. These were summarized as an electronic record. Where maps were drawn during focus groups, the data were digitally entered onto the maps.

Handwritten notes, maps, confidentiality agreements, original questionnaires and stipend receipt sheets are held by Golder Associates Ltd.(Golder) in Calgary.

Quality Control

Primary data collection quality control procedures included the following:

- preparation for focus groups, in discussion with local assistants, to establish translation requirements, representative participation in groups and appropriateness of subjects for discussion; and

- presence of at least one focus group facilitator and one co-facilitator/ translator at each discussion to cross check understanding of discussion results.

Data Limitations

There are some limitations to the secondary data and, despite quality control procedures, also to the primary data, as follows:

- Community level data are extensively reported by Statistics Canada, but these data were collected in 2006. The Nunavut Bureau of Statistics has more recent data, but most of these are reported only at the level of the Territory as a whole.
- There is significant population heterogeneity, both between communities and within communities. Representativeness of participants in focus group discussions was not necessarily always complete, given that groups were small. This is to some extent mitigated by triangulating the results of informant interviews and IQ results and information made available to Agnico Eagle Mines Limited (AEM) staff from feasibility studies for Meliadine, operations at Meadowbank, and in the course of ongoing meetings with people, businesses, hamlet governments, HTOs, and regional associations.
- Participants in interviews and focus group discussions were assured that they would not be quoted or otherwise identified in the public presentation of information provided. Interpretation of publicly available data depends on an understanding of the socio-economic context. This in turn depends on an environment of confidence and trust between data collectors and participants such that people feel as free as possible to share their experiences and insights. Particularly in small communities, the ascribing of views to specific individuals and/or the publishing of data that is considered by at least some to be confidential is inappropriate.
- AEM does not expect to move into its construction phase until 2015 and into its operations phase until 2018. This baseline makes best efforts to describe socio-economic conditions as they are in Kivalliq in 2010/2011, and comes to some conclusions about trends as background to the assessment of potential Project effects.

The data, information and analysis of socio-economic conditions in the 5 Kivalliq communities are nevertheless considered broadly reliable at the time of writing, particularly in aggregate. However, care is taken in the baseline and impact assessment not to over interpret the data.

9.1.2 Traditional Land Use Baseline Data Collection

9.1.2.1 Literature Review and Secondary Data Collection

The literature review considered IQ and TLU activities within the RSA. Some traditional activities (e.g., hunting) often occur within the context of geographically large phenomenon, such as caribou migration. Therefore, to provide context, the literature review also describes some traditional activities located outside the RSA. The results of the literature review are summarised by geographic location in Section 9.3 below and included the following:

- The Inuit Land Use and Occupancy Project (Freeman 1976) described TLU knowledge for northern Canada during 3 distinct chronological periods. Section 9.3 summarizes the TLU knowledge for the South and North-East Keewatin Coast during periods II (generally the early-mid 1900s) and period III (mid 1900s-1974).
- The Nunavut Atlas (Riewe 1992) describes and maps TLU knowledge collected through interviews in the late 1980s and early 1990s. Section 9.3 summarizes the TLU knowledge for the communities of Whale Cove, Rankin Inlet, Chesterfield Inlet, and the region surrounding these communities.
- AREVA Kiggavik Project EIS (AREVA 2011) provides information on Inuit knowledge and land use relating to sea ice, weather, and sea currents, and also includes information related to wildlife health.
- The Inuit Traditional Ecological Knowledge of Killer Whales (Westerdal 2009) summarizes information on killer (Orca) whales provided by Inuit in Rankin Inlet, Arviat, Repulse Bay, Igloolik and Hall Beach.
- Local Knowledge and Surveys on Declines of Arctic Terns Near Rankin Inlet and Whale Cove (Mallory and Akearok 2010) provides Elder information on declines of Arctic tern populations near Rankin Inlet.
- Meadowbank Project Inuit Qaujimajatuqangit Workshop: Fish (Nunami Stantec 2010) provides Inuit knowledge regarding health indicators and colour differences in Arctic char from the north and south of Rankin Inlet.
- Resource Management and Inuit Knowledge of Barren-Ground Caribou (Kendrick and Manseau 2008) examines how hunters' observations and knowledge of caribou can increase the depth and breadth of barren-ground caribou.
- WMC International Ltd. Meliadine West Gold Project Traditional Ecological Knowledge Study (Nanuk Enterprises 1999) undertook interviews with Elders and focused on traditional land use, past and present, and on the concerns of the local people regarding mining developments.

The following section describes the primary data collection undertaken for the Project.

9.1.2.2 Primary Data Collection

In the late 1990s, WMC retained Nanuk Enterprises Ltd. (Nanuk Enterprises) to undertake IQ studies for its West Meliadine Gold Project. The studies were overseen by a committee of residents of Rankin Inlet and Chesterfield Inlet. The purpose of the committee was to:

- Review and comment on work plans, methods, and schedules;
- Direct the studies to address subjects and issues of concern; and
- Identify potential participants for interviews (Nanuk Enterprises 1999).

The committee was composed of 11 Elders who also addressed issues related to ownership of the shared TEK, and the deposit and future use of original study maps, audio tapes, and transcripts (Nanuk Enterprises 1999). Interviews were held with participants from Rankin Inlet and Chesterfield Inlet, and were conducted in Inuktitut and audio-taped. Translators prepared English language recordings and transcripts from the audio tapes. A non-directive approach (where participants could speak about the topics they believed to be important) was used during the interviews, as this was considered the most culturally appropriate method. Interview participants spoke about their knowledge and use of the study area and also contributed their views on the impact of mineral exploration and development activities on their lifestyles, the economy of the region, and on the Environment (Nanuk Enterprises 1999). A total of 18 male and 11 female Elders participated in the study. Additional community input was sought during an open meeting held on 25 March 1998. The results of the studies are reported in Nanuk Enterprises (1999).

In 2010, Golder retained Nanuk Enterprises to undertake additional IQ studies for the Project. Nanuk Enterprises sought to replicate the same methodology used for the studies done in 1997 and 1998. Many of the participants in the earlier studies were not available to participate in the studies done during 2010 and 2011. Of the participants named in the earlier studies, 2 were available to participate in the recent studies. The field studies done in 2010 and 2011 were expanded to include participants from Whale Cove, along with participants from Rankin Inlet and Chesterfield Inlet. The studies involved the participation of Elders and younger adults, and a mixture of men and women. Under the terms of the scientific research licence, participants in the field studies are to remain anonymous. Table 9.1-1 lists dates, locations, and composition of the interviews and focus groups conducted in 2010 and 2011.

Table 9.1-1: Traditional Knowledge Interviews and Participants

Community	Date	Community Participants
Chesterfield Inlet	October 2010	Elders Focus Group
	October 27, 2010	Male Elder
	October 30, 2010	Female Elder
	October 30, 2010	Female Elder
	October 31, 2010	Female Elder
	October 31, 2010	Male Elder
Rankin Inlet	February 2011	Hunters and Trappers Focus Group
	May 2011	Male Elder
	June 2011	Elders Focus Group
	June 8, 2011	Young Adults Focus Group
Whale Cove	January 9, 2011	Elders Focus Group
	January 9, 2011	Male Elder
	January 9, 2011	Male Elder
	May 13, 2011	Male Elder

A semi-structured approach was used during the interviews through the use of questions that allowed participants an opportunity to provide additional information. An interview guide was prepared as a result of information derived from AEM's initial discussions with the communities, and previous experience with similar projects. The interview guide generally focused on topics related to the participants' use of land, understanding of the land, water, and its resources, and perceptions of potential impacts of proposed mining activities on the communities (including emotional and spiritual considerations).

Interviews were done in Inuktitut and audio recorded.

A separate report on IQ related to traditional plant harvesting and use was produced for the LSA (Appendix 9.3-B).

IQ information derived from interviews was organized and documented under the following headings:

- hunting and trapping resources, including:
  - caribou;
  - other land animals; and
  - marine mammals.
- fish resources;
- vegetation resources; and
- culturally important areas.

9.1.3 Valued Socio-Economic Components

Valued Socio-Economic Components are typically defined as being components of the socio-economic environment – such as economic development and opportunities, education and training, and community infrastructure and public services – that are important to people's wellbeing and quality of life. Any change to a VSEC that can be attributed to a project represents a project effect.

For a socio-economic component to qualify as valued for purposes of a project's effects assessment, the component must be known (or be reasonably expected) to occur in the project's area of influence. There must be a reasonable expectation that the component could be meaningfully affected by the project and people must articulate in some way that value is in fact assigned to the component.

A list of potential VECs and VSECs for the Project was provided in the guidelines for the preparation of an environmental impact statement for the Project based on community consultation efforts completed by NIRB (2012). A broad process of consultation was also undertaken by AEM (see SD 3-1 Public Engagement and Consultation Baseline) to select and gather community input on Project VSECs, and to identify key community concerns for inclusion in the socio-economic impact assessment. Experience from other projects in the RSA and LSA was also used in the selection of VSECs. The VSECs were not assigned to specific groups or sub-sets of groups, but rather represent the general views of Inuit and others in the RSA and LSA. Most people do not speak explicitly in valued environmental or socio-economic component terms. Therefore, consultation results – the content of concerns, comments and questions – suggest VSECs for assessment purposes, but are less useful in detailed understanding why a specific VSEC is valued or what relative value is assigned a VSEC.

Valued Socio-Economic Components and associated measurement endpoints identified for purposes of this socio-economic assessment are listed in Table 9.1-2 in the order of presentation in the assessment of effects sections, Sections 9.2 to 9.11 (see FEIS Volume 4, Section 4.2). It is noted that the VSECs and measurement endpoints are not organized to reflect relative importance to communities, but in an effort to provide a narrative framework of cause and effect that does not require excessive length, cross referencing or repetition. As an example, population demographics are addressed first because the take up of employment, education and training, and contracting opportunities offered by the Project is expected to have many consequent effects.

With regard to Table 9.1-2, it is also noted that elements not specifically identified here as VSECs and/or endpoints are not unimportant. On the contrary, all elements of economic, social and cultural life integrate and contribute to overall individual, family and community quality of life, and most in fact are subsumed (and will be discussed) within broader VSECs as those listed above. As well, the diversity of human experience and the range of responses to a project have the result that every component of the socio-economic environment is important to at least some people. A significant effect on a component valued by even a limited number of individuals or families can be important to consider. Finally, there are a number of themes that cut across most or all VSECs; themes that deserve consideration but are not easily framed as discrete VSECs. These include, as examples, gender, self-reliance (broadly defined here as reliance on one's own efforts to achieve quality of life goals), vulnerability to change, and sustainability.

Table 9.1-2: Valued Socio-Economic Components

Valued Socio-Economic Components	Measurement Endpoints
Population Demographics	• Demographic Changes • Migration • Fly-In/Fly-Out Effects on Employment and Population
Traditional Activity and Knowledge	• Traditional and Commercial Harvesting • Land Use and Mobility • Food Security • Language
Economic Development and Opportunities	• Employment • Gross Domestic Product and economic growth • Inflation and Consumer Price Index • Trade balance • Investment • Employment by industry • Economic infrastructure • Government fiscal situation • Business opportunities and contracting • Economic development • Income • Traditional economic activities
Education and Training	• Education achievement, dropout rates, school attendance • Available training in existing education system • Capacities of existing education system • Funding of existing education system • Education and skill levels of local labour force • Retention of school teachers
Individual, family and community wellbeing	• Physical and Mental Health • Substance Abuse • Sexually Transmitted Infections • Housing • Nutrition • Vulnerable Groups • Family and Community Cohesion • Family Function and Domestic Violence • Rotation

Table 9.1-2: Valued Socio-Economic Components (continued)

Valued Socio-Economic Components	Measurement Endpoints
	• Gambling • Crime • Safety • Accidents • Savings
Community infrastructure and Public Services	• Housing • Schools • Health services • Social services • Police • Religious services • Financial services • Local and regional transportation • Communication • Other infrastructure and services (see Addendum 9.1)
Governance and Leadership	• Fiscal performance of government • Operational capacity of government • Regulatory and monitoring capacity of government
Non-Traditional Land Use and Resource Use	• Hunting • Fishing • Tourism • Recreation • Parks and protected Areas • Wilderness character
Worker and Public Health and Safety	• Health and Safety Standards, Regulations and Policies • Security Standards, Regulations and Policies • Management Strategies for Cultural Conflicts
Cultural, Archaeological and Paleontological Resources	• Changes to the Cultural, Archaeological and Paleontological Record

9.1.4 Pathway Analysis

The effects assessment uses pathways (Project-environmental interactions) to assess effects (see FEIS Volume 4, Section 4.2). Pathway analysis is a screening step that is used to determine the existence and magnitude of linkages from the initial list of potential effects pathways for the Project. This screening step is intended to focus the effects analysis on pathways that require a more comprehensive assessment of effects on major socio-economic components. Pathways are determined to be primary, minor, or as having no linkage using scientific and traditional knowledge, logic, and experience with similar developments and environmental design features. Each potential pathway is assessed and described as follows:

- **no linkage** – pathway is removed by environmental design features so that the Project results in no detectable (measurable) environmental change and residual effects to a valued ecosystem component (VEC) or VSEC relative to baseline or guideline values;
- **minor** – pathway could result in a minor environmental change, but would have a negligible residual effect on a VEC or VSEC relative to baseline or guideline values; or

- **primary** – pathway is likely to result in a measurable environmental change that could contribute to residual effects on a VEC or VSEC relative to baseline or guideline values.

Pathways for individual, family and community wellbeing were determined to be primary, secondary or as having no linkage. The assessment of a secondary linkage replaces the assessment of a 'minor' linkage used for other socio-economic components as pathways for individual, family and community wellbeing are indirect and cascading, and so cannot be considered a direct result of the Project.

Primary pathways require further effects analysis in the effects assessment to determine the environmental significance from the Project on socio-economic components. Pathways determined to have no linkage to socio-economic components or those that are considered minor are not predicted to result in significant effects to the socio-economic environment. No linkage and minor pathways are summarized but not carried through the effects assessment.

9.1.5 Spatial and Temporal Boundaries

9.1.5.1 Social Component Study Areas

For purposes of socio-economic assessment, a project footprint is most often considered a study area only where there is a resident population. This is not the case for the Project. The Project's local and regional socio-economic study areas are defined below. It is also noted that for some socio-economic parameters, there is some potential for transboundary effects. Whereas areas outside Nunavut are not considered to constitute an assessment study area, where there is some potential for a trans boundary effect this is discussed in the relevant sections.

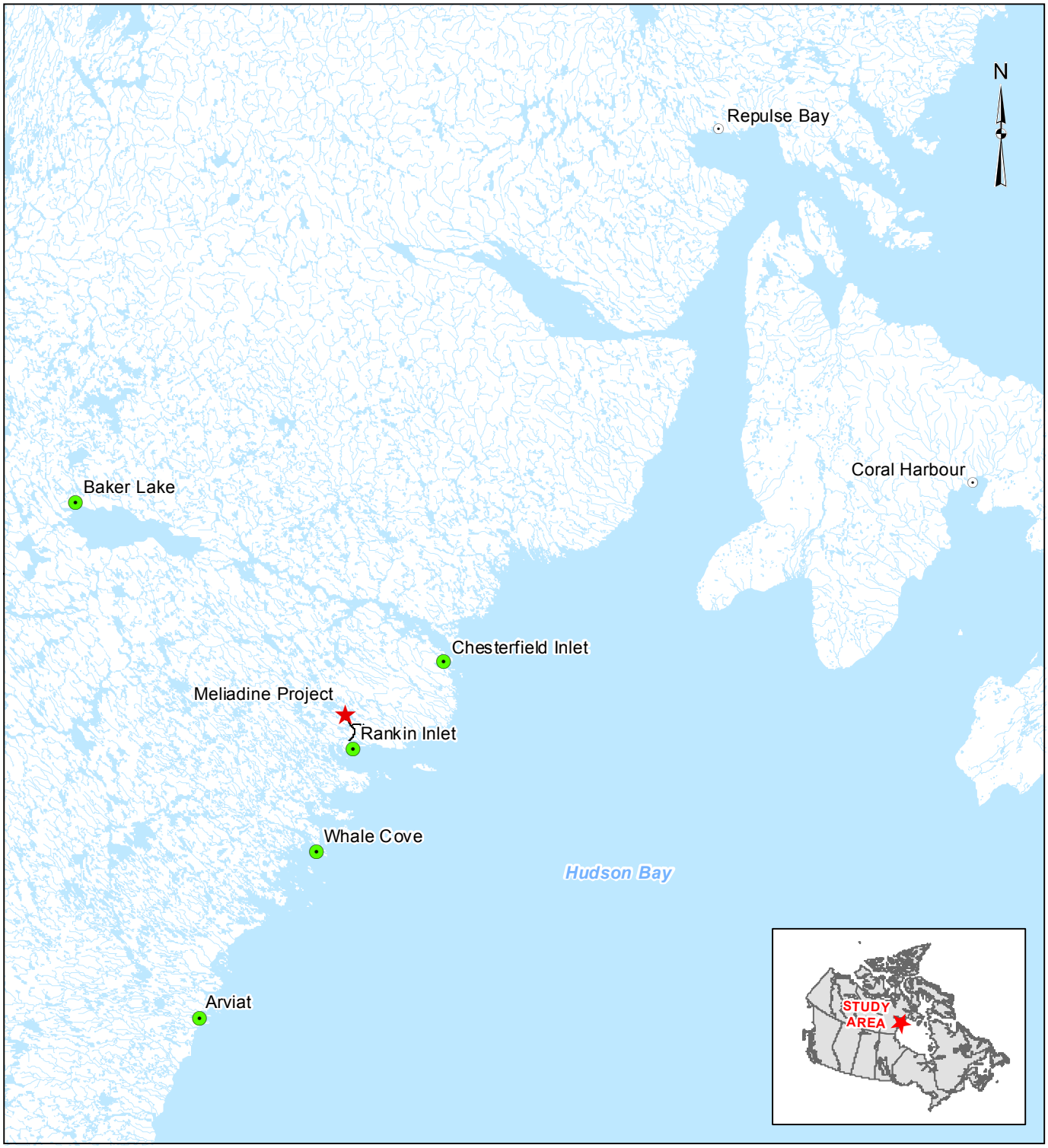
9.1.5.2 Socio-Economic Components Local Study Area

The Guidelines for the preparation of the environmental impact statement) for the Project (NIRB 2012) states, in relation to defining an LSA that "the [LSA] shall be defined as that area where there exists the reasonable potential for immediate impacts due to Project activities, ongoing normal activities, or to possible abnormal operating conditions. The [LSA] includes the Project facilities, buildings and infrastructure, and all areas proposed for Project activities...". Kivalliq Region and the five communities of Arviat, Baker Lake, Chesterfield Inlet, Rankin Inlet, and Whale Cove make up the Project LSA (Figure 9.1-1) for all VSECs listed in Table 9.1-2 above with 3 exceptions – the assessment of effects on the economy of Nunavut, the assessment of TLU and the assessment of non-Traditional Land Use (NTLU).

The five communities included with the LSA have the potential to experience socio-economic effects including (but not limited to) employment effects, use of infrastructure and services, population change and associated changes to demographics and social structures. Given their distance from the Project, Coral Harbour and Repulse Bay are not expected to provide goods and services to the Project, and will not act as shipping ports for the Project. Overall, socio-economic effects to these communities are not anticipated. Therefore, they have not been considered in the socio-economic LSA.

The closest community to the Project site is Rankin Inlet, approximately 25 kilometres (km) southeast of the mine site. Chesterfield Inlet is 80 km northeast of the Project, Whale Cove is approximately 80 km south of the Project, Arviat is approximately 220 km south of the Project and Baker Lake is 234 km northwest of the Project. These 5 communities are closest to lands and natural resources with some potential to be affected by the Project, although some individuals in other Kivalliq communities do use, or have in the past used, potentially affected lands and resources.

Economic and social benefits are expected for all LSA communities and in Kivalliq more generally. Such benefits will largely derive from employment, education and training, and contracting opportunities. All communities will also benefit from contributions; both those negotiated in the Inuit Impact Benefit Agreement (IIBA) to be signed between AEM and the Kivalliq Inuit Association (KIA), and those that AEM may make directly. There is however also potential for negative socio-economic effects on individuals and families, and at the community level, in each of the LSA communities. Such effects are largely associated with the challenges of transitioning into the wage based component of the economy, and more specifically, transitioning into mining related employment.



LEGEND

- Project Location
- Local Study Area (LSA) Community
- Community
- All-weather Access Road (AWAR)
- Watercourse
- Waterbody

80 0 80
KILOMETRES

REFERENCE

Base data obtained from ESRI and Natural Resources Canada.
Datum: NAD 83 Projection: UTM Zone 15

PROJECT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

SOCIO-ECONOMIC BASELINE LOCAL STUDY AREA

Golder Associates

PROJECT	10-1373-0076		FILE No.	
DESIGN	JO	21 Dec. 2012	SCALE AS SHOWN	REV. 0
GIS	CDB	21 Dec. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.1-1

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9.1.5.3 Socio-Economic Components Regional Study Area

Nunavut is the RSA for purposes of the economy of Nunavut major socio-economic component. Effects on Nunavut are primarily related to the potential for benefit to the territory's economy. There will also be fiscal effects on the Government of Nunavut (GN) and on Nunavut Tunngavik Incorporated (NTI), in terms both of increased revenues, and potentially of some increased costs. In addition, the potential for cumulative economic (and consequent social) effects has implications for government and NTI policy and programs in Nunavut.

9.1.5.4 Traditional Land Use Local Study Area

The TLU LSA includes the study area for the mine, and the study area for the All-weather Access Road (AWAR), and is shown in Figure 9.1-2. The LSA includes the Project area, and a 500 metre (m) buffer surrounding the Project area.

9.1.5.5 Traditional Land Use Regional Study Area

The TLU RSA is shown in Figure 9.1-3 and was developed to include the following:

- the Project Development Area;
- the proposed Project AWAR;
- the communities of Rankin Inlet, Chesterfield Inlet, and Whale Cove; and
- the caribou study area.

The RSA was selected to include the caribou study area as caribou are considered an important species by the Inuit for sustenance and cultural purposes.

9.1.5.6 Non-Traditional Land Use Local Study Area

For the purposes of this assessment, a study area was selected based on the area in which it could be reasonably expected that the Project may affect NTLU. Where effects are anticipated at a local level only, the terrestrial resources LSA (Figure 9.1-4), with a boundary modification to include the entire municipality of Rankin Inlet, has been used to discuss Project effects on NTLU. The caribou RSA will be used to discuss regional effects to NTLU, with the inclusion of Chesterfield Inlet and the surrounding lands bounded by the coast and the south shore of the inlet (9.1-5). The focus of the assessment is on the general area around Rankin Inlet, the AWAR and the mine site.

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Meliadine Camp
Meliadine Lake
Parallel Lake
Little Meliadine Lake (LML)
Meliadine River
Hudson Bay
Section 1
Section 2
Section 3
Section 4

N

LEGEND

- Camp
- AWAR Section (as per TK interviews)
- Proposed Project Infrastructure
- All-weather Access Road (AWAR)
- Road - New
- Road - Existing
- Watercourse
- Local Study Area (LSA)
- Territorial Park
- Waterbody

REFERENCE

Base data obtained from Agnico Eagle Mines Limited (AEM).
Datum: NAD 83 Projection: UTM Zone 15

2 0 2
KILOMETRES

PROJECT
AGNICO EAGLE
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
TRADITIONAL LAND USE BASELINE LOCAL STUDY AREA

Golder Associates

PROJECT NO. 10-1373-0076			FILE No.	
DESIGN	JO	21 Dec. 2012	SCALE AS SHOWN	REV. 0
GIS	CDB	21 Dec. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.1-2

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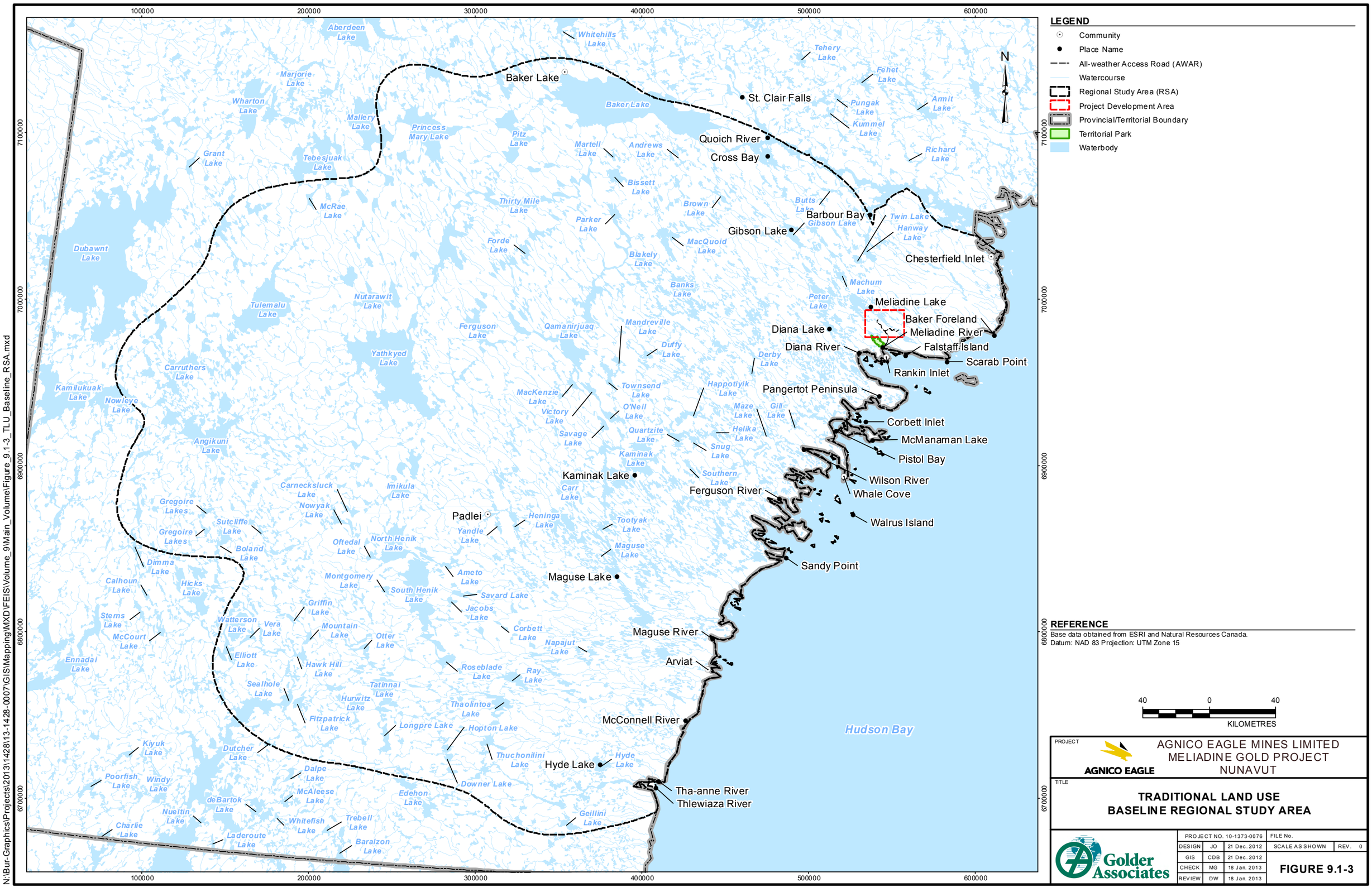

N:\Bur-Graphics\Projects\2013\1428\13-1428-0007\GIS\Mapping\MXD\FEIS\Volume_9\Main_Volume\Figure_9.1-3_TLU_Baseline_RSA.mxd

PROJECT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

TRADITIONAL LAND USE BASELINE REGIONAL STUDY AREA

Golder Associates

PROJECT NO. 10-1373-0076			FILE No.	
DESIGN	JO	21 Dec. 2012	SCALE AS SHOWN	REV. 0
GIS	CDB	21 Dec. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.1-3

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Parallel Lake

Meliadine Lake

Iqalugaarjuup Nunanga Territorial Park

Meliadine River

Rankin Inlet

LEGEND

- Local Study Area (LSA)
- Territorial Park
- Built-up Area around Rankin Inlet
- All-weather Access Road (AWAR)
- Road - New
- Road - Existing
- Watercourse
- Waterbody

REFERENCE

Base data obtained from Agnico Eagle Mines Limited (AEM).
Datum: NAD 83 Projection: UTM Zone 15

2500 0 2500
METRES

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
NON-TRADITIONAL LAND USE LOCAL STUDY AREA

Golder Associates

PROJECT NO. 10-1373-0076			FILE No.	
DESIGN	JO	28 Aug. 2012	SCALE AS SHOWN	REV. 0
GIS	JW	07 Sep. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.1-4

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LEGEND

- Community
- Local Study Area (LSA)
- Regional Study Area (RSA)
- Watercourse
- Waterbody

REFERENCE

Base data obtained from ESRI and Natural Resources Canada.
Datum: NAD 83 Projection: UTM Zone 15

40 0 40
KILOMETRES

PROJECT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

NON-TRADITIONAL LAND USE REGIONAL STUDY AREA

Golder Associates

PROJECT NO. 10-1373-0076			FILE No.	
DESIGN	JO	07 Sep. 2012	SCALE AS SHOWN	REV. 0
GIS	JW	07 Sep. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.1-5

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9.1.5.7 Cultural Resources Local Study Area

The main component of the Project includes the mine site and associated infrastructure (e.g., tailings storage facility, open pits, waste rock storage facilities, and camp), which is roughly surrounded on 3 sides by Meliadine Lake. The second component of the Project includes the AWAR Phase 2 between the mine and Rankin Inlet, including an Eastern road to the Discovery area. Finally, the third component of the Project includes the direct footprint of proposed infrastructure within the boundary of the Hamlet of Rankin Inlet including associated roads, barge laydown areas, and tank farm.

The LSA boundary for the cultural, archaeological, and paleontological resources impact assessment was defined based on the anticipated spatial extent of the immediate direct impacts (e.g., Project footprint) and a buffer of 500 m surrounding the footprint (Figure 9.1-6). A 500 m buffer was chosen because this was the buffer used in the field so that co-ordinates of sites generated in the 1970s could be assessed. The LSA for the Rankin Inlet footprint was limited to the Project footprint within the hamlet boundary (i.e., the outward limit of Rankin Inlet infrastructure) only and did not include a buffer, beyond the legislated 30 m protections zone (Territorial Land Use Regulations 2006). The reason for not including a buffer was to assess the anticipated effects from the Project in isolation from effects due to Rankin Inlet.

9.1.5.8 Cultural Resources Regional Study Area

The RSA for the cultural, archaeological, and paleontological resources impact assessment is the AEM Lease area plus a 7 km buffer (Figure 9.1-7). The 7 km buffer was applied to ensure that the Iqalugaarjuup Nunanga Territorial Park was included in the RSA. The inclusion of the Park was important because of its relevance to culture and heritage resources, and because Meliadine River, the focus of the Iqalugaarjuup Nunanga Territorial Park, is a location with high potential for archaeological sites.

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Meliadine Camp

Mine Infrastructure Area

Phase 2 All-weather Access Road

Hudson Bay

Rankin Inlet

Rankin Inlet

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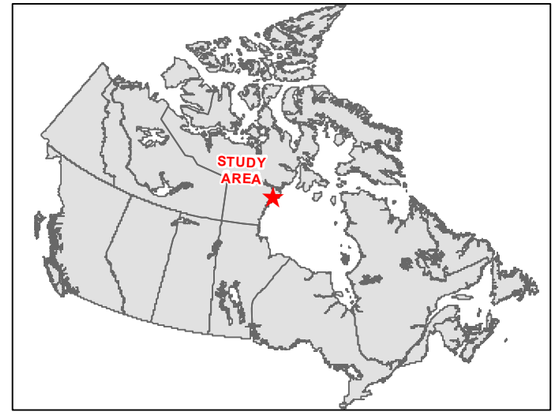
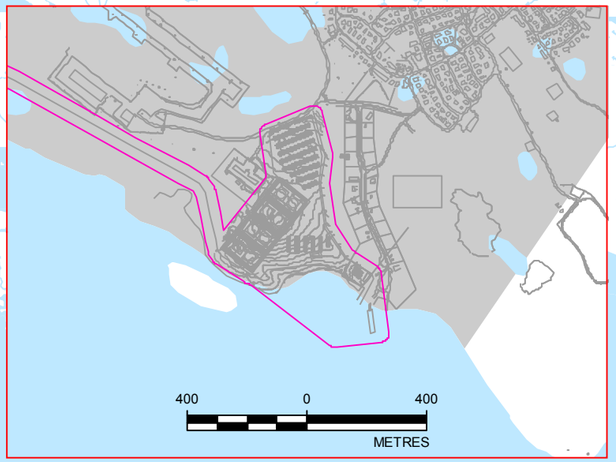
LEGEND

- Camp
- Proposed Project Infrastructure
- All-weather Access Road (AWAR)
- Road - New
- Road - Existing
- Watercourse
- Waterbody
- Built-up Area around Rankin Inlet
- LSA





REFERENCE

Archaeological Sites obtained from the Government Nunavut Department of Culture, Language Elders and Youth. Base data obtained from Agnico Eagle Mines Limited (AEM).
Datum: NAD 83 Projection: UTM Zone 15

2400 0 2400
METRES

PROJECT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

CULTURAL RESOURCES LOCAL STUDY AREA

Golder Associates

PROJECT NO. 13-1428-0007			FILE No.	
DESIGN	JR	26 Sep. 2012	SCALE AS SHOWN	REV. 0
GIS	MH	13 Jan. 2014		
CHECK	JMR	12 Feb. 2014	**FIGURE: 9.1-6**	
REVIEW	BN	12 Feb. 2014		

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Meliadine Camp

Mine Infrastructure Area

Territorial Park

Phase 2 All-weather Access Road

Rankin Inlet

Rankin Inlet

Hudson Bay

LEGEND

- Camp
- Lease
- Proposed Project Infrastructure
- All-weather Access Road (AWAR)
- Road - New
- Road - Existing
- Watercourse
- Waterbody
- Territorial Park
- RSA

REFERENCE

Archaeological Sites obtained from the Government Nunavut Department of Culture, Language Elders and Youth. Base data obtained from Agnico Eagle Mines Limited (AEM).
Datum: NAD 83 Projection: UTM Zone 15

6 0 6
KILOMETRES

PROJECT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

CULTURAL RESOURCES REGIONAL STUDY AREA

Golder Associates

PROJECT NO. 13-1428-0007			FILE No.	
DESIGN	JR	26 Sep. 2012	SCALE AS SHOWN	REV. 0
GIS	MH	13 Jan. 2013		
CHECK	JMR	12 Feb. 2014	FIGURE: 9.1-7	
REVIEW	BN	12 Feb. 2014		

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9.1.6 Temporal Boundaries

Currently the Project is expected to conduct its 3 year construction phase from 2015 to 2018. The mine life is expected to be 10 to 13 years. Section 9, Social-economic Environment uses the 10 year scenario for its effect assessment. The Projects operations phase is expected to commence in 2017 and its final closure phase is between the years 2026 to 2029. Thus the temporal boundaries for the socio-economic assessment are 2015 to 2029. However:

- there is some potential for the Project's operations phase to be extended if other proven and mineable gold deposits are found in the surrounding area;
- the effects assessment includes consideration of a far future scenario, focused on potential additional gold and other mineable developments in Kivalliq that do not at this time have a time frame; and
- given the rapid pace of socio-economic change in Nunavut, projection of potential Project effects into the years of the 2020s, 2030s, and 2040s must be considered very speculative.

These 3 factors have the following implications for the assessment of the Project's socio-economic effects:

- the base case used is the 10 year operations phase – for socio-economic effects this is the more conservative scenario[3];
- the assessment focuses on the construction phase and the first years of operation – this is considered justifiable both on grounds of confidence in predictions but also because whereas negative effects can be adaptively managed towards minimization in the short to medium term, positive effects are expected to gain momentum with time; and
- as closure will occur in the far future, in a year and in an economic context that is currently undetermined, the effects of closure are discussed in limited detail.

Socio-economic conditions are continually evolving in response to other projects, government initiatives, improved technologies and multiple other factors that are both unknown and unpredictable. As noted in the socio-economic baseline descriptions in Sections 9.2 to 9.11, the basis for assessing the Project's socio-economic effects is in some respects dated as a result of limitations on public available data, and provides scant insight into what the socio-economic context for Project construction in 2015 to 2018 and Project operations, from 2018 forward, will be. This assessment`s temporal boundaries are therefore such as to suggest that conclusions reached are not necessarily predictive, but rather indicative of the potential for effects, both positive and negative. Over the period 2012 to 2017, more information regarding the effects of mining projects in Kivalliq and how these effects can be most effectively managed will come to light as the Project concludes feasibility studies, and as Meadowbank mine is developed. AEM will continue to review expectations of Project effects and proposed management measures in the interim to 2015 and beyond.

The IQ and Traditional Land Use baseline and assessment considered past, current, and future land uses.

[3] Although there is potential for negative effects, the assessment concludes that there is more potential for benefit. The 10 to 13 year operations phase therefore results in a conservative assessment of effects.

9.1.7 Effects Analysis

9.1.7.1 Human Environment Residual Effects Criteria

The criteria for assessing potential socio-economic effects are broadly comparable to those used for biophysical effects. There are, however, some differences in the choice and/or the definition of criteria.

- **Direction** indicates whether an effect is considered positive (a benefit) or negative. Socio-economic effects are not neutral, although some effects may have both positive and negative dimensions (or are positive for some people and negative for others) and some potentially negative effects may become positive with the implementation of socio-economic management measures.
- **Magnitude** refers to the degree of change in a VSEC that an effect has the potential to produce. Magnitude may be negligible, low, moderate, or high and is usually (but not always) qualitatively assigned. Negligible indicates no discernible effect. Low magnitude indicates a discernible effect on a VSEC but the effect is not expected to materially affect people's quality of life. Moderate magnitude indicates a noticeable and potentially detrimental or beneficial change to people's quality of life. High magnitude indicates that the effect is expected to substantially interfere with or enhance the quality of life of at least some individuals, families or communities.

The primary exception to the above relates to select economic effects. A relatively large project, such as Meliadine, which is constructed, operates and then closes within a region characterized by very small territorial and community economies, will have economic effects that, where these are quantifiable, are necessarily of high magnitude. High magnitude criteria are individually defined for most economic VSECs in the individual effect assessment sections below (Section 9.4). Criteria for low and moderate magnitude economic effects have not been developed as they are not used.

- **Geographic extent** relates to most socio-economic effects and is considered in terms of administrative units. Local effects are experienced by people closest to a proposed project. For most socio-economic components, this is defined as the Kivalliq region and 5 of its 7 communities. For TLU, local effects occur inside the terrestrial LSA. For NTLU, local effects occur within the NTLU LSA. Regional effects are experienced at the level of the territory of Nunavut for most socio-economic components. For NTLU and TLU, regional effects occur inside the IQ RSA. As well, some effects are experienced by some, but not other individuals within an assessment area, and may not have community level manifestations. Any potential for particularly negative effects on some individuals needs to be identified and addressed so these are noted. Where there is potential for an effect to extend beyond Nunavut this is also noted as a trans-boundary effect. As no people are resident at the Project site, there is no Project footprint assessment area.
- **Duration** refers to the length of time over which an effect occurs. Socio-economic effects are not typically linked exclusively to project phases, given that they are relative to the individual human experience. While effects to an aspect of the physical environment may be considered short-term during construction, medium-term if lasting into operations, and long-term if extending beyond operations into closure, the same may not be true for aspects of the human environment.

Duration thresholds are established based on the period in which it can be reasonably expected that a project will affect an aspect of the socio-economic environment. For the purposes of this socio-economic effects assessment, short-term has been defined as a period of one year or less (i.e., a temporary nuisance not affecting the long-term activities of humans); medium-term duration has been defined as a period of 1 to 5 years (i.e., a period wherein human activities may be temporarily altered or suspended, after which time regular activity is likely to begin); and effects that are expected to persist for longer than 5 years have been defined as long-term (i.e., after which time, human activity may resume, but, after a significant amount of time, at a potentially different level or quality). For example, a socio-economic effect that persists for the Project's operations phase (10 to 13 years) would be considered long-term in respect to people's experience of that effect.

Most socio-economic effects are not considered to be reversible (unlike many physical and biological effects) and trend towards being long-term. Socio-economic effects are part of an ongoing process of interdependent economic and social change extending into the future and generally cannot be reversed to return to one or all of pre-project development conditions.[4] For example, although most employment will come to an end at final closure, job experience and training will have enhanced the capacity of individuals to find other employment, with lifelong implications. Therefore, the employment effect will not be fully reversed. Further, since it is presumed that a project is only permitted if it is expected to bring net economic and/or social benefit, a return to pre-project conditions may not in fact be desirable. Thus the reversibility criterion is only used, by exception, where an effect can be considered to be fully reversible.

Also, although there are isolated exceptions, most socio-economic effects are experienced continuously by people. Thus frequency is not often a useful criterion for socio-economic assessment. Where frequency is relevant to the assessment of a specific effect, this is noted in the discussion of that effect, again by exception.

Assigning likelihood can be problematic for socio-economic effects. With some exceptions, most socio-economic effects are considered highly likely (almost certainly) to affect at least some individuals even where community level effects may not be observable. In the event that an effect is considered likely, but with less certainty, this is noted in the assessment, again by exception.

The assessment of effects to the socio-economic environment is only as certain as the intrinsic truths known to be factual. For example, while it is certain that a project will pay taxes as per federal, provincial and municipal regulations, it is not certain how these payments will affect funding for programs as the distribution of funds by governments is a variable that is unknown. Thus, the certainty of some socio-economic effects is highly variable.

Table 9.1-3 presents definitions of socio-economic assessment criteria in table form.

[4] In this sense, most socio-economic effects are cumulative, as they are products not only of a given project but of the interaction of that project and its effects with the broader, continuously evolving, economic and social environment.

Table 9.1-3: Definitions of Criteria Used in the Assessment

Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency
Negative: Adverse effect on a VSEC **Positive:** Beneficial effect on a VSEC	**Negligible:** Indicates no discernible change to a VSEC **Low:** Indicates a discernible effect on a VSEC but the effect is not expected to materially affect people's quality of life **Moderate:** Indicates a noticeable and potentially detrimental or beneficial change to people's quality of life **High:** Indicates that the effect is expected to substantially interfere with or enhance people`s quality of life For quantifiable economic effects, all effects are considered of high magnitude and criteria for high are variable.	**Local:** Effect is within Kivalliq Region and/or its 7 communities For NTLU: Effect is within the NTLU LSA For TLU: Effect is within the terrestrial LSA **Regional:** Effect is within Nunavut For NTLU and TLU: Effect is within the IQ RSA **Individual:** Although no community level effects are expected, individuals and/or families are expected to be affected	**Short:** Effect occurs over one year or less **Medium:** Effect occurs over one to 5 years **Long:** Effect occurs over more than 5 years	**Most effects are considered to be irreversible** **By exception:** **Reversible:** Effect is transient for duration outlined, beyond which conditions will return to baseline	**Most effects are considered to be continuous** **By exception:** **Periodic:** Effect occurs intermittently or may repeat over the assessment duration

IQ = Inuit Qaujimajatuqangit; LSA = local study area; NTLU = non-traditional land use; RSA = regional study area; TLU = traditional land use; VSEC = valued socio-economic component

9.1.8 Integration between Traditional and Non-Traditional Land Use and Other Disciplines

When assessing impacts on traditional harvesting, the TLU effects assessment considers the results of the wildlife and habitat (FEIS Volume 6, Section 6.6), fish and fish habitat (FEIS Volume 7, Section 7.5), vegetation (FEIS Volume 6, Section 6.5), marine wildlife (FEIS Volume 8, Section 8.3) and economic development and opportunities (Section 9.4) assessments. In its assessment of impacts on land use and mobility, the TLU effects assessment takes into account the results from the archaeology (Section 9.11) and acoustic environment (FEIS Volume 5, Section 5.5) assessments. The human health and environmental risk assessments (FEIS Volume 10) inform the discussion of impacts on food security in the TLU effects assessment.

When considering baseline conditions and Project effects, the NTLU assessment makes reference to the community wellness (Section 9.6), economic development and opportunities (Section 9.4), TLU (Section 9.3), acoustic environment (FEIS Volume 5, Section 5.5), wildlife and habitat (FEIS Volume 6, Section 6.6), fish and fish habitat (FEIS Volume 7, Section 7.5) and public and worker health and safety (Section 9.10) assessments.

9.1.9 Determination of Significance

There are important differences in the methods used to determine significance and in the prediction confidence for socio-economic assessment as compared to biophysical assessments.

First, the significance of socio-economic effects must often be determined qualitatively. For example, it may be straightforward to conclude that an effect is not significant if it is very small, is of short duration, and affects almost no one; or to conclude that an effect is significant if it is very large, of long duration, and affects most people. However, determining significance in cases that are less well defined necessarily depends on:

- the perceptions and values of affected people and their leadership (as made evident through engagement);
- qualitative data and interpretation, and observations of the economic and social reality (including for example resilience in face of change) of a project area; and
- lessons learned from other experiences.

As a result there may appear to be a stronger element of professional judgment, as opposed to the use of quantitative tools (such as decision tress or valued matrices), in reaching conclusions on significance for socio-economic impacts.

Second, related to the first point above, there are no established thresholds or standards for most VSECs. Although it may be possible to set thresholds for some socio-economic effects for purposes of an environmental assessment, it often cannot be demonstrated that there is any consensus on any specific threshold value or what such a threshold means in terms of significance of an effect. For example, it might be determined that in-migration representing 5% of a community's population is a threshold for magnitude.[5] To the extent that

[5] This, and other examples of the challenges of quantifying many socio-economic effects in this section, is a constructed example for purposes of this discussion only.

migration happened over a period of years, was predominantly made up of people able to access stable employment, consisted primarily of returning family members and/or happened in a community with little natural population increase, this might be considered a benefit and a higher threshold might be warranted. Conversely, the effect might be considered negative under a different set of circumstances. This leaves aside the issue of whether or not it is possible to predict in-migration with a plus or minus 5% degree of accuracy.

Third, many socio-economic effects may not lend themselves to the assignment of criteria or determination of significance except in terms of potential, thus introducing a larger element of uncertainty into socio-economic effects assessment. There generally is the expectation that an effect brought forward for assessment will in fact occur, at least to some degree. However, it is, for example, extremely difficult to predict whether some effects will be positive, negative or both, and in what ways for whom. Socio-economic effects will result from interrelationships between:

- Project activities;
- the responses on the part of individuals, families and communities to socio-economic management measures implemented by AEM; and
- decisions made by individuals, families and communities with regard to events and situations unrelated to the Project.

Fourth, related to the third point above, mitigation and benefit enhancement measures are put in place to create the conditions and opportunities for individuals to improve their lives. That is, to offer mechanisms to enhance the potential for benefit, or at least the avoidance of harm. However, it is not possible to ensure that everyone will necessarily take advantage of those opportunities. There are also always other forces at work outside the control of a single project which can undermine the success of mitigation and benefit enhancement measures. Thus, while mitigation and benefit enhancement measures are developed, implemented and adjusted over time to provide positive opportunities, poor choices can be made, people may choose not to participate and/or other realities may intrude. The effectiveness of socio-economic management therefore may not always be complete for everyone. This speaks to the importance of adaptive management. The Social Management and Monitoring Framework for the Project can be found in SD 9-2.

Fifth, related to the fourth point above, it is generally accepted that a project will have some negative socio-economic effects on at least some people. Benefits are expected, however some individuals, families and communities will experience some negative effects in a context of overall net socio-economic effect. This is in contrast to negative biophysical effects, which are most often mitigated into insignificance over the long-term through engineering design, good practice policies and procedures, compensatory environmental improvements, reclamation or other means. Further, there are usually no to very few instances of biophysical benefits resulting from the extraction of a resource (although proponents are able to create environmental benefit where this is considered appropriate).

In summary, the challenges of quantification, thresholds, unpredictability, and effectiveness of socio-economic management measures and expectations of both negative and positive residual effects together imply that the approach to socio-economic assessment, for most effects, is more qualitative and nuanced than for biophysical assessment. In coming to conclusions on residual socio-economic effects, there is necessarily high dependence on engagement results, IQ and comparable experiences; in this case, experience in relation to other large

mining projects in northern Canada. Socio-economic assessment, particularly in the case of the Project, also must give important weight to socio-economic baseline trends; that is, not only to current socio-economic conditions. Evolving change can be expected to interact with a project over its life cycle.

Residual effects are defined as either 'not significant' or 'significant' on the basis of assigned criteria. For purposes of this effects assessment, each residual effect is determined to be not significant or significant on the basis of the expected result for most people and/or of the effect's manifestation at the community level. This is not to suggest that effects that may be experienced at the level of some individuals and/or families are not important, or even critical, to quality of life. Where this is the case, the effect is fully discussed, AEM will implement mitigation and benefit enhancement measures in response, and the residual effect will be assigned attributes in terms of the criteria described in Section 9.1.3. Such effects however are determined to be not significant in terms of quality of life for most people and/or at the community level.

For the individual, family and community wellbeing socio-economic component, significance is assigned a level – namely low, moderate or high – based on the level of concern regarding the impact of a VSEC on affected individuals or groups. For example, even a minor increase in alcohol related criminal offences that are related back to Project employment and increased incomes, could be considered high significance in a context of vulnerability.

Finally, confidence in the prediction of whether an effect is significant or not significant is often high, irrespective of all the uncertainties in describing the detail of that effect. This may at times seem to be a contradiction. For example, Section 9.4, the Economic Development and Opportunities Assessment, can only provide an approximation of effects on GDP and labour income, but even in the event of large errors in the approximation, the Project's effects on GDP and labour income will necessarily be significant.

9.2 Population Demographics

The purpose of this section is to address Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on population demographics.

Volume 1, Appendix 1.0-A of the FEIS lists the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for population demographics.

9.2.1 Baseline Environment

This section presents available data to outline the challenges and trends regarding population and demographics – information pertinent to the assessment of the potential for both negative impacts and benefits from the Project.

Nunavut

Nunavut's population of 31 909 people in 2011 (Statistics Canada 2012a) is distributed among 26 communities in the 3 regions of Kivalliq, Kitikmeot, and Qikiqtaaluk, with populations of 8955, 6012 and 16 939, respectively (Statistics Canada 2012a). Over half the total Nunavut population resides in the region of Qikiqtaaluk, particularly in the territorial capital of Iqaluit where there is a population of approximately 6700 (Statistics Canada 2012a).

Population grew rapidly over the 1980s and early 1990s, approaching 3% annually on average. This growth was largely attributable to high fertility rates, which were double those of Canada. Growth rates slowed substantially during the 2000s, to below 2% annually, and are expected to fall further in the coming decade. The GN Bureau of Statistics (GNBS) forecasts population growth at 1.3% in 2010, falling to 1.1% by 2026 (GNBS 2011c).[6]

In the absence of significant net out migration, which is not currently occurring in Nunavut (GNBS 2011c), slower population growth implies a gradual increase in the median age. In 2006, Nunavut's median age was 23.1 years, as compared to a median age in Canada of 39.5 years. Despite an expected increase in the median age, Nunavut will continue to have a young population relative to the rest of Canada for years to come.

At the time of writing the Draft Environmental Impact Statement (DEIS) for the Project, data that permit comparing demographic characteristics of Nunavut to Canada were most recently available from 2006 (Statistics Canada 2007a; Table 9.2-1). Newer information is now available for some socio-economic characteristics, however, updates have been incorporated only where relevant to the assessment; that is, if the new data might change assessment results, the new data has been included. A socio-economic baseline is a "snapshot" in time.

At the time of the 2006 census, Nunavut's population was 85% aboriginal, 99% of whom were Inuit and most of whom had Inuktitut as a mother tongue. The average household size was 4.2, as compared to 3.5 in Canada, and 20% of houses were in need of major repair, as compared to less than 2% in Canada. Single parent households represented 25% of all households, as compared to 15% in Canada, and incomes of these households were very low, less than half that of all families in Canada. The male/female ratio was 1.05 in Nunavut as compared to 0.96 in Canada[7]. Mobility rates were low by Canadian standards.

The demographic characteristics for each of the 3 regions show evidence of regional disparity, most obviously between Qikiqtaaluk and the other 2 regions (Table 9.2-1). Kivalliq and Kitikmeot could in some respects be considered more disadvantaged relative to Qikiqtaaluk, for example in terms of income and housing. Forty percent of Qikiqtaaluk's population lives in Iqaluit, with its more developed economy and larger non-Inuit population. This has a strong effect on the regional averages, and the evidence is that Qikiqtaaluk's smaller communities share many of the characteristics of communities in Kivalliq and Kitikmeot (Baffinland 2011).

[6] These rates are lower than the forecasts of the Conference Board of Canada, who are forecasting growth rates of 1.5% and higher until 2015.
[7] A ratio >1 indicates men outnumber women, and <1 that women outnumber men.

Table 9.2-1: Demographic Characteristics, 2006

	Kivalliq	Kitikmeot	Qikiqtaaluk	Nunavut
Population in 2006	8 348	5 361	15 765	29 474
Population in 2001	7 557	4 816	14 372	26 745
2001 to 2006 population change (%)	10.5	11.3	9.7	10.2
Average household size	4.0	3.9	3.5	3.7
Median age of the population (years)	21.1	22.1	24.5	23.1
Dwellings requiring major repair (%)	24.8	24.1	16.8	20.2
Percent of female lone-parent families (%)	27.1	22.9	19.8	27.6
Median income in 2005, all families ($)	42 368	45 875	54 699	49 270
Median income in 2005, lone parent families ($)	21 248	20 704	24 064	22 576
Mother tongue other than English or French (%)	81.0	44.3	77.1	72.2
Moved hamlet/city in the last year (%)	4.9	5.8	7.3	6.3
Moved hamlet/city in the last 5 years (%)	12.8	13.4	19.5	16.5
Aboriginal identity population (%)	90.4	89.7	80.5	85.0

Source: Statistics Canada (2007a)

Kivalliq Region

Kivalliq's population has been growing quickly, however this has been associated almost exclusively with high birth rates. Death rates have not decreased substantially over the last 15 years and net migration has been negative (GNBS 2011e). Although population growth rates are expected to slow somewhat over the coming years, they will remain high, and higher in Kivalliq than in Nunavut as a whole.

Kivalliq Region's population is estimated to have grown from 7944 to 9479 people between 2001 and 2009, for an average annual growth rate of 1.9%. This is slower than the 2.2% growth rate between 1996 and 2000. Rankin Inlet, Arviat, and Baker Lake are the largest communities, all with populations over 1500. The remaining 4 communities have populations between 300 and 800. The fastest growing community in the LSA between 2001 and 2009 was Whale Cove with 2.2% annual growth or 22.5% over 10 years. Chesterfield Inlet was the slowest growing community over the decade, growing only 6.6% in 10 years.

As Table 9.2-2 shows, growth rates between communities and within communities over time vary substantially. Kivalliq as a whole has grown slightly faster than Nunavut. As is the case for Nunavut, the birth rate is the primary determinant of population growth in some Kivalliq communities. For example, Arviat had very high population growth rates until 2001, averaging over 4% annually between 1996 and 2001. Growth rates subsequently fell dramatically, to average less than 2% annually, however the population was expected to start growing rapidly again, as children born before 2001 start having children. By 2010, population growth in Arviat was again over 4%. Similarly, Whale Cove faced a situation of declining population growth in 2001. Population growth rates have significantly increased over the following 10 year period with 22.5% growth from 2001 to 2010. This increase in population was primarily due to an increasing birthrate.

Table 9.2-2: Kivalliq Population

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Change 2001 to 2010
Population Numbers											
Arviat	1 997	2 026	2 055	2 096	2 140	2 144	2 177	2 215	2 246	2 331	334
Baker Lake	1 592	1 631	1 654	1 717	1 761	1 807	1 841	1 866	1 905	1 950	358
Chesterfield Inlet	362	365	357	348	352	347	357	362	366	386	24
Coral Harbour	743	748	763	784	780	802	820	832	847	861	118
Rankin Inlet	2 290	2 308	2 365	2 395	2 415	2 469	2 521	2 573	2 630	2 704	414
Repulse Bay	640	657	680	719	749	782	801	813	830	855	215
Whale Cove	320	329	343	355	363	367	372	376	390	392	72
Kivalliq	7 944	8 064	8 217	8 414	8 560	8 718	8 889	9 037	9 214	9 479	1 535
Nunavut	28 134	28 819	29 320	29 854	30 328	30 799	31 272	31 595	32 194	33 220	5 086
Percent Change											
Arviat	4.6	1.5	1.4	2.0	2.1	0.2	1.5	1.7	1.4	3.8	16.7
Baker Lake	1.7	2.4	1.4	3.8	2.6	2.6	1.9	1.4	2.1	2.4	22.5
Chesterfield Inlet	1.4	0.8	-2.2	-2.5	1.1	-1.4	2.9	1.4	1.1	5.5	6.6
Coral Harbour	2.6	0.7	2.0	2.8	-0.5	2.8	2.2	1.5	1.8	1.7	15.9
Rankin Inlet	1.1	0.8	2.5	1.3	0.8	2.2	2.1	2.1	2.2	2.8	18.3
Repulse Bay	2.9	2.7	3.5	5.7	4.2	4.4	2.4	1.5	2.1	3.0	33.6
Whale Cove	-0.6	2.8	4.3	3.5	2.3	1.1	1.4	1.1	3.7	0.5	22.5
Kivalliq	2.3	1.5	1.9	2.4	1.7	1.8	2.0	1.7	2.0	2.9	19.3
Nunavut	2.3	2.4	1.7	1.8	1.6	1.6	1.5	1.0	1.9	3.2	18.3

Source: GNBS (2011c)

Note: Shaded areas represent LSA community data

In Chesterfield Inlet on the other hand, there have been years when population has gotten smaller, which is attributed to out migration. Interviews and focus groups discussions suggest that where the opportunity arises, people have chosen to move out of smaller communities. The reasons for moving may be varied; however, rotational employment and increased employment in mining service centres such as Baker Lake and Rankin Inlet provide opportunities for people to move.

Whereas Baker Lake's population was not growing especially quickly during the construction of Meadowbank, the data show comparably faster growth in 2009 and again in 2010. Rankin Inlet has also seen much faster growth in 2010. Part of this is likely attributable to in-migration in response to development of the mining sector in the western part of Kivalliq. This population growth was greater than Population projections based on demographic structure (and expected birth rates).

Projected population growth rates to the year 2036 are presented in Table 9.2-3. Nunavut's Bureau of Statistics cautions that i) the figures are not forecasts, but represent population growth on the basis of current population age distribution and on existing trends in births, deaths and net migration; and ii) accuracy decreases for smaller populations and over longer time horizons. Accordingly, they advise 'extreme caution' in interpreting the figures.

Table 9.2-3: Kivalliq Population Projections

	2006	2011	2016	2021	2026	2031	2036
Population Number							
Arviat	2 144	2 339	2 571	2 841	3 136	3 439	3 747
Baker Lake	1 807	1 963	2 120	2 294	2 474	2 657	2 851
Chesterfield Inlet	347	383	419	455	490	522	568
Coral Harbour	802	870	958	1 056	1 153	1 253	1 363
Rankin Inlet	2 469	2 730	2 949	3 193	3 441	3 700	3 972
Repulse Bay	782	875	960	1 045	1 131	1 228	1 335
Whale Cove	367	400	433	467	494	525	563
Kivalliq	8 718	9 560	10 410	11 351	12 319	13 324	14 399
Percent Change							
Arviat	na	1.8	2.0	2.1	2.1	1.9	1.8
Baker Lake	na	1.7	1.6	1.6	1.6	1.5	1.5
Chesterfield Inlet	na	2.1	1.9	1.7	1.5	1.3	1.8
Coral Harbour	na	1.7	2.0	2.0	1.8	1.7	1.8
Rankin Inlet	na	2.1	1.6	1.7	1.6	1.5	1.5
Repulse Bay	na	2.4	1.9	1.8	1.6	1.7	1.7
Whale Cove	na	1.8	1.7	1.6	1.2	1.3	1.4
Kivalliq	na	1.9	1.8	1.8	1.7	1.6	1.6

Source: GNBS (2011c)

Notes: Shaded areas represent LSA community data.

Projection baseline is real data for 2006. Hence, first projections are for 2011. Therefore, no percent changes are shown for 2006 (na).

Nevertheless, on current trends, population growth rates are broadly expected to decrease over time in Kivalliq as a whole, from 1.9% annually in 2011 to 1.6% after 2026. As presented above, Arviat and Chesterfield Inlet are expected to grow more quickly than they have over the last decade. On the other hand, Rankin Inlet, Baker Lake, and Whale Cove are projected to grow more slowly than the Kivalliq average of 1.6%.

It is noted that the projections in Table 9.2-3 range between 1.2 and 2.4%, and thus are not as variable between communities, or within communities over time, or in comparison to actual data for the previous 15 years as presented in Table 9.2-2 (ranging from -2.5% to +5.7%). Much of the explanation lies in the fact that it is very difficult to estimate migratory movements. The projections assume a net loss of 236 people per year over the entire period 2011 to 2036, and assign a percentage of this to each community based on its population.

While mobility in Nunavut is comparatively low relative to the rest of Canada (Table 9.2-4), a decision on the part of one or 2 families in small communities to relocate can have a substantial effect on a population in percentage terms. For example, if 2 families of 5 people each left Chesterfield Inlet in 2011, this would represent a population decrease in the order of 2.6%. As noted above, there is some evidence of net movement into Baker Lake and Rankin Inlet in response to the 2 hamlets servicing the mining sector, and specifically people migrating to the community in response to increasing demand for labour.

Other selected demographic statistics are presented in Table 9.2-4. The population of Kivalliq is young, with a median age of 21.1 in 2006, slightly higher than the median age of 20.3 in 2001 and 2 years lower than that of Nunavut as a whole. Kivalliq has the highest fertility rate of the 3 regions, at 3.2 births per woman in 2006 as compared to 2.9 in the other regions (GNBS 2011c). The young population in Kivalliq presents the same challenges as for Nunavut as a whole, but this young population can become a driver of economic growth in the region, provided they have the tools and incentives needed to contribute to Kivalliq's economic development potential.

Age and gender data for communities within the LSA are provided in Table 9.2-5. It is difficult to accurately disaggregate gender and age data by community and Inuit identity. In most Kivalliq communities , the majority of the population is Inuit. For the purposes of confidentiality, Statistics Canada supresses data on small populations, such as the non-Inuit population in Kivalliq communities. The non-Inuit population in these communities is small enough to not influence the overall trends presented by the Inuit population. It is, however, acknowledged that the demographic characteristics of the non-Inuit population may differ from the Inuit population. Where possible throughout Volume 9, qualitative discussions of the variation between the Aboriginal (predominantly Inuit) and non-Aboriginal populations in the LSA have been made.

Table 9.2-4: Selected Demographic Statistics, 2006

	Arviat	Baker Lake	Chesterfield Inlet	Coral Harbour	Rankin Inlet	Repulse Bay	Whale Cove	Kivalliq	Nunavut
Population in 2006	2 060	1 728	332	769	2 358	748	353	8 348	29 474
Male	1 000	895	165	385	1 175	385	185	4 200	15 105
Female	1 055	830	165	385	1 180	360	165	4 145	14 365
Male/female ratio	0.95	1.08	1.00	1.00	1.00	1.07	1.12	1.01	1.05
Median age of the population (years)	19.5	22.0	24.0	18.9	23.9	18.9	19.1	21.1	23.1
Under 14 Population (%)	825 (40%)	605 (35%)	120 (36.1%)	305 (40.0%)	770 (32.7%)	295 (39.4%)	145 (41.1%)	3 060 (36.7%)	9 995 (33.9%)
Population aged 15 to 24 (%)	410 (19.9%)	330 (19.1%)	60 (18.1%)	155 (20.2%)	430 (18.2%)	175 (23.4%)	65 (18.4%)	1 625 (19.5%)	5 620 (19.0%)
Population aged 25 to 64 (%)	785 (38.1%)	720 (41.7%)	140 (42.2%)	285 (37.1%)	1,080 (45.8%)	260 (34.8%)	130 (36.8%)	3 415 (40.9%)	13 040 (44.2%)
Population aged 65+ (%)	45 (2.1%)	75 (4.3%)	5 (1.5%)	25 (3.3%)	70 (3.0%)	15 (2.0%)	15 (4.2%)	245 (2.9%)	815 (2.8%)
Average household size	4.5	3.8	3.2	3.9	3.6	5.6	3.9	4.0	3.7
Lone parent families (%)	29.1	29.6	29.4	26.5	25.7	20.6	31.3	27.1	27.6
Median income in 2005, all families ($)	37 248	39 360	51 072	38 144	66 133	28 224	36 736	42 368	49 270
Median income in 2005, lone parent families ($)	17 984	21 312	21 376	21 632	27 296	10 592	24 384	21 248	22 576
Aboriginal identify population (%)	93.2	90.7	90.8	95.5	83.7	95.3	95.8	90.4	85.0
Mother tongue English (%)	6.6	34.6	14.1	5.9	28.6	6.0	2.9	18.6	26.5
Mother tongue other (%)	93.0	65.4	87.5	94.8	70.7	93.3	97.1	81.0	72.2
Lived at same address 1 year ago (%)	94.1	88.5	91.9	88.7	83.0	90.3	83.8	88.3	84.3
Lived at same address 5 years ago (%)	75.7	68.4	62.1	64.9	56.7	67.5	51.7	65.4	57.8

Source: Statistics Canada (2007a)
Note: Mother tongue 'other' is almost exclusively Inuktitut
Shaded areas represent LSA community data
Percentages may not add up to 100% due to rounding

Table 9.2-5: Population by Gender and Age

Community	Total	Male		Female		0 to 4 years of age		5 to 14 years of age		15 to 24 years of age		25 to 44 years of age		45 to 64 years of age		65 years of age and Older	
	#	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Arviat	2 415	1 170	48.4	1 245	51.6	324	13.4	584	24.2	489	20.2	672	27.8	287	11.9	59	2.4
Baker Lake	1 995	1 047	52.5	948	47.5	227	11.4	383	19.2	422	21.2	575	28.8	317	15.9	71	3.6
Chesterfield Inlet	373	205	55.0	168	45.0	44	11.8	61	16.4	70	18.8	124	33.2	47	12.6	27	7.2
Coral Harbour	893	488	54.6	405	45.4	121	13.5	227	25.4	167	18.7	215	24.1	129	14.4	34	3.8
Rankin Inlet	2 602	1 307	50.2	1 295	49.8	291	11.2	560	21.5	528	20.3	721	27.7	446	17.1	56	2.2
Repulse Bay	926	514	55.5	412	44.5	154	16.6	232	25.1	164	17.7	238	25.7	109	11.8	29	3.1
Whale Cove	427	237	55.5	190	44.5	54	12.6	90	21.1	76	17.8	118	27.6	66	15.5	23	5.4
Total	**9 631**	**4 968**	**51.6**	**4 663**	**48.4**	**1 215**	**12.6**	**2 137**	**22.2**	**1 916**	**19.9**	**2 663**	**27.7**	**1 401**	**14.5**	**299**	**3.1**

Source: GNBS 2013a

The Kivalliq Aboriginal identity population was 90.4% of the total in 2006, about 5% higher than in Nunavut overall. About 81% of people had a language other than English as a mother tongue, and in the context of Nunavut, almost all of these would have Inuktitut as the mother tongue. Less than 2% of the population had knowledge of French. There are not many obviously large differences in the data for different communities, with the exception that Rankin Inlet has a lower percentage of Inuit residents, and higher incomes. Baker Lake and Rankin Inlet's demographic profile also means that more people speak English as their mother tongue (approximately 35% and 29%, respectively) than in the Kivalliq region (18.6%) as a whole.

Mobility is lower in Kivalliq than in Nunavut as a whole. That is, more people have stayed at the same address in Kivalliq than in Nunavut. Mobility is also lower in Kivalliq than in Canada as a whole (comparable figures for Canada are 85.9% at the same address as one year previously and 59.1% 5 years previously). This is likely a reflection of lack of housing options in Kivalliq rather than a lack of overall mobility (Table 9.2-4). People do not easily change addresses in an environment where 50% of families are in social housing.

Data for Aboriginal language trends are presented in Table 9.2-6. In the larger communities there has been some decrease in Inuktitut as the language first learned and still understood (such as Baker Lake and Rankin Inlet), but people in all other Kivalliq communities maintained Inuktitut as a mother tongue over the decade 1996 to 2006. There have, however, been larger decreases in speaking of Inuktitut in the home, especially in Baker Lake and Chesterfield Inlet. This would normally imply that many of the youngest of Kivalliq residents, children born after 2006, are receiving more exposure to English than to Inuktitut in the home.

Table 9.2-6: Aboriginal Language Trends (% of Aboriginal population)

	Arviat	Baker Lake	Chesterfield Inlet	Coral Harbour	Rankin Inlet	Repulse Bay	Whale Cove	Kivalliq	Nunavut
First learned and still understood									
1996	98	87	98	100	83	96	93	80	n/a
2001	98	75	95	96	75	98	97	87	84
2006	98	70	93	97	81	97	100	87	82
Aboriginal language spoken at home									
1996	96	53	87	95	65	95	88	69	n/a
2001	98	81	94	99	81	98	97	90	85
2006	95	29	57	84	53	87	93	67	64
Knowledge of Aboriginal language									
1996	100	96	100	100	94	99	100	89	n/a
2001	99	93	100	99	90	99	98	96	91
2006	100	89	98	98	93	97	99	95	90

Source: Statistics Canada (2007b, 2002a, 1997)

Notes: In 2006 data are for 'mother tongue as the question was changed for this census'. In 2006 the data are for 'most spoken at home'

Shaded areas represent LSA community data. Information for Nunavut is not available for the 1996 Census, data are reported for NWT only.

Data on perceptions of Aboriginal language use are presented in Table 9.2-7. There is an apparent strong commitment to Inuktitut and most people feel they speak well (with the possible exception of Rankin Inlet and Baker Lake). The numbers on access to services in Inuktitut are very low with less than 30% of health, social and justice services available. Access to justice in Inuktitut is particularly lacking in the more remote communities of Coral Harbour and Repulse Bay where only 9% and 10% of the population, respectively, are able to access justice services in Inuktitut (Statistics Canada, 2007b). Note that the LSA communities of Chesterfield Inlet and Whale Cove are not reported on by Statistics Canada because of their small populations. The GN is acutely aware of the ongoing need to staff social service delivery with non-Inuit in the absence of trained Inuit, and is aggressively trying to redress this. Developing capacity in these areas will take time however, and in the interim the need to deal with health, education and police in English may be a contributing factor to language loss.

Table 9.2-7: Aboriginal Language Use (% Age of Aboriginal Population Over 15)

	Arviat		Baker Lake		Chesterfield Inlet		Coral Harbour		Rankin Inlet		Repulse Bay		Whale Cove		Nunavut	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Knowledge of Aboriginal Language(s)[a]	99.5	99.5	88.3	89.4	96.6	93.3	96.0	89.8	89.8	92.5	97.3	98.6	100	100	89.8	90.3
Importance to keep, learn or relearn Aboriginal language																
Very	91		83		n/a		87		80		85		n/a		85	
Somewhat	7		0				9		15		13				10	

Sources: Statistics Canada (2007b); NPC 2008

[a]: As a percentage of the Aboriginal Identity Population.

Note: Shaded areas represent LSA community data

There is also some perception among older interview and focus group participants, particularly in Rankin Inlet, that as there is more contact with people from the south, including through employment, people will use Inuktitut less and eventually it could be lost. Statistics Canada data on migration are presented in Table 9.2-8. These data are only reported at the national and territorial level, and there is no data made publicly available at the regional or community level. However, the Nunavut level data are of some interest, recalling that at least as of 2006, mobility in Kivalliq was lower than in Nunavut overall.

The data for Nunavut indicate net out migration, whereas the data for Canada show net in migration. Movement is more likely to be in and out of the Territory than within the Territory; that is, a higher percentage of people in Nunavut move into and out of Nunavut as opposed to within Nunavut. In Canada, movement is much more likely to be within a province or territory. One year mobility in Nunavut is higher than in Canada overall, however 5 year mobility is less.[8] Higher interprovincial and short term mobility are a reflection of numbers of southern workers on shorter term contracts.

Inuit, however, also appear to be leaving the Territory. Table 9.2-9 presents data on the relative proportions of Inuit in different parts of Canada. Despite high population growth and birth rates, Nunavut was home to a smaller percentage of Inuit in Canada in 2006 than in 2001, while the rest of Canada has seen its Inuit population increase by a third. This is general to Inuit populations in the north, with the exception of Quebec. Statistics Canada found that in 2006, the urban centres outside Inuit Nunangat with the largest Inuit populations were Ottawa (725 people), Yellowknife (640), Edmonton (590), Montréal (570), and Winnipeg (355) (Statistics Canada 2007d). However these concentrations of Inuit represent less than 50% of Inuit in the rest of Canada.

Table 9.2-8: Migration

	Nunavut		Canada	
	1 Year	**5 Year**	**1 Year**	**5 Year**
Total population	28 665	26 050	30 897 210	29 922 355
Number				
Total in migrants	1 820	4 270	1 808 835	5 579 410
Intraprovincial	815	1 735	1 221 560	3 566 795
Interprovincial	955	2 425	289 745	852 580
External	55	105	297 525	1 160 040
Total out migrants	1 945	4 505	1 511 300	4 419 370
Intraprovincial	815	1 740	1 221 560	3 566 790
Interprovincial	1 135	2 770	289 745	852 500
Percentage of Total Population (%)				
Total in migrants	6.3	16.4	5.9	18.6
Intraprovincial	2.8	6.7	4.0	11.9
Interprovincial	3.3	9.3	0.9	2.8
External	0.2	0.4	1.0	3.9
Total out migrants	6.8	17.3	4.9	14.8
Intraprovincial	2.8	6.7	4.0	11.9
Interprovincial	4.0	10.6	0.9	2.8

Source: Statistics Canada (2007c)

[8] These data are slightly different from those reported in Table 9.2-8 for reasons of different methodologies used in the calculations.

Table 9.2-9: Inuit Population Change by Region

	2001		2006		2001 to 2006 % Change
	Number	%	Number	%	
Nunavut	22 560	50.1	24 640	48.8	9.2
Northwest Territories	3 910	8.7	4 165	8.3	6.5
Quebec	9 535	21.2	10 950	21.7	14.8
Labrador and Newfoundland	4 555	10.1	4 715	9.3	3.5
Total	40 560	90.0	44 470	88.1	9.6
Rest of Canada	4 510	10.0	6 010	11.9	33.3
Canada	45 070	100.0	50 480	100.0	12.0

Source: Statistics Canada (2010b)

9.2.2 Pathway Analysis

Pathways analysis was undertaken to determine the Project's potential effects on population and demographics. If a pathway is valid and assessed as primary, it is carried through for further assessment in the effects analysis section below.

Table 9.2-10: Pathway Table

VSEC	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Population stability	Employment opportunities Contracting opportunities	Project induced in-migration to Rankin Inlet Project induced out-migration from other communities	Points of hire in all communities Fully contained accommodation camp, fly in/fly out. Local hiring and contracting priorities Clear communication on recruitment procedures	Primary

VSEC = Valued Socio-Economic Component

9.2.3 Effects Analysis

The discussion in the effects sections largely relates to migration effects. For discussion of effects on language, refer to Section 9.3.

9.2.3.1 Mitigation Measures

Mitigating for population changes is a challenging task, as there is no clear definition of positive and negative effects. For example, one person or organization might view in-migration as an opportunity whereas another might find it to be a threat.

For the purpose of this EIS, the aim of AEM would be to minimize disturbance on the current demographic profiles of Nunavut and the Kivalliq region. Hence, to minimize migration, mitigation measures would include initiatives that maximize the number of local employees, as well ways to minimize the social effects of out of area employees on the local population.

Some of the key measures are described below:

- including points of hire in all 7 Kivalliq communities, and funding transport to and from the mine site from these points of hire, to enable Project employment without a need to leave home communities for extended periods of time;
- participating with the KIA in development and support for training programs for interested existing and potential entrepreneurs that will contribute to their success rates at offering goods and services to the Project;
- identifying synergies between the Project and Kivalliq businesses and facilitating Inuit Firms to access these procurement opportunities;
- establishing an accommodation camp at the mine site to house all workers while on rotation and providing return transportation to home communities (including select southern points of hire); and
- clear communication of hiring and recruitment policies so as to not encourage workers to move to Rankin Inlet without a confirmed job or contract.

9.2.3.2 Construction and Operation

The Project is not expected to affect death or birth rates, both of which are a function of the age structure of the population. As Kivalliq's population ages, death rates can be expected to go up. Kivalliq's high birth rates are largely related to the young population-- 35% of the population is under 15 and will, over the next 15 years become of child bearing age. A change in either death or birth rates for other reasons could not be attributed to a single project. For example a desire for fewer children would represent a cultural shift that could not be attributed to the Project alone. Improved health status as a result of government preventive and curative health services could slow the expected rise in death rates – this again would not be attributable to the Project.

The primary potential linkage between the Project and population growth is through migration. Potential migratory flows into Kivalliq are by:

- the Projects out of area workers moving into Kivalliq during construction and operations;
- family members returning to Kivalliq in response to increased economic opportunity; and
- economic migrants, also drawn to Kivalliq in response to increased economic opportunity – these may be from elsewhere in Nunavut and elsewhere in Canada.

Further, given the opportunities that different points of hire represent, and given expected rising demand for workers, particularly in Rankin Inlet (and Baker Lake), there is potential for both migratory movements within Kivalliq and net out migration.

It is not expected that Project out of area workers (e.g., southern hires) will migrate into Kivalliq. Construction jobs are temporary, all work will be rotational and transport between home communities and the work sites will be provided. It is possible that isolated individuals, for personal reasons, could choose to move into Kivalliq but numbers would not be large. Although operations jobs are longer term, and there again may be exceptions, these workers are also not expected to move in large numbers. A population model has been constructed based on 2 scenarios: 1) where individuals move to Rankin Inlet; and 2) Individuals move with their families to

Rankin Inlet. Results of the model are presented and in discussed in section 9.2.3.3. The model is based on a construction period of 2014 to 2017, with operations beginning in the first quarter of 2017.. The recent change in construction start up and operations of just one year, does not change the results of the model.

There is more potential for in migration to occur as a result of members of Kivalliq resident families returning in the expectation of employment at home. The return of family members, particularly those who left to find employment elsewhere, can be of great benefit to both in-migrating individuals and their families. It can be presumed that such people will return and stay only if they are assured of employment, with the Project or in the expanding economy. Reuniting families and the addition of well employed members to families can be seen as beneficial. Such in-migrants however can also have negative effects. They may compete for and get jobs that would therefore not go to present residents, place additional demands on social services, and put pressure on local supplies of goods and services; particularly housing (see Section 9.7 Community Infrastructure and Public Services).

Economic migrants could come from both elsewhere in Nunavut and from elsewhere in Canada. Speculative in migration, migration without an offer of secure employment, will be constrained by housing shortages where individuals do not have the finances to pay market rates for private accommodation. It is thus considered unlikely that many people with no existing support systems in Kivalliq would migrate unless they were assured of employment. Anecdotal evidence suggests, however, that some residents of Baker Lake did experience crowding as relatives and friends moved in with them while seeking employment.

Business growth, in response to Meadowbank and multiple exploration projects, has already generated searches by Kivalliq based businesses for employees from elsewhere in Nunavut and Canada. Smaller businesses in competitive markets are less likely to contract people on a rotational basis, but expect them to move. Some of these in- migrants will come with families. This migration is expected to concentrate in Rankin Inlet where most businesses servicing the mining sector are located. There is also some potential, however, for in-migration into Arviat, where the comparatively large population and the preparedness of people for mining sector jobs may create some consumer business opportunities as well.

While mobility of the Inuit in Nunavut has been comparatively low by Canadian standards, consultation results indicate that there is some expectation that particularly the young will be more likely to migrate in the future in search of employment. Many Nunavut communities are experiencing economic stresses and consequently comparatively high unemployment rates. Numbers of in- migrants to Rankin Inlet could become comparatively large. AEM will collect people from their home communities for rotational work schedules as one strategy to limit in-migration into these communities.

There is also possibility of out migration from communities. Most references in the literature to mining, rotational work and migration in Canada's north are concerned with in-migration of out of area workers from the south. However, there is some evidence of out migration. While people note that rotational jobs have an advantage in that it is not necessary for people to leave communities to be employed, there is some evidence that the reverse is also true – that people do not need to stay in home communities for work but have the option of moving to an alternative point of hire.

Storey and Hamilton (2003) report on out migration in Alaska (Red Dog) and northern Saskatchewan (uranium mines). With 2 exceptions, populations in small communities affected by the diamond mines in NT are declining or are stable, whereas Yellowknife is growing at twice the territorial average (NWTBS 2011). Aboriginal

communities in northern Ontario have seen mining workers move to Timmins. AEM has observed some out migration of some of its workers from smaller communities into Rankin Inlet and to Montreal. People choose to move for many personal reasons, including the often better education, health care and employment opportunities that can be found in larger centres for other family members.

Population growth rates in Rankin Inlet and Baker Lake as of 2010 have been within normal ranges for Kivalliq communities, so the implication is that to date, numbers of migrants have been small relative to population sizes. However, the loss of employed, well paid people and their families from particularly smaller Kivalliq communities, even in small numbers, could be regarded as a negative effect on the economic and social development of these communities. Family members left behind also lose the benefits of well paid, securely employed members.

There is also potential for migration out of Kivalliq to occur. The baseline data suggest that between 2001 and 2006 the Inuit population outside Inuit Nunangat increased 3 times as fast as did the population inside Nunavut. After big swings before and just after the Nunavut Land Claims Agreement (NLCA), the pattern of net migration in Nunavut appears to have stabilized at between 100 and 200 out migrants per year for Nunavut as a whole (GNBS 2011e). Points of hire in Iqaluit and southern Canada may offer employees an opportunity to move away for the same kinds of personal reasons that would motivate people to move to Baker Lake or Rankin Inlet.

How all these migratory flows will net out, and when, is not possible to determine with any accuracy. Most migration decisions are not expected during the construction phase; construction jobs are most often temporary and therefore do not provide the economic security many people need to make life altering decisions. Population growth figures for Baker Lake may bear this out; a growth rate of 1.4% during peak construction of Meadowbank was in fact the lowest growth rate of the decade in Baker Lake, but growth had accelerated in 2009 and 2010. With the settling in of operations however, migration becomes more conceivable for those people who find rotational work manageable and expect to be employed over the 14 year life of the Project.

At a regional level, it is expected that what is likely currently net out migration could reverse. It is noted that current migration levels in Kivalliq are likely very small so even a limited number of in- migrants has some potential to move migration to being net positive. This in turn could have an important effect on population growth. At current projected growth rates, Kivalliq's population could reach about 10 500 people by 2021. In a given year, 15 in- migrants, with an average household size of 4, would raise the regional population growth rate by almost 0.6% for example. An additional 15 families in response to a project the size of the Project is a very conservative scenario; actual figures could be much higher. However, it is noted that the effect does not reoccur annually, but is likely to take place only over the early years of operations.

Effects at a community level would be more dramatic. As noted previously, normally it would be expected that most new comers to Kivalliq, and most migrants within Kivalliq, would settle in Rankin Inlet. Potential for effects on population growth rates, currently over 2% in both these hamlets, would be greater than the region as a whole; on the order of 1 to 2% in each depending on where migrants choose to settle. Finally migrants within Kivalliq are expected to come from smaller communities. The departure of just 2 workers with families from Chesterfield Inlet or Whale Cove would represent a population decrease of about 2% on the basis of population projections for these hamlets to 2021.

The expected migration into Rankin Inlet could be a further stimulus to economic growth and has some potential to relieve any developing labour shortages and consequent pressure on wages. Population growth does however increase demand for social and physical infrastructure and services; demand that will need to be

planned for delivery of services not to suffer (see Section 9.7. Community Infrastructure and Public Services). The effects on small communities that may lose workers to Rankin Inlet are the reverse.

9.2.3.3 Population Projections

A population projection model[9] of the hamlet of Rankin Inlet was constructed to project the Project's impacts on population demographics. The model is based on mine construction beginning in 2014, concluding in January 2017, and the facility becoming operational in the first quarter of 2017. Mine life is expected to be 10 to 13 years with a possible extension subject to results of ongoing exploration.

Two in-migration scenarios were explored. In the first, a mixture of singles and families in-migrate to the hamlet in response to labour demand. In the second, housing shortages limit migration to only single people moving to the hamlet in response to labour demand. Migration impacts were projected only in Rankin Inlet, the closest community to the mine and the only one connected to the Project by road.

Direct employment (construction and operation) will have no impact on migration into the region. Workers will be located at the camp and will be rotated in and out of the facility as required. As such, only demand for indirect and induced labour will impact migration.

Decisions to move to another community are complex and not based on economic considerations alone. However, these are extremely difficult to model with the input-output and cohort survival frameworks. As such, for this model, migration is in response to economic considerations alone.

According to the latest available data, there are 115 persons in Rankin Inlet that are unemployed. This implies that these individuals are of labour force age and are actively seeking employment. Although census data exists for the education and skills of Rankin Inlet's labour force as a whole, no data are available on educational attainment and skill levels of Rankin Inlet's unemployed. Therefore, it is assumed that 50% of the new positions in indirect and induced impacted industries will be met by local employees, reducing labour demand for in-migrants in 2014 from 241 to 184 (241 less 50% of 115).

Indirect and induced construction employment will flow to support the operation phase in 2017. Thus there will likely be little to no in-migration as a result of mine start up. In-migration is likely to occur later in the mine's operating life when the local workforce has been fully tapped and word gets out that there are job opportunities in Rankin Inlet. AEM can help offset this to some extent by having all 7 of the Kivalliq Communities as points-of-hire thus eliminating the perceived need that a person has to move to Rankin Inlet to get a job at the Project.

The baseline population forecast is the expected population without the project assuming that historical patterns of births, deaths and migration continue through the forecast period. Without the Project, Rankin Inlet's population is expected to grow by 676 persons by 2026: 751 through natural increase (1076 births less 325 deaths) less 75 in net out-migration.

In Scenario 1, Rankin Inlet's population is expected to grow by 1214 persons by 2026, 751 natural increase (1201 births less 358 deaths) plus 371 in net in-migration. The additional births, 124 over the base case, is due

[9] The population model is a simple cohort survival model using Nunavut birth and death rates from Statistics Canada, Canadian Vital Statistics, Birth and Death Databases and Statistic Canada's Keewatin Census Division in migration statistics by age and sex. In its basic form, a cohort-survival model estimates future population based on the previous period's population plus natural increase (births less deaths) and net migration: Population[t+1] = Population[t] + Natural Increase + Net Migration

to 126 additional females of child bearing age times a weighted average fertility rate of 8% times 13 years of additional population (2014 to 2026).

In the second scenario, Rankin Inlet's population is expected to grow by 1036 persons by 2026, 806 natural increase (1153 births less 347 deaths) plus 230 in net in-migration. The additional births, 77 over the base case, is due to 80 additional females of child bearing age times a weighted average fertility rate of 8% times 13 years of additional population (2014 to 2026)

Incremental population impacts from the Project's employment[10] demand are estimated by calculating the difference from the baseline forecast. Population impacts by year during the construction phase, the first full year of operation, over a 10 year life of the mine, and mine closure are summarized in Table 9.2-11 below.

Table 9.2-11: Incremental Population Impacts for Rankin Inlet, by Year for a 10 Year Mine Life

Year	Base line Population Forecast	Forecast with Employment Impacts – Scenario 1 Singles and Families In-migration	Incremental Population Impacts-Scenario 1	Forecast with Employment Impacts – Scenario 2 Singles Only In-migration	Incremental Population Impacts-Scenario 2
2011	2717	2717	0	2717	0
2012	2760	2760	0	2760	0
2013	2808	2808	0	2808	0
2014	2856	3123	267	3039	183
2015	2903	3353	450	3212	309
2016	2951	3412	461	3268	317
2017	2998	3469	471	3323	325
2018	3044	3525	481	3376	332
2019	3090	3580	490	3428	338
2020	3136	3634	498	3479	343
2021	3181	3687	506	3529	348
2022	3226	3739	513	3577	351
2023	3269	3790	520	3624	355
2024	3312	3838	527	3669	357
2025	3353	3885	533	3711	358
2026	3393	3931	538	3753	360
Total Change From 2011	676	1214	NA	1036	NA
Population After Mine Closure 2027	3433	3532	99	3490	57

The impact of projected population growth on services and community infrastructure is discussed in Section 9.7.

Based on the assumptions, Scenario 1, where potential workers and their families move to Rankin Inlet, predicts that approximately 50 school age children will arrive in the hamlet during the construction period. Table 9.2-12 shows the in-migration to Rankin Inlet by age.

For Scenario 2, where only single workers more to Rankin Inlet, the model predicts a total of 121 individuals moving to Rankin Inlet during the construction phase. Table 9-2.13 shows the age breakdown.

[10] Regional construction and operation employment impacts stemming from the Project are provided in Section 9.4.

Table 9.2-12: In-migration to Rankin Inlet by Age - Scenario 1

In-Migration by Age Group – Scenario 1	2013-2014	2014-2015
0-4	12	8
5-9	12	8
10-14	13	8
15-19	12	8
20-24	33	22
25-29	33	22
30-34	25	16
35-39	23	15
40-44	32	21
45-49	26	17
50-54	23	15
55-59	15	10
60-64	7	4
65-69	2	1
70-74	2	1
75-79	0	0
80-84	0	0
85-89	0	0
90+	0	0
Total	**268**	**177**

Table 9-2-13: In-migration to Rankin Inlet by Age - Scenario 2

In-Migration by Age Group – Scenario 2	2013-2014	2014-2015
0-4	0	0
5-9	0	0
10-14	0	0
15-19	0	0
20-24	28	18
25-29	28	18
30-34	21	14
35-39	19	13
40-44	27	18
45-49	22	15
50-54	20	13
55-59	13	8
60-64	6	4
65-69	0	0
70-74	0	0
75-79	0	0
80-84	0	0
85-89	0	0
90+	0	0
Total	**184**	**121**

It should be noted that these are in-migration impacts alone. Total population impacts also include losses from out-migration, deaths, as well as births from in-migrating females of child-bearing ages.

The 2011 population by age and gender data from The Nunavut Bureau of Statistics were employed as the starting point for the forecast (Table 9.2-14). Birth and death statistics from Statistics Canada were used to calculate birth and death rates. Keewatin Census Division migration data were provided by Statistics Canada.

Table 9.2-14: Rankin Inlet Population 2011

2011	Males	Females	Both Sexes
0-4	129	139	268
5-9	131	145	276
10-14	141	149	290
15-19	140	131	271
20-24	125	105	230
25-29	109	119	228
30-34	99	73	172
35-39	75	85	160
40-44	110	113	223
45-49	105	78	183
50-54	101	61	162
55-59	51	54	105
60-64	29	18	47
65+	43	59	102
Total	**1388**	**1329**	**2717**

The baseline forecast is presented below (Table 9.2-15). As a check for reasonableness, the 2026 forecast population of 3393 was compared to a similar forecast prepared by the Nunavut Bureau of Statistics of 3441. The 50 person or 1.5% difference offers a degree of validity to the baseline forecast below.

Table 9.2-15: Baseline Population Forecast for Rankin Inlet

Year	Rankin Inlet Population
2011	2717
2012	2760
2013	2808
2014	2856
2015	2903
2016	2951
2017	2998
2018	3044
2019	3090
2020	3136
2021	3181
2022	3226
2023	3269
2024	3312
2025	3353
2026	3393
Total Change from 2011	676

9.2.4 Employment Impacts on Population - Scenario 1 Families and Singles

As per the assumptions, in-migration to Rankin Inlet is entirely in response to economic considerations; in this case, labour demand. Population impacts from incremental employment demand were modeled by adding incremental in-migration (refer to section 9.2.3) to the baseline forecast. It should be noted that in-migration by females in the appropriate age groups during 2014 to 2026 led to a slight increase in births over the baseline forecast. Likewise, a modest increase in total deaths occurred.

The population forecast including in-migration from employment demand is provided in Table 9.2-16.

Table 9.2-16: Population Forecast including In-migration from Employment Impacts – Scenario 1

Year	Rankin Inlet Population Including Employment Impacts
2011	2717
2012	2760
2013	2808
2014	3123
2015	3353
2016	3412
2017	3469
2018	3525
2019	3580
2020	3634
2021	3687
2022	3739
2023	3790
2024	3838
2025	3885
2026	3931

Incremental population impacts from employment demand are estimated by calculating the difference from the baseline forecast. Population impacts by year during the construction phase and first full year of operation are summarized in Table 9.2-17.

Table 9.2-17: Incremental Population Impacts from Employment – Scenario 1

Rankin Inlet	Baseline Population Forecast	Forecast With Employment Impacts	Incremental Population Impacts
2011	2717	2717	0
2012	2760	2760	0
2013	2808	2808	0
2014	2856	3123	267
2015	2903	3353	450
2016	2951	3412	461
2017	2998	3469	471
2018	3044	3525	481
2019	3090	3580	490
2020	3136	3634	498
2021	3181	3687	506
2022	3226	3739	513
2023	3269	3790	520
2024	3312	3838	527
2025	3353	3885	533
2026	3393	3931	538
Total Change from 2011	**676**	**1214**	**538**

It should be noted that demographic impacts will continue after Rankin Inlet has absorbed the initial wave of in-migrants. These are largely due to a slightly larger population of women within child bearing age cohorts.

9.2.5 Employment Impacts on Population - Scenario 2 Singles Only

Population impacts from incremental employment demand were modeled by adding incremental in-migration (in response to labour demand in Section 2.3) to the baseline forecast. In Scenario 2, housing shortages entail that only single people in-migrate to the hamlet in response to labour demand. Migrants are broken down by the age and gender split of the Rankin Inlet's 20-64 (working age) age groups. As in Scenario 1, in-migration by females in the child bearing age groups from 2014 to 2026 led to a slight increase in births over the base line forecast. In addition, a modest increase in total deaths occurred.

The population forecast including in-migration from employment demand is provided in Table 9.2-18.

Table 9.2-18: Population Forecast including In-migration from Employment Impacts – Scenario 2

Year	Rankin Inlet Population Including Employment Impacts
2011	2717
2012	2760
2013	2808
2014	3039
2015	3212
2016	3268
2017	3323
2018	3376
2019	3428
2020	3479
2021	3529
2022	3577
2023	3624
2024	3669
2025	3711
2026	3753

Incremental population impacts from employment demand are estimated by calculating the difference from the baseline forecast. Population impacts by year during the construction phase and first full year of operation are summarized in Table 9.2-19.

Table 9.2-19: Incremental Population Impacts From Employment – Scenario 2

Rankin Inlet	Baseline Population Forecast	Forecast with Employment Impacts	Incremental Population Impacts
2011	2717	2717	0
2012	2760	2760	0
2013	2808	2808	0
2014	2856	3039	183
2015	2903	3212	309
2016	2951	3268	317
2017	2998	3323	325
2018	3044	3376	332
2019	3090	3428	338
2020	3136	3479	343
2021	3181	3529	348
2022	3226	3577	351
2023	3269	3624	355
2024	3312	3669	357
2025	3353	3711	358
2026	3393	3753	360
Total Change from 2011	**676**	**1036**	**360**

It should be noted that demographic impacts will continue after Rankin Inlet has absorbed the initial wave of in-migrants. These are largely due to a slightly larger population of women within child bearing age cohorts.

9.2.5.1 Temporary, Final, and Post-Closure

Compared to many other socio-economic effects of a resource project, migration usually happens rather slowly as it might take time for the chain of effects to take place. This is especially true for indirect and induced effects. As population changes caused by the Project are driven by indirect and induced economic effects, the effects of Project closure on population demographics might not happen as immediately as many might believe. Furthermore, moving, especially for families, is often a stressful undertaking which involves extensive planning and logistics. Housing ownership, social ties, children in school and spouses' employment are typical factors that delay decisions to move from one community to another. With the above in mind, the inevitable closure of the Project might not lead to any rapid changes in population demographics.

A simulation was undertaken to model the impact of out-migration from Rankin Inlet after mine closure. In this case, all original in-migrants are assumed to leave in 2026-27. There remains a positive population impact after the departure of the original in-migrants due to the temporary increase in births in the community. Scenario 1, where both families and singles would migrate to the region, would result in 99 persons living in Rankin Inlet above what would happen without a Project. Scenario 2 would lead to 57 additional persons living in Rankin Inlet.

Although the duration of this effect is considered to be long-term, the extent and location of new economic activities (e.g., new resource extraction projects) will certainly guide migration patterns after the lifetime of the Project. Given that there is still one and a half decades until planned closure is expected to take place, much can happen in terms of economic development in Nunavut and the Kivalliq region. Hence, all projections should be treated with the highest caution.

Although the unlikely event of temporary closures, which tend to happen suddenly and without much forewarning, can have adverse effects on employment, a relatively short closure should not have significant effects on population demographics for reasons described above. However, if the time of the closure extends past a critical point, similar effects to a final and post-closure might occur. As with final and post-closure, the development of the mining sector in Nunavut, giving employees other alternatives, would certainly help minimize the negative effects of temporary closure.

As the goal is to minimize the impacts of out of area workers on the local communities, the disappearance of these workers would be largely unfelt.

9.2.6 Residual Impact Classification

Local hiring priorities, local contracting, promotion of recruitment procedures, and other mitigation measures would be sufficient to mitigate the effects on population demographics. Hence, there should be no residual effects and, therefore, no need for further mitigation measures. Population impacts on community infrastructure and public services are described in Section 9.7.

9.2.7 Cumulative Effects

Section 9.4.5 of this EIS constructs a scenario, at the territorial level, that considers the potential for construction and then operations of 9 large mining projects over the period to the late 2020's. The scenario is based on publicly available information on project development plans of Kiggavik, Doris North phases 1 and 2, Meadowbank, Mary River, Hackett River, Back River, and Izok Lake, as well as the Project. These projects are considered reasonably foreseeable. Other projects and initiatives are not considered, since their size is dwarfed by the projects listed above.

The extent of the cumulative effects depends on a complex interaction, where time, geographical location and the extent of collaboration of stakeholders are the most important factors. Out of these 3 factors, timing of projects is the most uncertain.

It will be noted that most of the above listed projects are outside of the Kivalliq region. Although these projects will certainly have impacts on population demographics in the Kivalliq region, they will do so to a less degree than the Project, Kiggavik, and Meadowbank. Hence, the extent of cumulative effects in Kivalliq will depend on the timing of construction, operation and closure of the 3 projects in the region.

As of mid-2012, the ramping down of Meadowbank is believed to coincide with the ramping up of the Project. Given the point of hire in each community, this could have significant dampening effects on the volume of in-migration to the region compared to if both projects were simultaneously ongoing. Similarly, the construction of Kiggavik will likely not take place until construction of Meliadine is finalized, which could have a similar dampening effect. In addition, projected labour force growth will decrease the likelihood of in-migration. Therefore, the cumulative effects of all 3 projects on in-migration might be less than effects of each project might indicate. Even so, this is not to suggest that the cumulative effects on migration and population would not be significant. Also, the timing of the projects could change, which could considerably impact the overall effects.

9.2.8 Monitoring and Follow-Up

The monitoring of socio-economic effects in Nunavut and Kivalliq will mostly be the responsibility of the Kivalliq Socio-Economic Monitoring Committee (SEMC) and the Nunavut General Monitoring Plan Secretariat (NGMP). However, AEM intends to take part in this collaboration. This could include taking part in the planning of monitoring initiatives, contributing with data[11] and other input, and providing support to the Kivalliq SEMC and NGMP Secretariat. In addition, AEM would collaborate with other resource companies towards a consistent and useful approach for data collection.

9.3 Traditional Activities and Knowledge IQ

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on traditional activities and knowledge.

Volume 1, Appendix 1.0-A of the FEIS lists the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for traditional activities and knowledge.

[11] It is acknowledged that there are a number of challenges to collecting data on Project workers.

9.3.1 Baseline Environment

The NIRB defines IQ as follows:

[Traditional Knowledge is the] [c]umulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission. Specific Inuit Traditional Knowledge is referred to as Inuit Qaujimajatuqangit (NIRB 2007).

The review board further elaborates that traditional knowledge, practice, and beliefs include the following:

Inuit Qaujimajatuqangit represents the] [g]*uiding principles of Inuit social values including: respecting others, relationships, and caring for people; development of skills through practice, effort and action; working together for a common cause; fostering good spirit by being open, welcoming, and inclusive; serving and providing for family and/or community; decision making through discussion and consensus; being innovative and resourceful; and respect and care for the land, animals and the environment* (NIRB 2007).

IQ is an important complement to scientific studies and can provide a deeper understanding of the potential effects of a Project.

9.3.1.1 Scope

Initial IQ studies for the Project took place in 1997 and 1998, when Nanuk Enterprises, an Inuit owned company of Rankin Inlet, undertook studies in Rankin Inlet and Chesterfield Inlet on behalf of the WMC International Ltd. Meliadine West Gold Project. The studies were guided by a project steering committee composed of Elders from Rankin Inlet and Chesterfield Inlet. The results of the studies were reported in the WMC International Ltd. Meliadine West Gold Project Traditional Ecological Knowledge Study Final Report (Nanuk Enterprises 1999).

Subsequent to the above studies, AEM took over the proposed Project, and retained Golder to help prepare the Project application. In 2010, Golder further retained Nanuk Enterprises to undertake additional IQ studies in Rankin Inlet, Chesterfield Inlet, and Whale Cove. Focus groups and interviews were held in Chesterfield Inlet during October 2010; in Whale Cove during January and May, 2011; and in Rankin Inlet in February, May, and June, 2011. During the focus groups and interviews, participants reviewed the maps and IQ information reported in Nanuk Enterprises (1999), and had the opportunity to update the information, or provide new information.

9.3.1.2 Approach

Data collection for the IQ Baseline included literature review and field studies. Initial IQ field studies for the Project were first undertaken in 1997 and 1998 in Rankin Inlet and Chesterfield Inlet (Nanuk Enterprises 1999). Follow-up IQ studies in Rankin Inlet, Whale Cove, and Chesterfield Inlet were done in 2010 and 2011 (Appendix 9.3-A). The Traditional Knowledge of Plant Use study was also undertaken for the Project (Appendix 9.3-B).

9.3.1.2.1 Research Licence

Under the *Nunavut Scientists Act* (GN 1988), a Scientific Research Licence is required to conduct social research in Nunavut. The Nunavut Research Institute is responsible for administering Scientific Research

Licences. In 2010, Golder received Research Licence No. 03 31 10N-A to undertake "Socio-economic and Traditional Knowledge Studies for the Agnico-Eagle Mines, Meliadine Gold Project Environmental Impact Assessment". The Licence was subsequently amended in 2011 to expire in June, 2011. In 2011, Golder received Licence No. 03 064 11R-M for the remainder of 2011. A third license (Research Licence No. 03 008 12N-A) was received in 2012. Team members identified in the Research Licences included representatives of Golder and Nanuk Enterprises. The 2010 and 2011 Licences provided for conducting key informant interviews and focus groups in Rankin Inlet, Whale Cove, and Chesterfield Inlet. The 2012 Licence was expanded to also include Arviat, Baker Lake, Repulse Bay and Coral Harbour (Appendix 9.1-A).

9.3.1.3 Results

The results of the literature review and studies are presented in the following sections. The results present a discussion of the following:

- Traditional land use seasonal patterns from early to mid-1900s;
- Traditional land use patterns from the mid-1900s to present for Rankin Inlet, Chesterfield Inlet, and Whale Cove; and
- Other traditional knowledge.

While the section on seasonal use patterns from the early to mid-1900s incorporates the results of the literature review, the section from the mid-1900s to present incorporates the results of the literature review and field studies (where applicable) undertaken for both the WMC International Ltd. Meliadine West Gold Project (Nanuk Enterprises 1999), and for the Project (Nanuk Enterprises 2011). While it can be difficult to separate traditional knowledge from traditional use of the land its resources, the above two sections focus mostly on the traditional activities within the RSA or LSA. The final section addresses other traditional knowledge identified during the literature review, including knowledge related to weather, sea currents, and the health and status of various wildlife populations.

9.3.1.3.1 Traditional Land Use Seasonal Patterns from Early to Mid-1900s

During the 1950s, Inuit moved from inland towards the coast, and with the establishment of government services, moved into communities (Freeman 1976). Moving into communities changed land use patterns as people took on wage employment.

9.3.1.3.1.1 Winter Land Use (Early to Mid-1900s)

From the early to the mid-1900s, many of the Inuit people of Rankin Inlet and Whale Cove wintered inland. Many lived near traplines in seal oil-heated snow houses. Caches stocked with caribou meat from the previous fall hunting season were located near inland traplines, and provided the majority of the winter food supply. If food supplies ran low, ice fishing and additional caribou hunting was undertaken to supplement the Inuit diet. Those Inuit that remained on the coast for the winter relied largely on seals and eider ducks for sustenance (Freeman 1976).

Trapping of Arctic fox and coloured fox was the primary occupation for the Inuit of Rankin Inlet and Whale Cove during the winter Inland base camps were established to facilitate winter trapping and caribou hunting (Riewe 1992). Traps would be laid near food caches in stretches as long as 160 km. While the entire region was extensively trapped, the areas surrounding Seal, Hyde, Camp, Maguse, and Kaminak lakes, and the McConnell, Wilson, and Ferguson rivers, were also popular areas for trapping. The traplines were also used as hunting routes in the winter months. Caribou, Arctic hare, ptarmigans, wolves, and wolverine were hunted when encountered during trapline checks, with both wolves and wolverines being particularly valued for their pelts (Freeman 1976; Riewe 1992).

During the same time frame, the Inuit of Chesterfield Inlet subsisted off of cached caribou and dried fish during the winter months. Seal oil was a less important fuel along the northeastern coast, where caribou fat was also used (Freeman 1976). Trapping was the predominant winter activity on land, with traps being set in Arctic fox dens near caches. The bounds of the intensive trapping area of the north-eastern coastal peoples were 95 to 125 km both north and south of Chesterfield Inlet. Wolves and wolverines were actively hunted in the area due to their tendency to interfere with both food caches and traps. The pelts of both species were considered valuable and were often traded during the spring and summer months. Arctic hare and ptarmigan were other notable species that provided additional sustenance during the winter months. Both were hunted near Inuit campsites (Freeman 1976).

Ringed and bearded seals were hunted near winter camps all along the coast. During the late winter months, seals were the primary source of food for the Inuit. Occasionally, walrus were hunted at the floe edge (Freeman 1976). Polar bear were also harvested in the winter (Riewe 1992).

9.3.1.3.1.2 Spring and Summer Land Use (Early to Mid-1900s)

From the early to about the mid-1900s, people in Rankin Inlet and Whale Cove would supplement their food supplies through ice fishing in the early spring. Ducks, and both snow and Canadian geese were also hunted in the spring, and goose and duck eggs were harvested (Freeman 1976; Riewe 1992), with McConnell River (Freeman 1976), and the shoreline between Mistake Bay and Rankin Inlet (Riewe 1992) popular locations.

Between mid-May and early June, families would travel down river valleys to the sea coast where they would begin hunting seals in birth lairs, on the open ice, and at the floe edge (Freeman 1976; Riewe 1992). While seals were an important source of food for the Inuit, their fat and oil was the most important resource collected; used later to heat and light the inland snow houses during the winter months (Freeman 1976).

During the ice break-up in June and July, canoes were used to hunt seals along the coast and in many harbours. Walrus were also hunted from large boats used along the northern coast near Rankin Inlet and Walrus Island (Freeman 1976; Riewe 1992). White whales (belugas) migrated from southern waters in the summer (Freeman 1976; Riewe 1992) and were hunted along the entire Keewatin coast, particularly at the mouths of rivers such as the Tha-anne, Thlewiaza, and Maguse (Freeman 1976). The skin of the whales was valued as a delicacy, while the meat and fat were cached for winter dog food and trap bait (Freeman 1976). Walrus were hunted during the summer as they migrated north (Riewe 1992).

During late July and August, caribou would migrate to the seashore to avoid the inland insects. Here they were hunted from canoes by the Inuit, often year-round (Freeman 1976; Riewe 1992). Late summer was also a time for the netting of Arctic char (Freeman 1976).

During the early to mid-1990s, early spring ice fishing was an important source of food for the Inuit of Whale Cove, Rankin Inlet, and Chesterfield Inlet (Freeman 1976; Riewe 1992). Before the snow melted in late spring, families would begin to move toward Chesterfield Inlet down the Quoich River to St. Claire Falls, or to Cross Bay or Barbour Bay (Freeman 1976). As the birds returned in the spring, ducks and geese were harvested, and eggs were collected along the coast (Freeman 1976; Riewe 1992).

Spring was also the time that Arctic char began their downstream run, providing another source of food for the Inuit. The rivers flowing into Barbour Bay, and Gibson and McManama lakes were considered to be good char fishing areas in the spring.

Many people went to Chesterfield Inlet to trade and to hunt seals. Young seals were hunted in their dens, while older seals were caught while basking on the ice. Occasionally, when encountered, polar bears were also hunted (Freeman 1976).

Summers were spent along the shores of Chesterfield Inlet, Cross and Barbour bays, and on Hudson Bay. Seal harvesting continued, and, like in the southern regions, the hunting of migrating beluga occurred (Freeman 1976; Riewe 1992). Walrus were hunted in Hudson Bay and brought back to Chesterfield Inlet where they were cached for winter dog food. Walrus fat was also rendered down as a fuel source for heating and lighting, and was stored for the winter months. Beluga whales were hunted from Marble Island to Cape Fullerton during their northward summer migration. During the late summer, the Arctic char began their upstream migration, again acting as an important food source (Freeman 1976).

9.3.1.3.1.3 Fall Land Use (Early to Mid-1900s)

During the early to mid-1900s, caribou hunting began during the fall for the Inuit in the area of Whale Cove. Camps were set at narrow river and lake crossings in anticipation of the southward caribou migration. Caribou were speared from kayaks as they swam at crossings such as on Kaminak and Maguse lakes, and on the McConnell, Tha-anne, Thlewiaza, and Maguse rivers. Caribou meat was harvested and cached for the winter to come, and the skins were processed for clothing. While Inuit men hunted caribou, women would fish for char, whitefish, and lake trout. Polar bears would also be hunted before the sea ice froze over (Freeman 1976), between Morso Island, north to Rankin Inlet (Riewe 1992).

Fall also marked the move inland for the Inuit of Rankin Inlet and Chesterfield Inlet. Here, caribou were hunted for meat and hides. Fall camps were usually located near lakes to facilitate ice fishing. Caribou meat and frozen or dried fish were cached in preparation for the winter months ahead, and the Inuit prepared for winter trapping (Freeman 1976). Polar bear were commonly hunted in the late fall and winter on the Pangertot Peninsula (Riewe 1992).

9.3.1.3.2 Traditional Land Use Patterns (Mid 1900s to Present)

9.3.1.3.2.1 Rankin Inlet

During the mid-1900s, most people living in Rankin Inlet had wage-labour jobs or were in primary or secondary school during the winter months. Recreation thus became an increasingly important activity. In spring and summer, many families would camp inland. The most important camping areas were Meliadine and Diana lakes, the Meliadine and Diana rivers, Scarab Point, Baker Foreland, the Falstaff Islands area, Pangertot Peninsula, Corbett Inlet, and Pistol Bay (Freeman 1976).

During summer camping, people would gather berries, fish, and gather eggs near their campsites. Hunting was limited to periods of vacation, or days off work. While the lifestyles of the people of Rankin Inlet became increasingly less traditional, caribou, seals and fish still made up a large part of the Inuit diet (Freeman 1976).

Marine mammal hunting still occurs along a wide range of the Hudson Bay shores, including the areas around Rankin Inlet. Winter and early spring hunting is most often carried out as far as 24 km offshore along the floe edge. Young seals are hunted in early spring in their birth lairs on the sea ice. The most intensively hunted area ranges from Whale Cove to the Baker Foreland, particularly at the heads of bays where the water is the freshest (Freeman 1976).

Seal hunting greatly expands in May and June when hunters move to their camps. Summer seal hunting extends for a long distance offshore, while winter hunting is limited by the floe edge limit. Ringed and bearded seal have been hunted from canoes during the summer along the coast by residents of Rankin Inlet. Summer is also the time of the northward beluga migration. Belugas are hunted by boat from Arviat to Cape Fullerton. They are hunted primarily for their skin, which is considered a delicacy (Freeman 1976).

Prior to the imposition of hunting restrictions, Polar bears were hunted from Whale Cove to Scarab point and the areas immediately north. Hunting occurred at the floe edge, 15 to 30 km off shore, and around Marble Island. Pangertot Peninsula and the areas around Rankin Inlet were also popular polar bear hunting grounds (Freeman 1976).

Field Studies in 1999

During the TEK studies for the WMC International Ltd. Meliadine West Gold Project (Nanuk Enterprises 1999), interviews with Elders focused on traditional land use, past and present, and on the concerns of the local Inuit regarding mining developments.

Hunting and fishing are important traditional pursuits in the Rankin Inlet area (extending towards Meliadine Lake). Caribou meat is an important part of the Inuit diet, and skins are valued for the production of warm clothing. At the time of the studies, caribou were plentiful near Rankin Inlet, and migrated through the general Project area. The introduction of motorized vehicles has allowed quick access to caribou herds. Motorized vehicles have made weekend hunting trips possible, which is complementary to the growing wage-labour economy in the area. Motorized vehicles also allow hunters to transport more meat back to the community, making the practice of caching less prevalent (Nanuk Enterprises 1999).

While Rankin Inlet harvesters have indicated that seals are no longer as plentiful in the Inlet, they are still hunted for their skins. Seal skin is used to make parkas, mitts, and waterproof boots. Traplines still exist throughout Keewatin region, but their use is not as intense as in the past. Arctic foxes remain abundant in the area, and remain the primary species harvested by those trappers still active. Domestic fishing, on the other hand, is still an important part of the Inuit lifeway, accounting for as much as 20% of the diet of the residents of Rankin Inlet and Chesterfield Inlet. Most of the lakes in the general Meliadine area are fished for trout and Arctic char (Nanuk Enterprises 1999).

Cabins are still used by the people of Rankin Inlet. During the May and September fish runs, cabins provide a base from which families fish on the weekends. Cabins are never locked, and can be used by anyone who needs them during emergency situations. Motorized vehicles are used to reach cabins, with dog teams being used only for tourism and racing purposes (Nanuk Enterprises 1999).

Field Studies in 2010 and 2011

During the field studies done for the Project in 2010 and 2011 (Nanuk Enterprises 2011), interview and focus group participants reviewed the IQ information presented in Nanuk Enterprises (1999). The following summarizes the results of the Rankin Inlet field studies as reported in Nanuk Enterprises (2011; Appendix 9.3-A). Caribou and muskox information from the interviews, and caribou migration information from Riewe (1992), are shown in Figure 9.3-1. Field study information relating to terrestrial wildlife, marine mammal, and cabins in the RSA is found in Figure 9.3-2; and information relating to wildlife and cabin locations in the LSA is shown in Figure 9.3-3.

100000 200000 300000 400000 500000 600000

7100000 7000000 6900000 6800000 6700000

Aberdeen Lake
Whitehills Lake
Tehery Lake
Fehet Lake
Marjorie Lake
Baker Lake
St. Clair Falls
Wharton Lake
Baker Lake
Pungak Lake
Amit Lake
Mallery Lake
Princess Mary Lake
Kummel Lake
Pitz Lake
Quoich River
Grant Lake
Martell Lake
Andrews Lake
Richard Lake
Cross Bay
Tebesjuak Lake
Bissett Lake
Barbour Bay
Gibson Lake
McRae Lake
Thirty Mile Lake
Brown Lake
Butts Lake
Twin Lake
Parker Lake
Gibson Lake
Hanway Lake
Forde Lake
MacQuoid Lake
Dubawnt Lake
Blakely Lake
Chesterfield Inlet
Banks Lake
Machum Lake
Nutarawit Lake
Peter Lake
Meliadine Lake
Tulemalu Lake
Meliadine River
Baker Foreland
Ferguson Lake
Qamanirjuaq Lake
Mandreville Lake
Diana Lake
Falstaff Island
Duffy Lake
Derby Lake
Diana River
Scarab Point
Yathkyed Lake
Carruthers Lake
Happotiyik Lake
Rankin Inlet
Townsend Lake
MacKenzie Lake
Maze Lake
Gill Lake
Kamilukuak Lake
Nowleye Lake
Victory Lake
O'Neil Lake
Pangertot Peninsula
Savage Lake
Quartzite Lake
Helika Lake
Corbett Inlet
Angikuni Lake
Snug Lake
McManaman Lake
Kaminak Lake
Pistol Bay
Southern Lake
Carr Lake
Wilson River
Carnecksluck Lake
Imikula Lake
Ferguson River
Whale Cove
Gregoire Lakes
Nowyak Lake
Padlei
Heninga Lake
Walrus Island
Sutcliffe Lake
Gregoire Lakes
Yandle Lake
Tootyak Lake
Oftedal Lake
North Henik Lake
Maguse Lake
Boland Lake
Dimma Lake
Sandy Point
Ameto Lake
Montgomery Lake
Maguse Lake
Calhoun Lake
Hicks Lake
South Henik Lake
Savard Lake
Griffin Lake
Jacobs Lake
Sterns Lake
Watterson Lake
Vera Lake
Mountain Lake
Corbett Lake
Maguse River
McCourt Lake
Otter Lake
Napajut Lake
Elliott Lake
Arviat
Ennadai Lake
Hawk Hill Lake
Roseblade Lake
Ray Lake
Sealhole Lake
Tatinnai Lake
Hurwitz Lake
Thaolintoa Lake
Fitzpatrick Lake
Longpre Lake
Hopton Lake
McConnell River
Hudson Bay
Kiyuk Lake
Dutcher Lake
Thuchonilini Lake
Hyde Lake
Hyde Lake
Poorfish Lake
Windy Lake
Dalpe Lake
Downer Lake
Tha-anne River
McAleese Lake
Edehon Lake
Thlewiaza River
deBartok Lake
Nueltin Lake
Geillini Lake
Whitefish Lake
Trebell Lake
Charlie Lake
Laderoute Lake
Baralzon Lake

N

LEGEND

- Community
- Place Name
- All-weather Access Road (AWAR)
- Watercourse
- Project Development Area
- Regional Study Area (RSA)
- Provincial/Territorial Boundary
- Territorial Park
- Waterbody
- Muskox Migration
- Caribou Migration Route
- Caribou Crossing Area
- Caribou Calving
- Caribou Migration Route (Nunavut Atlas - 1992)
- Caribou Migration Route - One Way (Nunavut Atlas - 1992)

REFERENCE

Base data obtained from Agnico Eagle Mines Limited. (AEM), Nunavut Atlas, ESRI and Natural Resources Canada.
Datum: NAD 83 Projection: UTM Zone 15

40 0 40
KILOMETRES

PROJECT
AGNICO EAGLE
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
CARIBOU AND MUSKOX INFORMATION FROM THE INUIT QAUJIMAJATUQANGIT INTERVIEWS

Golder Associates

PROJECT NO. 10-1373-0076			FILE No.	
DESIGN	MG	26 Dec. 2012	SCALE AS SHOWN	REV. 0
GIS	CDB	26 Dec. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.3-1

N:\Bur-Graphics\Projects\2013\1428\13-1428-0007\GIS\Mapping\MXD\FEIS\Volume_9\Main_Volume\Figure_9.3-1_IQ_RSA_Caribou_Muskox.mxd

500000
600000
700000
7000000
6900000

Cross Bay
Barbour Bay
Gibson Lake
Chesterfield Inlet
Baker Foreland
Meliadine Lake
Meliadine River
Falstaff Island
Scarab Point
Diana Lake
Diana River
Rankin Inlet
Pangertot Peninsula
Corbett Inlet
Pistol Bay
McManaman Lake
Wilson River
Whale Cove
Ferguson River
Walrus Island
Sandy Point

Andrews Lake
Richard Lake
Butts Lake
Brown Lake
MacQuoid Lake
Gibson Lake
Hanway Lake
Twin Lake
Machum Lake
Banks Lake
Peter Lake
Meliadine Lake
Diana Lake
Derby Lake
Happotiyik Lake
Gill Lake
Helika Lake
Maze Lake
Quartzite Lake
Snug Lake
Southern Lake
Hudson Bay

Beluga Whales
Seals
Beluga Whales seem to be going out further
Seals
Walrus
Seals
Beluga Whales
Seals
Seals
Beluga Whales seem to go out further

N

LEGEND

- Community
- Place Name
- All-weather Access Road (AWAR)
- Watercourse
- Regional Study Area (RSA)
- Project Development Area
- Provincial/Territorial Boundary
- Territorial Park
- Waterbody
- Cabin - Present Day (Rankin Inlet)
- Cabin - Chesterfield Inlet
- Camp 1912-1956
- Exploration Camp
- Present Day Cabin
- Noise Receptors
- Noise Receptors of Concern
- Noise Receptors of Specific Concern
- Fox and Wolf
- Water Mammal Migration
- Migatory Bird Area

REFERENCE

Base data obtained from ESRI and Natural Resources Canada.
Datum: NAD 83 Projection: UTM Zone 15

20 0 20
KILOMETRES

PROJECT
AGNICO EAGLE
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
TERRESTRIAL WILDLIFE, MARINE MAMMAL, AND CABINS IN THE RSA NEAR RANKIN INLET, CHESTERFIELD INLET, AND WHALE COVE

Golder Associates

PROJECT NO. 10-1373-0076			FILE No.	
DESIGN	MG	26 Dec. 2012	SCALE AS SHOWN	REV. 0
GIS	CDB	26 Dec. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.3-2

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530000
540000
550000
6990000
6980000
6970000

Meliadine Camp
Meliadine Lake
Parallel Lake
Little Meliadine Lake (LML)
Meliadine River
Hudson Bay
Section 1
Section 2
Section 3
Section 4

N

LEGEND

- Camp
- Proposed Project Infrastructure
- All-weather Access Road (AWAR)
- AWAR Section (as per TK interviews)
- Watercourse
- Local Study Area (LSA)
- Territorial Park
- Waterbody
- Cabin - Present Day (Rankin Inlet)
- Cabin - Chesterfield Inlet
- Camp 1912-1956
- Exploration Camp
- Present Day Cabin
- Fox and Wolf
- Muskox Migration
- Water Mammal Migration
- Caribou Migration Route
- Caribou Crossing Area
- Caribou Calving
- Migatory Bird Area

REFERENCE

Base data obtained from Agnico Eagle Mines Limited (AEM).
Datum: NAD 83 Projection: UTM Zone 15

2 0 2
KILOMETRES

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
WILDLIFE AND CABIN LOCATIONS IN THE INUIT QAUJIMAJATUQANJIT LOCAL STUDY AREA

Golder Associates

PROJECT NO. 10-1373-0076			FILE No.	
DESIGN	MG	26 Dec. 2012	SCALE AS SHOWN	REV. 0
GIS	CDB	26 Dec. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.3-3

N:\Bur-Graphics\Projects\2013\1428\13-1428-0007\GIS\Mapping\MXD\FEIS\Volume_9\Main_Volume\Figure_9.3-3_IQ_LSA_Wildlife_Cabins.mxd

Participants from Rankin Inlet said that, in general, the information presented in Nanuk Enterprises (1999) was still accurate (Nanuk Enterprises 2011). The participants were also familiar with the traditional land uses reported in Freeman (1976), adding that by the time that studies were being done for Nanuk Enterprises (1999), Rankin Inlet had been a mining town, had seen the economic downturn following the closure of the nearby nickel mine, and had grown through government-promoted economic development to become a regional centre with a developing business base.

Caribou

During the 2010 and 2011 studies (Nanuk Enterprises 2011), participants indicated that the lower Meliadine region (corresponding to Section 1 of the AWAR, Figure 9.1-2) was an important caribou hunting area when the herds migrated along the coast. There are numerous taluit (hunting hides) in the valley. Historically, these concealed hunters from the migrating caribou so they could take animals with bows and arrows, and later, with rifles obtained from the traders. Periodically, large herds migrate through the area, and many people hunt when caribou are present. This was particularly true in the summer of 2011, when a large herd of caribou passed through the Project area in early August. Inuit are permitted to hunt caribou at any time, while others must wait until 15 August, and obtain tags to hunt. Many people reported that they hunt caribou throughout Iqalugaarjuup Nunanga Territorial Park, along the slopes on the far side of the Meliadine River, and anywhere that caribou were to be found within ATV reach.

Study participants said that Section 2 of the AWAR crosses a flat area north of the Meliadine River bridge site (Figure 9.1-2). Study participants stated that this was a good area from which to watch the lowlands for approaching wildlife herds or flocks of birds. They also noted that the number of caribou bones on the land and incorporated into the moss of the tundra indicates that the area within Section 2 of the AWAR has been, and is currently a major caribou hunting area. Large numbers of caribou, including cows and calves, migrated through this area in early August 2011. They were hunted throughout the lower Meliadine River valley, and on the slopes of this section of the AWAR.

Discussions with hunters revealed that caribou were hunted out to the Meliadine exploration camp and beyond. There are many old caribou trails that weave among the lakes and ponds within the Section 2 AWAR area, indicating that this was a good migration area in the fall (in spring, caribou walk across the frozen waterbodies, and leave fewer trails). Many of these trails are deeply incised into the land, indicating the passage of many caribou. However, most trails are completely re-vegetated with rooted vegetation and with lichens. This suggests heavy caribou use in the past, but lighter use in recent times (Appendix 9.3-A).

Section 3 of the proposed AWAR follows a ridge and esker system, plus previously-established ATV trails, approximately northwest to the Project Development Area (Figure 9.1-2). Historically, this network of ATV trails has been a major transportation route to caribou hunting and fishing areas, and to cabins on Meliadine Lake (Appendix 9.3-A). Elders believe that caribou migrate through the area approximately every 6 to 12 years, and that although this is an important hunting area when caribou are present, it is not unique and caribou are hunted throughout the RSA and beyond (Appendix 9.3-A).

There is considerable use of the Section 3 AWAR area whenever caribou are present. People go caribou hunting from Rankin Inlet by ATV in the winter, and by boat and ATV in the summer. In winter they are not limited by trails, but can travel wherever they want to find caribou. In the summer they are somewhat limited to

the ATV trails, but readily leave them to get closer to animals if the terrain is not too rocky to permit the passage of their vehicles (Appendix 9.3-A).

Study participants observed that during the 2011 caribou migration through the Rankin Inlet area, and especially in the area of the proposed AWAR, hunters on ATVs readily left the trails to hunt, often following ridge crests because of the increased field of view, and because they can travel faster along the ridges (Appendix 9.3-A).

Section 4 of the proposed AWAR extends from the main proposed road northeast along the end of Meliadine Lake to the Discovery Deposit (Figure 9.1-2). The route follows a height of land and a prominent esker along the end of Meliadine Lake. The islands in Meliadine Lake are mostly used by residents of Rankin Inlet for caribou hunting; however, little other information was noted by interview participants about caribou hunting along this section of the AWAR (Appendix 9.3-A).

The study participants from Rankin Inlet also discussed potential affects to caribou from the development of the Project (Nanuk Enterprises 2011). Several Elders referred to experiences from the North Rankin Nickel Mine during these discussions. They noted that when the nickel mine was opened, and the Hamlet of Rankin Inlet was established in 1957, the caribou population was affected by the settlement, causing the caribou to change their migratory routes. When the caribou migration shifted during this period, there was hunger and starvation in the community. Community residents were not able to access resources, such as meat, oil, or fat from animals.

Members of the Rankin Inlet HTO believe that the construction and mining operations at the Project could potentially affect caribou. Interviewees also said they believe that AEM would follow any policies and constraints placed on the Project when caribou are in the area. Interviewees added they did not believe that local people would follow policies or constraints relating to caribou. Members of the HTO recommended that a patrol of the road aimed at ensuring that local people follow the policies and constraints regarding land use, particularly when caribou are in the area, should be considered. Another concern identified by the HTO was the potential negative effects to caribou as a result of encounters with Project infrastructure such as tailings ponds.

The HTO discussed the movement of caribou, and noted that there are definite fluctuations in caribou populations, and that caribou alter their migration patterns in response to predators, snow conditions, and food availability. This information was confirmed during a subsequent interview with Elders. Elders noted that the original traditional knowledge studies done for the Project by WMC International Ltd. (Nanuk Enterprises1999) were still applicable, and that the discussion of caribou movement was still relevant.

The HTO believes that road traffic will have a minor effect on caribou populations, but that uncontrolled hunting can exacerbate this effect. Rankin Inlet elder interviews done in 2010 suggest that early in the hunting season, caribou can be scared off their migration route by heavy snowmobile traffic and early hunting. Elders explained that the first few herds must be allowed to pass un-hunted to encourage other subsequent herds to follow the same migration routes. Elders added that younger generations hunt too early in the season.

Other Land Animals

Study participants also provided information relating to the traditional use of other land animals along the various sections of the proposed AWAR.

Climate change has the potential to affect polar bear marine habitat through the loss of traversable sea ice. Polar bear hunting has been restricted in the last 3 years, and communities receive tags that define their quota. When people hunt polar bears, they tend to follow the coast. Polar bears are important to the people from

Rankin Inlet, Chesterfield Inlet and Whale Cove, but sitings don't occur very often in the LSA. The most likely area for polar bear hunting is in the lower Meliadine valley, in the region of Section 1 of the AWAR (i.e., not marine habitat).

Elders indicated that grizzly bears are increasingly common along the Hudson Bay coast. Elders said that far more grizzly bears have been seen in the last six years than at any time within living memory. In Kivalliq, especially along the coast, grizzly bears are considered threats to cabins and human safety, and are hunted as a reaction to their presence or after damage has occurred. Grizzly bears have been seen in a number of places in the RSA, but come into conflict with people mostly in the areas between the Diana River and Meliadine River. None of the Elders interviewed said they purposefully hunt grizzly bears, but did say they would hunt them if they saw them. Most people spending time out on the land do take precautions against grizzly bears. Grizzly bears are not usually hunted for food.

Participants indicated that thousands of snow geese, Canada geese, and white-fronted geese stop in the lower Meliadine area to rest and feed during both spring and fall migrations. People hunted there in the past and continue to do so now. Many still use the old taluit as blinds, as evidenced by the large quantities of shotgun shell casings, 22 calibre bullet casings, and general plastic litter in the structures. Ptarmigan are also regularly hunted in the LSA. They are highly prized as a local delicacy, and hunted wherever they are encountered. Waterfowl are hunted along the proposed road route, as people can use the existing ATV trails to access important waterfowl feeding areas. In the fall, large flocks of snow geese and smaller flocks of Canada geese pass through the area and feed on berries on hill slopes. These are hunted where present throughout the area (Appendix 9.3-A).

Arctic foxes are frequently seen in the area, and in the past, were trapped for their fur, providing local Inuit with skins for trade at the small trading posts along the coast. A few people still trap today, and the Meliadine River valley area is used for that purpose. Wolverine and wolves are hunted whenever, and wherever seen.

During discussions about Section 2 of the AWAR, Elders indicated that snow geese, Canada geese, occasionally white-fronted geese, tundra swans, and sandhill cranes forage throughout this section of the road in spring and fall. Tundra swans, sandhill cranes, and geese also nest in the area. Geese are hunted in the spring and fall. Sandhill cranes and swans are also hunted, although these do not form a major part of the diet today. Elders also noted that polar bears are sometimes hunted on Section 2 of the road (Appendix 9.3-A).

Elders noted that, while muskox were present in the time of their ancestors, there were no muskox when they were young. As a result, muskox hunting fell out of common Inuit practice.During discussions related to Section 3 of the AWAR, participants said that muskox are increasing in numbers in the Rankin Inlet area, and there is much more hunting of muskox than before. Participants said that muskox are being hunted near Diana River.

With regard to the area in the vicinity of Section 4 of the AWAR, interviews identified concerns regarding the health of Meliadine Lake. Participants believed the removal of gravel from islands within the lake will have a potential negative effect on nesting birds (it is worth noting that AEM is not planning to remove gravel from the islands as part of the Project). They also commented that the area around Meliadine Lake is a good goose and other waterfowl hunting area in the fall (Appendix 9.3-A).

Wolves, wolverines, and other carnivores were also discussed by Elders in Rankin Inlet. They noted that in the past, these animals had not been displaced by mining, and remained in the region even while mining was taking

place. Elders expressed concern, however, that snowmobiles are now reported to be chasing away these land mammals.

Some Elders also expressed concerns about the potential for birds to be caught in tailings ponds.

Marine Mammals

Elders and hunters noted that marine mammals continue to be an important part of Inuit life, especially in times when land animals such as caribou are in short supply.

Elders noted that mining and exploration activities were not the only thing that affects marine mammals. For example, increased use of private boats by local residents, and irresponsible harvesting were believed to have a negative effect on marine mammal populations.

In October, 2012, a traditional knowledge study on marine approaches to Rankin Inlet was completed by Nanuk Enterprises (Burt and Hickes 2012). A copy of the report is appended to this assessment (Appendix 9.3-C), and has been reviewed and considered in Volume 8, when assessing the effects to marine components.

Fish Resources

Interview participants said that fishing for both char and Arctic grayling continues to be important to the people in the region. There are remnants of stone fishing weirs near the mouth of the Meliadine River, and stone drying racks scattered throughout the river valley. “Iqalugaarjuk” translates as “the river of little fishes”, and refers to the grayling in the river. Rectangular stone caches were used to store frozen char for winter use. The rivers are still considered good fishing sites today. Lake trout are often caught in Landing Lake, at the outlet to the Char River, which itself was reported by interview participants as offering good grayling fishing, and char fishing during the char runs.

Study participants in Rankin Inlet referred to Meliadine Lake as a popular fishing location in the late winter and springtime. Holes are bored in the lake ice during spring to facilitate ice fishing. The Lake is also host to family fishing events held by the Kivalliq Counselling and Support Services, and is a popular fishing spot during the local fishing derby (Appendix 9.3-A).

During discussions related to Section 4 of the AWAR, some study participants also commented that they appreciated the idea of AEM putting in a spur road and boat ramp at the southeast end of Meliadine Lake, as they will be able to get boats out to the lake once there is a road (Appendix 9.3-A).

Concerns raised by people about the Project include potential negative effects on fish populations in Meliadine Lake caused by the tailings pond, or sewage release (Appendix 9.3-A). Elders suggested that mining activities may affect some fishing areas, such as those in Meliadine Lake. Strong opposition was expressed towards the use of lake islands as a source of aggregate materials due to the perceived negative effects on sedimentation, and fish health and habitat in the lake (it is worth noting that AEM is not planning to use the lake islands as a source of aggregate materials for the Project). Any damage to Meliadine Lake would elicit great concern as this lake is a popular fishing spot for Inuit. The removal of fish from smaller lakes, and the subsequent drainage of those lakes, was of little concern to Elders.

The HTO representatives from Rankin Inlet also indicated that Meliadine Lake was an important lake for fishing for residents of Rankin Inlet. Several concerns were raised with respect to effects to fish from mining activities. Elders expressed concern over the potential for mining activities to affect fishing in Meliadine Lake.

Some community members were concerned about the potential effects of the Project on fish in the Meliadine River. Other Elders believe that the proposed location of the Project will not affect the river system, as it is not connected to the Project site. The HTO members also noted from fish migration patterns during the operation of the North Rankin Nickel Mine that mining did not appear to discourage Arctic char from using the Char and Meliadine rivers.

Vegetation Resources

A workshop on IQ related to the use of plants was held during the summer of 2010 with Elders from Rankin Inlet, Chesterfield Inlet, and Whale Cove. The workshop was conducted on the land in the valley of the Meliadine River. Plants were collected by Elders and discussions ensued about their use. The results of the workshop, including a detailed list of plants and their traditional uses, have been compiled into a report (Burt 2010) which is included as Appendix 9.3-B.

Berry picking was and is an important fall activity throughout the Meliadine valley, wherever there are low slopes with heath tundra, and in hummocky areas at the edges of wetlands. Elders participating in the IQ traditional plant use workshop during the summer of 2010 said that their families always picked berries in that area. The berries most commonly picked include paungait (black berry) or crowberry (Empetrum nigrum); kigutangirnaq or blueberry (Vaccinium uliginosum); and kakautit or lingonberry (Vaccinium vitis-idaea). Lesser quantities of the highly-desired aqpik or cloudberry (Rubus chamaemorus) and kablautitit or bearberry (Arctous alpina) are also picked. Mahok or liquoriceroot (Hedysarum alpinum) grows abundantly in the floodplain of the river. The plant is highly valued for its roots, and is a source of nutrition in the fall, tasting vaguely like carrots (Appendix 9.3-B).

A wide sedge and tussock sedge wetlands in the area near Section 2 of the road is bisected by many ATV trails. There is some damage to the land, with many areas where plants have been removed or ground into the mud. Elders noted that with a proper road alignment in this area, and culverts to correct drainage problems, this area will likely re-vegetate (Appendix 9.3-A).

Section 2 of the road runs through an area of heath tundra with many perched glacial boulders. Blueberries occur in abundance in this area, and there are also many lingonberries, bearberries, and crowberries. This area has regularly been used for berry picking. It is expected that with the construction of the bridge and road, this area will be used by far more people in the fall for berry picking (Appendix 9.3-A).

Berry-picking is practiced by families, including grandparents and children, wherever berry habitat is accessible from Rankin Inlet by ATV on Section 3 of the road. People are less likely to cross the Meliadine River to pick berries, especially if they are carrying young children on their ATVs. Residents of Rankin Inlet tend to pick berries in Iqalugaarjuup Nunanga Territorial Park, near Second Landing Lake, and along the Dianna River Trail. Elders believe that a bridge across the Meliadine River would enhance access to berry-picking areas (Appendix 9.3-A).

There are many areas along the ridges along which the proposed road will pass that are rich in crowberries. These are considered productive berry-picking areas. Most flat terrace, drumlin, or esker ridges offer abundant crowberry habitat. Slopes and lower heath tundra terraces are often rich in blueberries, while lingonberries are

common in sandy areas and in mixed heath tundra. Cloudberries (*Rubus chamaemorus*) grow in wet areas along the edges of sedge wetlands, and are eagerly sought (Appendix 9.3-A).

The participants in the studies noted that, while every ridge and slope within Section 4 of the road offers good berry-picking, there is little berry-picking here now except when families are camped on the land. They believe that the presence of a road would make this area much more accessible to those who wish to pick berries (Appendix 9.3-A).

Culturally Important Areas

Study participants said that the lower Meliadine River (Iqalugaarjuk) has been used by Inuit since prehistoric times as an important dwelling and hunting area. The area has also figured prominently in legends of the area (Appendix 9.3-A).

An archaeological site known as KfJm3 to archaeologists and as “Qamaviniktalik” to the Elders is located approximately 1 km upstream from the proposed Meliadine River bridge site. Qamaviniktalik refers to old semi-subterranean sod houses. It is thought that the site was occupied during the fall and early winter, before people moved into igloos on the sea ice (Appendix 9.3-A).

Study participants indicated that the entire lower Meliadine valley has many stone structures (e.g., qayaq cradles, fox traps, storage caches, tent rings, drying racks, hearths) suggesting a long history of traditional use (Appendix 9.3-A). A detailed discussion on the archaeology of the Project Development Area is found in Section 9.11.

Immediately to the east of Section 2 of the AWAR, as it leaves the river, is a low knoll with a number of well-defined tent rings and meat caches. It appears to be a site where people have camped for many years, assumedly mostly during hunting or fishing near the mouth of the Meliadine River (Appendix 9.3-A). Study participants believe that meat caches located on a rocky ridge about a wide wetland attest to past hunting success in this area. There are also several tent rings, and small inuksuit or drying racks along the ridges (Appendix 9.3-A).

There is large evidence of human use of the ATV trails in the area defined as Section 3 of the AWAR, including distinct trails worn through the vegetation into the soil, especially in wetlands, along with debris left behind by travellers and those hunting or camping in the area. Tent rings and meat caches have also been identified along the route, particularly on ridges where people camped in the wind to avoid mosquitoes and observe caribou movements (Appendix 9.3-A).

Some of the tent rings identified in the area are considered quite old. There are also taluit (hunting blinds) overlooking areas where caribou might pass below a ridge or promontory, and in areas where Elders suggested people likely stage goose hunts. There are many small inuksuit, some that may have been used as game drives, and some marking places where there are storage caches (Appendix 9.3-A).

Stone structures have been identified that are believed to be quite old, as the stones are covered by lichens that grow stone to stone. There are other tent rings or caches in the area that are likely much more recent; thought by Elders to have been built in the last 40 years (Appendix 9.3-A).

Discussions with Elders in Rankin Inlet, Chesterfield Inlet, and Whale Cove revealed information about the general use of the area between Chesterfield Inlet and Whale Cove, and inland to include the

Project Development Area, but few details about use of specific areas of land along the proposed road (Appendix 9.3-A).

Regarding Section 4 of the AWAR, while aerial imagery found evidence of several ATV trails that extend into this area, no other culturally important areas were identified in the area by study participants. Participants indicated that there are numerous cabins in the Meliadine and Peter lake areas, and that the locations of these cabins may have changed over the years since the 1998 field studies (Figure 9.3-2).

9.3.1.3.2.2 Chesterfield Inlet

Compared to the other Keewatin peoples, those of Chesterfield Inlet used a small area of land for traditional pursuits in the mid to late 1900s. The traditional land use area of the Chesterfield Inlet Inuit extended 50 to 65 km south, 65 to 80 km west, 95 to 110 km north-west, and 110 to 130 km north of the community. This was largely due to there being a sufficient supply of game that was found in close proximity to the community. The sharing of harvests was common among community members (Freeman 1976).

As in Rankin Inlet, temporary, seasonal wage-labour jobs were the primary means of support in the community during winter months. Most of the Chesterfield people did not depend on trapping as a means of support during this period, and used it rather as a way to supplement wage-labour incomes. Caribou, Arctic hare, bird and seal hunting were still important for providing sustenance in this period. Hunting was, however, largely limited to days off, or while on vacation (Freeman 1976).

Both ringed and bearded seals were hunted year round by the people of Chesterfield Inlet. The principal season for seal hunting was spring, when they could be found basking on the sea ice. It was also in the spring that young seals were hunted in their birth lairs. In the summer people hunted bearded, ringed and harp seals from Chesterfield Inlet to Father Hope Point. For much of the year, people hunted along the floe edge, located 4 to 7 km offshore (Freeman 1976).

As was the case for whale migration in the Rankin Inlet area, belugas migrated north past Chesterfield Inlet during the summer months. Walrus, though increasingly rare, were hunted from the Marble Island area to Cape Fullerton. Polar bears were hunted on the ice and at the floe edge at the mouth of Chesterfield Inlet, and from Cape Silumiut to Cape Fullerton (Freeman 1976).

Field Studies in 2010 and 2011

Chesterfield Inlet participants in the field studies for the Project (Nanuk Enterprises 2011) indicated that the current use of all-terrain vehicles (ATVs) and faster boats allows people to travel further afield in their daily hunting efforts. Participants further indicated that the ability to travel further is offset by the observation that they are no longer nomadic, and no longer make long journeys with their families to traditional hunting and fishing areas. Seasonal camps far from the coast, near cached meat, have been replaced by homes in the community, and although people do temporarily camp while hunting or fishing, they no longer live a nomadic, subsistence lifestyle. Elders reported that few are left who truly lived that lifestyle on the land (Appendix 9.3-A).

The following further details the results of the field studies for Chesterfield Inlet as reported in Nanuk Enterprises (2011; Appendix 9.3-A).

Caribou

The Chesterfield Inlet Elders emphasized that caribou do not follow the same migration routes each year. The caribou tend to wander in search of good grazing lands. Elders had mixed responses as to whether or not they believe mining and exploration affected caribou migration patterns. All Elders did note their concern regarding anything that could potentially affect caribou health or migration, as the Inuit depend heavily on the caribou for food.

Elders expressed concerns over the perceived inappropriate hunting practices of younger generations, suggesting that meat is not prepared properly, and that this often results in waste. Caribou hunting was reported to occur inland from Chesterfield Inlet towards Baker Lake where the caribou now have their calving grounds. The distance was reported as at one time daunting, but that the use of ATVs has made accessing inland hunting grounds a quicker journey. Elders noted that inland caribou hunting is best in October when the mating season is over, and the caribou are migrating south from the Repulse Bay area. In May, as the Caribou return north, hunting is again good between Baker Lake and Chesterfield Inlet.

The areas north of Chesterfield Inlet are reported as important Inuit hunting grounds. In interviews, Elders said that the area between Chesterfield Inlet and Wager Bay (north of and outside the RSA) should be protected from exploration and mining activities to preserve the historical meaning of the area, and its role as a hunting ground.

Other Land Animals

Elders interviewed in Chesterfield Inlet expressed concerns over the perceived effects of changing environmental conditions on land animals. Changes to the land and water can affect the diet of land animals other than caribou (e.g., polar bears, fox, and wolves) that are hunted by the Inuit. Road construction related to mining was raised by Elders as a potential threat to environmental stability. Elders noted that if roads are built over rivers, there should be inspections to determine that they do not obstruct wildlife movement, and that no contaminants flow into the river.

Marine Mammals

Chesterfield Inlet Elders suggested that increased shipping traffic between the south and Baker Lake, and increased use of motorized boats by local people may have resulted in fewer whales, walrus and seals available for hunting than in the past. In particular, it was noted that harp seals seemed to be especially affected. Elders suggested that dwindling capelin numbers, on which many mammals feed, may also have resulted in a reduction in the number of marine mammals in the Chesterfield Inlet area

Fish Resources

Chesterfield Inlet Elders stated in interviews that Arctic char migrate down to the sea from the lakes via rivers in spring and summer, and that in early fall they travel back upstream to the lakes. Elders noted that char prefer very clean waters, and that any contamination to water (e.g., leaving butchered remains from hunted animals near, or in rivers and lakes) could have adverse effects on char.

Elders expressed concern over the noticeable reduction in fish catches in 2010, and suggested that the cause of this may potentially be increased shipping traffic from the south to Baker Lake. Elders said that capelin fish numbers have decreased. The Elders attribute this to the movement of capelin spawning grounds further away from Chesterfield Inlet as a result of increased boat traffic in the area.

Culturally Important Areas

During an interview, a study participant recounted that the Apuqtinuaq (Meliadine River area) was a major camp for Inuit. There was concern that the area's traditional integrity be maintained, especially by the Project development. The participant recommended that people involved with mining should learn to recognise old sites in an effort to protect their significance

9.3.1.3.2.3 Whale Cove

Except for a few persons employed by the government or the local collective, most families in Whale Cove from the mid-1950s were still largely dependent on the land and sea for a living. Caribou, seals, fish, and other game animals (i.e., Arctic hare and ptarmigans) still comprised a major part of the Inuit diet. The entirety of the coast was used for hunting marine mammals (excluding the now scarce walrus), while caribou hunting and trapping was generally carried out within 160 km radius of the community, with the areas of highest intensity use being within 80 to 115 km of the community. The most important rivers for hunting and trapping were the Ferguson and Wilson rivers (Freeman 1976).

Spring camps were set up at many locations along the Keewatin Coast and on offshore islands near Whale Cove, where hunting, egg gathering, and fishing occurred throughout the summer. As fall came, polar bear were hunted from Bibby Island to Pork Peninsula before the sea ice freeze-up. With the onset of winter, trapping began again (Freeman 1976).

While hunted all year round, seal harvesting was especially prevalent at the ice floe edge during spring, and offshore from boats during summer. Bearded and ringed seals were hunted from the Manitoba border north to Chesterfield Inlet. The area from Sandy Point to Pork Peninsula was hunted intensively, and was considered to be of particular importance to the people of Whale Cove (Freeman 1976).

Field Studies in 2010 and 2011

Whale Cove was established in 1959 as families relocated from Rankin Inlet after the North Rankin Nickel Mine closed. As a result, Whale Cove families are familiar with hunting in the Rankin Inlet area. Whale Cove is located on the tip of a long peninsula, and the people who settled there were traditionally "inlanders", who often travelled inland as far as Henik Lake, Kaminak Lake, or the Padlei area to hunt caribou, or to run their traplines. They continue to hunt intensively in the coastal areas, around Corbett Inlet, Pistol Bay, and south to Sandy Point and beyond (Nanuk Enterprises 2011; Appendix 9.3-A).

The following further details the results of the Whale Cove field studies as reported in Nanuk Enterprises (2011; Appendix 9.3-A).

Caribou

Inland caribou are hunted by the Inuit of Whale Cove, but hunters seldom go as far as the Project Development Area. Elders also remarked that there are fewer caribou than in the pre-mining past, but that this is likely a result of weather patterns and increased predation by wolves, rather than mining and exploration activities. Elders also noted that caribou appear to have become accustomed to the noise associated with mining activities, adding that they have seen caribou among the buildings at mining sites.

Elders also stated in interviews that caribou calving grounds have been changing over the years, and that this in turn changes the caribou migration routes and the hunting practices of Whale Cove Inuit.

As in other communities, Whale Cove Elders expressed concern over the effect of increased human population, and the use of ATVs and snowmobiles on caribou populations; explaining that with increasing ease of access to caribou migration routes and calving grounds, overhunting is becoming a problem

Other Land Animals

During interviews, Elders commented that the wolf population in the Whale Cove area has been on the rise in recent years. In particular, wolf populations in caribou calving grounds are a concern for Inuit. Elders believe this is a threat to caribou populations, and recommended that predator control programs should be in place to help facilitate the propagation of caribou herds.

Summer camping is popular among Whale Cove Inuit, and allows for the harvesting of waterfowl and the collection of eggs.

Marine Mammals

Elders remarked that the Inuit of Whale Cove hunt marine mammals during summer camping. Belugas and seals are hunted in the late summer. Seals in particular were noted by Whale Cove Elders as being important for their furs and oil. Elders also explained that the seal population around Whale Cove has been declining over the years. One reason posited for this trend was the increased shipping traffic in the area.

Whale populations are also on the decline around Whale Cove. Elders claimed that at one time, hundreds of whales would come into the area each season, but that this number has dropped to approximately 20 or 30. The Elders said that this is a result of increased whaling in the area.

Regarding polar bear, Elders said that the numbers are increasing in the harbour area. Where at one time it was uncommon to see an abundance of bears, Elders stated it is now common to see upwards of 13 in one day. When asked about polar bear populations, Elders noted that while there are more bear sitings, this may not be a result of increasing bear populations.

Fish Resources

Fishing was not raised as a topic by Whale Cove Elders during interviews, other than the observation that fishing occurs in the summers around Corbett Inlet, Pistol Bay, and south to Sandy point

Culturally Important Areas

Whale Cove Elders indicated that the areas surrounding the communities were, and continue to be, popular summer camping locations for Inuit; and that it is from these locations that many traditional activities, such as hunting, trapping, and fishing, are staged.

9.3.1.3.3 Other Traditional Knowledge

In addition to the literature review and studies relating to traditional land use within the LSA or RSA, the literature review also identified studies relating to Inuit traditional knowledge of environmental features or wildlife. The following summarizes available traditional knowledge relating to:

- Sea ice, currents and weather;
- Wildlife populations and health;
- Killer (Orca) whales;
- Decline in tern populations;
- Fish; and
- Barren ground caribou.

9.3.1.3.3.1 Traditional Knowledge Related to Sea Ice Currents and Weather

During IQ studies done for the AREVA Kiggavik Project Impact Statement (AREVA 2011a), Elders in Rankin Inlet reported that sea ice begins to form in November and is normally gone in July. One participant indicated that prior to his birth (several decades previous), the ice used to form in October and sometimes as early as September. Interview participants in Chesterfield Inlet provided similar information, indicating that freeze-up occurs from mid-November to early December, and break-up occurs from about 25 June to 5 July. Chesterfield Inlet participants added that the dates can change from year to year, and that there is no real trend. Participants in Whale Cove provided similar information, and Arviat participants indicated that generally they believe the weather is not as cold as it used to be, and that it does not stay cold for as long as it used to. Participants in Repulse Bay indicated that the sea ice forms later than it used to and recalled that it would last until August, but now is gone by July. Coral Harbour interview participants indicated that in 2010, sea ice formation occurred in December, but in the past, ice formation would occur in October.

During interviews, participants also provided information on the ice floe edge. Rankin Inlet participants explained that the ice floe edge normally reaches its maximum extension in March, stretching out about 30 to 40 miles (48 to 64 km) from Rankin Inlet. Participants recalled that at one time in the past, the ice floe edge reached as far as Marble Island. The ice begins to break up and flow south during the months of May, June, July, and August. Chesterfield Inlet participants noted that the ice floe edge has a maximum extension of about 5 miles (8 km) from shore during the winter, and that this has been constant over the years. Near Whale Cove and Arviat, the ice floe edge ranges from about one mile (1.6 km) offshore (near Nunalla) to about 6 to 7 miles (10 to 11 km) offshore near Whale Cove. Participants believe that the ice may not be as thick as it used to be. In

the area of Repulse Bay, participants explained that the characteristics and location of the ice floe edge are generally the same from year to year in the sense that the edges repeatedly form and break. This is due to the strong currents that flow along the west coast of Southampton Island. In the vicinity of Southampton Island, Coral Harbour participants said that the ice floe edge is about 19 to 24 miles (30.5 to 38.5 km) from shore at its maximum distance. Participants said that in the past the ice floe was much farther from shore, estimating that it used to be about 50 miles (80.5 km) from shore. The Coral Harbour participants also recalled that if there is an ice bridge between Southampton Island and the mainland, this will coincide with ice extending south all the way to Coats Island. One participant also said that during the summer of 2010, he did not see much ice when travelling between Arviat and Southampton Island during July and August. He recalled that there used to be much more ice at that time of year when he was younger.

The Inuit of the northwestern Hudson Bay area have observed that the currents in the Roes Welcome Sound have weakened. They said they can now cross in summer's spring tide, whereas in the past, they could not (McDonald et al. 1997, in AREVA 2011a). Elders from the Arviat area have also noted that the Hudson Bay current has been reduced in strength. The surface water of Hudson Bay generally flows in a counter-clockwise direction, strengthened by river discharge moving past Chesterfield Inlet, Rankin Inlet, Whale Cove, Arviat and south to Churchill (McDonald et al. 1997, in AREVA 2011a). These currents affect the location of sea animals and the locations to which they travel (McDonald et al. 1997, in AREVA 2011a). The Inuit have indicated that rivers flowing into Hudson Bay greatly affect the larger currents flowing in the bay (McDonald et al. 1997, in AREVA 2011a). IQ

9.3.1.3.3.2 Traditional Knowledge Related to Wildlife Populations and Health

During studies for the AREVA Kiggavik Project (AREVA 2011a), Rankin Inlet interview participants indicated they have noticed changes in caribou health. They have observed boils on the skin, white spots that resemble larvae, and fluid around the joints (RIHT 2009, in AREVA 2011a). One of the participants also explained that the caribou are not as healthy as they used to be, and also noted that the Bathurst herd is a lot smaller than it used to be, while the herd from northern Quebec is much larger (RIJ 2011, in AREVA 2011a).

Geese and ducks have been hunted, and eggs collected, between Rankin Inlet and Mistake Bay, to the south near Whale Cove (Riewe 1992, in AREVA 2011a). Eggs were collected on many islands near Rankin Inlet, along the coast, on the shores of Rankin Inlet and along multiple lakes and ponds where the ducks and geese nest (Freeman 1976). In spring and summer, waterfowl have been hunted from around Rankin Inlet to Mirage Islands (offshore from Rankin Inlet), and in spring, from the ice floe edge (Freeman 1976, in AREVA 2011a).

Regarding marine fish and wildlife, summer seal hunting extended for a long distance offshore, but winter hunting was limited by the floe edge limit. During interviews, Rankin Inlet Elders reported that blasting associated with the old Rankin Inlet Nickel Mine prior to 1962 may have been the cause of seals staying away from Rankin Inlet around that time (RIJ 2011, in AREVA 20011a). In the reviewed literature, other Elders have reported similar effects to seals and fish due to their "sensitive hearing" (McDonald et al. 1997, in AREVA 2011a). During interviews, Elders also indicated that there were fewer harp seals in Rankin Inlet in 2010, which they attribute to an increase in marine shipping traffic (RIJ 2011, in AREVA 2011a). Bearded seals, ring seals, and harbour seals are hunted by the people of Rankin Inlet (RIJ 2011, in AREVA 2011a). In the spring and summer, hunters have observed seals that are so "skinny", they may sink when killed. In the fall, seals are fatter and easier to collect after being killed, because the increased amount of blubber they have during this time of the year causes them to float ((RIJ 2011, in AREVA 2011a).

9.3.1.3.3.3 Traditional Knowledge of Killer Whales IQ

The Inuit Traditional Ecological Knowledge of Killer Whales (Westdal 2009) summarised information on killer whales provided by workshop participants from Rankin Inlet, Arviat, Repulse Bay, Igloolik, and Hall Beach. Participants from Rankin Inlet indicated that killer whales have been around for a long time. In the past, there were not many killer whales seen near Rankin Inlet. One participant said that killer whales were not seen often, or talked about before the 1950s or 60s. About half the participants said that sightings have increased in recent years, and two participants mentioned that killer whales have been sighted by people in the community every summer since 2000. One participant said that there has not been a change in the numbers of killer whales in this area. Killer whales have been seen by participants in pods of 3 to 50 animals. One participant indicated that the whales are usually seen in pods of 5 to 7 animals. It is not known if it is the same whales coming back to the Rankin Inlet area. Participants were not aware of any migration routes. Killer whales are seen once the ice is gone sometime during the first two weeks of July, and the killer whales are gone as soon as the ice begins to return. Killer whales are considered smart and fast swimmers, and have been known to follow boats. Killer whales eat beluga, narwhal, seals and perhaps other sea creatures such as shrimp and capelin. Three participants mentioned that killer whales are afraid of walrus. Participants explained that it has been passed down through generations that it was best not to interfere with or hunt killer whales, and that killer whales would avenge the death of one of their own. It was also mentioned that killer whales scare the beluga towards shore, which is good for hunting, but three participants said that they are concerned about the killer whales taking the Inuit food. Participant concerns were related to the seal and beluga populations, and that the increase in killer whales could disrupt the food chain. Rankin Inlet participants reported that killer whales were not hunted, not good for human consumption, and otherwise of little use.

9.3.1.3.3.4 Local Traditional Knowledge on Declines of Arctic Terns near Rankin Inlet and Whale Cove IQ

As part of a study into reported declines in the number of terns, Mallory and Akearok (2010) undertook traditional knowledge studies in Rankin Inlet and Whale Cove. Arctic tern eggs are considered an important food source for harvesters in the Kivalliq region of Nunavut. During interviews for the studies, Elders in Rankin Inlet indicated that they did not see as many Arctic terns near their community as they did in the past. Younger interviewees, aged 30 years and younger, did not notice a difference in the number terns. The Elders further reported that there are not as many terns on some of the islands. Some of the Elders indicated that the terns may be nesting further north, near Chesterfield Inlet. Others suggested that the terns were moving due an increase in garbage near their usual nesting locations. Long-term residents in Whale Cove also reported seeing fewer Arctic terns near their community. The residents added that the terns may be nesting further north, adding that it is a normal cycle for terns, birds and other animals to change locations over the years. Another participant in the studies had observed an increase in foxes in the general area and that might be a reason for a decline in the local tern populations.

9.3.1.3.3.5 Meadowbank Project Inuit Qaujimajatuqangit Workshop: Fish

During IQ workshops held for the Meadowbank Project, participants provided information related to Arctic char (Nunami Stantec 2010). Arctic char south of Rankin Inlet generally have whiter flesh, whereas char north of Rankin Inlet have a pinker flesh. One of the participants also indicated that this year, people from Rankin Inlet were catching Arctic char with pink flesh, indicating that the fish are moving south. Participants agreed that Arctic

char with pink flesh and from further north tastes better, and identified an area where the Arctic char taste particularly good. Participants indicated that Arctic char runs are usually at the mouth of rivers. Some of the areas where Arctic char were once caught near Rankin Inlet have been fished out, but lakes still contain healthy fish.

9.3.1.3.3.6 Traditional Knowledge of Barren-Ground Caribou IQ

During studies on caribou undertaken with Elders from Arviat and Baker Lake, Kendrick and Manseau (2008) recorded Inuit hunters' observations regarding changes in seasonal environmental conditions and the physical condition of the caribou:

> *The water and the ground have really changed. Usually the weather blows from the west, now it is blowing from the north so when the weather changes, it usually changes the hair [of the caribou]. When there is cold/hot weather the hair changes all the time. The hair on the caribou depends on the weather. In the fall, it is very fine hair. In the spring they are shedding. But when the weather changes, the hair changes with it. Every animal with fur, the temperature affects caribou. When there is a lot of snow, there is a lot of water in the lakes and rivers. If there is little snow, I have noticed the rivers and lakes drying up. It is changing from the past when there was lots of water. The caribou mainly feed on the ground and get fatter because they are feeding well. When it is too dry, they get skinny, they are not chewing on ground plants since it is too dry. When it is too dry in the summer, it is too hard to swallow* (PS, Arviat 2003, in Kendrick and Manseau 2008).

The hunters also shared their knowledge and observations about wildlife behavior, movements::

> *Today, it is different because some caribou are now coming from the northwest down towards Arviat and unlike in the past they were coming from the southeast…Now the caribou are coming in circles. There are now wolves just west of South Henik Lake with the caribou.* (MM, Arviat 2003, in Kendrick and Manseau 2008).

Arviat hunters also made the following observation:

> *January is a cold month. The caribou are further inland. The caribou that are close to Arviat [at other times of year] are further up north by Whale Cove. Caribou with calves are mostly inland* (NM, Arviat 2003, in Kendrick and Manseau 2008).

The hunters commented that in September, if there is fat on the chest and stomach areas of a male caribou, this means that an animal is in good health. Further, fat colour differs depending on the sex of the animal, the time of year, and the animal's diet.

Baker Lake harvesting activities occur approximately 10 km north of the town site, while some hunters travel as far as 300 km. Baker Lake is located 300 km inland from the Hudson Bay coast, overlapping ranges of up to five caribou herds including the Beverly, Qamanirjuaq, Wager Bay, Lorillard, and Ahiak herds. Whereas, Arviat is located on the spring and fall migration routes of only one herd, the Qamanirjuaq. Baker Lake knowledge pertains to different animals, with different behaviours exposed to different environmental conditions. Arviat hunters commented that there is currently better winter feeding areas by Whale Cove and Rankin Inlet.

Hunters indicated that weather and snow conditions play a large role in defining caribou distribution. For example, older hunters shared their knowledge of seasonal feeding grounds and the connection to seasonal variation in the distribution and individual body condition of caribou:

> *When the feeding [ground] is all dried up, [the caribou] move further to find ground that is not too dry. The caribou coming from inland are skinnier since they are moving all the time. The coast caribou are always feeding well on kelp and they are much fatter than the ones inland; they taste different…In the fall, at freeze-up or in the winter the meat tastes the same in the winter and the fall. They feed more in the winter. When it starts to freeze-up it is moister inland, so they taste the same at the coast and inland* (LK, Arviat 2003, in Kendrick and Manseau 2008).

Arviat hunters concentrated their hunting efforts in the area most heavily used by the Qamanirjuaq caribou (Kendrick and Manseau 2008). The spring harvesting efforts of the Arviat hunters are thinly distributed, and reach further inland. In contrast, Baker Lake hunters concentrated their spring harvesting activities closer to the town of Baker Lake. One hunter commented on differences between the knowledge older hunters have about caribou distribution and information revealed by collar data:

> *The other thing about the collared caribou is that I didn't grow up with some of these older guys, going out hunting and not relying on the collared caribou, for hunting and stuff like that. I usually check before I go hunting, I check the collared caribou [maps displaying collar data]…Sometimes we go out…and all we see is a herd of maybe 10 caribou with a collar and there's no caribou around for another 40 miles…And then the bigger herds, the hunters find and they don't have a collar at all…There's a difference in the knowledge of the hunters and the collared caribou that the biologists rely on* (JC, Arviat 2004, in Kendrick and Manseau 2008).

Inuit hunters and Elders often make distinctions between caribou populations in relation to the direction animals have travelled from relative to other populations: Baker Lake Elders speak of the Arviamiut caribou or "caribou moving from Arviat" (Qamanirjuaq caribou) that move into the Baker Lake area at certain times of the year.

9.3.1.4 Socio-Economic Baseline Information Related to Traditional Knowledge

9.3.1.4.1 Cultural, Ethnic, Religious, and Language Characteristics and Diversities in the Regional Study Area

Selected demographic statistics are presented Table 9.3-1 below. The population of Kivalliq is young, with a median age of 21.1 in 2006, slightly higher than the median age of 20.3 in 2001, and 2 years lower than that of Nunavut as a whole. Kivalliq has the highest fertility rate of the 3 regions of Nunavut, at 3.2 births per woman in 2006 as compared to 2.9 in the other regions (GNBS 2011c). The young population in Kivalliq presents the same challenges as for Nunavut as a whole, but this young population can become a driver of economic growth in the region, provided they have the tools and incentives needed to contribute to Kivalliq's economic development potential.

Table 9.3-1: Selected Demographic Statistics, 2006

	Arviat	Baker Lake	Chesterfield Inlet	Coral Harbour	Rankin Inlet	Repulse Bay	Whale Cove	Kivalliq	Nunavut
Population in 2006	2 060	1 728	332	769	2 358	748	353	8 348	29 474
Median age of the population (years)	19.5	22.0	24.0	18.9	23.9	18.9	19.1	21.1	23.1
Male/female ratio	0.95	1.08	1.00	1.00	1.00	1.07	1.12	1.01	1.05
Average household size	4.5	3.8	3.2	3.9	3.6	5.6	3.9	4.0	3.7
Lone parent families (%)	29.1	29.6	29.4	26.5	25.7	20.6	31.3	27.1	27.6
Median income in 2005, all families ($)	37 248	39 360	51 072	38 144	66 133	28 224	36 736	42 368	49 270
Median income in 2005, lone parent families ($)	17 984	21 312	21 376	21 632	27 296	10 592	24 384	21 248	22 576
Aboriginal identify population (%)	93.2	90.7	90.8	95.5	83.7	95.3	95.8	90.4	85.0
Mother tongue English (%)	6.6	34.6	14.1	5.9	28.6	6.0	2.9	18.6	26.5
Mother tongue other (%)	93.0	65.4	87.5	94.8	70.7	93.3	97.1	81.0	72.2
Lived at same address 1 year ago (%)	94.1	88.5	91.9	88.7	83.0	90.3	83.8	88.3	84.3
Lived at same address 5 years ago (%)	75.7	68.4	62.1	64.9	56.7	67.5	51.7	65.4	57.8

Source: Statistics Canada (2007a)

Note: Mother tongue 'other' is almost exclusively Inuktitut

Shaded areas represent LSA community data

The Kivalliq Aboriginal identity population was 90.4% of the total in 2006, about 5% higher than in Nunavut overall. About 81% of people had a language other than English as a mother tongue, and in the context of Nunavut, almost all of these would have Inuktitut as the mother tongue. Less than 2% of the population had knowledge of French. There are not many obviously large differences in the data for different communities, with the exception that Rankin Inlet has a lower percentage of Inuit residents, and higher incomes. Baker Lake and Rankin Inlet's demographic profile also means that more people speak English as their mother tongue (approximately 35% and 29%, respectively) than in the Kivalliq region (18.6%) as a whole.

Mobility is lower in Kivalliq than in Nunavut as a whole. That is, more people have stayed at the same address in Kivalliq than in Nunavut. Mobility is also lower in Kivalliq than in Canada as a whole (comparable figures for Canada are 85.9% at the same address as one year previously, and 59.1% 5 years previously). This is likely a reflection of lack of housing options in Kivalliq rather than a lack of overall mobility. People do not easily change addresses in an environment where 50% of families are in social housing.

Data for Aboriginal language trends are presented in Table 9.3-2. In the larger communities there has been some decrease in Inuktitut as the language first learned and still understood (such as Baker Lake and Rankin Inlet), but people in all other Kivalliq communities maintained Inuktitut as a mother tongue over the decade 1996 to 2006. There have, however, been larger decreases in speaking of Inuktitut in the home, especially in Baker Lake and Chesterfield Inlet. This would normally imply that many of the youngest of Kivalliq residents, children born after 2006, are receiving more exposure to English than to Inuktitut in the home.

Table 9.3-2: Aboriginal Language Trends (% of Aboriginal population)

	Arviat	Baker Lake	Chesterfield Inlet	Coral Harbour	Rankin Inlet	Repulse Bay	Whale Cove
First learned and still understood							
1996	98	87	98	100	83	96	93
2001	98	75	95	96	75	98	97
2006	98	70	93	97	81	97	100
Aboriginal language spoken at home							
1996	96	53	87	95	65	95	88
2001	98	81	94	99	81	98	97
2006	95	29	57	84	53	87	93
Knowledge of Aboriginal language							
1996	100	96	100	100	94	99	100
2001	99	93	100	99	90	99	98
2006	100	89	98	98	93	97	99

Source: Statistics Canada (2007b, 2002a)

Notes: In 2006 data are for 'mother tongue as the question was changed for this census'. In 2006 the data are for 'most spoken at home'
Shaded areas represent LSA community data.

Data on perceptions of Aboriginal language use are presented in Table 9.3-3. There is an apparent strong commitment to Inuktitut and most people feel they speak well (with the possible exception of Rankin Inlet and Baker Lake). The numbers on access to services in Inuktitut are very low, and justice in Inuktitut is particularly lacking in the more remote communities of Coral Harbour and Repulse Bay. Note that the LSA communities of Chesterfield Inlet and Whale Cove are not reported on by Statistics Canada because of their small populations.

GN is acutely aware of the ongoing need to staff social service delivery with non-Inuit in the absence of trained Inuit, and is aggressively trying to redress this. Developing capacity in these areas will take time however, and in the interim the need to deal with health, education and police in English may be a contributing factor to language loss.

Table 9.3-3: Aboriginal Language Use (%age of Aboriginal population over 15)

	Arviat	Baker Lake	Coral Harbour	Rankin Inlet	Repulse Bay
Able to speak Aboriginal language very or relatively well	97	77	93	89	90
Access to services in Aboriginal language					
health	26	25	30	26	27
justice	22	22	9	23	10
social/employment	26	26	30	25	30
Importance to keep, learn or re learn Aboriginal language					
very	91	83	87	80	85
somewhat	7	n/a	9	15	13

Source: Statistics Canada (2007b)
Note: Shaded areas represent LSA community data; n/a = not applicable

There is also some perception among older interview and focus group participants, particularly in Rankin Inlet, that as there is more contact with people from the south, including through employment, people will use Inuktitut less and eventually it could be lost. These data are only reported at the national and territorial level, and there is no data made publicly available at the regional or community level. However, the Nunavut level data are of some interest, remembering that at least as of 2006, mobility in Kivalliq was lower than in Nunavut overall.

All communities have a number of churches including for example Anglican, Roman Catholic, and Glad Tidings (Local Directory.ca, 2013). Churches are described as not being overly involved in political or social issues, and as operating fairly independently from each other. That is, churches focus more on their teachings. Given the number of churches in most communities, church influence on their members is highly variable. Approximately 92% of the study area population identifies as Christian, while 7% claim no religious affiliation. The remaining 1% of the population identifies as having another religion (Statistics Canada, 2013b).

9.3.1.4.2 Local and Regional Economy Characteristics Related to Traditional Land Use Activities and Wage Incomes

Traditional Economy

Activity on the land provides food and other subsistence resources, maintains Inuit culture and generates cash income (through for example, sale of natural and arts and crafts products). The land based sector of the economy is described in the Keewatin Regional Land Use Plan as being ". . . generally based on non-monetary exchange, private ownership of modes of production . . . and transactions which provide for subsistence and do not increase profits or accumulate capital for its own sake" (NPC 2000).

Although all of the LSA communities except Baker Lake are located on the shores of Hudson Bay, and people hunt marine mammals and fish, across the region there is a high dependence on land resources for livelihoods as well, particularly caribou; the primary staple food in Kivalliq.

Caribou are taken largely from the Qamanirjuaq herd, although some Kivalliq communities also hunt the Beverly herd (NPC 2000). The Beverly and Qamanirjuaq Caribou Management Board's (BQCMB) baseline for herd sizes dates from 1994, when the populations of the Qamanirjuaq and Beverly herds were 496 000 and 276 000, respectively (BQCMB 2011). There is growing concern that these numbers have declined heavily in the intervening years although there are significant challenges to understanding exactly what has been happening, and why.

Musk oxen are also a valued resource, particularly in Baker Lake. Seal are harvested widely, and walrus is harvested in more northern parts of the Kivalliq. In Arviat and Whale Cove, hunters have traditionally harvested beluga. HTOs report that although numbers of beluga are thought to be very high, quotas may be introduced because there are also an increasing numbers of hunters.

Traditional knowledge studies have been done to establish the ranges of current (and previous) harvesting. Indications from Rankin Inlet suggest that the area of the Meliadine mine site is part of a larger region used for traditional activities, including harvesting. Meliadine Lake has also been a traditional site for fishing. Hunting and trapping do occur in the region – and there are a number of caribou migratory paths nearby.

Detailed community level information regarding participation in harvesting is available from the Nunavut Wildlife Harvest Survey (NWMB 2004). Conducted between 1996 and 2001, this survey remains the most recent and comprehensive study of subsistence harvesting throughout Nunavut (including hunting, trapping, and fishing of mammals, birds and fish, but not including plant gathering or commercial harvesting).

For the purposes of the survey, a hunter was defined as someone who was an NLCA beneficiary, who was 16 years of age or older at the time of the survey, and who participated in hunting, fishing, or trapping of animals at any time during the year. Hunters were classified either as intensive, active or occasional[12] hunters. Table 9.3-4 summarizes the number of hunters registered in the study by community and year. In most communities, most hunters were occasional and very few (as a proportion of the Inuit population) were intensive. Rankin Inlet, Baker Lake and Arviat, the largest and most economically diversified LSA communities, have the highest percentage of occasional hunters, while the smaller communities of Chesterfield Inlet and Whale Cove have high proportions of active hunters in addition to occasional ones.

Overall, the numbers show some stability over the period 1996 to 2001. However, Statistics Canada data for 2001 and 2006 (see Table 9.3-5) suggest substantial increases in the numbers of people harvesting in at least 5 of Kivalliq's communities (Statistics Canada 2002a, 2007b). This data indicates that more people reported hunting, fishing, gathering, and trapping in 2006 than in 2001 (this is despite the data suggesting that for Nunavut overall, there was had been a slight decrease in harvesting).

[12] An intensive hunter is one who repeatedly and regularly engages in all or nearly all of the various types of hunting activities during the annual cycle, and who always has country food in the household; an active hunter is one who regularly engages in some of the major harvesting activities during the annual cycle (e.g., ice-edge seal hunting, char fishing, or caribou hunting), participation in the activity may be short but intense and time commitment is more than day-trips or an occasional weekend; an occasional hunter is one who occasionally, but not regularly, participates in hunting activities (e.g. a day or two of caribou hunting or waterfowl hunting, or rod-and-reel fishing every now and then), and participation is usually short-term, such as day-trips or weekend outings (NWMB 2004).

Table 9.3-4: Registered Hunters by Community and Year

	1996/97			1997/98			1998/99			1999/00			2000/01		
	O	A	I	O	A	I	O	A	I	O	A	I	O	A	I
Arviat	309	64	6	309	65	6	312	69	6	315	74	6	312	74	7
Baker Lake	264	62	1	263	60	1	252	62	2	240	60	2	234	63	2
Chesterfield Inlet	40	21	11	45	23	11	46	23	11	43	24	10	47	29	9
Coral Harbour	113	110	33	112	111	31	124	110	32	105	108	31	94	104	28
Rankin Inlet	238	86	55	240	80	52	235	80	52	228	82	54	226	83	53
Repulse Bay	108	55	6	105	52	6	103	48	6	103	43	6	96	44	6
Whale Cove	32	16	2	32	16	2	31	16	0	32	18	0	30	18	1
Total	**1104**	**414**	**114**	**1106**	**407**	**109**	**1103**	**408**	**109**	**1066**	**409**	**109**	**1039**	**415**	**106**
Percent	67.6	25.4	7.0	68.2	25.1	6.7	68.1	25.2	6.7	67.3	25.8	6.9	66.6	26.6	6.8

Source: NWMB (2004)

Notes: O=occasional; A=active; I=intensive hunters; Shaded areas represent LSA community data

Table 9.3-5: Traditional Activity, 2001 and 2006 (% of the 15 years and over population)

	Arviat		Baker Lake		Chesterfield Inlet		Coral Harbour		Rankin Inlet		Repulse Bay		Whale Cove		Nunavut	
	2006	2001	2006	2001	2006	2001	2006	2001	2006	2001	2006	2001	2006	2001	2006	2001
Hunted	81	64	68	53	n/a	63	71	65	67	45	82	72	n/a	59	72	58
Fished	80	70	77	62	n/a	79	81	73	71	66	85	78	n/a	71	76	67
Gathered wild plants	86	57	87	55	n/a	79	76	43	81	49	78	75	n/a	47	79	51
Trapped	42	15	44	8	n/a	n/a	53	16	n/a	n/a	46	25	n/a	n/a	30	9

Source: Statistics Canada (2002a, 2007b)

Notes: Data are not available for Kivalliq Region, nor for smaller communities (Chesterfield Inlet and Whale Cove) in 2006; Shaded areas represent LSA community data; n/a = not available

Estimates of the value of harvesting are incomplete. In order to get an order of magnitude estimate of the contribution of harvesting to household food security in Kivalliq communities, data were used from different sources and years to derive the values in Table 9.3-6. The table provides estimates of the value of harvests of the 5 most harvested species, and in the last column expresses these as a percentage of funds required to purchase what Aboriginal Affairs and Northern Development Canada (AANDC; formerly Indian and Northern Affairs Canada, INAC) considers to be an adequate diet in individual communities in Kivalliq. Parameters used were:

- annual average harvests, 1996/1997 to 2000/2001 (NWMB 2004);
- estimated edible weights (Ashley 2002);
- community populations in 2001, one of the years for which there is harvest data (Statistics Canada 2002b);
- Net value per kilogram (kg) of edible harvests, that is value minus harvesting costs (Intergroup 2008); and
- grocery costs for a family of 4 in 2010 (INAC 2010a).

Table 9.3-6: Market Value per Person of Selected Harvests ($)

	Caribou	Ring Seal	Char/Trout	Beluga	Total	% of Total Required to Purchase
Arviat	1974	73	184	1231	3462	64
Baker Lake	1852	0	181	0	2033	36
Chesterfield Inlet	2136	95	473	561	3265	58
Coral Harbour	2323	301	563	1422	4609	80
Rankin Inlet	531	27	94	590	1242	23
Repulse Bay	1369	243	525	426	2563	46
Whale Cove	1982	51	515	1483	4032	76

Source: Derived from data as listed in bullets above
Note: Shaded areas represent LSA community data

It is emphasized that the data in Table 9.3-6 are indicative only. Numbers would fall if average harvesting levels per person in 1996 to 2001 have declined significantly since that time for example, or if the 2008 net value per kg is too high for each species[13] In general however, the results are probably conservative – only 5 species are included whereas, for example, Kivalliq communities harvest thousands of geese and eggs, and significant quantities of cod, walrus, and narwhal, which are not included in the derivations.

Irrespective, the numbers in the last column in the table are high. With the exception of Rankin Inlet and Baker Lake, and taking into account that more minor harvests are not included, communities harvesting levels are sufficient to substitute for about half or more of what total food costs would be if all food was store bought. This is not to claim that half of diets come from traditional food; harvesting replaces high value food, specifically meat.
Table 9.3-7 provides an indication of the percentage of consumed solid food that is traditional. Overall the percentage is about a third and is much higher among older generations (Kuhnlein et al. 2000). Both Kuhnlein et al. (2000) and Myers et al. (2005) noted a trend among younger people to consume less traditional food.

[13] Intergroup set a value $25 per kg for caribou based on the prices of high and low grade meat in selected communities. This price is used for all species in the table. Although some fish may be priced lower, prices have also risen since 2008.

Table 9.3-7: Solid Diet from Traditional Foods by Weight[14] (%)

	Age			Total
	20-40	**41-60**	**61+**	
Female	22.8	42.6	45.3	30.9
Male	30.5	49.5	60.4	38.5
Total	**26.7**	**45.8**	**52.3**	34.6
Sample size	199	78	38	315

Source: Kuhnlein et al. (2000)

The Centre for Indigenous Peoples' Nutrition and Environment (CINE) also notes that for the LSA communities in Kivalliq for which they have data (Chesterfield Inlet and Rankin Inlet), caribou alone accounts for about 30% of protein intake during the fall and about 20% during the winter.

Country foods are good sources of nutrients that contribute to physical health. However, harvesting is not just about subsistence. There are also important cultural dimensions in the relationship Inuit have to the land and its resources beyond its exploitation for subsistence. Through the harvest, distribution and consumption of wildlife, Inuit identity and social relationships are affirmed. Harvest, distribution and consumption of country foods are also fundamental to the reproduction of Inuit society and culture. Traditionally, sharing surplus harvest was part of a system of reciprocity or insurance against potential future misfortune. Sharing is reinforced by the belief that animals are sentient beings, are aware of human behaviour and motives, and act accordingly. If a harvest is not shared, a hunter's future success may be jeopardized (Bennet and Rowley 2004).

In some communities in Kivalliq, such as Chesterfield Inlet, the commitment to sharing is upheld by a strong social injunction against selling of harvested food. Surplus harvest is first to be shared with family and then with Elders and widows in the community. If there is additional surplus, the hunter may make an announcement on community radio saying that food is available for those who want it.

Harvesting also affirms social roles, particularly the value assigned to men as providers of food to families and communities, and to Elders as custodians of knowledge. Although women participate in hunting trips and also fish, it is less common for women to go hunt and trap, and they typically do not go out alone. There are exceptions -- interviews with women revealed that some will hunt seals from floe edges and occasionally hunt caribou alone.

There are also important income dimensions to harvesting – tourism, pelt sales, and arts and crafts all generate income based on land and resource use, as do commercial harvesting of caribou, musk oxen, and fish for sale outside Nunavut. Pelts are sold by individuals to their HTOs and sent south, typically to Thunder Bay, for auction. The price a hunter gets fluctuates according to supply and demand as well as the quality of the pelt. Arts and crafts are also marketed, sometimes more informally. For less well known artists, community stores sell carvings by photographing them and sending the pictures south to potential galleries and other buyers. Artists will also sell to travellers staying at hotels and to local businesses. Caribou and fish are sold for processing to Kivalliq Arctic Foods in Rankin Inlet.

Some of these income streams, however, have fallen in recent years. Environmental advocacy in the United States and Europe have reduced the markets for polar bear hunt guiding and seal pelts. Arts and craft

[14] As calculations are on the basis of grams/per day/person, water based drinks (which account for most consumption by weight and may have no calories are not included). By far the largest consumption of drinks is of coffee and tea, however including soda pop and fruit juices in the above table would reduce percentages.

production is constrained by the high cost of materials and tools, including soapstone which artists report is increasingly hard, and expensive, to source.

The interests of hunters and trappers at a community level are represented by HTOs. In addition, a number of harvester support programs are administered by NTI with HTO participation. For example, the Community Harvest Program provides financial assistance to hunters to supply country foods to people with limited means to access country foods themselves. The program is a good example of an adaptive use of a new institution to ensure that traditional sharing systems are maintained. The program provides cash to a community while at the same time the harvest is given away.

Hunters and trappers organizations are also involved in wider harvest distribution systems. If an HTO in one community has excess caribou for example, it may trade with another HTO that has an excess of seal or other resource (Rankin Inlet HTO, 2011). Because country foods are often broadly distributed, contamination in one area can affect many people. The origin of the country food is something people pay considerable attention to (CBC, 2012)

The major challenge for many harvesters is reported to be how to earn the money needed to harvest and still have the time to go out and do it. NTI's harvester support programs are intended to help address this challenge with subsidies for equipment, ammunition and fuel. Nevertheless, costs are high to go out on the land for those without much income. Maintaining traditional activity and supporting the development of the mining industry may require trade-offs, and also compensation.

Wage Economy

Employment data are available at the regional and community levels from national censuses. Table 9.3-8 below provides some indication of changes in labour force characteristics in Kivalliq between 2001 and 2006. The labour force had grown by about 17% (as compared to population growth of less than 11% over the same period). While unemployment rates had gone down between 2001 and 2006, the participation rate had also decreased, indicating discouragement in looking for work rather than economic improvement.

Table 9.3-8: Kivalliq Employment, 2001 and 2006

	2001	2006
Labour Force	2775	3240
Participation Rate (%)	66.9	61.7
Unemployment Rate (%)	18.6	15.7

Source: Statistics Canada (2002b, 2007a)

By 2006, Kivalliq's employment situation appeared similar to that in Nunavut as a whole; unemployment rates were comparable at 15.7% and 15.6%, respectively. However, participation rates were lower in Kivalliq (and lower than they are now), again a signal that high unemployment had discouraged people from looking for work.

Since the census data are from 2006, they are not expected to necessarily reflect the employment situation in Kivalliq as it is in 2012. Employment is thought to be substantially improved by the upswing in mining exploration and the construction and operations of Meadowbank. However, the data do provide an idea of differences that likely persist between Kivalliq and the rest of Canada, between communities and between genders (Table 9.3-9).

Table 9.3-9: Employment and Income, 2006

	Arviat			Baker Lake			Chesterfield Inlet			Coral Harbour			Rankin Inlet		
	All	M	F	All	M	F	All	M	F	All	M	F	All	M	F
Participation rate (%)	49.8	52.5	47.6	59.2	61.5	55.1	74.4	71.4	77.3	66.7	71.1	62.5	71.7	72.3	71.4
Unemployment rate (%)	13.0	15.6	8.5	18.9	25.0	11.9	15.6	26.7	11.8	19.4	18.8	20.0	10.2	11.3	9.1
Median earnings, persons 15 years and over ($)	26,048	31,168	22,976	15,019	15,328	13,984	20,032	20,288	18,240	10,784	10,965	10,496	32,736	34,688	32,026
Median income, persons 15 years and over ($)	15,200	14,688	16,096	15,904	15,232	16,512	21,184	22,848	19,648	14,029	12,480	15,104	26,389	26,176	26,880
Composition of total income (100%)															
Earnings, as % of total income	81.2	87.6	74.8	79.6	86.0	71.1	82.8	82.8	82.7	74.9	78.1	70.3	90.4	93.6	88.4
Government transfers, as % of total income	17.3	10.7	23.8	19.4	12.4	26.7	12.3	11.6	13.8	21.1	14.8	26.8	7.5	5.0	10.4
Other money as % of total income	1.2	1.3	1.1	1.2	0.8	1.7	5.3	8.1	2.7	3.6	4.3	2.9	1.8	2.0	1.5

	Repulse Bay			Whale Cove			Kivalliq			Nunavut		
	All	M	F	All	M	F	All	M	F	All	M	F
Participation rate (%)	61.1	63.8	54.5	47.6	50.0	47.6	61.7	63.7	59.5	65.3	67.9	62.6
Unemployment rate (%)	34.5	36.7	33.3	10.0	18.2	20.0	15.7	18.9	12.3	15.6	17.8	13.0
Median earnings, persons 15 years and over ($)	11,982	11,992	11,840	24,992	21,824	26,048	23,232	24,040	21,909	26,848	29,235	24,973
Median income, persons 15 years and over ($)	10,912	11,264	10,464	16,352	15,328	19,520	17,440	16,832	17,760	20,982	22,552	20,047
Composition of total income (100%)												
Earnings, as % of total income	71.7	80.8	62.3	80.7	92.8	72.6	84.1	88.9	78.9	86.5	90.0	82.3
Government transfers, as % of total income	26.3	16.7	36.3	17.1	10.4	26.1	14.2	9.2	19.6	11.2	7.4	15.8
Other money as % of total income	1.9	1.8	2.0	0.1	0.1	0.1	1.8	2.0	1.6	2.3	2.6	1.9

Source: Statistics Canada (2007a)

Note: Shaded areas represent LSA community data; M = males; F = females

Table 9.3-10 compares Kivalliq's participation and unemployment rates with Nunavut and Canada. Participation rates are on average lower, but within 4 to 5% of those in Nunavut and Canada, and unemployment rates are more than twice as high in both Kivalliq and Nunavut than in Canada. What is more interesting is that overall, women are less likely to be in the labour force in Kivalliq, but are more likely to find work once they enter the labour force.

Table 9.3-10: Comparison of Kivalliq's Participation and Unemployment Rates (%), 2006

	Participation	Unemployment
Kivalliq		
all	61.7	15.7
male	63.7	18.9
female	59.5	12.3
Nunavut		
all	65.3	15.6
male	67.9	17.8
female	62.6	13.0
Canada		
all	66.8	6.6
male	72.3	6.5
female	61.6	6.6

Source: Statistics Canada (2007a)

Figure 9.3-4 presents similar data at the community level. Whereas on average participation rates in Kivalliq approached rates in Nunavut and in the rest of Canada, there were large differences in rates between communities, with Chesterfield Inlet at over 70% and Whale Cove at fewer than 50%. There is no obvious difference between communities that are often described as more traditional and those that are not. For example, Chesterfield Inlet had a very high participation rate and higher than Rankin Inlet. Participation rates are therefore considered to be in large part a function of the prospects of finding employment, not simply a function of a desire or need to work. Additionally, seasonal workers are more likely to be in the labour force, but unemployed, which would influence the observed participation rates.

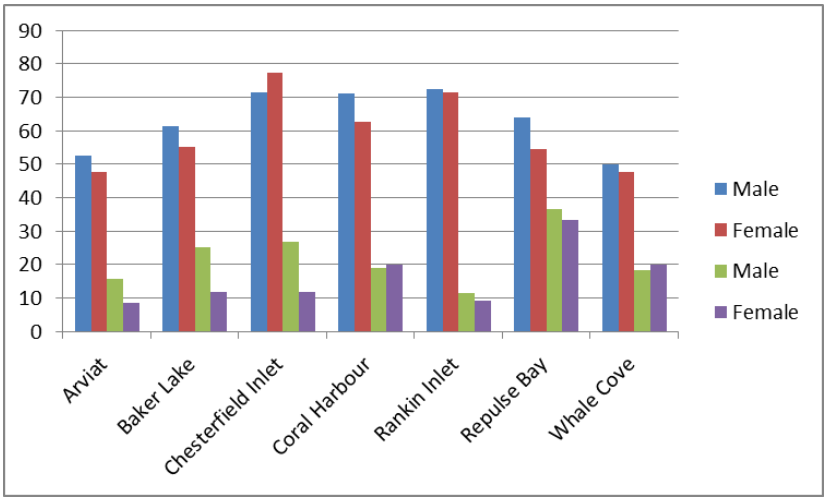


Figure 9.3-4: Employment, Gender Differences, 2006

Note: Columns on the left (blue and red) are participation rates, and on the right (green and purple) are unemployment rates.

Differences between communities were also much larger than differences between genders. With the exception of Chesterfield Inlet, women were slightly less likely to be in the workforce than men, which is expected. Women's unemployment rates were equally as variable between communities, but with the exception of Whale Cove, were less than men's, and in some cases such as Baker Lake and Chesterfield Inlet, women were half as likely to be unemployed as men. It is noted however that recent employment, particularly of men who find rotational mining work more possible, has certainly redressed some of the gender imbalances in employment. All communities, including Rankin Inlet, had high unemployment rates in 2006 compared to the Canadian value of 6.6%. Rates varied from Rankin Inlet's low of 10.2%, to Repulse Bay's high of 34.5%.

Table 9.3-11 presents 2006 data on types of employment. Less than half the people in Kivalliq who worked in the previous year, worked full time for a full year (FY/FT). This is comparable to the number for Nunavut (48.4% worked full year, full time) and only slightly less than that for Canada (50.9%). However, again there are larger differences between communities. In Chesterfield Inlet and Whale Cove, approximately 40% worked FY/FT as compared to Arviat and Rankin Inlet where almost 60% did. These figures need to be interpreted in relation to the number of people in the working age population. Arviat and Rankin Inlet, for example, has a substantial portion of the community who worked FY/FT (56% and 59.4% respectively), and a large percentage of the working age population participated in the labour force (74.5% and 50% respectively). In Whale Cove on the other hand, there was a lower percentage working FY/FT (44%), and a lower percentage of the working age population participating in the labour force (59.5%).

Table 9.3-11: Employment by Sector

	People with Earnings			Employment Sector (% of experienced workers)		
	Number	% of 15+ Population	% FY/FT	Primary	Secondary	Tertiary
Arviat	615	49.8	56.1	1.5	6.6	92.0
Baker Lake	700	62.8	40.0	7.3	8.1	84.6
Chesterfield Inlet	175	63.6	40.0	0.0	6.5	93.5
Coral Harbour	310	66.7	30.6	6.9	12.1	81.0
Rankin Inlet	1170	74.5	59.4	2.3	7.8	90.0
Repulse Bay	235	52.2	31.9	6.5	6.5	87.0
Whale Cove	125	59.5	44.0	10.0	10.0	80.0
Kivalliq	3325	63.3	48.4	4.1	4.7	91.2

Source: Statistics Canada (2007a)
Notes: % FY/FT is the percentage of people with earnings who worked full time, full year. Shaded areas represent LSA community data

Table 9.3-11 also provides some information on sector of employment. Statistics Canada groups type of employment into 10 industries: 'Agriculture and other resources based industries' (which would include mining) makes up the primary sector. 'Construction' and 'manufacturing' make up the secondary sector. Seven other sectors make up the tertiary (or services) sector, one of which is 'other services'. This other services category is undefined, but typically accounts for about one third of total employment in Kivalliq communities, and is by far the largest of the 7 sectors that make up the service economy. In all Kivalliq communities, the largest fraction of the employed is delivering government, retail and other services. The tertiary sector accounts for 90% of jobs on average for the region.

With development of the mining sector, the local community talks a lot about employment. Box 9.3-1 provides some of what was said. Overall, comments focused on the need for employment at least for those who want to work, and the challenges of working in a southern oriented workplace environment can imply. The range of comments on employment was very broad. Generally, they focused on the need to develop ways for young people to gain the necessary skills for employment. Focus group discussions with youth also revealed that they were aware about mining and exploration activities currently happening in Kivalliq, the types of jobs available at these projects, the skills needed to be hired for this work, and where to access this training (most noted courses offered at the Nunavut Arctic College).

Box 9.3-1: Employment

- We have an opportunity to be involved in this Project; we have an opportunity for job training to develop careers for many of our young people. This is important to us.
- We want our young people to have a chance to work and to learn trades.
- If there would be jobs available for the youth, if there are no obstacles to run into, but sometimes they tend to get dismissed.
- And the generation that will come after us, the younger people, will have to depend on working on a daily basis. Because hunting isn't done on a full-time basis anymore, even today. And, not everybody is eligible to qualify for assistance, so it would be better for younger people to find employment. And again, I'd like to say that mining companies are a main source of employment.
- We don't know how this works, but when young people get welfare, they seem to stop looking for jobs. There should be more emphasis on helping people to get off welfare and to make a living.
- If we provide fish well-packed or caribou meat ready to cook, and sell them to the mining company, maybe we could have a contract with them on a year or monthly basis? And this would create jobs for youth, to go hunting and fishing for meat to store, it's almost like working for the mine.
- Rotational employment seems to work fine for people in our community who have jobs.

Perceptions of mining and AEM operations were also raised in discussions with communities during primary data collection. In general, most people acknowledged that their experience with mining companies had been positive, although some concerns were raised. Most comments, however, expressed that relations between mining companies and Inuit have been improving over time. A number of these comments appear in Box 9.3-2 below.

Box 9.3-2: Perceptions of the Mining Sector

- In the past, when the mining companies first started working up here it was really different, there was no communication between the mine and people from around here.
- I seem to understand, that the mining camps are doing better jobs than before, because in the past there used to be health concerns due to the fact that mining companies used to just leave a lot of stuff behind, but today they seem to have a bit more knowledge now to be more careful with the land.
- Mining activity authorities and workers should learn more about IQ. They are creating employment opportunities; they already have an impact on the community, wildlife and land. They must involve local businesses, organizations. They have to be clear and careful of what they are developing.
- The community here does not seem to be too interested in what they (mining companies) have to say. But, I think if the mining companies would give opportunities to people who are not in support of mining to show them what they actually work on, maybe they would start to learn and understand.
- I personally have raised concerns to the mine project people that they should be more informative about their work performances and inform about what they use that may be harmful to the land and wildlife, etc.

Box 9.3-2: Perceptions of the Mining Sector

- Here, the mining company arrives, they have public meetings, and we usually express our concerns, and they state that they will have these written down.
- Mining companies usually meet with the community. We have to learn from them as well -- to learn what is happening or what they are preparing to do.
- Over the past 2 years the Baker Lake mines seem to be informing us of what is going on, and they are using a lot of funds, I seem to understand that the mines are being supportive.
- Today the mining camps seem to be more cautious of their activities with the wildlife trails being protected and seem to inspect the area before action is done.
- As long as the companies are following the regulations and procedures that they have to follow, I don't see any reason why we, the Inuit, should try and say that any company shouldn't operate within Nunavut.
- We are hearing stories about the language being used in the mining camps. Do you know how this works? It seems that the French people don't like Inuit using their own language with each other at work, but they often use their own language within their own group. This leads to feelings like those generated by the residential schools. It needs to be looked at before it gets worse.

Informal Economy

The informal economy includes not only subsistence activity (such as food harvesting, harvesting for clothing production, arts, and crafts materials), but also goods and services that are exchanged without financial transaction. Volunteering, lending of harvesting equipment, bartered services and some child care, as examples, are not captured in official statistics.

Further, the economic value of the food component subsistence activity is not well understood – there are only intermittent and partial attempts to establish the market value of harvested food. For example, InterGroup (2008) calculated a net harvest value for Nunavut for the Beverly and Qamanirjuaq caribou herds of about $12 million, and a subsistence food value of about $9 million, but these are only 2 of Nunavut's herds. Estimates of the Nunavut Economic Forum (2008b) are that food harvesting has a value of about $30 million annually in Nunavut. However, the EIS for the Mary River Project puts an estimated value for harvested food for 5 communities on the north part of Baffin Island at $20 million annually, communities with only about 18% of the territorial population (Baffinland Iron Mines Corporation 2011).

Since land based activity in the formal economy is not disaggregated from wage based activity, and because there are no reliable estimates of the size of the subsistence portion of the informal economy – much (but not all) of which may be considered to be land based – the true economic value of land based activity is not known. In 2001 the Conference Board of Canada suggested a figure, based on a 'consensus of key informants', of $40 million to $60 million as the value of some of the land based components of the economy (excluding for example volunteering and equipment sharing). However, the definition of land based activity was that it did not include a financial transaction. That is, the only land based activity considered was informal and therefore excluded such formal activity as pelt sales, tourism, sales of arts and crafts, the commercial fishery, environmental monitoring, and communications. Although none of these sectors is large, in aggregate the economic contribution is likely significant – tourism was estimated to contribute about $26 million to the economy in 2007 (GNDoF 2008), arts and crafts about $33 million annually (GNDoEDT 2010b), and the commercial fishery over $30 million[15]. Therefore, in addition to social and cultural value, the land based economy plays a much more significant economic role than available data suggest.

[15] This is not an official estimate, but is based on recent increases in quota, reported catches and approximate value.

Without reliable data, past and future trends are challenging to forecast. There are no data that provide conclusive evidence that land based economic activity has seen significant change in the recent past. However, there is some anecdotal evidence to suggest that although harvesting, a major component of the land based economy, remains an important economic activity for a majority of Nunavut households, some decrease may be underway.

Land Based Economic Activity

Activity on the land provides food and other subsistence resources, maintains Inuit culture and generates cash income (through for example, sale of natural and arts and crafts products). The land based sector of the economy is described in the Keewatin Regional Land Use Plan as being ". . . generally based on non-monetary exchange, private ownership of modes of production . . . and transactions which provide for subsistence and do not increase profits or accumulate capital for its own sake" (NPC 2000).

Although all of the communities within the LSA except Baker Lake are located on the shores of Hudson Bay, and people hunt marine mammals and fish, there is also a high dependence on land resources for livelihoods across the region, particularly caribou; the primary staple food in Kivalliq.

All attempts to estimate the value of harvesting are incomplete. To get an order of magnitude estimate of the contribution of harvesting to household food security in Kivalliq communities, data were used from different sources and years to derive the values in the Table 9.3-12. The table provides estimates of the value of harvests of the 5 most harvested species, and in the last column expresses these as a percentage of funds required to purchase what Aboriginal Affairs and Northern Development Canada (formerly Indian and Northern Affairs Canada [INAC]) considers to be an adequate diet in individual communities in Kivalliq. Data used in deriving the estimates included:

- annual average harvests, 1996/1997 to 2000/2001 (NWMB 2004);
- estimated edible weights (Ashley 2002);
- community populations in 2001, one of the years for which there is harvest data (Statistics Canada 2002b);
- net value per kg of edible harvests, that is value minus harvesting costs (Intergroup 2008); and
- grocery costs for a family of 4 in 2010 (INAC 2010a).

Table 9.3-12: Market Value per Person of Selected Harvests ($) in Kivalliq Communities

	Caribou	Ring Seal	Char/Trout	Beluga	Total	% of Total
Arviat	1974	73	184	1231	3462	64
Baker Lake	1852	0	181	0	2033	36
Chesterfield Inlet	2136	95	473	561	3265	58
Coral Harbour	2323	301	563	1422	4609	80
Rankin Inlet	531	27	94	590	1242	23
Repulse Bay	1369	243	525	426	2563	46
Whale Cove	1982	51	515	1483	4032	76

Source: Derived from data as listed in bullets above.
Note: Shaded areas represent LSA community data

It is emphasized that the data in Table 9.3-12 are indicative only. Numbers would fall if average harvesting levels per person in 1996 to 2001 have declined significantly since that time for example, or if the 2008 net value per kg is too high for each species.[16] In general however, the results are probably conservative – only 5 species are included whereas, for example, Kivalliq communities harvest thousands of geese and eggs, and significant quantities of cod, walrus, and narwhal, which are not included in the derivations.

Irrespective, the numbers in the last column in the table are high. With the exception of Rankin Inlet and Baker Lake, and taking into account that more minor harvests are not included, communities harvesting levels are sufficient to substitute for about half or more of what total food costs would be if all food was store bought. This is not to claim that half of diets come from traditional food; harvesting replaces high value food, specifically meat.

There are also important income dimensions to harvesting – tourism, pelt sales, and arts and crafts all generate income based on land and resource use, as do commercial harvesting of caribou, musk oxen, and fish for sale outside Nunavut. Pelts are sold by individuals to their HTOs and sent south, typically to Thunder Bay, for auction. The price a hunter gets fluctuates according to supply and demand as well as the quality of the pelt. Arts and crafts are also marketed, sometimes more informally. For less well known artists, community stores sell carvings by photographing them and sending the pictures south to potential galleries and other buyers. Artists will also sell to travellers staying at hotels and to local businesses. Caribou and fish are sold for processing to Kivalliq Arctic Foods in Rankin Inlet.

Some of these income streams; however, have fallen in recent years. Environmental advocacy in the United States and Europe have reduced the markets for polar bear hunt guiding and seal pelts. Arts and craft production is constrained by the high cost of materials and tools, including soapstone, which artists report is increasingly hard and expensive to source.

The major challenge for many harvesters is how to earn the money needed to harvest and still have the time to go out and do it. NTI's harvester support programs are intended to help address this challenge with subsidies for equipment, ammunition, and fuel. Nevertheless, costs are high to go out on the land for those without much income. Maintaining traditional activity and supporting the development of the mining industry may require trade-offs and also compensation.

Throughout Nunavut and Kivalliq, the land based economy is fundamental to people's health and wellbeing. Data predating the construction and operation of Meadowbank indicate that the levels of engagement in land based activities and the contribution of harvests to diet were both high and stable in most communities in Nunavut (NWM, 2004; Statistics Canada 2002a, 2007b).

Despite the high value assigned to, and high participation rates in, harvesting, there is unmet demand for country food. This in turn indicates that levels of engagement in harvesting activity are constrained in some way(s). Table 9.3-13 provides data on what people feel are the primary obstacles to more activity on the land, specifically hunting and fishing. A very low percentage of respondents (4%) answered that they faced no constraints to hunting and fishing (Kuhnlein et al. 2000) in 1998 and 1999, while the rate jumped substantially in the 2010 Baker Lake study to greater than 50% of respondents. Potential reasons for this variability may be that there is a higher dependence on transportation and other hunting and fishing supplies today than there was in

[16] Intergroup set a value $25 per kg for caribou based on the prices of high and low grade meat in selected communities. This price is used for all species in the table. Although some fish may be priced lower, prices have also risen since 2008.

the past. These tools cost money, and may indicate that contemporary hunting and fishing activities are becoming more dependent on the capacity of individuals to participate in the formal wage economy.

Table 9.3-13: Percentage of Households Reporting Constraints to Hunting and Fishing

	1998/99 (Kivalliq)		2010 (Baker Lake)	
	Hunting	**Fishing**	**Hunting**	**Fishing**
No constraints	4	5	57	63
Constraints	96	95	43	38
Of which				
too expensive	57	29	34	30
too busy	7	34	9	7
changes in wildlife	0	0	0	1
Weather	22	20	0	0
Health	3	3	0	0
Other	4	8	0	0

Sources: Kuhnlein et al. (2000) for 1998/99 data; Areva survey for 2010 data

For instance, households in both surveys (Table 9.3-13) were much more likely to identify costs than time as the primary obstacle to hunting. The primary constraint to fishing in the 1998/99 survey was time. Time constraints appear to be less of a factor in 2010. Weather also factored in as a constraint to hunting and fishing approximately 20% of the time in the earlier survey; however, it was not a factor in the 2010 survey. The studies did not find changes in wildlife to be a major constraint to hunting and fishing.

More recently, primary data collection findings also highlighted some of the key contemporary issues related to harvesting, as described by Inuit hunters and representatives of local HTO's. In particular, people are concerned that mine development will drive wildlife to change their migratory patterns and thus limit their ability to access traditional wildlife resources (Nanuk Enterprises 2011). It should be noted that some people regarded other forces, such as changes in climate, as the reason for changing migratory patterns rather than activities pertaining to mining (Nanuk Enterprises 2011).

9.3.1.4.3 Importance of and Level of Dependence on Country Food as Major Nutritional Sources within the Regional Study Area

Throughout Nunavut and Kivalliq, the land based economy is fundamental to people's health and wellbeing. Data predating the construction and operation of Meadowbank indicate that the levels of engagement in land based activities and the contribution of harvests to diet were both high and stable in most communities in Nunavut (NWMB, 2004; Statscan, 2002a and 2007b).

The CINE undertook a study to identify values around the harvesting and consumption of country food (Kuhnlein et al. 2000). The CINE methodology included workshops with participants in communities to reach consensus on a list of attributes considered to be relevant to the values assigned to harvesting and consumption of country food. These attributes are listed as statements in the Table 9.3-14, with indications of the percentage of respondents who agreed to each statement in Kivalliq during the 1998/99 study. Additionally, in support of the

application for the AREVA Kiggavik Project, a small survey was undertaken in Baker Lake (the closest LSA community to the Kiggavik Project) in 2010 to compare various values, practices and preferences with regard to traditional activity (harvesting and food consumption) (AREVA 2011b). Although the CINE survey was undertaken for the Kivalliq region and the AREVA survey was only undertaken in Baker Lake, there are several trends that can be extrapolated from the data. For instance, the results of both the CINE and AREVA surveys indicate that there are substantial positive attributes of harvesting country foods. In particular, respondents placed a high value on the benefits of country foods for nutritional health and physical fitness, teaching younger generations traditional skills, and local concepts of responsibilities. Generally, the harvesting and consumption of country foods was seen as a beneficial way to preserve Inuit culture. Current studies tend to focus on hunting activities and their importance; the studies are not detailed to the level of addressing topics such as specific portions of harvest consumed. Traditionally, Inuit have used most parts of a harvest animal either to support themselves or their dog teams. In the enthoarchaeological literature there is some evidence of preference for specific animal parts for consumption, and informal conversations have indicated that there are some that are considered delicacies (Smith 1991).

Table 9.3-14: Percentage of Respondents Agreeing to Statements about Harvesting

	1998/99 (Kivalliq)	2010 (Baker Lake)	Difference (1998/9 to 2010)
Contributes to physical fitness and good health	98	96	-2
Is a favorite outdoor recreation activity	89	94	5
Provides people with healthy food	98	100	2
Keeps people close to nature	87	92	5
Favours sharing in the community	95	95	0
Saves money	94	94	0
Is an important part of the culture	97	97	0
Is an occasion for adults to teach responsibility to their children	93	98	5
Is one way to practice spirituality	57	74	17
Keeps people humble (not proud or boastful)	71	82	11
Provides education on the natural environment	93	94	1
Contributes to children's education	94	95	1
Provides skills in survival	97	98	1
Provides skills in food preparation at home	98	99	1
Is an opportunity to teach spirituality	61	75	14
Is an opportunity to learn patience	83	97	14
Is a way to strengthen culture	89	97	8

Sources: Kuhnlein et al. (2000) for 1998/99 data; AREVA survey for 2010 data

Table 9.3-15 presents harvest (catch) levels in Arviat, Baker Lake, Chesterfield Inlet, Rankin Inlet, and Whale Cove over the 5 year period between 1996 and 2001 as presented by NWMB. This data indicates that the more traditional and/or smaller communities of Arviat, Chesterfield Inlet, and Whale Cove consume more country foods per capita than the larger and more cosmopolitan communities of Baker Lake and Rankin Inlet. For instance, per capita consumption of caribou (using 2001 census population data) finds that 1.9 caribou are harvested annually for each person in the community of Chesterfield Inlet. In Rankin Inlet on the other hand, per capita consumption of caribou is less than half an animal per person. Baker Lake, being the only community that

is not on the shores of the Hudson Bay, consumes more land and fresh water country foods such as Caribou, Wolves and fish species, and almost no marine mammals.

In Whale Cove an annual average of 40 beluga whales were harvested for a population 305 people. Rankin Inlet harvested less than double the number of belugas; however their population was over 7 times higher in 2001. Once again, Arviat showed its traditional character harvesting a substantially greater number of Beluga's, close to 3 times as many as Rankin Inlet, although the populations of the 2 communities are similar (see Table 9.2-2 for Kivalliq community populations). A similar trend is observed across all animals that community harvest data were collected for in the NWMB survey. While survey results are over 10 years old, there are currently no publically available follow up studies available that estimate annual catches across all Kivalliq communities. Anecdotal evidence suggests that harvest levels have remained the same or increased over the last decade.

Table 9.3-15: Estimated Annual Catches (no.)

Country Food	Arviat	Baker Lake	Chesterfield Inlet	Rankin Inlet	Whale Cove
Caribou	3332	2480	655	989	539
Polar Bear	16	2	9	9	11
Wolf	223	91	42	34	6
Seals[a]	452	4	104	198	56
Walrus	2	0	3	5	0
Beluga	208	0	17	73	40
Birds[a]	2555	273	220	302	143
Fish[a]	7577	5657	2745	3171	1421

Sources: NWMB (2004) for 1996 to 2001 data.

[a] indicate aggregate numbers for all species of that animal

Based on the currently available data, it appears that overall consumption levels have not decreased over the last decade, and the CINE conclusions with regard to the important contribution of traditional foods to household food security, nutrition and cultural wellbeing are validated by the AREVA baseline survey (AREVA 2011b) survey. In general, CINE determined that traditional food was the primary source of protein, iron, zinc, potassium and phosphorus for Inuit, and a valuable contributor of vitamin C, omega fatty acids, vitamin A, vitamin E, and magnesium. Market food contributed the majority of saturated fat, carbohydrate, sodium and calcium. The study concluded that 'large quantities and great varieties of these wildlife foods are consumed, and bring about better diet quality, social and cultural benefits, economic benefits and provide the opportunity for physical activity during hunting, fishing and gathering of plant food species . . . [and that] losing these benefits is potentially life threatening in several ways, including impacts on physiological and mental health.'

Despite the very high value assigned to harvesting, and very high participation rates in harvesting, there is unmet demand for country food. This in turn indicates that levels of engagement in harvesting activity are constrained in some way(s). Table 9.3-16 provides data on what people feel are the primary obstacles to more activity on the land, specifically hunting and fishing. It is noteworthy that a very low percentage of respondents in the CINE study (4%) answered that they faced no constraints to hunting and fishing (Kuhnlein et al. 2000) in 1998 and 1999, while the rate jumped substantially in the 2010 Baker Lake study to greater than 50% of respondents. Potential reasons for this variability may be that there is a higher dependence on transportation and other hunting and fishing supplies today than there was in the past. These tools cost money, and may

indicate that contemporary hunting and fishing activities are becoming more dependent on the capacity of individuals to participate in the formal wage economy.

For instance, households at both times were much more likely to identify costs than time as the primary obstacle to hunting. The primary constraint to fishing in the 1998/99 survey, however, was time. Time constraints appear to be less of a factor in 2010. Weather also factored in as a constraint to hunting and fishing approximately 20% of the time in the earlier survey, however, was not a factor in the 2010 survey. The studies, however, did not find changes in wildlife to be a major constraint to hunting and fishing.

Table 9.3-16: Percentage of Households Reporting Constraints to Hunting and Fishing

	1998/99 (Kivalliq)		2010 (Baker Lake)	
	Hunting	**Fishing**	**Hunting**	**Fishing**
No constraints	4	5	57	63
Constraints	96	95	43	38
Of which				
too expensive	57	29	34	30
too busy	7	34	9	7
changes in wildlife	0	0	0	1
weather	22	20	0	0
health	3	3	0	0
other	4	8	0	0

Sources: Kuhnlein et al. (2000) for 1998/99 data; Areva survey for 2010 data

More recently, primary data collection findings also highlighted some of the key contemporary issues related to harvesting, as described by Inuit hunters and representatives of local HTOs. In particular, people are concerned that mine development will drive wildlife to change their migratory patterns and thus limit their ability to access traditional wildlife resources. It should be noted that some people regarded other forces, such as changes in climate, as the reason for changing migratory patterns rather than from activities pertaining to mining.

9.3.1.4.4 Use of Caribou as Subsistence Tradition

Reader is referred to Section 9.3.1.6.2 Local and Regional Economy Characteristics above.

9.3.1.4.5 Current and Traditional Land Use Areas and Importance to Inuit Culture and Social Well-Being

Reader is referred to Section 9.3.1, as well as Section 9.3.1.6.3 (Importance of and Level of Dependence on Country Food) above.

9.3.2 Pathway Analysis

Pathway analysis is a screening step that is used to determine the existence and magnitude of linkages from the initial list of potential effects pathways for the Project. Table 9.3-17 shows potential pathways for effects to TLU VCs.

Table 9.3-17: Pathway Table

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Traditional and commercial harvesting	Construction and operations	Project activities may affect availability of terrestrial and marine wildlife for harvesting. Project footprint may change access to traditional harvesting areas	Traditional pursuits of Aboriginal employees accommodated within work schedules and co-ordinated with the operational needs of the Project. Use minimal size footprint. Use of AWAR for access to traditional harvesting areas. Other mitigation measures related to terrestrial and marine wildlife, and vegetation components	Primary
	Final closure and post-closure	Changes in availability of terrestrial and marine wildlife for harvesting. Change in access to traditional harvesting areas.		Primary
Land use and mobility	Construction and operations	Changes in access to traditional use areas.	Use minimal sized footprint. Use of AWAR for access to traditional use areas.	Primary
	Final closure and post-closure	Changes in access to traditional use areas.		Primary
Food Security	Construction and operations	Changes in availability and quality of traditional foods.	Refer to the Human Health Risk Assessment for mitigation measures	Primary
	Final closure and post-closure	Changes in availability and quality of traditional foods.	Refer to the Human Health Risk Assessment for mitigation measures	Primary

9.3.3 Effects Analysis

9.3.3.1 Mitigation Measures

Measures that mitigate the potential effects of the Project on traditional activities and use of the land include measures that mitigate the effects of the Project on resources used for harvesting, and measures that help to mitigate Project effects on traditional lifestyles. The mitigation measures that relate to traditional harvesting are found in the following sections:

- Terrestrial wildlife (FEIS Volume 6, Section 6.6);
- Birds (FEIS Volume 6, Section 6.7);
- Marine wildlife (FEIS Volume 8, Section 8.3);
- Fish and fish habitat (FEIS Volume 7, Section 7.5); and
- Vegetation (FEIS Volume 6, Section 6.5).

Mitigation measures relating to traditional lifestyles, culture, and environmental and human health are found in the following sections:

- Individual and community wellness (Section 9.6.3);
- Archaeological and palaeontological resources (9.11.6); and
- Human health (FEIS Volume 10, Section 10.2.6.2).

9.3.3.2 Effects to Traditional and Commercial Harvesting

For the purposes of this assessment, the effects to harvesting are considered to be a combination of various factors. These factors include a consideration of the Project's effects on the availability of the underlying resource; the Project's effects on the ability to access the resource; and the Project's effects on traditional values, lifestyles and changes to household function due to Project-related wage employment. Changes to traditional values and household function as a result of wage employment may affect the amount of time spent harvesting, regardless of the availability of traditional resources to be harvested. Typically, factors that facilitate traditional harvesting (such as increased time, or increased access to harvesting equipment) are considered positive effects. Generally, increased geographic access to important resources is also considered a positive effect. Increased access also has the potential to have a negative effect if it increases use of a resource to the point that the resource is diminished (e.g. increased hunting decreases the availability of hunted species).

Effects to Availability of Terrestrial Wildlife, Including Caribou and Muskox

The effects of the Project on caribou, and other species of terrestrial wildlife were assessed in FEIS Volume 6, Section 6.6. The wildlife assessment indicates that muskox were considered as a VEC, but ultimately not selected for the FEIS as the core part of their species home ranges does not overlap with the Project. In addition, there have been either no, or very few, observations of animals in close proximity to the Meliadine Gold Exploration camp. Although observations of muskox have increased in recent years, IQ suggests they were not in the region during Elders' childhoods. Observations in the wildlife RSA include one in 2008, a group of 26 in 2009, and a group of 18 in 2010 with suggestion that they have been hunted in the region of the AWAR (incidentals, J. Witteman, AEM, 2012, pers. comm.). In 2009, 35 tags were issued by the HTO for muskox harvest; however hunters went north of the wildlife RSA (Peter's Lake) to fill their tags (J. Witteman, AEM, 2012, pers. comm.). The region near Diana River was also identified as a muskox hunting region. While it will be important to monitor these changing populations in the region, muskoxen were not selected as a VEC.

The Economic Development and Opportunities Baseline indicates that most commercial harvesting in Nunavut is focused in Kitikmeot and Qikiqtaaluk, although Kivalliq Arctic Foods buys caribou and fish from communities for processing for export markets (Section 9.4.1.2). For the purposes of this assessment, Project-related effects to commercial harvesting of caribou are considered to be the same as the effects to traditional harvesting of caribou.

Section 6.6.8 (FEIS Volume 6) of the wildlife assessment indicates that with increased access due to the AWAR, an increase in hunting opportunities is expected during the life of the Project. Any change in availability of wildlife for harvesting from direct and indirect effects from the Project is predicted to be within the range of baseline values. People that hunt in the region should not observe a change in the availability of wildlife due to effects from the Project, relative to current natural cycles in populations during mine life or following post-closure.

Effects are expected to last from construction through perpetuity, in some cases, but are not expected to be measureable at the population level. With the development of the AWAR, hunters would be able to make more use of vehicles to access areas in the RSA. However, there is currently access in this area through the use of snow machines in the winter months and ATVs in the summer months. Although, the development of the AWAR will increase access into the RSA during the entire year, harvesting of wildlife would occur periodically during traditional and non-traditional hunting seasons.

Section 6.7 (FEIS Volume 6) of the wildlife assessment determined the effects of the Project on birds. The decrease in the availability of birds for harvesting from direct and indirect effects from the Project is predicted to be within the range of baseline values. People that hunt in the RSA should not observe a change in the availability of birds due to effects from the Project, relative to current natural cycles in populations. Effects are expected to last from construction through perpetuity, but are not expected to be measureable at the population level. With the development of AWAR, hunters would be able to make more use of vehicles to access areas in the RSA. However, there is currently access in this area through the use of snow machines in the winter months and all-terrain vehicles in the summer months. Although, the development of AWAR will increase access into the RSA during the entire year, harvesting of birds would occur periodically during traditional and non-traditional hunting seasons.

Currently, the community of Rankin Inlet is estimated to harvest 302 birds each year (Section 9.3, Table 9.3-13) and harvesting pressure is unlikely to be a limiting factor for bird populations in the RSA. In addition, there are existing trails that can be used to access the RSA for harvesting of waterbirds and ptarmigan. Should harvesting on the AWAR reach a level of concern, the Department of Environment could enact regulations to control harvesting. As such, it is expected that the incremental and cumulative increase in the harvest of birds from the AWAR will be within the range or approach the upper limits of baseline harvesting values.

Effects to Plant Harvesting

Within the LSA, berry picking is an important activity that occurs throughout the Meliadine Valley during the fall. Harvested berries include ‘blackberry’, crowberry, blueberry, and lignonberry, cloudberry, and bearberry. Liquoriceroot is also harvested. During interviews, Elders indicated that the proposed bridge over the Meliadine River and improved road access would result in the area being used more for berry harvesting.

Project-related effects of the Project on the traditional use of plants were assessed in FEIS Volume 6, Section 6.5.10. The Project footprint (including the AWAR) will alter 2950 ha (28%) of the LSA, including 977 ha (9%) of plant community types with a high traditional plant potential (FEIS Volume 6, Table 6.5-12). The overall effect from the Project on the use of vegetation resources is expected to be within the range of baseline conditions, as traditional use plants are associated with a range of plant community types that are locally and regionally abundant. Effects from dust deposition and air emissions on vegetation are also expected to be mostly confined to the immediate area around the anticipated mine footprint and the right-of-way along the AWAR and associated mine haul roads. Detailed information on human health risks associated with dust deposition and air emissions are described in FEIS Volume 5, Sections 5.2 and FEIS Volume 10, Section 10.2.

Effects to Availability of Freshwater Fish for Harvesting

The Socio-Economic baseline indicates that most commercial harvesting in Nunavut is focused in Kitikmeot and Qikiqtaaluk, although Kivalliq Arctic Foods buys caribou and fish from communities for processing for export

markets (Section 9.4.1.2). For the purposes of this assessment, Project-related effects to commercial harvesting of fish are considered to be the same as the effects to traditional harvesting of fish.

The Fish and Fish Habitat Assessment (FEIS Volume 7, Section 7.5.6.3) determined the effects of the Project on the availability of fish for traditional harvesting. A measurable change in the abundance and distribution of Arctic char, lake trout and Arctic grayling is predicted at the scale of the LSA, which includes Meliadine Lake. Although there will be measurable effects to fish distributions that exceed existing baseline conditions, the anticipated overall decrease in the availability of fish for harvesting is predicted to be within the range of baseline values. As a result, people that fish in the local study area should not observe a change in the availability of fish due to effects from the Project, relative to current natural changes in population sizes.

The Project will also result in improved access to waterbodies along the AWAR, as well as to Meliadine Lake, a popular fishing destination for traditional and non-traditional anglers. While the Project spur road and boat ramp at the southeast end of Meliadine Lake are supported by the local community, increased angler access may lead to overharvesting and effects to local populations of fish, particularly Arctic char in Meliadine Lake. To reduce the potential for overharvesting along the AWAR, AEM staff and contractors will not be permitted to fish while on working hours. This, along with the controlled access (if deemed necessary by the local HTO), and the ability of the regulators to implement management regulations to limit harvesting, should protect the fisheries resources in Meliadine Lake and River.

In summary, residual effects to people are expected, although incremental Project-related changes to fish abundance and distribution and opportunities for traditional and non-traditional users should be within range of baseline values at the local scale. The duration of the majority of effects will approximate the duration of the Project and AWAR, from opening to closure of the road. Effects from increased harvests could persist beyond the closure and decommissioning of the AWAR, but should diminish shortly thereafter. Although the spatial extent of Project-related effects may extend to the regional study area, including the Meliadine River systems, the magnitude of the incremental or cumulative effect at the RSA-scale (i.e., at the population scale) is anticipated to be much lower than that described for incremental changes at the local level. In other words people that fish in the region should not observe a change in the availability of fish due to effects from the Project.

Effects to Availability of Marine Species for Harvesting

The effects of the Project on marine mammals, marine fish, and marine birds were assessed FEIS Volume 8, Section 8.3.6. The assessments determined that given the duration of marine vessel operations and the frequency of transiting vessels, the slight potential exists that a vessel-mammal strike could occur over the life of the Project. The assessment further determined that due to the low vessel speeds (2 knots or less) and ships maintaining minimum distances from any observed marine mammals, the chance of a vessel strike are low. The consequences to the mammal would be more likely to be non-lethal incisions from propellers and non-lethal blunt force injury, rather than immediate mortality.

Regarding Project effects on marine fish and fish habitat, the assessment determined that although underwater noise may be detectable to fish in the immediate vicinity of the harbour and anchored cargo vessel, and is expected to occur at regular intervals throughout the open water season, underwater noise disturbance is expected to be low. With respect to habitat change from spud ground barging, the natural action of the sea ice on the substrate, combined with any restoration activities deemed necessary during decommissioning, are

expected to effectively prevent long-term residual effects on fish habitat following decommissioning. Any detrimental changes to fish habitat during operation of the spud barge are expected to be low or moderate.

The assessment of the Project's effects on marine birds considered effects to habitat, direct mortality, and sensory disturbance. The assessment determined that effects to habitat will occur at local scales and that direct loss of habitat within the Project footprint will occur throughout the life of the Project. Habitat disturbance due to Project construction is expected to recover within one or 2 breeding seasons after the disturbance. The risk of direct mortality to marine birds is considered low because construction activities are expected to temporarily deter birds from using the immediate Project area. As construction activities are scheduled during daylight hours, bird attraction to site and vessel lighting is also assessed as unlikely. The risk of direct mortality during Project operations is also expected to be low. Sensory disturbances to marine birds during the Construction phase is expected to be of minor concern because exposure to the majority of activities associated with construction will be limited in temporal and spatial scale (i.e., the spud barge).

Potential Impacts to Cultural, Traditional Values and Traditional Lifestyles, and Household Function due to Project-Related Wage Employment

The Project may also affect traditional harvesting activities as a result of Project-related impacts on traditional lifestyles, and cultural and traditional values. An assessment of the Project's effects on traditional lifestyles and values was generally considered through a variety of pathways in the Section 9.6.4 (Effects Analysis: Individual, Family and Community Wellbeing). The assessment indicates that cause and effect relationships between employment, traditional culture and wellbeing are very difficult to capture in the north. Evidence from diamond mines in the NT and the Meadowbank Mine in Baker Lake indicate that there have been benefits to community wellbeing as a result of these projects.

For example, evidence from diamond mines in the NT finds that people who are employed have the financial resources, equipment and time (due to rotational schedules) to regularly harvest the land for country foods and maintain their traditional diets. Baseline information demonstrates that country foods remain an important source of nutrition for Inuit living in Kivalliq. The biggest constraint to hunting and fishing in Kivalliq, as identified in the Kuhnlein et al. study (2000) for the CINE and the Baker Lake study (AREVA 2011b), is the costs associated with harvesting country foods. Employment through the mine will provide the necessary financial resources to harvest the land (Section 9.6.4.5).

Project construction and operations will be a force of change in Kivalliq, with anticipated in-migration to Rankin Inlet, and potential for rising levels of inequality. There is potential for the Project to contribute to a weakening of traditional culture which in turn may generate a weakening of social cohesion, which has served people well over the years (Section 9.6.4.7).

Section 9.6.4 discusses perceptions of harm that people may have regarding perceived contamination that may be affecting traditional foods. For example, an expectation of contamination from a project may lead to a fear of country food. As discussed elsewhere in, the maintenance of elements of traditional diets are important both to cultural integrity and health.

9.3.3.3 Effects to Land Use and Mobility

An assessment of the Project's effects on land use and mobility considers the interactions between Project development (mine site, AWAR, shipping routes) and land use activities. Assessed land use activities include the following:

- harvesting (terrestrial, freshwater, and marine);
- use of culturally important areas;
- impacts on access to areas for hunting, fishing, marine harvesting, travelling, recreational, and religious activities;
- availability of country foods and accessibility of carving stone deposits;
- impacts to users of ice-travel routes;
- effects of AWAR on Inuit harvesting activities.

An assessment of the Project's impacts on harvesting activities (terrestrial, fresh water and marine) were assessed in Section 9.3.3.2 and included a consideration of the Project's effects on the availability of country foods and the effects of the AWAR. Therefore, this assessment considers the Project's effects on the following:

- use of culturally important areas;
- impacts on access to areas for hunting, fishing, marine harvesting, travelling, recreational, and religious activities.
- availability of carving stone deposits; and
- impacts to users of ice travel routes.

Effects to Use of Culturally Important Areas

While Inuit believe the whole of the land (including aquatic environments) is important to sustain their traditional way of life, and hence is culturally important. There are some areas that have particular importance for Elders and other hunters. During interviews, participants said that cabins are important places used for relaxation, harvesting and generally sharing in family activities. Cabin locations within the RSA are found in (Figure 9.3-2) and locations within the LSA are found in Figure 9.3-3 (IQ Baseline). Participants also said that "old sites" (e.g., old camps) are culturally important. The Lower Meliadine River is an important area due to its prehistoric hunting and dwelling areas, and was prominent in the Inuit legends of the area. Other signs of old locations, such as old meat caches and tent rings are found in the general area of the proposed AWAR. Other important archaeology sites are found in Iqalugaarjuup Nunanga Territorial Park. An assessment of the Project's effects on archaeological sites is found in Section 9.11.

The Project's waste rock piles will be visible to cabins located in the general area of Meliadine Lake, and on higher ground in the vicinity of Rankin Inlet, Diana Lake (see Figure 9.9-1, in Section 9.9). Project-related noise will be attenuated to below 40 dBA at 1.5 km from the Project. Five cabins located within 5 km of Project components will experience noise levels above 40 dBA (Table 5.5-8 in FEIS Volume 5, Section 5.5.4.4). Of these 5 cabins, 2 already are experiencing noise levels above 40 dBA. Thus, only 3 cabins are expected to

experience a noticeable (i.e., a change to ambient noise exceeding the 40 dBA threshold) change in noise levels as a result of the Project. Noise effects are expected to be negligible in Rankin Inlet due to the ambient noise levels in Rankin Inlet. The effects of considered to be low in Iqalugaarjuup Nunanga Territorial Park, as intermittent nose from the AWAR may heard in the southeast portion of the park, and waste rock piles may be visible in the distance from points of high ground in the park. People who are able to see the waste rock pile and hear Project-related noise may experience a diminished sense of wilderness character while in these areas Project-related noise effects will last the life of the Project.

An assessment of the Project's effects on heritage resources was done in Section 9.11. There are 98 archaeological sites identified within the LSA, and 2066 sites within the RSA. The majority of the sites within the LSA have been mitigated with appropriate archaeological methods. There are 3 sites known to require mitigation prior to construction and possibly others that will require mitigation in relation to the Site Water Management Plan (SD 2-6) implementation. he increased human presence and easier access to the Project area may result in indirect impacts. Employees and contractors of AEM will not be permitted to go beyond the mine footprint. Past evidence suggests that the majority of sites within the LSA, while known, have not been disturbed. Easier access is not expected to influence people's behaviour toward archaeological heritage. No primary linkages are assessed for potential Project effects to the archaeological record, and a residual effects assessment and classification are not required (Section 9.11.6.1.4). Regarding cumulative effects, activities anticipated to have possible impacts on the archaeological record within the RSA include the AEM exploration programme, the municipality of Rankin Inlet, use and development of the Iqalugaarjuup Nunanga Territorial Park, and traditional and recreations land use. Of the 98 archaeological sites identified within the Project LSA, 34 sites will be impacted. Each feature type which will be impacted by the Project is also in Iqalugaarjuup Nunanga Territorial Park and in the general areas surrounding Rankin Inlet. Therefore, a sample of these site types will be preserved. As a result, the cumulative effects of the above listed activities to the archaeology record are predicted to have a minor effect and subsequently, no predicted residual impact (Section 9.11.7).

Project-Related Impacts on Access to Areas for Hunting, Fishing, Marine Harvesting, Travelling, Recreational, and Religious Activities

Current access throughout the RSA is via trails used by ATVs in the summer and snowmobiles in the winter. Similarly, within the LSA, there are series of trails used by ATVs to access cabins and Meliadine Lake. During interviews, participants indicated that the proposed AWAR would improve their access into the LSA, Meliadine Lake, and cabin locations in the portion of the RSA close to the LSA. They added that this would allow them to take boats to Meliadine Lake, access wildlife harvesting areas, and would also facilitate increased use of berry picking areas along the proposed AWAR.

While the proposed AWAR follows existing ATV trails and does not provide a new route to harvesting areas, the AWAR is expected to provide quicker and easier access to the LSA and portions of the RSA in the vicinity of the LSA. Cabins are located north of the LSA, along the shore of Meliadine Lake and other lakes. Water access to cabins along the shore of Meliadine Lake, north of the LSA should not be affected by the Project footprint. Land travel to the cabins north of the LSA might be slightly affected, if some additional travel around the Project footprint is required.

No specific religious activities were identified within Project LSA. Therefore, the potential effects on access for religious activities within the LSA are considered to be the same as those identified for harvesting and other traditional activities.

Effects on Availability of Carving Stone Deposits

A description of the geology and type of rock at the mine site is found in FEIS Volume 6, Section 6.2. Soapstone is not found at the mine site. As a result, Project activities are not expected to affect the availability or access to rock used for carving, and no residual impact assessment is required.

Impacts to Users of Ice Travel Routes

The Project does not include shipping during the ice season, or any ice breaking. As a result, there will be no effect to users of ice travel routes as a result of Project activities, and no residual impact assessment is required.

9.3.3.4 Effects to Food Security

The effects of the Project on food security is considered through several variable, which include the effects to the availability of country foods, effects to the quality of foods, and perceptions of harm. The effects of the Project on the availability of country foods were assessed in Section 9.3.3.2, above. The effects of the Project on the quality of country foods were assessed in FEIS Volume 10, Section 10.2.6.3.3 of the Human Health Risk Assessment (HHRA). The assessment determined that no chemicals of potential concern (COPCs) were identified in soil, with the result that concentrations of chemicals were not anticipated to in country foods (i.e., plants and animals consumed by humans). Therefore, country foods were not assessed further with respect to potential health effects and no residual health impacts due to changes to country food quality were identified. Section 10.2.6.3.6 of the HHRA (FEIS Volume 10) determined that since no COPCs were identified in surface water, concentrations of chemicals were not expected to change in fish tissue. As a result, no residual health impacts due to changes to fish tissue quality were identified. Section 9.6.4 discusses perceptions of harm that people may have regarding perceived contamination that may be affecting traditional foods.

9.3.3.5 Compliance with Official Languages Act

How the Proponent will Comply with the Official Languages Act

Issues of language and cultural preservation are central to economic and social development strategies in Nunavut. For example, debates on an appropriate education policy for Nunavut reflect a fundamental concern that the young acquire skills needed to work in the wage economy, but also retain the Inuktitut language. People in communities also worry that Inuktitut may be lost over the longer term as the young are more immersed in English environments. People are worried about maintaining Inuktitut as a primary language or worse, that there will be a loss of bilingualism in favour of English. Loss of language is loss of identify, and makes the communication between generations, including the transmission of traditional knowledge, difficult.

There are fundamental questions about the extent to which southern Canadians are coming to exert economic influence in the north. In a cross cultural context, language can be viewed as a resource, used to extend power of one group over another. If one language has to be used in preference to another, it gains status (Dorais 1989). This is the real concern related to the retention and use of Inuktitut. Allen (2007) notes that where people learn 2 languages from birth and live much of their lives in an English-speaking environment, there can be a trajectory to higher proficiency in English.

English has taken hold in Kivalliq in 2 important domains, school, and work. The non-Inuit population represents less than 10% of Kivalliq's population. But the use of English is proportionately much more dominant than that. The use of Inuktitut at home and the teaching of Inuktitut to children before they enter the school system are still common in Kivalliq communities and this does help to forestall erosion of language, however success in high school and in most of the wage economy requires English. There are large differences between communities – in more traditional communities, over 80% of Inuit speak Inuktitut at home, while only about half or less do in the larger communities of Rankin Inlet and Baker Lake.

It is noted that these percentages are from the 2006 census, and therefore pre-date employment at Meadowbank. There have been many drivers of language use that have no association with mining, including the English curriculum in high schools, entrance of English media (primarily the internet, television and music) and challenges to staff social service delivery with Inuktitut speakers. Nunavut passed the *Inuit Language Protection Act* in 2009 to address some of these issues and there are a number of initiatives underway to implement the act. To the extent that people in Kivalliq are aware of the potential for language loss and have convictions about the need to retain Inuktitut, measures to advance the use of Inuktitut can be expected to have some success (Allen 2007; Tulloch 2004).

The Project will encourage job advancement for Inuit, and eventually there may be work teams that function in Inuktitut. English will, however, be the work language for most Inuit employees and proficiency in English will be required on work place health and safety grounds. The Project will thus contribute to the expansion of the use of English. However, countervailing measures, by government and people, should result in strengthening bilingualism rather than loss of Inuktitut.

9.3.4 Residual Impact Classification

9.3.4.1 Impact to Traditional Harvesting

Section 6.6.9 (Table 6.3-29) in FEIS Volume 6 summarises the residual effects of the Project on the availability of animals for traditional and non-traditional land use. The assessment considered Project-related changes in access. The effects were assessed as positive in direction and low to moderate in magnitude for both the incremental and cumulative assessments. The geographic extents of the effects are regional for the incremental and cumulative assessments. The duration of the effects are considered medium-term (lasting until closure)

Section 6.7.12.2 (Table 6.7-39) in FEIS Volume 6 summarises the residual effects of the Project on the availability of birds for traditional and non-traditional use. The assessment considered Project-related changes in access. The effects are assessed as negative in direction and negligible to low in magnitude for the incremental and cumulative assessments. The geographic extents of the effects are regional for the incremental and cumulative assessments, and the duration is considered long-term.

Section 6.5.12.2 (Table 6.5-16) in FEIS Volume 6 summarises the effects of the Project on the availability of traditional plant use species. The effects are assessed as negative in direction and moderate in magnitude. The geographic extent is considered local and the duration is long-term.

The residual impacts of the Project on marine mammals as a result of a change in health (i.e., mortality) were assessed in FEIS Volume 8, Section 8.3.7.2.2. The assessed effects are considered to be low in magnitude, local in extent, long-term (for the life of the Project), sporadic (restricted to open-water season when vessels are

offloading cargo), and low in frequency. The effects of any injuries or fatalities on the marine mammal population as a whole are expected to be reversible through natural population regeneration (i.e., births).

The residual impacts of the Project on marine fish and fish habitat were assessed in FEIS Volume 8, Section 8.3.7.2.1. With the implementation of proposed mitigation, impacts due to underwater noise disturbances will be low in magnitude, local and reversible. The effect will be medium-term and local in extent, and is not expected to have a significant effect on fish populations in the LSA. Any detrimental changes to fish habitat during operation of the spud barge are expected to be of a continuous low magnitude, local extent, and are highly likely during Project operation. The effect of the spud barge and anchors on fish habitat is expected to be fully reversible within months (most likely one winter) of decommissioning.

The residual impacts of the Project on marine birds were assessed in FEIS Volume 8, Section 8.3.7.2.3. Impacts due to direct mortality are considered to be low in magnitude for both the construction and operations phases. The geographic extent is considered local, and the effect will persist periodically in the medium-term. Changes in marine bird behaviour due to sensory disturbance are expected to be of low magnitude, local in extent and reversible, and will occur periodically over the medium-term. The residual impacts to cultural and traditional values and lifestyles were assessed and summarised in Section 9.6.4, and the residual impacts to traditional ways of life and household function due to Project-related wage employment were assessed and summarised in Section 9.6.6. The residual impacts of the Project's contribution to weakening of traditional culture are assessed as negative in direction and high.in magnitude. The geographic extent is considered local and long-term in duration. The significance is considered moderate. The residual impacts of the Project on the time and resources (e.g., finances or equipment) available for traditional harvesting are assessed as positive in direction and moderate in magnitude. The geographic extent is considered local and the duration, medium-term. The significance is considered moderate. The residual impacts of the Project on people's perceptions of harm (e.g., changes in traditional diet due to fear of contamination) were assessed in Section 9.6.4. The impacts are assessed as negative in direction and moderate in magnitude. The geographic extent is assessed as local and the duration, long-term. The significance is assessed as low.

The wildlife assessment determined effects on the movement of terrestrial wildlife (e.g., caribou) that were beyond-regional (FEIS Volume 6, Section 6.6.9.2). As a result, there may be transboundary effects on traditional harvesting of terrestrial wildlife, such as caribou outside of Nunavut. The marine wildlife assessment determined that potential Project-related transboundary effects to marine wildlife were not significant (FEIS Volume 8, Section 8.3.7.2).

Summary of Residual Effects to Traditional Harvesting as a Result of Changes to Availability of Wildlife

In summary, the residual effects of the Project on traditional wildlife harvesting (terrestrial, marine and fish) will be negligible to moderate in magnitude, and local to regional in scale. The effects will last from medium to long term and will be reversible. The probability of the effects will range from not likely to highly likely.

Sustainability of Traditional Resources and Harvesting

The vegetation assessment determined that the overall effect from the Project on the use of vegetation resources is expected to be within the range of baseline conditions (FEIS Volume 6, Section 6.5.10). The wildlife assessment determined that people who hunt in the region should not observe a change in the availability of wildlife relative to current natural cycles in populations during mine life or following post-closure (FEIS Volume 6, Section 6.6.8). The marine wildlife assessment determined that the productive capacity of fish habitat is not

expected to be altered, disrupted or destroyed, and that the cumulative underwater noise effects are not expected to have population-level effects on marine fish (FEIS Volume 8, Section 8.3.7.2.1). The marine wildlife assessment assessed that the residual effects of the Project on marine birds are not significant (FEIS Volume 8, Section 8.3.7.2.3) and that there will be no Project-related residual impacts on marine mammal populations, including polar bear (FEIS Volume 8, Section 8.3.7.2.2). As a result, the Project is not expected to have an effect on the sustainability of resources for harvesting. Therefore, the sustainability of traditional harvesting is not expected to be affected due to Project-related changes in the availability of traditional resources.

9.3.4.2 Impact on Land Use and Mobility

Effects to Use of Culturally Important Areas

The residual impacts of Project activities on noise and visual effects to culturally important areas, such as cabins and sites in Iqalugaarjuup Nunanga Territorial Park, were assessed in Section 9.9.4.2. The effect of Project-related noise and changes to the visual environment on recreation, parks and protected areas in the RSA is considered to be negative, as increased noise and changes to the visual environment detract from the wilderness experience of tourists and traditional land users. The magnitude of the effect is considered negligible to moderate, depending on the location of land users. While noise effects are limited to the LSA, the visual effect extends beyond the LSA, and is considered to be regional. The effect is considered long-term as it will persist throughout Project construction and operations, and visual effects will extend beyond the life of the Project due to the presence of waste rock piles. The effects to the use of culturally important areas are considered to be low in significance.

The effects of the Project on heritage resources were assessed in Section 9.11. The assessment determined that no primary linkages are assessed for potential Project effects to the archaeological record, and a residual effects assessment and classification is not required (Section 9.11.6.1.4).

Project-Related Impacts on Access to Areas for Hunting, Fishing, Marine Harvesting, Travelling, Recreational, and Religious Activities

Current access throughout the RSA is via trails used by ATVs in the summer and snowmobiles in the winter. Similarly, within the LSA, there is a series of trails used by ATVs to access cabins and Meliadine Lake. The proposed AWAR would improve access into the LSA, Meliadine Lake, and cabin locations in the portion of the RSA closest to the LSA, and will allow harvesters to transports boats to Meliadine Lake. Water access to cabins north of the LSA should not be affected by the Project footprint, while some additional travel might be required for land access to cabins north of the LSA. Overall, the residual impacts of the Project on access is considered positive in direction and moderate in magnitude. The geographic extent is considered regional, as the improved access within the LSA is expected to enhance access to areas outside the LSA. The duration is considered long-term and will be reversible upon decommissioning. The effect is considered continuous. The likelihood of the effect is considered highly likely. The significance of the effect is considered moderate.

9.3.4.3 Impact on Food Security

The residual impacts of the Project on availability of country foods were assessed in Section 9.3.4.1, above, and summarised in the following Table 9.3-20.

The HHRA (FEIS Volume 10, Section 10.2.6.3.3) determined that no COPCs were identified in soil, with the result that concentrations of chemicals were not anticipated to change in country foods (i.e., plants and animals consumed by humans). Therefore, country foods were not assessed further with respect to potential health effects and not residual health impacts due to changes to country food quality were identified. Section 10.2.6.3.6 of the HHRA (FEIS Volume 10) determined that since no COPCs were identified in surface water, concentrations of chemicals were not expected to change in fish tissue. As a result, no residual health impacts due to changes to fish tissue quality were identified.

The residual impacts of the Project on people's perceptions of harm (e.g., changes in traditional diet due to fear of contamination) were assessed in Section 9.6.4. The impacts are assessed as negative in direction and moderate in magnitude. The geographic extent is assessed as local and the duration, long-term. The significance is assessed as low.

9.3.4.4 Residual Impacts Summary

Table 9.3-18 summarises the residual impacts of the Project on Traditional and Commercial harvesting, and Table 9.3-19 summarises the residual effects of the Project on Land Use and Mobility. Residual impacts on food security is presented in Table 9.3-20.

Table 9.3-18: Residual Impact Classification Summary for Traditional and Commercial Harvesting

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance
Traditional Harvesting	Changes in availability of wildlife (terrestrial, marine and fish)	Positive and Negative	Negligible to Moderate	Local to Regional	Medium term to Long term	Periodic to Continuous	Reversible	Not likely to very likely	No significant
Traditional Harvesting	Residual ground disturbance can cause permanent loss and alteration of vegetation, including listed and traditional plant species	Negative	Moderate (incremental); negligible to low (cumulative)	Local (incremental); Regional (cumulative)	Unknown/permanent	Continuous	Irreversible/ reversible	Highly likely	Not significant
Traditional Harvesting	Project employment may increase time and resources available for harvesting nutritious country foods	Positive	Moderate	Local	Medium-term	Not applicable	Not applicable	Not Applicable	Moderate
Traditional Harvesting	Project may contribute to weakening of traditional culture	Negative	High	Local	Long-term	Not applicable	Not applicable	Not applicable	Moderate
Traditional Harvesting	Perceptions of Project effects may lead to mental stress and changes in behaviour (i.e., diet)	Negative	Moderate	Local	Long-term	Not applicable	Not applicable	Not applicable	Low

Note: As a result of the varying methodologies between technical and social assessments, not all assessment categories are applicable to the assessment components in the summary table.

Table 9.3-19: Residual Impact Classification Summary for Land Use and Mobility

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance
Land Use and Mobility	Project impacts on use of culturally important areas.	Negative	Negligible to moderate	Regional	Long-term	Continuous	Reversible/ Irreversible	Highly Likely	Low
Land Use and Mobility	Project impacts on access to land use areas	Positive	Moderate	Regional	Long-term	Continuous	Reversible/ Irreversible	Highly Likely	Moderate

Note: As a result of the varying methodologies between technical and social assessments, not all assessment categories are applicable to the assessment components in the summary table.

Table 9.3-20: Residual Impact Classification Summary for Food Security

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance
Food Security	Perceptions of Project effects may lead to mental stress and changes in behaviour (i.e., diet)	Negative	Moderate	Local	Long-term	Not applicable	Not applicable	Not applicable	Low

Note: As a result of the varying methodologies between technical and social assessments, not all assessment categories are applicable to the assessment components in the summary table.

9.3.5 Cumulative Effects

9.3.5.1 Traditional Harvesting

Availability of Wildlife and Birds

Cumulative effects from changes in the availability of wildlife for human use were assessed and summarised in FEIS Volume 6, Section 6.6.9.2. The assessment determined that the cumulative effects are predicted to be positive and low to moderate in magnitude and regional in geographic extent. The AWAR will be scarified during closure, so effects are expected to be medium-term and reversible. Effects are expected to occur periodically during traditional and non-traditional hunting seasons (FEIS Volume 6, Table 6.6-1; Table 9.3-18).

The cumulative effects from changes in the availability of birds for humans were assessed in FEIS Volume 6, Section 6.7.11. The assessment determined that the availability of birds for human use is predicted to be negative in direction and low in magnitude. The effect is regional in geographic extent long-term in duration, and continuous in frequency (FEIS Volume 6, Table 6.7-39; Table 9.3-18).

Availability of Marine Species

The cumulative effects to the availability of marine species were assessed in FEIS Volume 8, Section 8.3.7. Project-related marine transportation activities and barge operations will not result in a significant contribution to cumulative effects on the marine mammals, marine birds, or marine fish. As there is limited development in the RSA in the future scenario, the overall cumulative direct and indirect effects to marine species are predicted to be negligible.

Availability of Vegetation

The cumulative effects on vegetation land cover classes were assessed and summarised in FEIS Volume 6, Section 6.5.15.2. The assessment determined that the cumulative incremental change of each regional land cover class in the RSA relative to reference conditions is predicted to be between 0.05% and 6.76% (FEIS Volume 6, Table 6.5-17). As there is limited development in the RSA in the future scenario, the overall cumulative direct and indirect effects to vegetation, including effects to listed species and traditional plant species, are predicted to be negligible to low.

9.3.5.2 Land Use and Mobility

Use of Culturally Important Areas

Noise effects will be limited to the LSA, and no other projects are identified within the LSA. As a result, the cumulative noise effects on traditional activities within the LSA will be limited to those predicted for this Project (FEIS Volume 5, Section 5.4.4).

Visual effects will extend beyond the life of Project, as the waste rock piles will remain after decommissioning. As a result, it is possible that visual effects from the Project may combine with visual effects from other developments within the RSA. Because there is limited development in the RSA in the future scenario, the cumulative visual effects are predicted to be low.

As there were no residual impacts to heritage resources, a cumulative effects assessment for heritage resources has not been completed.

Impacts on Access to Traditional Use Areas

There are no other developments within the LSA and limited development in the RSA. As a result, the cumulative effects of the AWAR in combination with other potential access roads are predicted to be negligible to low.

9.3.5.3 Effects to Food Security

The HHRA (FEIS Volume 10, Section 10.2.6.3.3) determined that no COPCs were identified in soil, with the result that concentrations of chemicals were not anticipated to change in country foods (i.e., plants and animals consumed by humans). Therefore, country foods were not assessed further with respect to potential health effects and no residual health impacts due to changes to country food quality were identified. Section 10.2.6.3.6 (FEIS Volume 10) of the HHRA determined that since no COPCs were identified in surface water, concentrations of chemicals were not expected to change in fish tissue. As a result, no residual health impacts due to changes to fish tissue quality were identified.

The cumulative effects on Individual, Family and Community Wellbeing were discussed in Section 9.6.8. As with other socio-economic effects, the expected rapid expansion of the mining sector may accelerate the various predicted effects to individual, family and community wellbeing, as the same processes apply. These effects have the potential to affect traditional harvesting and other traditional activities, and include, for example, how social relationships are changing in families and communities, values around sharing and reciprocity, and how financial resources are becoming necessary to participate in hunting and harvesting activities. These potential effects are discussed in more detail in Section 9.6.2.3 Cultural Integrity and Section 9.6.2.7 Nutrition and Traditional Activity.

9.3.6 Monitoring and Follow-Up

Monitoring and follow-up plans for traditional activities relate to monitoring activities developed for the underlying resources. Monitoring and follow-up plans for the various components related to traditional activities can be found as follows:

- Terrestrial wildlife (FEIS Volume 6, Section 6.6.12);
- Birds (FEIS Volume 6, Section 6.7.15);
- Marine wildlife (FEIS Volume 8, Section 8.3.11);
- Fish (FEIS Volume 7, Section 7.5.9); and
- Vegetation (FEIS Volume 6, Section 6.5.16).

Monitoring and follow-up plans relating to traditional lifestyles, culture, and human health are found in the following sections:

- Individual and community wellness (Section 9.6.9); and
- Human health (FEIS Volume 10, Section 10.2.9).

9.4 Economic Development and Opportunities

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on economic development and opportunities, including employment and contracting and business opportunities.

Volume 1, Appendix 1.0-A lists the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for economic development and opportunities, including employment and business and contracting opportunities.

9.4.1 Baseline Environment

This baseline environment discussion provides information on the existing socio-economic environment in Nunavut and the Kivalliq Region.

The purpose of this baseline discussion is to describe the socio-economic environment that may be affected by the Project to provide sufficient information to support the Effects Analysis section of this EIS (Section 9.4.3). The objectives are to:

- present and discuss the economic conditions in Nunavut and in communities affected by the Project to understand the potential for impacts and benefits, and to develop appropriate mitigation and benefit enhancement measures in response; and
- construct a baseline of economic data that can be used to monitor change in Project affected communities such that the effectiveness of mitigation and benefit enhancement measures can be evaluated, and where unforeseen impacts occur, these can be iteratively addressed as the Project proceeds.

The baseline section integrates i) quantitative and qualitative data collected during socio-economic and IQ investigations, including data from field studies between 2009 and 2011; ii) results of consultations on the Project undertaken by AEM up to the end of 2011; and iii) information from secondary sources, such as census data, GN reports, academic studies, and reporting by other large mining projects in northern Canada. Secondary sources are cited throughout this section and a full list of references is provided in Section 9.12.

The baseline is divided into 2 sections, a regional section and a local section. This breakdown will facilitate the understanding of economic effects of the project, explained later in the report, which tend to be either local or regional in nature.

The RSA consists of the entire territory of Nunavut. The LSA consists of the Kivalliq region. Special focus is put on the communities of Arviat, Baker Lake, Chesterfield Inlet, Rankin Inlet, and Whale Cove. This is due to the expectations that the Project will mainly draw labour from these communities.

9.4.1.1 Nunavut (Regional Study Area)

Nunavut has a mixed economy, a combination of both land and wage based components. Although the land based economy is not well captured statistically, its importance is reflected in people's preferences and concerns, in government deliberations, and in academic and other literature.[17] The land based economy continues to provide important economic, social, and cultural benefits to Inuit. In addition, the land based economy and associated values provide the foundation upon which economic development priorities, policies, strategies, plans and programs of government and its people are based, including moving forward with the wage based component of the economy.

The land based and wage based components of the economy in Nunavut are not always clearly separated. As an example, hunting, trapping, and fishing serve to supplement household food security and nutrition (subsistence) but are also commercialized as a source of cash income. Outfitting, although a cash and/or wage generating activity, is based on traditional knowledge and practices that have their origins in the land based component of the economy. Even government service positions, although formally wage based, are more effectively delivered with due consideration and application of values derived from land based activity.

Most individuals are, or strive to be, active in both the land and wage based components of the economy. There is a continuum along which harvesting, arts and crafts, guiding and wage based employment lie, and along which individuals operate as they engage in a range of economic activities. It is in this sense that the economy is mixed, and is distinguished insofar as the goals of economic activity are nuanced. "An important feature of the mixed economy is that the production of money is not seen as the sole or final goal of economic activity. Rather the goal flows from the earlier subsistence structure, which is the maintenance of wildlife harvesting and its related social interactions in order to provide security and psychological returns" (Dowsley 2010). Traditional livelihood activities are a source of self-reliance for communities in Nunavut. It is expected that reliance on government social services will decrease with growing opportunities for employment and training. Resource development projects will likely be a driver for increased employment and training opportunities of Nunavummiut living in Kivalliq.

Economic Development Policy

The guiding document for all governing institutions in Nunavut is Tampata 2009-2013, Building Our Future Together (GN 2009). The document describes the vision for Nunavut to the year 2030, reaffirms guiding principles, identifies priorities and sets out an action plan for implementation. The vision, set within the context that basic needs (broadly defined, to include social and cultural needs) must be met, is that:

- Nunavummiut will continue to have a highly valued quality of life and a much better standard of living for those most in need;
- individuals and families will all be active, healthy and happy;
- communities will be self-reliant, based on Inuit societal values, with reduced dependence on government; and
- Nunavut will be recognized for its unique culture, its ability to help one another and for its useful contributions to Canadian and global issues.

[17] Specific references to government policy and programming and literature on Nunavut and the northern Canada more generally are contained throughout this document.

The guiding principles for achieving this vision continue to include those set out in an earlier guiding document, Pinasuaqtavut 2004-2009 (GN 2004). The principles are derived from the following Inuit societal values that have been passed on over generations:

- inuuqatigiitsiarniq: respecting others, relationships and caring for people;
- tunnganarniq: fostering good spirit by being open, welcoming and inclusive;
- pijitsirniq: serving and providing for family and/or community;
- aajiiqatigiinniq: decision making through discussion and consensus;
- pilimmaksarniq/pijariuqsarniq: development of skills through observation, mentoring, practice and effort;
- piliriqatigiinniq/ikajuqtigiinniq: working together for a common cause;
- qanuqtuurniq: being innovative and resourceful; and
- avatittinnik kamatsiarniq: respect and care for the land, animals and the environment.

To achieve the vision, GN priorities are to:

- improve education and training outcomes;
- reduce poverty;
- connect the community;
- increase housing options;
- increase support for culture and the arts;
- help those at risk in the communities;
- support community-based, sustainable economies;
- address social concerns at their roots;
- improve health through prevention;
- enhance the recognition of Nunavut in Canada and the world; and
- strengthen the public service.

The GN's economic (and social) development strategies are based on the vision, principles, and priorities identified first in Pinasuaqtavut and subsequently in Tampata. The strategies seek to identify the means by which the vision can be achieved, focusing on the economic sectors that represent potential for both growth and increased employment while being consistent with both environmental conservation and Inuit values. The strategies also explore means to realize this potential, through 'foundation' interventions to prepare Nunavut and Nunavummiut to access economic opportunities. These strategies include the following:

- The Nunavut Economic Development Strategy[18] (SEDS 2003) identifies mining, tourism and commercial fishing as sectors of most potential for economic development, with arts and crafts, harvesting and small business to be emphasized. The strategy also notes that the development of infrastructure (transportation, energy and telecommunications) is a prerequisite (foundation intervention) for realizing the potential for growth in these 3 priority sectors. Subsequent work on the strategy emphasized the need to strengthen education and training, community capacity and business development as additional prerequisites (NEF 2009).
    - Qanijijuq (NEF 2004a) identifies the same sector priorities for funding made available by the federal government for economic development through the Strategic Investments in Northern Economic Development program. In addition, Qanijijuq identifies 3 foundation areas for investment – capacity building, trade and communications (connectivity). Qanijijuq II (NEF 2008a) reconfirmed the priorities for the renewal of the Strategic Investments in Northern Economic Development program in 2009.
    - The Department of Economic Development and Transportation has produced sector strategies for mining, tourism, arts and crafts and transportation (GNDoEDT 2006a,b and 2010a, b). These strategies also strongly emphasize the need to enhance the capacity of communities and people to participate.

The Government of Nunavut has initiated a business planning process to support the achievement of Tampata's vision for Nunavut and Nunavummiut, including the implementation of the Nunavut Economic Development Strategy, as well as the sector strategies (GN n.d). The 2 imperatives to i) protect the environment, and ii) increase employment, are explicitly recognized as fundamental to all GN activity.

It is noted that enhancing the capacity of Nunavummiut to participate in new economic opportunities is common to all the above referenced documents. The Conference Board of Canada (CBoC, 2001) noted a decade ago that '[e]conomic growth is required for a society to achieve its development objectives and meet increased demand for goods and services arising from a growing population and rising levels of individual consumption; [t]raditional land based economies cannot, on their own, keep pace with the increasing demands for goods and services produced in the industrial economy.'

In July of 2012, the Nunavut Economic Forum announced that it will be reviewing and renewing the Nunavut Economic Development Strategy within 2 years. The process will include a series of roundtable discussions with key sector groups in each region, stakeholder consultation and extensive research of best practices. An updated plan is scheduled to be released in 2014 (NEF 2012).

Performance of the Formal Economy

As noted above, the economy of Nunavut is mixed, including both wage and land based components. Economic statistics capture what might be called the 'formal' economy – goods and services that are exchanged for money. These statistics therefore include not only wage based, but also land based economic activity where such activity results in a financial transaction.

[18] The strategy is the product of a process led by the Nunavut Economic Forum to bring together community, government and private business organizations to conduct economic research and analysis and jointly plan for Nunavut's economic development.

Table 9.4-1 provides Statistics Canada's data on Nunavut's formal economic performance between 2002 and 2010[19]. In constant dollars, there is evidence of economic growth as measured by changes in gross domestic product (GDP).[20] The GN's more recent reporting on year to year changes in GDP (GNDoF 2011) indicate that growth in 2008 was 10.6%, that GDP shrank in 2009 by 6.2%, and that expectations of growth in 2010 are 11.8%. These swings, larger than those indicated by the Statistics Canada data, are almost entirely due to the end of the bulk of construction at Meadowbank in early 2009, and the Project's ramping up of gold production in 2010.

Table 9.4-1: Gross Domestic Product, Nunavut 2002 to 2010 (2002 dollars, millions)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Change 2002 to 2010 (%)
Gross Domestic Product	951	950	989	996	1,021	1,066	1,206	1,107	1,233	29.7%
Personal expenditures	418	443	460	477	498	520	551	565	587	40.4%
Government expenditures	817	824	819	888	881	884	946	956	964	18.0%
Business expenditures	173	236	297	349	324	581	965	427	430	148.6%
Net exports	-534	-720	-732	-807	-789	-1,082	-1,409	-995	-878	64.4%
Final domestic demand	1,512	1,648	1,695	1,801	1,801	2,124	2,581	2,096	2,135	41.2%
Economic Growth (%)	5.9	-0.1	4.1	0.7	2.5	4.4	13.1	-8.2	11.4	n/a

Source: Statistics Canada (2010a)
Notes: Statistical discrepancy accounts for final demand less net exports not always being equal to GDP.
n/a = Not Applicable

Table 9.4-2 presents data in constant 2002 dollars to allow for comparison between years. In current dollars, the GDP of Nunavut was estimated at $1420 million in 2009 and forecasted at $1633 million in 2010 (CBoC 2010). Although prices are much higher in Nunavut, inflation, as measured by the consumer price index, has been somewhat slower than in Canada overall over the last decade.

Table 9.4-2: Consumer Price Index

	Iqaluit	Canada
2010	111.8	116.5
2009	113.5	114.4
2008	109.0	114.1
2007	107.7	111.5
2006	104.5	109.1
2005	102.1	107.0
2004	100.8	104.7
2003	99.9	102.8
2002	100.0	100.0

Source: GNBS (2011b)

[19] Data presented are the most recent available. The 2011 information will be released in November of 2012.

[20] GDP is measured largely through the dollar value of goods and services exchanged (reported as expenditure and as income) in an economy. Goods and services without a reported dollar value, including subsistence, housework and volunteering for example, do not get counted.

Table 9.4-2 also gives some idea of recent economic trends. The rate of increase of government expenditures has been relatively slow, with the result that government accounted for just over 50% of domestic demand in 2009, as compared to over 60% in 2002 (this compares to less than 25% that is typical of Canada's government expenditures). Business expenditures have increased by almost 200%, raising business' share of demand from less than 10% in 2002 to just over 20% in 2009. Business expenditures were particularly high during Meadowbank construction in 2007 and 2008, but fell in 2009. Personal expenditure growth has been steady, and has quite consistently made up about 25% of final demand over time.

While such trends are positive, there are cautions. Many of the recent changes evident in Table 9.4-2 are attributable to Meadowbank (GNDoF 2011), a very large project in the context of Nunavut. With the completion of its construction in 2009, the dependence of the economy on government increased again in 2010, although not to levels seen prior to 2005. Furthermore, there is very high dependence on imports to meet domestic demand. Imports accounted for almost half of goods and services in the economy in 2009. Again, with the end of Meadowbank construction, this moderated somewhat when compared to 2007 and 2008 data, however, throughout Nunavut's history the Territory has consumed more than it has produced. The Conference Board of Canada (CBoC 2001) indicated that over time, continuing high dependence on both government spending and imports could have negative effects on household incomes in face of rapid population growth.

Table 9.4-3 presents the Conference Board of Canada's projections for GDP growth to 2020. The projections assume the construction of the Project, with production starting in 2016. GDP growth is forecast to outpace the expected population growth rate, which is estimated to average 1.5% annually to 2014 and fall to 1.2% by 2020. This implies improving incomes for Nunavummiut.[21] Employment is reported by primary, secondary and tertiary sector within the NSA (Table 9.4-3).

The forecast indicates that growth in the primary (excluding mining) and tertiary sectors will be fairly steady, at about 2 to 3% a year. Steady growth in the service sector, at a rate substantially above population growth, is a stabilizing influence because the service sector (which includes government services) represents about 3 quarters of GDP. The variations in GDP growth (6.6% in 2016 as compared to -1.7% in 2020) are thus largely attributable to the mining sector and the construction component of the secondary sector. The stimuli represented by the expected beginning and then end of construction of the Project, the start of production at the Project, and the closing of Meadowbank (barring any additional finds) are largely responsible for the big percentage change numbers in the table.

In this regard, it is worth noting that other mining projects, including some with capital costs of over $1 billion dollars, are currently in, or have indicated they intend to enter, the environmental approval process and may be expected to begin construction before 2020. In 2012 alone, expenditures on exploration and deposit appraisal in Nunavut are expected to reach $568 million. In 2011, there were 98 active properties in the region (AANDC 2012). The large interest in the mining industry in Nunavut can have a large impact on the economic development and growth. This makes all forecasting exercises rather uncertain.

[21] Some assumptions have changed since projections were made. Therefore, projection outputs should be interpreted with caution.

Table 9.4-3: Forecast for GDP and Sector Growth 2011 to 2020, (2002 dollars, millions)

	2011*	2012	2013	2014	2015	2016	2017	2018	2019	2020	Change 2011 to 2020 (%)
GDP	1280	1318	1362	1483	1559	1612	1634	1636	1669	1712	37.3
	7.7	2.9	3.4	8.8	5.1	3.4	1.4	0.1	2.0	2.5	
Primary (excluding mining)	0.60	0.62	0.63	0.64	0.65	0.65	0.66	0.67	0.68	0.69	13.6
	0.0	2.8	2.4	1.3	0.9	1.1	1.4	1.3	1.2	1.2	
Mining	181	215	216	222	248	271	327	305	313	321	76.6
	1.1	19.1	0.3	2.7	11.9	9.1	20.7	6.6	2.6	2.5	
Secondary (goods producing industries)	435	455	470	555	597	622	618	593	596	605	49.5
	14.3	4.8	3.3	18.0	7.6	4.1	-0.6	-4.1	0.6	1.5	
Tertiary (service producing industries)	884	899	928	964	997	1026	1052	1079	1109	1143	29.5
	2.4	1.6	3.3	3.9	3.5	2.9	2.5	3.6	2.8	3.0	

Source: CBoC (2013)

Note: The un-shaded rows present the dollar amounts and the shaded rows present percent changes from year to year.

* 2011 data are actual rather than forecasted data.

Informal Economy

The informal economy includes not only subsistence activity (such as food harvesting, harvesting for clothing, arts and crafts materials), but also goods and services that are exchanged without financial transaction. Volunteering, lending of harvesting equipment, bartered services and most child care, as examples, are not captured in official statistics.

Further, the economic value of the food component subsistence activity is not well understood – there are only intermittent and partial attempts to establish the market value of harvested food. For example, InterGroup (2008) calculated a net harvest value for Nunavut for the Beverly and Qamanirjuaq caribou herds of about $12 million, and a subsistence food value of about $9 million, but these are only 2 of Nunavut's herds. Estimates of the Nunavut Economic Forum (2008b) are that food harvesting has a value of about $30 million annually in Nunavut. However, the EIS for the Mary River Project puts an estimated value for harvested food for 5 communities on the north part of Baffin Island at $20 million annually, communities with only about 18% of the territorial population (Baffinland Iron Mines Corporation 2011).

Since land based activity in the formal economy is not disaggregated from wage based activity, and because there are no reliable estimates of the size of the subsistence portion of the informal economy – much (but not all) of which may be considered to be land based – the true economic value of land based activity is not known. In 2001 the Conference Board of Canada suggested a figure, based on a 'consensus of key informants', of $40 to $60 million as the value of some of the land based component of the economy (excluding for example volunteering and equipment sharing). However, the definition of land based activity was that it did not include a financial transaction. That is, the only land based activity considered was informal and therefore excluded such formal activity as pelt sales, tourism, sales of arts and crafts, the commercial fishery, environmental monitoring, and communications. Although none of these sectors is large, in aggregate the economic contribution is likely significant – tourism was estimated to contribute about $26 million to the economy in 2007 (GNDoF 2008), arts and crafts about $33 million annually (GNDoEDT 2010b), and the commercial fishery over $30 million[22]. It can be concluded therefore that in addition to social and cultural value, the land based economy plays a much more significant economic role than available data suggest.

Without reliable data, past and future trends are challenging to forecast. There are no data that provide conclusive evidence that land based economic activity has seen significant change in the recent past. However there is some anecdotal evidence to suggest that although harvesting, a major component of the land based economy, remains an important economic activity for a majority of Nunavut households, some decrease may be underway.

The NWMB harvest study has data on harvesting rates for about 80 species of land and sea mammals, birds and fish over the 5 year period 1996/97 to 2000/01 (NWMB 2004). Figure 9.4-1 shows results for Nunavut as a whole – the data are for those species most actively harvested (as measured by the number of harvesters) and exclude commercial harvests, defined as harvests sold outside of Nunavut. The data are expressed as the harvest level in each year as a percentage of the 5 year mean[23]. Harvest rates are variable from year to year and show no clear trends over time, with the 2 notable exceptions of caribou and ringed seal.

[22] This is not an official estimate, but is based on recent increases in quota, reported catches and approximate value.

[23] Comparing absolute harvest levels does not produce a comparable visual impression. For example, about 200,000 arctic char were harvested annually over the period, as compared to about 600 beluga.

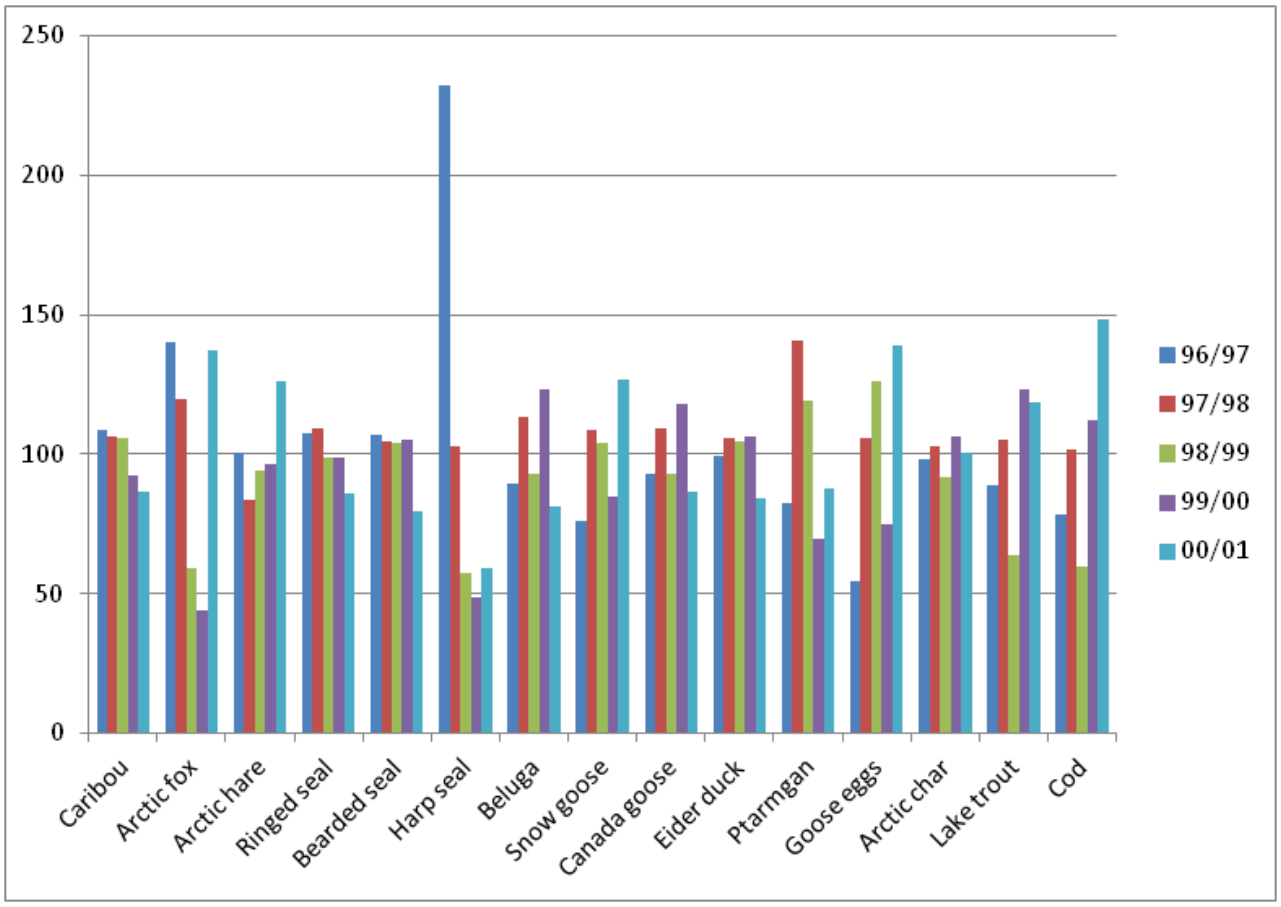


Figure 9.4-1: Harvesting Levels, 1996/97 to 2000/01

Source: NWMB (2004)

The NWMB cautions against over interpretation of the data and presents harvest results in terms of number of animals, which can be difficult to interpret because animals vary enormously in size. Nevertheless, the 2 species that do show some evidence of declining harvests, caribou and ringed seal, are hunted by more hunters, and are hunted in larger numbers than any other land or sea mammal of comparable size[24]. Thus, if the observed declines are real, and have continued since 2001, the suggestion is that an important harvesting component of the land based economy may be decreasing.

Other anecdotal evidence suggesting that the harvesting component may be declining includes the following:

- As reported in the Aboriginal Peoples Survey for each of the census years from 2001 and 2006, 70% of Nunavummiut participated in harvesting in 2001, and 67% (which included 59% of women) did so in 2006. Country food made up about half or more than half of the meat and fish eaten in 73% of households in 2001, and in less than 66% of households in 2006. In 2001, 96% of Nunavummiut indicated that they lived in households that shared harvested food with others but this had fallen to 80%

[24] NWMB reported about 3,000 hunters harvesting a total of about 24,500 caribou, and about 2,700 hunters harvesting about 25,000 ringed seal over the 5 year study period. By contrast, no other land or sea mammal was hunted by more than 1,000 hunters, and the third largest harvest in terms of number of animals was about 4,000 arctic fox.

by 2006 (2001 data are reported in Impact Economics 2008; 2006 data are from Statistics Canada 2008a).

- A study by the CINE (Kuhnlein et al. 2000) on Inuit diet across the Canadian Arctic included an investigation of perceptions of changes to consumption levels of traditional food. The results for Nunavut are provided in Table 9.4-4. In total, about as many people felt they were consuming less traditional food than 5 years earlier as felt they were consuming more, and about half felt consumption levels were the same. This would indicate little change on average; however, it is only in the 20 to 40 age groups that a decrease in consumption was not reported. In addition, although the data are not publicly reported, subsequent work on the CINE data suggested that consumption of traditional food had fallen off in younger generations (Kuhnlein et al. 2004).

Table 9.4-4: Perceptions of Consumption of Traditional Food in 1999 Relative to Five Years Previously (%)

Age	More	Less	Same
15 to 19	30.7	33.2	35.8
20 to 40	28.2	24.9	46.9
41 to 60	20.5	22.9	56.4
61+	16.0	35.5	48.3
Total	**25.1**	**26.2**	**50.1**

Source: Kuhnlein et al. (2000)

Future trends are yet more uncertain. The 2 main threats to harvesting described by Impact Economics (2008) are the effects of environmental change on the supply of wildlife and increasing costs associated with harvesting. The CINE work reported people's perceptions of constraints to higher levels of harvesting as costs, work, child care and weather in that order. Recent polar bear and seal initiatives in Europe and the United States have undermined the potential for some tourism and pelt harvesting. In addition, as evidenced from results of consultations conducted by mining project proponents (Cumberland Resources[25] 2005; Baffinland 2011), there is some concern among older Inuit about a generational shift, with younger people less interested and/or less able to participate in land based economic activity.

Employment

Job creation has been strong in the recent past. This is related primarily to the mining and construction sectors. Nunavut's employment picture, however, remains challenging (Table 9.4-5). Over the years 2009 to mid-2011, the number of employed people increased by almost 10% representing about 1000 new jobs. While this job growth is faster than population growth (currently about 2% per year), it remains slower than the growth in the labour force (approximately 17%).

[25] Cumberland Resources Ltd were the original developers of the Meadowbank Project, prior to being acquired by Agnico-Eagle Limited in 2007.

Table 9.4-5: Recent Employment Statistics[26]

	2009	2010	July 2011	Change (%)
Labour force	12 400	13 700	14 500	16.9
Participation rate	61.2	65.5	68.9	na
Number employed	10 800	11 700	11 800	9.2
Employment rate	53.5	55.7	56.1	na
Number unemployed	1 600	2 100	2 700	68.7
Unemployment rate	12.6	15.0	18.6	n/a

Source: GNBS (2011a)

Notes: Figures for 2009 and 2010 are annual averages, whereas the figure for July 2011 is a 3 month moving average; that is it incorporates data from May to July 2011.

n/a = not applicable.

The labour force increases in size as a function of people becoming old enough, or more encouraged by economic opportunity, to seek employment. The young median age of the population and the increase in the participation rate suggest that both are factors contributing to rapid growth in labour force size. Despite many new entrants into the labour force finding jobs, many do not find jobs, resulting in a spike in unemployment. The table above shows that despite strong job creation, the number of unemployed increased by almost 70% between 2009 and mid-2011.

Unemployment is particularly acute in the 15 to 24 year old age cohort, with an unemployment rate approaching 40% as compared to the population wide unemployment rate of less than 19%. The unemployed are almost all Inuit – data for the non-Inuit population are suppressed on confidentiality grounds because the unemployed are so few. Males are slightly more likely to be unemployed than women, however because males are more likely to be in the labour force, there are 3 unemployed males for every 2 unemployed females (Table 9.4-6).

Table 9.4-6: Nunavut Employment by Identity, Gender and Age, July 2011

	Size of the Labour Force	Number Employed	Participation Rate	Unemployment Rate
Inuit	10 100	7 500	61.9	25.8
Non-Inuit	4 400	4 300	93.7	n/a
Male	8 000	6 400	74.3	19.8
Female	6 500	5 400	63.3	17.1
15 to 24 years	3 100	1 800	52.2	39.7
25 years and above	11 500	10 000	75.4	13.0
Total	**14 500**	**11 800**	**68.9**	**18.6**

Source: GNBS (2011a)

Note: n/a =not applicable.

The above discussion on employment does not reflect informal land based economic activity. NWMB (2004) counted an average of over 5300 hunters registered with HTOs over the 1996 to 2001 period of their harvesting study, equivalent to about one third of the 15 years and over population, and about half of the labour force in

[26] As a point of comparison, 2006 census data noted a labour force of 12,600, a participation rate of 65.3%, unemployed numbering 2000 and an unemployment rate of 15.6%. These data are comparable to those in the table for 2009 and 2010, however methods used by Statistics Canada and the Nunavut Bureau of Statistics for estimating employment parameters are different.

2001. Statistics Canada data from the 2006 census indicated that about 10 300 people, or 2 thirds of the 15 years and over population, had harvested animals, fish or plants in the previous year.[27] It is cautioned that these figures do not represent the equivalent of full time jobs in the land based economy – for example only 7% (430) of harvesters in the NWMB study were considered to be intensive harvesters; those who participated in more than a limited number of major harvesting activities during the annual cycle.

Table 9.4-7 provides the Conference Board of Canada's (2010) forecasts for employment until the year 2020. Job creation is expected to be much lower than that seen in 2009/2010, at 200 to 300 new jobs per year. Both population and labour force growth rates are expected to slow by 2020. The result is marginal improvements in unemployment rates over the next decade. It is noted however that by mid-2011, the Government of Nunavut Bureau of Statistics data indicate that Nunavut's population and labour force had already grown faster than forecast and that unemployment was higher. Table 9.4-7 also shows that wages are expected to rise, and rise faster than the expected consumer price increases of less than 2% annually.

As for other economic parameters, it is noted that development of one or 2 large projects currently in the environmental approval process could change the employment outlook substantially, as has been demonstrated by the economy in the NT.[28]

Table 9.4-7: Employment Forecast

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Average weekly wage ($, industrial composite)	1,007	1,039	1,074	1,118	1,156	1,194	1,236	1,276	1,317	1,355
	3.0	3.1	3.4	4.1	3.4	3.3	3.5	3.2	3.3	2.9
Population	33,200	33,700	34,200	34,700	35,200	35,700	36,200	36,600	37,100	37,500
	1.5	1.6	1.6	1.5	1.4	1.4	1.3	1.3	1.2	1.2
Labour force	12,000	12,300	12,500	12,700	12,900	13,200	13,400	13,600	13,700	13,800
	2.4	2.1	1.7	1.5	1.4	2.2	1.6	1.4	1.3	0.3
Employment	10,500	10,800	11,000	11,300	11,500	11,700	11,900	12,100	12,300	12,300
	2.1	2.8	1.9	2.5	1.5	2.2	1.8	1.5	1.5	0.1
Unemployment rate (%)	12.6	12.0	11.9	11.1	11.0	11.0	10.8	10.7	10.6	10.8

Source: CBoC (2010)

Note: Shaded rows present percent changes

Mining

Economic policies and strategies of Nunavut accord the mining sector a primary role in development. Mining is expected to be the source of most capital investment, formal sector employment growth, direct and induced economic growth, and government revenue in the near to mid-term future. Mining constitutes the single highest growth potential sector for the Territory. In fact, the GN has now formalized a Mineral Exploration and Mining

[27] As noted earlier, the 2006 census data indicate that harvesting levels had gone down slightly since 2001. The difference between the NWMB count of harvesters (5300) and the Statistics Canada count (10 300) is a function of the definitions used to count harvesters rather than of an absolute increase in numbers.

[28] The rapid GDP growth in NT, expected to approach 10% in 2011, will be largely due to recovery in diamonds (including planned expansions at Snap Lake and Diavik). By 2009, NT had a per capita GDP of more than twice the national average. Unemployment is expected to fall to the 4% to 5% range, and average wages to increase by up to 40% over the coming decade (CBoC 2010).

Strategy, where the goal is to capture the opportunities of mineral extraction, in a sustainable manner, to enhance the future self-reliance of Nunavut and Nunavummiut (GNDoEDT 2006b)

Nunavut is known to be rich in mineral resources, although exploiting these resources is somewhat challenging. Remoteness, the extreme climate, incomplete geological data, limitations on the availability of a range of infrastructure (including roads), and difficult geotechnical conditions (permafrost) all contribute to high costs and thus to uneven development of these resources.

Nevertheless, 3 mines operated through the 1980s and 1990s, generating some territorial mineral output.[29] As of mid-2011, Nunavut had only one operating mine (Meadowbank). It is noted that under conditions similar to those in Nunavut, large mining projects are successfully operating in the NT and in Nunavik in northern Quebec. These include mines of major players such as BHP (Ekati, diamonds), DeBeers (Snap Lake, diamonds), Rio Tinto/Aber (Diavik, diamonds) and Xstrata (Raglan, nickel).

In addition, and despite the challenging environment, exploration interest in Nunavut's mineral resources continues to be very high, as evidenced by exploration and project development expenditures since 2006 (see Table 9.4-8). In 2012, expenditures on exploration and deposit appraisal in Nunavut will reach over $500 million (AANDC 2012). Recently, Nunavut has consistently seen 10% or more of all Canadian exploration and project development expenditures; about twice the levels seen in the NT.

As an indication of where and how the expenditures in Table 9.4-8 are being spent, Table 9.4-9 lists 85 exploration projects considered active in Nunavut in 2011. Although most operators are junior and mid-level, there are some major players, including BHP Billiton, Xstrata, Vale, Teck, and ArcelorMittal (MaryRiver). Key targets are gold, diamonds, base metals and uranium. Exploration projects are found in all 3 regions. Not many of these projects will necessarily develop into mines in the near future, however it is clear that there is potential for geographically widespread mining sector development.

[29] The 3 mines were the Lupin gold mine, the Nanisivik lead and zinc mine and the Polaris zinc mine. Jericho diamond mine also operated for 2 years in the mid 2000s.

Table 9.4-8: Exploration and Project Development Expenditures

	2006		2007		2008		2009		2010[a]		2011[a]	
	$ (millions)	Total (%)	$ (millions)	Total (%)	$ (millions)	Total (%)	$ (millions)	Total (%)	$ (millions)	Total (%)	$ (millions)	Total (%)
Nunavut	210.6	11.0	338.0	11.9	432.6	13.2	187.6	9.6	280.6	10.0	322.8	10.3
Northwest Territories	176.2	9.2	193.7	6.8	147.7	4.5	44.1	2.3	98.8	3.5	83.0	2.3
Canada Total	**1011.5**	**100.0**	**2830.8**	**100.0**	**3279.5**	**100.0**	**1944.4**	**100.0**	**2817.5**	**100.0**	**3188.0**	**100.0**

Source: NRCan (2011)

[a] These are preliminary figures.

Table 9.4-9: Nunavut Exploration Projects, 2010

	Nearest Community	Project	Commodities	Operator/Partner(s)
Kitikmeot				
1	(Baker Lake)	West Plains (Committee Bay Gold Project)	Gold	North Country Gold
2	Bathurst Inlet	Blue Caribou	Copper, Molybdenum, Silver, Gold, Rhenium	Skybridge Development
3	Bathurst Inlet	Contwoyto IOL Concession	Gold	Golden River Resources
4	Bathurst Inlet	Gondor	Copper, Lead, Zinc	MMG Resources/Xstrata
5	Bathurst Inlet	Hackett River	Silver, Zinc, Gold, Copper, Lead	Sabina Gold & Silver
6	Bathurst Inlet	Hood River IOL Concession	Gold	Golden River Resources
7	Cambridge Bay	George Lake (Back River Project)	Gold	Sabina Gold & Silver
8	Cambridge Bay	Goose Lake (Back River Project)	Gold	Sabina Gold & Silver
9	Kugaaruk	Amaruk Diamonds	Diamonds	Diamonds North Resources
10	Kugaaruk	Amaruk Gold	Gold	Diamonds North Resources
11	Kugaaruk	Amaruk Nickel	Nickel, Copper, Cobalt	Diamonds North Resources/MMG Resources
12	Kugaaruk	Anuri	Gold	North Country Gold
13	Kugaaruk	Halkett Inlet	Gold	MMG Resources
14	Kugaaruk	Inuk (Committee Bay Gold Project)	Gold	North Country Gold
15	Kugaaruk	Raven (Committee Bay Gold Project)	Gold	North Country Gold
16	Kugaaruk	Three Bluffs (Committee Bay Gold Project)	Gold	North Country Gold
17	Kugluktuk	Arcadia Bay	Gold	Alix Resources
18	Kugluktuk	Coppermine Project	Uranium	Hornby Bay Mineral Exploration
19	Kugluktuk	Hammer	Diamonds	Stornoway Diamond/North Arrow Minerals
20	Kugluktuk	Hepburn Base Metals	Copper, Silver	MMG Resources
21	Kugluktuk	Hepburn Diamonds	Diamonds	MMG Resources
22	Kugluktuk	High Lake	Copper, Zinc, Silver, Gold	MMG Resources
23	Kugluktuk	High Lake East	Copper, Zinc, Silver, Gold	MMG Resources
24	Kugluktuk	Hood	Copper, Zinc	MMG Resources
25	Kugluktuk	Izok Lake	Copper, Zinc, Lead, Silver	MMG Resources
26	Kugluktuk	Jericho Mine	Diamonds	Shear Diamonds
27	Kugluktuk	Lupin Mine	Gold	MMG Resources
28	Kugluktuk	MIE	Nickel, Copper, Cobalt, Platinum, Palladium, Gold	MIE Metals

Table 9.4-9: Nunavut Exploration Projects, 2010 (continued)

	Nearest Community	Project	Commodities	Operator/Partner(s)
29	Kugluktuk	Rockinghorse IOL Concession	Gold	Golden River Resources
30	Kugluktuk	Ulu	Gold	MMG Resources
31	Kugluktuk	Wishbone	Copper, Silver, Zinc, Lead, Gold	Sabina Gold & Silver
32	Kugluktuk	Yava	Copper, Lead, Zinc, Silver, Gold	Savant Explorations
Kivalliq				
33	Arviat	Nueltin Lake	Uranium	Cameco
34	Baker Lake	Aberdeen	Uranium	Cameco
35	Baker Lake	Ferguson Lake Diamonds	Diamonds	Thanda Resources/Starfield Resources
36	Baker Lake	Ferguson Lake Ni-Cu-PGM	Nickel, Cobalt, Copper, Platinum, Palladium	Starfield Resources
37	Baker Lake	Greyhound Lake	Copper, Lead, Zinc, Gold, Silver	Aura Silver Resources
38	Baker Lake	Judge Sissons (North Thelon)	Uranium	Forum Uranium/Agnico Eagle Mines
39	Baker Lake	Kiggavik North	Uranium	Forum Uranium
40	Baker Lake	Kiggavik Project (Including Kiggavik, Sissons, St. Tropez Claims)	Uranium	AREVA Resources Canada/DAEWOO International/ JCU Exploration (Canada)
41	Baker Lake	Kiggavik South (North Thelon)	Uranium	Forum Uranium
42	Baker Lake	Lac Cinquante (Angilak)	Uranium	Kivalliq Energy/Nunavut Tunngavik Incorporated
43	Baker Lake	Mallery Lake Project	Gold	Uranium North Resources
44	Baker Lake	Meadowbank Mine	Gold	Agnico Eagle Mines
45	Baker Lake	Muskox	Gold	Agnico Eagle Mines
46	Baker Lake	Nanuq	Diamonds	Peregrine Diamonds
47	Baker Lake	Nanuq North	Diamonds	Indicator Minerals/Peregrine Diamonds/Hunter Exploration
48	Baker Lake	Nutaaq	Rare Earth Elements	Forum Uranium
49	Baker Lake	Parker Lake	Gold	Agnico Eagle Mines
50	Baker Lake	Schultz Lake (North Thelon)	Uranium	Forum Uranium/Agnico Eagle Mines
51	Baker Lake	Tanqueray Block (North Thelon)	Uranium	Forum Uranium
52	Baker Lake	Turqavik	Uranium	Cameco
53	Baker Lake	Ukalik (North Thelon)	Uranium	Forum Uranium
54	Baker Lake	Yathkyed (Angilak)	Uranium	Kivalliq Energy/Nunavut Tunngavik Incorporated
55	Chesterfield Inlet	Chesterfield Inlet	Diamonds	Shear Diamonds/Stornoway Diamond
56	Coral Harbour	Southampton	Nickel, Cobalt, Copper, Platinum, Palladium	Vale Inco
57	Coral Harbour	Southampton Island [a]	Nickel, Cobalt, Copper, Platinum, Palladium	Anglo American Exploration (Canada)

Table 9.4-9: Nunavut Exploration Projects, 2010 (continued)

	Nearest Community	Project	Commodities	Operator/Partner(s)
58	Coral Harbour	Southampton Island [b]	Nickel, Cobalt, Copper, Platinum, Palladium	Anglo American Exploration (Canada)
59	Rankin Inlet	Churchill	Diamonds	Shear Diamonds/Stornoway Diamond
60	Rankin Inlet	Churchill West	Diamonds	Shear Diamonds/Stornoway Diamond
61	Rankin Inlet	Meliadine	Gold	Agnico Eagle Mines
62	Repulse Bay	Qilalugaq	Diamonds	Stornoway Diamond/BHP Billiton Diamonds
63	Whale Cove	Aura	Gold	Uranium North Resources
64	Whale Cove	Cache	Gold	Alix Resources
65	Whale Cove	SY Project	Gold	Corsa Capital/Kaminak Gold
Qikiqtaaluk				
66	Arctic Bay	Nanisivik Mine	Zinc, Silver	Breakwater Resources
67	Clyde River	Bravo Lake (Baffin Island Gold)	Gold	Commander Resources/AngloGold Ashanti
68	Clyde River	Qimmiq (Baffin Island Gold)	Gold	Commander Resources/AngloGold Ashanti
69	Hall Beach	Roche Bay	Iron Ore	Advanced Exploration/Roche Bay
70	Hall Beach	Tuktu	Iron Ore	Advanced Exploration/Roche Bay
71	Igloolik	Aviat	Diamonds	Stornoway Diamond/Hunter Exploration
72	Iqaluit	Chidliak Diamonds	Diamonds	Peregrine Diamonds/BHP Billiton
73	Iqaluit	Chidliak Ni-Cu-PGM	Platinum, Palladium, Lead, Zinc, Copper, Gold	Peregrine Diamonds/BHP Billiton
74	Iqaluit	Qilaq	Diamonds	Peregrine Diamonds
75	Kimmirut	Kimmirut	Uranium	Peregrine Diamonds
76	Pangnirtung	Cumberland	Diamonds	Peregrine Diamonds
77	Pond Inlet	Mary River	Iron Ore	Baffinland Iron Mines, now ArcelorMittal and Nunavut Iron Ore
78	(Repulse Bay)	Melville Gold	Gold	AngloGold Ashanti
79	Resolute Bay	Polaris Mine	Lead, Zinc	Teck Resources
80	Resolute Bay	Storm	Copper, Zinc, Silver	Commander Resources
81	Sanikiluaq	SQ-05 [a]	Copper, Iron Ore	McKinnon Prospecting
82	Sanikiluaq	SQ-05 [b]	Copper, Iron Ore	McKinnon Prospecting

Source: Nunavut Geoscience (2011)

In addition to the Project, there are several projects in, or are about to enter, the environmental approval process and might be expected to start construction within the coming 2 to 5 years. This will represent an extraordinary demand for Nunavummiut labour and businesses, building of much additional infrastructure in the Territory, and

an exceptional boost to Nunavut's GDP. A brief overview of the existing and the more foreseeable mining projects in Nunavut, as of July 2012, is as follows[30]:

- Jericho Diamond Mine is in the Kitikmeot Region, about 250 km south of Kugluktuk. Shear Diamonds is now the operator. Tahera Diamond Corporation operated Jericho between 2006 and 2008, when it was closed as Tahera moved into bankruptcy. In 2010, the property was sold to Shear, which expects to reopen the mine, likely when environmental approvals are in place. Jericho is a small mine, producing about 300,000 carats annually when it was open and employing less than 300 people on average. Shear is also actively exploring for diamonds and gold at various locations in the Kivalliq Region.
- Meadowbank Gold Mine is in the Kivalliq Region, about 70 km northwest of Baker Lake. AEM is the operator. Construction costs were $800 million and operations began in 2010. The mine has an expected operational life of 5 years, at a production rate of about 325 000 ounces/year. Measured and indicated resources on AEM's leases are now over 2.2 million ounces. Meadowbank is a large mine in the Nunavut context. The work force in early 2011 was over 1100 people, with almost 25% of these from Kivalliq communities. Project economic effects are significant in terms of increasing employment and incomes in Kivalliq and in terms of effects on territorial GDP. The project has also motivated preparation for employment training and a good business response, both of which represent contributions to Kivalliq's future capacity to supply the mining sector.
- Doris North (Hope Bay) Gold Mine is in the Kitikmeot Region, about 90 km south of Cambridge Bay. The operator, Hope Bay Mining, is now owned by Newmont Mining. This small underground mine is one of the properties in the larger Hope Bay Greenstone Belt under exploration license to Newmont. Hope Bay, until recently had been a late stage exploration project that was preparing to start construction. In February 2012, development and surface exploration of the Hope Bay Project, however, were postponed.
- Mary River Iron Ore Mine is in the Qikiqtaaluk Region of Nunavut. It is on Baffin Island, about 160 km south of Pond Inlet. The project has very recently been acquired by a joint venture of ArcelorMittal and Nunavut Iron Ore. Mary River is a large, high grade iron ore deposit, with capital costs currently estimated at about $4 billion. The project expects to ship 21 million tonnes of iron ore annually for 21 years, and includes the construction of a railroad to move the ore to port. Mine life could be extended or the production rate increased if, as expected, additional iron ore deposits are discovered as exploration continues. Construction will require a work force of between 3000 and 5700 people and will take 4 years to complete. Operations will employ over 1000. The Nunavut Impact Review Board has approved the project to proceed, with conditions. This decision has gone to the federal minister of Aboriginal Affairs and Northern Development for a final approval.

[30] Information for the project descriptions comes from proponent websites, reporting to the Nunavut Mining Symposium and documents on the NIRB public registry.

- The Kiggavik Uranium Ore Mine is in the Kivalliq Region of Nunavut. It is approximately 80 km west of the community of Baker Lake. The project's ESIA was submitted to the NIRB in December 2011 and is now under review. Measured and indicated resources are approximately 44 000 tonnes of uranium ore reserves. Estimated capital investments needed to bring the project into production will be in the order of $1.5 billion, with an annual operating cost of about $200 million for about 20 years. The Kiggavik mine will require a road between Baker Lake and the site to transport supplies to the mine. Construction will require an average workforce of about 900 full time equivalent direct and indirect jobs annually over the construction phase. Construction is estimated to take 4 years.
- Hackett River Base Metals Mine is in the Kitikmeot Region, about 325 km southeast of Kugluktuk. Xstrata Zinc is the owner. The mine will produce silver, zinc, lead, copper, and gold. Capital costs have been estimated at $700 million, project life at 16 years and operational employment at 600 people. In response to a project proposal submitted over 3 years ago, NIRB issued guidelines for the EIS in early 2009. With one of the world's largest undeveloped volcanogenic massive sulphide properties, the project as earlier conceived has the potential to become much larger, and be operational for decades.
- High Lake and Izok Lake Base Metals Mines are in the Kitikmeot Region, about 290 km south of, and 255 km southwest of, Kugluktuk, respectively. Mineral and Metals Group (MMG) is the operator. Both projects are expected to produce silver, zinc, copper and lead – Izok Lake alone currently has an estimated 14.8 million tonnes of ore containing the 4 metals. Previous owners of the projects had submitted a draft EIS for High Lake to NIRB; however, MMG's priority has shifted to Izok Lake. Izok Lake is expected to cost about $1 billion to construct, and be operational for at least 10 years. MMG expects to move Izok Lake into the environmental approval process in 2013.

It is noted that mining sector investment implies substantial contributions to identified requirements for foundation interventions in Nunavut's economic development strategies, including the building of transportation infrastructure, and enhancing the capacity of individuals, businesses and communities. Each mining project that goes forward not only has large effects on Nunavut's economic parameters, but contributes to preparing the ground that facilitates subsequent projects and other economic and social development.

Other Priority Economic Growth Sectors

Tourism and the commercial fishery are the other 2 priority sectors for economic development in Nunavut. Tourism is largely non-consumptive (excluding hunting), can be managed towards minimal environmental effects, has the potential for providing substantial employment in areas that do not necessarily require advanced education, and is an economic activity that is consistent with efforts to maintain the integrity of traditional cultures. Associated with tourism, Nunavut's arts and crafts sector provides income to over 20% of the Inuit working age population and is estimated to contribute over $33 million to the economy annually (GNDoEDT 2010b).

The Government of Nunavut expects the tourism industry to grow in the coming years, in part as a result of the growing level of awareness of climate change and its impacts on the Arctic, its people and their cultures. The government recognizes the need to construct tourism related infrastructure while ensuring that Inuit are the

primary economic and social beneficiaries of tourism, and the very cultural and ecological values that attract visitors to Nunavut are protected (GNDoF 2008).

The commercial fishery in Nunavut focuses primarily on 2 species, turbot and shrimp, although inshore fishing of Arctic char accounts for a small percentage of the sector. The fishery has grown over the recent past – there have been larger allocations for turbot and shrimp catches for Inuit and increased investments in offshore fishing vessels. As noted earlier, the commercial fishery is believed to have contributed over $30 million annually to the economy and has some room for continued growth through increased quotas.

Economic Infrastructure

Less than 4% of Nunavut's land mass is located within 100 km of any transportation infrastructure. Economic development strategy documents and Nunavut's Transportation Strategy note the need to develop infrastructure in Nunavut if economic goals are to be achieved (GNDoEDT 2009). There are no road or rail connections between Nunavut communities, or to the south. Currently, aside from networks of roads in and around some communities, the only road of length is the road to Meadowbank. To travel overland between communities, and to harvest and access exploration sites, people and mining companies use snow machines and all-terrain vehicles.

Discussions have been ongoing for several years regarding the construction of an all-weather road linking Rankin Inlet to Churchill, and then to southern Manitoba. In 2009, a business plan for the road was completed and there are plans to move to a cost benefit analysis. The road is of immense interest to Kivalliq despite some controversy about potential negative environmental and social effects. Progress on the project, however, is unpredictable. The future of the Bathurst Inlet Port and Road Project, which would build over 200 km of road in Kitikmeot to facilitate the development of its mining potential, is also uncertain.

Nunavummiut and tourists largely travel within and into Nunavut by air; goods are transported by sea during the short summer season, or by air. Existing air and sea transportation infrastructure is in need of updating and expansion. Every community has an airport but these are not always sufficient to meet the needs of residents and visitors. Most of the airports were constructed decades ago, and because of changes in aircraft design, more modern (and cost efficient) planes are unable to land in most communities. Marine transportation infrastructure is also constrained. With few updated charts and very basic landing facilities, boats and cargo are at risk of damage and delay. As with roads, there are various projects underway to improve air and marine transportation infrastructure. A new airport in Arctic Bay has just opened, the Nanisivik Naval Facility is expected to start construction in 2013, and smaller upgrades are underway at various air and marine facilities across the Territory.

The necessary transportation investments are large – the mining sector appears to offer the most potential for building new transportation infrastructure, although such infrastructure will be purpose built and therefore may not always meet the requirements of, for example, the tourist sector.

Telecommunication in Nunavut relies on costly satellite technology because ground based systems such as fibre optic cable and microwave are not currently considered to be economically feasible (Nunatsiaq Online, 2013a). The largest internet service provider in Nunavut is QINIQ. Recent years have seen a steady flow of investment in broadband infrastructure, notably the upgrades to the QINIQ service. The investment in QINIQ is part of a 5-year commitment between Nunavut Broadband Development Corp, SSI Micro and the federal government.

QINIQ is introducing services for classroom connectivity, large data transfers, audio and video conferencing and direct connections with other internet service providers in the larger Nunavut communities (NBDC, 2012).

In their strategic document Northern Connections - A Multi-Modal Transportation Blueprint for the North, the governments of the 3 Territories estimated that the transportation deficit in the north would require a $2.5 billion investment (Government of Yukon 2008).

Government Revenue

Nunavut's economy is dominated by Government of Nunavut expenditures. The public sector typically accounts for about 40% to 50% of domestic demand, half to three quarters of capital formation (in the absence of large mining projects) and a third of formal sector employment in the Territory. Government revenue was projected to total over $1.35 billion in 2011/12. Transfers from the federal government represented 92% of this revenue, with the remaining 8% coming from own source revenue – the biggest own source revenues are from taxes on personal income, payrolls and tobacco. Government expenditures were expected to be nearly $1.32 billion in 2011/12, with about 90% for operational expenditures and the balance for capital investments. This would allow the government a small surplus.

A high proportion of the GN budget is expended on non-discretionary entitlement programs, constraining budget flexibility. In 2010/11, GN spent almost half of its revenue on social services, including education, health, social assistance and social housing – in part as a result of the challenging socio-economic status of the population (Table 9.4-10). In addition, costs for fuel, labour and transportation (including between Nunavut and the rest of Canada) resulted in higher unit costs for government services (as well as higher costs for personal and business goods and services). Fuel alone was estimated to take up about 20% of GN's annual budgets in 2006 (GNDoF 2010)[31]. Per capita government spending is about 3 times that of Canada as a whole.

Table 9.4-10: Operational Expenditures ($ millions)

	2008/09	2009/10	2010/11	2011/12
Health and Social Services	281.7	290.0	292.9	297.0
Education (includes Nunavut Arctic College)	204.0	249.7	230.1	221.2
Community and Government Services	165.2	169.5	167.7	184.2
Nunavut Housing Corporation	119.0	128.5	133.1	143.8
Justice	74.4	74.1	78.2	88.4
Finance	63.9	52.3	58.0	61.3
Economic Development and Transportation	53.3	56.5	52.7	58.4
Other	93.1	59.1	99.2	140.1
Total	**1054.6**	**1079.7**	**1111.9**	**1194.4**

Source: GNDoF (2010 and 2011)
Note: Figures for 2010/2011 are revised estimates and figures for 2011/12 are budget estimates

Revenue growth is expected to average about 4 to 5% annually between 2011 and 2020 provided renegotiation of transfers from the federal government in 2014 does not result in material changes (Table 9.4-11). Growth in

[31] This is the last year for which full data are available.

expenditure over the period will be slightly slower. The Conference Board of Canada also expects its own source revenues to increase at a slightly slower pace than federal transfers, so transfers will continue to represent over 90% of total revenues for the foreseeable future.

Table 9.4-11: Projected Government Revenues and Expenditures (2011 to 2020)

	Fiscal Year Ending									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Total revenue	1,284.5	1,373.4	1,451.5	1,531.1	1,602.5	1,677.6	1,757.6	1,838.5	1,921.4	2,006.3
	4.6	6.9	5.7	5.5	4.7	4.7	4.8	4.6	4.5	4.4
Own source revenue	116.9	123.5	128.9	134.5	140.9	146.5	153.4	160.1	166.6	172.9
	-10.1	5.6.	4.4	4.3	4.8	4.0	4.7	4.4	4.1	3.8
Transfers from Government of Canada	1,167.6	1,250.0	1,322.6	1,396.6	1,461.6	1,531.1	1,604.1	1,678.4	1,754.8	1,833.3
	6.3	7.1	5.8	5.6	4.7	4.8	4.8	4.6	4.5	4.5
Total expenditures	1,211.0	1,277.1	1,346.3	1,414.4	1,478.7	1,547.2	1,619.5	1,693.0	1,768.6	1,846.2
	6.4	5.5	5.4	5.1	4.7	4.8	4.9	4.7	4.6	4.5

Source: CBoC (2010a)

Note: The un-shaded rows present the dollar amounts ($ millions) and the shaded rows the percent change from the year before.

9.4.1.2 Kivalliq Region (Local Study Area)

The Kivalliq region is one of 3 administrative regions in Nunavut. The region consists mostly of land west of Hudson Bay, as well as Coats Island and Southampton Island. As of 2006, the total population in Kivalliq was 8348.

The region has 7 communities, of which Rankin has the largest population. Other hamlets are Arviat, Baker Lake, Chesterfield Inlet, Coral Harbour, Repulse Bay, and Whale Cove. Rankin Inlet is the regional seat.

Community Profiles

Arviat

Arviat (meaning place of the bowhead whale) is the second largest community in Kivalliq, and the most southern community in Nunavut. Historically, Inuit had congregated in Arviat to hunt marine mammals but in the 1950s inland people (inland Padlei) were settled there and learned to hunt marine mammals from seashore people. Elders report that even after settlement, families went out on the land for many months of the year, and would travel long distances to hunt and fish. This remained the case until children started attending the residential school in Chesterfield Inlet, when people started to go out on the land less. Hunters say that most people no longer travel far.

Arviat had a population of 2318 in 2011 (Statistics Canada, 2012b). Population has grown by approximately 18% since 2001 (Statistics Canada, 2010). The population of Arviat is slightly younger than Kivalliq (median age is 20 in Arviat versus 22 in Kivalliq) (Statistics Canada, 2012b). The population is expected to grow at a faster rate than the national average, barring out migration, for the foreseeable future.

People in Arviat frequently refer to their strong history of support and desire for education. This is embedded in the Arviat Community Economic Development Plan, which sees a trained and educated workforce, responsive to current labour market needs, as a priority. Arviat has been proactive in working with AEM, exploration companies and Nunavut Arctic College to implement training programs to prepare people for work in the mining

sector. For example, the diamond driller's training program was begun in September 2011 and Meadowbank now employs more people from Arviat than from any other community except Baker Lake.

Unemployment and a shortage of housing are two of Arviat's main concerns. The unemployment rate was 27.9% in 2011 (Statistics Canada, 2013a). The unemployment problem was referred to by almost all participants in interviews and focus groups discussions. Arviat has the lowest labour force participation rate in Kivalliq (Statistics Canada, 2013b), which is attributed to the lack of opportunities discouraging people from looking for work rather than a lack of interest in working. The housing shortage (there were reportedly 210 names on the waiting list for social housing, which represented slightly less than 1 person out of 5 for those aged 15 and over) (GNBS, 2011f) has particularly negative consequences on public health; there are frequent outbreaks of methicillin resistant staphylococcus aureus infections (Nunatsiaq Online. 2010).

Arviat has made some progress towards integrating the land based and wage based component of their economy, with incomes being generated from traditional activities. Pelts are sold to the Northern Store, Eskimo Point Lumber Supply and the Co-op. Kiluk Ltd. emphasizes design, employs seamstresses to make hand crafted clothing and is looking to expand its product base. Artists sell carvings made of soapstone, caribou antler and ivory, as well as wall hangings and paintings. More than half of the people in Arviat produce arts and crafts products. There are also outfitters, primarily for hunting caribou.

Arviat's community economic development plan for the period 2008 to 2012 has 5 priorities: i) health, wellness, education, and training; ii) infrastructure and transportation development; iii) small business and commercial development; iv) renewable and non-renewable resource management; and v) the public sector. Infrastructure needs include a new hamlet office, bigger recreational facilities and an expanded community freezer to store country foods and support the expansion of fish processing.

Baker Lake

Baker Lake (or Qamanittuaq, denoting its location at the mouth of the Thelon) is the LSA community farthest from the Meliadine Project. It is the only inland community in Nunavut, and was established as a residential settlement at the time the government brought the Inuit into settlements. Previously there had been only trading, missionary and police posts at this location. Baker Lake was settled by both inland and coastal Inuit.

Baker Lake had a population of 1950 in 2010. The population had grown by 22.5% since 2001. This growth rate is higher than for the Kivalliq Region as a whole, but annual figures do not suggest that this can be attributed to Meadowbank; Baker Lake's population did not grow as quickly over the period 2007 to 2010 as most other communities.

Meadowbank is now in operation and there have been an increasing number of mineral exploration companies operating out of Baker Lake over the recent past. These activities have generated significant changes in the hamlet, particularly in employment, incomes, business activity and outlook of the people. Recent changes in Baker Lake have included dramatically increased high school graduation rates (perhaps in part in response to expanded employment opportunities associated with mining activity); increased returns to businesses, particularly in hospitality, transport and expediting; and competition for qualified staff. The unemployment rate is believed to be very low, including by Canadian standards.

Baker Lake's community development plan outlines the community's multiple natural and cultural assets, including abundant nearby wildlife and fish; the Thelon and Kazan heritage rivers (both of which flow into Baker

Lake); proximity to parks and reserves (Innujarvik Territorial Park, Ukkusiksalik National Park, and the Thelon Wildlife Sanctuary); a longstanding and internationally renowned artistic tradition; and mineral resources. Tourism, arts and crafts and mining are therefore priority sectors for employment creation, to be supported through foundation investments in education and training, assistance to small businesses and economic infrastructure. Recognizing that economic development rests on community wellness, the plan also identifies needs in the areas of community infrastructure and wellness.

Chesterfield Inlet

Chesterfield Inlet (or Igluligaardjuq, meaning place with a few houses) is the smallest and slowest growing community in Kivalliq, with a population of 386 in 2010 that had grown by 6.6% since 2001. Most of this growth is attributable to growth of 5.5% in 2010 alone; in fact, Chesterfield Inlet has had negative population growth in some years over the last decade.

Chesterfield Inlet is also one of the oldest communities in the eastern Canadian Arctic. In the mid-1800s to the early 1900s Chesterfield Inlet was regularly visited by whalers who overwintered nearby. Inuit hunted for the whalers and worked manning their boats. People came to Chesterfield Inlet from other parts seeking work from whalers and opportunities to trade goods. Until the 1950s, the community was the major centre north of Churchill – a Roman Catholic mission and hospital were established in 1912. The hamlet was the Hudson Bay Company's main northern supply centre, the site of the largest Royal Canadian Mounted Police (RCMP) barracks, and had the first residential school in Nunavut (Chesterfield Inlet Economic Development Office, 2011).

The community is considered by people who live there to be quiet and more traditional than others in Kivalliq. Arctic sports are popular – James Tautu of Chesterfield currently holds the 2010 Arctic Games gold medal for kneel jumping, a traditional Inuit sport where athletes start on their knees and then jump as far as they can to land on 2 feet. Many people make ulus and harpoon edges. Most people (including women) hunt and fish. Adult children are expected to support their extended families. Substance abuse, domestic violence and crime rates are also reported to be low (although this is difficult to confirm from the available statistics).

Median incomes in Chesterfield are high, second only to those in Rankin Inlet. This might be unexpected in such a small community; however, Chesterfield Inlet has a proportionately large number of government employees, delivering the health, education and other services in this community.

Chesterfield Inlet's community development plan prioritizes the development of infrastructure, including the extension of roads both to support the mining sector (Shear Minerals was exploring nearby), and to make it easier for people to reach their cabins on the land. Other infrastructure priorities include the development of a community water treatment plant and extending the airport runway so that Chesterfield can be used as a transportation hub for the Kivalliq region. The plan also prioritizes: i) the provision of affordable housing; ii) education and training initiatives; iii) small business development; iv) strengthening manufacturing and processing capabilities of country foods; v) encouraging arts, crafts, and tourism; and vi) augmenting social and health care services.

Rankin Inlet

Rankin Inlet (or Kangiqliniq, meaning deep inlet) is the largest community in Kivalliq and is the regional hub. The population was 2704 in 2010, and had grown by 18.3% since 2001. Most of this growth has occurred since 2006. As a regional centre, Rankin Inlet has probably seen the most population effects of the mining interests across Kivalliq.

Rankin Inlet was originally established as a mining town. The North Rankin Nickel Mine operated from 1957 to 1962. The mine built the first housing in Rankin Inlet for workers from elsewhere in Nunavut. In the 1970s the Government of the Northwest Territories moved its administrative offices from Churchill to Rankin Inlet.

Rankin Inlet therefore developed somewhat differently from other Kivalliq communities. A number of private businesses emerged and Rankin Inlet became the administrative, transportation and medical services center for Kivalliq. It has Nunavut's first birthing centre and a new medical facility which serves as the regional hospital.

Rankin Inlet has Kivalliq's largest non-aboriginal population, at 16% of the total, and people are more likely to speak English. Incomes here are higher than elsewhere in Kivalliq, and most socio-economic indicators are better – crime rates have been a notable exception. Land based activity is not as prevalent as in other Kivalliq communities – there are fewer hunters on a per capita basis and harvests are proportionately smaller. For instance, on average less than 25% of food comes from harvested sources in Rankin Inlet. This is significantly lower than other communities including Arviat (64%), Baker Lake (36%), Chesterfield Inlet (58%), Coral Harbour (80%), Repulse Bay (46%), and Whale Cove (76%) (see Table 9.3-6: Market Value per Person of Selected Harvests). Some people report feeling that the 'south is moving in too fast', that there is less of a community feel as the population grows and that Inuit identity is being challenged (results of community consultations).

The community also has more recreational facilities than found elsewhere, including a hockey rink, a fitness center, curling arena, baseball diamond, outdoor beach volleyball court, soccer field, swimming pool and a 9-hole golf course. Rankin Inlet is also home to the KIA, has 2 Nunavut Arctic College campuses with the recent opening of the trades training school in 2010, and a number of business associations and organizations.

Population growth is driving town infrastructure needs. Economic development priorities include supporting the development of the mining sector and supporting arts and crafts.

Whale Cove

Whale Cove (or Tikirarjuaq, meaning long point) had a population of 392 in 2010; an increase of 22.5% over 2001.

Whale Cove is often described as relatively traditional. However, some people say that the lack of employment opportunities in the community, and therefore lack of money, is resulting in a decrease in hunting because families cannot afford expensive gear. At the same time, the hamlet notes that they are challenged to fill openings in hamlet operations. Although there is a small fish processing facility, commercial fishing is not generally practiced – people say this is because fishing does not earn them much.

A 5 year community specific economic development plan for Whale Cove emphasizes equitable and participatory community development processes. Sectors of importance for development in Whale Cove are: i) community health and wellness; ii) education and training; iii) infrastructure and transportation; iv) arts and crafts; v) small business development; vi) establishing and enabling the environment for the exploitation of renewable and non-renewable resources; and vii) reinforcing the capacity of the public sector.

Economic Development Policy

The GN drives economic development policy in the Territory. Kivalliq does however have an approved land use plan that is intended to provide a framework within which development is to take place (NPC 2000). The plan recognizes that most of the Kivalliq private sector economy is, and will continue to be, based on use of land and natural resources and that the greatest economic development potential will likely be in the mining sector. It

therefore sets out conditions for mining projects – broadly that there should be no significant environmental effects and that the benefits of mining should accrue to Kivalliq communities as well as to Canada.

The plan indicates that a balance between the potentially incompatible land uses of mining and tourism is desirable to achieve economic development. The emphasis is on combining community participation, environmental protection, economic wellbeing (including opportunities to earn wage income) and maintenance of the integrity of traditional culture in land use implications of specific development proposals. The land use plan for Kivalliq also emphasizes the desire of people to develop employment opportunities for youth.

There are also economic development plans prepared at the community level and all communities have economic development officers. The plans set out community priorities for economic, social and cultural development, as input into GN's allocation of resources, including capital expenditures. The development of the plans is intended to be highly participatory, to ensure that community priorities are broadly reflective of different groups of interests within a community. The planning process is also intended to motivate reflection about community strengths and weaknesses, and encourage self-reliance, partnerships and learning. Many of plans have common elements – the recognition that health and community wellbeing are integral to successful economic development, that mining and arts and crafts are priority sectors, and that education, training, and infrastructure development are prerequisites to achieve goals.

Mining

Mining development is expected be the largest economic driver in Kivalliq in the coming years. Mining is likely to provide more employment and business opportunities than any other foreseeable economic activity over the near to medium term. The mining sector also generally funds its own training and infrastructure needs, implying less dependence on territorial resources to enable development. Mining job experience, training and some infrastructure are also of potential value to other economic activity.

Inuit Impact and Benefit Agreements associated with large mining projects generate funds for community development priorities.

As of 2012, Kivalliq has the only operating mine (Meadowbank) in Nunavut. Kivalliq is also home to 2 major mining projects under active environmental review (Kiggavik and Meliadine). Of Nunavut's 82 exploration projects listed in Table 9.4-9, almost 40% (33 projects) are in the Kivalliq Region. There is at least one project near each of the 7 communities. Gold accounts for 9 of the 33 (or 27%) exploration projects in Kivalliq.

Although mining's potential has barely started to be realized, the evidence is that many of the expected benefits can be achieved in comparably short time frames. The development and now operation of Meadowbank has employed more than the forecast number of Inuit. Meadowbank has motivated the development of a number of joint ventures between Inuit and southern firms, enabling Inuit businesses to participate in the project, expand, hire and gain important experience in the mining sector. There is also some evidence that the opportunities offered by Meadowbank, and expected at other mining projects, has increased incomes, decreased unemployment rates and motivated improved educational achievement in Kivalliq; however, this regional information will not be verified until the release of complete and disaggregated data from the 2011 Census.

Tourism

Tourism is also a priority sector for development, although progress has been somewhat slower than in the mining sector. Kivalliq is home to the Kazan and Thelon watersheds, 2 of the longest undisturbed river systems

in the Arctic. The unspoiled wilderness character, as well as the wildlife and archaeological sites along the Thelon and Kazan Rivers, are attractions to outdoor enthusiasts. Most canoeists organize trips through wilderness outfitters and tour operators, most based outside Nunavut – in Whitehorse, Fort Smith, Winnipeg and La Ronge. A recent study investigating the level of canoeing on the Kazan and Thelon rivers indicates low but constant use (GeoVector 2008). However, the study also notes that canoeists bring little in the way of economic benefits to Kivalliq (or other Arctic) communities, other than a short hotel stay at the end of a trip.

Sport hunting is also important. Polar bears, musk oxen, wolves, caribou, and wolverines are all sought after animals in the commercial sport hunting sector. Local outfitters (for example Northwind Outfitting in Chesterfield Inlet or Pissuk Outfitting and Kowmuk Tours in Rankin Inlet) lead and outfit hunting and fishing expeditions, and there are a number of independent hunters who have guided trips in the past.

Outfitting and guiding hunting is thought to be a more promising activity than outfitting and guided canoeing, involving more individuals from communities and generating larger financial returns. Based on research done in the early 2000s, Dowsley (2010) reported that an outfitted sport hunt for polar bear brought in an average of $19 000 to Inuit outfitters. However, recent restrictions on polar bear tags, in combination with the ban on the import of polar bear trophies in the United States, are said to have had a negative effect on outfitting businesses, particularly in Arviat and Coral Harbour.

In the past, guiding could be arranged comparatively informally – customers could contact an HTO to make arrangements and the HTO would identify someone who had the appropriate training and experience, including safety training. However, new requirements for insurance, high start-up costs and the need to market in order to expand, have become barriers to expansion of independent outfitting and guiding by Inuit, and have resulted in some loss of interest. Some HTO members report that there is little incentive to invest the necessary significant sums in face of market uncertainties.

Cruise ships and adventure tourists visit Nunavut, and there is some expectation of increasing interest in light of climate changes and potential effects on wildlife; however, most interest has been in the high Arctic and numbers of visitors remain small. A significant increase in tourism in Kivalliq will require a concerted effort to invest in tourist infrastructure and services (including opportunities to experience traditional culture), to further develop the arts and crafts sector, and to promote Kivalliq's attractions. In a fiscal environment of many other economic and social demands on government resources, strong public and private sector partnerships will be needed to advance on the tourism front.

Business

Until recently there has been limited business development in Kivalliq. All communities share the same problems with regard to business – small markets in Nunavut, long distances to other markets, and shortages of investment funds and skilled human resources. Most businesses have been small, catering to consumption needs in Nunavut. Commercial harvesting and fishing activity, with some exceptions, is focused in Kitikmeot and Qikiqtaaluk, although Kivalliq Arctic Foods buys caribou and fish from communities for processing for export markets.

The Nunavut Development Corporation was established at the time of the NLCA with a mandate to develop Nunavut business in order to create income opportunities for Nunavummiut. The Nunavut Development Corporation has focused on developing external markets for country food, clothing, and arts and crafts. In Kivalliq, Kivalliq Arctic Foods, Ivalu Ltd (both in Rankin Inlet), Whale Cove Fisheries, Jessie Oonark Ltd.

(Baker Lake) and Kiluk Designs (Arviat) produce a range of goods for export and for sale to visitors to these communities. This has created some employment – calculated at about 25 full time equivalent jobs in 2010. However sales remain small, totalling less than $1.5 million in 2010 (about half of which was made by Kivalliq Arctic Foods), and financial viability of these companies has not yet been achieved. Each still required subsidies from NDC to operate, and some, despite subsidies, lost money (NDC 2010).

Sakku Investment Corporation in Rankin Inlet is the business and economic development arm of the KIA. It is an Inuit birthright for-profit corporation, owned in trust by the Inuit of the Kivalliq Region. Sakku is preferentially contracted by the Government of Nunavut in the interests of increased Inuit content in government operations. Sakku owns 2 companies (real estate in Rankin Inlet, and drugs and medical product supply) and is part owner of a third, M and T Enterprises (freight handling, hauling, storage, and construction). Sakku also partners with other companies in Nunavut, and often with southern companies supplying the construction and mining industries. Sakku sees increasing opportunities in the areas of expediting, camp operation, drilling, fuel supply, environmental monitoring, training and air transportation, largely expected in relation to mining. Partners include other regional birthright corporations, Dyno Nobel, Toromont, Stantec, NSSI, Fountain Tire, and the Royal Bank.

Nunavut Tunngavik Incorporated qualifies businesses for preferential contracting (on the basis of their Inuit control or majority ownership) by government and private sector project proponents (Table 9.4-12). Over half of the 70 registered NTI businesses in Kivalliq are based in Rankin Inlet.

Table 9.4-12: NTI Listed Businesses in Kivalliq

Arviat	**Rankin Inlet**
Arviat Inuit Enterprises	Adjuk Healthcare
Larry & Sons Construction	Aglu Consulting & Training
Northern Networks Ltd.	Arctic Expression
Panainaaq Construction Ltd.	Curley Construction
Qitik Inc.	Ed's Electrical Services Ltd
Illnik Electric	Electrix Ltd.
Igloo Nunavut o/b 5226 Nunavut Ltd.	Ikajuqtigiit Ltd.
Arviat Inuit Enterprises	Ilagiiktut Ltd.
DAPA Enterprises Inc.	Inukshuk Construction Ltd.
Eskimo Point Lumber/Airport Services Ltd.	Kakivak Construction Ltd.
Henik Lake Adventures Ltd.	Kanaknaq Investments Ltd.
Arctic Traders operated by Qitik Inc.	Kangiqliniq Development Limited
Baker Lake	Kissarvik Co-operative Ltd.
Peter's Expediting Ltd.	Kivallingmiut Aviation Inc.
Power House Electric	Kivalliq Expediting & Storage Inc.
Tangmaarvik Inland Camp Services Inc.	Kivalliq Services Ltd
Nunamiut Lodge	M & T Enterprises Ltd.
Nunamiut Company Ltd.	Nahanni Nunavut Construction Ltd.
Baker Lake Contracting & Supplies Ltd.	Nanuk Enterprises Ltd
BLCS Development Limited	Northern Allied Travel Inc.
Kanguujaq Ltd	Nunami Helicopter Transport Corporation
5235 Nunavut Ltd	Nunavut Insurance Brokers Ltd.

Table 9.4-12: NTI Listed Businesses in Kivalliq (continued)

Chesterfield Inlet	Oomilik Enterprises Ltd.
Pimakslirvik Corporation	Piruqsaijit Ltd.
Chesterfield Inlet Holding Corporation	Qagvik Enterprises Ltd.
Aulajuq Limited	Qamanittuaq Developments Corporation Ltd.
Coral Harbour	Qunngaataq & Associates
Tuniq Lumber & Supply	Sakku Drugs Ltd.
Sudliq Developments Ltd.	Sakku First Aviation Ltd
R&A Vehicle Rentals	Sakku Investment Corporation
Leonie's Place Ltd.	Sam's General Contracting
Kivalliq Electrical Services	Sarliaq Holdings Ltd.
Whale Cove	Siniktarvik Hotel & Conference Center
Issatik Co-operative Ltd.	Steve Sayles Contracting
	Toromont Arctic Ltd. - Rankin Inlet
	Turaarvik Inns North
	Umingmak Supply (2007) Ltd.

Source: NTI (2011)

Notes: No businesses in Repulse Bay were listed.
Shaded areas are NTI registered businesses in communities within the LSA

The Meadowbank mine has created an important opportunity for expansion of NTI registered businesses in Kivalliq. AEM has expended over $438 million to NTI registered companies from the beginning of construction in 2007 until mid-2011; about 20% of total expenditures (during the same time period, close to 40% of purchases were spent in Nunavut). Recent figures for 2011 alone see the percentage of expenditures to NTI registered companies approaching 37%; over 90% of this to companies in Kivalliq Region, primarily in Baker Lake and Rankin Inlet (AEM 2011a). These 2 hamlets are the closet communities to the AEM Projects in Kivalliq; Meadowbank and Meliadine, respectively.

In addition, there are non-Inuit owned businesses operating in Kivalliq, including airline, bank, and media branch offices, as well many small retail and service businesses catering to consumption needs of people in each of the Kivalliq communities.

Kivalliq's regional Chamber of Commerce represents more than 80 companies and sole proprietors, from all Kivalliq communities. The Chamber also works to support projects that would provide important boosts to business in Kivalliq, including the proposed road between Rankin Inlet and Northern Manitoba, and hydro developments which would tie in to the Manitoba power grid.

Land Based Economic Activity

Activity on the land provides food and other subsistence resources, maintains Inuit culture and generates cash income (through for example, sale of natural and arts and crafts products). The land based sector of the economy is described in the Keewatin Regional Land Use Plan as being ". . . generally based on non-monetary exchange, private ownership of modes of production . . . and transactions which provide for subsistence and do not increase profits or accumulate capital for its own sake" (NPC 2000).

Although all of the communities within the LSA except Baker Lake are located on the shores of Hudson Bay, and people hunt marine mammals and fish, across the region there is a high dependence on land resources for livelihoods as well, particularly caribou; the primary staple food in Kivalliq.

All attempts to estimate of the value of harvesting are incomplete. In order to get an order of magnitude estimate of the contribution of harvesting to household food security in Kivalliq communities, data were used from different sources and years to derive the values in the Table 9.4-13. The table provides estimates of the value of harvests of the 5 most harvested species, and in the last column expresses these as a percentage of funds required to purchase what Aboriginal Affairs and Northern Development Canada (formerly Indian and Northern Affairs Canada) considers to be an adequate diet in individual communities in Kivalliq. Parameters used were:

- annual average harvests, 1996/1997 to 2000/2001 (NWMB 2004);
- estimated edible weights (Ashley 2002);
- community populations in 2001, one of the years for which there is harvest data (Statistics Canada 2002b);
- net value per kg of edible harvests, that is value minus harvesting costs (Intergroup 2008); and
- grocery costs for a family of 4 in 2010 (INAC 2010a).

Table 9.4-13: Market Value per Person of Selected Harvests ($)

	Caribou	Ring Seal	Char/Trout	Beluga	Total	% of Total
Arviat	1974	73	184	1231	3462	64
Baker Lake	1852	0	181	0	2033	36
Chesterfield Inlet	2136	95	473	561	3265	58
Coral Harbour	2323	301	563	1422	4609	80
Rankin Inlet	531	27	94	590	1242	23
Repulse Bay	1369	243	525	426	2563	46
Whale Cove	1982	51	515	1483	4032	76

Source: Derived from data as listed in bullets above.
Note: Shaded areas represent LSA community data

It is emphasized that the data in Table 9.4-13 is indicative only. Numbers would fall if average harvesting levels per person in 1996 to 2001 have declined significantly since that time for example, or if the 2008 net value per kg is too high for each species.[32] In general however, the results are probably conservative – only 5 species are included whereas, for example, Kivalliq communities harvest thousands of geese and eggs, and significant quantities of cod, walrus, and narwhal, which are not included in the derivations.

Irrespective, the numbers in the last column in the table are high. With the exception of Rankin Inlet and Baker Lake, and taking into account that more minor harvests are not included, communities harvesting levels are sufficient to substitute for about half or more of what total food costs would be if all food was store bought. This is not to claim that half of diets come from traditional food; harvesting replaces high value food, specifically meat.

There are also important income dimensions to harvesting – tourism, pelt sales, and arts and crafts all generate income based on land and resource use, as do commercial harvesting of caribou, musk oxen and fish for sale outside Nunavut. Pelts are sold by individuals to their HTOs and sent south, typically to Thunder Bay, for auction. The price a hunter gets fluctuates according to supply and demand as well as the quality of the pelt.

[32] Intergroup set a value $25 per kg for caribou based on the prices of high and low grade meat in selected communities. This price is used for all species in the table. Although some fish may be priced lower, prices have also risen since 2008.

Arts and crafts are also marketed, sometimes more informally. For less well known artists, community stores sell carvings by photographing them and sending the pictures south to potential galleries and other buyers. Artists will also sell to travellers staying at hotels and to local businesses. Caribou and fish are sold for processing to Kivalliq Arctic Foods in Rankin Inlet.

Some of these income streams, however, have fallen in recent years. Environmental advocacy in the United States and Europe have reduced the markets for polar bear hunt guiding and seal pelts. Arts and craft production is constrained by the high cost of materials and tools, including soapstone which artists report is increasingly hard, and expensive, to source.

The major challenge for many harvesters is reported to be how to earn the money needed to harvest and still have the time to go out and do it. NTI's harvester support programs are intended to help address this challenge with subsidies for equipment, ammunition and fuel. Nevertheless, costs are high to go out on the land for those without much income. Maintaining traditional activity and supporting the development of the mining industry may require trade-offs, and also compensation.

Throughout Nunavut and Kivalliq, the land based economy is fundamental to people's health and wellbeing. Data predating the construction and operation of Meadowbank indicate that the levels of engagement in land based activities and the contribution of harvests to diet were both high and stable in most communities in Nunavut (NWM, 2004; Statistics Canada 2002a, 2007b).

Despite the very high value assigned to harvesting, and very high participation rates in harvesting, there is unmet demand for country food. This in turn indicates that levels of engagement in harvesting activity are constrained in some way(s). Table 9.4-14 provides data on what people feel are the primary obstacles to more activity on the land, specifically hunting and fishing. It is noteworthy that a very low percentage of respondents in the CINE study (4%) answered that they faced no constraints to hunting and fishing (Kuhnlein et al. 2000) in 1998 and 1999, while the rate jumped substantially in the 2010 Baker Lake study to greater than 50% of respondents. Potential reasons for this variability may be that there is a higher dependence on transportation and other hunting and fishing supplies today than there was in the past. These tools cost money, and may indicate that contemporary hunting and fishing activities are becoming more dependent on the capacity of individuals to participate in the formal wage economy.

Table 9.4-14: Percentage of Households Reporting Constraints to Hunting and Fishing

	1998/99 (Kivalliq)		2010 (Baker Lake)	
	Hunting	**Fishing**	**Hunting**	**Fishing**
No constraints	4	5	57	63
Constraints	96	95	43	38
Of which				
too expensive	57	29	34	30
too busy	7	34	9	7
changes in wildlife	0	0	0	1
Weather	22	20	0	0
Health	3	3	0	0
Other	4	8	0	0

Sources: Kuhnlein et al. (2000) for 1998/99 data; Areva survey for 2010 data

For instance, households at both times were much more likely to identify costs than time as the primary obstacle to hunting. The primary constraint to fishing in the 1998/99 survey, however, was time. Time constraints appear to be less of a factor in 2010. Weather also factored in as a constraint to hunting and fishing approximately 20% of the time in the earlier survey, however, was not a factor in the 2010 survey. The studies, however, did not find changes in wildlife to be a major constraint to hunting and fishing.

More recently, primary data collection findings also highlighted some of the key contemporary issues related to harvesting, as described by Inuit hunters and representatives of local HTO's. In particular, people are concerned that mine development will drive wildlife to change their migratory patterns and thus limit their ability to access traditional wildlife resources. It should be noted that some people regarded other forces, such as changes in climate, as the reason for changing migratory patterns rather than from activities pertaining to mining.

Employment

Employment data are available at the regional and community levels from national censuses. At the time the DEIS was written, the most recent data was for 2006. The older data does not effect assessment results.. Table 9.4-15 provides some indication of changes in labour force characteristics in Kivalliq between 2001 and 2006. The labour force had grown by about 17% (as compared to population growth of less than 11% over the same period). While unemployment rates had gone down between 2001 and 2006, the participation rate had also decreased, indicating discouragement in looking for work rather than economic improvement.

Table 9.4-15: Kivalliq Employment, 2001 and 2006

	2001	2006
Labour Force	2775	3240
Participation Rate	66.9	61.7
Unemployment Rate	18.6	15.7

Source: Statistics Canada (2002b and 2007a)

By 2006, Kivalliq's employment situation appeared similar to that in Nunavut as a whole; unemployment rates were comparable at 15.7% and 15.6%, respectively. However, participation rates were lower in Kivalliq (and lower than they are now), again a signal that high unemployment had discouraged people from looking for work.

Since the census data are from 2006, they are not expected to necessarily reflect the employment situation in Kivalliq as it is in 2011. Employment is thought to be substantially improved by the upswing in mining exploration and the construction and operations of Meadowbank. However, the data do provide an idea of differences that likely persist between Kivalliq and the rest of Canada, between communities and between genders (see Table 9.3-9).

Table 9.4-16 compares the participation and unemployment rates of Kivalliq communities with Nunavut. Kivalliq community participation rates are on average lower, but within 4% to 5% of those in Nunavut and Canada, and unemployment rates are more than twice as high in both Kivalliq and Nunavut than in Canada. What is more interesting is that overall, women are less likely to be in the labour force in Kivalliq, but are more likely to find work once they enter the labour force.

Table 9.4-16 Labour Force Participation and Unemployment Rates by Aboriginal Identity and Gender, Kivalliq Communities (2006)

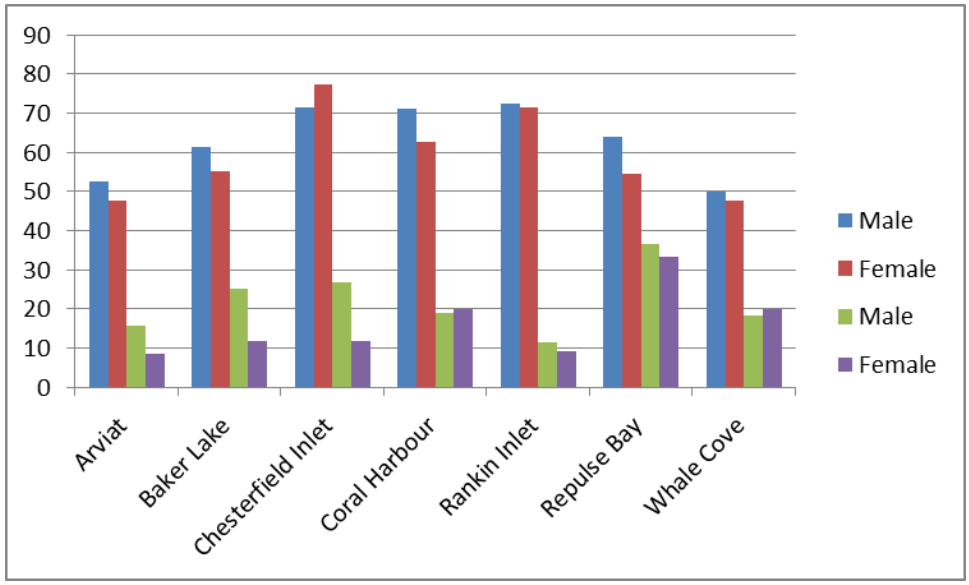
	Aboriginal Identity	Gender	Arviat	Baker Lake	Chesterfield Inlet	Coral Harbour	Rankin Inlet	Repulse Bay	Whale Cove	Nunavut
Participation Rate	Total Population	**All**	**49.8**	**59.2**	**74.4**	**66.7**	**71.7**	**61.1**	**47.6**	**65.3**
		Male	52.5	61.5	71.4	71.1	72.3	63.8	50.0	67.9
		Female	47.6	55.1	77.3	62.5	71.4	54.5	47.6	62.6
	Aboriginal	**All**	**46.0**	**55.8**	**73.7**	**66.7**	**64.8**	**58.8**	**46.2**	**59.1**
		Male	48.2	59.8	66.7	69.8	65.3	65.1	45.0	61.2
		Female	44.7	52.6	78.9	62.2	64.2	53.7	40.0	57.0
Unemployment Rate	Total Population	**All**	**13.0**	**18.9**	**15.6**	**19.4**	**10.2**	**34.5**	**10.0**	**15.6**
		Male	15.6	25.0	26.7	18.8	11.3	36.7	18.2	17.8
		Female	8.5	11.9	11.8	20.0	9.1	33.3	20.2	13.0
	Aboriginal	**All**	**16.5**	**20.9**	**14.3**	**20.7**	**13.3**	**36.0**	**16.7**	**20.1**
		Male	20.8	27.9	25.0	23.3	16.5	39.3	22.2	23.7
		Female	11.8	14.0	13.3	21.4	10.1	31.8	25.0	16.2

Source: Statistics Canada (2007a); NPC 2008

Labour force participation rates amongst the total population in Chesterfield Inlet and Rankin Inlet are higher than the overall rate in Nunavut. Baker Lake, Coral Harbour, and Repulse Bay have participation rates similar to Nunavut, while the rates in Whale Cove and Arviat are lower. This trend is similar for the Aboriginal population in each community. In general, participation rates are higher amongst the male population than the female population (NPC 2008).

In Arviat, Chesterfield Inlet, Rankin Inlet, and Whale Cove, the unemployment rate is at or below the Nunavut average, while in Baker Lake, Coral Harbour, and, most noticeably, Repulse Bay, the rate is higher. This trend applies to both the total and Aboriginal populations in the Kivalliq communities. The unemployment rate of males is noticeably higher than females in most Kivalliq communities, with the exception of Whale Cove (NPC 2008). This is, however, expected given the higher participation of males in the labour force compared to females, and the challenging labour market conditions in Kivalliq.

Figure 9.4-2 presents similar data at the community level. There is no obvious difference between communities that are often described as more traditional and those that are not. For example, Chesterfield Inlet had a participation rate higher than Rankin Inlet. Participation rates are therefore considered to be in large part a function of the prospects of finding employment, not simply a function of a desire or need to work. Additionally, seasonal workers are more likely to be in the labour force, but unemployed, which would influence the observed participation rates.



Note: Columns on the left (blue and red) are participation rates, and on the right (green and purple) are unemployment rates.

Figure 9.4-2: Employment, Gender Differences, 2006.

Differences between communities were also much larger than differences between genders. With the exception of Chesterfield Inlet, women were slightly less likely to be in the workforce than men, which is expected. Women's unemployment rates were equally as variable between communities, but with the exception of Whale Cove, were less than men's, and in some cases such as Baker Lake and Chesterfield Inlet, women were half as likely to be unemployed as men. It is noted however that recent employment, particularly of men who find rotational mining work more possible, has certainly redressed some of the gender imbalances in employment. All communities, including Rankin Inlet, had high unemployment rates in 2006 compared to the Canadian value of 6.6%. Rates varied from Rankin Inlet's low of 10.2%, to Repulse Bay's high of 34.5%.

Table 9.4-17 presents 2006 data on types of employment. Less than half the people in Kivalliq who worked in the previous year, worked FY/FT. This is comparable to the number for Nunavut (48.4% worked FY/FT) and only slightly less than that for Canada (50.9%). However, again there are larger differences between communities. In Chesterfield Inlet and Whale Cove, approximately 40% worked FY/FT as compared to Arviat and Rankin Inlet where almost 60% did. These figures need to be interpreted in relation to the number of people in the working age population. Arviat and Rankin Inlet, for example, has a substantial portion of the community who worked FY/FT (56% and 59.4% respectively), and a large percentage of the working age population participated in the labour force (74.5% and 50% respectively). In Whale Cove on the other hand, there was a lower percentage working FY/FT (44%), and a lower percentage of the working age population participating in the labour force (59.5%).

Table 9.4-17: Employment by Sector, 2006

	People with Earnings			Employment Sector (% of experienced workers)		
	Number	% of 15+ Population	% FY/FT	Primary	Secondary	Tertiary
Arviat	615	49.8	56.1	1.5	6.6	92.0
Baker Lake	700	62.8	40.0	7.3	8.1	84.6
Chesterfield Inlet	175	63.6	40.0	0.0	6.5	93.5
Coral Harbour	310	66.7	30.6	6.9	12.1	81.0
Rankin Inlet	1170	74.5	59.4	2.3	7.8	90.0
Repulse Bay	235	52.2	31.9	6.5	6.5	87.0
Whale Cove	125	59.5	44.0	10.0	10.0	80.0
Kivalliq	3325	63.3	48.4	4.1	4.7	91.2

Source: Statistics Canada (2007a)

Notes: % FY/FT is the percentage of people with earnings who worked full time, full year. Shaded areas represent LSA community data

Statistics Canada groups type of employment into 10 industries: 'Agriculture and other resources based industries' (which would include mining) makes up the primary sector. 'Construction' and 'manufacturing' make up the secondary sector. Seven other sectors make up the tertiary (or services) sector, one of which is 'other services'. This other services category is undefined, but typically accounts for about one third of total employment in Kivalliq communities, and is by far the largest of the 7 sectors that make up the service economy. In all Kivalliq communities, the largest fraction of the employed is delivering government, retail and other services. The tertiary sector accounts for 90% of jobs on average for the region.

With development of the mining sector, the local community talks a lot about employment. Box 9.4-1 provides some of what was said. Overall, comments focused on the need for employment at least for those who want to work, and the challenges of working in a southern oriented workplace environment can imply. The range of comments on employment was very broad. Generally, they focused on the need to develop ways for young people to gain the necessary skills for employment. Focus group discussions with youth also revealed that they were aware about mining and exploration activities currently happening in Kivalliq, the types of jobs available at these projects, the skills needed to be hired for this work, and where to access this training (most noted courses offered at the Nunavut Arctic College).

Box 9.4-1: Employment

- We have an opportunity to be involved in this Project; we have an opportunity for job training to develop careers for many of our young people. This is important to us.
- We want our young people to have a chance to work and to learn trades.
- If there would be jobs available for the youth, if there are no obstacles to run into, but sometimes they tend to get dismissed.
- And the generation that will come after us, the younger people, will have to depend on working on a daily basis. Because hunting isn't done on a full-time basis anymore, even today. And, not everybody is eligible to qualify for assistance, so it would be better for younger people to find employment. And again, I'd like to say that mining companies are a main source of employment.
- We don't know how this works, but when young people get welfare, they seem to stop looking for jobs.

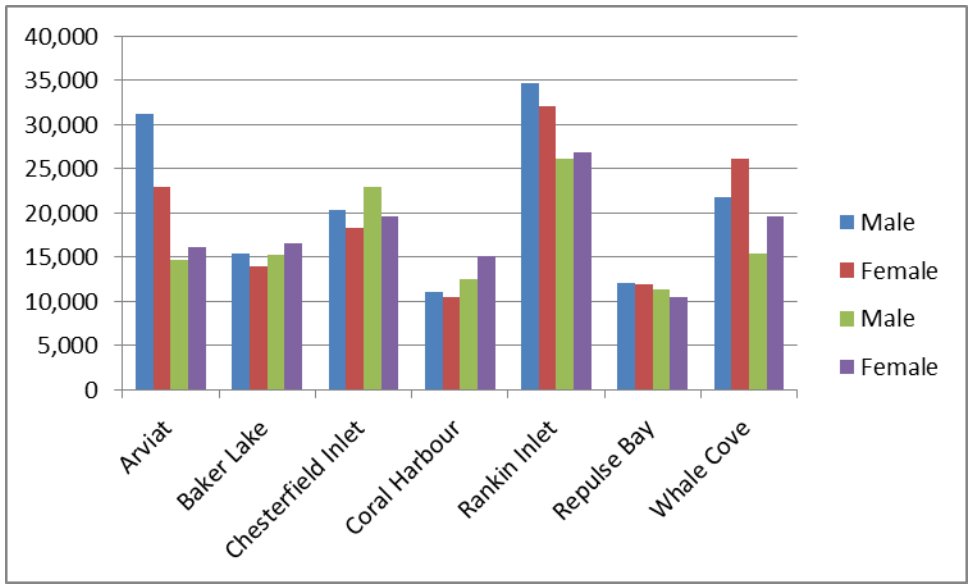
Box 9.4-1: Employment

There should be more emphasis on helping people to get off welfare and to make a living.

- If we provide fish well-packed or caribou meat ready to cook, and sell them to the mining company, maybe we could have a contract with them on a year or monthly basis? And this would create jobs for youth, to go hunting and fishing for meat to store, it's almost like working for the mine.
- Rotational employment seems to work fine for people in our community who have jobs.

Earnings and Incomes

Figure 9.4-3 shows median earnings and incomes for males and females in Kivalliq communities[33]. Earnings were generally higher than incomes. The calculations of medians use different populations; people who have earnings and people who have incomes, respectively. More people have incomes than earnings, and their incomes come predominantly from government transfers, which are generally lower than earnings. This drags down median incomes.



Note: Columns on the left (blue and red) are earnings, and on the right (green and purple) are incomes. Data are for the year 2005, the full year before the census.

Figure 9.4-3: Median Earnings and Incomes, people 15 years and over, 2005

The differences in median earnings and incomes between communities and genders are much greater than between Kivalliq and elsewhere. Overall, earnings in Rankin Inlet were significantly higher than other LSA communities of Baker Lake, Chesterfield Inlet, and Whale Cove. Incomes (which factor in earnings) were also highest in Rankin Inlet. With the exception of Whale Cove, men have higher earnings than women but generally lower incomes. This is explained by women's higher dependence on income support; at the regional level women see twice as much income coming from government transfers as men do.

[33] Earnings are defined as money paid in return for labour. Income, however, includes not just earnings but all other payments made to individuals, for example government transfers, child support, inheritances, etc.

Table 9.4-18 shows recent annual income data at a community level in Kivalliq for between 1999 and 2008 gathered from tax returns by Statistics Canada. Overall, Kivalliq people had lower median incomes (24% lower) than Nunavut. In Nunavut, median incomes are about 20% lower than in Canada.

The tax file data in Table 9.4-18 provide some insight into year to year changes in median income over the last decade. The data confirm that incomes in the LSA are lowest in Whale Cove and highest in Rankin Inlet. The table also indicates that incomes have risen in the LSA communities at a faster rate than in Kivalliq generally. The exception is Arviat where income grew slower than Kivalliq at approximately 6% over the decade. It is noted that the data are in constant dollars - the inflation rate in Canada has been about 23% over the decade. Therefore, median income in the LSA communities of Baker Lake, Chesterfield Inlet, Rankin Inlet, and Whale Cove has grown at a faster rate than inflation, and in Arviat, median income has grown more slowly than inflation.

Table 9.4-18: Income, 1999 - 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Change 1999 to 2008
Median Income, $											
Arviat	15,000	14,100	16,600	16,200	16,700	16,700	19,500	19,100	19,200	17,140	3,040
Baker Lake	14,700	13,900	15,300	15,900	16,700	16,800	17,100	17,800	20,510	19,910	6,010
Chesterfield Inlet	16,400	18,400	19,000	21,300	23,400	21,600	24,100	27,700	30,000	26,150	7,750
Coral Harbour	16,600	14,400	15,300	16,300	18,600	18,600	19,000	20,200	17,720	16,470	2,070
Rankin Inlet	24,300	23,200	26,300	26,800	27,800	28,500	29,400	30,800	31,100	30,760	7,560
Repulse Bay	13,200	11,700	15,000	14,000	15,400	17,400	17,300	17,100	17,660	14,350	2,650
Whale Cove	17,200	16,000	19,000	18,600	19,300	20,400	21,000	23,700	22,630	21,270	5,270
Kivalliq	17,000	16,400	18,200	18,700	19,500	19,900	21,000	22,000	22,320	20,960	4,560
Nunavut	18,200	18,300	20,600	21,700	22,300	22,900	24,000	24,800	25,630	24,560	6,260
Change %											
Arviat	n/a	-6.0	17.7	-2.4	3.1	0	16.8	-2.1	0.5	-10.7	21.6
Baker Lake	n/a	-5.4	10.1	3.9	5.0	0.6	1.8	4.1	15.2	-2.9	43.2
Chesterfield Inlet	n/a	12.2	3.3	12.1	9.9	-7.7	11.6	14.9	8.3	-12.8	42.1
Coral Harbour	n/a	-13.3	6.3	6.5	14.1	0.0	2.2	6.3	-12.3	-7.1	14.4
Rankin Inlet	n/a	-4.5	13.4	1.9	3.7	2.5	3.2	4.8	1.0	-1.1	32.6
Repulse Bay	n/a	-11.4	28.2	-6.7	10.0	13.0	-0.6	-1.2	3.3	-18.7	22.6
Whale Cove	n/a	-7.0	18.8	-2.1	3.8	5.7	2.9	12.9	-4.5	-6.0	32.9
Kivalliq	n/a	-3.5	11.0	2.7	4.3	2.1	5.5	4.8	1.5	-6.1	27.8
Nunavut	n/a	0.5	12.6	5.3	2.8	2.7	4.8	3.3	3.3	-4.2	34.2

Source: GNBS (2011a)

Note: Shaded areas represent LSA community data

Baker Lake and Chesterfield Inlet have seen median income grow by over 40% in a decade. Much of Baker Lake's growth can be attributed to Meadowbank – incomes went up by 15.2% in 2007 and declined much less in 2008 than in most other communities in Kivalliq. Chesterfield has seen substantial income growth in multiple years over the decade, predating Meadowbank. Rising income levels in Chesterfield Inlet during this period can possibly be attributed to nearby exploration programs and people from the community working on the Distance Early Warning (DEW) line rehabilitation projects.

Incomes in Kivalliq have fluctuated considerably in the past. One notable case is in Whale Cove, which experienced negative income growth of 7% in 2000 followed by an increase in median income by 18.8 % in 2001. In fact, no community has seen constant growth, even excluding consideration of 2008, which was a negative year for all communities. The small size and undiversified nature of community economies makes them exceptionally vulnerable to shocks, both negative and positive.

Figure 9.4-4 provides a visual impression of median income changes between 1999 and 2008 in Kivalliq communities. The figure is based on 3 year running means, to effectively even out dramatic year to year fluctuations. As the data in Figure 9.4-4 suggest, overall growth has been positive. Even the poor results for 2008 did not undo positive gains of the previous year (2007) in the LSA communities of Baker Lake, Chesterfield Inlet, Rankin Inlet, and Whale Cove.

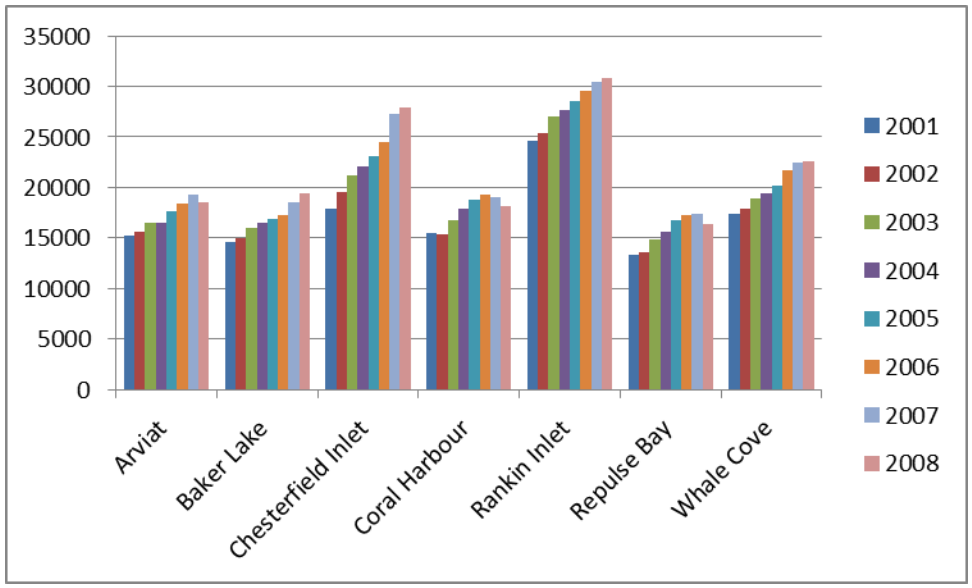


Figure 9.4-4: Median Income ($), 2001 to 2008

9.4.2 Pathway Analysis

The EIS uses pathways (Project-environmental interactions) to assess effects. Pathway analysis is a screening step that is used to determine the existence and magnitude of linkages from the initial list of potential effects pathways for the Project. This screening step is largely a qualitative assessment and is intended to focus the effects analysis on pathways that require a more comprehensive assessment of effects on VSECs.

Pathway analysis identifies and assesses the linkages (or interactions) between Project components or activities, and the corresponding potential residual effects to VSECs relating to socio-economics. Potential pathways through which the Project could affect VSECs were identified from a number of sources including a review of the Project description, effects identified by other projects in Nunavut and the Guidelines for the Project.

The first part of the analysis is to produce a list of all potential effects pathways for the Project. Each pathway is initially considered to have a linkage to potential effects on VSECs. This step is followed by the development of design features and mitigation that can be incorporated into the Project to remove a pathway or limit (mitigate) the effects to VSECs. Such design features include best practices, management policies, work procedures and social programs that can avoid or mitigate effects.

Knowledge of the environmental design features and mitigation is then applied to each of the pathways to determine the expected amount of Project-related changes to the environment and the associated residual effects (i.e., effects after mitigation) on VSECs. For an effect to occur, there has to be a source (Project component or activity) that results in a measurable change to the environment (pathway) and a corresponding effect on a VSEC.

Table 9.4-19: Pathway Table

Valued Socio-Economic Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Employment	Construction and operations.	Project would increase the demand for labour during construction and operational phases.	Maximize the employment of people in Kivalliq communities through training. Culturally sensitive workforce practices aimed to improve workplace and retention	Primary, direct and indirect.
Gross Domestic Product and Economic Growth	Project spending on goods and services.	Project would temporarily expand the "size" of the economies of Nunavut and the Kivalliq region.	Economic development (new projects) would minimize the "bump" when the Project ramps down.	Primary, direct and indirect.
Inflation and Consumer Price Index	Spending on labour, goods and services	Increased demand on labour, goods and services would raise prices in short term.	None required.	Primary, direct and indirect.
Trade Balance	Imports of capital equipment and consumables from outside Nunavut	During ramping up, peak activity and ramping down, the Project would add to a trade deficit	Negative effect will be mitigated by increased exports and decreased imports during operations phase.	Primary, direct
Investment	Capital expenditure	Expenditure would add to the economic activity in Nunavut, including investment.	Strategies that increase capacity of local businesses to supply the Project.	Primary, direct and indirect.
Employment by Industry	Direct, indirect and induced spending on goods and services.	Project impacts on different industries would be different, both in terms of scope and timing.	Ensuring that the need for goods and services is mapped out and clarified as well as possible, so that local businesses, individuals and government can prepare and maximize the benefits.	Secondary, direct and indirect.
Economic Infrastructure	Use of infrastructure	Use of infrastructure might decrease its lifetime and leave less capacity for other users.	Project minimizes use of community infrastructure through on site services; road has public access but will be reclaimed during closure.	Secondary, direct and indirect.
Government Fiscal Situation	Payment of taxes	Project would increase public revenue.	None required.	Primary and minor, direct and indirect.

Table 9.4-19: Pathway Table (continued)

Valued Socio-Economic Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Business Opportunities and Contracting	Project spending on goods and services.	Project spending on goods and services would increase the demand locally, allowing local businesses (and new businesses) to grow and become more cost-effective.	Maximize opportunities for local businesses to develop business.	Primary, direct and indirect.
Economic Development	General mining activities and spending on labour, goods and services	Project would increase demand for goods and services, which should lead to growth in several sectors. Mining activities might also conflict with interests of other sectors (e.g. tourism and hunting) and elevate costs through increased demand for resources (e.g. labour).	Maximise local spending through various measures, consult with local businesses.	Primary and minor, direct and indirect.
Income	Payment of salaries and other local spending.	Project would directly and indirectly contribute to disposable income of employees and other local people.	Maximise the employment of people in Kivalliq communities. Offer wealth management through life skills training.	Primary, direct and indirect.
Traditional Economic Activities	General mining activities and local hiring.	Mining activities could impact traditional activities, and local hiring will decrease time available for traditional activities. However, increased incomes might also help local residents overcome constraints to traditional activities.	Consultation with local people, flexible work schedules which allow for certain traditional activities, purchasing traditional goods when possible.	Secondary, direct and indirect.

9.4.3 Effects Analysis

The Project will have effects on the economy of Nunavut and the Kivalliq region, through expenditures in the territory, job creation and revenues to the GN, the KIA, and NTI. These effects will be seen as 'bumps' in economic indicators, as construction ramps up, and then down, and then as production ramps up, remains approximately stable and ramps down at closure. As the socio-economic baseline's description of the experience of Meadowbank shows, these bumps can be quite large and have potential to introduce some volatility in economic performance of Nunavut and the Kivalliq region.

This section explains and discusses some of the potential economic effects. As with the baseline section, the effects are presented separately for Nunavut and the Kivalliq region.

Analytical Methods

To estimate the effects of the Project, an input-output model (IO-model), or economic impact model, was used to imitate potential chain of economic events that might take place. This method is a recognized industry standard, where the objective is to identify and simulate the production and trade that a project might trigger.

In order to assess the effects on the local Kivalliq economy, a different and more mixed method was chosen. This analysis was based on data from Inuit participation in various projects to date, the Project feasibility study data, some analytical analyses, local trends and baseline conditions.

A detailed overview of each methodology is found at the beginning of each respective section.

9.4.3.1 Mitigation Measures

Given how interrelated (and in some cases cascade) socio-economic effects are, it is not practical to present measures specific to each effect. Effect mitigation and benefit enhancement measures are therefore discussed below by category of measure rather than by the effects they are expected to address. Hence, there will be some overlap with other sections of the EIS; some non-economic measures will be discussed in this section and economic measures might be dealt with elsewhere in the document.

Contracting

As for employment, AEM's policy is to maximize opportunities for businesses in Kivalliq to access opportunities to provide goods and services to the Project, again in the interest that Project benefits accrue not only to the larger national and regional economies, but also to the economy and people of Kivalliq. Such a policy implies that where local businesses have little experience with the mining sector, Project specific initiatives may be necessary to remove barriers to successful bidding on procurement contracts.

Although there are now a growing number of exceptions, most businesses in Kivalliq, and particularly in the 4 smaller communities, are largely geared to meet the consumption needs of the resident population rather than the needs of large mining projects. There is, thus, limited experience with the management and logistics of procurement, including preparing offers of goods and/or services. Many businesses are small, and do not have the breadth or the financial resources needed to bid on large contracts. They have limited experience with the demands of supplying large, time sensitive operations and limited experience with quality control.

Initiatives that will be put in place to enhance opportunities to supply goods and services to the Project are identified below:

- maintaining a regularly updated database of potential Kivalliq suppliers[34] of goods and services that identifies businesses interested and with some capacity to supply the Project, noting Inuit content of the business, coordinates and contacts, goods and/or services on offer, updates on contract performance, requests for assistance to improve supply performance and any assistance extended in support;
- AEM will work with the KIA during the construction and operational phases of the Project to provide a framework for tendering and awarding contracts that facilitates and promotes the participation of Inuit Firms from the Affected Communities in priority, and then from other Kivalliq Region communities, and that encourages the retention of economic benefits of the Meliadine Project in the Kivalliq Region, without placing excessive burden on AEM or undermining the viability of the Meliadine Project. The Procedures to achieve this objective will be established within the Meliadine IIBA currently being negotiated with the KIA;
- Providing to the KIA, business associations and the business community, in English and Inuktitut, full and timely information on procurement requirements in agreed areas of capacity to supply on the part of existing and/or potential businesses (including for example, road construction and maintenance, accommodation, catering, janitorial services, trades work, materials handling and expediting, cross cultural and other training, light vehicle maintenance, warehousing, secretarial services, air services and/or environmental and socio-economic monitoring);
- developing contracting procedures that take into account potential needs to break down procurement packages, waive financial guarantees for smaller sized contracts, or otherwise facilitate the participation of smaller businesses;
- providing an explanation for the weaknesses in an offer to any business that may be denied an opportunity to bid for reasons of determined lack of capacity or unsuccessfully competes on a goods or service contract;
- participating with the KIA and the GN in development and support for training programs for existing and potential entrepreneurs that will contribute to their success rates at offering goods and services to the Project;
- identifying synergies between the Project and Kivalliq businesses and facilitating Inuit Firms to access procurement opportunities;
- AEM will work with Kivalliq businesses when asked to and as interest and opportunities warrant to provide information on the needs of the Meliadine Project that may be helpful to Kivalliq businesses looking to form joint ventures with southern Canada businesses that have expertise in supplying the mining industry; and
- monitoring contractor performance for compliance with their commitments as per the eventual IIBA and using monitoring results in decisions on contract administration and management.

[34] Inuit Firms are expected to be defined in the IIBA as will a formula for calculating the level of 'Inuit content'. Factors taken into account in the Meadowbank IIBA include i) location of head office; ii) degree of Inuit ownership and participation in business profits; iii) proportion of Inuit employees; iv) proportion of Inuit wages; and/or v) proportion of inputs from other Inuit firms. The contents of the Meliadine IIBA will likely include similar topics. The final scope will be determined in ongoing negotiations.

Country food for a commercial kitchen facility can only be sourced from a certified contractor (inspected and approved by Canada Food Safety Agency). Currently, capacity to supply country food is limited by certified contractors; therefore it will not be possible to provide country food on-site on a regular basis. Facilities will be provided for Inuit employees to safely store, prepare and enjoy country food brought from their home communities.

Community Contributions

In addition to contributions that may be negotiated as part of the IIBA[35], AEM expects to continue to provide financial and in kind contributions to Kivalliq communities, as has been done at Meadowbank and over the Meliadine Project's development phase. The contributions are made in response to community priorities, usually on the basis of requests by representative organizations. In the recent past, contributions have included providing laptops to students to increase their computer literacy, providing financial support for an anti-bullying program within the Rankin Inlet high school and sponsorship for community events including feasts, and sports events. AEM, for instance, has been an ongoing sponsor of the Kivalliq Trade Show, an annual event held in Rankin Inlet that provides a forum to create and support networking opportunities and information to expand trade and economic activity in the region.

AEM would expect to continue to respond to requests for contributions through the Project life cycle, including in partnerships with hamlet and regional organizations and institutions, and in collaboration with other mining companies.

Compensation

In the course of Project development to date, including exploration at the mine site, there has not been evidence that any Project specific disturbances to wildlife have resulted in declines in traditional harvesting. Therefore there has been no requirement for compensation for loss of economic resources. Nor, given the results of the traditional knowledge studies and the environmental effect assessments, are future such disturbances foreseen.

However, as is the case with any large project, there is some potential that a Project risk might be realized, with unforeseen consequences on traditional harvesting. The IIBA and KIA Land Use Lease is expected to include provisions for compensation for mortality of some large mammals, with compensation being paid to the KIA. It is still possible however that an environmental risk could be realized with consequent effects on one or more individuals. In any such unlikely event, AEM would ensure fair compensation to the affected individual(s), on the basis of an estimate of harm, including taking into consideration cultural loss. The compensation would of course depend on the determination of harm, but could imply a financial payment and/or an 'offset' of some kind.

Nor is it expected that the Project will have any significant effects on commercial activity related to environmental resources. In the improbable event that effects on existing or expected commercial activity did occur, compensation would be negotiated with the affected individuals on the basis of demonstrable loss.

[35] AEM and the KIA initiated negotiations fir an IIBA for the Meliadine Project in January 2012 and continue to advance discussions in accordance with the requirements set out in article 26 of the NLCA. Finalization of the IIBA could occur in the second half of 2014 or early 2015. KIA and AEM have agreed that the most affected communities are Rankin Inlet and Chesterfield Inlet, however the IIBA will cover all 7 Kivalliq communities. Details of the draft IIBA cannot be publicly disclosed at this point, however AEM can indicate that the IIBA will include language to address the following areas: Inuit training and preferential hiring; employmernt rotation; scholarships; labour relations; business opportunities for Inuit; accommodation and recreation; health and safety; language; access to roads; obligations of sub contractors; and coordination with other developments.

People are also concerned about compensation for any effects of the Project on human health. Standards for monitoring and protecting both worker and public health will be established for the Project and comply with regulations and best practices. In the event of an unforeseen accident compensation will be paid.

Closure

The economic effects of final closure are most keenly felt in the coming to an end of employment and contracting opportunities created over, in this case, a period expected to be up to 17 years, including construction and operation phases, and the consequent negative social effects of an economic downturn. The challenge is to ensure that in the process of enhancing access to economic opportunities during the Project's life, consideration is always given to eventual final closure. AEM's intent is to have, by Project final closure, increased the capacity of Kivalliq labour and business to engage in economic activity that is independent of the Project.

Although the final closure of the Project will inevitably cause dislocation, this dislocation should be attenuated to the extent that the following are successful:

- Contracting: Preferential contracting, assistance with the development of business expertise and including the use of Kivalliq businesses as a criterion for evaluation of bids from businesses supplying to the Project, will build experience and capacity.
- IIBA and community contributions: The IIBA will be negotiated according to priority needs in Kivalliq, while incorporating sustainability principles. Implementation of the IIBA will contribute to economic growth but also the social and cultural wellbeing that underlies the ability of people to create and take up life opportunities. AEM's ongoing community contributions, although modest, will have a similar effect.

In addition, AEM will commit to collaborative socio-economic planning with, but not limited to, the Kivalliq SEMC. For final closure, the 'trigger' for final planning should be no less than 2 years before the expected date of closure. Planning would yield mitigative measures such as potentially turning over Project physical infrastructure (e.g., buildings, accommodation camp, docking facilities and/or AWAR), where interest warrants and agreement can be reached on terms of handover – it is noted that for purposes of this FEIS, AEM's undertaking is to remove all physical infrastructure.

There is also a possibility for premature closure (temporary or permanent), which would occur if for any reason the Project became uneconomic and was expected to remain so over an extended period. Premature closure by its nature is unplanned and therefore has more potential for negative effects. Should premature closure happen early in the Project`s life cycle, many of the expected benefits to the capacity of labour, businesses and communities may not have fully developed, and closure mitigation measures will not have been well detailed. If and when a premature (temporary or final) closure occurs, AEM will continue to participate in collaborative monitoring with the Kivalliq SEMC as a means to address any negative socio-economic impacts of the closure..

It is noted that the economic effects of closure will to a large extent depend on whether or not there are economic alternatives available at the time of closure to replace the Project. This in turn is expected to largely depend on progress in developing the mining sector in Kivalliq, and Nunavut more generally.

9.4.3.2 Nunavut (Regional Study Area) Effects Assessment

Analytical Methods

To estimate the effects of the Project, an input-output model (IO model), or economic impact model, was used to imitate potential chain of economic events that might take place. By choosing this method, an attempt is made to identify and simulate the production and trade that a project might trigger. This way, a model should capture the overall economic impact of an event, including new spending and investment, and other shocks to an economy.

The model utilized was the latest (2008 version) of the *NU Input-Output Model* (the Model) which was developed by SJ Research Services. The outputs of the Model indicate the estimated territorial (regional) impacts associated with the construction, investment and operation of the Meliadine mine.

The Model is based on Statistics Canada's 2008 NU input-output table and is rectangular, where each sector or industry can produce multiple outputs and use multiple input structures to do so. This allows for more flexibility and more realistic assumptions, which should lead to more valid and reliable results. The Model allows for modification of the input structure of an expanding industry to reflect the output and input structure of a new development.

The outputs of the Model describe the expected impacts of the Project in terms of Gross Output of the Project, GDP, labour income, and employment (number of positions). The impacts are categorized further into direct, indirect and induced impacts.[36]

Gross Output is equivalent to the total value of sales or shipments relating to the Project. Included in this number are values of intermediate goods and services. Since some double counting will occur, Gross Output is not as good a measure of economic activity as GDP, which includes the total value that is added throughout all sectors of the economy of a geographic area. In other words, GDP equals the gross value of production of firms less the purchases of intermediate goods and services from other firms.

The Construction and operations inputs of the Model reflect only those that can be sourced from within Nunavut. Direct Gross Output impacts equal the initial project expenditure and the GDP component is the value added portion of the project. Inter-industry inputs, however, are adjusted for leakages. This corresponds to the geographic definition of GDP as activity taking place within a prescribed geography. In other words, since construction takes place within Nunavut, Gross Output and GDP accrue within the same geography.

There are some important limitations to input output models in general and results should be interpreted cautiously. The small size and breadth of the economy in Nunavut makes all assumptions and, therefore, results more sensitive to flaws in the limited data available for many economic sectors. In addition IO models are known to have the following shortcomings:

- They do not capture changes over time. Rather, an IO model is best described as comparative statics, where parameters with or without a change (shock) are compared.

[36] The direct impacts in the Model reflect the Project's initial expenditures after adjusting for leakages out of the Nunavut economy. Indirect impacts reflect secondary business transactions that result from the initial expenditures. Induced impacts result from the spending of incremental labour income in the economy after adjusting for the portion of income that goes towards taxes and savings.

Leakage is when capital and operational expenditures exit the Nunavut economy, i.e. through taxes, wages and imports.

- They do not capture economies of scale. Hence, they do not express decreasing inputs or increasing outputs that might happen when operations grow.
- They do not capture environmental and social effects (positive and/or negative) that are not easily expressed in economic terms, such as training and experience gained from a project, which can lead to increased productivity and better quality and workmanship in the region in the long run.
- They do not address the ability of an economy to respond to increases in economic activity in the short term, which can be especially important in a small economy such Nunavut.

Attempts have been made to mitigate some of these shortcomings listed above. For example, expressing results for each year of the construction phase (2015 to 2018) and the operational phase (assumed as 2017 to 2027 for this analysis) offsets the weaknesses associated with changes over time.

As with any modeling exercise, a number of assumptions regarding the Project had to be made. Some are listed as follows:

- For operations, the mining industry was shocked by vectors of expenditures by commodity, based on information supplied by AEM. Total new annual output will be, on average, $403 million per year[37].
- The Project is expected to process 8500 tonnes of ore per day for the duration of operations.
- The total construction costs of the Project are estimated to be $1400 million.
- Construction costs are broken down into labour, consumables, power, fuel, transport, support services, EPCM[38] and owner's costs. Operating costs are broken down into labour, consumables, power, fuel, transport, training and owner's costs.
- Based on the Meadowbank experience, Nunavut's share in the supply of construction and operational inputs was set at 25 percent.[39]
- AEM provided both total labour costs and average wage by type of workers. Labour costs were divided by a weighted average wage to calculate total employment during the construction phase.
- At the time of running the IO model, construction was assumed to run from May 2014 to January 2017, for a total of 33 months. Construction costs were allocated to each year based on the number of months in each year in which construction occurs.
- Construction crews will be rotated in and out of the construction site on a regular basis. As a result, little spending of construction wages in Nunavut is expected to occur, except by local labour. Consequently, induced impacts during construction phase were scaled back to 20%, which is the assumed ratio of local labour during this phase. Similarly, induced impacts during operations phase was scaled back to 30%.

[37] 8500 tonnes per day x 365 days per year x $130 per tonne

[38] Engineering, Procurement and Construction Management

[39] An exception is Nunavut's manufacturing industries which will unlikely meet the demands during construction phase. An analysis of the Meadowbank project revealed that the bulk of manufactured goods that were invoiced in Nunavut came from local suppliers (wholesalers) while the actual manufacturing occurred elsewhere. As such, manufacturing inputs in the Model are reflected as the wholesale margin on the 25 percent of local supply and appear as inputs supplied by the wholesale industry. Other Nunavut inputs, such as the professional, scientific and technical services industries, are also unlikely to have the capacity to meet 25 percent of required inputs during the construction phase. Consequently, construction phase impacts in this industry should be treated as a "target" rather than an actual.

- Total annual costs were subtracted from total annual revenues and the GDP component of "Other Operating Surplus" was modified to provide model balance.

In a few exceptions, which are clearly indicated, the assessment is based on other sources than the outputs of the Model.

9.4.3.2.1 Construction

Economic Effects[40]

Nunavut GDP

Gross Domestic Product is the measure of the sum of all goods and services produced within a geographic area, in this case Nunavut. Generally, it is used to measure the 'size' of an economy.

The Nunavut Bureau of Statistics publishes detailed economic accounts for the territorial economy in both current and constant (2002) dollars. In 2010 (the latest year available), Nunavut GDP was $1755 million in current dollars and $1233 million in constant 2002 dollars. Annual GDP growth rates have been highly variable, ranging from 10.6% in 2008 to minus 6.2% in 2009 – attributable to the small size of the economy and the consequent large effects of the 'economic shock' of the Meadowbank Project.

According to the conference Board of Canada, Nunavut's growth prospects are substantial. The Board estimates a real GDP growth of 6.8% in 2011 and 16% in 2012.

It is estimated that the Project will add $522 million cumulatively to Nunavut's GDP over the construction phase (2014 to 2017[41]). The numbers below (Table 9.4-20) represent the total GDP impacts of the Project, by direct, indirect and induced effects.

Table 9.4-20: Project GDP Effects, Construction ($Million)

GDP Effects	2014	2015	2016	2017
Direct	102.1	153.3	153.2	12.8
Indirect	16.3	24.5	24.5	2.0
Induced	8.1	12.1	12.1	1.0
Total	**126.5**	**189.8**	**189.8**	**15.8**

Table 9.4.-21 presents total GDP for Nunavut and associated growth rates for the same period 2014 – 2017 for 2 scenarios, one with the Project and the other without (the no investment case). As the table reveals, Nunavut is predicted to have consistent high growth rates (6.4%) for the period, much higher than other parts of Canada, even without the spending relating to the Project. The average growth rate with the Project, during the same years, however, is estimated to be 23%.

[40] Economic effects include effects on GDP, consumer prices, imports and exports and savings rates. These effects could be considered transboundary in nature.

[41] Economic modelling and discussion is based on a contruction period of 2014 to 2017. The proposed Project construction period of 2015 to 2018 does not effect results.

Table 9.4-21: GDP Growth Rates Scenarios in Nunavut (2014 to 2017), No Investment, and Project Scenarios

GDP Effects	2014	2015	2016	2017
No Investment				
Total GDP ($Million)	1729	1840	1958	2083
% change in GDP	6.4	6.4	6.4	6.4
The Project				
% change in GDP	18.2	23.1	22.1	28.7

Consumer Price Index

Nunavut's inflation rate broadly tracks that of Canada, insofar as so much of Nunavut's economy is in fact imports from the rest of Canada. In fact, from 2007 to 2011 the Consumer Price Index for Nunavut was consistently lower than the national level (Statistics Canada 2012a).

There is, however, some potential for short term inflation in response to the Project, originating in excess demand over supply, primarily for labour in Kivalliq communities. However, this is not expected to result in significant effects at the level of the territorial economy. For example, increased demand for labour usually implies increasing wage rates for those with skills that are in short supply, which are inflationary. High inflation may harm people who are unable to access jobs in the expanding labour market for whatever reason. Such people would include some of the more vulnerable in communities – Elders and single parents and their young children for example. Increased wage rates however are a benefit to those who work for wages.

While prices are generally higher in Nunavut than the rest of the country, this is mainly attributed to higher transportation and shipping costs for goods and services to the territory rather than inflationary effects from mining developments. In fact, historical evidence and projections by Conference Board of Canada (2010) and GN Department of Finance (2011) have illustrated that there has been no inflationary effect in response to Meadowbank and none is expected in response to the Project.

Imports and Exports

Nunavut imports more than it exports. In 2012, the trade deficit was approximately $900 million. This means that about half of expenditure in Nunavut finds its way outside the territory, through federal taxation, incomes spent on imports of southern goods, and business expenditures on supplies and labour to meet contractual obligations.

As large projects necessarily imply large imports of capital equipment and consumables during construction, and of consumables during operations, they will inevitably result in a trade deficit. References to Nunavut's economic response to Meadowbank indicate that negative trade balance and business expenditures movements over the period 2007 to 2009 essentially followed the ramping up, peaking and ramping down of construction activity (Statistics Canada 2011). Most likely, the Project will have a similar effect.

The Project is expected to result in $866 million in goods and services to be purchased during the construction phase outside of Nunavut. Thus, the Project will further increase Nunavut's trade deficit, which was $878 million in 2010. An additional $866 million of imports during the construction phase will raise the deficit to $1,866M

(2002 dollars) in 2016. However, the mine outputs from 2017 and onwards will start offsetting this effect, which should bring the trade deficit down to $1,126M (2002 dollars) by 2017.

The bulk of imports will be in manufactured goods, transportation and professional services. It is expected that some of this can be provided by local contractors and businesses, and that the percentage of goods and services provided in the territory will gradually increase throughout the lifetime of the mine as greater capacity to meet the project procurement needs is gained. Consequently, the negative effects on the trade deficit should decrease over time.

Personal Savings Rate

Nunavut's savings rate is the highest in Canada, and is predicted by the Conference Board of Canada to remain above 30% (as compared to recent figures for Canada of about 4%) until 2020 (GNDoF 2011). Large projects are not typically expected to shock savings rates in Nunavut as they may do other more commonly accepted economic indicators such as GDP and employment.

Savings rates are however better correlated with consumer expenditure patterns. Rising incomes could start to cause a drop in Nunavut's savings rate. If a large number of people moved into the private housing market, savings rates could fall because mortgage payments are counted as expenditures in savings rates calculations.

Saving rates should be used with caution as an explanatory variable for economic health in Nunavut. Much of what is saved currently is expected to be saved by non-residents who do not invest in the territory but take their savings with them when they move. Also saving rate calculations depend on tracked financial transactions in the economy and do not capture illicit expenditures on drugs and alcohol and other elements of the underground economy. These will show up in the statistics as savings.

Fiscal Effects[42]

As most expansions in economic activity would, the Project is expected to generate some government revenues, both on a federal and territorial level. These government revenues will be generated through direct, indirect, and induced impacts and through various types of taxes.

In calculations of probable taxes, estimates have not been adjusted for any changes to territorial funding formula entitlements. Furthermore, a number of assumptions were made in order to derive a territorial property tax. First, property taxes were kept as a stable function of GDP at basic prices. Time series analyses of territorial government property tax revenues and GDP at basic prices have suggested that this is the case. Second, the direct operational property tax is assumed to be the impact of the Project on property taxes within the general taxation area, in which the territorial government collects property taxes. This revenue is assigned to the general revenue fund to provide territory-wide services. This figure will be approximately $0.3 million per year once the Project is fully operational.

Mining royalties are problematic to estimate with IO models. While results from such models are typically linear and proportional, mining royalties in Nunavut are levied at a graduated rate and royalty rates vary considerably. In this assessment, mining royalties are assumed to be 12% of mining profits, proposed by the NTI to be implemented beginning in 2013. This assumption should be treated with caution.

[42] Fiscal effects include the Project's impacts on taxes and other public revenues.

As Table 9.4-22 shows, the construction phase is expected to generate estimated government revenue of just over $160 million, of which $27 million will go towards the territorial government.

Table 9.4-22: Cumulative Government Fiscal Impacts from Construction (2014-2017)

Government Fiscal Impacts - Construction 2014-2017	Personal Income Tax	Corporate Income Tax	Taxes Unincorp-orated Business Profits	Non-Renewable Resource Revenue	Sales and Excise Taxes	Payroll Taxes	Property Taxes	Total Revenue
Federal ($M)	121.8	2.8	3.3	na	9.5	na	na	**137.4**
Territorial ($M)	9.5	2.2	1.3	2.8	2.4	8.1	0.5	**26.9**
Total ($M)	**131.3**	**5.1**	**4.7**	**2.8**	**11.9**	**8.1**	**0.5**	**164.2**

Although income generated from the Project is earned in Nunavut, non-local workers will pay Personal Income tax (PIT) in their jurisdiction of residence. As such, PIT actually accrued in Nunavut would likely be equivalent to the ratio of local to non-local employment, 20% during construction. Numbers in Table 9.4-22 have been scaled back accordingly.

Currently, the GN generates only about 10% of its revenue needs from territorial taxation. Instead, it depends on transfers from the federal government because per capita spending needs in Nunavut are far greater than Nunavut could collect on a per capita basis. The main federal transfer, the Territorial Formula Financing grant (TFF), is designed to fill this gap between Nunavut's spending needs and revenue raising capacity. Under Nunavut's funding arrangements with the federal government, a large part of the increase in own-source revenues that result from a growing economy is offset by a lower TFF. The TFF theoretically measures the difference between what Nunavut would need to spend to provide comparable levels of public services as the provinces and its ability to raise its own revenues at comparable levels of taxation. Nunavut's revenue-raising ability takes into account the various revenue sources that the government has at its disposal to raise revenues and measures how much Nunavut could raise from these sources if it levied the same taxes as the provinces at national average tax rates. This revenue-raising ability is referred to as Eligible Revenues. An Economic Development Incentive is applied to Eligible Revenues, effectively excluding 30% of Eligible Revenues from the TFF calculation. This is meant to provide a fiscal incentive for Nunavut to promote economic growth. Without it, a dollar of increased tax revenue would simply be offset by an equal reduction in the Grant.

The combination of the revenues measured at National Average Tax Rates and the Economic Development Incentive produce different rates at which each revenue reduces the TFF Grant.

Mining royalties are not a part of the TFF Agreement and therefore would not be subject to claw-back should Nunavut negotiate a resource revenue sharing agreement with the federal government. At present, these revenues go to the Federal government.

In addition to the aforementioned calculation assumptions, the estimated tax revenues also assume that external factors will not make the construction of the Project deviate from the project plan. As an example, the estimated tax revenues have not been adjusted for the risk of construction being delayed due to technical difficulties, disruptions due to weather, emergencies and/or other events.

In conclusion, the net fiscal impact of the Project on Territorial revenues is difficult to measure but is likely in the range of 30% of total revenues, less mining royalties.

9.4.3.2.2 Operation

Economic Effects[43]

Nunavut GDP

During a 10-year operations period, 2017 to 2027, it is expected that the Project will add an annual $272 million to the Territorial GDP. Table 9.4-23 breaks this effect down by type.

Table 9.4-23: Project Annual GDP Effects, Operations* ($Million)

GDP Effects	2017 to 2027
Direct	250.0
Indirect	13.8
Induced	8.1
Total	**271.9**

Note: The Project GDP contribution will be the same for each year of operation, 2017 to 2027

As noted in Section 9.4.3.2.1 on the impacts of AEM's construction on the GDP, the GDP growth rate will have considerable impacts on the no investment GDP growth rate during construction, increasing to 18.2% in 2014, 23.1% in 2015, 22.1% in 2016, and 28.7% in 2017. These high growth rates are expected to continue throughout operations, particularly as GDP contributions are higher during operations than during the construction period.

Most of the constraints and opportunities relating to incomes that are discussed in the construction phase section of the territorial effects (Section 9.4.3.2.1) also apply to the operations phase. Therefore, please refer to that section for more in-depth discussion about impacts on GDP and growth rates during the operation of the Project.

Consumer Price Index

Please refer to the subheading Consumer Price Index under Section 9.4.3.2.1, which deals with the economic effects of the construction phase. In summary, high prices in Nunavut are mainly attributed to higher transportation and shipping costs for goods and services to the territory rather than inflationary effects from mining developments. Hence, no inflationary effect is expected in response to Meliadine.

Imports and Exports

During the operational lifespan of the Project, it is estimated that goods and services worth a total of $127 million will be purchased outside of Nunavut annually. However, unlike the construction phase, the Project will produce enough outputs ($403 million) to offset this and more. Hence, the overall positive effect on the balance of trade during operations phase should be close to $300 million.

For further discussion, please refer to the subheading Imports and Exports under Section 9.4.3.2.1, which deals with the economic effects of the construction phase.

[43] Economic effects include effects on GDP, consumer prices, imports and exports and savings rates.

Personal Savings Rate

Please refer to the subheading Personal Savings Rate under Section 9.4.3.2.1, which deals with the economic effects of the construction phase.

Fiscal Effects[44]

During a 10-year operations phase, 2017 to 2027, the Project is expected to generate substantial government revenues, both on a federal and territorial level. These government revenues will be generated through direct, indirect, and induced impacts, and through various types of taxes.

Just as with the calculations of fiscal effects during construction phase, calculations of public revenue during operations phase are based on several assumptions. For a summary of those assumptions, please refer to Section 9.4.3.2.1, which deals with fiscal effects during construction phase.

The generation of territorial government revenue from the Project will likely be higher during the operations phase compared to construction. In addition, a higher proportion of the total revenues will go towards the territorial government than for the construction phase. As Table 9.4-24 shows, the estimated annual revenue of the Project is around $55 million, $26 million of which would go to the territorial government.

Table 9.4-24: Annual Government Fiscal Impacts from Operations (2017 to 2027)

Annual Government Fiscal Impacts – Operational 2017	Personal Income Tax	Corporate Income Tax	Taxes Unincorp-orated Business Profits	Non-Renewable Resource Revenue	Sales and Excise Taxes	Payroll Taxes	Property Taxes	Total Revenue
Federal ($M)	16.9	8.9	0.6	n/a	1.9	n/a	n/a	**28.3**
Territorial ($M)	2.3	7.1	0.2	8.9	0.6	1.3	0.3	**20.7**
Total ($M)	**19.2**	**16.1**	**0.8**	**8.9**	**2.5**	**1.3**	**0.3**	**49.0**

Note: n/a = Not Applicable.

As explained in Section 9.4.3.2.1, only local employees will pay PIT in Nunavut. As such, PIT accrued in Nunavut would likely be equivalent to the ratio of local to non-local employment, 30% during operations. Table 9.4-24 has been scaled back accordingly.

During the operations phase of the Project, the price of gold could have substantial effects on the fiscal impacts of the Project. In addition, this phase is more sensitive to disruptions in activities due to technical difficulties, weather incidents, emergencies and other events. Therefore, all projections of fiscal impacts should be interpreted with caution.

Most of the discussion relating to fiscal impacts in the construction phase section of the territorial effects (Section 9.4.3.2.1) also apply to the operations phase. Therefore, please refer to that section for more in-depth discussion about impacts on GDP and growth rates during the operation of the Project. In short, the project is expected to have significant and positive effects on the GDP and growth rates during its lifetime.

[44] Fiscal effects include the Project's impacts on taxes and other public revenues.

9.4.3.2.3 Temporary, Final, and Post-Closure

Final closure is inherent in the non-renewable resource extraction industry. GNDoF (2010) notes the importance of encouraging the development of multiple mining projects in order to stabilize Nunavut's economy in the face of inevitable closures. The extent that other opportunities open up as the Project comes to its final closure will determine what actually happens in the economy. A final closure of the Project will result in economic contraction in the absence of new activity that takes its place.

Based on the current production plan, final closure may begin as soon as 2027, given that additional and minable reserves have not been found. Final closure and the subsequent post-closure phase will lead to up to 90% reductions in project expenditures, with consequent reductions in other economic parameters. Corporate tax and royalty payments to government and NTI will end. Large reductions in contracting and employment also imply that business and personal income tax receipts will decrease.

As noted in Section 9.4.3.1, which explains mitigation measures, AEM will remain mindful of the potential for negative effects throughout the Project life cycle, integrating sustainable development principles into mitigation and benefit enhancement measures in an effort to minimize to the extent possible the negative socio-economic effects of closure on individuals. Enhanced capacity of the labour force and businesses, institutional strengthening of civil society, social investment, and increased government revenues are expected to position people to achieve improved socio-economic status over the life of the Project. This should have the result of improved capacity to absorb the impacts of closure.

On the assumption that at least some other mining projects in Nunavut go forward, and that the industry grows with time, Nunavut's economy can be expected to be, by 2027, much larger than it is today. Thus, although closure in fact reverses most of the Project's economic benefits, the relative contribution to economic performance should be lower than in the early years of the Project. Ongoing development in the mining sector may imply that there are other projects in the pipeline to replace the Project. Therefore, the risk of the closure of the Project having a long-term negative impact on the territorial economy is rather minimal.

9.4.3.3 Kivalliq Region (Local Study Area) Effects Assessment

Effects on community economies will largely be driven by opportunities the Project will create for employment and contracting. As noted in Section 9.4.3.1, AEM will put in place measures to increase the capacity of people in Kivalliq to take advantage of these opportunities, including a range of education and training initiatives. To the extent that economic opportunities can be taken up by people in Kivalliq, there will also be economic growth and diversification in at least some communities, incomes will increase, and some people can be expected to migrate.

Not all positive effects will necessarily be immediately seen in their full potential, but are expected to gain momentum with time. It is noted that the construction and now operation of Meadowbank has prepared some of the ground for growing capacity in Kivalliq region to supply labour, goods and services to the mining sector. With regard to negative effects, most of these are expected to become evident in the transition first into construction and then into operations. With time, negative effects are expected to moderate as people and the economy adjust to the Project.

Analytical Methods

The analysis of employment, contracting and income effects has been somewhat quantified on the basis of patterns of Inuit participation in various projects to date, the Project pre-feasibility data regarding AEM's expected work force size and skill requirements, and baseline conditions and trends regarding labour force size and participation rates.

Contracting opportunities are based on outputs of the economic impact model (the Model) which is described in Section 9.4.3.2. However, as the Model describes territorial effects, some assumptions have been made with regards to the effects on the Kivalliq region. Furthermore, the residual effects of these will depend on a number of factors relevant to the capacity of business to access opportunities – including importantly availability of workers and joint venture developments. The assessments of indirect and induced economic effects and income effects are necessarily also largely qualitative.

Increased economic opportunities are considered in this section to largely represent benefits, in and of themselves. This is not to imply that there are no consequent negative effects, such as effects on traditional culture, community wellbeing and infrastructure and services. Such effects are addressed in applicable sections of this assessment.

Although an attempt has been made to divide the discussion on the Project effects on employment, contracting and income into construction and operation related effects, this has not always been feasible. Therefore, in some instances, operational effects are discussed in the construction section and vice versa.

9.4.3.3.1 Construction

Employment

The Project's direct employment during construction phase is expected to be predominantly by construction contractors, of which the largest will be southern based companies with their own established, skilled work forces. Skill sets required are different at different times over the course of a large construction project, thus many skilled jobs are short term. The high financial costs of construction phases, with no return on capital investments until mine production begins, forces very tight schedules with fewer opportunities for on the job training than is characteristic of operations phases.

These conditions are inherent in mine construction. The major implication of these conditions as regards the employment of people in Kivalliq is that most employment is expected to be employment of people with unspecialized skills. The advantage however is such employment can be continuous throughout the 4 years of construction (2015 to 2018).

Work force requirements (positions) for construction will vary over the construction period (early 2014 to early 2017), averaging 1000 positions and totalling about 1700 positions in 2015 and 2016 (see Table 9.4-25). It is conditionally estimated that up to 30% of these jobs will require unspecialized skills, representing up to 450 jobs on average. Skilled workers would also of course be offered employment to the extent that such workers are available. On average, the skilled positions are estimated to be around 55% of total. There are experienced construction workers in Kivalliq. In 2006, almost 200 people identified themselves as construction workers specifically, and over 500 people had experience in trades, transport and equipment operations (Statistics Canada 2007c). Numbers have likely increased in the last 5 years.

Other positions during construction phase include management positions (2%) and supervisory and professional positions (13%). It is expected that these will mainly be held by southern based employees.

These estimates (number and distribution) are based on pre-feasibility data and can be subject to change as a result of a feasibility study, negotiations with stakeholders and other factors. Apart from the direct construction positions, the Project will lead to both indirect and induced positions. During construction phase, the number of such positions might total 340. While it is hard to predict the proportion of unspecialized positions, there are good reasons to assume that this percentage can be at least as high as for the direct construction positions (30%). This could translate into 100 unspecialized positions during the construction period.

Table 9.4-25: Number of Positions (direct, indirect, and induced) during Construction Phase

Employment Impacts (positions)	2014	2015	2016	2017
Direct	1138	1706	1706	142
Indirect	181	272	272	23
Induced	60	90	90	8
Total Employment	**1379**	**2069**	**2069**	**172**

Table 9.4.26 provides data on Inuit participation at the Meadowbank Mine during construction. The table indicates that a 20% Inuit work force is a conservative estimate of what is achievable.

Most hiring for Meadowbank in the past was in Baker Lake. However, as the labour market has tightened in Baker Lake, AEM is now recruiting in all Kivalliq communities. As of early 2011, just over 50% of AEM's local work force was from communities other than Baker Lake. Most of these newer workers were from Arviat and Rankin Inlet, but some workers came from each of the smaller communities (AEM 2010).

Table 9.4-26: Construction Employment Data for the Meadowbank Mine

Meadowbank Mine	Total employment	Total employment wages	Local employment	Local employment %
AEM construction, 2007/2008	612	$35 914 766	132	22

Sources: Areva (2011); AEM (2011b); AEM (2014, pers. comm.).

Note: "Total employment wages" is for the period 2007 to 2010; remainder of the data are for 2007/2008.

Given that the total number of positions for the Project is larger than for Meadowbank, and other projects in the region now will be competing for labour resources, it is rather unclear how many jobs (construction and operation) can be expected to be taken up for the Project by people in Kivalliq. Given that the Meadowbank project is expected to be ramping down as the Project is underway, it can be assumed that local hires could be substantial. However, other projects elsewhere in the territory might complicate this scenario, as they could have a spill-over effect into the Kivalliq region. Given its large size, this is especially true for the Mary River Project.

Although it seems that the 500 unemployed people in Kivalliq in 2006 (Statistics Canada 2007a) might be able to meet a large part of the Project's demand for workers during the construction phase, this is not necessary the case. Not all these unemployed are still unemployed and both willing and able to take up rotational work.

Available labour force data at the regional and community level are only available for 2006, and do not reflect AEM's hiring since 2006 which now approaches 250 people from Kivalliq. Data from tax files (Table 9.4-27) show that 320 more tax filers[45] reported earned income in 2008 than in 2006; about two thirds of whom lived in Baker Lake. Thus the increase in the percentage of people reporting earned income is a good measure of new employment.[46] So, despite a growing labour force, the total number of unemployed would be expected to be substantially lower than the 500 unemployed in 2006.

Table 9.4-27: Tax Filers Reporting Earned Income

	No. of Tax Filers in 2006	Percent Change			Added Tax Filers 2006 to 2008
		2006 to 2007	2007 to 2008	2006 to 2008	
Arviat	800	0.0	1.3	1.3	10
Baker Lake	690	14.5	11.4	27.5	190
Chesterfield Inlet	200	0.0	5.0	5.0	10
Coral Harbour	330	0.0	3.0	3.0	10
Rankin Inlet	1220	1.6	4.0	5.7	70
Repulse Bay	350	-8.6	12.5	2.9	10
Whale Cove	160	0.0	12.5	12.5	20
Kivalliq	3740	2.4	6.0	8.6	320

Source: Areva (2011)

On the grounds of efficiency and of health and safety, as in Meadowbank, there will be minimum language and education requirements to work at the Project. The work language will necessarily be English and basic literacy will be required. Given the considerable evidence that employment rates are positively correlated with educational achievement (see for example GNBS 1999 which looks specifically at the correlation between education and employment in Nunavut), many of the unemployed are expected to have low to very low educational levels that may exclude them from employment at the Project.

Current AEM hiring practices do not imply systematic criminal records check. Checking for criminal records is a restricted exercise that requires well defined rationale to be conducted. Criminal records check could be done for candidates prior to their appointment to a position of trust, to a highly sensitive position or other position that could be identified as requiring verification. Under those circumstances, employee's written consent would be requested before proceeding.

AEM's experience also suggests that rotational work has proven quite challenging for many. Turnover rates have been high at Meadowbank. In 2011, the turnover rate for the Nunavummiut workforce was 40%, not including workers who left the Project because their temporary work term was not extended (AEM 2012a).

Finally, the discussion above is general to the labour force and does not take into account that rotational mines continue to have difficulty attracting and retaining female employees.

[45] Tax file data provide good coverage in Nunavut (over 93.9%, Statscan, 2010), in part because, even for those with no to very little income filing, a tax return is needed in order to claim the GST credit.

[46] It is however not an exact measure. For example, 2 people could work at the same job but over different time periods. Both might newly report earned income however this would be earned at only one job.

These 4 factors – decreasing numbers of unemployed, limited educational achievement, challenges of rotational work and limited participation by women – might suggest that AEM could have some difficulty in identifying workers from Kivalliq. However, there are at least 4 countervailing factors.

First, large numbers of people have entered (and will continue to enter) the labour force since 2006. Table 9.4-28 provides an indication of potential new entrants to the labour force by 2017, when Meliadine is expected to enter an operational phase, using population by single year age for Nunavut (column A) as the basis for calculating population by single year for Kivalliq (column B, at an assumed 29% of Nunavut's population[47]) and new entrants to the labour force (column C, at an assumed participation rate of 65%). However, people will also leave the labour force during these years so new entrants do not all represent labour force growth; that is labour force growth is not expected to be as high as almost 900 people by 2017. Assuming a (conservative) annual labour force growth of 2.3% annually, about 500 people would be added to the labour force over the period to 2017.

Table 9.4-28: Kivalliq Labour Force Growth Rate Scenario

Age		Column A - Nunavut	Column B - Kivalliq	Column C - Kivalliq New Entrants
17	18 years and over by 2017	624	181	118
16		695	202	131
15		682	198	129
14		669	194	126
13		665	193	125
12		686	199	129
11		680	197	128
Subtotal (new entrants by 2017)				**886**

Source: Areva (2011)

There will be job creation in Kivalliq over the coming decade – not all of these people can expect to be unemployed and available for work at Meliadine of course. However, Table 9.4-28 does confirm the concerns of both government and people about jobs for youth newly joining the labour force are well founded.

Secondly, people may choose to move from part time and seasonal, to full time/full year work. There are no data to indicate the degree to which workers choose or must accept part time and seasonal work. However, over 50% of people with earned income in Kivalliq in 2006 did not work full time for a full year, equivalent to over 1600 people. Some of those would choose to work full time/full year if they had the opportunity. The time that part time and seasonal workers who want to work fulltime/full year but currently do not represents additional labour force availability.

Thirdly, there are hopeful signs that the young are responding to improved economic opportunities by completing high school – high school graduations in Kivalliq have doubled since 2000, to 83 graduates in 2010 (NAC 2011). These graduates represent more than 45% of 18 year olds in Kivalliq in 2010. If the 1350 children who will reach 18 years over the coming 6 years graduated at a rate of 45%, this would be about 600 graduates. Not all of

[47] About 29% of Nunavut's population was in Kivalliq in 2010. Kivalliq's population is growing faster than Nunavut's however, thus 29% is conservative.

these graduates will enter the labour force immediately – some of will move on to post-secondary education and enter later, and some will choose not to work.

Fourthly, employment at good wages is expected to attract some of the more than 1,600 workers (in 2006) who are already fully employed. While this does not have any effect on available labour, such people are a source of workers and create opportunities for others to take up the jobs they have left.

In addition, AEM has committed to implementing benefit enhancement measures for local communities to capture the benefits of the Project (i.e. employment, skills development). These benefit enhancement programs will support local residents' ability to benefit from Project activities, and aim to address barriers to employment. Benefit enhancement programs will include, but are not limited to[48]:

Employment Benefit Enhancement Measures:

- maintaining a regularly updated database of potential Kivalliq employees and preferentially hiring people from local study area (LSA) communities;
- including points of hire in all 7 Kivalliq communities, and funding transport between the mine site and these points of hire to enable Project employment without a need to leave home communities for extended periods of time;
- providing to Kivalliq communities and the KIA full and timely and easily accessible information in English and Inuktitut on workforce requirements, job descriptions, qualifications, and performance criteria;
- under the Meliadine IIBA (currently under negotiation) AEM expects to jointly establish with the KIA annual employment goals in selected trades and job categories for each 12-month period of construction and operations at the Project. These annual employment goals will be established, measured and reviewed based on the number of workers needed, the availability of Inuit and, as appropriate, the availability of skilled Inuit who are interested and want to work at the Meliadine Mine.
- reviewing educational and training requirements for Project positions, together with conducting prior learning assessments, with a view to accepting experience in lieu of qualifications where this is possible. At its Meadowbank operation AEM does not enforce a minimum educational level as a qualification for employment for most of its job openings. AEM recognizes that establishing a minimum grade 10 educational level for potential employees hired from Nunavut would have significantly limited its success in hiring Nunavummiut. At Meadowbank AEM has waived such a requirement for Nunavummiut applicants and has evaluated each local applicant based on their attitude and past job/life experience. Under this approach many Nunavummiut have been hired at Meadowbank without meeting a minimum Grade 10 educational level. This approach does present AEM with a "Catch 22" type of quandary, specifically AEM believes that Nunavummiut need to attain higher levels of educational attainment to be able to access the more skilled and better paying job openings offered by mining and thus does not want to encourage younger

[48] A full list of benefit enhancement programs that AEM has committed to implementing is found in SD 9-2 Socio-Economic Management Plan – Meliadine Gold Project, Nunavut.

Nunavummiut to leave school early to obtain work at the Mine. AEM has demonstrated its willingness to work with the Government of Nunavut (MOU with the GoN Department of Education on educational initiatives such as the Mining Matters curriculum, apprenticeship programs, etc.) and others to encourage young Nunavummiut to stay in school to maximize their educational attainment so that greater opportunities are available to the next generation. However these changes will take time and in the interim there are many Nunavummiut who do not have Grade 10 but who can work at Meadowbank, consequently AEM has applied a highly flexible approach to prevent educational levels being a barrier to entry level positions available at Meadowbank. AEM intends to transfer this approach to employment of Nunavummiut at its proposed Meliadine Project;

- designing recruitment methods, advertisements, application procedures, interview protocols, selection procedures, and training and promotion decision making to reduce potential artificial barriers to employment, including language barriers;
- putting in place a culturally appropriate Employee and Family Assistance Program (EFAP) to address individual and family problems that threaten an individual's ability to continue working;
- under the EFAP AEM will provide counselling services to employees to help them address problems that threaten an individual's ability to continue working. The frequency and duration of counselling will be determined by the counselor and client, with due regard to work schedules, rotation schedules and employment duties.
- conducting exit interviews with a view to increasing the understanding of potential barriers to successful long term employment and integrating the results into other initiatives as relevant;
- providing cross cultural training to all employees in order to facilitate the successful integration of Inuit employees into the workforce and to facilitate understanding of Inuit values by employees not resident in Nunavut;
- providing culturally appropriate services to workers, including recreational facilities, food and accommodation, country food storage and/or country food kitchen, and work schedules that accommodate traditional activity to the extent practical;
- training on and enforcing policies related to vehicle operation, controlled substances, alcohol and harassment, with a view towards establishing the workforce discipline which encourages health, safety, learning, retention and advancement of Inuit employees;
- providing recrimination free opportunities for workers to express complaints or concerns, and bring to light conflicts such that grievances are addressed promptly;
- establishing a collaboration committee consisting of employees who are elected to represent their co-workers to discuss all issues of concern to employees including employment conditions;
- maintaining a safe workplace for women workers, and on a case by case basis providing additional support to women applicants and employees to enhance the potential for employment success;

- reviewing, at least biannually, the results of employment initiatives to identify barriers to employment for particularly women and challenged workers such that appropriate additional responses can be developed.
- including in the evaluation criteria for contractors (at the pre-qualification stage) the extent to which they have previously used Inuit labour in meeting their contractual obligations and using this criterion as set out within the IIBA to help guide decisions on contract awards; and
- monitoring contractor performance for compliance with their commitments and using monitoring results in decisions on contract administration and management.

Education and Training Benefit Enhancement Measures:

- providing pre-employment training to job candidates in such areas as work readiness, life skills, and personal financial management to enhance the potential for success once employed;
- providing timely and accessible information to Kivalliq communities on all Project related education and training opportunities;
- establishing a Work Force Development Plan to be updated annually to internally guide AEM on its Project related training needs and to facilitate addressing those needs through AEM's continued participation in the Kivalliq Mine Training Society. For example this Plan could include funding for training positions[49] for Inuit at Nunavut educational institutions and at existing AEM operations in preparation for the operations phase of the Project, including in heavy equipment operations, mill operations, apprenticeship and technician training, technology, environmental monitoring and computer and office skills;
- providing on the job training in areas such as orientation to AEM operations, health and safety, and skills upgrading (core competency), supervision, leadership and management with a view to enhance job performance, retention and advancement;
- providing on the job training and counseling as appropriate in areas such as career development, diversity and respectful behaviours, life skills, and personal financial management with a view to support a successful employment experience;
- retraining selected construction workers for operations phase jobs and training operations workers in new required skills (for example, in mining methods) to allow successful employees to continue their employment as work force needs shift;
- supporting efforts on the part of employees to upgrade their education as a means towards job advancement – for example, accommodating employees (where practical) who decide to participate in high school completion programs by allowing employees to retain employment with the mine while upgrading their skills;

[49] These training positions will be for different time periods, from one to 4 years, depending on the nature of the training.

- offering haul truck driver training to increase the number of skilled Inuit workers at the Project. AEM's objective is to train semi-skilled workers using a simulator of actual equipment to be used on site. This program will enable workers to build their capacity so that they can access employment opportunities that require specialized skills. The haul truck training will also include a career path to ensure trained haul truck operators can access employment at the mine. This is similar to the training currently being conducted at Meadowbank. AEM intends to move this training facility to Meliadine upon closure of the Meadowbank Mine. AEM also intends to offer employment at Meliadine to its trained Meadowbank workforce to allow employees to continue their career development pathway with AEM;
- cooperating with appropriate agencies in Nunavut in providing entrepreneurial training programs for Inuit businesses – this training will address health and safety, business skills (finance and administration), quality control and legal/contracting issues;
- cooperating with appropriate educational authorities and institutions in Nunavut in the development and implementation of high school and college courses with mining sector content;
- cooperate with the GN and KIA to provide summer employment and cooperative education opportunities at the proposed Mine Site (when economically possible) to provide job experience to the youth (for example, this may include a 'Youth in Mining' program to expose high school graduates to a career in the mining industry and give them work experience in a mining environment);

- working with other mining sector organizations in the region to enhance education and training strategies across the sector through sharing of best practice experience and resources;
- cooperate with the KIA (through the IIBA) to provide a scholarship fund for post-secondary education – eligibility would include both high school students and Project workers;
- participating with schools to deliver youth programs intended to develop traditional skills, particularly those related to activity on the land, and to address the management of mixed economy livelihoods; and
- offering a training program for Project supervisors and management teams. The aim of this training is to develop leadership, communication and conflict management skills needed for responsibilities as a supervisor.

In order to better plan for the future, at its Meadowbank operation AEM has entered into a Memorandum of Understanding (MOU) with the GN Department of Education that will consider a range of initiatives that will benefit students from the Kivalliq Region. The programs are intended to help inform, engage and support youth to be prepared to enter the labor force. These include:

- Design of new information materials about the mining industry and careers in mining that are targeted to reach students from grade 1 through 12.
- A multi-year sponsorship with Professional Developers Association of Canada's to deliver and support their "Mining Matters" program in the Kivalliq region. The program will provide a new earth

sciences program curriculum in schools as well as in service support to teachers to deliver the program. The GN has recently approved the “Mining Matters” program as an official curriculum resource. The program will be delivered in Baker Lake schools on a scheduled basis.

- Sponsorship of regional science and math camps that provide participants with credit. Select Baker Lake students will participate.
- Co-organizing an annual “Career Week” in Baker Lake that attracts employers from various sectors to promote career opportunities to students.
- Co-organizing a trade’s access and skills week that provides students with practical skills experience in trade’s skills, such as welding, mechanics, hairdressing etc. Students receive credit for their participation.
- AEM has participated in curriculum reviews with the Department of Education to consider changes in curriculum that could provide students with new options to link education studies with career choices.

Based on the success of this initiative, AEM intends to extend this initiative to other areas of the Kivalliq Region (specifically Rankin Inlet and Arviat) should the Meliadine Mine be allowed to proceed.

Contracting Opportunities

As for the labour force, the capacity to supply goods and services to the mining sector is rapidly evolving in Kivalliq. Existing businesses are expanding, and new businesses and joint ventures are being formed in response to the economic opportunities offered by Meadowbank and ongoing exploration projects. As progress with other projects in the region will provide additional stimulus to business development, this is expected to continue over the interim until the Project’s planned construction start date.

AEM will depend on several contract services in the construction phase of the Project, which will lead to additional job opportunities. Substantial contract opportunities will be accessible to local businesses. Such opportunities might include the following:

- camp services, catering, and accommodation management;
- transportation and logistics;
- mechanical and fuel services;
- road construction and road maintenance services;
- environmental monitoring services;
- communication services;
- on-site training (e.g. conflict management and cultural awareness);
- community relations services; and
- administration services.

Other potential opportunities for local businesses could exist in power generation, waste services and waste management, heat management, information services, rental and leasing services, technical services and warehousing.

When possible, AEM will require contractors to draw labour from qualified local sources and provide on-the-job training programs during the construction phase. This should ensure that the local benefits from contracting opportunities are maximized.

Historical data on expenditures on goods and services in Nunavut is provided in Table 9.4-29. The data suggest that in the recent past, on the order of 20% of expenditures of Cumberland Resources (previous owner of Meadowbank), Comaplex (previous owner of Meliadine) and AEM have been spent in Nunavut; almost all of it in Kivalliq with NTI registered companies.

It is to be noted that the figures in Table 9.4-29 are only for expenditures invoiced in Kivalliq and Nunavut. As such, they will be reflected in such economic statistics as business expenditures and domestic demand, but only partially reflected in GDP growth. The Conference Board of Canada (CBoC 2001) has pointed out, and public accounts continue to confirm, that 'leakage' is high. This means that about half of dollars spent in Nunavut will find their way outside the territory, through federal taxation, incomes spent on imports of southern goods, and business expenditures on supplies and labour to meet contractual obligations. The figures in Table 9.4-29 therefore overstate the real economic boost to communities, which will largely derive from wages for Kivalliq residents that businesses hire to meet contract requirements, and on business profits that are reinvested in Kivalliq. The Conference Board of Canada estimated leakage in Nunavut due to consumer expenditure patterns at 53 cents on the dollar – leakage of business expenditure would be higher.

Table 9.4-29: Historical Expenditures on Goods and Services (in $Million)

Project and Phase	Total Expenditures	Regional Expenditures		Local Expenditures		Expenditures on Contractors
		$	% of Total	$	% of Total	$
Cumberland Meadowbank development, 1995 to 2003	30	n/a	n/a	7	23	n/a
Comaplex Meliadine development, 2003 to 2009	76	n/a	n/a	15	20	
AEM Meadowbank construction, 2007/2008	512	171	33	n/a	n/a	121
AEM Meadowbank construction and operations, 2007 to 2010	969	237	24	227	23	253
AEM Meadowbank operations, 2nd quarter 2010	n/a	31	n/a	31	n/a	16

Sources: Areva (2011).
Note: Regional = Nunavut; Local = Kivalliq; n/a = not applicable

AEM's total construction expenditures on contracted goods and services are expected to reach $866 million[50] during the 3 and a half year construction phase of the Project. If AEM achieves at least 20% of these expenditures in Kivalliq, this represents about $175 million, or an annual average of about $50 million. A more precise estimate of the total amount of goods supplied to the Project, including country foods, procurement,

[50] All AEM spending estimates are in 2012 dollars.

services and contracting, and other business opportunities in the socio-economic RSA is not available at this stage of Project development.

Based on Nunavut's GDP and Kivalliq's population, it is likely that the Kivalliq domestic product was in the order of $320 to $380 million in 2011, and total demand in the regional economy about twice that.[51] AEM's expenditures for the construction phase would, therefore, likely represent 7 to 8% of the total demand.

It has to be noted that these figures are indicative of potential rather than predictive. Although capacity on the part of businesses to respond to mining sector requirements is clearly expanding in Kivalliq, so is demand. Rapid expansion in face of rapidly increasing demand will require capital, workers and management systems that may take some time to develop. Response to a combination of demand from Meliadine, Meadowbank and Kiggavik may be challenging to achieve. Although Mary River is not in Kivalliq, much of Inuit capacity to supply large projects is now within Kivalliq – a drive for Inuit content from that project could represent additional demand in Kivalliq.

With regard to distribution of contracting opportunities among communities, all indications are that most will be seen in Baker Lake and Rankin Inlet since 70% of Kivalliq's NTI registered businesses are in these 2 hamlets, including all those that have been contracted to date by AEM, and by AREVA during its Kiggavik exploration phase. Therefore, these 2 communities have developed cost advantages that other communities will find hard to compete with.

Due to the proximity to the site, businesses in Rankin Inlet will likely be able to capitalize on some contracting opportunities with the Project almost immediately, notably in the areas of transportation (air, water, and ground), storage, construction and vehicle and equipment rental services.

Businesses in Rankin Inlet will also benefit from the fact that the hamlet has become a business and transportation hub for the Kivalliq region. The Rankin Inlet Airport services regular scheduled flights, charter flights and air courier flights, and local freight companies have a variety of services. In addition, local businesses include vehicle and equipment rentals, taxi services and construction companies. Furthermore, the infrastructure in Rankin Inlet is relatively strong, including complex water and sewer treatment and distribution systems, which provides more capacity for local business development.

While Baker Lake is located further from the Project, it is in closest proximity to two thirds of exploration projects in the Kivalliq region. Therefore, the local businesses have developed substantial skills and experience in servicing the mining industry. Consequently, Baker Lake businesses will likely be in a good position to fulfil certain contracting opportunities.

Economic Growth and Diversification

Due to the small size of the economy of the Kivalliq region, the direct Project expenditures on goods and services will be relatively large. In addition, there will be indirect and induced effects.

In order to better capture the opportunities related to contracting, businesses in the Kivalliq region will require new employees. In addition, with increasing direct and indirect economic activity, individuals and business will be spending increasing incomes on goods and services. This in turn will induce more employment, and perhaps

[51] There are no data on the size of the economies of Nunavut's regions. Very approximate estimates can be calculated from Nunavut's per capita income, adjusted downward for Kivalliq`s population size and lower incomes.

more small businesses, as people in local communities organize to provide additional goods and services demanded by others with new disposable income. In the end, the impacts of contracting could benefit the Kivalliq region in a major way.

Additional income may be spent for example on renovations to housing, increased travel, new household appliances, vehicles that will require maintenance, and other consumer items. This process of direct economic effects feeding back into community economies represents both economic growth and diversification of the economy. The best examples are in Baker Lake, where there is now some demand for private housing and businesses have organized to meet that new demand, and in Rankin Inlet where its economic advantage as the regional hub has meant more goods and services are available than, for example, in the bigger hamlet of Arviat.

Table 9.4-30 describes potential economic impacts of the Project by sector for the years 2014 to 2017. The numbers for effects on the construction sector are direct impacts of AEM's construction activities. However, the table shows that the Project will lead to indirect and induced spending in various other sectors. Although the numbers are for Nunavut, it can be assumed that the vast majority of the regional capture of the spending will happen in Kivalliq. Consequently, most of the economic growth and diversification will happen there.

Table 9.4-30: Total Economic Impacts of the Project by Industry during Construction, 2014 to 2017 ($M)

Sector	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions - Cumulative)
Crop and Animal Production	0.0	0.0	0
Forestry and Logging	0.0	0.0	0
Fishing, Hunting and Trapping	0.0	0.0	0
Support Activities for Agriculture and Forestry	0.0	0.0	0
Mining and Oil and Gas Extraction	4.1	3.1	32
Utilities	19.2	9.9	36
Construction	1400.0	421.4	4693
Manufacturing	0.1	0.0	1
Wholesale Trade	3.4	1.6	17
Retail Trade	6.7	3.7	66
Transportation and Warehousing	19.4	6.6	74
Information and Cultural Industries	4.6	3.6	32
Finance, Insurance, Real Estate and Rental and Leasing	25.4	19.5	28
Professional, Scientific and Technical Services	57.9	36.4	487
Administrative and Support, Waste Management and Remediation Services	5.1	3.2	62
Educational Services	0.6	0.4	8
Health Care and Social Assistance	1.4	0.4	5
Arts, Entertainment and Recreation	0.3	0.1	14
Accommodation and Food Services	2.7	1.4	27
Other Services (Except Public Administration)	0.8	0.5	7
Operating, Office, Cafeteria and Laboratory Supplies	9.1	0.0	0
Travel, Entertainment, Advertising and Promotion	6.2	0.0	0
Transportation Margins	0.0	0.0	0
Non-Profit Institutions Serving Households	5.2	3.2	56
Government Sector	10.4	4.7	44
Total	**1582.6**	**519.7**	**5688**

While there is no doubt that the Project will lead to substantial economic growth in the Kivalliq region, it is trickier to value its effects on diversification. Although Table 9.4-30 indicates that there will be opportunities to grow several industry sectors, the Project will also establish the Kivalliq region as a resource based economy, with the advantages and disadvantages of being heavily reliant upon one or a few economic sectors and employers. This means, for example, that the local economy might become more sensitive to changes in commodity prices and other external factors that can lead to changes and disruptions in resource projects.

It is also true that rapid economic growth can have negative effects in Kivalliq. Because over half of what Nunavut consumes comes from southern Canada, inflation is in large part dependent on inflation in Canada more generally. As noted earlier in the EIS, inflation tends to harm those who are unable to access the labour market, e.g. Elders and single parents and their young children.

Increasing wage rates also imply additional costs to businesses and hamlet governments, and, at the limit, inability to offer services in face of labour shortages. The potential for full time/full year employment, with associated opportunities for training and career advancement, will be an incentive for some workers to leave current employment (or underemployment). Employment at the Project may be preferred by some of the already employed, and it is in the Project's interests to try to attract particularly more highly skilled already employed, both to maximize Inuit employment, and to effectively operate. The departure of workers from current jobs represents a further cost to employers, insofar as new employees must be trained.

The labour market has certainly changed in such ways in Baker Lake in response to Meadowbank. However, it is noted in this regard that Meadowbank initially gave hiring preference to people in Baker Lake, as the most Project affected community, and hired substantially more people than originally envisaged. This contributed to a very tight labour market. Meadowbank has subsequently hired more people from other Kivalliq communities, but more than half of its employees still come from Baker Lake. Given the close proximity of the Project to Rankin Inlet, as well as the skills and experience that has accumulated in Baker Lake, most hiring will likely take place in the 2 communities. However, continued attempts to hire more widely in Kivalliq should result in less pressure on wage rates and labour availability in any one community. Nevertheless, there will still be instances where employers will lose employees to the mining sector.

Thus, to the extent that the Project draws workers from other economic activity rather than from the pool of unemployed, there can be negative impacts on service delivery and/or costs for both business and government. Labour force adjustments can also result in in-migration. In-migration can relieve labour shortages, however it also increases demand for goods and services. However it is important to note that such labour force adjustments have an overall positive effect. As more skilled people move into new jobs, room is left for the less skilled to become employed and learn new skills. This process represents an increase in labour force capacity overall.

Finally, it is noted that whereas the positive effects of labour force adjustment are long lasting, the negative effects arise in response to the rapid growth represented by the introduction of the Project into the Kivalliq economy. With time, labour force conditions will adjust and are expected to stabilize.

In summary, the Project could have substantial and long-lasting positive effects on businesses in Kivalliq, creating a platform for substantial economic growth and diversification of the economy. These effects are projected to outweigh the potential negative effects caused by increased pressure on the labour market.

Incomes

AEM acknowledges the challenges of rotational work and the potential for competition for skilled labour, in part by paying competitive wages. Current estimates are that an average wage for unspecialized skilled workers during construction would be in the order of $60 000 per annum in 2012. The average wage for the whole workforce, for all workers on all levels, would likely be in the order of $85 000 to $90 000 per annum.

Conservatively assuming that 200 unspecialized position (although some of those will be filled by skilled workers) on average will be filled by local construction workers, the Project's payment of wages to Kivalliq residents would be $12 million annually on average.

In 2006, the median wage for full time/full year work was $50 000, which would be about $55 000 in 2012 on the basis of Nunavut's inflation rates since 2006. AEM's expected wages for unspecialized skilled workers during construction is 9% higher than this median (which of course is calculated for all people working full year/full time including the highly skilled). The average wage for the whole workforce, however, is expected to be more than 50% above the median wage.

In order to calculate the effects on the total wages paid in Kivalliq, some significant assumptions have to be made. It is considered unlikely that wages paid in 2012 will be more than $100 million, given that in 2008 (taking into account Meadowbank employment) there were 4,060 wage earners with median earnings of just under $22 000 in Kivalliq (NBS 2011). The construction wages paid to Kivalliq unspecialized workers would therefore represent increases in total wages of perhaps 15%.

The above considers only direct employment by the Project. However, a substantial number of jobs will also be created as a result of indirect and induced economic effects. It is not expected that all these jobs will pay wages comparable to those paid by AEM, however there will be additional, substantial income effects from these jobs as well.

Finally, some pressure on wages is expected, also increasing incomes. In this regard, it is noted that the median wage in Kivalliq between 2005 (without Meadowbank) and 2008 (with Meadowbank) rose by 25% as compared to increases of 14% and 5% in Qikiqtaaluk and Kitikmeot, respectively. The median wage in Baker Lake increased by 53%.

Increased incomes are generally associated, overall, with increased individual, family and community wellbeing. It is this association that motivates the emphasis given in consultations, by people and governments, to employment by the Project. The economic strategies of all levels of government in Nunavut are importantly based on the creation of formal sector economic opportunities as one primary means towards enhancing wellbeing. There is, as the major benefit of the Project, potential for improved quality of life for those individuals (and their families) who are able to find employment with the Project, with businesses that supply the Project or elsewhere in the expanding economy.

Land Based Economic Activity

As described in the baseline section of this EIS, it is difficult to quantify the importance of land based activities on the economy of the Kivalliq region. Consequently, it is not easy to analyse trends over time. There are reasons to believe that importance of income streams generated by land based activities (e.g., hunting and fishing) have decreased in recent years, although it still contributes substantially to the local economy, both in terms of total market value and family income.

The Project might impact land based economic activities in both negative and positive ways. Firstly, employment opportunities related to the Project, which should lead to increased income levels, should help reduce the cost constraints that many local residents experience as a major hurdle for hunting and fishing. In fact, there are indications of this happening in Baker Lake since work on the Meadowbank Project commenced (Areva 2011b), although it is hard to verify a causal relationship.

Secondly, with increased employment opportunities and much time spent on site, more people might experience time constraints which could offset the benefit of having more funds for hunting and fishing.

Thirdly, the Project and induced activities might spur an increase in demand for local food, which could create opportunities for local individuals and business to preserve and develop their hunting and fishing skills, as well as generate some additional income.

Fourthly, certain aspects of the Project might affect the access and barriers to land based activities in positive and negative ways. An example of this is the AWAR, which can lead to better access for hunting activities while it also has the potential to change current hunting patterns.

The effects to traditional and commercial harvesting were assessed in Section 9.3.3.2. As no marine mammal harvesting occurs within the LSA, Project-related effects on access are not expected to have an effect on marine mammal harvesting. The marine mammal assessment further concluded that there would be no impacts on marine mammal populations, including polar bear (FEIS Volume 8, Section 8.3.7.2.). As a result, the Project is not expected to have an effect on the sustainability of marine mammals for harvesting. Thus, the sustainability of traditional harvesting is not expected to be affected due to Project-related changes in the availability of marine mammals (Section 9.3.4.1). Economic activity associated with the harvest of marine mammals is, therefore, not expected to be affected by the Project.

Overall, it is impossible to quantify the effects of the Project on land based economic activities. Furthermore, the economic aspects of land based activities only represent a part of a greater topic. In reality, the impacts of such activities on individual and social health and wellbeing, as well as culture, are even more important. Therefore, as noted in sections that relate to mitigation measures, AEM will put in measures to minimize potential negative effects on land based activities and support appropriate monitoring initiatives.

9.4.3.3.2 Operations

Employment

Work force requirements (positions) for mining operations will stay relatively constant over the operational period of the Project. This period should start in early 2017 and last for 10 to 13 years with a potential extension period.

The likely number of required positions during the operations phase would be about 700 positions from 2017 and onwards until the Project starts ramping down in the future. Out of the 700 positions, about 55% will be unspecialized. Other positions include management positions (2%), skilled positions (30%), and supervisor and professional positions (13%). These estimates (number and distribution) are based on pre-feasibility data and can be subject to change as a result of a feasibility study, negotiations with stakeholders and other factors.

Table 9.4-31, which provides data on Inuit participation during the operations phase of the Meadowbank Mine to date, indicates that a 20% Inuit work force is a conservative estimate of what is achievable. This would translate

into 140 local workers. Based on the Meadowbank experience, and potential growth of the local workforce, the number could be 30% or even higher. This would translate into approximately 210 local positions. Of those, about 170 are likely to be unspecialized positions.

Table 9.4-31: Operational Employment Data (not including Contractors)

Meadowbank Mine	Total Employment	Total Employment Wages	Local Employment	Local Employment %
AEM Meadowbank operations, 2011	702	$297 206 796	249	35.5

Sources: AEM (2012b); AEM (2014).

Note: Local employment is based on positions held by Nunavummiut. Although strictly not correct, this should give a good indication of local employment.

External factors drive to a large extent the volume of potential local hiring for the Project, of which the status of other projects, such as Meadowbank, Mary River, and Kiggavik, is the most important factor. Although skilled workers would of course be offered employment to the extent that such workers are available, potential employees might be working on construction or operations of other projects. While Meadowbank is less likely to have an impact during the operations phase than during the construction phase, non AEM projects are more likely to have an impact.

Apart from the direct operational positions, the Project will lead to both indirect and induced positions during the operations phase (refer to Table 9.4-32). During this phase, the number of such positions could be around 175, combined. While it is hard to predict the proportion of unspecialized positions, there are good reasons to assume that this percentage would be at least 15 to 20%. This would translate to up to 25 to 35 unspecialized positions during the operations period.

Table 9.4-32: Number of Positions during Operations Phase

Employment Impacts (positions)	2017 and onwards
Direct	700
Indirect	114
Induced	60
Total Employment	**874**

During the operations phase, a much higher proportion of employees will be directly employed by AEM since the operations are less reliant on temporary contractors than construction. This also means that the positions will have a more long-term nature, which the construction phase does not allow for. This should result in a more balanced impact on the employment market, with less stress and turnovers.

Most of the constraints and opportunities during the construction phase of the Project, described in Section 9.4.3.3.1, will also apply to the operations phase. Therefore, please refer to that section for a more in-depth discussion about employment related matters during the operations of the Project.

Contracting Opportunities

Total Project operational expenditures on goods and services are expected to be in the order of $127 million per year during the operations phase. This would translate into total expenditures of about $1270 over a 10 year

operations phase. If an estimated 20% (please refer to Section 9.4.3.3.1, which discusses the contracting opportunities during the construction phase, for further rationale) of these expenditures were spent in Kivalliq, this would be about $25 million annually. Based on Nunavut's GDP and Kivalliq's population, it is likely that the Kivalliq domestic product was in the order of $320 to $380 million in 2011 and total demand in the regional economy about twice that.[52] AEM's contracting expenditures would, therefore, likely represent 4% of the total annual demand during the operations phase.

Total wages paid to contractors during operation of the Meadowbank Mine thus far have amounted to $307 254 080. Similar expenditures can be expected for the Project. By the time that operations of the Project start, businesses will have had more time to mobilize and prepare for the economic opportunities offered at the Project. Likely, businesses at Rankin Inlet will have grown proportionally fastest, putting Rankin Inlet in an even stronger position than before.

The types of contracting opportunities will be similar to the opportunities during the construction phase. However, the nature of operations is more stable and long-term and this will likely translate into a more stable business environment. This should benefit the businesses through more cost-effectiveness and less turnover, both on the staffing and client sides.

Most of the constraints and opportunities discussed in the construction phase section of local effects (Section 9.4.3.3.1) also apply to the operations phase, e.g. the discussions on economic leakages and the competitiveness of different communities. Therefore, please refer to that section for more in-depth discussion about potential for contracting opportunities during the operation of the Project.

Economic Growth and Diversification

Table 9.4-33 presents the potential annual economic impact of the Project, by sector, for a 10 year operational life (2017 to 2027). The effects on the mining sector are direct impacts of AEM's operational activities. However, the table shows that the Project will lead to indirect and induced spending in various other sectors as well. Although the numbers are for Nunavut, it can be reasonably assumed that the majority of the regional capture of the spending will happen in Kivalliq. Consequently, most of the economic growth and diversification will happen in the region.

Table 9.4-33: Total Economic Impacts of the Project by Industry during Operation, 2017 to 2027 ($M)

Sector	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)
Crop and Animal Production	0.0	0.0	0
Forestry and Logging	0.0	0.0	0
Fishing, Hunting and Trapping	0.0	0.0	0
Support Activities for Agriculture and Forestry	0.0	0.0	0
Mining and Oil and Gas Extraction	403.3	250.0	700
Utilities	13.5	7.0	25
Construction	0.4	0.1	0
Manufacturing	0.0	0.0	0

[52] There are no data on the size of the economies of Nunavut's regions. Very approximate estimates can be calculated from Nunavut's per capita income, adjusted downward for Kivalliq`s population size and lower incomes.

Wholesale Trade	0.6	0.3	3
Retail Trade	1.7	1.0	17
Transportation and Warehousing	12.2	4.1	46
Information and Cultural Industries	0.6	0.5	4
Finance, Insurance, Real Estate and Rental and Leasing	5.8	4.5	6
Professional, Scientific and Technical Services	1.3	0.8	11
Administrative and Support, Waste Management and Remediation Services	1.8	1.2	22
Educational Services	0.1	0.0	1
Health Care and Social Assistance	0.3	0.1	1
Arts, Entertainment and Recreation	0.1	0.0	3
Accommodation and Food Services	0.7	0.4	7
Other Services (Except Public Administration)	0.2	0.1	2
Operating, Office, Cafeteria and Laboratory Supplies	3.7	0.0	0
Travel, Entertainment, Advertising and Promotion	1.2	0.0	0
Transportation Margins	0.0	0.0	0
Non-Profit Institutions Serving Households	1.2	0.8	13
Government Sector	2.4	1.1	10
Total	**451.1**	**272**	**871**

Most of the constraints and opportunities relating to economic growth and diversification that are discussed in the construction phase section of local effects (Section 9.4.3.3.1) also apply to the operations phase. Therefore, please refer to that section for more in-depth discussion about potential for economic growth and diversification during the operation of the Project.

Incomes

Just as for the construction phase, the nature of work during the operations phase and potential for competition for labour will result in competitive wages for people working on the Project. In total, the Project's annual payments of wages to local workers with unspecialized skills are estimated to be about $15 million. This will represent approximately 15% of the total wages paid in the region. Furthermore, the expected wage of an unspecialized worker will be approximately 9% above the median income in the region (please refer to Section 9.4.3.3.1 above for calculations).

Most of the constraints and opportunities relating to incomes that are discussed in the construction phase section of local effects (Section 9.4.3.3.1) also apply to the operations phase. Therefore, please refer to that section for more in-depth discussion about impacts on incomes during the operation of the Project.

Land Based Economic Activity

The discussion on land based economic activities in the construction phase section of local effects (Section 9.4.3.3.1) also applies to the operations phase. Therefore, please refer to that section for more in-depth discussion about potential for effects of the Project.

9.4.3.3.3 Temporary, Final, and Post-Closure

Fiscal Effects

Final closure is inherent in the non-renewable resource extraction industry. GNDoF (2010) notes the importance of encouraging the development of multiple mining projects in order to stabilize Nunavut's economy in the face of inevitable closures.

The economic instability that the expenditure patterns of large mining projects can have on Nunavut's small economy has been demonstrated in the recent past by large swings in economic indicators in response to Meadowbank. The closing of the Project can be expected to have equally large, and larger, effects to the extent that other opportunities do not open up as the Project comes to its final closure. What evolves in the mining sector in Nunavut will determine whether the result is unemployment and economic contraction, with consequent social effects, or whether new mines are taking the Project's place.

Based on the current production plan, final closure may begin as soon as 2027, given that additional and minable reserves have not been found. At this time, large reductions in contracting and employment are inevitable. The Project's closure will unquestionably have more impact on the local economy in Kivalliq than on the Nunavut economy as a whole. However, most of what can be said about potential mitigation in a territorial scale can be generalized onto the local Kivalliq economy. Most economic facets in Kivalliq, such as economic growth, employment and contracting, will be affected, but new activities inside and outside the region could potentially mitigate this impact to a large degree.

There is also a possibility for premature closure (temporary or permanent), which would occur if for any reason the Project became uneconomic and was expected to remain so over an extended period. Premature closure by its nature is unplanned and therefore has more potential for negative effects. Should premature closure happen early in the Project`s life cycle, many of the expected benefits to the capacity of labour, businesses and communities may not have fully developed, and closure mitigation measures will not have been well detailed. AEM would work with communities and government to agree on appropriate measures, including schedules, to ensure that effects of any premature closure are managed as best as possible.

As noted in Section 9.4.3.1, AEM will remain mindful of the potential for negative effects throughout the Project life cycle, integrating sustainable development principles into mitigation and benefit enhancement measures in an effort to minimize to the extent possible the negative socio-economic effects of closure on individuals. Enhanced capacity of the labour force and businesses, institutional strengthening of civil society, social investment and increased government revenues are expected to position people to achieve improved socio-economic status over the life of the Project. This should have the result of improved capacity to absorb the impacts of closure.

In addition, AEM will commit to collaborative socio-economic planning with, but not limited to, the Kivalliq SEMC. For final closure, the 'trigger' for final planning should be no less than two years before the expected date of closure. If and when a premature (temporary or final) closure occurs, AEM will continue to participate in collaborative monitoring with the Kivalliq SEMC as a means to address any negative socio-economic impacts of the closure.

Employment Effects

The economic effects of temporary, final, and post-closure are dependent on the number of other mining activities available to replace the Project. As the number and location of active projects at the time of any proposed closure of the Project is not predictable with any measure of certainty, an assessment of the employment effects of a number of scenarios that include/or exclude other currently proposed projects is highly speculative, though possible.

Project construction was assessed for the period 2014, concluding in early 2017[53]. The facility would become operational in the first quarter of 2017. The final year of production is expected to be 2027. At this time, operational employment will be 700 positions.

Although construction employment by project was estimated, potential project closure mitigation measures are best described by other project operational employment because of the difference in skills required between mine construction and operation. While a certain amount of crossover skills will exist between the two phases, these have been assumed to be limited in the interest of a cautious and conservative prediction. Therefore, the discussion of the mining industry's capability to absorb workers from the Project at closure is conservatively focused on operational employment alone.

Three growth scenarios have been considered when discussing the economic effects of temporary, final and post-closure: Low, Medium, and High. Each scenario is based on the number of projects at a given stage in the development process. Total employment (both operational and construction) was estimated for 16 mining projects in Nunavut, at various stages of exploration, review, and operation for the period of 2014 to 2040. There are 9 projects in the exploration stage (High Growth scenario assuming all projects proceed), 5 in the review/permitting stage (Medium Growth scenario), and 2 in the operational stage (Low Growth scenario). Low Growth includes the Project as it is assumed that it will go forward. Details on data sources and estimation methodology are detailed below on a project by project basis.

- Meliadine (Agnico Eagle Mines Limited) - Low Growth Scenario. Project employment is readily available in the Socio-economic RSA. Construction employment will be 4600 person years over a 4 year period from 2014 to 2017 and operational employment will be 700 positions per year for 10 years.
- Meadowbank Mine (Agnico Eagle Mines Limited) - Low Growth Scenario. Project employment was available on the mine operations website at 678 positions per year (AEM Meadowbank 2014). Construction employment was not estimated because the construction phase has already wound down.
- Back River (Sabina Gold and Silver Corp) - Medium Growth Scenario. The project is currently under review with the Review - Final Environmental Impact Statement expected in 2014. With production scheduled for 2017, a three year construction period is assumed beginning in 2015. Construction employment (1500 person years) was estimated based on project capex relative to the Meliadine Project. 700 operational positions per year was assumed because the rate of annual production is the same as Meliadine's. Mine life (12 years) was based on deposit size divided by annual production rate.

[53] Economic modelling and discussion is based on a contruction period of 2014 to 2017. The proposed Project construction period of 2015 to 2018 does not effect the results presented

- Mary River (ArcelorMittal and Nunavut Iron Ore) - Medium Growth Scenario. The Project was approved in 2013 with construction scheduled to start in late 2013/early 2014 and finish in late 2017. Productive life is 21 years (2018 to 2039). The construction workforce will range in size from 1700 to 2700 positions and operational employment will be 950 positions per year. Project details were available in the project Final Environmental Impact Statement.
- Izok corridor Project - Hood and Izok Lake (MMG Resources Inc) - Medium Growth Scenario. MMG submitted its Izok Corridor project proposal to the Nunavut Impact Review Board (NIRB) and key authorising agencies in September 2012. MMG since advised it will continue its feasibility study and exploration program in 2014 and expects to provide NIRB with an update project proposal in the fourth quarter 2014. Construction is expected to run from 2015 to 2017 and production from 2017 to 2029, assuming an EIS is submitted in 2014. The average on-site construction work force is expected to be approximately 670. The total workforce will be approximately double at 1140 workers based on a fly-in-fly-out (FIFO) rotation. Operational employment will be 710. Project details were available in the project proposal submitted in September 2012 (MMG 2012).
- Hackett River (Xstrata Zinc Canada) - Medium Growth Scenario. The EIS was expected by end of 2013. Sabina originally submitted an EIS in 2008, however, an updated submission by Xstrata is not yet available. Construction is forecasted to start in 2018 assuming the probability of restarting the review process. The original Sabina submission was used for employment estimates with pushed out construction and production dates. Under this assumption, 2020 will be the first year of production with a mine life of 14 years. Construction employment will be 450 (150 per year). Operational employment will range from 225 to 300 positions with an average of 260.
- Kiggavik (AREVA Resources Canada) - Medium Growth Scenario. This project is under review with the Review - Final Environmental Impact Statement in 2014. Construction will be from 2017 to 2019 and a 14 year mine life. Construction employment will be 750 positions per year with operational employment at 550. Project data were obtained from: Kiggavik Project Environmental Impact Statement Tier 2 Volume 9 Part 1 - Socio-Economic Environment (AREVA 2012).
- Roche Bay (Advanced Explorations Inc) - High Growth Scenario. The project proponent believes pre-stripping is possible in 2015 with production ending in 2016. Capex is $1.37B and construction employment will be 1100 positions per year based on the same capex as Meliadine but half the construction time length. Operational employment is estimated at 600 as most mines with this level of capex employ 500 to 700. The remaining data were sourced from the project feasibility study (Advanced Exploration Inc 2013).
- Angilak Lac 50 Uranium Deposit (Kivalliq Energy Corporation) - High Growth Scenario. This project is currently at the exploration stage. A 5 year lag time before construction could begin (2019) was assumed. The operational and construction time frames and employment levels are assumed to be the same as the Kiggavik project, another uranium mine of approximately the same scale.
- Ulu Deposit (Elgin Mining Inc.) - High Growth Scenario. This project is currently in the Exploration phase. Construction is unlikely to happen before 2018 based on the approval process. Based on deposit size relative to Meliadine, construction time, productive life, and workforce are estimated

to be slightly less than 50% of Meliadine: 1800 person years of construction and 300 operational positions. Productive life is 3 years based on deposit size and a rate of extraction equivalent to Meliadine.

- Hope Bay (TMAC Resources) - High Growth Scenario. Construction is expected to begin in 2014 and end in 2015. Mine life will be to 2025. Capex is $276M. Construction employment is 345 positions per year (inferred from construction camp capacity). Operational employment is 240 positions. Data were sourced from the Preliminary Economic Assessment Study on the TMAC Project, Hope Bay Nunavut Canada .
- Committee Bay Greenstone Belt – Three Bluffs (North Country Gold Corporation) – High Growth Scenario. This project is at the exploration stage. Earliest construction would be in 2018 based on regulatory milestones. Construction would be for 2 years (2018 and 2019) at roughly half of the Meliadine construction workforce (1100 per year) with production in 2020. Productive life is estimated at 5 years based on the Meliadine extraction rate. Operational employment is 50% of Meliadine (350 positions) based on relative deposit sizes.
- Qilaq Project (Peregrine Diamonds Ltd) – High Growth Scenario. Based on the 9 year period between initial surveying and construction experienced by the Diavik Diamond Mine in the Northwest Territories, construction is not expected to occur until 2019. Similarly, construction will take 2 years and operational employment will be 700 positions per year. Construction employment is estimated at 1000 positions per year based on the Kiggavik and Meliadine estimates.
- Chidliak (Peregrine Diamonds Ltd) – High Growth Scenario. The employment estimates are based on assumptions identical to the Qilaq Project, above. The only difference is a 2 year later start date because exploration is less advanced than at the Qilaq Project. Construction is estimated to start in 2021 rather than 2019. All other assumptions are identical.
- Jericho Diamond Mine (Shear Diamonds Inc.) – High Growth Scenario. The project is a diamond reclamation project, currently dormant due to low prices versus high operating costs and capitalization difficulties. In the High Growth Scenario, the project will re-enter production in 2015, as a regulatory and construction process is unlikely to be required. Production is assumed to be until 2017 because the original mine only produced for 3 years. Operational Employment is estimated to be 50 positions (rounded up) based on a scaled 375,000 carats per year (vs. Diavik at 7.5m carats/yr) and 700 positions.
- Lupin Gold Mine (Elgin Mining Inc.) – High Growth Scenario. This project is currently suspended but originally was a mine rehabilitation/construction project. The project was suspended in 2013 due to lower than anticipated gold prices. In the High Growth Scenario, construction will resume in 2015, the earliest most analysts expect a rebound in gold prices. Production will continue to 2016 based on deposit size and the Meliadine extraction rate. Operational employment is expected to be 100 positions per year, based on employment per deposit size using Meliadine as a baseline.

Under the Low Growth Scenario, only Nunavut mines that are currently in production or advanced construction are considered (i.e., 2 projects). In the Medium Growth Scenario, mining employment is projected only for projects currently in the review/permitting process, as well as those in the Low Growth Scenario (i.e., 7 projects). In the High Growth Scenario, all projects currently in the exploration stage are projected to move to production in

addition to those in the Low and Medium Growth Scenarios (i.e., 16 projects). Figure 9.4-5 provides a summary of mining employment under all three growth scenarios from 2014 to 2028.

Vacant positions at mines are not necessarily represented by the number of operations positions required at the mine. Rather, vacant positions are estimated by applying turnover rates to total mining employment. Two turnover rate scenarios are considered below in the discussion of vacant positions in the Low, Medium, and High Growth Scenarios. In the first turnover scenario, the Conference Board of Canada's latest national turnover rate (both voluntary and involuntary) of 11% is used. In the second scenario, the Canadian Mining Industry Human Resources Council's (MiHR) predicted national mining turnover rate (for the next 10 years) of 5.2% is used (CBoC 2014).

Under the Low Growth Scenario, only the Project and Meadowbank Mine are expected to be operational. 2014 employment consists entirely of 678 positions for Meadowbank. Employment peaks at 1378 positions in 2017, the only period where both the Project and Meadowbank Mine are simultaneously operational. However, 2018 will be the final year of production for Meadowbank. Therefore, in the Low Growth Scenario there will not be sufficient demand to accommodate the 700 Project operational staff at closure in 2028 (i.e., there will be surplus labour from the Project following closure), in either the 11% or the 5.2% vacancy turnover scenarios.

Conversely, mining operational employment demand in 2028 under the Medium Growth Scenario (3175) is sufficient to absorb Project employment following closure. However, not all 3175 positions will be vacant. In the first turnover scenario, it can be expected that mining employment turnover (11%) will amount to approximately 350 vacant positions. Consequently, it will take 2 years to fully absorb all surplus labour from the Project following closure. In the second turnover scenario (5.2%), slightly more than 4 years will be required to absorb surplus workers.

Under the High Growth Scenario, mining labour demand in 2028 will be 5725 positions. With an annual turnover rates of 11%, 649 vacant positions will be available to absorb Project employment. Given a certain amount of Project employment attrition (e.g., retirements), High Growth Scenario mining employment will likely be sufficient to fully mitigate Project closure in 2028. In the second turnover scenario (5.2%), 300 vacant positions will be available. If all Project employees migrate to other employment in the industry, it will take at least 2 years to fully absorb surplus workers.

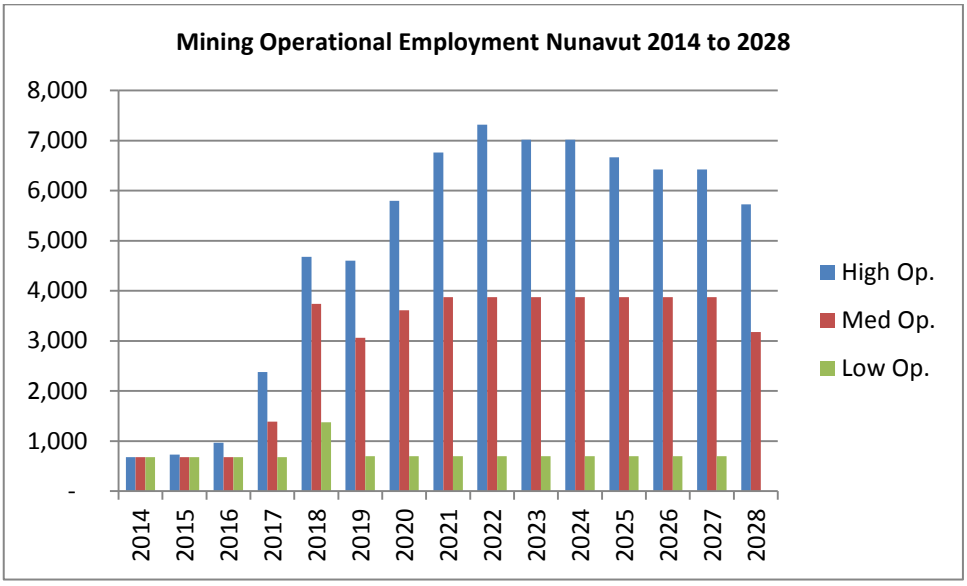


Figure 9.4-5: Mining Operational Employment Nunavut 2014 to 2028

In terms of mid-term temporary closure, the Project labour force is at most risk during the low growth scenario. After 2018, and the closure of Meadowbank, there are no other mining projects in the region to absorb surplus labour.

In the Medium Growth Scenario employment in mining track in the 3900 to 3700 person range for the entire operational life of the Project. As such, surplus employment due to a mid-term closure can be absorbed within 2 years under the 11% turnover scenario and 4 years under the 5.2% turnover scenario.

In the High Growth Scenario, mining employment tracks at 6400 to 9200 positions from 2018 to 2028. There will be no issues with absorbing surplus employment resulting from a mid-term closure over the operational life of the project under the 11% turnover scenario. Under the 5.2% turnover scenario, at least 50% of the surplus labour can be absorbed immediately with the remainder being absorbed within the next 12 months.

9.4.4 Residual Impact Classification

A summary of residual economic and fiscal effects is provided in Table 9.4-34. Although it is emphasized that the quantitative results need to be considered with some caution, the margin of error would have to be extremely high to conclude anything other than that the Project will have significant positive economic effects. That is, confidence in the prediction of positive economic effects is high. The Project's economic impacts in Nunavut are so large in comparison, and will remain so for the life of the Project irrespective of what else happens in Nunavut's economy, that they must be considered significant.

Fiscal effects to the NTI in an environment of resource constraints and a policy priority of reducing dependence on federal transfers, are also positive and significant.

No mitigation measures would be required since preferential employment and contracting, education and training and other Project socio-economic management measures are expected to maximize the retention of economic benefits in Nunavut.

Table 9.4-34: Summary Impact Matrix

Valued Socio-Economic Component	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Significance
Employment	Project would increase the demand for labour during construction and operational phases, which should lead to a considerable number of local jobs.	Positive	High	Local and Regional	Long-term	Significant
GDP and Economic Growth	Investment and expenditures of Project would temporarily expand the "size" of the economies of Nunavut and the Kivalliq region. Total effects during construction might be $520 million. The annual effect during operations might be $272 million.	Positive, although ramping down of the Project might result in negative effects	High	Local and Regional	Long-term	Significant
Investment	Expenditure would add to the economic activity in Nunavut, including investment.	Positive	Moderate	Mostly Local	Long-term	Significant
Government Fiscal Situation	Project would increase public revenues, e.g. through taxes and royalties. Total tax effects during construction might be $27 million. The annual tax effect during operations might be $21 million.	Positive	High	Regional	Long-term	Significant
Business Opportunities and contracting	Project spending on goods and services would increase the demand locally, allowing local businesses (and new businesses) to grow and become more cost-effective.	Positive	High	Mostly Local	Long-term	Significant
Economic Development	Project would increase demand for goods and services, which should lead to growth in several sectors. Mining activities might also conflict with interests of other sectors (e.g. tourism and hunting) and elevate costs through increased demand for resources (e.g. labour).	Positive (and possibly also negative)	Moderate	Mostly Local	Long-term	Significant
Income	Project would directly and indirectly contribute to disposable income of employees and other local people.	Positive	Moderate	Mostly Local, but a spill-over effect to Regional	Long-term	Significant

Note: Effects include direct, indirect and induced economic effects.

9.4.5 Cumulative Effects

9.4.5.1 Nunavut

Cumulative effects assessment generally considers reasonably foreseeable projects – projects that can be expected to advance to construction and operations. A project is defined as reasonably foreseeable for purposes of this subsection if it has initiated, or has publicly indicated an intention to initiate, an environmental approval process in Nunavut. In the case of socio-economic cumulative effects there are also other considerations – the socio-economic environment is not as static as the biophysical environment is often considered to be (barring climate change). Socio-economic conditions will be quite different in Nunavut into the future – the labour force is growing rapidly, educational achievement is likely improving, traditional culture and attitudes to wage employment are evolving, capacity to supply the mining industry is expanding and various changes to the ways that mining companies operate in the territory are being contemplated.

Only the largest of reasonably foreseeable projects are considered here, and they are all mining projects. Smaller projects, such as the Nanisivik Naval Facility and the Canada High Arctic Research Station, are excluded because their individual effects are dwarfed by those of the large mining projects (although it is noted that many smaller projects can together have important economic effects). The projects included are each large enough to alone have significant effects on the economy of Nunavut but in combination may suggest challenges and/or opportunities that are more than additive.

The assessment essentially is limited to the period extending through the decade of 2020s, when the Project is scheduled to ramp down. There are no reasonably foreseeable projects expected to begin construction later than about 2017.

The approach is again through the building of a plausible scenario. This is most straightforward with respect to employment. Estimates of large project employment levels during construction and operations can be arrived at on the basis of information publicly available from project proponents or can be approximated on the basis of available information on project size, expressed variously as expected capital costs, reserves and/or comparisons with similar projects.

Table 9.4-35 presents what may be considered a plausible scenario. In this scenario, the total labour demand will peak at around 6000 positions between the years 2015 and 2019. Taking into account the multiplier effects, the total number of new jobs attributable to mining industry growth will be higher than the table suggests.

Expectations for labour force growth in Nunavut and the Kivalliq region indicate that for the foreseeable future, Nunavut will add between 400 and 500 people annually to its labour force as the high numbers of young grow up and look for work. The growth in jobs attributable to mining projects, including indirect and induced jobs, will not keep up with labour force growth in the longer term. The scenario described above indicates some potential for labour shortages before 2015. This would be of concern as it would indicate that more out of area employees will be needed to supplement the available Nunavut workforce. This in turn represents a potential Project-related cumulative transboundary economic effect. However, delays against expectations, which might be considered characteristic of the mining industry, would eliminate much of the apparent labour shortage in short term.

Table 9.4-35: Cumulative Effects Scenario, Employment

	Construction			Operations		
	Employment	Start Date	End Date	Employment	Start Date	End Date
Meadowbank				800	2010	2019
Doris North Phase 1	Currently on hold.					
Meliadine	1500	2014	2017	900	2017	2027
Mary River	1500	2013	2018	1,050	2019	2050
Kiggavik	750	2017	2020	550	2021	2035
Doris North Phase 2	Currently on hold.					
Hackett River	1500	2015	2018	900	2019	2035
Back River	1000	2019	2021	750	2022	2029
Izok Lake	1000	2015	2017	750	2018	2027

Sources:

	Nunavut Mining Symposium presentations, 2011
	Kivalliq Socio-Economic Monitoring Committee presentation, 2011
	Project application submitted to NIRB, 2011
	EISs (EIS figures are generally conservative, that is, are low estimates)
	Rough estimates based on available information

Source: Areva 2011b (some revisions have been made according to more current information)

Different scenarios can be constructed on the basis of different assumptions of, for example, labour force growth rates, lower or higher direct Inuit employment rates by mining projects or a different constellation of projects. However unless assumptions were radically altered, scenario changes would not change the major conclusions, which are:

- although in the shorter term (2013 to 2015) there is some potential for competition for labour, over the longer term labour demand will not exceed Nunavut's capacity to supply;
- the mining industry currently holds out the most promise in creating the jobs that a rapidly growing workforce will need, but currently foreseeable projects will not provide all the jobs Nunavut will need to create over the coming decades;
- the capacity of labour to respond to mining industry workforce requirements is a critical component – with the exception of many induced jobs, skilled and productive workers will be needed to achieve and exceed the employment demand; and
- provided there are more than a very few mining projects in Nunavut, development of the industry can smooth out 'bumps' in unemployment – as projects open and close, alternative employment opportunities are opened for retrenched employees.

A full discussion of employment effects under Low, Medium and High Growth scenarios can be found in Section 9.4.3.3.3 Employment Effects.

Since economic systems are so integrated, employment can also be considered a sort of surrogate for other economic parameters characteristic of an industry. Although there will be many differences in detail, large mining projects will have roughly comparable relationships between work force requirements, capital expenditures, and revenues. Cumulative effects on GDP, labour income and revenues to government would approximate those developed for employment above – increasing over time and smoothing out the bumps in economic performance as compared to a scenario of occasional large projects. It is noted that as for labour, a growing capacity on the part of businesses to respond to mining projects goods and services will be an important component of cumulative economic effects.

It is clear from the above that there is, in the farther future, both a capacity to provide labour to other developments in the mining sector and a need for mining projects in view of the eventual closure of foreseeable projects.

Territorial cumulative economic effects are significant benefits, and do not require either mitigation or monitoring by AEM. It is noted however that government planning for enhancing capacity of labour and businesses, and for sequencing of mining projects (particularly over the very short term when there may be more constraints to Inuit participation), can enhance cumulative benefits.

9.4.5.2 Kivalliq

A full discussion of employment effects under Low, Medium, and High Growth scenarios can be found in Section 9.4.3.3.3 Employment Effects. Under the Low Growth Scenario, only the Project and Nunavut mines that are currently in production or advanced construction (i.e., Meadowbank Mine) are considered (i.e., 2 projects). In the Medium Growth Scenario, mining employment is projected only for projects currently in the review/permitting process, as well as those in the Low Growth Scenario (i.e., 7 projects). In the High Growth Scenario, all projects currently in the exploration stage are projected to move to production in addition to those in the Low and Medium Growth Scenarios (i.e., 16 projects). The important conclusion, relevant to expectations regarding cumulative economic effects in Kivalliq and its communities, is that, in the Medium and High Growth scenarios, ongoing, sequential development of mining projects can be expected to 'even out' economic shocks that individual projects can produce (e.g., through closure). Under the Low Growth Scenario, employment shocks cannot be 'evened out'.

It will be noted that most of the above listed projects are in the Kitikmeot Region. This may be less relevant to supply and demand for Kivalliq based workers, goods and services than may be first apparent. To date, Nunavut expenditures of local mining projects have been over 95% in Kivalliq. The rapid growth of capacity to supply the mining sector is expected to continue on the basis of high levels of exploration activity, ongoing experience with Meadowbank and early development of Meliadine. Kivalliq may in fact be well into developing a competitive advantage that may see, in face of imperatives to maximize project expenditures in Nunavut, more than proportional participation in mining projects in other regions.

Cumulative benefits of Meliadine, Meadowbank, and Kiggavik are essentially additive – each will add more jobs, contracting, education and training, economic growth and diversification and incomes to a growing total. This will happen in an environment with a lack of economic opportunity. Any spillover effects from projects in other regions would also be additive.

However, the cumulative positive effects of all reasonably foreseeable projects are potentially less than additive. The analyses in previous sections indicate that there is capacity in Kivalliq to meet supply requirements of Meliadine. Depending on additional demand from outside Kivalliq, including for supply of goods and services which also imply increased demand for labour, it is conceivable that the potential for benefit would be less than additive; that is, could cross a threshold into a loss of opportunity for reasons of lack of capacity to supply labour or goods and services to projects outside Kivalliq.

In addition to reasonably foreseeable projects, AEM expects 3 additional uranium mines, in addition to Kiggavik, in western Kivalliq and one additional uranium mill will be developed; that the project life of Meadowbank will be extended on the basis of new finds; and that one gold mining project (additional to Meliadine) will be developed. Such developments would of course imply additional demand for Kivalliq labour, goods and services, and again, all are notionally benefits. As these future developments, to date basically not identified as to time or place, are considered 'far future', actual effects are unknown. The balance between benefits and inability to realize benefits will be a function of a well-planned and well positioned supply response. This in turn will be a function of experience with mining projects on the parts of both labour and business, and increases in educational achievement of Kivalliq's population.

It is arguable that such cumulative effects are not the responsibility of AEM to mitigate or monitor, beyond measures described in Section 9.4.3.1 to maximize Inuit participation in the Project. Additive effects are in any case simply the impacts of additional projects on baselines at the time these projects move forward with their respective environmental assessments (EAs), and would be expected to be addressed in those EAs. Managing the economic response to a large number of new projects is a fundamental responsibility of government.

This is not to say that AEM has no role – capacity enhancement of labour and business, and cooperation with other mining companies to share information and best practice, contribute to government's management of the mining sector. However, the preparation of the labour force, perhaps initially focusing on technical and short term training, in the longer run should be targeting postsecondary degrees and diploma courses in mining related fields.

9.4.6 Monitoring and Follow-Up

The monitoring socio-economic effects in Nunavut and Kivalliq will mostly be the responsibility of the Kivalliq SEMC and the NGMP. However, AEM intends to take part in this collaboration. This could include taking part in the planning of monitoring initiatives, contributing with data[54] and other input, and providing support to the Kivalliq SEMC and NGMP Secretariat. In addition, AEM would collaborate with other resource companies towards a consistent and useful approach for data collection.

9.5 Education and Training

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on education and training. Volume 1, Appendix 1.0-A lists

[54] It is acknowledged that there are a number of challenges to collecting data on Project workers.

the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for education and training.

9.5.1 Baseline Environment

9.5.1.1 Nunavut (Regional Study Area)

Education and training are strongly connected to quality of life, both of individuals and communities. For example, many economic and employment opportunities require skills that are only reached through education and training.

Education achievements in Nunavut are well below Canadian averages. In 2006, more than 55% of the 15 years and over population had not graduated from high school, and only 9% had a university degree. Comparable numbers for Canada were 24% and 17%, respectively. Taking into account that women are less likely than men to pursue trade certification, there was some balance in the achievement of men and women.

Educational achievement may also have declined over time. While people in the 15 to 24 years age group in Nunavut might not be expected to have finished high school, this cannot fully account for the differences in educational achievement between this age group and older ones – 80% of the 15 to 24 years age group had not completed high school compared to 46% of people 25 years and older (Table 9.5-1).

There is evidence, however, to suggest educational attainment may recently have improved in the territory. The GNBS, for instance, reports that students are more likely to graduate high school than they were a decade ago. The graduation rate in Nunavut, although still low at 39.1%, did in fact increase by 8.5% between 2000 and 2010 (GNBS 2011g). In Kivalliq, graduation rates almost doubled over the same period – major developments in the mining sector, underway for some time, may have been a motivating factor in this increase.

The numbers for the regions demonstrate disparities between Qikiqtaaluk and the other 2 regions. The trend to fewer people graduating from high school with time is clear; in both Kivalliq and Kitikmeot the highest percentages of high school graduates were in the oldest age group, and the lowest percentages in the youngest age group. There is also evidence that women's achievement fell short of men's in these 2 regions while it was better than men's in Qikiqtaaluk.

Poor educational achievement has been attributed to several causes. The most obvious one is that benefits of completing high school may not be directly obvious to students. Most available jobs, with the exception of many government positions, do not require formal education or degrees. However, with increased availability of positions that require formal skills and education, this might change rather rapidly.

Due to geographical vastness and the small number of people, delivery of education is an expensive and complicated task. However, access to education in Nunavut has improved recently. High schools are now locally available for most residents, and a post-secondary institution, Nunavut Arctic College, has campuses in the larger Nunavut communities. Although some of these institutions experience operational challenges, the increased accessibility might facilitate better education achievements in the longer term. Recent developments in information technology and distance learning methods are also good reasons to believe that the accessibility of education in Nunavut should improve with time.

In 2008, the total expenditures per capita on public elementary and secondary schools were almost 3 times higher in Nunavut than Canada's average (Statistics Canada 2010c). This is explained by several factors, such as the geographical vastness, a young population and elevated costs of goods and services. However, this suggests that spending on education is not causing the lack of educational achievement.

The overall conclusion has to be that there are multiple and complex factors driving the low academic achievement in Nunavut. Most likely, these factors are environmental, cultural and economic.

It should also be noted that the skill set of the Inuit population is different from most other Canadians, preparing them for a participation in the land-based economy. This includes extensive skills in navigation, hunting, safety and land skills. Historically, these skills have not been learned from the formal education system but rather from families and Elders, although traditional knowledge is currently being embedded into curriculum and teaching. However, given how recent this initiative is, most Inuit people have studied in schools where a part of their knowledge has not been formally recognized. This makes a literal comparison of education rates between the Inuit and the rest of Canadians questionable and, perhaps, unfair.

Table 9.5-1: Educational Achievement by Region, Age Group and Gender, 2006 (%)

	Kivalliq			Kitikmeot			Qikiqtaaluk			Nunavut		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total population 15 years and over												
No certificate, diploma or degree	64.6	63.5	65.7	61.4	58.5	64.5	52.3	51.8	52.8	57.3	56.1	58.6
High school certificate or equivalent	10.1	9.0	11.0	7.7	8.5	6.7	12.4	12.0	12.8	10.9	10.6	11.2
Apprenticeship or trades certificate or diploma	6.4	10.2	2.5	10.9	15.5	6.1	5.9	9.1	2.6	7.0	10.5	3.2
Post-secondary certificate or diploma below bachelor level	12.7	11.7	13.7	13.1	12.4	14.0	18.2	16.7	19.9	15.8	14.6	17.1
University certificate, diploma or degree	6.4	5.6	7.1	6.7	5.1	8.1	11.1	10.3	12.0	9.0	8.1	10.0
Population aged 15 to 24												
No certificate, diploma or degree	85.8	88.3	83.9	85.7	84.0	86.5	74.3	76.6	71.8	79.9	81.3	78.3
High school certificate or equivalent	10.5	9.2	11.8	8.6	8.5	8.7	17.1	15.5	18.6	13.6	12.6	14.7
Apprenticeship or trades certificate or diploma	0.6	1.2	1.2	3.3	4.7	1.9	1.9	2.0	1.8	1.9	2.3	1.5
Post-secondary certificate or diploma below bachelor level	2.5	1.2	3.1	2.4	1.9	1.9	5.3	5.0	5.7	3.7	3.0	4.6
University certificate, diploma or degree	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.3	1.4	0.9	0.9	1.1
Population aged 25 to 34												
No certificate, diploma or degree	54.7	55.4	53.7	49.0	47.3	50.0	41.2	43.4	39.1	46.0	47.3	44.9
High school certificate or equivalent	12.8	9.9	15.4	10.7	12.2	7.9	15.1	14.8	15.3	13.7	13.1	14.4
Apprenticeship or trades certificate or diploma	7.4	12.4	2.4	13.4	18.9	9.2	6.2	10.2	2.7	7.7	12.0	3.5
Post-secondary certificate or diploma below bachelor level	16.9	16.5	17.1	16.1	14.9	17.1	22.4	20.7	26.1	20.4	18.2	22.4
University certificate, diploma or degree	9.1	6.6	11.4	10.7	8.1	14.5	14.1	11.3	16.9	12.2	9.3	14.8
Population aged 35 to 64												
No certificate, diploma or degree	52.1	47.5	56.3	47.2	42.5	52.3	42.8	39.3	46.8	46.0	42.0	50.2
High school certificate or equivalent	8.9	9.0	8.9	6.3	7.8	5.4	8.9	9.2	8.6	8.5	8.8	8.0
Apprenticeship or trades certificate or diploma	10.6	17.0	4.2	15.6	22.2	8.7	8.3	12.8	3.2	10.2	15.5	4.5
Post-secondary certificate or diploma below bachelor level	18.8	17.0	20.6	21.2	20.3	23.5	24.2	22.8	25.9	22.2	20.9	23.7
University certificate, diploma or degree	9.9	9.4	10.3	9.6	8.5	11.4	15.7	15.6	15.8	13.1	12.7	13.5

Source: Statistics Canada (2007a)

9.5.1.2 Kivalliq Region (Local Study Area)

Education Facilities

Rankin Inlet, Baker Lake, and Arviat, being the largest communities in the LSA, have both a primary and secondary school. In each of the smaller communities of Chesterfield Inlet and Whale Cove, one school includes all grades from kindergarten to grade 12. Many of these schools are new and have been built taking into account rapid population growth. None of the schools currently report overcrowding.

The Alberta high school curriculum is followed, with various modifications to accommodate experiential learning opportunities, training in speaking and writing Inuktitut, and learning traditional Inuit cultural practices, history and values.

Schools, staffing levels and registration vary with community population. Not all schools are fully staffed at all times given problems with recruitment and retention. Schools, even in the largest Kivalliq communities of Arviat, Baker Lake and Rankin Inlet, do not have full time guidance counsellors. Schools have some Inuit teachers, teaching assistants, and student support assistants who help with extracurricular activities and physical education programs. Many also have elder support in delivering IQ related programming.

Education Levels

Table 9.5-2 contains data on educational achievement for Kivalliq communities, collected in the national census in 2006. The data indicates some negative trends. First, adult education levels decrease with younger age. This mirrors the Region, suggesting that fewer young people finish education than before. However, anecdotal evidence suggests that this trend has been somewhat reversed in at least some Kivalliq communities more recently. Second, educational achievement in Kivalliq was low compared to the rest of Canada in 2006, and also, in each of the Kivalliq communities with the exception of Rankin Inlet, relative to Nunavut as a whole. Kivalliq people were more likely to have no certificate, diploma or degree than elsewhere in Nunavut, and less likely to have a university credential (Figure 9.5-1).

Aboriginal educational attainment is lower, in general, than that of the total population in Kivalliq communities, with a greater prevalence of no certificate, diploma, or degree (i.e., no recognised formal secondary or post-secondary education) held by people 15 years of age and older, and a smaller portion of the population in possession of a university certificate, diploma, or degree. The portion of the Aboriginal population in possession of a high school certificate, apprenticeship or trade, or a college or other non-university certificate was similar to that of the overall population (Table 9.5-2).

Table 9.5-2: Education in Kivalliq Communities, 2006 (%)

	Arviat			Baker Lake			Chesterfield Inlet			Coral Harbour			Rankin Inlet		
	All	M	F	All	M	F	All	M	F	All	M	F	All	M	F
Total population 15 years and over	**1235**	**615**	**620**	**1115**	**585**	**530**	**210**	**105**	**110**	**460**	**220**	**235**	**1565**	**795**	**770**
No certificate, diploma or degree	70.9	70.7	70.2	66.4	64.1	68.9	59.5	57.1	59.1	66.3	63.6	70.2	53.4	52.8	53.9
High school certificate or equivalent	9.3	8.9	9.7	10.3	10.3	10.4	9.5	9.5	9.1	7.6	6.8	6.4	14.4	11.3	17.5
Apprenticeship or trades certificate or diploma	4.0	6.5	1.6	6.7	10.3	2.8	4.8	9.5	0.0	10.9	18.2	4.3	6.7	11.3	1.3
College, CEGEP or other non-university certificate or diploma	8.5	7.3	9.7	10.3	9.4	10.4	19.0	14.3	22.7	8.7	9.1	8.5	13.7	12.6	14.9
University certificate or diploma below the bachelor level	2.0	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	3.3	4.5	4.3	2.9	3.1	2.6
University certificate; diploma or degree	5.7	5.7	6.5	6.3	5.1	7.5	4.8	0.0	9.1	3.3	4.5	4.3	8.9	8.2	9.7
Aboriginal population 15 years and over	**1120**	**555**	**570**	**985**	**510**	**470**	**185**	**90**	**100**	**435**	**215**	**225**	**1220**	**610**	**610**
No certificate, diploma or degree	76.8	77.5	75.4	72.6	70.6	74.5	64.9	66.7	60.0	69.0	65.1	73.3	66.0	66.4	66.4
High school certificate or equivalent	8.9	7.2	9.7	9.6	9.8	9.6	10.8	0.0	10.0	6.9	7.0	6.7	13.5	9.8	17.2
Apprenticeship or trades certificate or diploma	4.5	7.2	2.6	6.6	9.8	2.1	8.1	11.1	0.0	10.3	18.6	0.0	6.1	9.8	1.6
College, CEGEP or other non-university certificate or diploma	8.5	6.3	9.7	9.6	7.8	10.6	18.9	11.1	25.0	8.0	7.0	8.9	11.5	9.8	13.1
University certificate or diploma below the bachelor level	1.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	4.4	2.0	2.5	1.6
University certificate; diploma or degree	1.0	0.0	1.8	1.5	0.0	2.1	0.0	0.0	0.0	2.3	0.0	0.0	0.8	1.6	1.6
Total population aged 15 to 24															
No certificate, diploma or degree	86.4	87.5	85.4	93.9	94.4	93.3	75.0	80.0	83.3	83.9	85.7	77.8	77.6	81.4	69.8
High school certificate or equivalent	11.1	10.0	12.2	6.1	5.6	6.7	16.7	40.0	33.3	9.7	14.3	11.1	17.6	16.3	20.9
Apprenticeship or trades certificate or diploma	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0
College, CEGEP or other non-university certificate or diploma	2.5	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	7.0

Table 9.5-2: Education in Kivalliq Communities, 2006 (continued)

	Arviat			Baker Lake			Chesterfield Inlet			Coral Harbour			Rankin Inlet		
	All	M	F	All	M	F	All	M	F	All	M	F	All	M	F
University certificate or diploma below the bachelor level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
University certificate; diploma or degree	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	4.7
Total population aged 25 to 34															
No certificate, diploma or degree	60.3	66.7	56.3	63.0	56.5	66.7	45.5	40.0	50.0	50.0	45.5	50.0	40.5	44.7	40.0
High school certificate or equivalent	12.7	10.0	15.6	8.7	8.7	12.5	0.0	40.0	0.0	10.0	0.0	20.0	18.9	13.2	22.9
Apprenticeship or trades certificate or diploma	4.8	6.7	6.3	8.7	13.0	0.0	18.2	40.0	0.0	15.0	27.3	0.0	5.4	10.5	0.0
College, CEGEP or other non-university certificate or diploma	12.7	10.0	12.5	8.7	13.0	8.3	27.3	0.0	33.3	10.0	18.2	20.0	17.6	18.4	20.0
University certificate or diploma below the bachelor level	3.2	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	5.4	7.9	5.7
University certificate; diploma or degree	9.5	10.0	6.3	8.7	8.7	12.5	0.0	0.0	0.0	0.0	0.0	20.0	10.8	7.9	14.3
Total population aged 35 to 64															
No certificate, diploma or degree	62.1	59.6	63.8	46.4	43.1	51.1	58.8	44.4	55.6	56.8	52.9	63.2	41.8	38.9	46.4
High school certificate or equivalent	6.3	8.5	4.3	13.4	15.7	11.1	11.8	0.0	0.0	5.4	0.0	0.0	11.3	8.3	13.0
Apprenticeship or trades certificate or diploma	7.4	12.8	4.3	10.3	15.7	6.7	0.0	22.2	0.0	13.5	23.5	10.5	12.1	19.4	2.9
College, CEGEP or other non-university certificate or diploma	12.6	12.8	12.8	17.5	15.7	22.2	23.5	22.2	33.3	10.8	11.8	15.8	18.4	16.7	20.3
University certificate or diploma below the bachelor level	3.2	0.0	4.3	2.1	0.0	0.0	0.0	0.0	0.0	8.1	11.8	10.5	2.8	2.8	2.9
University certificate; diploma or degree	8.4	8.5	10.6	9.3	7.8	8.9	11.8	0.0	22.2	5.4	11.8	10.5	13.5	13.9	14.5

Table 9.5-2: Education in Kivalliq Communities, 2006 (continued)

	Repulse Bay			Whale Cove			Kivalliq			Nunavut		
	All	M	F	All	M	F	All	M	F	All	M	F
Total population 15 years and over	**450**	**230**	**220**	**210**	**105**	**415**	**5255**	**2660**	**2595**	**19,340**	**9930**	**9410**
No certificate, diploma or degree	80.0	78.3	79.5	73.8	76.2	76.2	61.4	63.5	65.7	57.3	56.1	58.6
High school certificate or equivalent	2.2	0.0	4.5	4.8	0.0	9.5	7.7	9.0	11.0	10.9	10.6	11.2
Apprenticeship or trades certificate or diploma	7.8	10.9	4.5	7.1	9.5	0.0	10.9	10.2	2.5	7.0	10.5	3.2
College, CEGEP or other non-university certificate or diploma	5.6	6.5	4.5	9.5	9.5	9.5	12.4	9.8	11.8	14.2	13.1	15.3
University certificate or diploma below the bachelor level	0.0	4.3	0.0	0.0	0.0	0.0	0.7	1.9	1.9	1.6	1.5	1.8
University certificate; diploma or degree	3.3	4.3	4.5	0.0	0.0	0.0	6.7	5.6	7.1	9.0	8.1	10.0
Aboriginal population 15 years and over	**425**	**220**	**205**	**120**	**60**	**60**	**4570**	**2290**	**2280**	**15,510**	**7785**	**7720**
No certificate, diploma or degree	83.5	79.5	87.8	62.5	66.7	58.3	3,310	1,645	1,665	68.7	68.2	69.2
High school certificate or equivalent	2.4	4.5	4.9	0.0	0.0	0.0	425	180	240	9.6	9.1	10.0
Apprenticeship or trades certificate or diploma	8.2	11.4	4.9	8.3	16.7	0.0	290	230	60	6.7	10.2	3.4
College, CEGEP or other non-university certificate or diploma	4.7	4.5	4.9	29.2	33.3	25.0	440	190	255	12.1	10.5	13.7
University certificate or diploma below the bachelor level	2.4	4.5	4.9	0.0	0.0	0.0	55	30	25	1.0	1.0	1.0
University certificate; diploma or degree	0.0	0.0	0.0	0.0	0.0	0.0	50	15	35	2.0	1.2	2.8
Total population aged 15 to 24												
No certificate, diploma or degree	97.1	100.0	100.0	85.7	85.7	100.0	85.8	88.3	83.9	79.9	81.3	78.3
High school certificate or equivalent	0.0	0.0	0.0	0.0	0.0	0.0	10.5	9.2	11.8	13.6	12.6	14.7
Apprenticeship or trades certificate or diploma	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.2	1.2	1.9	2.3	1.5
College, CEGEP or other non-university certificate or diploma	5.7	11.1	0.0	0.0	0.0	0.0	2.5	1.2	3.1	3.7	3.0	4.2
University certificate or diploma below the bachelor level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4
University certificate; diploma or degree	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	1.1

Table 9.5-2: Education in Kivalliq Communities, 2006 (continued)

	Repulse Bay			Whale Cove			Kivalliq			Nunavut		
	All	M	F	All	M	F	All	M	F	All	M	F
Total population aged 25 to 34												
No certificate, diploma or degree	80.0	72.7	80.0	55.6	75.0	33.3	54.7	55.4	53.7	46.0	47.3	44.9
High school certificate or equivalent	0.0	0.0	0.0	0.0	0.0	0.0	12.8	9.9	15.4	13.7	13.1	14.4
Apprenticeship or trades certificate or diploma	10.0	18.2	0.0	22.2	0.0	0.0	7.4	12.4	2.4	7.7	12.0	3.5
College, CEGEP or other non-university certificate or diploma	10.0	0.0	0.0	22.2	0.0	33.3	14.7	13.2	13.8	18.2	16.4	20.0
University certificate or diploma below the bachelor level	10.0	0.0	0.0	0.0	0.0	0.0	2.9	3.3	3.3	2.2	1.8	2.4
University certificate; diploma or degree	10.0	0.0	0.0	22.2	0.0	0.0	9.1	6.6	11.4	12.2	9.3	14.8
Total population aged 35 to 64												
No certificate, diploma or degree	62.5	58.8	66.7	72.2	66.7	66.7	52.1	47.5	56.3	46.0	42.0	50.2
High school certificate or equivalent	6.3	11.8	0.0	0.0	0.0	0.0	8.9	9.0	8.9	8.5	8.8	8.0
Apprenticeship or trades certificate or diploma	15.6	17.6	0.0	11.1	0.0	22.2	10.6	17.0	4.2	10.2	15.5	4.5
College, CEGEP or other non-university certificate or diploma	12.5	0.0	13.3	11.1	0.0	0.0	16.3	14.8	17.8	19.8	18.6	21.1
University certificate or diploma below the bachelor level	6.3	0.0	0.0	0.0	0.0	0.0	2.5	2.2	2.8	2.4	2.3	2.6
University certificate; diploma or degree	6.3	0.0	0.0	11.1	22.2	0.0	9.9	9.4	10.3	13.1	12.7	13.5

Sources: Statistics Canada (2007a); NPC 2008

Note: Shaded areas represent LSA community data

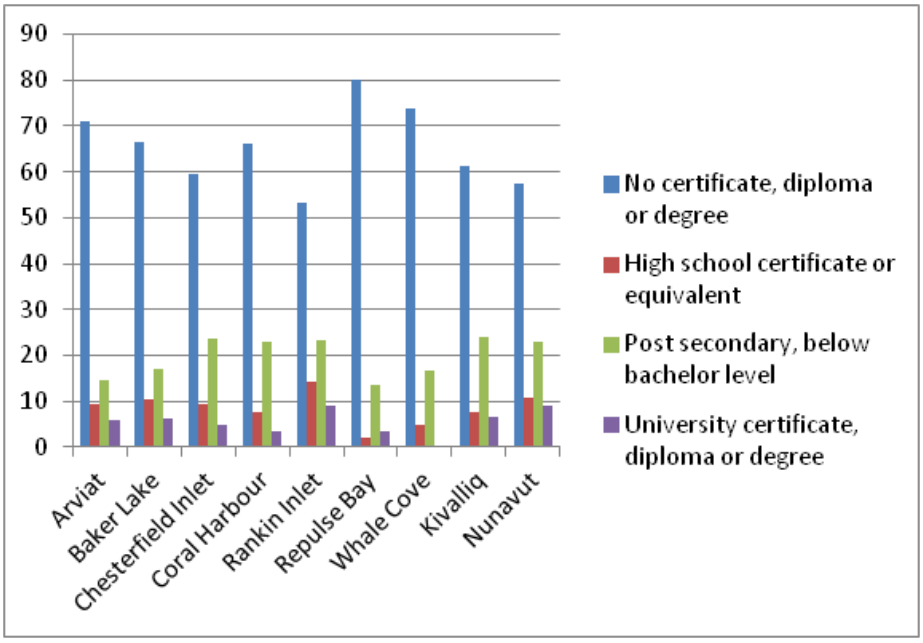


Figure 9.5-1: Educational Achievement (%age of population 15 years and over)

Source: Statistics Canada (2007a)

There is also evidence that educational achievement deteriorated over the period 1996 to 2006. Statscan changed its age cohort reporting for each census, thus the data are not strictly comparable. Data from 1996 are for the over 25 population; from 2002 for 24 to 35 year olds; and from 2006 for 20 to 35 year olds. However, if educational achievement were improving with time, one would expect younger populations to have better education than older ones, that is, the data should have improved from 1996 onwards. Figure 9.5-2 shows just the reverse – with time, larger percentages of the population in each community did not complete high school. Data for older age groups in 2001 and 2006 for Kivalliq as a whole also show an increase of people with no high school certificate or equivalent; from 43% in 2001 to 52% in 2006.

Figure 9.5-3 compares the gender distribution of educational achievement for younger and older age cohorts for the Kivalliq region in 2006. The findings provide evidence that the gender gap has been closing. Whereas younger males were less educated than older males (more had no high school and fewer had postsecondary education), younger females are graduating from high school and postsecondary schools at an increasing rate over older females. This is not to suggest that female achievement does not need to improve; as of 2006, over 50% of females over the age of 24 in Kivalliq had not graduated, and less than 10% of 15 to 24 years olds had graduated (although some in this latter age groups can be expected to as 15 year olds are not expected to have finished high school). However, the data do suggest that the deterioration in educational achievement has been particularly serious for males.

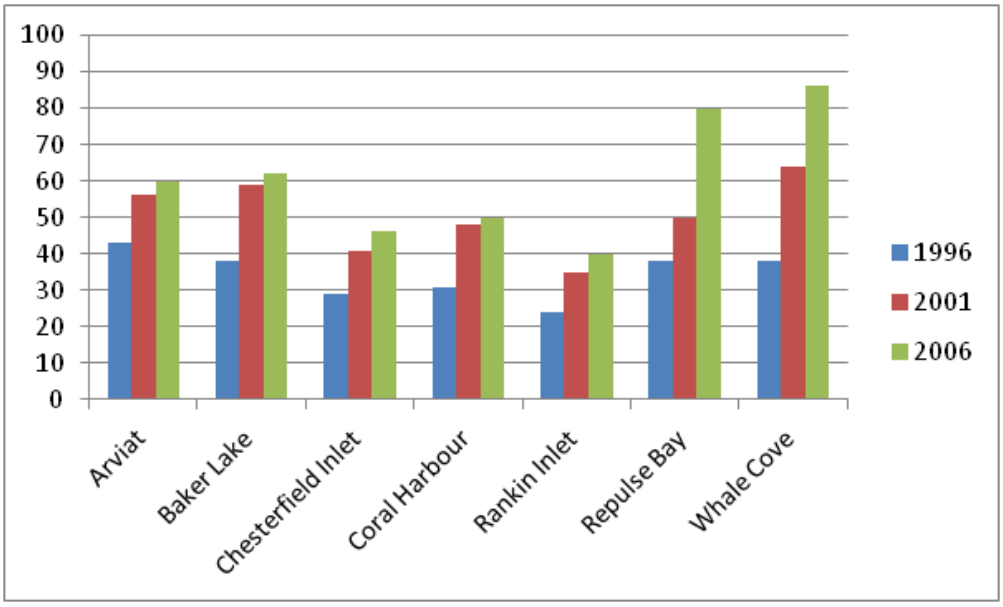


Figure 9.5-2: Less than High School Education (%age of population), 1996 to 2006

Source: Statistics Canada (1997, 2002b, 2007a)

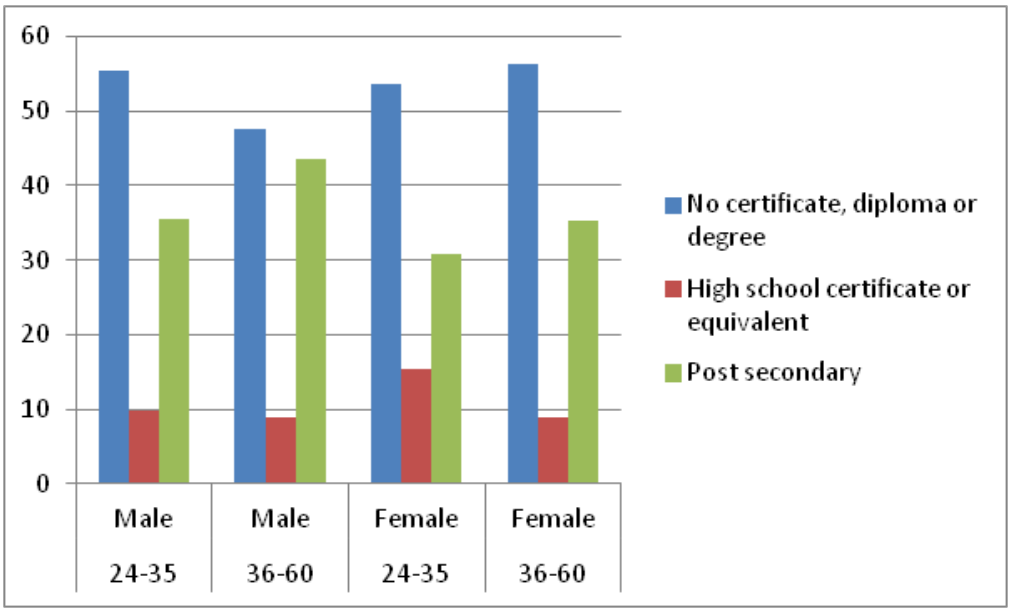


Figure 9.5-3: Educational Achievement by Gender (%age of the population), 2006

Source: Statistics Canada (2007a)

Despite the historical trend shown in Figure 9.5-2 for 1996 to 2006, graduation rates have improved in Kivalliq over the past decade. In 2002, 25.5% of 18 year olds graduated high school (39/151). Graduation rates did not improve much over this level during the period 2002 to 2008, but jumped to 41.4% in 2009. By 2012, this number had increased to 49.5% (94/193). Graduation rates are generally higher in Kivalliq communities than in Nunavut as a whole, which saw a graduation rate of 35.9% in 2012 (GNBS 2013b). Despite the trend of recent

improvement in graduation rates at a community level, Baker Lake did not have a single graduate between 2000 and 2004. However, Baker Lake educators report that there have been 8 or more graduates annually since 2006[55] (AREVA 2011b). Most high school educators in Kivalliq now report that they expect that up to half their registered students will graduate over the coming years.

The challenges of getting children through high school are varied, and different people have differing perspectives. Given recent evidence that educational outcomes are improving, but are still not stellar, it is perhaps expected that there is still some ambivalence among Inuit about a need for education. People also frequently note that an important aspect of encouraging students to stay in school is providing them with information about career opportunities they can have with education, and the type of training they need. Focus group comments show a mix of views (Box 9.5-1).

Box 9.5-1: Education

- We have not finished high school or gotten any kind of certificate. This makes us feel inadequate and lack confidence (young adults).
- Some people who have dropped out of school cannot really hold a job.
- With no education, young people will not find work. They have to have proper training, if they want to have certain positions in these mining companies; they need to be well educated, other than just being custodians in a work force.
- If a person wants to work in a mining field, they have to be properly trained. Not only in the mining field, they must be able to read and write fluently and they can work in an office too. It's very difficult with no education.
- Here we are just being Inuit; we do not know where to get the information for training, for individuals that would be interested to go for training.
- In small communities like this, a (high school) graduate sometimes cannot find work in their home community due to no employment being available. A suggestion too would be for the mines to present information to the high school students that would probably help the high school student to graduate and prepare themselves to work in that mine that will be opening
- Now that there is a Trades School available, a place for young people to go for further education

As noted in Box 9.5-1 above, many people acknowledge that education is probably necessary if the young wish to work, but they also see this as a two way street; there is an appreciation that opportunities to work have to be present to motivate children to go to school.

School absenteeism was presented by key informants as a major challenge in Kivalliq communities. Leaving school is a process that usually begins with missing school and subsequently missing assignments and tests. This process often starts in primary school. Early school leavers in Kivalliq, as elsewhere in Canada, tend to leave school completely in grade 10, when they enter the credit system and cannot continue without passing grades. Absenteeism is often linked to other social issues such as poor parenting, teenage pregnancy and

[55] This information was presented in the draft AREVA Kiggavik Baseline that was submitted to the Nunavut Impact Review Board (NIRB) in 2011. The data is based on results of key informant interviews with educators in Baker Lake.

crowded living conditions. Alcohol and drug abuse was not cited as a major factor for leaving school by key informants or in focus group discussions with youth and Elders.

Based on discussions with key informants and in focus groups, it is thought that changes to curriculum and teaching frameworks have been more successful at engaging children in school. Consistent with Government of Nunavut foundation documents, schools should embed and accommodate Inuit Qaujimajatuqangit[56] (IQ) into curriculum and teaching. Workshops are held with teachers to promote teaching with the IQ emphasis. Inuit learning styles that integrate IQ knowledge are more experientially based. Various methods are being developed to make it easier for children to combine school and the learning of traditional skills and values. Elders are involved in the delivery of some school programs, including in some cases the teaching of survival skills needed to hunt on the land and ice. As a specific example of one school's initiative in Chesterfield Inlet, Victor Sammurtak students write their departmental exams in January so that they are free to go out on the land in May. Schools also allow young adults to continue in school until age 21 to give them the time they may need to pass all required courses.

There is some conviction within the Kivalliq communities that exchange and entrepreneurial programs that enable children to travel outside Nunavut to other parts of Canada and to other countries, are also contributing to higher graduation rates. Such programs are thought to build self-confidence, encourage mobility and suggest options, all of which motivate children to stay in school. New job opportunities in the mining sector and new options for postsecondary training, such as the new technical school in Rankin Inlet and training programs offered in conjunction with mining project proponents, are also considered motivators.

Additionally, Kivalliq high schools are interested in developing programs that prepare students for the kinds of employment that are found, are expected to be found, or can be developed in Kivalliq. For example, the school in Chesterfield Inlet has developed an experiential program that includes training in building maintenance, safety training and a nationally approved kayak building program. Other Kivalliq communities are also in the process of developing programs that are tailored for local employment opportunities. The John Arnalukjuak High School in Arviat is hoping to offer courses in electrical and green energy training. Sakku School in Coral Harbour is hoping to offer small engine repair courses.

The retention of a stable and committed teaching staff was cited as being critical to keeping children engaged in school. While staffing levels appear adequate in most cases (although there are exceptions), there is low teacher retention. Keeping teachers is a challenge almost everywhere in Kivalliq. Many complete a 2 year contract and then return to the south, while others leave before their contracts expire. Low retention is most often attributed to isolation and lack of preparedness, as well as a high cost of living which is also believed to explain difficulties in recruiting teachers in the first place. Schools now inform potential hires that single teachers may find it difficult to meet their costs and some schools prefer to hire teaching couples.

Teacher benefits package are also thought to be part of the problem. However, while teachers' benefits packages in Nunavik are considered much more generous[57], its schools have not fared better than those in Nunavut when it comes to keeping teachers. Rankin Inlet's schools have experienced fewer turnovers and it has been suggested that this is because the community has less expensive food and good air transport links to the

[56] Inuit Qaujimajatuqangit refers to the knowledge and unique cultural insights of Inuit, with regards to land, nature, people and animals.

[57] For example, rent subsidized housing is available for as little as $200.00 a month and teachers get 2 paid trips home per year.

south. Coral Harbour has Inuit teachers making up half of its teaching staff and this has greatly reduced turn over. The GN is acutely aware that the long-term solution to teacher retention is to train more Inuit.

As noted earlier, efforts on addressing the above challenges to education would appear to be paying off, although this may not yet be obvious in the census data. Not only are schools in Kivalliq graduating twice as many students as a decade ago, educators are encouraged that many of their graduates intend to continue on to postsecondary training. Rankin Inlet educators expect about half their graduates to continue their education, most often at Nunavut Arctic College or Red River College in Winnipeg.

This success is attributed not only to curriculum and teaching improvements, but also to people's experience of Meadowbank and expectations of further development in the mining sector in the future. These are small communities, and most students have a relative or know someone who works for either Meadowbank, the many other companies exploring for minerals in Kivalliq, or for businesses that supply the mining companies. There are now enough of these workers that children are seeing alternative livelihoods and lifestyles that some of them would like to achieve. Mining companies have also been active in schools, presenting information and programs that suggest to students that employment is achievable.

Finally, there are more postsecondary education opportunities in Nunavut, allowing students to further their education, in ways appropriate to their needs and expectations, inside the Territory. That is, there has been a concerted effort to provide more advanced training in Nunavut as an alternative to sending students to the south of Canada. Leaving the Territory for educational institutions in the south has not been as successful as hoped as students can have a difficult time adjusting. Students were abandoning postsecondary training in the south, most often as a result of feeling isolated from family and culture. Students also say they feel less prepared than classmates.

For many mining jobs, a high school education, supplemented with shorter term skill training in particular areas such as heavy equipment operations, is sufficient. However the better and higher paying jobs require formal postsecondary training in such areas as trades and professions. The Nunavut Arctic College serves the Kivalliq Region through its 2 campuses in Rankin Inlet and its learning centres in the 6 other Kivalliq communities. The college offers both skills upgrading training, as well as some trades and professional accreditation. Its programs include an emphasis on preparing students for employment in the mining sector, with training for camp cooks, office administration and environmental technologists. Some of the shorter of these programs are offered in NAC's community learning centres. Trades and apprenticeship programs generally take about a year to complete and can accommodate about 10 to 12 students per program. Enrolment levels at NAC in 2011 were approximately 70 people across all programs.

Whereas NAC's nurse and teacher training programs had previously required students to go to Dalhousie and Regina respectively to complete their education, students are now able to complete all their training in Nunavut. The recent opening of the technical trades training centre in Rankin Inlet now makes possible full apprenticeship programs for electricians, plumbers, housing maintainers and oil burner mechanics in Nunavut. Expansion of the centre's offerings, and the opening of a similar centre in Cambridge Bay, will allow apprenticeship programs for heavy equipment technicians, automotive mechanics, millwrights and welders to be offered in Nunavut in the near future.

NAC is also a partner of the Kivalliq Mining Training Society, whose goal is to prepare Kivalliq people for 280 permanent jobs in the mining sector. Training includes such areas as heavy equipment operation, trades, general labouring, and administrative and technical support. Other funding partners include GN, KIA, the Aboriginal Skills Employment Partnership Program of the federal government, and AEM.

NAC's Kivalliq campuses and community learning centres are seeing increased demand for training. More so than in the past, this demand is also coming from the younger population. Unlike southern training programs that see high dropout rates, NAC staff estimate that their success rate with students is about 70%. NAC is funded by the GN, the federal government and private donors.

9.5.2 Pathway Analysis

The EIS uses pathways (Project-environmental interactions) to assess effects. Pathway analysis is a screening step that is used to determine the existence and magnitude of linkages from the initial list of potential effects pathways for the Project. This screening step is largely a qualitative assessment and is intended to focus the effects analysis on pathways that require a more comprehensive assessment of effects on VSECs.

Pathway analysis identifies and assesses the linkages (or interactions) between Project components or activities, and the corresponding potential residual effects to VSECs relating to socio-economics. Potential pathways through which the Project could affect VSECs were identified from a number of sources including a review of the Project description, effects identified by other projects in Nunavut and the Guidelines for the Project.

The first part of the analysis is to produce a list of all potential effects pathways for the Project. Each pathway is initially considered to have a linkage to potential effects on VSECs. This step is followed by the development of design features and mitigation that can be incorporated into the Project to remove a pathway or limit (mitigate) the effects to VSECs. Such design features include best practices, management policies, work procedures and social programs that can avoid or mitigate effects.

Knowledge of the environmental design features and mitigation is then applied to each of the pathways to determine the expected amount of Project-related changes to the environment and the associated residual effects (i.e., effects after mitigation) on VSECs. For an effect to occur, there has to be a source (Project component or activity) that results in a measurable change to the environment (pathway) and a correspondent effect on a VSEC.

Table 9.5-3: Pathway Table

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Education achievement, dropout rates, school attendance	Requirements for skills and education.	To benefit from employment options, potential workers would have to prove minimum education/qualifications. This should lead to increased interests in completing education. Consequently this should decrease dropout rates and increase school attendance. However, instant work opportunities might stop some from proceeding to higher education.	Providing training opportunities Working with local education authorities Support efforts to upgrade education Provide career counselling	Primary, direct and indirect.
Available training in existing education system	Requirements for skills and education.	AEM would require training and education of employees. Although much of the training would be led and administrated by AEM, there would be multiple opportunities for the local education system to increase the availability of programs.	Establish a Work Force Development Plan which could include funding for local training positions Establish training programs in collaboration with hamlet governments Cooperating with appropriate agencies in Nunavut in entrepreneurial training programs for Inuit businesses Cooperating with appropriate educational authorities and institutions in Nunavut in the development and implementation of high school and college courses with mining sector content providing a scholarship fund for post-secondary education	Primary, direct and indirect.
Capacities of existing education system	Project related in migration.	In migration, depending on its volume, nature and timing, could lead to increased number of children of school-age, leading to higher admission rates and larger class sizes. This could put added strain on schools.	None required but can be monitored through Kivalliq`s Socio-Economic Monitoring Committee (SEMC) and eventually the Nunavut General Monitoring Plan (NGMP).	Primary, indirect.
Funding of existing education system	Requirements for skills and education.	AEM would require employees to meet grade 10 education requirements for almost all jobs. Although much of the training will be led and administrated by AEM, it would unquestionably “spill over” to the local and regional education systems. Increased funding would happen through direct funding (e.g. programs and scholarships), taxes paid and increased demand by local workers.	None required.	Primary, direct.
Education and skill levels of local labour force	Education and training of employers and contractors.	Increased opportunities for on the job training will enhance the capacities of local workers, which can be applied elsewhere when the work with Meliadine comes to an end.	Providing training opportunities Working with local education authorities Support efforts to upgrade education Provide career counselling	Primary, direct.
Retention of school teachers	Increase in cost of living	The Project is not expected to drive the cost of living up, which has been noted as an issue in retaining teachers. If more goods and services are provided locally, as a result of the Project’s procurement needs and workforce spending, the cost of living could improve.	None required.	Secondary linkage, indirect.

9.5.3 Effects Analysis

9.5.3.1 Mitigation Measures

AEM wishes to enhance the potential on the part of people in Kivalliq to access employment and contracting opportunities created by the Project. AEM will therefore provide Project related education and training programs. AEM recognizes that poor educational achievement contributes both to lack of economic opportunity generally, and to social challenges that are the consequence of unemployment and poverty. There is also a concern, particularly among Elders, that traditional knowledge is being lost to communities and youth.

The promotion of education and training is therefore intended to address not only Project requirements, but also to maximize the contribution of the Project to Inuit beneficiaries and contribute to longer term participation in both the wage and traditional economies in the interests of sustainable development. That is, the Project aims to develop skills amongst Inuit beneficiaries that have lasting effect beyond the lifecycle of the Project. Accordingly, AEM has signed a Memorandum of Understanding with the Department of Education that will focus on increasing the number of students in the Kivalliq region who are able to successfully transition from high school to trades and mining-related career opportunities. Additionally, AEM will work with the KIA, and education authorities in Kivalliq and Nunavut to develop the details of an education and training strategy that is broader based in its goals than simply meeting Project related needs. Elements of the education and training strategy include the following:

- Providing timely and accessible information to Kivalliq communities on all Project related education and training opportunities.
- Providing pre-employment training to promising job candidates in such areas as work readiness and life skills in order to enhance the potential for success once employed
- Establish a Work Force Development Plan, updated annually to internally guide AEM on its Project related training needs and to facilitate addressing those needs through AEM's continued participation in the Kivalliq Mine Training Society. For example, this Plan, which could include funding for training positions[58] for Inuit at existing AEM operations in preparation for the operations phase, including in heavy equipment operations, mill operations, apprenticeship and technician training, technology, environmental monitoring and computer and office skills. Some of these programs may involve Nunavut education institutions such as NAC.
- Providing on the job training in areas such as orientation to AEM operations, health and safety, and skills upgrading (core competency), supervision, leadership and management to enhance job performance, retention and advancement.
- Providing on the job training and counselling as appropriate in areas such as career development, diversity and respectful behaviours, life skills, and personal financial management to support successful employment experience.
- Retraining selected construction workers for operations phase jobs and training operations workers in new required skills (for example, in mining methods) to allow successful employees to continue their employment as work force needs shift.

[58] These training positions will be for different time periods, from one to 4 years, depending on the nature of the training.

- Supporting efforts on the part of employees to upgrade their education as a means towards job advancement, –accommodating employees (where practical) who decide to participate in high school completion programs by allowing employees to retain employment with the mine while upgrading their skills.
- Offer haul truck driver training to increase the number of skilled Inuit workers at the Project. AEM's objective is to train semi-skilled workers on site using a simulator of actual equipment to be used at the Project. This program will enable workers to build their capacity so that they can access employment opportunities that require specialized skills. The haul truck training will also include a career path to ensure trained haul truck operators can access employment at the mine. This is similar to the training currently being conducted at the Meadowbank Mine. AEM intends to move this training facility to Meliadine upon closure of the Meadowbank Mine. AEM also intends to offer employment at Meliadine to its trained Meadowbank workforce to allow employees to continue their career development pathway with AEM.
- Cooperating with appropriate agencies in Nunavut in entrepreneurial training programs for Inuit businesses – this training will address health and safety, business skills (finance and administration), quality control and legal/contracting issues.
- Cooperating with appropriate educational authorities and institutions in Nunavut in the development and implementation of high school and college courses with mining sector content.
- Cooperate with the GN and KIA to provide summer employment and cooperative education opportunities at the mine site (when economically possible) to provide job experience to the young (for example, this may include a 'Youth in Mining' program to expose young graduates to career in the mining industry and give them work experience in a mining environment).
- Working with other mining sector organizations in the region to enhance education and training strategies across the sector through sharing of best practice experience and resources.
- Cooperate with the KIA (through the IIBA) to provide a scholarship fund for post-secondary education – eligibility would include both high school students and Project workers.
- Participating with schools to deliver youth programs intended to develop traditional skills, particularly those related to activity on the land, and to address the management of mixed economy livelihoods.
- Offer a training program for supervisors and management team at Meliadine. The aim of this training is to develop leadership, communication and conflict management skills needed for responsibilities as a supervisor.

In order to better plan for the future, at its Meadowbank operation AEM has entered into a Memorandum of Understanding (MOU) with the GN Department of Education that will consider a range of initiatives that will benefit students from the Kivalliq Region. The programs are intended to help inform, engage and support youth to be prepared to enter the labor force. These include:

- Design of new information materials about the mining industry and careers in mining that is targeted to reach students from grade 1 through 12.

- A multi-year sponsorship with Professional Developers Association of Canada's to deliver and support their "Mining Matters" program in the Kivalliq region. The program will provide a new earth sciences program curriculum in schools as well as in service support to teachers to deliver the program. The GN has recently approved the "Mining Matters" program as an official curriculum resource. The program will be delivered in Baker Lake schools on a scheduled basis.
- Sponsorship of regional science and math camps that provide participants with credit. Select Baker Lake students will participate.
- Co-organizing an annual "Career Week" in Baker Lake that attracts employers from various sectors to promote career opportunities to students.
- Co-organizing a trade's access and skills week that provides students with practical skills experience in trade skills, such as welding, mechanics, hairdressing etc. Students receive credit for their participation.
- AEM has participated in curriculum reviews with the Department of Education to consider changes in curriculum that could provide students with new options to link educations studies with career choices.

Based on the success of this initiative, AEM intends to extend this initiative to other areas of the Kivalliq Region (specifically Rankin Inlet and Arviat) should the Meliadine Project be allowed to proceed.

9.5.3.2 Nunavut (Regional Study Area)

9.5.3.2.1 Construction and Operation

The Project will build capacity through learning and should influence education and training opportunities in Nunavut in a constructive way, both through increased number of training programs but also through increased motivation to complete studies due to increased employment opportunities. However, there could possibly also be some negative impacts, such as larger class sizes and less interest in proceeding to post-secondary education since a high school education will be sufficient for many of the Project's employment opportunities.

Most of these impacts are local in nature, influencing foremost the Kivalliq region. Some benefits will surely "spill over" to other regions, and to Nunavut as a whole. These impacts will be similar to the ones experienced by Killaviq. Please refer to discussion in Section 9.5.3.3, which refers to local effects on education, for further information and discussion on the aforementioned matters.

9.5.3.2.2 Final Closure and Post-Closure

As is the case for construction and operations, the regional impacts during final closure and post-closure will be similar to the ones experienced by Killaviq, hence, please refer to discussion in Section 9.5.3.3 for further information and discussion.

9.5.3.3 Kivalliq Region (Local Study Area)

9.5.3.3.1 Construction and Operation

The Project should have substantial, and mostly positive, effects on education in the Kivalliq region. The direct impacts will be mostly related to Project specific training of potential employees, but indirect impacts should include elevated education achievements of younger learners.

Capturing the potential positive impacts of the Project will depend on labour force and business education and training. It is also noted in this regard that consultation results indicate a strong interest in training by the Inuit, motivated by the understanding that training will be needed to access mining jobs and other opportunities. Local businesses are also eager to increase and develop their capacity in order to take advantage of contracting opportunities, as evidenced by the number of joint ventures that have been formed with southern companies.

AEM will, during all phases of the Project, emphasize on the job training to employees. The intention of this training is to improve skills towards improved job performance and promotion, and towards broadening the skill base of employees such that new or strengthened skills can be applied elsewhere in the economy. Job experience and training in heavy equipment operation and maintenance, haul truck driver training (on an on-site simulator), construction trades (including electrical, plumbing and carpentry training), catering, environmental studies, health and safety, computers and information technology, and accounting and clerical work – even if provided in a mining sector context – is transferable. In other words, the projects should leave substantial benefits to the local economy by increasing the human capital in the region.

In 2011 and 2012 a total of 30,722 training hours were provided to Nunavut Based Employees working at the Meadowbank Mine. Training was spent on both mandatory activities (health and safety and emergency response training), lifeskills training (work readiness and cross cultural training) and on job related training (haul truck drivers, drillers, heavy equipment operators). As of 2012, for instance, there were a total of 60 Inuit working as haul truck drivers for AEM, of which 14 were women.

AEM has also developed a career path program for heavy equipment operators, drillers, process plant workers and site services and road maintenance employees. At the end of 2012, 73 of Meadowbank Inuit employees had enrolled in the program (59 men and 14 women). Most of the career path programs outline a 3 to 6 year career path, with a defined number of total positions available. For instance, the equipment operator career path has 22 entry level positions, 10 axillary class positions (intermediate level) and 10 production class positions (highest level). Career paths are defined and made publically available to all AEM employees. AEM has also developed competencies matrices in conjunction with the career path program that lists all mandatory, general and specific training required for career advancement. This tool aims to help employees understand requirements for career advancement.

There is some potential for on the job training during construction; for example for people in support positions to construction trades and equipment operation work, such as for catering and office workers. However most on the job training will take place over the operations phase, as the Project builds to a 30% Inuit permanent workforce. In addition, AEM expects to offer job experience in its Meadowbank Mine which is scheduled to begin the closure phase as Meliadine operations ramp up. It is expected that people trained at Meadowbank will be able to extend their employment with AEM at the Project.

On the job training brings multiple benefits. It enhances job performance, enabling promotions of people trained, and opening up less skilled positions to new workers from communities. Through this process, AEM expects to increase the numbers of Inuit employees over the early years of operations. On the job training of Inuit supervisors is expected to enable at least some work crews to work in Inuktitut, potentially both widening the pool of available labour and enhancing job satisfaction. As noted above, many mining skills developed through Project specific training are transferable. Consequently, trained workers who will leave their positions during the course of the Project will bring skills back into communities. This way they might be better equipped to do hamlet jobs and, especially, jobs with businesses serving the mining sector.

Beyond on the job training, AEM will also provide assistance to those who wish to develop the skills which can better position them for Meliadine employment and contracting. Such assistance would include pre-employment programs, educational institution based programs such as apprenticeship and technician programs, and training for businesses. AEM's participation in the Kivalliq Mine Training Society has some potential to serve as a model. The specific objective of the Kivalliq Mine Training Society is to enhance the capacity of the people to work for AEM or other mining sector employers, at levels beyond the unspecialized skilled jobs that many may only be qualified for initially.

Although most of the Project's training and education programs will impact the individuals that have already entered the workforce (adults), AEM will also emphasize programs for the younger population. As noted above, high school graduation rates in Kivalliq are well below Canadian averages, although they have improved considerably over the past 5 years. Furthermore, consultation and data collection has shown that some children may be moving away from interest in traditional activity but not succeeding at finding a secure place in the wage economy. As a result, the fear is that some children have shrinking livelihood options. AEM's planned interventions in education and training include not only initiatives to meet the Project's work force and supplier needs, but also broader based initiatives to encourage children to stay in school and to work with educational institutions to increase mining sector content in curricula.

Accordingly, education and training initiatives will be developed by AEM, in association with governments, education authorities, communities and potentially other mining projects with a view to enhancing educational achievement levels in Kivalliq. As such, the Government of Nunavut Department of Education and AEM signed a memorandum of understanding (MOU) in 2012 with a focus on increasing the number of students in the Kivalliq region who are able to successfully transition from high school to trades and mining-related career opportunities. As part of this MOU, AEM sponsored Mining Matters (a branch of the Prospectors and Developers Association of Canada (PDAC)) to bring knowledge and awareness about Canada's geology and mineral resources to students and educators in Kivalliq. AEM is committed to fulfilling the obligations of the MOU with the Government of Nunavut in a manner that reflects the traditional and cultural values of Kivalliq and Nunavut to encourage a high likelihood of success of these initiatives.

In addition, AEM is committed to working with governmental, education, community, and private sector stakeholders towards addressing cultural, motivational, lifestyle, curriculum[59] and financial issues and barriers related to raising graduation rates, increasing the number of youth that choose to proceed to postsecondary education. Such measures would be intended to contribute to encouraging a commitment to education on the

[59] Curriculum issues include, as examples, learning methods, content children feel that is relevant to their adult lives and opportunities for traditional studies.

part of youth, and to provide the tools these children need to succeed at this commitment. To the extent that children stay in school and graduate, and more proceed to postsecondary education, including training as teachers and health staff, this will also contribute to the GN's goals of providing more services to Inuit in Inuktitut, and of increasing the representativeness of government workers.

It is hard to predict the impacts of the Project on the school capacities, such as class sizes and teacher retention. This will largely depend on the volume and nature of in migration to the region, which is still uncertain and will remain so until work on the Project commences and even longer. Generally, the more families that move to the region, the greater will be the impacts on the schools and class sizes. However, it seems logical that increased school funding should also lead to better teacher retention. Overall, it seems reasonable that the Project should lead to better school performances, not only through increased funding but also through the motivation of employment on the Project. This in turn should lead to higher graduation rates through better attendance of students.

In the face of ongoing changes in both the delivery and uptake of education, the detail of such measures will necessarily depend on needs identified closer to the start of construction. It is also noted that, in addition to training, simply gaining experience on the job and in contracting to meet the supply needs of the Project further enhance capacity in the labour force and in businesses. Preferential employment and contracting, and education and training, are mutually reinforcing.

9.5.3.3.2 Temporary, Final Closure, and Post-Closure

Education, by definition, has a long-term nature. In other words, once a person or people have increased their capacity through training or education, this enhanced capacity tends to be useful for a long period of time. Consequently, the effects of the Project on training and education will likely be felt in a positive way in the Kivalliq region for a number of years and make local people better equipped for careers in the wage economy. This will be especially true for those with highly transferrable skills, such as management, information technology, human resource management and other technical skills. Given that other mining projects commence in the region, mining specific skills will be directly transferrable as well.

In addition to preparing Kivalliq residents for new employment opportunities, training during the life span of the Project should also increase their potential to proceed to higher education in a range of areas, such as health, education, and business administration.

It is AEM's intent to increase the capacity of Kivalliq workers during the Project's life span. Therefore, there are no training and/or education programs planned specifically for the closure process. However, employees will be assisted in their attempts to maximize their potential through employment counselling and retrenchment programs.

Benefits associated with economic inputs to education and training initiatives stemming from the Project would cease at closure. In the event of out-migration of workers seeking employment outside of Kivalliq, schools may experience reduced class sizes should those workers move with their families.

9.5.4 Residual Impact Classification

Residual effects on education, training and capacity in the RSA and LSA should be positive and long lasting. Increase local capacity should lead to increased economic development and diversification, making the economy more resilient to economic fluctuations and negative events, such as closure of resource projects.

Table 9.5-4 summarizes what are expected to be Project effects on education and training. As the table depicts, the effects are positive and significant in all Kivalliq communities, and this should also be true for Nunavut as a whole. Moreover, most of the effects should be long-term.

Table 9.5-4: Residual Impact Classification Summary Education and Training

Effect	Project Phase	Mitigation / Enhancement	Direction	Magnitude	Geographic Extent	Duration	Significance	Likelihood	Prediction Confidence
Education achievement, dropout rates, school attendance	Constr.	None required. Increased training and education is expected to maximize the benefits in Kivalliq and Nunavut.	Positive	High	Local	Long-term, benefits will last longer	Significant	High	High
	Operat.								
Available training in existing education system	Constr.		Positive	High	Local and Region	Long-term, benefits will last longer	Significant	High	High
	Operat.								
Capacities of existing education system	Constr.		Positive	Medium	Local and Region	Long-term, benefits will last longer	Significant	High	High
	Operat.								
Funding of existing education system	Constr.		Positive	Medium	Local and Region	Long-term	Significant	High	High
	Operat.								
Education and skill levels of local labour force	Constr.		Positive	High	Communities	Long-term, benefits will last longer	Significant	High	High
	Operat.								
Retention of school teachers	Constr.		Positive	Low	Communities	Long-term	Significant	Medium	Medium
	Operat.								

9.5.5 Cumulative Effects

Section 9.4.5.1 constructs a scenario, at the territorial level, that considers the potential for construction and then operations of 9 large mining projects over a period to the late 2020's. The scenario is based on publicly available information on project development plans of Kiggavik, Doris North phases 1 and 2, Meadowbank, Mary River, Hackett River, Back River, and Izok Lake, as well as the Project – these projects are therefore considered reasonably foreseeable. Other projects and initiatives are not considered, since their size is dwarfed by the projects listed above.

It will be noted that most of the above listed projects are outside of the Kivalliq region. Although these projects will certainly draw from Kivalliq's workforce, they will do so to a lesser degree than Meliadine, Kiggavik and Meadowbank. Therefore, the cumulative effects of the 3 projects are essentially additive, while only some spillover effects from other projects impact the Kivalliq region. Since expertise and experience in mining has been accumulating in the Kivalliq region, this spillover effect should not be undervalued.

It cannot be overstated that training and education is the key for most members of the local workforce to utilize the opportunities of the Project. Therefore, the cumulative effects of the projects on training and employment will essentially be beneficial to the region. Not only will there be more opportunities to access training but, given the potential competition for workers by different projects, the opportunities to benefit from the training will be better.

If the cumulative effects on the demand for labour exceed a critical point, offering training and education opportunities might not be sufficient to meet to demand for local labour. This would lead mining operators to look increasingly outside the region for available workers and contractors, making the region "lose out" on some of the economic benefits that each project brings about by itself. However, given that Meadowbank will most likely be ramping down as Meliadine ramps up, that Kiggavik and Meliadine are geographically separated and that the unemployment rates in Kivalliq are high, the risk of this effect is rather minimal.

It is arguable that cumulative effects are not the responsibility of AEM to mitigate or monitor, beyond measures described in Section 9.3.5.1 to maximize Inuit participation in the Project. Additive effects are in any case simply the impacts of additional projects on baselines at the time these projects move forward with their respective EAs, and would be expected to be addressed in those EAs.

9.5.6 Monitoring and Follow-Up

The monitoring socio-economic effects in Nunavut and Kivalliq will mostly be the responsibility of the Kivalliq SEMC and the NGMP Secretariat. However, AEM intends to take part in this collaboration. This could include taking part in the planning of monitoring initiatives, contributing with data[60] and other input, and providing support to the Kivalliq SEMC and NGMP Secretariat. In addition, AEM would collaborate with other resource companies towards a consistent and useful approach for data collection.

[60] It is acknowledged that there are a number of challenges to collecting data on Project workers.

9.6 Individual, Family, and Community Wellbeing

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on individual, family, and community wellbeing.

Volume 1, Appendix, 1.0-A lists the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for individual, family, and community wellbeing.

9.6.1 Baseline Environment: Individual, Family, and Community Wellbeing (Regional Study Area)

9.6.1.1 Health

Health is broadly defined as a state of complete physical, mental and social wellbeing, not merely the absence of disease or infirmity. The determinants of health are broad, and include socio-economic parameters such as income, education, environment, social support networks and culture. A series of workshops in Nunavut in 2005 (Healy 2006) defined the following 11 social determinants of Inuit health:

- acculturation (cultural change as a result of intercultural contact);
- productivity (including harvesting, sewing, paid and voluntary work, etc.);
- income distribution;
- housing;
- education;
- food security and nutrition;
- health care services;
- quality of early life;
- addictions;
- social safety nets; and
- environment.

These determinants are somewhat different from those defined by the Public Health Agency of Canada (PHAC 2003) for the health of the Canadian population as a whole. The Inuit determinants do not include gender or personal health practices that are part of the Canadian determinants. Inuit determinants include food security, housing and addictions, which are included among the Canadian determinants. Conversely, the Canadian determinants include income and social status as one determinant, and employment and working conditions as another; the Inuit determinants are framed in the language of productivity and income distribution.

Inuit Tapiriit Kanatami (ITK 2010) prepared a report on Inuit health, comparing available data for the 4 regions of Inuit Nunangat and for Canada over the periods 1994 to 1998 and 1999 to 2003. Over the 1999 to 2003 period, total mortality, infant mortality, cancer mortality, and suicides in Nunavut were 2, 3, 4, and 8 times higher respectively than in Canada, and life expectancy was more than 12 years less. Further, ITK's comparison with data from each of the 2 periods indicated that total mortality, cancer mortality and suicide rates had gone up in

Nunavut and down in Canada, and that life expectancy had gone down in Nunavut and up in Canada. The gaps between the health of the Inuit and that of people in the rest of Canada were in fact widening. Only rates of infant mortality had improved in Nunavut between the 2 periods – however they were still much higher than in the rest of Canada.

Public Health Agency of Canada health data for provinces and territories[61] for the years 2007 and 2008 are provided in Table 9.6-1. Some positive outcomes are evident. Nunavut rates of mortality, heart disease and suicide declined over the period 2000 to 2007. Rates were still higher than Canadian averages but gaps were closing rather than widening.

Table 9.6-1: Selected Death and Disease Incidences (rate/100 000 people, age adjusted)

	Nunavut		Canada	
	2000	2007/8	2000	2007/8
Deaths (2007)				
all causes	1159	996	616	540
all cancers	302	340	180	166
lung cancer	195	202	64	58
major cardiovascular disease	230	187	209	152
diabetes	0	0	19	17
suicide	83	56	11	10
Diseases (2008)				
chlamydia	2567	4251	150	250
gonorrhoea	347	1154	20	38
tuberculosis	170	174	6	5

Source: PHAC (2010a, b)

Cardiovascular related death rates are similar to those in the rest of Canada. Although no diabetes deaths were reported, diabetes in Nunavut's population is thought to be high risk in face of changing diets and activity levels, as evidenced by diabetes education and prevention programs. Sexually transmitted infection (STI) rates have rapidly increased and are very high – the most common are chlamydia and gonorrhea. The first HIV diagnosis in Nunavut occurred in 2002, and although the disease has been rarely diagnosed since then, high STI rates elevate concerns about HIV becoming more prevalent.

There is very little data on some other health issues that are considered to be challenging in Nunavut. Outbreaks of infectious diseases in Nunavut are common, including respiratory syncytial virus, community acquired methicillin-resistant Staphylococcus aureus and, most recently, tuberculosis (MacDonald et al. 2011). Alcohol consumption is thought to be higher in Nunavut than in the rest of Canada, including among pregnant women – fetal alcohol syndrome/effects can result. Drug abuse levels are considered high. Levels of smoking have been reported to be 3 to 4 times the Canadian average (Henderson 2007). High lung cancer and respiratory illness rates, the latter also among children, are attributed to heavy smoking and/or exposure to second hand smoke. Mental health is challenging to diagnose and treat with the lack of facilities in Nunavut.

[61] The ITK looked specifically at health in Inuit regions, 3 of which are contained within other provinces/territories with majority non Inuit populations. PHAC data are reported by province/territory, and thus only approximately characterize Inuit health in Nunavut, where 85% of the population is Inuit.

There are more data available on traffic accidents and injuries. Snow machines and ATVs, in high use within and between communities, are more dangerous than cars. Traditional activity on the land also creates potential for accident and injury given the environmental conditions. However, people report increasing use of safety equipment to mitigate the risk.

Table 9.6-2 presents Transport Canada's data for fatality and injury rates for road accidents as rates i) per 100 000 population; and ii) per billion vehicle km. It is noted that because Nunavut's population has been less than 30 000 for most of the period 2004 to 2008 covered in the table, a rate of 3.4 fatalities per 100 000 is equivalent to one fatality, and a rate of 12.6 is equivalent to 4 fatalities in the total population. Similarly, one fatality translates to a rate of 33.7 fatalities per billion km driven, and 4 fatalities to a rate of 132.5 per billion km. There are few roads in Nunavut so distances driven are on average short.

Table 9.6-2: Transport Canada Motor Vehicle Traffic Collision Statistics

Year	Jurisdiction	Per 100 000 Population		Per Billion Vehicle-Kilometres	
		Fatalities	Injuries	Fatalities	Injuries
2008	Canada	7.3	536.6	7.4	549.2
	Nunavut	12.6	129.7	132.5	1357.6
2007	Canada	8.4	589.7	8.3	584.4
	Nunavut	0.0	48.0	0.0	461.5
2006	Canada	8.9	604.0	8.9	604.2
	Nunavut	0.0	214.0	0.0	n/a
2005	Canada	9.1	652.7	9.3	668.0
	Nunavut	6.7	240.1	n/a	n/a
2004	Canada	8.5	664.7	8.8	680.8
	Nunavut	3.4	222.6	33.7	2222.2

Source: Transport Canada (2011)

In Canada, fatalities and injuries have consistently declined, on both a population and km driven basis, over the period 2004 to 2008. In Nunavut, rates per 100 000 are variable, no trend is evident, and with the exception of 2008 with its 4 fatalities, fatality and injury rates have been lower than in Canada. However, on a km driven basis, rates of both fatalities and injuries are much higher in Nunavut than in Canada.

Nutrition is an input to, and foundation for, health and development – better nutrition means stronger immune systems and less illness, and healthy children learn better. In an investigation of household and children's food security, it was found that less than a third of households, and fewer than half of children, regularly had enough food on a daily basis (Table 9.6-3). Lack of food security is a function of poverty, but may also be linked to choices made with regard to expenditure of disposable income.

Table 9.6-3: Nunavut Food Security, 2007/2008

	Overall household food security (%)	Child food security (%)
Food secure	30.4	43.9
Food insecure	69.6	56.1
moderately insecure	35.3	31.0
severely insecure	34.4	25.1

Source: Egeland et al. (2010)

Poor health status prevails in Nunavut despite per capita spending on health at about twice the Canadian average. High health costs are due to high demands and needs for health services, but also to expenses associated with servicing small, remote populations reachable only by air. All communities have health centres staffed with nurses and counsellors; however, typically doctors, mental health professionals, medical specialists and dentists serve communities on a fly in basis, and many patients, including the seriously ill, pregnant women and substance abusers, must be transferred to southern Canada for treatment.

Community wellbeing is also a function of public security. Crime levels in Nunavut are high. In Nunavut in 2009, total crime and violent crime rates were 389 and 94 per 1000 people, respectively; about 6 and 14 times Canadian rates (Table 9.6-4). Kivalliq is distinguished by its low crime rates relative to the rest of Nunavut.

Table 9.6-4: Crime Rates (per 1000 people)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total Crime Rate										
Kivalliq	140	193	174	201	248	205	183	194	203	226
Kitikmeot	258	284	358	451	455	395	455	399	399	434
Qikiqtaaluk	238	287	345	408	414	423	352	348	436	461
Nunavut	214	260	300	358	375	356	323	313	363	389
Violent Crime Rate										
Kivalliq	56	64	69	62	68	58	57	53	55	60
Kitikmeot	76	88	115	145	142	123	113	96	114	123
Qikiqtaaluk	91	100	95	110	103	104	90	109	114	102
Nunavut	79	88	91	103	100	94	85	91	97	94

Source: GNBS (2011d)

Government is responsible to provide affordable (social) housing to Inuit in cases of need. In 2010, 51% of houses were social housing, 22% were privately owned and almost all of the rest were staff houses provided by public and private sector employers (GNBS 2011e; Table 9.6-5). However, housing conditions are poor (49% of houses are overcrowded and/or in need of major repair) and many of Nunavut's education, health and wellbeing weaknesses are attributed at least in part to poor housing conditions. People in Qikiqtaaluk have better housing than in the other 2 regions. The GN estimates unmet demand for housing at over 3580 units, equivalent to over 40% of current housing stock.

Table 9.6-5: Housing Characteristics

	Kivalliq		Kitikmeot		Qikiqtaaluk		Nunavut	
	Number	%	Number	%	Number	%	Number	%
Total Dwellings	2310	n/a	1450	n/a	4800	n/a	8560	n/a
Public housing	1360	60	900	63	2150	45	4400	52
Dwellings crowded and/or require major repairs	1240	56	820	58	1970	44	4030	49
Households dissatisfied with condition of dwelling	900	40	540	39	1630	35	3070	37
Groups of people who would move (demand)	1030	44	790	41	1760	37	3580	40
Internet available in the house	1430	63	760	53	2830	59	5020	59

Source: GNBS (2011e)
n/a = not applicable

9.6.2 Baseline Environment: Individual and Community Health and Wellness (Local Study Area)

Health, as defined by the World Health Organization, is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity. Community wellbeing is a function of individual wellbeing. As for Nunavut as a whole, Kivalliq is reported to experience severe health challenges, and in general, health indicators are acknowledged to be well below those typical of southern Canada. Additionally, there is concern that, despite some improvements in some health indicators in both Nunavut and Kivalliq, the gap with the rest of Canada may be widening in some respects.

There is, however, very little data publicly reported. This is largely due to confidentiality issues. For example, although lung cancer and domestic violence rates can be high, in small communities it may be only a very few people who have been diagnosed with cancer or have been arrested for spousal abuse. There is also controversy about the wisdom of widely reporting on some health challenges. Thus most of the content of this section is based on the results of informant interviews and focus groups discussions, and to some extent on data available for Nunavut as a whole.

Under the broad definition of health, there are concerns in Kivalliq about such challenges as chronic (including mental) illness and infectious disease; smoking, alcohol and drug abuse; cultural integrity; family function; violent and non-violent crime; and housing. These concerns are addressed in this section. Other determinants of health, as listed in Section 9.6.1.1 Health (in Nunavut)[62], are addressed in other sections of this baseline, but are referred to as necessary in this section.

There are also concerns in both Nunavut and Kivalliq about contamination of country foods; including radiation levels in caribou from radioactive fallout that occurred during the period of above ground nuclear testing in the 1950s and early 1960s. In 1991, INAC (now AANDC) established the Northern Contaminants Program, to 'work towards reducing and eliminating contaminants in traditional/country foods'. The program is ongoing (INAC 2010b; FEIS Volume 10, Section 10.2).

The only health data available for communities in Kivalliq are reported by Statistics Canada on the basis of the Aboriginal Peoples Survey done in conjunction with the national censuses. Data are available for all communities in 2001 and for the 5 largest communities in 2006 (Table 9.6-6). In 2006, Statistics Canada did not report on the LSA communities of Chesterfield Inlet or Whale Cove for confidentiality reasons.

[62] For reference, these are acculturation, productivity, income distribution, housing, education, food security and nutrition, health care services, quality of early life, addictions, social safety nets and environment.

Table 9.6-6: Health, Population 15+, 2001 and 2006

	Arviat		Baker Lake		Coral Harbour		Chesterfield Inlet	Rankin Inlet		Repulse Bay		Whale Cove	Kivalliq	Nunavut	
	2001	2006	2001	2006	2001	2006	2001	2001	2006	2001	2006	2001	2001	2001	2006
% who say their health is:															
excellent or very good	81	60	51	45	46	56	37	66	50	53	48	59	62	57	49
good	15	30	28	38	38	29	53	26	33	44	40	24	28	33	35
fair or poor	n/a	11	20	18	16	16	n/a	n/a	16	n/a	15	18	n/a	10	16
% who saw or talked on telephone about physical, emotional or mental health in past 12 months to:															
family doctor or general practitioner	21	43	41	31	38	47	42	29	54	34	33	18	31	34	43
nurse	64	74	72	59	62	87	68	71	70	66	70	65	68	58	70
dentist or orthodontist	34	49	28	36	30	51	37	44	54	41	50	24	35	39	49
other health professional	30	53	49	29	43	36	68	54	37	50	40	41	46	38	42
long-term health conditions (diagnosed by a professional)															
%	31	25	42	26	36	31	32	29	34	26	40	38	36	30	37

Source: Statistics Canada (2002a, 2007b)

Note: Shaded areas represent LSA community data

n/a = not applicable

Although there is no data for Kivalliq as a whole in 2006, the community level data (representing over 90% of Kivalliq's Inuit populations) indicate that people in Kivalliq overall saw their health as better than people in Nunavut did in both 2001 and 2006. However, for people in both Kivalliq and Nunavut, the perception was that health had declined over the 5 year period between 2001 and 2006. The increased percentage of people with diagnosed chronic illness is likely part of the explanation for Nunavut; however, the community data for Kivalliq suggest that there were fewer chronically ill people in 2006 than 2001.

There are few clear patterns to the data presented in Table 9.6-6; however, in most (but never all) communities, perceptions of very good to excellent health declined between 2001 and 2006, and both visits to doctors and chronic illnesses increased, as is the case for Kivalliq on average. There are however no consistent relationships between any of these factors. For example, perceptions of poorer health do not consistently lead to more visits to doctors.

Figures 9.6-1 to 9.6-3 were developed from the data in Table 9.6-6 to provide some indication of health trends in the 3 largest communities in Kivalliq. Data are presented for Rankin Inlet, the largest LSA community, as well as for the LSA communities of Arviat and Baker Lake. Arviat was selected because of its similar size in terms of population to Rankin Inlet, and Baker Lake was selected because of its role as the primary 'mining services community' for the Meadowbank Project.

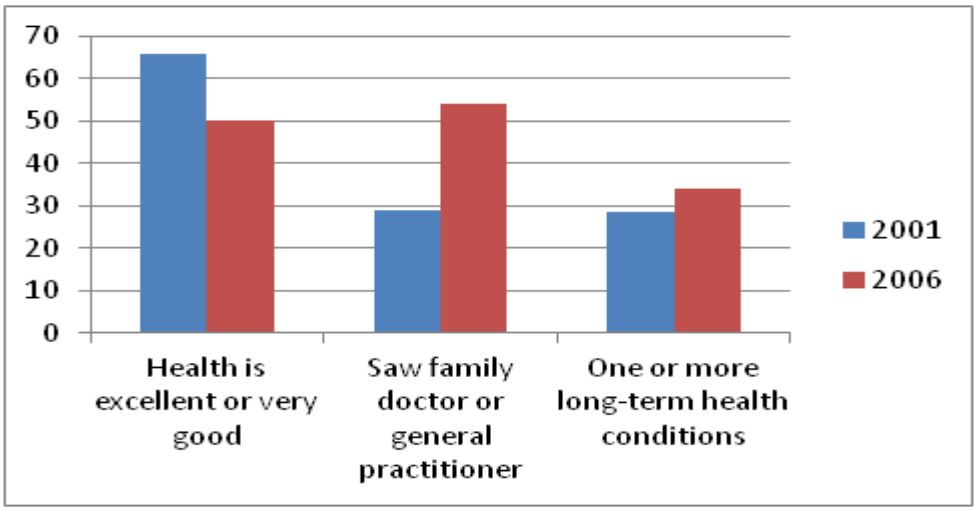


Figure 9.6-1: Rankin Inlet Health, % of Population 15+, 2001 and 2006

In Rankin Inlet there was an unusually large drop in perceptions of very good to excellent health, and an unusually high increase in visits to doctors. Chronic illness also increased slightly.

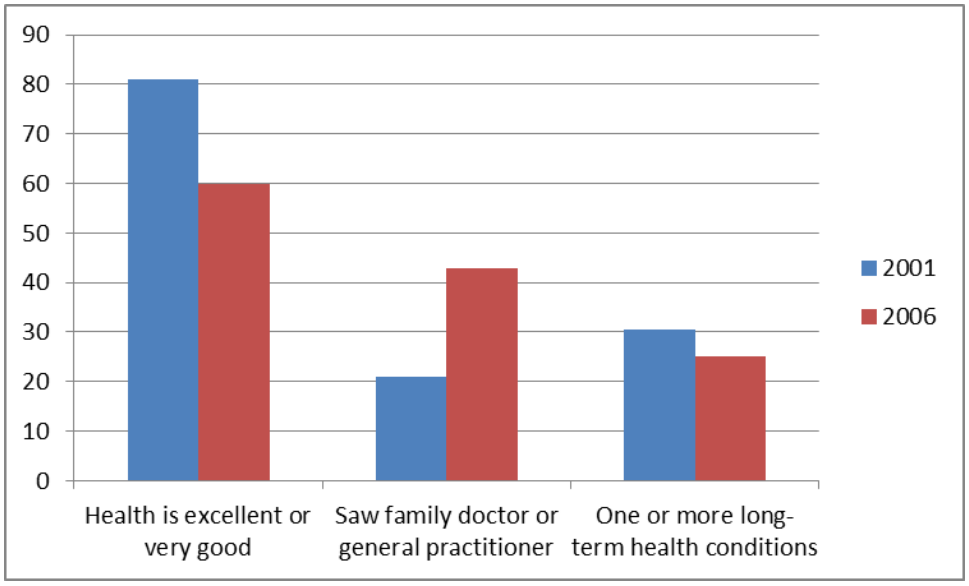


Figure 9.6-2: Arviat Health, % of Population 15+, 2001 and 2006

Arviat saw the largest perceived decrease in health condition, as well as the largest increase in visits to doctors; in 2006, twice the percentage of people saw a doctor in the previous 12 months than in 2001. As population also grew over this period, more than twice as many people saw a doctor; a heavy increase in demand on health services over a short period. Nevertheless, people in Arviat still describe their health as very good to excellent, much more so than in the other communities.

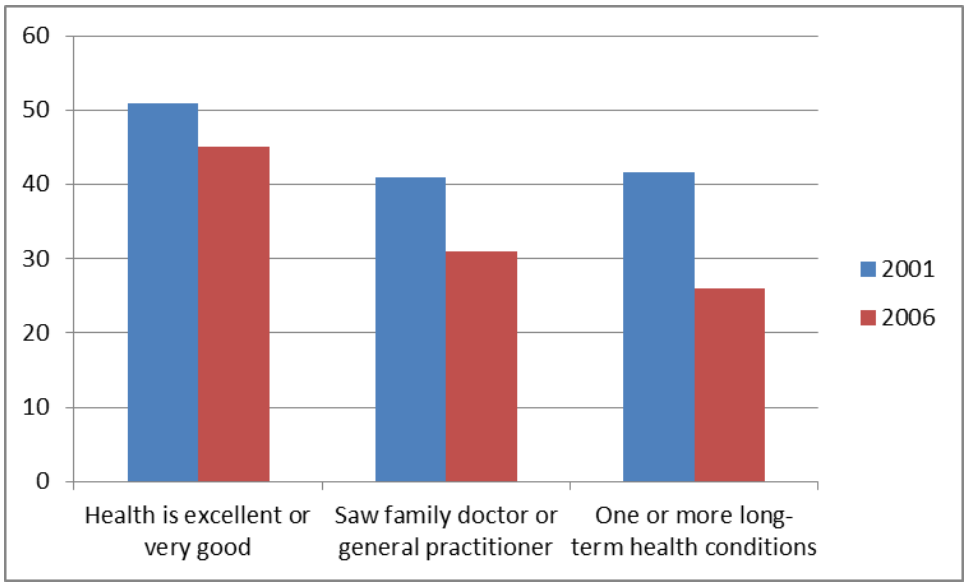


Figure 9.6-3: Baker Lake Health, % of Population 15+, 2001 and 2006

In Baker Lake, perceptions of excellent to very good health are low relative to other communities. However Baker Lake is also the only community that reported a substantial drop in visits to doctors. Perhaps as a result, diagnosed chronic illness fell faster than in any other community.

Perceptions of health are obviously much more than simply a function of incidence of chronic illness. As well, perceptions of poor health do not necessarily lead to more visits to doctors. Health is perceived much more broadly, more holistically, by most people; the Inuit understanding of health determinants make this clear. Variability between communities with regard to a myriad of factors, including activity on the land, economic opportunity and environmental conditions, will produce unexpected variability in self-reporting on health as reported in Figures 9.6-1 to 9.6-3 above.

Reference can be made to Section 9.6.1.1 for health trends in Nunavut, most of which can be considered to hold true for Kivalliq. A largely qualitative discussion on health and community wellbeing challenges in Kivalliq and its communities is presented below.

9.6.2.1 Disease

Kivalliq's communities do not differ significantly in terms of the types of common illnesses seen by health care staff. Flu and respiratory problems are most common. Anaemia cases occur, often in young pregnant women, and are sometimes attributed to changes in traditional diets (seal and polar bear are rich in iron). Instances of vitamin D deficiency are also ascribed to less eating of country food.

Sexually transmitted infections are reported to be of less concern than the figures for Nunavut as a whole would suggest. HIV has not been reported in Kivalliq region, and syphilis is not common, but chlamydia is seen frequently.

Infectious disease outbreaks are also noticeably present. Periodically, there are outbreaks of respiratory syncytial virus and methicillin resistant staphylococcus aureus. Both managing care of the ill and containing the diseases are difficult where the circumstances are overcrowded housing and/or constrained water supply. Recent outbreaks of tuberculosis are also a concern and have been attributed to poor housing standards.

Health care staff reported seeing recent evidence of increasing levels of chronic obstructive pulmonary disease and other heart diseases. There are abundant data to demonstrate that country food, and the active lifestyle its harvesting implies, are protective factors against these and other life threatening diseases. Particularly for the young, heavily advertised and comparatively cheap fast food is more accessible (from franchise operations in some communities and from grocery stores) than country food. Both health care staff and the community give high importance to increasing recreational opportunities for the young to combat sedentary lifestyles, particularly facilities that can be used in winter months.

Health care staff and the community are aware that psychological disorders, if not clinical mental illness, are common. Diagnostic challenges make it difficult for health care staff to talk confidently about incidence. The lack of capacity to diagnose and treat in Kivalliq, or often in Nunavut, has been of concern in the past. It was noted, however, that there are several mental health counsellors that service Kivalliq communities on a rotating basis, which is reducing the amount of time it takes to diagnose and treat mental health disorders. It is often observed that suicide is not the problem in Kivalliq that it is in Nunavut as a whole; however, this does not mean that rates

are not high by Canadian standards (WG-S 2009) or that suicide prevention programs are not needed. Anecdotal evidence suggests frequent successful and attempted suicides in very recent years in Kivalliq.

Injury rates in Kivalliq are also considered to be high. Often alcohol is said to be a factor; however, racing snow machines over ramps and rough terrain is a new recreational activity that is increasingly being taken up.

9.6.2.2 Alcohol and Drug Abuse

Rapid cultural change is well documented as a determinant of negative social behaviours in northern communities, including alcohol and drug abuse, domestic violence and suicide (Curtis and Bjerregaard 2005; Bjerregaard 2001; Shepard and Rode 1996). In a span of about 50 years, the Inuit have gone from subsistence livelihoods on the land into settlements and residential schools, and have been faced with a need to function in a mixed economy, often using a new language and new technologies.

Gambling might also be considered a negative behaviour where it is not well controlled. Leadership in Arviat cancelled bingo in the weeks preceding Christmas in 2009 in the hopes that people would spend more money on gifts for their children.

Abuse of alcohol and drugs has negative effects on all of economic, social, cultural, and health outcomes. A prohibition on alcohol has in some instances been shown to be correlated with decreases in other negative social behaviours in the north (Wood and Gruenewald 2006). Kivalliq communities determine their own alcohol control programs. For example, in Arviat there is absolutely no alcohol allowed, by law, in the community. In Baker Lake, Chesterfield Inlet, and Whale Cove alcohol is not prohibited, however there are restrictions in place on the purchase of alcohol[63].In Rankin Inlet, the most cosmopolitan hamlet in Kivalliq, the sale of alcohol is unrestricted. All liquor in Nunavut is purchased from the Nunavut Liquor Commission and the Commission's Kivalliq offices are based in Rankin Inlet (GN 2011a). There may however be an association between difficult access to alcohol and increased use of drugs. Drugs are in principle easier to transport, including by rotational southern workers, and are sometimes available over the internet and delivered by mail. Prohibition also often means that alcohol is still available but at a higher price. There is no consensus on whether or not alcohol and drug abuse has increased in Kivalliq as a consequence of Meadowbank. However, the number of alcohol applications has increased considerably. AEM committed to developing an annual wellness report for the hamlet of Baker Lake in 2012. An objective of this report is to collect information on food, alcohol and drug consumption to better understand illness/disease cause and prevention. This report, once produced, may provide more information about how mine employment impacts wellbeing, and particularly rates of alcohol drug abuse (AEM, 2012c). Information collected will be shared with the Kivalliq SEMC, KIA and other relevant stakeholders.

9.6.2.3 Cultural Integrity

The evolution of Inuit culture in Kivalliq is a topic of interest and has produced a substantial amount of academic literature. Of specific interest is the potential effects on culture of widening opportunities in the wage based component of the mixed economy. Research on traditional activities rooted in subsistence needs, suggests that important intergenerational relationships and roles (Collings 2005; Wenzel 1995) and the continuity of ecological

[63] Residents must get permission (permit) from the local Alcohol Education Committee before bringing alcohol into any restricted community.

knowledge (Nuttall 1998) are founded on the organization and practice of subsistence living in the north. The practice of traditional culture ensures strong feelings of identity and is a means toward social cohesion. Wenzel (1995) concludes that subsistence living is about more than meeting needs for food and shelter; rather it is a powerful ideology that contributes to the structure of society, leadership and moral authority. Finally, traditional activity more recently continues to be an integral part of the social safety net.

Changing patterns of subsistence in turn change social relationships, roles, knowledge bases, and livelihood security. Patterns of subsistence have changed over the last 60 years in Kivalliq. People in the 'settlement generation' of Inuit, born and raised in communities, have a different set of economic constraints than their parents did. The oldest of those born in communities are now in their late 40's, and many were sent to residential schools. Residential schooling had many devastating effects, most related to preventing young Inuit from acquiring important traditional knowledge and skills. Elders in Chesterfield Inlet, for example, felt concern for the younger generations because they are not adequately learning traditional Inuit life ways.

New technologies, notably snow machines and outboard motors, were introduced in the 1960s. These were adopted for traditional activity on the land but ultimately encouraged reliance on wage employment to pay for and run. The declines in fur markets in the 1970s and early 1980s (initially a collapse in the market for seal skins and subsequently the steady decline in the market for musk ox pelts) meant that hunting and trapping as a full time economic activity was no longer possible for many people in light of monetary needs. This in turn increased people's reliance on social assistance programs for income (Collings 2005).

Wage labour and the consumption of mass produced goods are now the daily realities for most Inuit. Traditional activities, such as hunting and fishing, continue to be important for most people in Kivalliq. Such activities have monetary value insofar as they represent a way to displace spending for food. Collings (2005) observed that Inuit men tend to define their worth based on their ability to provide harvested food to others. Wage employment is not perceived to have the same cultural value, even though wages are increasingly necessary to hunt. Traditional culture thus is a non-monetized system of production and exchange in which social as well as economic values are expressed. However country food is rarely sold and does not generate cash.

The cultural imperative to hunt and the financial imperative to earn money to enable hunting would be challenging to reconcile under many circumstances, but more so in an environment of few jobs. This is yet more difficult a situation for young males, whose recent unemployment rates approach 40% (GNBS 2011a). Additionally, many Inuit prefer to remain in their own communities. Wages are not as valued as living close to family and moving to find employment removes them from familiar hunting Territory. Subsequently, it is not just if jobs are available, but also where they are available, that is of relevance.

Community and family ties are sustained by the values of reciprocity and sharing, manifested by regular exchanges, including of goods (country food, but also sharing of equipment for example) and of gestures of emotional support. In Chesterfield Inlet for example, ceremonies are held to honour a young person's first catch. Community wide grieving following death is another manifestation of these community ties. Community feasts on special occasions, and in the event of unusually high harvests, are frequent events in all communities. Focus groups and interview results suggest that the production and exchange of country food have consumption value, but are important cultural activities vital to the survival of Inuit tradition and the wellbeing of people and communities.

Such ties are of enormous benefit, as noted above. However, expectations of reciprocity can be inconsistent with individual goals and in some socio-cultural settings individual goals may be inappropriate relative to the needs of families and other social obligations. Where social ties dominate personal and public life, individuals can feel that obligations are inhibiting the achievement of personal wellbeing. People also noted that family and other social ties that are not community wide can lead to exclusion and segregation.

The Inuit no longer live on the land and the culture has evolved. As noted above, reactions to this fact are broad ranging. Most people recognize that there is no going back and want to focus on understanding how better to manage change. There is less agreement on what management of change implies in detail with regard to, as examples, wage employment, language of instruction in schools, environmental conservation and community wellbeing. Communities are affected through widespread negative social behaviours and their consequences, but families are also struggling.

The notion of family among Inuit is said to be broader than just blood relations. Families also have members who are related through personal relationships, whether hunting partners, children taken into care for any number of reasons, or other people who become very close. There is no typical family. However, in all families there are, almost universally, Elders and youth, and men and women. Challenges in dealing with cultural change seem most strongly evident in newly defined relationships as compared to a past when generations shared the same world and gender roles were more fixed and achievable.

Many Elders are certain in their convictions that the young cannot live as they did in the past and must get educated and find wage employment. There is however significant discomfort with the erosion of traditional culture as this is manifested in growing lack of understanding between the worlds of Elders and youth (Box 9.6-1). Some Elders suggested that many of the issues challenging the young would not be as challenging if traditional values were stronger. The young, by and large, remain close to their families and respect their Elders. However, while some expressed commitment to traditional culture, others said that traditional skills and values are not as relevant to the challenges in their lives as Elders sometimes think they are, and the young need to learn to do things that will help them take up modern day roles and responsibilities.

Box 9.6-1: Intergenerational Relations

- I am concerned especially for the younger generation. I am concerned about their lives because they (younger generation) are supposed to be taught our tradition and our traditional food diet, but they are not being taught, or are not learning (Elder).
- In the old days, we knew we can stay out overnight, just outside without proper shelter – we could survive. Young people do not know how to do this today. They don't prepare (Elder).
- Before, family didn't stay in one place all the time. They were always on the move following the migration of the animals. Before people started living in one community, they lived in camps, they didn't always stay in one spot.
- Anything is coming, the mines are opening, the weather is changing, and it's hard to figure out (the effects of) the changes. Our younger generation will be mostly affected by all the changes.
- With no education, young people will not find work. They have to have proper training, if they want to have certain positions in these mining companies; they need to be well educated (Elder)

Traditional livelihoods also depended on gender roles, although there are many examples of women fulfilling male roles where this has been necessary. There is also exceptionally high rate of male suicide, which in Kivalliq is 10 times that of females (WG-S 2009). This may be related to an inability to fulfill what is still widely held as the role of a man – providing (Collins 2005). A man can harvest, or he can work at a job, but in a world when the 2 are interlinked (in the absence of a job harvesting can be less achievable), some are unable to do either. Where a man is unable to do either, he may feel there is little place for him in the family or society.

There is more certainty about the social roles for women. Having children is the one area that a young woman knows she can succeed, and that this may be part of the explanation for the observation that many young girls get pregnant before finishing high school. With this understanding, the high school in Rankin Inlet has child care facilities that enable young girls to continue to go to school after giving birth.

Perceptions of gender roles persist. However, as men find it harder to provide and as women are increasingly more successful at school and in employment, stresses can be expected. Where there have been observed increases in domestic violence, health care and police staff are uncertain whether these are actual or a result of raising the profile of the issue, encouraging more reporting. Informants acknowledge that alcohol in particular is a factor in domestic violence.

Retention of Inuktitut is also fundamental to cultural integrity, and thus individual and community wellbeing. Elders in particular are concerned that Inuktitut is being lost and the young are less interested in maintaining Inuktitut as their primary language, or worse, that there will be a loss of bilingualism in favour of English.

The data suggest that language retention is better among the Inuit in Nunavut than among most other Aboriginal groups in Canada. However, there are some signs of erosion. There remain fundamental questions about the extent to which English speakers exert economic and political control in Nunavut, and the extent to which English becomes the dominant language as a consequence. Language can be viewed as a resource that is used, purposefully or not, to entrench the power of one group over another, and thus one language over another (Dorais 1989).

There are a number of drivers affecting use and maintenance of Inuktitut, both positive (language of instruction in primary schools for example) and negative (southern media influences for example). However, English is taking hold in the 2 important domains of education (secondary schools, and postsecondary education and training schools) and work. English does appear to be the dominant language in Rankin Inlet.

9.6.2.4 Crime

Data on crime rates in Kivalliq is provided in Table 9.6-7. There is high variation between communities and between years, particularly for violent crime. Nevertheless, the rates overall are many multiples of the Canadian rates, which were 6.1 per 1000 people for total crime and 1.3 for violent crime in 2009. It is also noted that drug crimes, included in total crime in Table 9.6-7, are much higher in the Kivalliq region than in Canada overall.

The community level data are too variable to discern patterns; however, at the level of the region as a whole, an upward trend may be observed in total crime (Figure 9.6-4). Violent crime is staying flat however. It is noted that in all years, Kivalliq's crime rates, and those of 6 of its communities, are substantially lower than rates for either of the other 2 regions within Nunavut, or for Nunavut as a whole. The exception is for total crime in Rankin Inlet.

Table 9.6-7: Total and Violent Crime Rates (per 1000 people)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total Crime											
Arviat	107	121	152	108	96	124	189	183	146	134	158
Baker Lake	84	158	127	177	239	203	151	172	158	150	162
Chesterfield Inlet	n/a	n/a	n/a	n/a	95	98	116	135	157	142	186
Coral Harbour	84	90	104	168	152	272	142	75	137	127	153
Rankin Inlet	194	241	416	293	323	458	351	286	337	353	389
Repulse Bay	n/a	n/a	n/a	148	175	95	52	42	97	144	114
Whale Cove	n/a	n/a	n/a	n/a	67	189	121	125	54	196	268
Kivalliq	108	140	193	174	201	248	205	183	194	203	226
Violent Crime											
Arviat	46	53	59	39	38	30	53	73	55	51	58
Baker Lake	34	80	43	71	83	72	66	66	45	52	46
Chesterfield Inlet	n/a	n/a	n/a	n/a	28	55	34	29	45	42	85
Coral Harbour	34	36	44	63	35	78	49	34	56	55	55
Rankin Inlet	59	82	126	120	87	108	75	64	73	64	66
Repulse Bay	n/a	n/a	n/a	62	60	28	19	14	15	45	53
Whale Cove	n/a	n/a	n/a	n/a	26	68	58	49	32	74	106
Kivalliq	38	56	64	69	62	68	58	57	53	55	60

Source: GNBS (2011d)

Note: 2009 data are not comparable to other years because of a change in reporting standards

Shaded areas represent LSA community data

n/a = not applicable

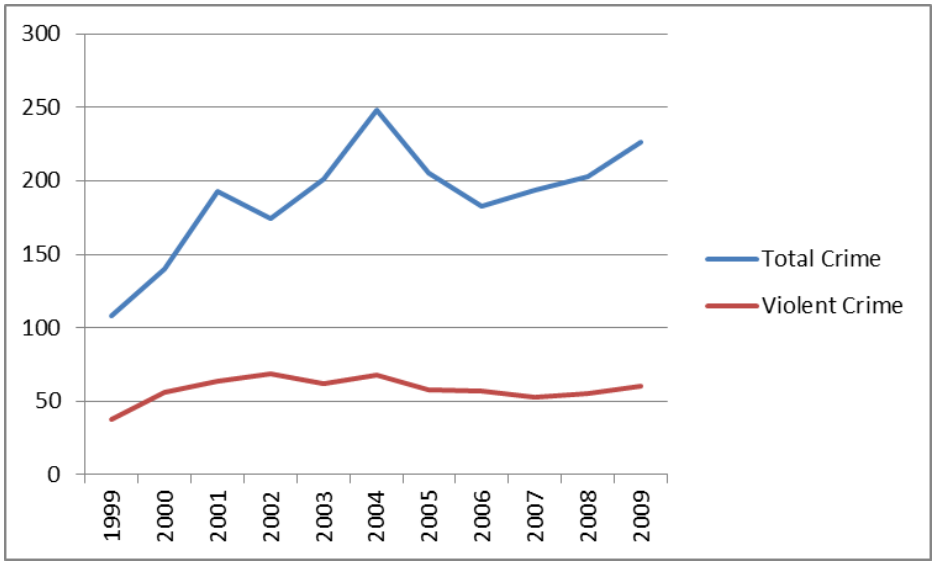


Figure 9.6-4: Crime Rate Trends in Kivalliq

Figure 9.6-5 shows average crime rates over the period 1999 to 2009 for each community. As people in communities have indicated, the smaller, more traditional communities have relatively less crime when compared to larger communities, particularly Rankin Inlet.

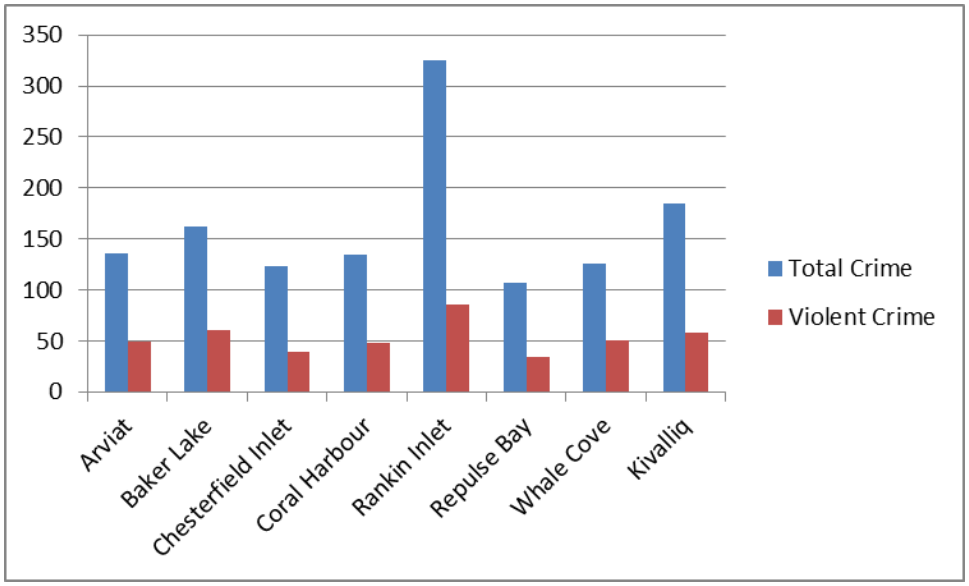


Figure 9.6-5: Average Crime Rates in Kivalliq Communities

Specifically, these crimes are defined as crimes against the person (which is typically acts of violence, including threats against another person) and crimes against property (which is primarily thefts and possession of stolen property).

As reported in Table 9.6-8, while the crime rate in Kivalliq is increasing faster than in Nunavut as a whole, it has yet to reach the level of crime in Iqaluit on a per capita basis.

Table 9.6-8 highlights that crime rates are rising in all communities, except for property crimes in Rankin Inlet which reduced marginally by 1% (from a higher than average rate compared to other Kivalliq communities) between 2006 and 2010. The 2011 SEMC reported that the increase in crime is due to an increase in drug and alcohol purchases that are linked to increased incomes from the wage economy. Drugs and alcohol may lead to increased crime such as theft to fund addictions and/or increased violence due to intoxication from these substances. To date, there is no evidence to substantiate that increased incomes from employment is correlated with rising levels of crime. There is currently a research gap on the relationship between rising incomes and drug and alcohol consumption. This gap will likely be addressed by the GN and major employers in Kivalliq to see if there are any valid linkages, and if so, develop strategies to mitigate them.

Table 9.6-8: Crime Rates in the Kivalliq Region (Rate of Crime per 1000 residents)

	2006	2007	2008	2009	2010	Average Annual Change 2006 to 2010
Crimes Against the Person (%)						
Nunavut	152	154	160	159	166	+3.5
Kivalliq	60	55	57	73	86	+6.5
Arviat	74	53	50	108	90	+4.0
Baker Lake	66	50	61	50	85	+4.8
Chesterfield Inlet	26	39	41	87	62	+9.0
Coral Harbour	42	55	50	54	92	+12.5
Rankin Inlet	69	71	63	66	90	+5.3
Repulse Bay	23	19	46	55	69	+11.5
Whale Cove	46	65	82	100	94	+12.0
Crimes Against Property (%)						
Nunavut	209	204	224	238	233	+6.0
Kivalliq	79	89	100	101	111	+8.0
Arviat	51	57	63	72	93	+24.0
Baker Lake	49	74	81	88	135	+21.5
Chesterfield Inlet	69	81	61	66	83	+3.5
Coral Harbour	35	49	50	66	70	+9.6
Rankin Inlet	160	157	175	172	156	-1.0
Repulse Bay	37	69	91	45	43	+1.5
Whale Cove	30	24	64	72	46	+4.0

Source: GNBS (2011)

Note: 2009 data are not comparable to other years because of a change in reporting standards.
Shaded areas represent LSA community data

9.6.2.5 Housing

Housing shortages are a widespread and persistent problem in Nunavut. There is a need for more housing to ease overcrowding, replace substandard housing and accommodate growing populations. The most basic problem is the high cost of construction and maintenance of units. Home ownership was encouraged as early as 1972 by the Northwest Territories Housing Corporation, which was charged with managing housing. But the nature of the northern economy, where wage labour is scarce and often seasonal, home ownership is out of reach for most people.

The basic system of housing delivery has remained unchanged; residents apply to the local housing office and are either assigned, or placed on a waiting list for, social housing. Increasingly, waiting lists are the norm. Rent is assessed on ability to pay. High income earners however may have many dependents. Social networks and kin obligations can result in substantial redistribution of income from wage earners to extended family members. There is some dismay that under these circumstances, a member of what might be a very large family can see a more than tenfold rent increase upon finding employment.

The quality and availability of housing varies by community. Some, such as Chesterfield Inlet, see their housing situation as good compared to other communities. At the other extreme, Arviat has an acute shortage and crowding problem – a 6 year wait for a family and a 14 year wait for a single person.

As noted earlier, substandard and/or overcrowded housing has significant health and wellbeing consequences, as well as effects on children's schooling. There can also be economic effects as the shortage of housing can make it difficult to recruit employees (CBoC 2001).

Table 9.6-9 presents data on housing in Kivalliq communities. The situation in Kivalliq is somewhat worse than for Nunavut as a whole. In 2010, 59% of houses were social housing, 25% were privately owned and almost all of the rest were staff houses provided by public and private sector employers (GNBS 2011e). Housing conditions are poor with 56% of houses overcrowded and/or in need of major repair. People, however, are somewhat less dissatisfied with their housing; just over 40% would move if they could.

Demand for social housing in all Kivalliq communities is high, with wait lists equaling a quarter to one third of the total stock in most communities. The demand for social housing is lower in Chesterfield Inlet than other Kivalliq communities, with the wait list amounting to 15% of the total stock. Conversely, in Arviat and Repulse Bay, demand for social housing is equivalent to nearly half of the existing stock..

The demand for housing can only continue to increase as the population grows and ages, and more people decide they want to live in their own houses rather than with families. Compounding the general lack of housing is the growing need for housing for special needs people such as the elderly and the disabled.

There is some expectation that with high levels of employment in the communities closest to mining projects (Baker Lake and Rankin Inlet), demand will increase for privately owned housing. There is no evidence, however, of large demand for private housing development in these communities as of yet. Construction work is not permanent. It may be that as the operations phase of Meadowbank establishes itself, and people become more confident about secure employment over the long-term, they will choose to move into private housing. This should free up some social housing. However, high construction costs mean that private houses in these communities are comparatively expensive and may be out of reach for many with lower paying jobs and non-working dependents.

Table 9.6-9: Housing Characteristics

	Dwellings (no.)	Owners (%)	Renters (%)				Crowded and/or in Need of Major Repair (%)	Dwellings with Temporary Residents (%)	Demand for Housing (no.)
			Social Housing	Staff Housing	Private Housing	Other			
Arviat	490	27	59	12	0	2	64	20	310
Baker Lake	530	23	68	**4**	**4**	n/a	53	24	220
Chesterfield Inlet	100	20	70	**0**	**0**	0	54	**31**	**50**
Coral Harbour	180	22	67	0	**6**	6	60	34	70
Rankin Inlet	740	31	43	**18**	**4**	**4**	46	37	220
Repulse Bay	170	12	71	12	6	**0**	76	31	100
Whale Cove	90	22	67	**11**	**0**	0	61	43	50
Kivalliq	2310	25	59	11	3	2	56	30	1030
Nunavut	8550	22	51	20	4	3	49	32	3580

Source: GNBS (2011e)

Note: Data in bold are considered unreliable by GNBS.
Shaded areas represent LSA community data

9.6.2.6 Summary

Community wellbeing is a function not only of the subcomponents described above, but of many other factors as well. It is also evident from engagement results that people's perceptions and experiences of community wellbeing are quite variable. To come to conclusions about overall wellbeing, or even trends, in LSA and other communities in Kivalliq, or in Kivalliq as compared to the rest of Nunavut is difficult. AANDC (formerly INAC) has attempted to do this using a community wellbeing index (Table 9.6-10); however, it should be noted that important determinants of a sense of wellbeing in Nunavut, such as the state of the environment and integrity of traditional culture, are not included in this index.

Table 9.6-10: Community Wellbeing Index, 2006[64]

Community	Population	Score				
		Income	Education	Housing	Labour Force	Overall Wellbeing
Arviat	2060	64	26	58	73	55
Baker Lake	1728	67	30	63	76	59
Chesterfield Inlet	332	75	33	67	84	65
Coral Harbour	769	59	29	77	80	61
Rankin Inlet	2358	83	40	77	86	71
Repulse Bay	748	52	18	50	68	47
Whale Cove	353	63	21	65	74	56
Iqaluit	6184	96	55	85	89	81

Source: INAC (2011)

Note: Shaded areas represent LSA community data

9.6.2.7 Nutrition and Traditional Activity

Throughout Nunavut and Kivalliq, the land based economy is fundamental to people's health and wellbeing. Data predating the construction and operation of Meadowbank indicate that the levels of engagement in land based activities and the contribution of harvests to diet were both high and stable in most communities in Nunavut (NWMB 2004; Statistics Canada 2002a, 2007b).

The CINE undertook a study to identify values around the harvesting and consumption of country food (Kuhnlein et al. 2000). The CINE methodology included workshops with participants in communities to reach consensus on a list of attributes considered to be relevant to the values assigned to harvesting and consumption of country food. These attributes are listed as statements in the Table 9.6-11, with indications of the percentage of respondents who agreed to each statement in Kivalliq during the 1998/99 study. Additionally, in support of the application for the AREVA Kiggavik Project, a small survey was undertaken in Baker Lake (the closest LSA community to the Kiggavik Project) in 2010 to compare various values, practices and preferences with regard to traditional activity (harvesting and food consumption) (AREVA 2011b). Although the CINE survey was undertaken for the Kivalliq region and the AREVA survey was only undertaken in Baker Lake, there are several trends that can be extrapolated from the data. For instance, the results of both the CINE and AREVA surveys indicate that there are substantial positive attributes of harvesting country foods. In particular, respondents placed a high value on the benefits of country foods for nutritional health and physical fitness, teaching younger

[64] INAC has developed the community well being index as a means of examining the well being of individual Canadian communities. Various indicators of socio-economic well-being (measures of education, housing and labour force activity) were derived from Statistics Canada census data and combined to give each community a well being score.

generations' traditional skills, and local concepts of responsibilities. Generally, the harvesting and consumption of country foods was seen as a beneficial way to preserve Inuit culture.

Table 9.6-11: Percentage of Respondents Agreeing to Statements about Harvesting

	1998/99 (Kivalliq)	2010 (Baker Lake)	Difference (1998/9 to 2010)
Contributes to physical fitness and good health	98	96	-2
Is a favourite outdoor recreation activity	89	94	5
Provides people with healthy food	98	100	2
Keeps people close to nature	87	92	5
Favours sharing in the community	95	95	0
Saves money	94	94	0
Is an important part of the culture	97	97	0
Is an occasion for adults to teach responsibility to their children	93	98	5
Is one way to practice spirituality	57	74	17
Keeps people humble (not proud or boastful)	71	82	11
Provides education on the natural environment	93	94	1
Contributes to children's education	94	95	1
Provides skills in survival	97	98	1
Provides skills in food preparation at home	98	99	1
Is an opportunity to teach spirituality	61	75	14
Is an opportunity to learn patience	83	97	14
Is a way to strengthen culture	89	97	8

Sources: Kuhnlein et al. (2000) for 1998/99 data; AREVA survey for 2010 data

Table 9.6-12 presents harvest (catch) levels in Arviat, Baker Lake, Chesterfield Inlet, Rankin Inlet and Whale Cove over the 5 year period between 1996 and 2001 as presented by NWMB. This data indicates that the more traditional and/or smaller communities of Arviat, Chesterfield Inlet, and Whale Cove consume more country foods per capita than the larger and more cosmopolitan communities of Baker Lake and Rankin Inlet. For instance, per capita consumption of caribou (using 2001 census population data) finds that 1.9 caribou are harvested annually for each person in the community of Chesterfield Inlet. In Rankin Inlet on the other hand, per capita consumption of caribou is less than half an animal per person. Baker Lake, being the only community that is not on the shores of the Hudson Bay, consumes more land and fresh water country foods such as caribou and fish species, and almost no marine mammals.

In Whale Cove an annual average of 40 beluga whales were harvested for a population of 305 people. Rankin Inlet harvested less than double the number of belugas, however their population was over 7 times higher in 2001. Once again, Arviat showed its traditional character harvesting a substantially greater number of belugas, close to 3 times as many as Rankin Inlet, although the populations of the 2 communities are similar (see Table 9.2-2 for Kivalliq community populations). A similar trend is observed across all animals for which community harvest data were collected in the NWMB survey. While survey results are over 10 years old, there are currently no publically available follow up studies available that estimate annual catches across all Kivalliq communities. Anecdotal evidence suggests that harvest levels have remained the same or increased over the last decade.

Table 9.6-12: Estimated Annual Catches (no.)

Country Food	Arviat	Baker Lake	Chesterfield Inlet	Rankin Inlet	Whale Cove
Caribou	3332	2480	655	989	539
Polar Bear	16	2	9	9	11
Wolf	223	91	42	34	6
Seals[a]	452	4	104	198	56
Walrus	2	0	3	5	-
Beluga	208	0	17	73	40
Birds[a]	2555	273	220	302	143
Fish[a]	7577	5657	2745	3171	1421

Sources: NWMB (2004) for 1996 to 2001 data

[a] Indicate aggregate numbers for all species of that animal

Based on the currently available data, it appears that overall consumption levels have not decreased over the last decade, and the CINE conclusions with regard to the important contribution of traditional foods to household food security, nutrition and cultural wellbeing are validated by the AREVA baseline survey (AREVA 2011b) survey. In general, CINE determined that traditional food was the primary source of protein, iron, zinc, potassium and phosphorus for Inuit, and a valuable contributor of vitamin C, omega fatty acids, vitamin A, vitamin E and magnesium. Market food contributed the majority of saturated fat, carbohydrate, sodium and calcium. The study concluded that "large quantities and great varieties of these wildlife foods are consumed, and bring about better diet quality, social and cultural benefits, economic benefits and provide the opportunity for physical activity during hunting, fishing and gathering of plant food species [and that] losing these benefits is potentially life threatening in several ways, including impacts on physiological and mental health."

Despite the very high value assigned to harvesting, and very high participation rates in harvesting, there is unmet demand for country food. This in turn indicates that levels of engagement in harvesting activity are constrained in some way(s). Table 9.6-13 provides data on what people feel are the primary obstacles to more activity on the land, specifically hunting and fishing. It is noteworthy that a very low percentage of respondents in the CINE study (4%) answered that they faced no constraints to hunting and fishing (Kuhnlein et al. 2000) in 1998 and 1999, while the rate jumped substantially in the 2010 Baker Lake study to greater than 50% of respondents. Potential reasons for this variability may be that there is a higher dependence on transportation and other hunting and fishing supplies today than there was in the past. These tools cost money, and may indicate that contemporary hunting and fishing activities are becoming more dependent on the capacity of individuals to participate in the formal wage economy.

For instance, households at both times were much more likely to identify costs than time as the primary obstacle to hunting. The primary constraint to fishing in the 1998/99 survey, however, was time. Time constraints appear to be less of a factor in 2010. Weather also factored in as a constraint to hunting and fishing approximately 20% of the time in the earlier survey, however, was not a factor in the 2010 survey. The studies, however, did not find changes in wildlife to be a major constraint to hunting and fishing.

Table 9.6-13: Percentage of Households Reporting Constraints to Hunting and Fishing

	1998/99 (Kivalliq)		2010 (Baker Lake)	
	Hunting	Fishing	Hunting	Fishing
No constraints	4	5	57	63
Constraints	96	95	43	38
Of which				
too expensive	57	29	34	30
too busy	7	34	9	7
changes in wildlife	0	0	0	1
weather	22	20	0	0
health	3	3	0	0
other	4	8	0	0

Sources: Kuhnlein et al. (2000) for 1998/99 data; Areva survey for 2010 data

More recently, primary data collection findings also highlighted some of the key contemporary issues related to harvesting, as described by Inuit hunters and representatives of local HTOs. In particular, people are concerned that mine development will drive wildlife to change their migratory patterns and thus limit their ability to access traditional wildlife resources. It should be noted that some people regarded other forces, such as changes in climate, as the reason for changing migratory patterns rather than from activities pertaining to mining.

9.6.2.8 Perceptions Regarding Hunting, Trapping, and Harvesting

Box 9.6-2: Perceptions Regarding Hunting, Trapping, and Harvesting

Wildlife disturbance from mining:

- We are Inuit, and we will not become white people. If they ruin the land we depend on to get our main diet (country food, land), we will be greatly affected by this disturbance.
- I'm not saying to stop the mining. Our main diet is from wildlife, and whales are not around here anymore, they used to be here a lot.
- (Many species of) wildlife today are disturbed by ships, barge, and helicopters.
- Transportations like (ship, barge) are very noisy, our sea mammals are already affected by these kinds
- This summer (2010) we didn't even reach the number of pounds, because there was hardly any fish this summer. Why is this happening, I'm not sure myself, maybe the ships passing by are causing this?
- Last year the barges and ships were constantly passing by. We used to have a lot of harp seals, but they do not come around here anymore. They are disturbed by the noises from these ships and barges.
- If the mine was to go in full force, then hunters would have to find other places to hunt caribou because the hunters know that when there's too many activities there wouldn't be any wildlife. If many helicopters are flying around then there would likely be no caribou there. Hunters would have to find other places.
- Concerns are (that) all wildlife we eat depends on its diet from land and water. If the land is healthy, the wildlife will be healthy.
- Caribou migration trails (routes) are affected by the mining camps. Fish, birds and plants are also affected, even if they are saying they are careful.

Box 9.6-2: Perceptions Regarding Hunting, Trapping, and Harvesting

- There used to be caribou in the area of Josephine River, but there are no caribou in that area anymore. They think it is from the explosions that were done out there.
- Today, it is more difficult to hunt because wildlife has moved to different areas due to the disturbance of all types of transportation mentioned. The old ways of finding wildlife no longer seem to work.
- Our wildlife is going. We know they will not be completely gone, but they are moving away. This may be from the ships & barges, they are loud; there were at least 3 ships here this summer. In the wintertime when we have the floe edge, we had seals, but today is different.

Wildlife resilience to mining:

- But the river here is where the fish are, even when the mining was going on. The mining, even including blasting, did not discourage the fish from using those rivers.
- There is a road now to Meadowbank Mine from Baker Lake, and the caribou are still roaming through that area. Because there is no fence, the caribou still roam. The caribou are still around
- Some scientists or people like that say that the caribou are almost gone, but no, I don't believe that, the hunter is the one who knows about this.
- When I worked at the mine in Baker Lake, there was a herd of caribou that was passing by. The workers had to stop working for about 1 hour -- the workers were watching the caribou herd walk by.
- But if people indicate there is no more caribou due to too many mining activities, I do not believe that anymore, the reason is today the weather has changed.
- The migration of caribou changed today, I don't think the mining activities are the reason of no caribou around as often anymore.

9.6.3 Pathway Analysis

Potential pathways through which the Project could affect Individual, Family and Community Wellbeing are presented in Table 9.6-14. Environmental design features and mitigation incorporated into the design of the Project to remove a pathway or limit the effects to wellbeing are listed, and pathways are determined to be primary, secondary, or as having no linkage. The following section discusses the potential pathways relevant to wellbeing.

For wellbeing, primary and secondary pathways require further effects analysis to determine the significance from the Project. Pathways determined to have primary or secondary linkages are summarized and carried through to the residual effects assessment.

Table 9.6-14: Individual, Family and Community Wellbeing Pathway Table[65]

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Physical and Mental Health	Employment	Project may induce in-migration to Rankin Inlet leading to overcrowding of housing and detrimental public health effects	The Project will take measures to limit in-migration such as clear messaging around recruitment Provide H&S training (i.e. hygiene and food preparation) that can be implemented in communities (as well as for Project activities)	Secondary
		Long-term Project employment may enable people to rent/purchase private housing	Provide long-term employment with opportunities for advancement and growth Provide money management training for employees	Primary
		Project employment may increase time and resources available for harvesting nutritious country foods	Use a 2:2 rotation schedule to maximise time at home Accommodate traditional pursuits of Inuit employees within work schedules where practicable and with appropriate notice, in balance with operational needs of the Project Provide financial or in-kind support for local cultural programming Work with employees to allow country foods to be brought to the mine and provide facilities at mine site for Inuit to prepare and consume when on work rotation	Primary
		Increased incomes from direct, indirect and induced Project employment may lead to changes in diet	Accommodate traditional pursuits of Inuit employees within work schedules where practicable and with appropriate notice, in balance with operational needs of the Project Provide financial or in-kind support for local cultural programming Work with employees to allow country foods to be brought to the mine and provide facilities at mine site for Inuit to prepare and consume when on work rotation	Secondary
		Increased incomes from direct, indirect and induced Project employment may lead to increased substance abuse	Implement a worker code of conduct Offer drug and alcohol programming and other counselling to employees and their immediate families Offer employee and family assistance programming to employees and their immediate family members	Secondary

[65] The pathway analysis for Individual and Community Health and Wellbeing will use secondary pathways in its analysis. This is because most of the pathways for this section are indirect and cascading pathways.

Table 9.6-14: Individual, Family and Community Wellbeing Pathway Table (continued)

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
			Provide financial or in-kind support for local cultural programming Maintain Community Liaison Coordinator positions to work with communities throughout the Project Provide money management training for employees	
		Increased incomes from direct, indirect and induced Project employment may lead to illegal behaviours.	Implement a worker code of conduct Offer drug and alcohol programming and other counselling to employees and their immediate families Offer employee and family assistance programming (EFAP) to employees and their immediate family members Provide financial or in-kind support for local cultural programming Maintain Community Liaison Coordinator positions to work with communities throughout the Project Provide money management training for employees Report any illegal activities to authorities	Secondary
		Project induced in-migration may result in higher levels of STI's (such as HIV) in the region	Offer EFAP to employees and their immediate family members Provide sexual health awareness as part of the Health and Safety training Provide cultural awareness and cross-cultural training for Inuit and non-Inuit workers	Secondary

Table 9.6-14: Individual, Family and Community Wellbeing Pathway Table (continued)

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Safety	Employment	Project health and safety training may improve health and safety at mine site and outside of the workplace	Provide H&S training to all Project employees Provide core policies in Inuktitut as well as English Provide a mine orientation program for all new employees Provide First Aid / CPR, SHE and WHMIS training	Primary
	Perceptions of Harm	Perceptions of Project effects may lead to mental stress and changes in behaviour (i.e., Diet)	Maintain Community Liaison Coordinator positions to work with communities throughout the Project Provide communities with results of wildlife and socio-economic monitoring studies Provide ongoing and informative information to communities Offer EFAP and counselling services to employees and their immediate families	Secondary
	Traffic	A higher number of Project vehicles in Rankin Inlet may increase the risk of traffic accidents	Post traffic signage clearly with speed controls on the AWAR Distribute vehicle traffic schedules in Rankin Inlet and other potentially affected communities. Provide a new route for project related freight to bypass the populated areas of Rankin Inlet (bypass road from Port). Project drivers will undertake regularly scheduled road safety training	Primary
Family and Community Cohesion		The Project may contribute to weakening of traditional culture	Accommodate traditional pursuits of Inuit employees within work schedules where practicable and with appropriate notice, in balance with operation needs of the Project Provide direct return air transportation to employees travelling from LSA communities and the Project, which will maximize time in the community. Provide financial or in-kind support for local cultural programming Provide financial or in-kind support for language support programs in communities Provide cultural awareness and cross-cultural training for Inuit and non-Inuit workers Collaborate with Inuit communities on the development and delivery of training programs based on cultural value systems	Secondary

Table 9.6-14: Individual, Family and Community Wellbeing Pathway Table (continued)

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
			Make available Elders, peer counsellors and staff in community offices with some competence to ease work/life balance challenges Provide and maintain space at the mine site for spiritual and cultural pursuits Implement employment policies and procedures that give value to traditional knowledge, including the principles of sharing and cooperation, and enable traditional activities and practices	
		The Project may result in a reduction of cohesion due to higher levels of inequality in the family or community	Work with the GN and the KIA to provide a scholarship fund for post-secondary education – eligibility would include both high school students and Project workers Provide opportunities for job advancement through training programs Provide financial or in-kind support for priority activities of communities Provide financial or in-kind support for HTO programs that distribute country foods to vulnerable groups	Secondary
		The Project may result in higher inequality which could result in increased vulnerability	Regularly monitor socio-economic indicators in LSA communities, including vulnerability if possible, through AEM's internal monitoring and in collaboration with the Kivalliq Socio-Economic Monitoring Committee (SEMC) Maintain a safe workplace for women workers and on a case by case basis, providing additional support to women applicants and employees to enhance the potential for employment success Review, at least bi annually, the results of such initiatives in order to identify barriers to employment for particularly women and challenged workers such that appropriate additional responses can be developed Provide financial or in-kind support for priority activities of communities Provide financial or in-kind support for HTO programs that distribute country foods to vulnerable groups	Secondary
		The Project may result in inflation which could increase vulnerability	The Project will take measures to limit in-migration such as clear messaging around recruitment Develop Project procurement policies in consideration of community access to affordable goods and services	Secondary
		The Project may impact values around sharing, leading to increased vulnerability	Provide financial or in-kind support for HTO programs that distribute country foods to vulnerable groups	Secondary

Table 9.6-14: Individual, Family and Community Wellbeing Pathway Table (continued)

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
		of Elders and other vulnerable groups	Accommodate traditional pursuits of Inuit employees within work schedules where practicable and with appropriate notice, in balance with operational needs of the Project Provide financial or in-kind support for priority activities of communities Provide cultural awareness and cross-cultural training for Inuit and non-Inuit workers	
		Project may change gender roles, potentially resulting in increased family violence	Work through Skills Canada, Government of Nunavut, Nunavut Arctic College and others to promote equal opportunity for men and women in trades and mining occupations Work with the GN and the KIA to offer scholarships, awards and apprenticeship programs to Nunavummiut students who are attending college and university programs Make role models available for school programs to promote working in the mining sector and/or at the Project Designing recruitment methods, advertisements, application procedure, interview protocols, selection procedures, and training and promotion decision making that reduce artificial barriers and promote widespread participation of qualified individuals Making available Elders, peer counsellors and staff in community offices with some competence to ease work/life balance challenges As part of the terms of employment, providing a confidential EFAP that is competent to address in a culturally sensitive and knowledgeable fashion the full range of work/life issues that can arise for an individual employee, including problems with drug and alcohol abuse, addictions including gambling, inappropriate sexual behaviours, personal financial management, adjustment to change and stress including work rotations, and family relationships Maintaining a safe workplace for women workers and on a case by case basis, providing additional support to women applicants and employees to enhance the potential for employment success Encourage contractors to participate and support AEM's commitments related to employment equity in the workforce	Secondary
		Project may lead to higher levels of	Employees and immediate family members may access counselling services	Secondary

Table 9.6-14: Individual, Family and Community Wellbeing Pathway Table (continued)

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
		substance abuse, resulting in increased family violence	through the company health care plan Provide programs for drug and alcohol abuse and addiction to employees and their immediate families Provide return air transportation to employees travelling from designated pick-up points in communities to maximise time at home Report any illegal activity or violence to authorities	
		Rotational employment may lead to a breakdown of family cohesion, including increased family violence	Use a 2:2 rotation schedule Provide return air transportation to employees travelling from designated pick-up points in communities to maximise time at home Accommodate traditional pursuits of Inuit employees within work schedules where practicable and with appropriate notice,, in balance with operational needs of the Project	Secondary
		Increased incomes from direct, indirect and induced Project employment may potentially result in increased gambling	Offer life skills programs, including budgeting for employees	Secondary
		The Project may result in increased alcohol consumption leading to crime	Implement a worker code of conduct Offer drug and alcohol programming and other counselling to employees and their immediate families Offer EFAP to employees and their immediate family members Maintain Community Liaison Coordinator positions to work with communities throughout the Project Report all illegal activity to the authorities	Secondary
		The Project may result in increased social inequality leading to higher crime rates	Provide opportunities for job advancement through training Maintain Community Liaison Coordinator positions to work with communities throughout the Project Offer counselling services and EFAP to employees and their immediate families Provide financial or in-kind support for priority activities of communities Report all illegal activity to the authorities	Secondary

Table 9.6-14: Individual, Family and Community Wellbeing Pathway Table (continued)

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Savings	Employment and Training; Project Infrastructure	The Project may result in increased percentage of Territorial savings being exported out of Nunavut by out of Territory employees	Increase hiring and retention of local employees Provide opportunities for job advancement of Inuit employees Increase procurement opportunities for local communities	Primary
		The Project will offer financial management training which may encourage better money management practices	No mitigation required	Secondary

9.6.4 Effects Analysis: Individual, Family, and Community Wellbeing

Potential effects on individual, family, and community wellbeing are complex, far reaching, and unpredictable. Wellbeing is intimately associated with potential effects on community economies and traditional culture as discussed in Section 9.4 Economic Development and Opportunities and Section 9.3 Traditional Activities and Knowledge. In addition, increased incomes, stresses related to rotational work, risks to public health and safety and changes to social capital are other drivers that have the potential to affect wellbeing. There are also numerous mutually reinforcing and counteracting linkages between both drivers and their effects. For example, both or either available funds and job stress can lead to substance abuse.

Most Project effects on wellbeing would be expected to be positive. However in the circumstances of Kivalliq, there are a number of confounding factors that raise concerns, including cultural change, negative social pathologies and lack of access to Project benefits. Many, but not all people in Kivalliq will benefit from either the employment offered by AEM, employment by businesses supplying AEM or induced economic opportunities. For some who do access economic opportunities, poor personal choices may be made. There can also be negative effects for those who do not access the economic opportunities, many of whom are likely to be the most vulnerable, whose educational achievement and/or personal challenges constrain their capacity for economic participation. This section will assess each of the valued components associated with individual and community wellbeing in consideration of the probable effects from the Project to employees, their families and communities in the LSA.

9.6.4.1 Physical and Mental Health

The Project is not expected to have direct negative effects on infectious or chronic diseases, nor on the physical health of workers. Crowding as a result of indirect and induced population growth and the limited housing supply in Kivalliq may have indirect negative implications on rates of infectious disease transmission. Effects on housing are described further in Section 9.7.3.1.

There is some potential for positive effects, through worker health and safety training, income effects on overcrowded housing conditions that are considered a major contributor to the spread of infectious diseases, and what is generally believed to be a positive correlation between employment and improved physical and mental health. Increased incomes enable healthier lifestyles. However there are a number of potentially confounding factors that can influence physical and mental health. Concerns centre on the consequent health effects of increased substance abuse, changes to diet, lifestyles and cultural changes associated with increased development.

Whereas there is evident concern that increased disposable income can lead to more drug and alcohol abuse, people in most communities generally see such abuse as an ongoing challenge; a challenge associated with not just employment but also unemployment and other factors.

9.6.4.2 Substance Abuse

There is evidence of an association between wage employment and increasing rates of substance abuse in the Canadian north, although this is most often seen in environments where access to alcohol particularly is open. It is also the case that some individuals will choose to use new income and/or cope with job stress in ways that do

not create benefit for themselves or their families. However, there is also evidence of the opposite – that substance abuse is related to socio-economic and cultural challenges that can erode self-esteem, a process that employment can reverse.

Drug use of both cannabis and harder drugs (e.g., cocaine, methamphetamine [crystal meth]) are higher in Nunavut than in the nation overall (Northern News Services, 2012). Approximately 65% of Kivalliq residents agree with the statement that 'drug abuse is a problem' in the region (NDoEDT, 2013). To the extent that there is a relationship between mining and drug abuse, the 2011 Kivalliq SEMC reports that drug seizure was one of the top 5 reasons for dismissals of employees at AEM (GoN Department of Economic Development and Transportation, 2011). Anecdotal evidence suggests that Southern-based mining employees are importing drugs into the region for their own consumption and for sale.

Many people in Baker Lake do not believe that alcohol abuse has increased in association with Meadowbank. Police note that calls that involve alcohol abuse, often also involving domestic violence, are higher on the days that Meadowbank rotational shifts end, but are also higher on other days of 'moment', such as days of alcohol delivery. There are controls on the amounts of alcohol that can be accessed in all communities, even considering that there are ways around these. Thus it may be, as people observed, that the timing of abuse can be linked to Meadowbank activities, but there are limited opportunities to increase the amount of abuse. It may also be the case that the discipline required by an alcohol (and drug) free work place mitigates the potential to develop addictions.

Gibson and Klinck (2005) and Sly et al. (2001) in their reviews of the literature come to no conclusions about any necessary relationship between substance abuse and employment on the part of individuals, nor has monitoring in NT suggested any community level effects. The linkages between employment and substance abuse are therefore expected to vary from person to person.[66] To the extent that there are individuals who abuse alcohol, GN services and public health education programs, as well as AEM's on site counseling, Employee and Family Assistance Program (EFAP) and health and safety training are intended to both prevent and manage poor choices. However, AEM's programs will reach only its own employees and their families and there will be also increased employment in the expanding economy. Addiction counseling services are stretched, there is little capacity to manage associated mental health issues, and social service staff is wary that high drug prices in the north will attract more aggressive marketing.

9.6.4.3 Sexually Transmitted Infections

It seems clear, from people's comments about Meadowbank and the frequency with which spousal jealously was spoken of during socio-economic baseline discussions, that what many would consider to be inappropriate sexual behaviours are an issue. The sensitivity of the subject makes it difficult to come to any concrete conclusions as to how different sexual behaviours are at Meadowbank, and might be at Meliadine, than they are when people are at home. However anecdotal evidence overall suggests that it is likely that consensual (but adulterous) sex, prostitution and sexual harassment (potentially extending to rape) do occur at Meadowbank and will also occur at the Project. Whereas work force management measures will discourage harassment and encourage people, women specifically, to come forward if it occurs, the control of other sexual activity is

[66] This would also apply to gambling, also said to be a problem in some communities but not generally noted as a problem of addiction by addiction counsellors.

somewhat problematical. People in communities have suggested mitigation measures such as employing only men at mine sites and testing potential employees for STIs with a view to denying them employment. Such measures however contravene human rights and cannot be put in place. Aside from other negative effects of inappropriate sexual behaviours (see family violence section above), the very high rates of STIs in Nunavut suggest cause for concern, particularly in regard to HIV which has not yet been a major health problem in the territory. As for substance abuse and diet, public health education by government and AEM may go some way toward mitigating potential health effects.

9.6.4.4 Housing

Housing in Kivalliq is already constrained. A noteworthy concern in Nunavut and Kivalliq would be increased demand for social housing and the capacity of the GN to respond to this demand. Recent rapid population growth has had particularly negative effects on the availability and quality of housing, with consequent negative effects on wellbeing. Increased demand for private housing however is an economic driver, creating employment and other economic activity.

Existing housing conditions and wait lists are described in Section 9.7.1.1. In general, there are wait lists for public housing in all Kivalliq communities, including Rankin Inlet, where the stock is 310 and the wait list is 90. The number of people waiting for private rental housing in Rankin Inlet was 50 in 2012 (E. Morrison, Rankin Inlet, 2012, pers. comm.).

Rankin Inlet is currently planning to develop the “Area 5 subdivision” which will be an additional 30 to 40 lots for commercial and residential use. In addition, the Nunavut Housing Corporation is planning on building 20 housing units in the hamlet in 2013/2014 (NHC 2013). While this will be an important development to decrease the demand for social housing, it will still not satisfy the demand for social housing in Rankin Inlet (E. Morrison, Rankin Inlet, 2012, pers. comm.).

Additional demand will occur as a result of population growth, but also from employment. Demand arising as a result of employment may occur when people have some measure of economic security. This is particularly true with regard to demand for private housing insofar as mortgage payments, unlike social housing rents, are not adjusted over time on the basis of ability to pay. Construction work is often temporary and shorter term and may not provide the economic security, in a small economy, that allows people to choose to buy their own houses and most migration decisions are expected to be made at the time of operations.

Increased employment incomes have some potential to increase the demand for social housing, to the extent that newly employed workers feel more confident about their finances and wish to leave over crowded housing. In migration can also be expected to increase demand for social housing. While most migrants are likely to be employed before making the decision to migrate, they will still need housing and most will at least initially likely seek out social housing. To the extent that demand increases, and cannot be met, overcrowding can result, although shortages of housing are in fact expected to be a constraint on migration.

People who have permanent employment are eventually expected to move into private housing, which may alleviate the demand for social housing over the long-term. It is noted that this does not appear to have occurred in the NT in response to the diamond mines. The cost of building in the north is very high and while mining incomes are generally higher than elsewhere in the economy, they are not extravagant. In Baker Lake however,

smaller and therefore less expensive houses are being built and finding a market including among the Inuit. The development of these smaller homes has coincided with the operations of AEM's Meadowbank mine. The construction of smaller and more affordable houses may also be an option in Rankin Inlet in response to increased demand for housing due to the Project. Oftentimes, people find rent increases for social housing onerous, and do aspire – once they have secure employment – to owning their own homes. In the larger communities of Baker Lake, Rankin Inlet, and Arviat, there are established contractors who can achieve some economies of scale in building houses where demand is sufficiently high.

To the extent that demand can be met, workers moving out of over-crowded housing will not alleviate the housing shortage, but will improve the housing situation for family members who remain at original habitations. There is potential for this type of effect in all communities supplying workers to the Project. Workers moving out of social housing into private housing will result in a release of social housing to others. This is considered most likely to occur in Baker Lake and Rankin Inlet where not only the Project, but also others operating in the expanding economy (AEM Meadowbank, AREVA Kiggavik) will provide a market of sufficient size to encourage a more active private housing response. This is also considered possible in Arviat, as an increasing number of Meadowbank employees come from there.

9.6.4.5 Nutrition

Good nutrition plays an important role in reducing health risks. Eating well has many benefits, such as reducing incidence of heart disease, cancer, high blood pressure, diabetes, and obesity. The health benefits of traditional diets are well documented and well appreciated by Inuit. Health Canada (2007) has published a food guide of culturally appropriate and nutritious food specific to First Nations, Inuit, and Métis. The food guide describes healthy eating and recommends servings for each of the 5 food groups. It includes traditional country foods that are harvested by Inuit, as well as nutritious store bought food options.

Reduced activity on the land can have implications for consumption of country food. This becomes a health concern when consumption of traditional foods are replaced by poor quality bought food, or worse, where it cannot be replaced and people go hungry. Diabetes is a primary concern.

Employment offers at least the possibility that for those people who consume less country food as a result of employment[67], healthy alternatives are affordable. Again, the response will vary from person to person and to some extent can be mitigated with health education by both government and AEM. However given the struggle in most developed economies to see that people eat well and control their weight, the danger of diet changes and consequent health effects is real.

Evidence from diamond mines in the NT finds that people who are employed have the financial resources, equipment and time (due to rotational schedules) to regularly harvest the land for country foods and maintain their traditional diets. Baseline information demonstrates that country foods remain an important source of nutrition for Inuit living in Kivalliq. The biggest constraint to hunting and fishing in Kivalliq, as identified in the Kuhnlein et al. (2000) study for the CINE and the Baker Lake study (AREVA 2011b), is the costs associated with

[67] This can either be because of a shortage of time for activity on the land, or as is increasingly feared, less interest and/or ability to harvest on the part of the young who may now have income to buy alternatives.

harvesting country foods. Employment through the mine will provide the necessary financial resources to harvest the land.

While at the mine site, AEM will also provide a kitchen that is dedicated to the preparation of country foods. AEM will work with employees to allow employees to bring supplies of country food to the mine site and the facilities to allow Inuit to safely store and prepare these foods in accordance with their local tradition so that the Inuit workforce is able to access country foods at site. These policies aim to ensure that the nutrition and cultural values associated with country foods is available to Inuit while working at the mine. AEM is also trying to negate a trend that is already present in Kivalliq communities, especially amongst youth, towards a stronger preference to store bought and preserved foods.

9.6.4.6 Vulnerable Groups

A general definition of vulnerability is “people who by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage, or social status may be more adversely affected than others and may be limited in their ability to claim or take advantage of assistance and related development benefits” (IFC 2002).

Vulnerability is oftentimes defined within a particular context; in this case it is considered in the context of developing the Project. Vulnerable sub-populations may include both Inuit and non-Inuit, although there is a higher propensity for vulnerable people to be Inuit as the non-Inuit living in Nunavut usually migrate to the territory in search of employment. Vulnerable groups may include seniors, persons with disabilities, single parent households (especially those headed by women), and single people in general. Children are also most vulnerable to family violence, and to physical, sexual, and mental abuse.

To highlight an example of how the project may increase vulnerability, inflation could potentially increase the vulnerability of people such as women or the elderly who may face greater challenges to accessing benefits from economic development in Nunavut, such as through employment. In such circumstances, rising prices due to inflation could make them relatively less well-off and increase social disparity within communities. Similar experiences from mining projects in Nunavut and the north of Canada have not provided any evidence that the Project will lead to higher levels of inflation. Cost of living, however, may increase due to rising cost of fuel and therefore higher costs to transport goods from the south. Rising fuel and transportation costs is a global trend and is not impacted by developments in Nunavut.

Single women and parents of single-parent households (especially women) may also face increased vulnerability due to the challenges associated with participating in the new economy and accessing jobs in the mining industry. Some potential constraints include lack of child care support, appropriate skills and training, lack of mobility to and from work, and conflict with community expectations and obligations that may lead to social stigmatization.

Children and youth are also not direct beneficiaries of the Project. They may experience positive benefits such as increased family income from a parent working at the mine. They also may experience other consequences of the mine employment such a change in family values and social cohesion, which could potentially increase their vulnerability. For instance, there is a potential correlation between rotational work and divorce rates. Family violence, break-ups and changes in family functions oftentimes has the greatest impact on children, their security and their performance in school and society. Higher levels of crime, substance abuse and assault have also

been noted in Baker Lake since the development of Meadowbank. When children are the victims of these acts it increases the chances that they will engage in negative social behaviors, such as bad performance and/or dropping out of school, substance abuse, joining gangs, and teenage pregnancies.

Elderly people (rather than Elders) are also more vulnerable to potential economic impacts from the Project. The Project employment will create individual wealth through wages that may alter the values around sharing and collectivity that are traditionally held by the Nunavummiut. If employees of the mine adopt more individualistic values, elderly people who depend on the younger generation to share their harvests and resources derived from the land with them may face increased vulnerability. This is particularly true because the elderly have a greater preference for traditional food, values and lifestyles than younger generations who have been raised in the mixed traditional and wage economy and have grown up with 'southern' food also.

The Project does not directly lead to an increase in vulnerability. The Project will however participate in socio-economic monitoring at the regional and hamlet level through internal monitoring systems and via the Kivalliq SEMC. Additionally, the project will enforce worker codes of conduct, provide counseling through EFAP programs and support cultural programming, where appropriate, to support the maintenance of traditional Inuit values and help people manage the changes associated with a wage economy.

9.6.4.7 Family and Community Cohesion

Social capital represents the ability of people to work together to identify, understand and manage the opportunities and challenges they face as they advance towards the goals that they themselves establish. It is a function of satisfaction of basic needs such as health and education, but equally of well-grounded social networks, mutual understanding and cooperative relationships (social cohesion). Experience in participatory mechanisms and the learning that comes with collaboratively producing results through these mechanisms are also important to strengthening social capital, as are institutional strength and political empowerment.

Construction and operations of the Project will be a force of change – it will be a further driver for the wage economy in Kivalliq, with all that implies for traditional culture and wellbeing, likely in-migration to Rankin Inlet, and potential for rising levels of inequality. Much of this change is highly desired, as some people clearly want to move into the wage economy. However, it can be challenging to manage societal changes effectively, and consider that these rapid social changes do have significant potential to undermine social relationships, to the disbenefit of some, particularly of the more vulnerable (described above).

People give very high importance to social cohesion in Kivalliq. The potential for the Project to contribute to some weakening of traditional culture may in turn generate a weakening of social cohesion, which has served people well over the years, in response to very challenging conditions for earning livelihoods. Reduced social cohesion can reduce a sense of wellbeing.

With regard to in-migration, different groups of Inuit do feel distinct from other groups. For example, a major distinction is made between inland people and the coastal people who make up most of the Rankin Inlet population. People say that Rankin Inlet has already seen the arrival of different Inuit (and non Inuit), and that society there is more diverse so absorption of different people is not something to be overly feared. Baker Lake, and the more traditional communities of Arviat, Chesterfield Inlet, and Whale Cove are where there is some evidence that migrants are not welcome, both at the family level (which seems more an issue of inconvenience,

expense and crowding) but also at the community level. This is expected to change with time, as Baker Lake and other hamlets become more varied in their population and more accepting of diversity (AREVA, 2011c). Exposure to diverse people employed at the mine site, mainly from different regions of Kivalliq, Nunavut and English and French southern Canadians can potentially lessen the fear associated with in-migration and increasing cultural diversity in the region.

Consultations, and indeed AEM's experience with people at their Meadowbank operations and at Meliadine to date, have indicated that some people are concerned about the distribution of the Project's (and other) economic benefits. Some communities see themselves as 'left out' and some people feel that they will not experience significant benefit while others will. Developing inequities can also undermine social cohesion and have the potential to create social conflict.

9.6.4.8 Family Function and Domestic Violence

Traditionally, harvesting was strongly tied to gender and intergenerational roles and to the pattern of social relationships. Hunting was strongly linked to male identity, with women responsible for processing much of the harvest and for caring for children. Authority was vested in Elders, with their vast knowledge of and experience on the land. Group decision making, reciprocity, sharing, teaching and learning (as well of course of environmental preservation) were essential to subsistence livelihoods.

Although the livelihood imperative is somewhat less now, and would become yet more so with increasing wage employment, expectations of roles and relationships persist and are integral to identity and wellbeing. At the same time, the 'south moving in' introduces new opportunities, expectations and requirements. In the wage economy there are opportunities for women in the work force, potentially as bread winners of their families. There is new income, coinciding with access to a very large range of commercial goods. Workers are required to attend work regularly, and have education and job experience. New technologies are not always understood by Elders. These and other factors have implications for roles and social relations, some of which are manifested in substance abuse and suicides, but also poor family function – inter gender and inter generation misunderstanding, conflict and violence – that can culminate in family breakdown.

Thus, as for most of the VCs associated with wellbeing, there are both positive and negative relationships between Project effects and good family function. The integrity of families, for instance, has the potential to come under threat from various sources, including poor decisions on uses of new income, stresses related to rotational work both for workers and families left at home, fears (however real) of infidelity during separations of spouses during rotational periods, and changing cultural roles.

The more serious consequences of poor family function include domestic violence – often alcohol related, divorce and resultant single parent households, and mental health challenges including suicides.[68] Incidences of all of these are already too high in Nunavut. With the exception of suicide perhaps, women are considered to be more vulnerable as they are more likely to not be working and more likely to have responsibility for young children. Their children of course are also very vulnerable to the physical and mental distress of growing up in a violent household, and the repercussions that childhood abuse may have on the next generation of Nunavummiut.

[68] This is not to say that poor family function is the leading cause of suicide, but that in the absence of strong and supportive families, the threat of suicide is elevated.

9.6.4.9 Rotation

Much has been written on the potential effects of rotational employment on employees and their families. For example rotation may put stress on families during times away, but a rotational schedule may also allow more time with spouses and children when the employee is at home. Rotational work schedules can potentially have both positive and negative effects on individual, family and community wellbeing. Sly et al. (2001) summarized these in 2001, and more recent studies of individual project cases converge on the same conclusions (Gibson 2008; Intergroup 2005). These studies find that positive effects of rotation may include reduced cross-cultural contact within communities on the part of southern employees, increased time and resources available for harvesting, enough time to spend with their family to complete tasks / projects and more workforce discipline while on the job, contributing to long-term capacity building. Negative effects can include personal stress, discord within the family between generations and between spouses, and challenges for the non-rotational spouse when children are young (i.e., they become the primary caregiver when the employee is on rotation), breakdown of traditional values of sharing and mutual support, and increased substance abuse.

Rotational work schedules may also interfere with the timing of traditional activities on the land. On the other hand, rotational employment provides the time and resources to spend more time on the land when not working. It is important to segments of the Inuit population, however, that wage employment not conflict with traditional activities and practices that are both economically and socially and culturally critical to livelihoods and social cohesion and wellbeing. Rotational work can make it challenging for people to retain their traditional ways of using and harvesting the land.

There is also some substantiated concern that rotational work and new income can lead some individuals to substance abuse, excessive gambling and inappropriate sexual behaviours. In turn, these behaviours can be associated with physical and mental health problems, domestic violence, family breakdown, poor parenting, crime, suicide, and the general disintegration of social cohesion and public participation, which can affect not only individual and family wellbeing, but also community wellbeing.

The probable association between mining and the increase in the percentage of single parent families has been correlated by researchers to the stresses placed on families through rotational work schedules (Government of Northwest Territories 2006). Families may not be able to cope and withstand the changes to family function associated with rotational work and this may result in the break-up of families. Evidence from Northern Saskatchewan has suggested that the spouse who stayed at home with young children (in most cases the mother) had to deal with most of the effects of the rotational system on family function, acting as a single parent while their spouse was at work and assuming most of the household and child caregiver activities (Intergroup, 2005).. If parents split, due in part to rotational work, women oftentimes continue parental responsibilities as a single parent and primary caregiver. This type of stress on families was less likely to lead to a breakdown of family function and/or separation in families who did not have children in need of constant care (i.e., families with no children and/or older children) (Intergroup, 2005).

Single parent families are likely one explanation of the under representation of women in the rotational workforce. Additionally, women oftentimes face a lack of opportunity rather than lack of desire to participate in rotational work. This type of work is not easily available to women who have children and who do not have affordable childcare and the social network to ensure that their child is being looked after when they are away from the home on rotational work.

Women from conventional 2 parent families may also face obstacles to working rotational schedules and therefore may not be able to access Project employment due to entrenched gender roles that are still prevalent in Nunavut. These gender stereotypes may be self-reinforced, for instance, guilt for leaving their children and their role as the primary caregiver. Stereotypes may also be maintained by family and community members who reinforce traditional gender roles and may attach stigma to women working on rotation.

As for most other components of wellbeing, AEM's capacity to respond is limited to culturally appropriate work force management measures that support people and their families in the successful transition to rotational work lifestyles. This includes a number of lifeskills training programs provided to all employees, including a module on "Transitioning to Work," which addresses some of the challenges of working at mining projects, including rotational work schedules. The training has been developed to help employees understand challenges associated with employment at the Project, and develop strategies and mechanisms to cope and overcome them.

AEM has reported that worker turnover at their Meadowbank operations has declined recently (compared to 2009 rates). Although the desire to be home with family and the need for childcare has been cited as reasons for worker turnover, many other reasons[69] were also cited. However, overall turnover rates were significantly reduced in 2010 (Kivalliq SEMC, 2010). It remains clear, however, that rotational work has its costs on families and therefore there is a need for support services for employees, families and the community at large. There is also an important role for government in this regard.

9.6.4.10 Gambling

In Nunavut, people gamble with lottery tickets, card games, bingo, Nevada pull tickets and over the internet. Nunavummiut sometimes gamble in each other's homes and bet large amounts of money, 4 wheelers, snowmobiles, and other important personal belongings (GN Department of Health and Social Services 2012).

Statistics Canada (2009) reports that per capita revenue from government-controlled gambling, such as lotteries, casinos and Video Lottery Terminals generated $120 per person in Canada's 3 Territories. This is significantly less than other provinces – such as Saskatchewan ($855/person), Alberta ($740/person), or Newfoundland and Labrador ($490/person). Additionally, government-controlled gambling in the Territories grew at a rate of 50% from 1992 to 2009, which is a rate that is much slower than most provinces and the Canadian national growth rate of almost 400% during the same period.

Anecdotal evidence, however, suggests that gambling is a real problem in Nunavut. Potential reasons why this may not be captured in the Statistics Canada data above is: a) people gamble at private and in-house venues that are not government controlled; b) online gaming statistics are not accounted for in the data; and c) Nunavumuit spend less money on gambling because their income per capita, and therefore disposable income, is also less.

Evidence from Inuit in Nunavik, Quebec found that 3 of out 5 Inuit (60%) gambled in the preceding year. Additionally, Inuit who were involved in gambling in Nunavik spent over $3300 yearly. Although the percentage of Inuit involved in gambling in Nunavik was less than in the general population in Southern Quebec, those who

[69] Other reasons cited for worker turnover included: Gossiping, other employment opportunities, did not like the job, legal problems, returning to school, higher wages causing rent increases (Kivalliq SEMC, 2010)

did gamble oftentimes spent much more money. This indicates that pathological gambling addictions are higher amongst Inuit, although recreational gambling is on par or lower than Canadian levels (NRBHSS 2004). Research on gambling addiction in circumpolar communities indicated that pathological gambling (or gambling addiction) amongst Inuit may be attributed to issues surrounding 'cultural loss' and 'alcohol-related problems' (George, 2009).

While people look forward to increased incomes and many individuals and families will benefit in terms of household economies and health, there is some concern that rotational work and new income can lead to more social pathology, such as substance abuse, excessive gambling and inappropriate sexual behaviours.

For instance, the GN is currently making strategic investments in the telecommunications sector, and specifically broadband internet connections through service providers such as Qiniq, to bring information and communication technology to students, residents and businesses. There is, however, an increasing risk that online gambling could become a problem in the region, especially because internet technology is arriving in tandem with the transformation to the wage economy, coupled with poor money management skills and a high level of addiction.

Nunavut has developed a treatment system to address problems of addiction in the territory. In 2 of Nunavut's Regions - Kivalliq and Kitikmeot - the primary source of substance abuse education and counselling is a network of territorially funded Alcohol and Drug Workers who work for the Municipal Governments. These councillors also work with gambling addictions.

9.6.4.11 Crime

New baseline information was released in 2012 about criminal violations in Kivalliq communities (Table 9.6-15). An in depth analysis was undertaken of types of crimes committed in Baker Lake between 1999 to 2010 to gauge the impact of Meadowbank (Table 9.6-16).

Project effects on public security would result if there were increases in crime and public nuisance behaviours, as a result of in migration (more people), increased drug trafficking, substance abuse and domestic violence, and/or high inequality between those who access project benefits and those who do not. Although increased incomes have potential to remove one of the motivations for some crime, police say that more income equates to more police activity simply because more people have more money to do more things. It is noted that there are also other drivers of crime rates, most notably the percentage of the population that is young – as Kivalliq's population ages, crime rates can be expected to go down although this may take some time to manifest.

Crime rates are already high in Kivalliq, although they remain lower than in Nunavut overall. Violent crime rates in Kivalliq have not changed much in the decade to 2010 but total crime rates show an upward trend with time. At the community level, crime rates have also been increasing over the last decade with the RCMP reporting higher aggregate levels of crime in all Kivalliq communities. For instance, total crime has increased by over 400% in Baker Lake over the last decade, while the population of the community has grown by just under 80%.

Violent crime rates, however, are lower in Baker Lake in the period 2008 to 2010 than in the period 1999 to 2001. The Baker Lake RCMP has reported a substantial increase in crime to the Kivalliq SEMC (Kivalliq SEMC 2011). They have suggested that this increase is in part linked to the development of the Meadowbank mine and other exploration projects that are resulting in migration and changes from a traditional to

wage economy. The RCMP report that many of the criminal activities fall under the category of 'Mischief' and 'Disturbance of the Peace'.

It is expected that increased incomes and in-migration into Baker Lake and Rankin Inlet will result in more crime, if not necessarily an increase in violent crimes. It is likely that people will hear about more incidences of crime as well, which can affect perceptions about public security. It may also be that rising income inequality (between those who can access Project benefits such as employment, and those who do not) can have consequences on the crime rate. Although an important benefit of the Project will be to increase incomes, both in aggregate at a community level and for many individuals, not everyone will benefit, and certainly not all will benefit equally. Even in societies that don't place strong value on equity, property crime can seem to some people an appropriate means of wealth redistribution (see for example Andrienko 2003).

Table 9.6-15: Number of Actual Violations per 100 000 Persons for Canada and Nunavut by Region and Community, 1999 to 2010

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Canada	8 474	8 376	8 390	8 315	8 532	8 391	8 090	8 002	7 697	7 460	7 262	6 969
Nunavut	19 413	22 382	27 181	31 122	36 736	38 544	36 600	33 053	31 974	37 253	39 852	41 231
Kivalliq	11 230	14 269	19 751	17 882	20 555	25 410	20 806	18 582	19 811	20 770	23 139	28 885
Arviat	11 240	12 153	15 573	11 155	10 122	12 739	19 112	18 470	14 975	13 544	16 340	26 083
Baker Lake	8 949	16 220	12 877	17 903	24 365	20 326	15 389	17 488	16 458	15 809	16 850	30 923
Chesterfield Inlet	-	-	-	-	9 524	10 632	11 932	14 409	16 527	15 193	19 399	21 762
Coral Harbour	8 659	9 254	11 171	17 647	15 465	28 571	15 513	7 606	13 659	13 462	15 584	20 093
Rankin Inlet	20 081	24 503	42 358	29 939	32 939	46 764	35 404	29 000	34 153	35 639	39 316	39 423
Repulse Bay	-	-	-	15 373	18 235	10 014	5 207	4 220	9 988	14 637	12 289	13 684
Whale Cove	-	-	-	-	6 706	19 437	12 121	13 079	5 376	21 011	26 923	22 194

Table 9.6-16: Baker Lake Criminal Violations by Type, 1999 to 2010

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Population Estimates, Baker Lake	**1,542**	**1,566**	**1,592**	**1,631**	**1,654**	**1,717**	**1,761**	**1,807**	**1,841**	**1,866**	**1,905**	**1,950**
	Number of Violations											
Total, All Criminal Violations	138	254	205	292	403	349	271	316	303	295	321	603
Sexual Assault	7	31	10	5	9	18	19	9	13	13	8	20
Assault	22	62	37	63	76	82	77	90	58	56	63	98
Harassment and Threats	21	29	20	43	45	20	18	16	8	26	8	19
Breaking and Entering	20	19	29	33	57	35	23	26	22	20	24	19
Theft	26	18	14	14	19	12	3	9	21	13	15	40
Mischief	8	30	34	17	60	104	59	41	81	76	96	200
Disturb the Peace	5	26	32	53	61	42	28	50	35	38	49	104
Administration of Justice	10	13	10	32	38	25	26	40	32	14	20	36
Impaired Driving	5	8	7	9	12	2	4	11	10	15	11	17
Drugs	6	5	3	3	4	0	5	6	10	11	10	12
Other Violations	8	13	9	20	22	9	9	18	13	13	17	38
	Percentage of Violations											
Total, All Criminal Violations	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sexual Assault	5.1	12.2	4.9	1.7	2.2	5.2	7.0	2.8	4.3	4.4	2.5	3.3
Assault	15.9	24.4	18.0	21.6	18.9	23.5	28.4	28.5	19.1	19.0	19.6	16.3
Harassment and Threats	15.2	11.4	9.8	14.7	11.2	5.7	6.6	5.1	2.6	8.8	2.5	3.2
Breaking and Entering	14.5	7.5	14.1	11.3	14.1	10.0	8.5	8.2	7.3	6.8	7.5	3.2
Theft	18.8	7.1	6.8	4.8	4.7	3.4	1.1	2.8	6.9	4.4	4.7	6.6
Mischief	5.8	11.8	16.6	5.8	14.9	29.8	21.8	13.0	26.7	25.8	29.9	33.2
Disturb the Peace	3.6	10.2	15.6	18.2	15.1	12.0	10.3	15.8	11.6	12.9	15.3	17.2
Administration of Justice	7.2	5.1	4.9	11.0	9.4	7.2	9.6	12.7	10.6	4.7	6.2	6.0
Impaired Driving	3.6	3.1	3.4	3.1	3.0	0.6	1.5	3.5	3.3	5.1	3.4	2.8
Drugs	4.3	2.0	1.5	1.0	1.0	0.0	1.8	1.9	3.3	3.7	3.1	2.0
Other Violations	5.8	5.1	4.4	6.8	5.5	2.6	3.3	5.7	4.3	4.4	5.3	6.3

There is also an association between out of area mining workers, largely men of single status and/or with good income, and such public security concerns as prostitution, harassment, and other negative social behaviours such as drunkenness. The Project will fly-in rotational workers directly to the site where they will be housed in a worker accommodation site. The Project will also try to avoid transiting employees through Rankin Inlet on their way to site. As at the mine site, AEM expects enforcement of its worker code of conduct, and the openness to expression of any complaints on the part of Kivalliq residents (particularly Rankin Inlet) about out of area workers, to address some of the potential for negative effect.

AEM's responsibility for preventing and controlling crime and public nuisance behaviours is limited. The RCMP and community justice committees have responsibilities in this regard. An increase in police presence could prevent some crime although this is not a complete response as incidence of crime tends to correlate better with factors other than the number of police.

Despite high crime levels, most people feel their communities are safe and good places to raise children. This may be because the experience of crime at a community level is somewhat different than the statistics might indicate. Violent crimes are most often a result of domestic disputes rather than random aggression in public. Property crimes are often breaking and entering of community facilities rather than private homes.

9.6.4.12 Safety

Mining Safety

Health and safety of workers and the broader population is subject to legislation, and perhaps more importantly to best practice, as outlined throughout the FEIS. AEM's experience at Meadowbank, and FEIS Volume 10, Section 10.2 suggest that while there will always be some risk, health and safety practice is expected to minimize this risk. AEM will not only comply with legal requirements, but also seek to continually improve its safety records through application of best practice and lessons learnt at their other operations in Kivalliq and Northern Quebec.

The dissemination and enforcement of clear workplace health and safety regulations, health and safety training, provision of safety equipment, emergency response planning, availability of medical and evacuation services for work forces, and other health and safety measures as are appropriate will be continually implemented, monitored and improved upon where possible. Health and safety training also has applications in personal life – workers often not only use new health and safety training on the job but at home in the course of daily tasks. Risk cannot ever be entirely eliminated however.

Perceptions of Harm

There have been many environmental concerns associated with mining development in Nunavut, but more generally people are worried that they don't understand, and can't see, what may be happening to them, to their culture and to their children in the future. A review of consultation results also suggest that whereas some people are in fact confident in the environmental stewardship of modern mining, others are supportive of the Project, despite fears, only on the grounds that mining development will provide needed economic opportunities.

Concern was raised by some people that an expectation of contamination could lead to a fear of country food. As discussed elsewhere, the maintenance of elements of traditional diets are important both to cultural integrity and health. People have tales of observed differences in, as examples, the skins of polar bears and the meat of

caribou, which they attribute to existing environmental contamination and note that where these things are noticed people choose to throw away country food rather than consume. People will need objective and trusted information on AEM mining practices and the mitigations established in order to ensure that they are not basing harvesting decision on false fears.

AEM has held and will continue to hold consultations and public information and education events on mining and its risks. Presentation of environmental monitoring results is another avenue to provide people with the information and provide opportunities for questions. Public discussion of the pros and cons of mining developments and eventual policy decisions on the part of GN and NTI will also in the longer term bring to people more confidence in their knowledge of mining development, and consequently less fear should mining proceed. Experiences and lessons learnt from AEM's Meadowbank operations should also help to reduce the fears about the contamination of country foods and build confidence about project design features in place to protect human health.

9.6.4.13 Accidents

Traffic

It is expected that the primary risk to public health and safety will be related to the potential for traffic accidents, either involving Project vehicles, or of people using the AWAR to be constructed between the Project site and Rankin Inlet. Health and safety best practice briefly described above includes driver training, codes of conduct and safety equipping. In addition, the larger transport movements of the Project will not pass through the centre of Rankin Inlet[70]; however vehicles are expected to travel a northern route to be constructed by AEM from the port to the AWAR. The driving of all-terrain vehicles and snow machines is more dangerous than the driving of cars and trucks and, probably on that account, Nunavut's accident rate has been consistently higher than that of Canada on a per kilometer driven basis.

Roads permit higher speeds than travel on the land and may contribute to accident rates and seriousness. In mitigation, AEM security personnel will periodically patrol the AWAR, and the volumes of Project traffic (all equipped with 2 way radio communication to security) will contribute to ensuring that in the event of an accident, assistance will be closer at hand than it would be on the land. In addition, the Project will fully cooperate with search and rescue teams in event of an accident. The Meadowbank experience with their all-weather road, in operation now for over 4 years, is illustrative. People are reported to be respectful of the rules of road use (speed and vehicle type restrictions for example) and there have been no injury causing accidents.

9.6.4.14 Savings

Good personal financial management that permits savings is a contribution to household economic security which in turn has a beneficial effect on family function, personal feelings of self-esteem, resilience in the face of adversity and, at the limit, some potential to reduce dependence on government transfers.

[70] As presented in the Project description, AEM is projecting that Meliadine heavy transport and passenger vehicles could be as high as 1,500 trips (one way) per year, equivalent to 25 trips per day on the all weather road, during good weather. When the barges arrive at Itivia port, 6 to 14 trucks per day can be estimated on the road to move the freight to the Meliadine site. It is expected that 2 loaded barges will arrive at Itivia per year.

At an aggregated level, Nunavut has a savings rate (over 30%) that is higher than anywhere else in Canada, and much higher than the rate for Canada as a whole (4%; see Section 9.4 Economic Development and Opportunities). This however does not translate into a large amount of savings, nor are many of these savings benefitting Kivalliq and/or Nunavut, as these resources are mainly held in accounts outside the territory. Much of these savings are exported out of Nunavut when highly paid high savers leave the territory at the end of their contracts. Additionally, some money is recorded as savings; however it is actually spent in the underground economy for illicit goods and is not actually saved.

Nunavut's high savings rate is projected to continue over the coming years. The Conference Board of Canada (2010) has project income, disposable income and savings rates for Nunavut to 2020 Economic growth is projected to outpace population growth and therefore per capita incomes are expected to rise over the decade until 2020. The savings rate is forecasted to remain at 31 to 33% in all years. These forecasts take into account the construction and then operation of the Project (CBoC 2010).

At the household level, it was frequently mentioned during consultations with both Inuit and non Inuit, that in face of rising incomes, people will need assistance with personal financial management. Presently, there are very limited financial services available in Kivalliq and most people outside of Rankin Inlet (where there are 2 bank branches) depend on automatic teller machines for their banking. There is also very little access to credit in the LSA communities. Credit cards are uncommon and many people use prepaid cards to make purchases online or outside of the territory. People are able to access informal credit brokers to borrow money; although oftentimes they do not receive fair interest rates and terms for repayment.

Access to credit is also a challenge for locally owned businesses in Kivalliq, and the socio-economic baseline includes references to these challenges (Section 9.7.1.2.6 Financial Services). Some efforts have been made by the GN to assist businesses to borrow money for capital and operating expenses. AEM will consider how to strengthen the capacity of local businesses through their commitment to procure goods through local NTI and other Nunavut and Kivalliq based producers.

Younger people have raised issues about how employment will bring about additional responsibilities and expenses. For instance, they spoke about the cultural expectation to 'share', and how this made it challenging for them to save. Some people went as far to say that because of these expectations, employment would not bring any tangible benefits to them. In addition, social housing in Nunavut is based on the ability to pay. When people are employed they will also be required to pay increasing housing rents from their wages. However, the GN did revise its social housing rent scale in 2013 to 'encourage economic activity and employment' (see Section 9.7.1.1).

AEM has included personal financial management components in its life skills training program to encourage good money management practices amongst employees and their families.

9.6.5 Project Design Features and Mitigation Measures

Negative effects on wellbeing can potentially arise from many sources. They can be the result of the challenges of rotational work, individual choice on how additional income is spent, inequalities introduced between different segments of society, in-migration, and/or changes in traditional values consequent on increased participation in the wage economy and cross cultural contact.

None of these is directly within the control of AEM to mitigate completely. It is however in AEM's interests to provide support to individuals, families, and communities in managing the potential for negative effects. It is also important to recall that the increased economic activity the Project represents is generally considered to be of benefit to wellbeing; particularly in a context of high unemployment and poverty that have in themselves significant negative effects on individual, family and community wellbeing.

Of particular relevance to mitigating the potential for negative effects on wellbeing are:

- as part of the terms of employment, AEM provides a confidential EFAP that is competent to address the full range of work/life issues that can arise for an individual employee in a culturally sensitive and knowledgeable fashion, including problems with drug and alcohol abuse, addictions including gambling, inappropriate sexual behaviours, personal financial management, and adjustment to change and stress, including work rotations and family relationships. The program is delivered via a contract with Homewood Human Solutions; the same contractor that provides family assistance services to GN employees. In addition to counseling, staff members and their eligible dependents have access to nutritional, legal and financial consultation, e-learning courses, health and wellness resources, and work life services;
- AEM maintains full time Inuit Councillors at the Meadowbank Mine. The Councillors act as a liaison between Inuit employees from Baker Lake (and other Kivalliq communities) and managers to resolve any issues at work, and are a first line for employees to share any personal issues that employees may be facing, from financial management problems to spousal relationship issues to health and well-being problems. The Councillors can provide advice and referrals for employees as required;
- AEM retains a doctor who makes regular visits to the Meadowbank Mine. The doctor conducts physical exams of employees and can provide advice and referral to employees who may be seeking help with mental health or other health issues. AEM also retains registered nurses who operate the medical facilities at the Meadowbank Mine, and can provide advice and referral to Inuit employees as requested;
- implementing employment policies and procedures that give value to traditional knowledge, including the principles of sharing and cooperation, and enable traditional activities and practices; and
- supporting community wellbeing initiatives, as may be agreed in the IIBA or individually with communities to address community priorities towards enhanced wellbeing, including for example substance abuse management, recreational programs for youth, and IQ retention.

AEM currently offers the following programs to its Nunavummiut employees at the Meadowbank Mine and will provide similar programs at the proposed Meliadine Project:

- Meadowbank Sijjaq

The objectives of the Meadowbank Sijjaq program are to bring Inuit employees together to collectively discuss workplace irritations and share ideas towards solutions. The program operates every quarter and is facilitated by Inuit Councillors. This is an open forum and a broad range of subjects are discussed, from

noise in dormitories affecting night shift workers, to types of food on the menu, to issues at home when the employee is at site.

- Visiting Elders Program

On a monthly basis, AEM organizes Elders from Baker Lake to come to the Meadowbank Mine site to meet with employees and provide guidance and advice. The advice and guidance provided is steeped in Inuit cultural values and encourages employees to choose balanced, healthy and productive lifestyles.

- Access to Inuit Impacts & Benefits Co-ordinator.

Based from the AEM office in Baker Lake, the Inuit Impacts and Benefits Co-ordinator provides another line of support services for employees to access. These services are similar to those provided by onsite Councillors, but also include access to the Family Network Support program, as detailed in the following section.

- Family Network Support Program

AEM is a partner and investor in the Kivalliq Mine Training Society (KMTS). The KMTS is working with AEM's Inuit Impacts and Benefits Co-ordinator in Baker Lake to establish a Family Network program. The program is intended to assist the families of current and potential employees to become more prepared for the expectations and realities involved in a having a family member employed at the Meadowbank Mine.

The program will:

- help families address challenges they may face by having a family member leave the community for extended periods of time to work at a mine site;
- provide social and learning opportunities for the families and community of AEM workers to get together to support each other and strengthen the families' ability to support the workers, reduce their concerns about their families during their work rotations, and thus reduce absenteeism and turnover;
- Increase the families' awareness of and access to the various programs and services available to AEM workers and to all residents of the region in terms of employment and training opportunities, social support resources; and
- Increase life skills and financial literacy of family members that will help ensure stronger families while also reducing potential sources of stress for workers in their absence;

- Interagency Program

In order to engage community partners in considering approaches to help the community deal with the impacts of development in 2014, AEM and the KMTS will begin working with community partners to ensure they are regularly informed of available programming and how their cooperation can facilitate the uptake and delivery of the collaborative programs at the community level. The objectives of the program are:

- to develop a process and structure to enable AEM, the KMTS and its partners to collaborate at the community level. The Interagency Committee (IC) in Baker Lake holds promise to bring together representatives from the community to look at ways to co-operate in the delivery of programs and

services (including KIA Community Liaison Officer, Government Liaison Officer, AEM staff, NAC Adult Educator, Community Wellness Worker, RCMP, Health & Social Services workers, Hamlet leadership and others as identified);

- to initiate and provide a regular forum for the exchange of information pertaining to labour market supply, demand and issues at the local level;
- to encourage joint program efforts that will help the community mitigate impacts of development; and
- The KMTS can provide some financial assistance to help coordinate IC efforts;
    - Work Readiness Program.

The work-readiness program is both a mine site and a community-based training initiative. The community based program is organized by the KMTS. This 3-week intensive training session deals with the skills and confidence level needed to enter the mining industry (money and time management, conflict resolution, cross cultural, family affairs) and to access a job at a mine site. The program helps employees and their families be better prepared to cope with working away from home in an industrial setting. This program will be the first step into the AEM hiring process of any new employee. A shorter term 3-day work readiness program is provided to any Baker Lake based employee already working at the Meadowbank Mine.

While AEM cannot control cross-cultural differences between employees, they will also provide cultural sensitivity and cross-cultural awareness training to Project personnel in an effort to mitigate any cross-cultural conflict on-site.

Project design features and mitigation measures for each of the valued components in the Individual and Community Wellbeing assessment are outlined below.

Table 9.6-17: Project Design Features and Mitigations for Individual, Family, and Community Wellbeing

Valued Component	Project Design Features	Additional Mitigations
Physical and Mental Health	■ Implement a worker code of conduct ■ Offer drug and alcohol programming and other counselling ■ Offer employees and family assistance programming (EFAP) to employees and their immediate family members ■ Cultural awareness and cross-cultural training for Inuit and non-Inuit workers	
Safety	■ Provide core policies in Inuktitut as well as English ■ Provide a mine orientation program for all new employees ■ Provide First/Aid/CPR, SHE and WHMIS training ■ Ensure that medical personnel are accessible 24/7 at the mine site to respond to any health and safety incidents ■ Post traffic signage clearly with speed controls on the AWAR	
Family and Community Cohesion	■ traditional pursuits of Inuit employees accommodated within work schedules where practicable and with appropriate notice, in balance with operational needs of the Projects; ■ Provide and maintain space at the mine site for spiritual and cultural pursuits; ■ Collaborate with Inuit communities on the development and delivery of training programs based on cultural value systems ■ Use a 2:2 rotation to maximize time in the community ■ Provide return air transportation to employees travelling from designated pick-up points in Nunavut ■ Maintain Community Liaison Coordinator positions to work with communities throughout the Project	■ Financial or in-kind support for local cultural programming ■ Financial or in-kind support for language support programs in communities ■ Coordinate and welcome special site visits with Inuit community leaders ■ Make available Elders, peer counsellors and staff in community offices with some competence to ease work/life balance challenges
Savings	■ Provide money management training for employees through the life skills program	

9.6.6 Residual Impact Classification

Table 9.6-18 summarizes what are expected to be the Project's residual effects on individual, family and community wellbeing. For most people in communities, health status will improve, families may have more resources and can potentially function better (although it may take some time for cultural acceptance of evolving roles – including gender roles) and households will have more opportunities to save. These are all considered significant benefits.

Table 9.6-18: Residual Impacts for Individual, Family and Community Wellbeing

Valued Socio-Economic Component	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Significance
Physical and Mental Health	Project may induce in-migration to Rankin Inlet leading to overcrowding of housing and detrimental public health effects	Negative	Moderate	Local	Long-term	Moderate
Housing	Long-term Project employment may enable people to rent/purchase private housing	Positive	Low	Local	Medium-Term	Low
Nutrition	Project employment may increase time and resources available for harvesting nutritious country foods	Positive	Moderate	Local	Medium-term	Moderate
Nutrition	Increased incomes from direct, indirect and induced Project employment may lead to changes in diet	Positive and Negative	Low to Moderate	Local	Long-term	Low
Substance Abuse	Increased incomes from direct, indirect and induced Project employment may lead to increased substance abuse	Negative	High	Local	Long-Term	Moderate to High
Substance Abuse / Crime	Increased incomes from direct, indirect and induced Project employment may lead to illegal behaviours	Negative	High	Local	Long-term	Moderate to High
Sexually Transmitted Infections	Project induced in-migration may result in higher levels of STI's (such as HIV) in the region	Negative	High	Regional	Long-term	Moderate to High
Safety	Project health and safety training may improve health and safety at mine site and outside of the workplace	Positive	Moderate	Local	Long-term	Moderate
Safety – Perceptions of Harm	Perceptions of Project effects may lead to mental stress and changes in behaviour (i.e., Diet)	Negative	Moderate	Local	Long-term	Low
Accidents - Traffic	A higher number of Project vehicles in Rankin Inlet may increase the risk of traffic accidents	Negative	Moderate	Local	Long-term	Low
Family and Community Cohesion	The Project may contribute to weakening of traditional culture	Negative	High	Local	Long-term	Moderate
Family and Community Cohesion	The Project may result in a reduction of cohesion due to higher levels of inequality in the family or community	Negative	Moderate	Local	Long-term	Moderate
Vulnerable Peoples	The Project may result in higher inequality which could result in increased vulnerability	Negative	Moderate	Local	Long-term	Moderate
Vulnerable Peoples	The Project may result in inflation which could increase vulnerability	Negative	Low	Local	Short-term	Low
Vulnerable Peoples	The Project may impact values around sharing, leading to increased vulnerability of Elders and other vulnerable groups	Negative	Moderate	Local	Long-term	Moderate

Table 9.6-18: Residual Impacts for Individual, Family and Community Wellbeing (continued)

Valued Socio-Economic Component	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Significance
Family Function and Domestic Violence	Project may change gender roles, potentially resulting in increased family violence	Negative	Moderate	Local	Long-term	Moderate
Family Function and Domestic Violence	Project may lead to higher levels of substance abuse, resulting in increased family violence	Negative	Moderate	Local	Long-term	Moderate
Rotation/Family Function and Domestic Violence	Rotational employment may lead to a breakdown of family cohesion, including increased family violence	Negative	High	Local	Long-term	Moderate
Gambling	Increased incomes from direct, indirect and induced Project employment may potentially result in increased gambling	Negative	Moderate	Local	Long-term	Moderate
Crime	The Project may result in increased alcohol consumption leading to crime	Negative	High	Local	Long-term	Moderate
Crime	The Project may result in increased social inequality leading to higher crime rates	Negative	High	Local	Long-term	Moderate
Savings	The Project may result in increased percentage of Territorial savings being exported out of Nunavut by out of Territory employees	Negative	Low	Regional	Long-term	Low
Household Savings	The Project will offer financial management training which may encourage better money management practices	Positive	Moderate	Local	Long-term	Moderate

As mentioned, the Project will likely result in increased household savings. It will, however, also lead to a larger percentage of these savings being exported out of Nunavut by out of Territory employees working for AEM. While overall increased savings are a positive benefit of the Project, the growth in the percentage of savings being exported out of the territory has been assessed as a negative impact of low significance.

It is noted that there will be an adjustment period during which more negative effects may be expected until people learn to manage the income and stresses that new employment brings. There are concerns about further spread of STIs, increasing crime rates, housing shortages and substance abuse. Ongoing health and safety education programs for employees, and community engagement and outreach investments by AEM and the government are expected to go a long way towards addressing these, but negative effects may still occur.

In addition, more negative effects can be expected earlier in the Project lifecycle because construction work can be shorter term contract work and not provide as much of a measure of security as would operations work. People are more likely to struggle as they transition into the wage economy than they will once they have been through the construction and/or early years of operation and determine the path forward that works for them and their families. Negative effects on individuals are not expected to occur with such frequency that overall community wellbeing suffers.

The Project may have both positive and negative effects on overall nutrition and diet. Project employees and their families will benefit from having a wage income to buy nutritious store bought foods. They will also have income to go out on the land to harvest country foods. These, by in large, will both positively impact nutrition. On the other hand, the Project may be an additional driver for changing food preferences and more people may move away from a traditional diet towards more store bought and preserved food, especially the younger generations. As people move towards a more ‘Southern’ diet, this may have negative implications for the elderly and others who depend on younger people to share their harvest of country foods. Additionally, people who are not employed by the Project are also changing their diets and purchasing a greater amount of store bought foods. Potential reasons for this change include increasing perceptions of harm about the safety of country foods (that may be linked to Project activities) and an overall change in preferences towards store bought foods. They however, may not have the same level of purchasing power for nutritious groceries as Project employees. Changing diets therefore have been assessed to be both positively and negatively affected by the Project.

The Project is expected to have a significant negative effect on public security in Rankin Inlet and other LSA communities. Again, there may be an adjustment period during which effects stabilize and/or can be better managed by police and government, and it is not certain that rates of crime, as opposed to incidences of crime, will increase. However with more people and more activity in these communities, people’s perceptions that they are secure in public are expected to lessen, a significant negative effect on a sense of wellbeing at a community level.

No significant negative effects are expected on public health and safety, although risk cannot be completely eliminated. Rather, worker health and safety training can result in improved public health and safety, which is a benefit. For example, use of the AWAR is considered safer than travel elsewhere on the land and is therefore a significant benefit. For some people there will potentially remain a perception that they are in harm’s way, or could be. This is a significant negative effect on those individuals sense of wellbeing. Again, this is expected to lessen over time.

9.6.7 Summary of Effects on Individual, Family, and Community Wellbeing

The actual cause and effect relationships between employment, traditional culture and wellbeing have proved extremely difficult to capture in the context of the north. Wellbeing parameters in communities affected by the diamond mines in NT have not evolved as negatively as might have been expected given the conclusions of various project EAs. Similarly, experiences from Meadowbank operations in Baker Lake have also yielded benefits to wellbeing, but this does not definitively prove that communities and individuals would have not have had better wellbeing in the absence of the mines.

There is ample evidence world-wide that employment and good incomes are overall associated with improved wellbeing. And it can only be expected that the same relationship would hold true in Nunavut. There will be individuals and families that disbenefit, there will be an adjustment period and there will be some community level manifestations of at least a reduced sense of wellbeing in some parameters. It is important to recall that the potential effects on traditional culture are a very strong component of overall community wellbeing.

Community level effects are expected to be positive, and both Inuit and non Inuit will benefit. The most potential negative effect at the individual and family level is rooted in the challenges of transitioning to the wage economy and in existing socio-economic health and education conditions for Inuit. Generally, either of these apply to the non Inuit population, and where they may apply, the non Inuit have more resources with which to cope.

Climate change is a potential additional source of stress and as such has some potential to affect wellbeing as other stressors, such as rotational work and shifting social roles, do. No transboundary effects are expected.

9.6.8 Cumulative Effects

As for other socio-economic effects, the expected rapid expansion of the mining sector could very well accelerate the various effects foreseen on individual, family and community wellbeing, as the same processes apply. Many of these effects are additive, however it is arguable that at some undetermined point, a critical mass of healthy and well-functioning individuals and families can provide a shift in the understanding of possibilities and aspirations of the balance of the population. Role models are important, and more valuable insofar there are many of them who have not achieved their status on the basis of extraordinary talent, but more on the basis of more easily achievable personal goals such as regular attendance at school and work.

It is also noted that fewer people are left out as more economic opportunities open, as people have wider choices on how to earn their livelihoods, and as people adapt to the results of those choices. This has potential, in the longer run, to limit the negative effects of inequities for example, on crime and social conflict.

9.6.9 Monitoring and Follow-Up

Monitoring wellbeing can be challenging because it is oftentimes difficult to accurately collect quantitative data that directly correlates to wellbeing valued socio-economic components. In addition, it can be intrusive to ask people personal information about their wellbeing to collate qualitative monitoring results. AEM will develop a monitoring schedule to regularly monitor aggregate employee use of counselling, EFAP programs, job retention rates and other social wellbeing data. AEM will also work with the Kivalliq SEMC to collect regional statistics on health outcomes, crime rates, housing statistics and other wellbeing indicators. AEM's monitoring programs are more fully developed in the Social Management Plan (SD 9-2).

9.7 Community Infrastructure and Public Services

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on community infrastructure and public services. Volume 1, Appendix 1.0-A lists the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for community infrastructure and public service.

9.7.1 Baseline Environment

The GN currently provides a range of infrastructure and services to Kivalliq communities that are adequate, and in many cases comparable to infrastructure and services available in small communities elsewhere in Canada. However, the breadth and depth of challenges experienced by Nunavut's population, the small numbers of people across an enormous expanse of land, and the high cost of staff and transportation are all important constraints to providing infrastructure and services faced by the GN. It has been noted by the GN that it is difficult to keep pace with infrastructure development in the face of population growth.

In addition to GN services, community health, justice, and/or wellbeing committees have been established in most communities. Given the acknowledged interrelationships of health, education, income, crime and other socio-economic parameters, most of these committees are multidisciplinary, with broad participation by service delivery staff and community representatives. These committees function at different levels of effectiveness between communities and over time. Where facilitators can be identified, communities have also established special purpose self-help groups to address their priority issues, such as Alcoholics Anonymous and suicide prevention groups.

9.7.1.1 Housing

Housing shortages are a widespread and persistent problem in Nunavut. There is a need for more housing to ease overcrowding, replace substandard housing and accommodate growing populations. The most basic problem is the high cost of construction and maintenance of units. Home ownership was encouraged as early as 1972 by the Northwest Territories Housing Corporation, which was charged with managing housing. But the nature of the northern economy, where wage labour is scarce and often seasonal, makes home ownership out of reach for most people.

The basic system of housing delivery has remained unchanged; residents apply to the local housing office and are either assigned, or placed on a waiting list for social housing. Increasingly, waiting lists are the norm. Rent is assessed on ability to pay. High income earners however may have many dependents. Social networks and kin obligations can result in substantial redistribution of income from wage earners to extended family members. There has been some dismay that under these circumstances, a member of what might be a very large family can see a rent increase of up to more than tenfold upon finding employment.

To combat this sharp increase, the GN adjusted how rents were calculated for people entering the wage economy. As of 2013, rent will be calculated on the income of the housing unit's two primary leaseholders. Minimum rents will remain at $60/month, while a graduated income scale will be employed to determine increased rents paid by wage-earners in public housing. Further, should a tenant obtain employment or receive a raise that takes them beyond an income threshold, the tenant's rent would not increase until September 1 of the following year. Tenants whose employment comes to an end (either through termination or expiry of a seasonal

contractor), however, would have an immediate reduction in rent associated with their loss of income (NHC 2013).

According to the 2011 Nunavut housing needs survey (GNBS 2011g), the territory had a total of 9400 dwellings, of which 8550 were occupied by their usual residents. The remaining 850 dwellings were either unoccupied or occupied temporarily by persons who considered their usual home elsewhere. Approximately 80% of occupied homes are rented and over half are considered public housing. Nearly 35% of homes are affected by crowding, and 23% required major repairs (Nunavut Bureau of Statistics 2011). Table 9.7-1 shows the current housing setting in the Kivalliq region.

Table 9.7-1: Housing Characteristics in the Kivalliq Region (2011)

Community	Dwellings (no.)	Owners (%)	Renters (%)				Crowded and/or in Need of Major Repair (%)	Dwellings with Temporary Residents (%)	Demand for Housing (no.)
			Social Housing	Staff Housing	Private Housing	Other			
Arviat	490	27	59	12	0	2	64	20	310
Baker Lake	530	23	68	**4**	**4**	n/a	53	24	220
Chesterfield Inlet	100	20	70	**0**	**0**	0	54	**31**	**50**
Coral Harbour	180	22	67	0	**6**	6	60	34	70
Rankin Inlet	740	31	43	**18**	**4**	**4**	46	37	220
Repulse Bay	170	12	71	12	6	**0**	76	31	100
Whale Cove	90	22	67	**11**	**0**	0	61	43	50
Kivalliq	2310	25	59	11	3	2	56	30	1030
Nunavut	8550	22	51	20	4	3	49	32	3580

Source: Nunavut Bureau of Statistics (2011)

Note: Data in bold are considered unreliable by Nunavut Bureau of Statistics.

Shaded areas represent LSA community data

The majority of housing in the Kivalliq region is publicly funded. Home ownership in the region is low, with rental properties comprising roughly three quarters of the occupied dwellings. Approximately a quarter of the region's homes are in need of major repairs. Crowding is prevalent in Kivalliq, with nearly half of the region's homes considered to be crowded. Many people living in crowded homes indicate that they would consider moving out; however the shortage of housing in the region and the long waiting lists for public housing are seen as barriers (Nunavut Bureau of Statistics 2011).

Public housing in the LSA communities is in short supply, with wait lists in all LSA communities (Table 9.7-2). In most LSA communities, the wait list for public housing is approximately on quarter to one third of the total public housing stock in the community. The public housing situation is particularly strained in Arviat, where the wait list is nearly half the size of the existing stock (NHC 2013).

Table 9.7-2 Public Housing Availability and Wait Lists by LSA Community, January 2013

Community	Public Housing Stock	Wait List	Wait List as % of Stock	Need Rank[a]	Housing Allocation (2013/2014)
Arviat	369	158	43	3	30
Baker Lake	389	113	29	7	30
Chesterfield Inlet	89	13	15	22	0
Coral Harbour	36	12	33	5	10
Rankin Inlet	310	90	29	8	20
Repulse Bay	145	68	47	2	20
Whale Cove	77	21	27	9	5

Source: NHC 2013

a: The Need Rank is based on the wait list as % of stock, and is based on all communities in Nunavut.

On March 21, 2013, the Federal government announced $100 million in new funding for social housing in Nunavut. The funding is to be administered during 2013/2014 by the Nunavut Housing Corporation, and will be allocated to communities based on need (NHC 2013). In general, the Kivalliq communities are in high need of housing, with 6 of the 7 Kivalliq communities ranked in the top 10 communities in need of additional social housing in Nunavut (Table 9.7-2). With the exception of Chesterfield Inlet, which has a low need rank, all of the Kivalliq communities will be provided with additional housing. However, in each case the housing allocation will not meet the wait list demand (NHC 2013).

The deficit of residential units in the face of growing demand for housing has led to crowding in some Rankin Inlet households. The 2011 Nunavut Housing Needs survey (Nunavut Bureau of Statistics 2011) identified 740 dwellings that are occupied by their usual residents in the hamlet. Of these, 69% were rental units, while 31% were privately owned. Private ownership is costly in Rankin Inlet, with the average private dwelling costing approximately $400 000 to $450 000 (Rogers 2012, pers. comm.). Nearly half of the homes in Rankin Inlet are publicly funded. Twenty-two percent of all dwellings were in need of major repairs, and 38% were considered to be crowded (Nunavut Bureau of Statistics 2011).

9.7.1.2 Infrastructure and Services

9.7.1.2.1 Schools

Rankin Inlet and Arviat both have a primary, middle and secondary school in the hamlet. Baker Lake, the other large community in Kivalliq, has both a primary and secondary school. In each of the smaller communities of Chesterfield Inlet, Coral Harbour, Repulse Bay and Whale Cove, one school includes all grades from kindergarten to grade 12 (Nutara, C., 2014, pers. comm.). Many of these schools are new and have been built taking into account rapid population growth, so none report overcrowding. The NWT, Alberta, Saskatchewan and Manitoba high school curriculum is followed, with various modifications to accommodate experiential learning opportunities, training in speaking and writing Inuktitut and learning traditional Inuit cultural practices, history, and values (Department of Education, 2013). Table 9.7-3 below presents the Kindergarten to Grade 12 (K-12) educational institutions in the Kivalliq region.

Table 9.7-3: K-12 Educational Institutions in Kivalliq, Capacity and Graduation Rates (2013 / 2014)

Community	Grade	School Name	Total Capacity	Utilization (% Capacity)	Attendance Rate (%)	Graduation Rate (% of Grade 12 Students)
Arviat	K-5	Levi Angmak Elementary School	390	83%	70.1%	n/a
Arviat	6-8	Qitiqliq Middle School	187	95%	55.4%	n/a
Arviat	7-12	John Arnalukjuak High School	422	89%	69.6%	59.6%
Baker Lake	K-5	Rachel Arngnammaktiq Elementary School	313	69%	81.4%	n/a
Baker Lake	6-12	Jonah Amitnaaq Secondary School	382	92%	68.7%	57.1%
Chesterfield Inlet	K-12	Victor Sammurtok School	157	68%	70.2%	55.6%
Coral Harbour	K-12	Sakku School	335	83%	69.8%	26.1%
Rankin Inlet	K-4	Leo Ussak Elementary School	346	75%	84.2%	n/a
Rankin Inlet	5-6	Simon Alaittuq School	176	51%	89.4%	n/a
Rankin Inlet	7-12	Maani Ulujuk Ilinniarvik	442	77%	74.1%	58.2%
Repulse Bay	K-12	Tusarvik School	263	141%	79.6%	41.7%
Whale Cove	K-12	Inuglak School	187	76%	89.2%	46.2%

Source: Nutara, C., 2014 pers. comm.; Cooper, B., 2014 pers. comm.

Schools, staffing levels, and registration vary with community population. Not all schools are fully staffed at all times given problems with recruitment and retention; however, the Kivalliq region has hired 219 teachers for the region's 3,200 students and has almost filled all available teaching positions (Nunatsiaq Online, 2013b). There are also applicants for outstanding positions (Nunatsiaq Online, 2013).

Currently, many of the LSA community schools are reporting being near capacity. They have almost as many students as can be handled by the educational infrastructure (i.e., the school) and service (i.e., teachers and support staff) (KSO staff pers. comm. 2014). Educators have noted that, while schools are officially near capacity in many cases, classrooms are not overcrowded with students due to challenges associated with attendance

(KSO staff pers. comm. 2014). Capacities, attendance rates and graduation rates for schools in the Kivalliq region are provided in Table 9.7-3 above (Cooper, B. 2014 pers. comm.)..

9.7.1.2.2 Health Services

A discussion of all health infrastructure and services available in Nunavut could result in a distorted representation of health services readily accessible to members of communities that may interact with the Project. Hence, this section focuses on services available to LSA communities. All the communities have health centres, managed and staffed by nurses who have telephone support. All communities also have medical evacuation services. Regular fly in specialists, including doctors, physiotherapists, optometrists, psychiatrists, and dentists, supplement the care nurses are able to provide. Rankin Inlet is the exception, with its new Kivalliq Health Centre and full time doctors. For many medical emergencies and complicated health issues, patients still must be transferred south, usually to Churchill or Winnipeg. With the exception of mental health services, Kivalliq's infrastructure and health services are comparable to those available in small communities elsewhere in Canada.

Health services in Rankin Inlet and Baker Lake are currently running at capacity (Sawyers, 2014, pers. comm.). Appointments at the Rankin Inlet Health Center are currently being scheduled up to 10 days out, and in the emergency room, patients are increasingly waiting in the hall. Most service users are local residents, and many of the treatments are related to injuries (e.g., foreign objects in eyes, muscular and repetitive stress strains, other bodily injuries) and, more frequently, drug and alcohol related poisonings (Sawyers, 2014, pers. comm.).

At the Meadowbank Mine, AEM operates a medical clinic to meet the needs of Project personnel. Between January 1, 2012 and December 31, 2012, AEM's clinic had 3581 visits for medical care. Of these, 661 visits were for work related issues (injuries) and 2920 were for personal conditions (headaches, stomach cramps, sore throats, flues, colds, etc.) (AEM 2013).

During the year there were 37 referrals by the Meadowbank Mine site medical clinic to either a GN Community Health Centre or to a Provincial Health Facility for additional medical care. There were thirteen medical evacuations, three (3) by air and ten (10) by road to the GN medical facility in Baker Lake, mostly for x-rays. AEM estimates that out of these 37 referrals, 18 involved Nunavut residents being referred to a GN Community Health Centre in their home community, and 19 to a Provincial Health Facility. In nearly all instances non-Nunavut resident employees who are referred to a Provincial Health Facility for care (either due to on-site accident, injury or illness) are transported back to Val D'Or or Montreal to receive this care in their home community (AEM 2013).

Because of the distance between the Meadowbank Mine and Baker Lake, most immediate care actions following an accident are provided on site. The 37 referrals referenced above include those resulting from an on-site injury and those resulting from illness. The current information system does not allow for this statistic to be separated. AEM's medical unit contacts the GN's medical unit in Baker Lake between 3 to 5 times per month to obtain or share information. During 2012 AEM estimates that the volume of additional burden on Kivalliq GN Community Health Centres resulting from an on-site accident or injury to be less than 20 visits for the year (AEM 2013).

In 2012 there were no fatal accidents at the Meadowbank Mine. However, there was one death related to personal condition for which an air medevac was called but was aborted by the GN. There was one air medevac

for polytrauma, one for Oesophageal Obstruction and one for personal condition. In 2012 there were 8 accidents that resulted in lost time with a total of 63 days lost (AEM 2013).

9.7.1.2.3 Social Services

Social services are available in all communities including child protection, adoption, family services, income support, residential care and counselling, social workers and other staff. (GoN Department of Health, 2013) however, appear to be the most stretched in terms of demand among Government of Nunavut service delivery staff. Although violence towards children is rare, neglect does occur. Social service staff, at times aided by volunteers or other agencies,[71] are involved with parenting, head start, early steps and justice programs. There are severe shortages of day care options and of residential care facilities for Elders, the disabled and victims of domestic violence. Counsellors also report being very busy (AREVA 2011d).

9.7.1.2.4 Police

All communities have RCMP police posts. Most police describe their communities as 'pro police'. People see the police as helpful and seek police out for all kinds of assistance, including those that are not police related (e.g., assistance with tax returns). Although exceptional events occur, calls for policing are largely related to domestic violence and property crimes. Police priorities are described as youth, and alcohol and drugs (AREVA 2011d).

There are no courts in Kivalliq (NCJ, 2014). The Nunavut Court of Justice (NCJ) lays criminal charges in the region, and administers trials and sentencing. Trials are conducted on a fly in circuit of judges, according to community need. In 2013, LSA communities scheduled between 2 (in Chesterfield Inlet/Whale Cove) and 6 (in Rankin Inlet) weeks of court circuits. There are currently six resident judges of the NCJ, with five facilitating circuits in LSA communities. Twenty-two deputy judges assist the court (NCJ 2014).

Prior to laying charges for low-level crimes like property offences, the NCJ considers offenders for the Community Justice Diversion Program, which is "designed to divert and resolve cases by focusing on reconciliation between the accused, victims of the crime committed, and the community in which the crime occurred" (NCJ, 2014). The program is available in all LSA communities.

9.7.1.2.5 Religious Services

All communities have a number churches including Anglican, Roman Catholic, and Glad Tidings (Local Director.ca, 2013). Churches are described as not being overly involved in political or social issues, and as such operate fairly independently from each other. That is, churches focus more on their teachings. Given the number of churches in most communities, church influence on their members is highly variable.

[71] As an example, the AQSAARAQ Project in Rankin has been in operation for over 25 years and offers services to people (and their families) struggling with alcohol or drugs..

9.7.1.2.6 Financial Services

There are very limited financial services in Kivalliq. Aside from Rankin Inlet with its 2 banks, people in communities must depend on automatic teller machines where these exist, or on the stores that will cash cheques and in some cases will extend credit for groceries and other supplies. Few people have credit cards. Prepaid cards can be obtained for ordering from consumer item suppliers outside Nunavut. However, there is also much informal borrowing (AREVA 2011d).

Cultural expectations, low incomes and lack of financial services imply low savings in Nunavut, and this is likely the case for most people. However, it is noted that Nunavut's personal savings rate, at over 30%, has consistently been the highest among Canada's territories and provinces (CBoC, 2013). The overall rate in Canada in 2013was 5.4% (Statistics Canada, 2013c. As well, the median RRSP contribution in Nunavut is twice the national average. Both these statistics are expected to be largely the result of high savings on the part of the non-Inuit population, savings that are by and large exported at the end of contracts. The Nunavut Economic Forum (2004b) for example suggests that one constraint to small business development in Nunavut is the low availability of personal savings.

Lack of financial services, specifically credit, is a challenge for small businesses. Programs in place to assist businesses to borrow capital or operating loans include that of the Nunavut Business Credit Corporation and of Government of Nunavut Department of Economic Development and Transportation (GNDoEDT). The Nunavut Business Credit Corporation provides financing to business based in Nunavut across all economic sectors, whether owned by Inuit or non-Inuit. At any given time, the lending portfolio will have about 50 or more loans outstanding with a total worth of about $16 million. GNDoEDT supports their sector strategy for arts and crafts through small loans to individuals and organizations active in making things by hand. GNDoEDT also has a small business support program that assists with overhead costs or small capital and operating costs (Nunavut Business Credit Corporation, 2014).

9.7.1.2.7 Local and Regional Transportation

Rankin Inlet is Kivalliq's major transportation link to the rest of Nunavut and Canada. There are regular flights between Rankin Inlet and each of the other 6 Kivalliq communities. Canadian North and First Air provide B737 jet service between Rankin Inlet and Winnipeg, Iqaluit, Ottawa, Montréal, Yellowknife, and Edmonton. The Rankin Inlet airport is the only paved and jet capable runway in the Kivalliq. The Rankin Inlet Airport Master Plan details expansions and improvements to the airport planned for the period of 2010 to 2030. Between 2010 and 2015, new taxiways will be constructed and existing aprons will be expanded to enhance air transportation. Other communities are served by turboprop aircraft, such as the Saab 340 operated by CalmAir and the ATR-42 operated by Sakuu-First Air, providing service between Kivalliq communities and Manitoba centres, including Churchill and Winnipeg. There are also smaller regional air carriers and charter services.

Large quantity and weight shipments (for example fuel, construction materials, vehicles and dry goods) to supply communities through the winter months come from Churchill by barge and from Montreal by ship. Large tire vehicles are sometimes used to transport supplies during the winter months between Churchill and the larger communities of Kivalliq (Arviat, Baker Lake and Rankin Inlet).

Outside of study area communities, traffic systems and infrastructure are limited. Winter roads and ATV trails facilitate access to areas outside of settlements. AEM does not currently plan to build new, or upgrade existing

structures beyond the community boundaries to facilitate local hunting activities/travelling in the Project Area, including weather shields and outposts.

9.7.1.2.8 Communications

Canada Post provides mail service on a regular basis to all communities. Two newspapers, Kivalliq News and Nunatsiaq News, publish weekly. Kivalliq News is published in English and Inuktitut versions, and Nunatsiaq News, published in Iqaluit, is a bilingual newspaper. Direct dial telephone and cell phone service is available in all communities. Satellite and radio telephones are used to monitor people and families who are travelling or living on the land.

Every Kivalliq community now has access to the internet, at least from community centres, and overall more than 60% of households had internet in the home (there is little variation between communities) by 2010. An initiative developed by Industry Canada called the Community Access Program helps to provide people access to the Internet. Under CAP, local schools, libraries, and community centres provide access to the Internet and support on how to make the best use of its services.

CBC Radio North broadcasts from studios in Yellowknife, Inuvik, and Iqaluit, and transmits by satellite to all communities. The Nunavut production centre is in Iqaluit, with programs and stories contributed by bureaus in Rankin Inlet (as well as Cambridge Bay and Kuujjuaq, Quebec). Programs are produced in both Inuktitut and English. Local radio broadcasts are a vital mode of communication for Kivalliq residents. They provide personal announcements, messages, and community news and events.

Television programs are produced and broadcast in Inuktitut, Inuinnaqtun, Inuvialuktun, and English by CBC North and the Inuit Broadcasting Corporation. Inuit Broadcasting Corporation headquarters are in Iqaluitm and is one of the contributors to the Aboriginal Peoples Television Network that broadcasts throughout the country.

9.7.1.2.9 Other Community Infrastructure and Services

Other community infrastructure and services located in Rankin Inlet that may be affected by the Project include power (both generator and fuel tanks), search and rescue, fire department, water, waste water, solid waste, fuel storage (diesel, gasoline, etc.), and the community freezer. Additional baseline information on these community infrastructure and services is provided in Addendum 9.1.

9.7.2 Pathway Analysis

Pathways analysis was undertaken to determine the Project's potential effects on population and demographics. If a pathway is valid and assessed as primary, it is carried through for further assessment in the effects analysis section below. Results of the pathway analysis can be seen in Table 9.7-4.

Table 9.7-4: Potential Pathways for Effects to Community Infrastructure and Public Services

Valued Socio-economic Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Housing	Construction and operations	Project workforce may increase demand on local housing	A fully catered permanent camp will be built on the site to accommodate employees, along with other infrastructure appropriate to a remote mine site Project Personnel will be flown between their home communities and Rankin Inlet, then transported on a company shuttle bus service to the mine site, minimizing time spent in Rankin Inlet	No linkage
		Project-induced in-migration may increase demand on local housing	Recruitment and hiring practices will be communicated clearly to discourage people from moving to Rankin Inlet without secure employment	Primary
Schools	Construction and operations	Project-induced in-migration may increase demand on educational facilities	Recruitment and hiring practices will be communicated clearly to discourage people from moving to Rankin Inlet without secure employment	Primary
Health services	Construction and operations	Project-induced in-migration may increase demand on health services	Taking into account health and safety issues in conditions placed on public use of the Project access roads; for example the setting of limits on speeds and on the use of firearms along the road and an appropriate buffer Securing the Project site in the interests of public health and safety, and advertising these security arrangements widely, to protect people from health effects that might be caused by access to closed facilities and/or land and water that may still be exhibiting environmental effects	Primary
		Accidents involving Project workers may increase demand on health services	Provide a first responder medical station at the accommodation camp facilities to meet workers' medical needs while at site, in order to limit the demand for Rankin Inlet and other governmental health facilities for work related injuries (similar to the medical clinic currently in place at the Meadowbank Mine) Taking into account health and safety issues in conditions placed on public use of the Project access roads; for example the setting of limits on speeds and on the use of firearms along the road and an appropriate buffer Driver training and enforcement of a driver code of conduct, to control speeds and encourage considerate driving	No linkage

Table 9.7-4: Potential Pathways for Effects to Community Infrastructure and Public Services (continued)

Valued Socio-economic Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Social Services	Construction and operations	Project-induced in-migration may increase demand on social services	Maintain Community Liaison Coordinator positions to work with communities throughout the Project	Primary
		Project personnel may increase demand on social services	Offer drug and alcohol programming and other counselling to employees and their immediate families Offer employee and family assistance programming to employees and their immediate family members Project Personnel will be flown between their home communities and Rankin Inlet, then transported on a company shuttle bus service to the mine site, minimizing time spent in Rankin Inlet	No Linkage
Police	Construction and operations	Project-induced in-migration may increase demand on protective services	Post traffic signage clearly with speed controls on the AWAR Report any illegal activity or violence to authorities	Primary
		Project personnel may increase demand on police services	Post traffic signage clearly with speed controls on the AWAR Report any illegal activity or violence to authorities Offer drug and alcohol programming and other counselling to employees and their immediate families Offer employee and family assistance programming to employees and their immediate family members Project Personnel will be flown between their home communities and Rankin Inlet, then transported on a company shuttle bus service to the mine site, minimizing time spent in Rankin Inlet	No Linkage
Religious services	Construction and operations	Project-induced in-migration may increase demand on religious services	Recruitment and hiring practices will be communicated clearly to discourage people from moving to Rankin Inlet without secure employment Existing religious services in the LSA and Rankin Inlet would likely accommodate for induced population growth	No Linkage
Financial services	Construction and operations	Project-induced in-migration may increase demand on financial services	Recruitment and hiring practices will be communicated clearly to discourage people from moving to Rankin Inlet without secure employment	Primary

Table 9.7-4: Potential Pathways for Effects to Community Infrastructure and Public Services (continued)

Valued Socio-economic Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
		Project personnel may increase demand on financial services	Offer the appropriate money management and financial planning counselling to employees Project Personnel will be flown between their home communities and Rankin Inlet, then transported on a company shuttle bus service to the mine site, minimizing time spent in Rankin Inlet	No Linkage
Local and regional transportation	Construction and operations	Project-induced in-migration may increase traffic on local roads	Recruitment and hiring practices will be communicated clearly to discourage people from moving to Rankin Inlet without secure employment	Primary
		Project-related traffic may increase traffic on local roads	Construct a bypass road around Rankin Inlet to allow fuel, freight and other equipment to be transported from the port to the mine site without passing through the built up populated section of Rankin Inlet Project Personnel will be flown between their home communities and Rankin Inlet, then transported on a company shuttle bus service to the mine site, minimizing time spent in Rankin Inlet	Primary
		The construction of the AWAR may increase access to areas outside of Rankin Inlet by local residents	No known mitigations	Primary
Communication	Construction and operations	Project-induced in-migration may increase demand on communication services	Recruitment and hiring practices will be communicated clearly to discourage people from moving to Rankin Inlet without secure employment Existing communications infrastructure would likely accommodate induced population growth	Primary
Other Community Infrastructure and Services[1]	Construction and operations	Project-induced in-migration may increase demand on other community infrastructure and services	Recruitment and hiring practices will be communicated clearly to discourage people from moving to Rankin Inlet without secure employment Revenues paid to municipal, territorial and federal governments by the Project are expected to more than offset the additional costs associated with increased service use	Primary
Access to Project Infrastructure	Post-Closure	Project facilities and infrastructure and the AWAR may be available for use by local people	Project facilities, infrastructure and the AWAR will be removed post-closure	No Linkage

[1] Other community infrastructure and services is discussed further in Addendum 9.1

9.7.3 Effects Analysis

Effects to community infrastructure and public services are largely a function of population changes. Population change is considered to be cumulative and incremental, and thus occurs throughout the life of a Project and beyond. For the purposes of this assessment, a highest-increase-scenario has been assumed for Project effects to population. Project personnel will be accommodated at a fully serviced camp facility, and will be flown in between the mine site and their home communities. Thus Project personnel are not expected to contribute to population increase in Rankin Inlet.

The Project is expected to result in some induced in-migration as a result of people moving to Rankin Inlet in hopes of securing Project-related employment, or work in associated industries (i.e., contracting, maintenance or housekeeping services). In a scenario wherein workers relocate with their families to Rankin Inlet, the Project would result in a population increase of 538 people between 2014 and 2026 from in-migration (SJ Research Services 2012). This amounts to a 16% increase over baseline projections[72] in Rankin Inlet. This population projection has been assumed when discussing Project effects to community infrastructure and public services as a result of in-migration below. In-migration scenarios for the Project are described in detail in Section 9.2. Effects to other community infrastructure and services are discussed in Addendum 9.1.

9.7.3.1 Housing

AEM will be constructing a fully catered permanent camp to house workers, and will provide transportation via a fly-in-fly-out system from designated pick up spots and / or the worker's home communities to Rankin Inlet, from where AEM will then transport these employees on a company shuttle bus service to the mine site. These strategies aim to decrease new demand for housing in Rankin Inlet from AEM's direct Project workforce. Thus the linkage between the Project direct workforce and increased demand on housing is invalid.

Assuming an average household size of 3.7[73] people per household (Statistics Canada 2007c), indirect and induced population increases as a result of the Project are estimated to lead to a maximum increase in housing demand of approximately 145 housing units between 2014 and 2026. Most of this increase in demand would be expected in Rankin Inlet, the closest community to the Project. Mitigation measures discussed in Table 9.7-4 may partially alleviate this increase in housing demand from indirect and induced population growth.

Existing housing shortages and the high cost of real estate in Rankin Inlet may act as a deterrent to prospective buyers who are considering moving to the hamlet in hope of employment indirectly brought about by the Project. People may, however, live temporarily with family or friends from Rankin Inlet while they search for employment and/or housing for themselves and their families. This may exacerbate housing overcrowding in Rankin Inlet, which has already been identified as a problem (see Section 9.6.4.4).

With an existing waiting list for public housing of approximately 90 units, any population increase in Rankin Inlet will affect housing demand in the hamlet. The allocation of 20 new social housing units by the end of 2014 will alleviate some of the pressure, but will not fulfill the existing demand, let alone any increased demand from induced population growth. Despite mitigation measures and environmental deterrents, the Project will result in a

[72] Baseline projections include both natural population growth and growth as a result of in-migration.

[73] Based on the average household size in Nunavut as per the 2006 Statistics Canada Census.

change from baseline conditions, placing increased stress on the already overextended housing market in Rankin Inlet.

9.7.3.2 Infrastructure and Services

9.7.3.2.1 Schools

Assuming that some workers move to Rankin Inlet with their families, it is predicted that approximately 50 school-aged children (between the ages of 5 and 18) would migrate to the community during construction of the Project (SJ Research Services 2012; Section 9.2). This would result in approximately 7% increase to the population of school-aged children in the hamlet. In the event that workers do not bring their families to Rankin Inlet, the Project would not result in an increase in school aged children in the community[74]. Given that schools in Rankin Inlet, and Kivalliq as a whole, are operating at or near capacity, even a small increase to the school aged population could increase pressure on the education system (though the increase would not be pronounced).

9.7.3.2.2 Health Services

Given that the majority of the population that relocates to Kivalliq as a result of Project induced in-migration will move to Rankin Inlet, health services in the hamlet are likely to experience some level of increased demand. Over the lifetime of the Project, the population is estimated to increase, beyond baseline projections, by 538 people (16%) incrementally per annum over the life of the Project.

For medical emergencies and complicated health issues, patients must be transferred to Churchill or Edmonton for treatment. The proposed airport expansion may help to alleviate increased demand on transfer services. Employees trained in Standard First Aid and CPR may act as first responders to minor accidents and medical issues.

Given that medical and emergency medical services are provided to workers onsite, and that health and safety, first aid and CPR training will be provided to workers, the Project is not likely to have a direct effect on emergency healthcare services in the LSA. Thus, the Project is not expected to increase demand on emergency services in Rankin Inlet.

9.7.3.2.3 Social Services

The increase in population as a result of Project induced in-migration may affect demand on social services in Rankin Inlet. The number of children under the ages of 1 to 5 moving into the community is expected to be low and it is not expected that the Project would result in a noticeable increase in demand for daycare services (see Section 9.2.3.3 Population Projections).

Increased instances of substance abuse as a result of higher incomes related to the Project (see Section 9.6 for a discussion of Project effects to health and wellbeing), and associated social pathology (i.e., crime, spousal abuse, gambling) may place additional strain on social services in Rankin Inlet. Given that drug and alcohol

[74] It can be expected that the number of school aged children in the community will increase as a result of non-Project-related natural population increase.

counselling will be available to Project personnel and their immediate families, and that Project personnel will be flown between their home communities and the mine site, it is not anticipated that social services will be sought in Rankin Inlet or the LSA by AEM employees residing outside of the LSA. There may, however, be an increase in demand for physical and mental health services by employees and their families from the LSA. Additionally, it is expected that the changes to traditional culture may also potentially be a driver to increase the demand for services amongst other people living in the LSA who are not employed and/or associated to the Project (see section 9.6.4.1 Physical and Mental Health). Some additional demand for services may also come from in-migrants who come to the region as part of indirect or induced population growth.

9.7.3.2.4 Police

The increase in population as a result of Project induced in-migration may affect demand on police services in Rankin Inlet as will the Project's workforce that resides in the hamlet. Crime in Kivalliq is commonly related to drugs and alcohol abuse, and often manifests in property crime and domestic violence. Thus, drug and alcohol abuse prevention is a priority for the regional RCMP.

Increased instances of substance abuse as a result of higher incomes related to the Project (see Section 9.6.4.11 for a discussion of Project effects to health and wellbeing), and the associated increase in crime (i.e., spousal abuse, impaired driving, and property crimes) may place additional strain on the already at- or beyond-capacity police services in Rankin Inlet. Although drug and alcohol counselling will be available to Project personnel and their immediate families, and Project personnel will be flown between their home communities and Rankin Inlet, and then transported on a company shuttle bus service to the mine site, it is anticipated that they may still have an effect on police services in Rankin Inlet or the LSA. This relates particularly to i) AEM employees who live in Rankin Inlet or the LSA; ii) People from LSA who experience increasing loss of traditional culture which may be correlated to higher crime rates; and iii) more Project induced migrants living in the LSA.

AEM's responsibility for preventing and controlling crime and public nuisance behaviours is limited. AEM commits to implementing a worker code of conduct and to reporting to authorities any criminal activity that comes to the company's attention. The RCMP and community justice committees may also face increased responsibilities in this regard. For instance, increasing police presence could prevent some crime; however, this is not a complete response as incidence of crime tends to correlate better with factors other than the number of police.

9.7.3.2.5 Religious Services

Despite the increase in population as a result of the Project, the Project is not expected to have an effect on people's access to religious services in the LSA given the number of churches in the LSA communities.

9.7.3.2.6 Financial Services

It is not anticipated that the Project-induced population growth will result in an increased pressure on financial services in the LSA. While financial services are limited in the LSA, there are 2 banks and ATMs in Rankin Inlet. These financial institutions will likely meet the banking needs of those individuals who choose to relocate to

Rankin Inlet for Project-related employment (indirect or induced) or other economic opportunity. Thus, the Project is not expected to affect people's access to financial services in the LSA, and if demand for banking services grew, the banking industry would likely respond to increased demand.

9.7.3.2.7 Local and Regional Transportation

While an increase in population as a result of the Project will have an associated effect on increased demand for goods shipped by land, sea and air, local development plans are expected to mitigate these effects, and enhance regional shipping and transportation (nb it is not possible to accurately assess the likelihood of shared shipping costs with communities at this stage of Project development). The proposed deep sea port[75] will allow larger vessels to dock in Rankin Inlet The Manitoba to Rankin Inlet road[76] would enhance all-weather ground transportation to the Kivalliq region from southern Canada. The planned expansion of the Rankin Inlet airport[77] will allow for larger planes and more frequent flights into and out of the region. The AWAR from Rankin Inlet to the Project will allow for transportation of goods to and from the mine site, and will enhance access to Iqalugaarjuup Nunanga Territorial Park and the surrounding areas for local residents (see Section 9.9 for a discussion of access effects to the Territorial Park).

Project traffic on local roads will interact with local traffic, acting as a nuisance to local road users, and potentially increasing the risk of collisions. In order to minimize the amount of Project traffic on local roads, AEM will construct a bypass road in Rankin Inlet to transport goods from the harbour to site via the AWAR. With the bypass road in place, it is estimated that 6 to 12 vehicles will be on local roads on weekdays during the summer months, and 12 to 20 vehicles will be present on the weekends. During the winter months, 2 to 15 vehicles will be on local roads on weekdays, and 15 to 30 vehicles will be present on the weekends. During poor weather conditions, no Project vehicles will be present on local roads. Population growth in Rankin Inlet will also increase traffic on local roads. Despite upcoming upgrades to land, sea and air transportation in the LSA, and the mitigation measures discussed above, the Project will result in a change in traffic, transportation patterns and use of infrastructure.

9.7.3.2.8 Communication

Given the already taxed internet and telephone services in the LSA, the increase in population as a result of the Project induced population growth could increase demand for and pressure on communication services.

9.7.3.2.9 Costs to Infrastructure and Services as a Result of the Project

Some (i.e., shipping, transportation) infrastructure and services in the LSA will benefit from the Project, and so will not experience additional costs as a result of the Project. Other infrastructure and services (i.e., communication, religious, and financial services) are not expected to be adversely affected by the Project, and so will likely not experience additional costs. Public services such as education, health care, social services,

[75] An EA for the deep sea prot is currently being prepared; no construction date has been set.

[76] In 2012 the GN reviewed the business case for the road. Final rout selection, planning and approvals are currently underway. It is expected that the road would be constructed in 3 stages over 14 years.

[77] The airport expansion will occur in 3 stages between 2010 and 2030.

and RCMP policing may experience increased demand as a result of the Project. These services are publicly funded. Revenues paid to municipal, territorial and federal governments by the Project are expected to more than offset the additional costs associated with increased service use.

9.7.3.3 Access to Project Infrastructure

Project infrastructure will not be accessible to the community of Rankin Inlet and the general public as a whole during operations, or post-closure. Project facilities will be decommissioned and the AWAR will be removed in the interest of environmental reclamation. Thus, the linkage between Project infrastructure and the AWAR and community use upon closure is invalid.

9.7.4 Residual Impact Classification

Socio-economic effect pathways are considered to be of high likelihood, to occur at a continuous frequency and to be irreversible. Thus, these parameters are assumed, and have not been included in the discussion below. Certainty is not assigned to assessments of significance for socio-economic pathways due to the variability of Project interactions with the socio-economic environment.

Table 9.7-5: Residual Impact Classification for Community Infrastructure and Public Services

VSEC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Significance
Housing	Project-induced in-migration may increase demand on local housing	Negative	Moderate	Local	Long-term	Significant
Schools	Project-induced in-migration may increase demand on educational facilities	Negative	Low	Local	Long-term	Not Significant
Heath Services	Project-induced in-migration may increase demand on health services	Negative	Low to Moderate	Local	Long-term	Significant
	Accidents involving Project workers may increase demand on health services	Negative	Low	Local	Long-term	Not Significant
Social Services	Project-induced in-migration may increase demand on social services	Negative	Low	Local	Long-term	Significant
Protective Services	Project-induced in-migration may increase demand on protective services	Negative	Low	Local	Long-term	Significant
Financial Services	Project-induced in-migration may increase demand on financial services	Negative	Negligible	Local	Long-term	Not Significant
Local and Regional Transportation	Project-induced in-migration may increase traffic on local roads	Negative	Low	Local	Long-term	Significant
	Project-related traffic may increase traffic on local roads	Negative	Low	Local	Long-term	Significant
	The construction of the AWAR may increase access to areas outside of Rankin Inlet by local residents	Positive	Moderate	Local	Long-term	Significant
Communication	Project-induced in-migration may increase demand on local communication services	Negative	Low	Local	Long-term	Significant

9.7.4.1 Impact to Housing

The effect of the Project on housing in the LSA is considered to be negative due to the increased demand placed on an already over-extended housing market. The magnitude of this effect is assessed to be moderate with the majority of in-migration occurring in Rankin Inlet. While lack of housing is a deterrent to relocating, some people will likely find temporary accommodation with friends and relatives, which can increase crowding and have a detrimental effect on quality of life. The effect will persist throughout Project construction, operations, and closure, and has thus been assessed as long-term in duration. Due to the long duration negative impact of this effect on quality of life, the Project's effect on housing is considered significant. For further discussion of the effects of housing pressure and crowding on health and wellbeing, refer to Section 9.6.

9.7.4.2 Impact to Schools

The effect of the Project on schools in the LSA is considered to be negative due to the increased demand placed on schools. This effect in turn will have a detrimental effect on quality of life. The magnitude of this effect is assessed to be low as, while the large majority of in-migration will occur in Rankin Inlet and the number of school-aged children in-migrating will be small (i.e., about 50), existing educational services may not have the capacity to accommodate significantly more students. The effect will persist throughout Project construction, operations and closure, and has thus been assessed as long-term in duration, though funding to schools may increase during operations to account for additional students. Despite the long duration of this effect, given that the school-aged population increase in the LSA is predicted to be small over the 17 year life of the Project, and that education services are available in Rankin Inlet and can accommodate some additional students (with most schools operating at below 100% capacity), the Project's effect on schools is not considered significant.

9.7.4.3 Impact to Health Services

The effect of the Project on health services in the LSA is considered to be negative due to the potential for increased demand for services. The magnitude of this effect is assessed to be low to moderate given that the population increase in the LSA is predicted to be incrementally small over the 17 year life of the Project, but moderate (i.e., 538 people) cumulatively, and will occur primarily in Rankin Inlet, which has existing healthcare services. Project personnel already residing in Rankin Inlet will be trained in First Aid and CPR, and may act as first responders to medical emergencies. Health and safety training provided to Project personnel may also have a positive effect, reducing accidents in the home and raising awareness of the importance of safety in the community. The effect will persist throughout Project construction, operations and closure, and has thus been assessed as long-term in duration. Given the long duration of this effect, and the cumulatively moderate amount of population growth expected in Rankin Inlet – a community where, healthcare services, while available, are already in high demand, the Project's effect on health services is considered significant.

9.7.4.4 Impact to Social Services

The effect of the Project on social services in the LSA is considered to be negative due to the potential for increased demand for services. The magnitude of this effect is assessed to be low as the large majority of in-migration will occur in Rankin Inlet, and because demand for some social services (i.e., social assistance) may reduce as a result of the Project. Project personnel, including those already residing in Rankin Inlet, will be

provided with drug and alcohol counselling and wealth management counselling. This counselling will be extended to the immediate families of Project personnel. The magnitude of the effect is not considered negligible because some social services may see increased demand as the population copes (often in unhealthy ways such as drug and alcohol abuse) with changes in earnings and to social structures that develop in relation to the Project. This in turn will have a detrimental effect on quality of life. Section 9.6 discussed Project effects to health and wellbeing, including need for social services. The effect will persist throughout Project construction, operations and closure, and has thus been assessed as long-term in duration. Due to the long duration negative impact of this effect on quality of life, the Project's effect on social services is considered significant.

9.7.4.5 Impact to Police Services

The effect of the Project on police services in the LSA is considered to be negative due to the potential for increased crime and the associated increased demand on police. The magnitude of this effect is assessed to be moderate as the large majority of in-migration will occur in Rankin Inlet, a community where incidences of crime are on the rise. Police (RCMP) in Rankin Inlet consider the existing force to be too small for the number of crimes in the community. Given the current size of the police force, and the already high demand for police services, an increase in crime as a result of Project-induced population growth in the community would have a noticeable negative effect. This effect will persist throughout Project construction, operations and closure, and has thus been assessed as long-term in duration. Due to the moderate, long duration negative impact of this effect on quality of life, the Project's effect on police services is considered significant.

9.7.4.6 Impact to Financial Services

The effect of the Project on financial services in the LSA is considered to be negative due to the increased demand for services. The magnitude of this effect is assessed to be negligible as the large majority of in-migration will occur in Rankin Inlet, and there are financial services available in the hamlet. The effect will persist throughout Project construction, operations and closure, and has thus been assessed as long-term in duration. Due to the negligible negative impact of this effect, the Project's effect on financial services is considered not significant.

9.7.4.7 Impact to Local and Regional Transportation

The effect of traffic from Project-related in-migration on traffic volumes in the LSA is considered to be negative due to the increased volumes on local roads in Rankin Inlet. The magnitude of this effect is assessed to be low as the incremental population increase in the hamlet between 2014 and 2026 is low relative to the baseline population. The effect will persist throughout Project construction, operations and closure, and has thus been assessed as long-term in duration. Due to the long duration negative impact of this effect on quality of life, the effect of increase traffic as a result of Project-relate in-migration on transportation is considered significant.

The effect of Project-related traffic on traffic volumes in the LSA is considered to be negative due to the increased volumes on local roads in Rankin Inlet. Increased traffic as a result of the Project will have a nuisance effect on local road users, and may potentially result in increased risk of collisions between Project and local traffic (including snow mobiles). The magnitude of this effect is assessed to be low as the large majority of traffic

due to Project activities will be isolated to the road connecting the AWAR to the Itivia harbour. The effect will persist throughout Project construction and operations, and has thus been assessed as long-term in duration. Due to the long duration negative impact of this effect on quality of life, the effect of Project-related traffic on transportation is considered significant. The effect of the AWAR on traffic infrastructure is considered to be positive as this will allow for enhanced access to areas around Rankin Inlet for the purposes of traditional and non-traditional land uses (refer to Sections 9.3 and 9.9 respectively for discussions of land use and access in the Rankin Inlet area). The magnitude of this effect is assessed as moderate, as transportation infrastructure is needed in the area and will result in a noticeable change in land use opportunities for local residents. The effect will persist throughout Project construction and operations and thus has been assessed as long-term (i.e., lasting longer than 10 years) in duration. Despite the fact that the road will be removed in the interest of reclamation post-closure, this effect is considered significant given its moderately positive long-term nature.

9.7.4.8 Impact to Communication Services

The effect of the Project on communication services in the LSA is considered to be negative due to the increased demand for and pressure on existing services. The magnitude of this effect is assessed to be low as the large majority of in-migration will occur in Rankin Inlet, where service expansion would be logistically realistic. The effect will persist throughout Project construction, operations and closure, and has thus been assessed as long-term in duration. Due to the low negative impact of this effect, the Project's effect on communication services is considered significant.

9.7.5 Cumulative Effects

As for other socio-economic effects, the expected rapid expansion of the mining sector has the potential to accelerate and exacerbate the effects on public infrastructure and services discussed above, as the same processes apply. Such cumulative effects are expected largely to be additive and would be as significant as they are for Project residual effects. Irrespective of where the projects selected for the cumulative effects scenario are located, the competitive advantage of Rankin Inlet[78] will continue to mean that most effects are seen in the hamlet.

Cumulative increase on demand for services in the LSA communities is considered to be a significant negative cumulative effect in the event that the capacity of service provision does not grow. It is arguable, however, that at some point, populations in the LSA communities (most notably Rankin Inlet) could cross thresholds that would warrant not only an expansion of existing services, but addition of services not seen before. This would be a cumulative benefit of significance.

9.7.6 Monitoring and Follow-Up

For monitoring and follow-up strategies related to community infrastructure and public services, refer to the socio-economic management plan (SD 9-2).

[78] As the major transportation hub for the Kivalliq region, and the most developed hamlet in terms of community infrastructure and public services

9.8 Governance and Leadership

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on governance and leadership.

Volume 1, Appendix 1.0-A lists the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for governance and leadership.

Industry and government are intertwined and interdependent in various ways. While industry can enhance the fiscal and operational strength of governments, governments will ensure that industrial projects are carried out in a responsible manner so that the overall quality of life of citizens is optimized. Hence, to maximize the benefits to all parties, it is of utmost importance that both industry and government understand and look after this relationship.

9.8.1 Baseline Environment

9.8.1.1 Nunavut (Regional Study Area)

Governing Institutions

The Territory of Nunavut was created in 1999 with the signature of the NLCA. The agreement includes provision for:

- title to approximately 351 000 square kilometres of land (Inuit owned lands), of which about 37,000 square kilometres include mineral rights;
- equal representation of Inuit with government on a new set of wildlife management, resource management, and environmental boards (co management boards);
- the right to harvest wildlife on lands and in waters throughout the Nunavut settlement area;
- capital transfer payments of $1.148 billion, payable to the Inuit over 14 years;
- a share of federal government royalties for Nunavut Inuit from oil, gas and mineral development on Crown lands;
- the right to negotiate with industry for economic and social benefits from non-renewable resource development on Inuit owned lands;
- creation of 3 federally funded national parks; and
- inclusion of a political accord that provides for the establishment of the new Territory of Nunavut, and through this, a form of self-government for the Nunavut Inuit.

The NLCA specifies which governing institutions should be in place to implement the terms of the NLCA as follows:

- The Government of Canada and controls crown lands as well as subsurface mineral rights on most Inuit owned lands. It remains in control of environmental assessments, and regulatory processes and permits for resource extraction, land use and water use. These authorities are exercised by AANDC (formerly INAC), through various federal and territorial boards and agencies. The Government of Canada also funds over 90% of Nunavut's government budget.
- The GN is elected by all residents of the Territory (Nunavummiut). Nineteen members of the legislative assembly are elected as independents, and select a premier and cabinet ministers from

among themselves. The Government of Nunavut has some direct tax authority, and manages and administers the Territory's economic and social development through its departments including finance, human resources, health and social services, education, and economic development and transportation. The Government of Nunavut has little direct authority over land and resource use in Nunavut, but does have political influence over federal decisions and is a key intervener in processes of various regulatory boards established under the NLCA.

- Nunavut Tunngavik Incorporated is an elected body representing the Inuit beneficiaries of the NLCA, and administers all Inuit owned land. Nunavut Tunngavik Incorporated has a regional Inuit association in each of Nunavut's 3 regions - Kivalliq, Kitikmeot and Qikiqtaaluk. Nunavut Tunngavik Incorporated and regional Inuit association representatives are elected by Inuit beneficiaries. Representing the interests of about 85% of the population, NTI and the regional associations have considerable influence over federal and territorial decision making and are key interveners in regulatory board processes. Since most Nunavummiut are also Inuit beneficiaries, GN and NTI represent the same constituents, with GN also representing the additional 15% that are not NLCA beneficiaries.
- The Nunavut Planning Commission (NPC) is responsible for land use policy and planning to guide and direct resource use and development. The Nunavut Planning Commission also has a role in evaluating proposed developments for conformance with policy and planning. In developing land use policies and plans, NPC carries out extensive consultation with communities, as well as with other institutions of government and civil society, to take into account a range of values, priorities and aspirations. Land use plans thus include consideration of the economic, social and cultural needs of Nunavummiut, as well as environmental and ecosystem considerations. The Keewatin Regional Land Use Plan for the Kivalliq Region was completed by the NPC in 2002.
- The NIRB has the responsibility to assess and monitor the environmental and socio-economic impacts and performance of developments. NIRB screens project proposals, issues guidelines for preparation of EISs, leads the regulatory review process, sets terms and conditions for any forthcoming approvals, and makes recommendations to the federal government for decisions. The NIRB process is highly consultative (NIRB 2010).
- The Nunavut Water Board (NWB) has responsibilities and powers over the use, management and regulation of inland water in Nunavut, including the issuing of water licenses and the deposit of wastes into inland waters. Water licenses include terms and conditions, with all applicable provisions of territorial and federal legislation.
- The Nunavut Surface Rights Tribunal is a quasi-judicial body with a mandate to settle disputes on access, and compensation for losses (wildlife or carving stone rights, for example). Disputing parties are encouraged to negotiate and reach settlement before applying to the Nunavut Surface Rights Tribunal for assistance.
- The NWMB is the regulator of access to wildlife in Nunavut. It establishes wildlife harvesting quotas, and approves plans for the management and protection of wildlife and wildlife habitats. In Kivalliq, the Beverly and Qamanirjuaq Caribou Management Board has been established as a co-management board to make recommendations about the management of 2 caribou herds whose migratory routes range into the NT, Manitoba, and Saskatchewan.

Recently, the NGMP Secretariat was formed with the goal of coordinating monitoring initiatives in Nunavut. The NGMP Secretariat will collect and analyse information relating to socio-economic matters. The outcome should lead to better data, regulatory improvements and better decision making processes.

The various public agencies and departments have produced a number of key policy documents, some of which are directly related to the Project and AEM. The various documents are presented and discussed throughout this EIS document and will not be covered further in this section.

Capacity to Govern

Nunavut is a very young jurisdiction within Canada, with new institutions of government. The rapid process of establishing a territorial government has led to some initial difficulties, most of which are caused by inexperience with formal institutions of government and unique political imperatives with regard to how government is run. As a result, government in Nunavut has dealt with harsh capacity constraints. Other concerns include high employee remuneration costs in face of limited budgets, low educational achievement in the Territory, large staffing requirements of government relative to the size of the labour force and, increasingly, competition for workers in the private sector.

Nunavut's Department of Human Resources has in place a number of programs to address staffing constraints both within government staff and the broader public. These programs are aimed at preparing people for positions within the government in the future. This is in the context of i) the NLCA goal that GN staffing is representative of the Nunavut population as a whole - that is, it aspires to Inuit making up 85% of staff; and ii) expectations that government services can be delivered in Inuktitut and reflect the integration of Inuit values. Priority hiring for Inuit, student summer and internship programs, staff training programs, language and cross cultural training and initiatives to address retention issues have all been put in place, but will take time to mature before they achieve desired outcomes.

The GN had a staffing requirement of about 4000 in 2011, equivalent to about 30% of Nunavut's entire labour force of 13 700 (GNBS 2011a) at that time. About 85% of these jobs would normally require at least some post-secondary education. In 2010, 25% of these jobs were vacant (see Table 9.8-1), with higher rates of vacancies in higher ranked positions. In the absence of qualified Inuit, filling these jobs would mean some combination of i) hiring qualified non-Inuit, reducing the percentage of Inuit in government service to below the current average of 50% (up from 42% in 2002; a reduction in the percentage of Inuit staff may dilute language and cultural content in government as well); and ii) hiring unqualified Inuit, reducing the quality of government services at least in the shorter term.

Table 9.8-1: Government of Nunavut Staffing by Level, 2011

	Total Positions	Position Filled by Inuit (%)	Positions Filled (%)
Executive	39	42	92
Senior management	170	19	82
Middle management	459	24	80
Professional	1368	27	77
Paraprofessional	1546	70	72
Administrative	563	92	73
Total	**4145**	**50**	**75**

Source: GNDoHR (2011)

Note: Data include full-time equivalent positions contained in all Departments, Agencies, Boards and Corporations

On the other hand, institutional capacity can be somewhat offset by significant participation of people in decisions that affect them. In an investigation of political culture in Nunavut, Henderson (2007) found that there were many factors present in Nunavut (as compared to Canada) that might be expected to limit public participation in governance, including the non-party system of elections, higher transaction costs, reduced access to information and poorer socio-economic indicators – all of which have been found to limit political participation elsewhere. However, Henderson also found that people's participation was at a comparable level to that in the rest of Canada. Inuit social values, the NLCA provision that government be highly consultative, and active community level political organizations have created avenues for public influence on government decision making. This in turn enhances the capacity of government to respond to public will.

In short, the governance framework in Nunavut is strong but suffering from capacity issues, relating mostly to lack of qualified labour.

9.8.1.2 Kivalliq Region (Local Study Area)

Governing Institutions

The communities in Kivalliq are incorporated as hamlets. Citizens elect a mayor and council, as well as representatives to HTOs.

HTOs have responsibilities for wildlife management and related tasks, such as participation in wildlife research projects and delivery of NTI programs for hunters.

There is no regional administration – government is by the Territory and its co management boards. However, NTI is represented in Kivalliq by the KIA.

Capacity to Govern

Generally, hamlet governments have small staffs responsible for the delivery of a range of municipal services, such as water supply, recreation programs, community planning and community infrastructure operation and maintenance. Aside from cost recovery for some of these services, hamlets are dependent on the GN for revenues. Typically, this funding falls short of meeting the requirements of the hamlets, leading to capacity constraints and even service shortfalls. This is also the case with HTOs.

As with GN, local governments also suffer from lack of qualified labour in the communities.

9.8.2 Pathway Analysis

The EIS uses pathways (Project-environmental interactions) to assess effects. Pathway analysis is a screening step that is used to determine the existence and magnitude of linkages from an initial list of potential effects pathways for the Project. This screening step is largely a qualitative assessment and is intended to focus the effects analysis on pathways that require a more comprehensive assessment of effects on VSECs.

Pathway analysis identifies and assesses the linkages (or interactions) between Project components or activities, and the corresponding potential residual effects to VSECs relating to socio-economics. Potential pathways through which the Project could affect VSECs were identified from a number of sources including a review of the Project description, effects identified by other projects in Nunavut and the Guidelines for the Project.

The first part of the analysis is to produce a list of all potential effects pathways for the Project. Each pathway is initially considered to have a linkage to potential effects on VSECs. This step is followed by the development of design features and mitigation that can be incorporated into the Project to remove a pathway or limit (mitigate) the effects to VSECs. Such design features include best practices, management policies, work procedures and social programs that can avoid or mitigate effects.

Knowledge of the environmental design features and mitigation is then applied to each of the pathways to determine the expected amount of Project-related changes to the environment and the associated residual effects (i.e., effects after mitigation) on VSECs. For an effect to occur there has to be a source (Project component or activity) that results in a measurable change to the environment (pathway) and a correspondent effect on a VSEC.

Table 9.8-2: Potential Pathways for Effects to Governance and Leadership

Valued Socio-Economic Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Fiscal performance of government	Payment of taxes and royalties. Use of various public services.	The Project would add substantially to the income of government, e.g. through taxes and royalties. However, it will also lead to increased costs, since demand for various services will go up. Given that its fiscal burden (costs) will be smaller than the public revenues it generates, the Project would lead to a better fiscal position of all levels of government.	None required.	Primary, direct and indirect.
Operational capacity of government	Various applications and other undertakings that draw from public services.	The Project will increase demand on various public services, putting additional pressure on resources; human resources in particular. This would have a negative effect on users. However, increased training of the labour force could have a beneficial effect on capacities in the long-term.	None required.	Primary, direct and indirect.
Regulatory and monitoring capacity of government	Various applications and monitoring requirements.	As with any other economic activity, the Project would go through a range of regulation processes and procedures. This could potentially expose shortcomings and flaws in regulations, leading to inefficiencies and possibly less than desirable outcomes.	None required.	Primary, direct and indirect.

9.8.3 Effects Analysis

Like any economic activity, the development, construction and operation of the Project would draw from the services of all levels of government. As an example, merely the process of acquiring anticipated permits and approvals would directly involve close to 20 public institutions. This EIS will not be able to assess and discuss all these effects, but an attempt has been made to consider the most important impacts that the Project will have on

the capacities of governments and leadership in Nunavut and the Kivalliq region. In some cases, a reference will also be made to the Government of Canada.

9.8.3.1 Mitigation Measures

Theoretically, taxes and royalties generated by the Project would mitigate for any added demand for government services by, for example, allowing government to add staff and other resources to respond to added demand. In practice, however, this process is more complicated. For example, the Project might draw from the same labour pool as government, leading to increased competition for qualified workers. This could, in a worst case scenario, lead to reduced government service levels and longer processing times.

On the positive side, the Project would also have long-term beneficial effects on capacities of government institutions in Nunavut and the Kivalliq region. For example, AEM's education and training initiatives of its own employees could, with time, add considerably to the qualifications of the local and regional workforce. At some point, some of AEM's employees will leave the Project and fill available positions in the region, including positions in the public sector. These employees, given their elevated skill levels, will be better equipped to take on various tasks that these jobs might require.

Overall, the positive effects on government in Nunavut and the Kivalliq region should outweigh the negative effects. Therefore, there is limited need for mitigation measures. In fact, there are good reasons to question the appropriateness of AEM directly initiating and delivering direct mitigation measures. For example, the potential of conflict of interest makes industry unable to take part in decisions of governmental institutions which have a governing, monitoring and enforcing authority over industry. Therefore, most mitigation measures would have to come from within government itself.

However, AEM can facilitate effective government operations and procedures by ensuring good and proactive communication, transparent reporting and working together with government on initiatives wherever possible; as well as complying with procedures and requirements that government requests. This will also help prevent conflict of interest between stakeholders. If such conflict would occur, AEM would attempt to:

- make all stakeholders aware of the conflict of interest and potential implications;
- seek consensus on how the conflict of interest should be managed in a fair and open manner; and
- seek consensus and accommodation in an open manner so that such potential conflicts of interest can be addressed.

In addition, AEM would:

- Maintain a toll-free ethics hotline where any suspected violations of the AEM Code of Business Conduct and Ethics (http://www.agnico-eagle.com/English/Our-Company/corporate-presentation/Code-of-Business-Conduct/default.aspx) can be reported anonymously, in order to ensure that AEM and its employees act in a responsible manner and measure up to core values (already in existence). This would include any suspicions of AEM operations not confirming with government standards and regulations, as well as any suspicions of conflicts of interest. A quarterly report from the third party operator of AEM's ethics hotline is currently submitted to the

AEM Board of Director's Audit Committee. The Board of Directors are informed of any reported breaches so that appropriate action can be taken.

- Encourage open dialogues and debates on public policy issues. AEM typically participates in public policy discussion through industry organizations. AEM is a member of the Centre for the North through the Conference Board of Canada. This organization works with multiple stakeholders, including all levels of government, to reach a vision of a sustainable and prosperous future in the North. The goal is to build a common vision among key stakeholders in the North, and assist in establishing and implementing initiatives that might help in realizing this vision.
- Welcome the chance, where appropriate and feasible, to take part in formulating and delivering plans that can enhance the quality of life in the region. This could include economic development plans, wellness initiatives and hamlet programs. This could be realized through meetings with municipal councils or, on specific issues, with citizens and neighbours. Open houses would also be held on a regular basis.
- Make sure that enquiries from communities are dealt with and responded to. In order to facilitate this, communities would be provided with a consistent AEM contact person. In addition and in order to ensure that stakeholder concerns are addressed, AEM has formed a Stakeholder Advisory Committee which regularly provides candid feedback and advice to AEM's leadership.
- Create a project Community Liaison Committee made up of members from various community groups. The groups would meet with the AEM Project Management team on a regular basis

9.8.3.2 Nunavut (Regional Study Area) Effects Analysis

9.8.3.2.1 Construction and Operation

Increased economic activities will typically lead to more demand for public services. Given the relative size of the Project, there is no doubt that it will lead to substantial increases in demand for public services at the territorial level.

The effects of the Project on government services can be divided into 3 categories: i) effects on financial capacities; ii) effects on the regulatory and monitoring capacities; and iii) and effects on operational capacities, particularly human resources.

As with any other economic activity, the Project would lead to increased expenses of all levels of government. As an example, the approval process would put significant strain on various agencies and boards, such as the NWB and NIRB. However, this negative effect would be more than mitigated with taxes and royalties paid to the Government of Canada, GN, and NTI, as this added funding can assist in increasing capacities. Revenues generated by both indirect and induced activities would enhance this effect even further.

In addition to the aforementioned fiscal effect, positive socio-economic effects of the project from, for example, raised employment levels, should lead to decreased demand for various social assistance programs. This should free up fiscal resources, leading to an even more positive effect on the finances of government. This effect could also open up opportunities to streamline government operations, e.g. transferring human resources to operational units where demand is the highest.

With regard to operational capacities and human resources, there are a number of positive linkages to the ability to supply public infrastructure and services on the part of the GN. These include expected increases in educational achievement and labour force capacity. For example, even where an individual can adapt to rotational work, this can eventually become less preferred, so some rotation between mining work and work in hamlets can be expected, including of people who have become more qualified through mining experience. This, of course, does not mean that the Project will come at no cost to quality and delivery of public services. In the short term, as the Meadowbank experience in Baker Lake has proved, there would be labour shortfalls due to high employment levels.

Although the GN has experienced capacity problems, the framework regulating and monitoring industry development is strong and comprehensive. Hence, as long as the GN can maintain sufficient staffing levels, government should be able to deal with the technical strain that the Project would put on the regulatory structure.

9.8.3.2.2 Temporary, Final, and Post-Closure

The Project will have a long-term effect on the government in Nunavut. As such, increased capacities that the government would build during the lifespan of the Project would be available after the Project ramps down and, eventually, closes down. Hence, what happens during and after the lifespan of the Project will determine what the effects on the government will be. In the likely scenario that other industry projects or other economic activity will be developed before the Project comes to an end, the improved capacities of government will be needed to deal with the continued demand. If, however, none or little economic activities will follow the Project, some cost cuts and simplifications are inevitable since taxes and other revenues will go down.

Since final and post-closure of the Project would be highly predictable, there should be enough time for both government and industry to prepare for the shock that the closure will cause. The unlikely event of the Project having a temporary closure, however, could potentially have more negative and severe effects on government since there will be less time to prepare and streamline operations. Therefore, open communication between AEM and governmental agencies would be an important way to minimize the chance of a temporary closure coming as a surprise to public agencies.

It is AEM's intent to increase the overall capacity of the labour force in Nunavut, and the Kivalliq region, during the Project's life span. This should help individuals, business and the government to reach full potential after the Project ramps down, regardless of how much resource development will take place in the meantime.

9.8.3.3 Kivalliq region (Local Study Area) Effects Analysis

9.8.3.3.1 Construction and Operation

Hamlet governments are responsible to deliver municipal services and fund this activity to some degree through cost recovery, but primarily through transfers from the territorial government. As noted in the socio-economic baseline, GN has significant financial constraints in its ability to fund hamlets' needs and to provide the level and quality of other services that meet the needs of its population and are comparable to levels and quality of services elsewhere in Canada. Both hamlets and GN struggle to find capable staff to deliver services and any inflation in wage rates in response to shifts in the labour market will also affect budgets. However, increased

public revenues would enable local governments to offer more competitive salaries and, hopefully, address some of these constraints.

Increased demand for public infrastructure and services can be seen as a benefit to the extent that new demand can be met. However, this increased demand can often not be met, leading to disappointment of both new and existing users of services. Worst case scenario, some users may be crowded out of services. In some cases, those able to access economic opportunities may have some options for recourse in the private market that either exists or develops to meet demand that can be paid for. Of more concern are people whose needs may be higher but have reduced access. This could include, as examples, single mothers and those that are, for some reason, less employable.

With regard to operational capacities and human resources, there are good reasons to believe that the Project could have beneficial effects on the local governments in Kivalliq. This includes, for example, expected increases in educational achievement and labour force capacity. In particular, governmental agencies could benefit from instances where AEM's employees, for various reasons, decide to leave the Project and look for work elsewhere. These qualified individuals, if hired by government, could add substantially to the human capital and capacities of various governmental agencies.

As pointed out above, the public revenues generated by the Project should lead to increased funding for the local communities. As with the GN, the Project should also lead to less pressure on social assistance programs, e.g. through increased employment rates, which could lower some current expenditures. This could lead to opportunities to streamline operations, transferring staff and so forth.

The above is not to deny that negative effects will occur. The Hamlet of Baker Lake, for example, has struggled to find and pay municipal service workers in response to high employment levels at Meadowbank. With a rapidly expanding workforce, though, this should hopefully be less of a problem in the future.

9.8.3.3.2 Temporary, Final, and Post-Closure

The effects of closure on hamlets and HTOs in Kivalliq will be similar to the ones experienced by government in Nunavut, although the indirect effects might be somewhat more severe since much of the workforce would be residents of the hamlets in the region. Negative effects would be more likely if other industry projects will not take over as the Project ramps down. For further information and discussion on these matters, please refer to Section 9.8.3.3.1 which discusses effects on GN.

9.8.4 Residual Impact Classification

Residual effects on governments and leadership in both Nunavut and the Kivalliq region should be rather positive and long lasting. Increased local capacity and experience should lead to more cost-effective public services and increased service levels. This should make government better equipped to handle any future industrial projects and other economic activities. Nevertheless, if there will be no continuation of new resource projects, there is a risk of over-capacity of government when the Project ramps down. This would likely lead to some downsizing in administration and other cost cuts. Given the number of pending applications, this is considered a highly unlikely scenario.

Table 9.8-3 summarizes what are expected to be Project effects on governance. As the table depicts, the effects are mostly positive and significant. This should be true for both the Kivalliq region and Nunavut. Moreover, most of the effects should be long-term.

Attributing a direction (positive or negative) to an increased demand for government services is problematical insofar as where demand can be met, there is a long-term benefit for people, and where demand cannot be met there is not.

No mitigation measures would be required for effects on governance since overall the effects would be both significant and positive.

Table 9.8-3: Summary Impact Matrix

Valued Socio-Economic Component	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Significance
Fiscal performance of government	The Project would add substantially to the income of government, e.g. through taxes and royalties. However, it will also lead to increased costs, since demand for various services will go up. Given that its fiscal burden (costs) will be smaller than the public revenues it generates, the Project would lead to a better fiscal position of all levels of government.	Positive	High	Region and Local	Long-term	Significant
Operational capacity of government	The Project will increase demand on various public services, putting additional pressure on resources, and human resources in particular. This would have a negative effect on users. However, increased training of labour force could have a beneficial effect on capacities in the long-term.	Negative and Positive	High	Region and Local	Long-term	Significant
Regulatory and monitoring capacity of government	As with any other economic activity, the Project would progress through a range of regulation processes and procedures. This could potentially expose shortcomings and flaws in regulations, leading to inefficiencies and possibly less than desirable outcomes.	Unknown	Moderate	Region and Local	Long-term	Significant

9.8.5 Cumulative Effects

Section 9.4.5.1 constructs a scenario, at the territorial level, that considers the potential for construction and then operations of 9 large mining projects over a period to the late 2020's. The scenario is based on publicly available information on project development plans of Kiggavik, Meadowbank, Mary River, Hackett River, Back River, and

Izok Lake, as well as the Project. These projects are considered reasonably foreseeable. Other projects and initiatives are not considered since their size is dwarfed by the projects listed above.

Given the tremendous size of some of the aforementioned projects, and the current constraints of all levels of government, cumulative effects on governance will without a doubt be large. In short, as for other socio-economic effects, the expected rapid expansion of the mining sector would likely accelerate the effects discussed above on governance, as the same processes apply. Such effects are expected largely to be additive. It will be noted that most of the above listed projects are outside of the Kivalliq region. Although these projects would certainly draw from the services of the GN, they would certainly not for the local governments. However, Kiggavik, Meadowbank, and the Project will all have substantial effects on local hamlet governments.

As all the foreseeable projects would have fiscal benefits, constraints are likely to be on the government expenditure side; increased competition for labour in particular. Therefore, cumulative effects would likely have to lead to considerable streamlining of various operations and processes. Training initiatives and decreasing certain hiring goals might also be a temporary solution. On the positive side, increased experience of staff and operational cost-effectiveness might mitigate some of this effect.

9.8.6 Monitoring and Follow-Up

The monitoring socio-economic effects in Nunavut and Kivalliq will mostly be the responsibility of the Kivalliq SEMC and the NGMP. However, AEM intends to take part in this collaboration. This could include taking part in the planning of monitoring initiatives, contributing with data[79] and other input, and providing support to the Kivalliq SEMC and NGMP Secretariat. In addition, AEM would collaborate with other resource companies towards a consistent and useful approach for data collection.

9.9 Non-Traditional Land Use and Resources Use

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on non-traditional land use and resource use. Volume 1, Appendix 1.0-A lists the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for non-traditional land use and resource use.

9.9.1 Baseline Environment

9.9.1.1 Data Collection

A desktop review was conducted of publicly available information on Rankin Inlet, Iqalugaarjuup Nunanga Territorial Park and the surrounding areas. Information from local businesses, the Hamlet of Rankin Inlet, academic reports (i.e., Dowsling 2010) and Government of Nunavut websites has been included. Where information gaps were apparent, personal communications were conducted with local officials from Rankin Inlet.

[79] It is acknowledged that there are a number of challenges to collecting data on Project workers.

9.9.1.2 Study Areas

For the purposes of this assessment, a study area was selected based on the area in which it could be reasonably expected that the Project may affect NTLU. The caribou RSA will be used to discuss regional effects to NTLU with the inclusion of Chesterfield Inlet. Where effects are anticipated at a local level only, the terrestrial resources LSA, with a boundary modification to include the entire municipality of Rankin Inlet, has been used to discuss Project effects on NTLU. The focus of the assessment is on the general area around Rankin Inlet, the AWAR and the mine site. The Iqalugaarjuup Nunanga Territorial Park is the only known existing or proposed protected area, special management area, or conservation areas in the NTLU RSA.

9.9.1.3 Mine Site, AWAR and Rankin Inlet

Land Use and Development Plans

In Rankin Inlet, the Lands Administration By-law provides the procedures and implementation of municipal lands. This by-law also outlines the terms and conditions that will be required in municipal leases. The Rankin Inlet Zoning By-Law provides the administration and enforcement of the community plan. This outlines the specific use and requirements of each differently zoned land within Rankin Inlet. The Rankin Inlet Community Plan By-Law describes the manner in which development or redevelopment of a municipality may best be organized and carried out. This by-law includes a detailed map of lots and zoning in Rankin Inlet.

Shipping and Transportation

Rankin Inlet is a transportation and shipping hub for the RSA, and the Kivalliq region as a whole. Large quantity and weight shipments come to Rankin Inlet from Churchill by barge and from Montreal by ship. Due to the limited capabilities of the Rankin Inlet marine facilities, ships arriving at the hamlet anchor approximately half a mile off shore outside the barrier islands and use a barge system to transport goods to shore. Freight comes through the Itivia Harbour, while fuel is brought ashore through Johnsons Cove (Rankin Inlet 2012a).

There is currently an all-weather gravel road that extends from Rankin Inlet to the bank of the Meliadine River, approximately 15 km away from the Project. A 27 km long continuation of this existing road to the Project has been permitted and is in the construction stage (AEM 2011c). This road will be used to transport goods from the proposed Deep Sea Port Facility to the Project.

Refer to the Community Infrastructure and Public Services baseline (Section 9.7.1) for further information on air transportation in Rankin Inlet and the forthcoming expansion of the Rankin Inlet Airport.

Hunting and Outfitting

Hunting is a popular activity in the RSA. Outfitting and guided hunting is thought to be a more promising activity than outfitting and guided canoeing, involving more individuals from communities and generating larger financial returns. Based on research done in the early 2000s, Dowsley (2010) reported that an outfitted sport hunt for polar bear brought in an average of $19 000 to Inuit outfitters. However, recent restrictions on polar bear tags, in combination with the ban on the import of polar bear trophies in the US, are said to have had a negative effect on outfitting businesses in the RSA.

Independent hunters in Rankin Inlet, Whale Cove, and Chesterfield Inlet have also been known to provide outfitting services and guided trips. In the past, guiding could be arranged comparatively informally – customers could contact a HTO to make arrangements and the HTO would identify someone who had the appropriate

training and experience, including safety training. However, new requirements for insurance, high start-up costs and the need to market in order to expand, have become barriers to expansion of independent outfitting and guiding by Inuit, and have resulted in some loss of interest. Some HTOs members report that there is little incentive to invest the necessary significant sums in the face of market uncertainties.

Several outfitters operate in the LSA. Pissuk Outfitting facilitates wildlife viewing, hiking tours, fishing and outfitting expeditions out of Rankin Inlet. Kowmuk Tours also operates out of the town, and provides touring services in the Rankin Inlet area. Come Along Tours and Outfitting provides boat tours and dog sledding excursions (Explore Nunavut 2012). Nanuk Lodge in Rankin Inlet offers dog sledding trips to lodge guests (Nanuk Lodge n.d.). Finally, boat tours staged out of Rankin Inlet destined for Marble Island are available from local guides (E. Morrison, Rankin Inlet, 2012, pers. comm.). Given the relative unavailability of polar bear tags, and the prevalence of wolf hunting in more accessible southerly locations, it is expected that the majority of any outfitted hunting in the RSA is for caribou.

Fishing

Commercial fishing is not prevalent in the RSA. The shallow water harbour in Rankin Inlet does not allow for large commercial fishing vessels to dock (E. Morrison, Rankin Inlet, 2012, pers. comm.). Smaller-scale commercial fishing occurs around Whale Cove, where there is a fish processing plant.

There is no known commercial fishing in the LSA (E. Morrison, Rankin Inlet, 2012, pers. comm.). Guided fishing trips are offered out of Rankin Inlet, and occur throughout the LSA. Refer to the TLU baseline (Section 9.3.1) for a discussion of traditional fishing activities in the LSA.

Land Use and Inuit Culture, Wellbeing, Self-Reliance, and Livelihood

Traditional land use is discussed in the TLU baseline (Section 9.3.1), while social wellbeing is discussed further in the Individual and Community Wellness baseline (Section 9.6.1).

The land-based economy (including land use activities and their relation to the local economy and livelihoods) is described in the Economic Development and Opportunities baseline (Section 9.4.1). Food supplies (including country foods) derived from land-based activities are described in the TLU baseline (Section 9.3.1) and the Individual and Community Wellness baseline (Section 9.6.1).

Tourism, Recreation, Parks, and Protected Areas

Tourism is a priority sector for development in the Kivalliq region and the RSA, although progress has been somewhat slower than in the mining sector. Kivalliq is home to the Kazan and Thelon watersheds, 2 of the longest undisturbed river systems in the Arctic. The Thelon and Kazan rivers were designated as Canadian Heritage Rivers in 1990, marking them as having “outstanding natural, cultural and recreational heritage” (CHRS 2011).

The wilderness character, as well as the wildlife and archaeological sites along the Thelon and Kazan rivers, are attractions to outdoor enthusiasts. Most canoeists organize trips through wilderness outfitters and tour operators, the majority of which are based outside Nunavut – in Whitehorse, Fort Smith, Winnipeg, and La Ronge. A recent study investigating the level of canoeing on the Kazan and Thelon rivers indicates low but constant use (GeoVector 2008). However, the study also notes that canoeists bring little in the way of economic benefits to Kivalliq (or other Arctic) communities, other than a short hotel stay at the end of a trip.

Cruise ships and adventure tourists visit Nunavut, and there is some expectation of increasing interest in light of climate changes and potential effects on wildlife; however, most interest has been in the high Arctic and numbers of visitors remain small. A significant increase in tourism in Kivalliq and, more specifically, the RSA, will require a concerted effort to invest in tourist infrastructure and services (including opportunities to experience traditional culture), to further develop the arts and crafts sector, and to promote Kivalliq's attractions. In a fiscal environment of many other economic and social demands on government resources, strong public and private sector partnerships will be needed to advance on the tourism front.

Recreation and tourism opportunities exist in the LSA. The Rankin Inlet Fitness Club is located at the Arctic College campus (Rankin Inlet 2012b). In the spring, Rankin Inlet celebrates Pakallak Time with traditional games, competitions, snowmobile races, dancing and community feasts (Nunavut Tourism 2012).

The Iqalugaarjuup Nunanga Territorial Park is located 8 km northwest of Rankin Inlet (Government of Nunavut, Department of the Environment 2008). In the summer months, the Park is used by visitors and residents of Rankin Inlet for fishing, wildlife viewing, hiking, camping, and berry picking (Government of Nunavut, Department of Environment 2008). The park can be accessed via a gravel road from Rankin Inlet. Local outfitters offer cultural experience tours to the park. Off-road driving and ATVing is not permitted in the park. Non-Inuit are required to hold a fishing licence to fish in the park. Licences can be obtained from the wildlife office in Rankin Inlet. There are at least 24 unusual species in the park, including the endangered peregrine falcon (Ayaya Marketing and Communications 2004).

Roads and pathways in Iqalugaarjuup Nunanga Territorial Park maintain the ecological integrity of the sensitive lichen-moss communities that cover much of the park's esker formations. Visitors are discouraged from disturbing the natural environment within the park. There is a picnic area, outhouse and change rooms in the park near Sandy Lake – a popular summer swimming area. Visitors can camp in the park, with 3 tent platforms available on a first-come, first-served basis, along with a barbecue. There is also an Elders cabin available for day-use by the public. The park also holds over 45 archaeological sites, the most prominent of which is named Qamaviniqtalik or "place with ancient sod houses". Visitors can see remnants of tent rings, caches, graves and semi-subterranean houses built into the hillside (Ayaya Marketing and Communications 2004).

Wilderness Character

For the purposes of this assessment, wilderness character is taken to mean the ability of land users to enjoy the wilderness environment, including parks and protected areas. Enjoyment is a function of the visual and acoustic environment.

There are several protected areas in the RSA. The Arvia'juaq and Qikiqtaarjuk National Historic Site includes a small island in Hudson Bay near Arviat, and a peninsula to the north of Arviat. Both areas are considered to be important cultural sites. The McConnell River Migratory Bird Sanctuary is located 27 km south of the community of Arviat. The sanctuary acts as an important breeding ground for several species of goose. Inuujarvik Territorial Park is located on the north shore of Baker Lake, to the west of the community of the same name. Iqalugaarjuup Nunanga Territorial Park is located approximately 7 km northwest of Rankin Inlet, and is discussed in greater detail below.

Project waste rock piles will be visible from vantage points throughout the RSA as far from the Project as 55 to 60 km. With the exception of Iqalugaarjuup Nunanga Territorial Park, the Project will not be visible from any of the aforementioned parks and protected areas. Figure 9.9-1 displays the viewshed for waste rock piles, and shows the vantage points from where the waste rock piles are visible.

There are no known protected areas overlapping the LSA. Iqalugaarjuup Nunanga Territorial Park is the only park partially overlapping the LSA. Project waste rock piles will be visible from high points in Iqalugaarjuup Nunanga Territorial Park, along the majority of the AWAR and from some vantage points in Rankin Inlet.

The maximum noise level at the edge of a 1.5 km buffer is not predicted to exceed the recommended value of 40 dBA for remote, undeveloped areas (FEIS Volume 5, Section 5.5).

9.9.2 Pathway Analysis

Potential pathways through which the Project could affect NTLU are presented in Table 9.9-1. Environmental design features and mitigation incorporated into the design of the Project to remove a pathway or limit the effects to NTLU are listed, and pathways are determined to be primary, minor, or as having no linkage. The following section discusses the potential pathways relevant to NTLU.

Primary pathways require further effects analysis to determine the environmental significance from the Project on NTLU. Pathways determined to have no linkage to NTLU or those that are considered minor are not predicted to result in environmentally significant effects on NTLU. No linkage and minor pathways are summarized but not carried through the effects assessment.

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6960000

Meliadine Lake
Diana Lake
Iqalugaarjuup Nunanga Territorial Park
Meliadine River
Diana River
Rankin Inlet
Falstaff Island
Hudson Bay

N

LEGEND

- Cabin - Present Day (Rankin Inlet)
- Cabin - Chesterfield Inlet
- Camp 1912-1956
- Exploration Camp
- Present Day Cabin
- Community
- Place Name
- Local Study Area (LSA)
- Proposed Project Infrastructure
- All-weather Access Road (AWAR)
- Road - New
- Road - Existing
- Watercourse
- Waterbody
- Territorial Park
- Project Components Visible
- Project Components Not Visible

REFERENCE

Base data obtained from Agnico Eagle Mines Limited (AEM).
Datum: NAD 83 Projection: UTM Zone 15

5000 0 5000
METRES

PROJECT
AGNICO EAGLE

AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
VIEWSHED ANALYSIS FOR THE WASTE ROCK STORAGE FACILITIES

Golder Associates

PROJECT NO. 10-1373-0076			FILE No. 1700	
DESIGN	MG	28 Aug. 2012	SCALE AS SHOWN	REV. 0
GIS	JW	07 Sep. 2012		
CHECK	MG	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE 9.9-1

N:\Bur-Graphics\Projects\2013\1428\13-1428-0007\GIS\Mapping\MXD\FEIS\Volume_9\Main_Volume\Figure_9.9-1_Viewshed_Analysis.mxd

Table 9.9-1: Potential Pathways for Effects to Non-Traditional Land Use

Valued Socio-Economic Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Hunting and fishing	Construction and operations	The Project may increase access to non-traditional hunting and fishing opportunities, outfitting and guiding businesses in the RSA via the AWAR	No mitigation measures necessary	Primary
		The Project may affect the availability of wildlife for hunting and fish for fishing in the RSA	Employ mitigation measures detailed in the wildlife and habitat pathway analysis (FEIS Volume 6, Section 6.6.3) and the fish and fish habitat pathway analysis (FEIS Volume 7, Section 7.5.5)	Primary
		Project-related noise and visual effects may have an effect on hunting and fishing in the RSA	Employ mitigation measures for noise control (FEIS Volume 5, Section 5.5.3.4) Where possible, minimize the above-ground visibility of waste rock piles	Primary
Tourism, recreation, parks and protected areas	Construction and operations	The Project may enhance access to Iqalugaarjuup Nunanga Territorial Park, a major tourist attraction and recreation area in the RSA, and surrounding areas via the AWAR	No mitigation measures necessary	Primary
		Project-related noise and visual effects may have an effect on tourism in the RSA	Employ mitigation measures for noise control (FEIS Volume 5, Section 5.5.3.4) Where possible, minimize the above-ground visibility of waste rock piles	Primary

9.9.3 Effects Analysis

9.9.3.1 Mitigation Measures

Mitigation measures are not required for enhanced access to NTLU resources as this is considered to be a positive effect. Mitigation measures pertinent to the VSEC Hunting and Fishing are discussed further in the wildlife and habitat pathway analysis (FEIS Volume 6, Section 6.6.3) and the fish and fish habitat pathway analysis (FEIS Volume 7, Section 7.5.5). Refer to FEIS Volume 5, Section 5.5.3.4 for a discussion of mitigation measures related to effects on the acoustic environment. Mitigation measures related to effects to wilderness character are limited, as waste rock piles are unavoidable. Where possible, AEM will minimize the above-ground visibility of waste rock storage facilities. This, however, will have to be balanced against terrestrial impacts as local consultation has shown a preference to minimize the footprint of the mine.

9.9.3.2 Mine Site, All-weather Access Road, and Rankin Inlet

Effects to NTLU occur throughout the lifetime of the Project (i.e., during construction, operations, and in closure).

Effects to Hunting and Fishing

The Project may affect non-traditional hunting and fishing opportunities and outfitting and guiding businesses in the RSA in that the AWAR will provide enhanced access to wilderness areas. Enhanced access to resources and recreational areas for NTLU is considered to be a positive effect. Given the limited amount of non-traditional land uses, this effect is assessed to have a low effect, and may result in a change from baseline conditions.

Project activities may have an effect on the availability of wildlife for non-traditional harvesting and fish for non-traditional fishing. Project effects on the availability of wildlife[80] and fish were assessed in FEIS Volume 6, Sections 6.6 and FEIS Volume 7, 7.5 respectively and were determined to be not significant (FEIS Volume 6, Sections 6.6.10.2 and FEIS Volume 7, 7.5.8.2).

Project-related noise and changes to the visual environment may have an effect on hunting and fishing in the RSA. This effect is expected to be negligible in Rankin Inlet as hunting will not occur in the hamlet. The effect is considered to be low in Iqalugaarjuup Nunanga Territorial Park, as the hunting and fishing experience may be negatively affected by intermittent noise from the AWAR in the southeast portion of the park, and the visibility of waste rock piles from high points in the park. The effect of Project-related noise and waste rock piles are assessed to be moderate around Meliadine Lake in the event that NTLU hunting and fishing is staged out of nearby cabins, as locations along the lake are in close proximity to the Project. Thus, the effect of Project-related noise and visual effects on hunting and fishing in the RSA are considered to be negligible to moderate as they may result in a change from baseline conditions.

Effects to Tourism, Recreation, Parks, and Protected Areas

The Project may enhance access to Iqalugaarjuup Nunanga Territorial Park, a major tourist attraction and recreation area in the RSA, and surrounding areas via the AWAR (the Park is currently accessible by a gravel road from Rankin Inlet owned and operated by the Hamlet, however the maintenance and accessibility of access will be partially improved by the proposed Project through more frequent maintenance and snow clearing of the

[80] Given that the majority of outfitted hunting in the RSA is expected to be for caribou, this discussion of Project effects on wildlife draws heavily from the barren ground caribou assessment (DEIS Volume 6, Sections 6.6.4 and Section 6.6.10).

section of Hamlet Road between Rankin Inlet and the Char River, where the new AWAR then branches away from the Iqalugaarjuup Nunanga Territorial Park access road). Enhanced access to the Iqalugaarjuup Nunanga Territorial Park is considered a positive effect. Tourism in the Rankin Inlet area of the RSA is limited, and it is not expected that the Project will result in an increased number of tourists to the area. Thus, while the AWAR will increase opportunities to access the park, a substantial increase in NTLU park usage from baseline conditions is not anticipated. The effect of the Project on recreational and cultural activities in the Iqalugaarjuup Nunanga Territorial Park, and the overall usage of the Iqalugaarjuup Nunanga Territorial Park, are assessed to have a low residual effect, and may result in a change from baseline conditions.

Effects from mining activities (i.e., visual effects, noise pollution) may affect tourism in the Rankin Inlet area of the RSA as a result of changes to wilderness character. Waste rock piles will be visible from high ground areas in Rankin Inlet and Iqalugaarjuup Nunanga Territorial Park, and other vantage points beyond the LSA to a distance of 55 to 60 km. Project-related noise will be attenuated to below 40 dBA at 1.5 km from the Project. Five cabins located within 5 km of Project components will experience noise levels above 40dBA (FEIS Volume 5, Section 5.5.4.3). Of these 5 cabins, 2 already experience noise level above 40 dBA in the baseline scenario. These effects are expected to be negligible in Rankin Inlet as it is unlikely that Project-related noise will be immediately noticeable given the ambient noise in Rankin Inlet, and since the visual impact of Project waste-rock piles will not likely be noticeable in the setting of a built urban environment. The effects are considered to be low in Iqalugaarjuup Nunanga Territorial Park, as intermittent noise from the AWAR may be heard in the southeast portion of the Iqalugaarjuup Nunanga Territorial Park, and waste rock piles may be visible in the distance from points of high ground in the Iqalugaarjuup Nunanga Territorial Park. The effect of Project-related noise and waste rock piles is assessed as moderate around Meliadine Lake in the event that NTLU guiding is staged out of nearby cabins. Thus, the effect of Project-related noise and visual effects on tourism in the RSA are considered to be negligible to moderate, and may result in a change from baseline conditions.

There will be no shipping during the winter months, and no ice breaking. Thus, the Project is not expected to have an effect on ice travel routes. Project-related effects to traditional travel routes (including ice travel routes) are discussed in the TLU effects analysis (Section 9.3.3). Project-related effects to public safety are discussed in the Public and Worker Health and Safety effects analysis (Section 9.10.3).

Project-related effects (including those related to the AWAR) to Inuit harvesting activities, carving stone deposits and accessibility of country foods are discussed in the TLU effects analysis (Section 9.3.3).

9.9.4 Residual Impact Classification

Socio-economic effect pathways are considered to be of high likelihood, to occur at a continuous frequency and to be irreversible. Thus, these parameters are assumed, and have not been included in the discussion below. Certainty is not assigned to assessments of significance for socio-economic pathways due to the variability of Project interactions with the socio-economic environment.

Table 9.9-2: Residual Impact Classification for Non-Traditional Land Use

VSEC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Significance
Hunting and fishing	The Project may increase access to non-traditional hunting and fishing opportunities, outfitting and guiding businesses in the RSA via the AWAR	Positive	Negligible to Low	Regional	Medium-term	Not Significant
	The Project may affect the availability of wildlife for hunting and fish for fishing in the RSA	Negative	Low to Moderate	Regional	Medium to Long-term	Not Significant
	Project-related noise and changes to the visual environment may have an effect on hunting and fishing in the RSA	Negative	Negligible to Moderate	Regional	Long-term	Not Significant
Tourism, recreation, parks and protected areas	The Project may enhance access to Iqalugaarjuup Nunanga Territorial Park, the major tourist attraction and recreation area in the LSA, and surrounding areas via the AWAR	Positive	Negligible to Low	Regional	Medium-term	Not Significant
	Project-related noise and changes to the visual environment may have an effect on tourism in the RSA	Negative	Negligible to Moderate	Regional	Long-term	Not Significant

9.9.4.1 Impact on Hunting and Fishing

The effect of the Project on access to non-traditional hunting and fishing, outfitting and guiding in the RSA via the AWAR is considered to be positive as increased access to resources enhances opportunities for NTLU. The magnitude of this effect is considered to be negligible to low as NTLU hunting and fishing in the study are very limited, and thus few non-traditional land users would be affected. The effect extends beyond the LSA, and so is considered to be regional. The effect will persist throughout Project construction and operations, and will be removed post-closure with the removal of the AWAR, and so is considered long-term in duration. Thus, the Project's effect on access to non-traditional hunting and fishing opportunities is not considered to be significant.

The Project's effect on the availability of wildlife for hunting and fish for fishing in the RSA is considered negative. Further discussion of Project effects on wildlife are discussed in the wildlife and habitat (FEIS Volume 6, Section 6.6) and fish and fish habitat (FEIS Volume 7, Section 7.5) assessments. The magnitude of the effect is expected to be low to moderate given mitigation measures outlined in FEIS Volume 6, Section 6.6 and FEIS Volume 7, 7.5. The effect extends beyond the LSA, and so is considered to be regional. The effect will persist throughout Project construction and operations, and will be removed post-reclamation, and so is considered to be medium-term in duration for hunting and long-term for fishing[81]. NTLU hunting and fishing in the RSA is not prevalent. The Project's effects on the availability of wildlife for NTLU hunting and fishing are thus considered to be not significant.

The effect of Project-related noise and changes to the visual environment on hunting and fishing in the RSA is considered to be negative as increased noise and changes to the visual environment detract from the hunting and fishing experience. The magnitude of the effect is expected to be negligible to moderate depending on the location of NTLU hunting and fishing activities due to mitigation measures discussed above in Table 9.9-2 and in the noise assessment (FEIS Volume 5, Section 5.5). The effect extends beyond the LSA, and so is considered to be regional. The effect will persist throughout Project construction and operations, and will extend beyond the life of the Project due to the presence of waste rock piles, and so is expected to be long-term in duration. NTLU hunting and fishing in the RSA is not prevalent. The effect of Project-related noise and changes to the visual environment on NTLU hunting and fishing in the RSA is thus not considered to be significant.

9.9.4.2 Impact on Tourism, Recreation, Parks, and Protected Areas

The effect of the Project on access to the Iqalugaarjuup Nunanga Territorial Park, a tourist attraction and recreation area in the RSA, and surrounding areas via the AWAR is considered to be positive as increased access to resources enhances opportunities for NTLU. The magnitude of this effect is considered to be negligible to low as NTLU tourism in the study is limited, and thus few non-traditional land users would be affected. The effect extends beyond the LSA, and so is considered to be regional. The effect will persist throughout Project construction and operations, and will be removed post-closure with the removal of the AWAR, and so is considered long-term in duration. Thus, the Project's effect on access to tourism opportunities is not considered to be significant. The effect of Project-related noise and changes to the visual environment on tourism, recreation, parks and protected areas in the RSA is considered to be negative as increased noise and changes to the visual environment detract from the wilderness experience. The magnitude of the effect is expected to be negligible to moderate depending on the location of NTLU tourist activities due to mitigation

[81] The duration of the majority of impacts to Arctic char, lake trout, and Artic grayling is expected to be reversible in the long-term.

measures discussed above in Table 9.9-2 and in the noise assessment (FEIS Volume 5, Section 5.5). The effect extends beyond the LSA, and so is considered to be regional. The effect will persist throughout Project construction and operations, and will extend beyond the life of the Project due to the presence of waste rock piles, and so is expected to be long-term in duration. The effect of Project-related noise and changes to the visual environment on NTLU tourism in the RSA is thus considered to be not significant.

9.9.5 Cumulative Effects

There are no other developments in the vicinity of the Project. Cumulative effects NTLU are not expected in the LSA, with the exception of potential cumulative effects to the acoustic environment. The proposed Manitoba to Nunavut road will extend from Churchill, Manitoba to Rankin Inlet, Nunavut. In the RSA, the Project may act cumulatively with the Manitoba to Nunavut road itself, the Ferguson Lake Project and the Churchill Diamond Project in that all developments will potentially use the Manitoba to Nunavut road to transport goods and personnel. It is unlikely, yet possible, that these other developments will use Rankin Inlet as port. Thus, Project traffic would act cumulatively with traffic from other developments to increase noise levels in the LSA where the Manitoba to Nunavut road enters Rankin Inlet. Given the unlikelihood of this scenario, this effect is not considered to be significant.

9.9.6 Monitoring and Follow-Up

No further monitoring or follow-up is recommended for NTLU VCs.

9.10 Public and Worker Health and Safety

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on public and worker health and safety.

Volume 1, Appendix 1.0-A lists the specific requirements set out in the Guidelines relating to the baseline and to the impact assessment for public and worker health and safety.

9.10.1 Baseline Environment

9.10.1.1 Applicable Health and Safety Regulations

The *Mine Health and Safety Act* (R-1225-95) in Nunavut has been adapted from Health and Safety regulations governing the Northwest Territories. The consolidation of mine health and safety regulations for Nunavut came into effect in 2011 (GN 2011b). Additionally, companies operating in the territory must abide by the Canada Occupational Health and Safety Regulations (SOR/86-304), a sub-section of the greater Canada Labour Code (R.S.C., 1985, c. L-2) (Department of Justice 1986). Together, these Acts are the foundation of health and safety (H&S) controls and reporting requirements for the Project.

AEM has experience operating with these regulatory frameworks in Canada, and in particular at the Meadowbank operation in Nunavut. A major H&S incident at the Meadowbank mine was a fire in the kitchen in 2011. The combined lost-time accident frequency rate at Meadowbank operations for all employees and contractors in 2011 was 5.16 accidents per 200 000 person hours (AEM 2012b). This is higher than the lost-time

accident frequency for the metal mining industry in Quebec, which was 4.2 in 2011. AEM's combined score across all their operations was 3.21 lost-time accidents.

AEM has also developed internal H&S management systems to comply with territorial and national regulations, as well as to meet corporate goals and voluntary H&S frameworks. AEM has implemented a number of tools to reach their target of achieving a level A within the Mining Association of Canada's "Safety and Health Towards Sustainable Mining Protocol". AEM's H&S systems are designed to be compliant with International Standards Organisation 14001 environmental management system and the Occupational Health and Safety Advisory Services 18001 Health and Safety Management system. Additionally, AEM has implemented a workplace training program developed by the Quebec Mining Association, the "safety card system", to build the capacity of their employees to assess health and safety risks.

9.10.1.2 Crisis Management and Emergency Preparedness

AEM has a crisis management and emergency response plan at all 5 of their projects. Personnel are trained to respond to safety, fire, or environmental emergencies. AEM's emergency response plan was called into action at Meadowbank during the kitchen fire in 2011. For a detailed discussion of AEM's crisis management and emergency response plan, please refer to SD 2-15 Risk Management and Emergency Response Plan.

9.10.1.3 Baseline Health Indicators

The Inuit Tapiriit Kanatami (ITK 2010) prepared a report on Inuit health, comparing available data for the 4 regions of Inuit Nunangat and for Canada over the periods 1994 to 1998 and 1999 to 2003. Over the 1999 to 2003 period, total mortality, infant mortality, cancer mortality, and suicides in Nunavut were 2, 3, 4, and 8 times higher respectively than in Canada, and life expectancy was more than 12 years less. Further, ITK's comparison with data from each of the 2 periods indicated that total mortality, cancer mortality and suicide rates had gone up in Nunavut and down in Canada, and that life expectancy had gone down in Nunavut and up in Canada. Some positive outcomes from this study includes that rates of infant mortality had improved in Nunavut – albeit still much higher than in the rest of Canada. Nunavut rates of mortality, heart disease and suicide declined over the period 2000 to 2007. However, once again these rates were higher than Canadian averages, but gaps were closing rather than widening.

Cardiovascular related death rates in Nunavut are similar to those in the rest of Canada. Although no diabetes deaths were reported, diabetes in Nunavut's population is thought to be a high risk in face of changing diets and activity levels, as evidenced by diabetes education and prevention programs. Sexually transmitted infection rates have rapidly increased and are very high – the most common are chlamydia and gonorrhea. The first HIV diagnosis in Nunavut occurred in 2002, and although the disease has been rarely diagnosed since then, high STI rates elevate concerns about HIV becoming more prevalent.

Kivalliq is reported to experience severe health challenges, and in general, health indicators are acknowledged to be well below those typical of southern Canada. There are concerns in Kivalliq about such challenges as chronic (including mental) illness and infectious disease; smoking, alcohol and drug abuse; cultural integrity; family function; violent and non-violent crime; and housing. Additionally, there is concern that, despite some improvements in some health indicators in both Nunavut and Kivalliq, the gap with the rest of Canada may be widening in some respects.

9.10.1.4 Community Health Services

Along with workplace management systems for H&S, AEM also strives to build the capacity of their employees to maintain good health and safety behaviour outside of the workplace. AEM has implemented a safety induction and training program at their operations, which is delivered in the respective languages of each project. At Meadowbank, safety training is delivered in English with key policies and procedures available in writing in both English and Inuktitut.

In terms of health services available in communities, all Kivalliq hamlets have health centres, managed and staffed by nurses who have telephone support. Rankin Inlet is the exception, with its new Kivalliq Health Centre and full time doctors. For many medical emergencies and complicated health issues, patients still must be transferred south, usually to Churchill or Winnipeg. With the exception of mental health services, Kivalliq's infrastructure and health services are comparable to those available in small communities elsewhere in Canada.

9.10.1.5 Human Health Risk Assessment

Risk to human health and environment can happen through potential effects that can lead to changes to the environment surrounding the Project. To monitor and understand such potential effects, it is important to establish the current environmental conditions (baseline), as well as the current human health conditions in areas where effects can happen. For this purpose, data was collected and analysed for the following environmental condition; atmospheric environment (air and noise), terrestrial environment (soil, terrain and vegetation), freshwater (surface water, sediment quality, fish and habitat), wildlife (mammals, birds and fish), and the socio-economic habitat (traditional land use and population demographics). The findings are described in the following sections:

- Atmospheric environment (FEIS Volume 5 including air quality [Section 5.2] and noise [Section 5.5]);
- Terrestrial environment (FEIS Volume 6 including soil and terrain [Section 6.4] and vegetation [Section 6.5]);
- Freshwater environment (FEIS Volume 7 including surface water and sediment quality [Section 7.4] and fish and fish habitat [Section 7.5]); and
- Socio-economic environment (FEIS Volume 9 including population demographics [Section 9.2] and traditional knowledge and TLU [Section 9.3]).

The information presented in the sections listed above were reviewed in order to understand existing environmental conditions, human activities in the area and existing wildlife and aquatic communities.

9.10.2 Pathway Analysis

Table 9.10-1: Potential Pathways for Effects to Health and Safety

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Good Health and Safety Performance for the Project	All activities in all phases of the Project Transportation of employees, contractors, good and services for Project activities	Health and Safety training may result in increased health and safety capacity for Project Activities	No mitigation required	Primary
		Health and Safety training and culture may result in increased health and safety capacity with employee families and community members in the LSA	No mitigation required	Secondary
General Public, Workers	All activities in all phases of the Project	Project activities, including the release of emissions, may result in changes to the environment and people's perception of the environmental quality, which can in turn affect human health.	Strategies that manage the release of emissions into the environment (Section 10.2.6.3). Worker and public education on potential human health effects from the Project.	Primary

9.10.3 Effects Analysis

9.10.3.1 Project Design Features and Mitigation Measures

Worker and public health and safety risks will be managed first through the application of best health and safety practice. In addition, emergency response planning will ensure that in the event of a Project emergency, potential damages can be contained. Risks related to the Project access road (with controlled public use) and to road traffic represent the most tangible risks to the Project workforce, and to the people of Rankin Inlet and the other LSA communities. Environmental effects, for example on caribou and water, can have implications for public health and safety. Measures put in place to minimize risks to health and safety are detailed throughout this FEIS, and includes:

- comprehensive worker health and safety plans, training and enforcement (including human rights training for security staff) as detailed in SD 9-6 Occupational Health and Safety Plan;
- comprehensive risk management and emergency response planning and training, including the provision of necessary emergency response facilities and/or equipment, and training in Rankin Inlet as detailed in SD 2-15 Risk Management and Emergency Response Plan;
- regular inspection and maintenance in good condition of i) vehicles; and ii) transportation infrastructure, including access roads, road crossings, facilitating people's activity on the land, water crossings, signage, refuge stations, air strip and docking facilities as detailed in SD 2-9 Roads Management Plan;
- taking into account health and safety issues in conditions placed on public use of the Project access roads, for example the setting of limits on speeds and on the use of firearms along the road and an appropriate buffer;
- driver training and enforcement of a driver code of conduct to control speeds and encourage considerate driving;

- ongoing communication between Project site and Rankin Inlet of road traffic use, as well as consultations with Rankin Inlet with regard to scheduling of heavy vehicle traffic to minimize risks and any potential disturbance effects;
- securing all Project facilities with potential to pose public health and safety risks, including prevention of public access where necessary;
- avoiding and minimizing any environmental effects that have the potential to affect public health, including those that may negatively affect livelihood resources;
- providing emergency assistance where the health or safety of people travelling on the land near Project facilities (mine site and access road) is at risk;
- establishing a site tours program[82] to provide opportunities for LSA residents to better understand mining and measures put in place to protect environmental resources and worker and public health and safety;
- delivering public information and education programs on Project environmental effects and risks to contribute to people's i) understanding of mining activities; and ii) emergency preparedness; and
- delivering public information and education programs, targeted to the appropriate audiences, to enable enhanced community participation in both environmental and socio-economic monitoring.

As outlined in the baseline environment, AEM has robust health and safety systems in place that conform to territorial and national requirements. Additionally, the company has a set of internal management systems that comply with International Standards Organisation 14001, Occupational Health and Safety Advisory Services 18001 and standards developed by the Mining Association of Canada's Towards Sustainable Mining Initiative.

Additionally, AEM has previous experience about the health and safety context and culture in Kivalliq through its Meadowbank operations. It is expected that a portion of the Meadowbank workforce will transfer to the Project operations as the ramp-up phase of the Project corresponds to the closure phase of Meadowbank[83]. These employees who transfer between operations will already have a significant amount of training on occupational health and safety, including: assessment of H&S risks, H&S standards for construction and operations activities, how to report incidents and more generally H&S culture expected by AEM. Ongoing training will also be done for all Meliadine employees to ensure that they are trained sufficiently in terms of workplace health and safety.

While Meadowbank operations needed a significant transition period for H&S protocols to become fully functional under Nunavut Standards, it is expected that the Project will require less time to come up to an acceptable H&S standard because there is existing experience and capacity on the part of AEM management and employees about how to implement H&S in accordance with Nunavut requirements. For example, Meadowbank has established a Joint Health and Safety Committee that includes Inuit and Southern workforce from the management, supervisory and general employee levels. AEM will transfer management systems established through the Meadowbank Joint Health and Safety Committee to their counterpart committee at the Project. In this way, H&S capacity gained at Meadowbank will be implemented at the Project.

[82] As AEM moves into operations, visits to the Project will be initiated.

[83] More information about the number of employees projected to transfer from Meadowbank to Meliadine operations can be found in the Population and Demographics Section 9.2.

Additionally, AEM has in-house health services capabilities to address non-life threatening incidents at its operations. When state services are required, AEM privately pays for public health care related to Project work. Although these health care services do not place a financial burden on the public health care system, Project use of public health care services can potentially reduce the quality and capacity of state services to the general public. This is because there are a limited number of health care professionals, labs and equipment in Kivalliq and Nunavut. AEM will have to consider the additional pressure that will be put on the public health system in Kivalliq if they are to use government services for qualifying employees as 'fit for work' at the Project. This should be done in conjunction with local and territorial government health care policy makers. AEM has also brought outside medical professionals into Meadowbank to conduct pre-employment medicals for Nunavut resident employees. These services were privately funded by AEM and thus avoided imposing additional burden on the Nunavut public health care system.

AEM will also be expected to make sure that H&S protocols are followed when workers are travelling to the site for their rotation. This implies that H&S will be implemented off the Project site, while employees are in their communities, travelling to work. In this way, it is expected that H&S training will also have knock-on benefits in communities as they learn about H&S from Project employees. Additionally, H&S training is also done in Inuktitut (as well as English). It is imperative, however, that employees with different mother tongues are able to adequately communicate with each other to ensure effective implementation of H&S throughout all project related activities. Multi-lingual H&S training is a tool for ensuring that employees fully understand H&S systems. Training employees in Inuktituk will also make it easier to translate these skills to family and community members who are not part of the Projects workforce. It is hoped that the H&S culture at the Project will be a driver to improve performance amongst Inuit employees and their communities. It is also expected that southern employees will also be able to transfer H&S skills to their families and their communities who live outside of Nunavut.

9.10.3.2 Effects to Human Health

The HHRA (FEIS Volume 10, Section 10.2) considered the potential changes in chemical concentrations in air, soil, water, sediment, fish, country foods (plants and animals consumed by humans), and noise for a *bounding case*. The bounding case is defined as the phase of the Project that either was considered to result in the highest potential change in environmental quality by the subcomponent (e.g., air quality, noise) or that resulted in the highest predictions out of all of the phases that were modeled (e.g., water quality). The bounding case included the construction, operation, closure, and post-closure phases.

After considering mitigation measures, the following residual impacts were identified in the HHRA (refer to FEIS Volume 10, Section 10.2.7):

- Acute Air Quality Assessment: Potential acute health risks for workers due to DPM, NO_2, cadmium, acrolein, and aldehyde and recreational users due to DPM and aldehyde;
- Chronic Air Quality Assessment: Potential chronic health risks for workers due to acrolein;
- Particulate Matter Assessment: Potential chronic health effects for workers and recreational users due to DPM; and
- Noise Assessment: Noise impacts for recreational users at one Rankin Inlet hunter/trapper cabin.

Table 9.10-2 shows that all of these residual impacts were considered negative, ranging from low to moderate in magnitude. Only noise effects on recreational users were deemed to likely happen, all other impacts are unlikely. Noise effects on recreational users is also the only effect to be considered continuous, all other will be either isolated or periodic. All impacts will be long-term and all but one are reversible. As a result, the HHRA deemed all residual impacts on human health to be not-significant.

Table 9.10-2: Residual Impacts Matrix for Human Health (results of HHRA)

Residual Impact	COPC	Direction	Magnitude	Frequency	Duration	Reversibility	Geographic Extent	Likelihood	Significance
Acute health effects for workers	DPM	Negative	Moderate	Periodic	Long-term	Reversible	Local	Unlikely	Not Significant
	NO_2	Negative	Low	Isolated	Long-term	Reversible	On-Site	Unlikely	Not Significant
	Cadmium	Negative	Low	Isolated	Long-term	Reversible	On-Site	Unlikely	Not Significant
	Acrolein	Negative	Low	Isolated	Long-term	Reversible	On-Site	Unlikely	Not Significant
	Aldehyde	Negative	Moderate	Isolated	Long-term	Reversible	Local	Unlikely	Not Significant
Acute health effects for recreational users	DPM	Negative	Low	Isolated	Long-term	Reversible	Local	Unlikely	Not Significant
	Aldehyde	Negative	Low	Isolated	Long-term	Reversible	Local	Unlikely	Not Significant
Chronic health effects for workers	Acrolein	Negative	Low	Periodic	Long-Term	Reversible	On-Site	Unlikely	Not Significant
	DPM	Negative	Low	Periodic	Long-Term	Irreversible	On-Site	Unlikely	Not Significant
Health effects due to noise for recreational users	Noise	Negative	Low	Continuous	Long-Term	Reversible	Local	Possible	Not Significant

COPC = contaminant of potential concern

9.10.4 Residual Impact Classification

The assessment of Public and Worker Health and Safety does not require a residual impact classification. No significant negative effects are expected on public health and safety, although risk cannot be completely eliminated. Rather, worker health and safety training can result in improved public health and safety; a benefit. Two out of 3 pathways that are identified are of positive significance. The training of workers in health and safety skills are part of AEM's Project Design Features. The secondary effect of increased public H&S capacity within families and communities is a further effect of worker training.

The pathway which describes potential environmental effects on human health is deemed non-significant.

9.10.5 Cumulative Effects

As more mining projects come to Kivalliq, it is expected that there will be an accumulation of H&S capacity in the region. Health and safety training ranges from, among other things, operating heavy equipment, working with chemicals, road safety, food safety and hygiene. The reinforcement of these H&S principles from Projects such as Meliadine, Meadowbank and Kiggavik, for instance, will be a driver for an H&S culture to take hold amongst Inuit and non-Inuit populations in Kivalliq. It is expected that Project employees, their families and communities at large will benefit from accrued H&S training from these Projects.

The past, present, and potential future industrial developments are described in the Assessment Methodology section of the FEIS (Volume 4, Section 4.5.2). Combined, these developments could potentially have a cumulative effect on human health should they result in significant changes to environmental quality (e.g. air quality, noise, water quality). Refer to FEIS Volume 5, Sections 5.2.6 and 5.5.5.6, and FEIS Volume 7, Section 7.4.8 for further analysis. As indicated in these sections, cumulative effects to air quality, noise, and surface water and sediment quality are expected to be negligible. Therefore, the subsequent effects to human health are also expected to be negligible.

9.10.6 Monitoring and Follow-Up

A monitoring program will be put in place to ensure that there is compliance with the Project's public and worker health and safety commitments, as outline in SD 9-6 Occupational Health and Safety Plan. The plan will cover aspects, such as employee uptake and attendance at H&S related training, recordable incidents and compliance with Canadian and Nunavut occupational H&S regulations. Specific targets and indicators will be outlined in the AEM's Occupational Health and Safety Plan for the Project (SD 9-6).

9.11 Cultural, Archaeological and Paleontological Resources

The cultural, archaeological and paleontological heritage resources of Nunavut are unique and non-renewable resources that provide information about Nunavut's human and natural past. These resources are public property and held in trust for all Nunavummiut by the GN. An archaeological site is any location where an artifact is found. An artifact is defined as any tangible evidence of human activity that is more than 50 years old and in respect of which an unbroken chain of possession or regular pattern of use cannot be demonstrated (GN 2003). A fossil includes natural cast, preserved tracks, coprolites, and plant remains; and the preserved shells and exoskeleton of invertebrates and the eggs, teeth, and bones of vertebrates (GN 2003).

The purpose of this section is to describe the baseline conditions for heritage resources and assess the effects of the Project on these resources. This assessment includes potential changes resulting from Project-related components and associated activities. The effects assessment will only evaluate construction, operation, and closure Project phases, since temporary closure and post-closure are unlikely to impact heritage resources. Indirect and cumulative effects have been incorporated throughout this section, where applicable.

9.11.1 Concordance with Guidelines

The purpose of this section is to address the Guidelines issued by the NIRB for the Project (NIRB 2012), and specifically those relating to the impact of the Project on cultural, archaeological, and paleontological resources. Specific requirements set out in the Guidelines relating to the baseline and the impact assessment for cultural, archaeological, and paleontological resources are provided in FEIS Volume 1, Appendix 1.0-A.

9.11.1.1 Requirements and Procedures for Recovery and Removal of Artifacts and/or Fossils

The main legal documents relating to archaeological and palaeontological work in Nunavut include Section 33 of the *Nunavut Land Claims Agreement,* and the *Nunavut Archaeological and Paleontological Site Regulations* developed pursuant to Section 51(1) of the *Nunavut Act* (Government of Canada 1993a, b; GN 2003). An associated policy document is the *Guidelines for Applicants and Holders of Nunavut Territory and Palaeontology Permits*. It is a summary offence to search for or disturb an archaeological or paleontological site without a Nunavut Archaeologist or Palaeontologist Permit. Permit applications are submitted to the Government of Nunavut on or before 31 March, of the year the field work is proposed. Archaeological Permit applications are translated and submitted to the Inuit Heritage Trust Incorporated (IHTI/Trust). Permit applications must outline field and laboratory methodologies for the removal of fossils and artifacts. The IHTI submits the documents to the relevant Hamlet Councils. The IHTI Board meets in late May or early June to discuss all permit applications and determine if they object to any permit applications. Section 33.5.6 of the *Nunavut Land Claims Agreement* outlines the circumstances where the IHTI can reject applications when objections are reasonably founded on:

(a) inadequate efforts to secure Inuit participation and benefits or inadequate performance of commitments to provide such participation and benefits under permits issued at an earlier date, or

(b) disturbance of a site of Inuit religious or spiritual significance, as such significance is defined by the Trust in consultation with the Designated Agency, the Designated Agency shall reject the application for the permit.

The IHTI is also able to make reasonable requests for conditions to be attached to a permit. Once the Board and Government of Nunavut, Department of Culture and Heritage (GN-CH) have reviewed the permit applications, a permit may be issued. Permits specifically identify the final repository of artifacts and fossils. If a project occurs on Inuit Owned Land, the IHTI may identify the repository. Until 2012 the default repository was the Prince of Wales Northern Heritage Centre, in Yellowknife for archaeological materials, and the Canadian Museum of Nature for fossils. As of 2012 the Canadian Museum of Nature is the repository for both fossils and artifacts. These items are not housed in Nunavut because an adequate facility does not exist.

Excavated fossils and artifacts are on loan to the Permit holder until 31 March of the year after which the permit was issued. At this time the permit holder must submit the fossils and artifacts or request a loan agreement. Loans are issued for a year at a time, and after 3 years a collections is referred to as alienated. All alienated artifact loan agreements are managed by GN-CH and the IHTI.

9.11.2 Baseline Environment

The Project area is situated in the eastern Barrenlands within a continuous zone of permafrost. The vegetation is classified as sub-arctic vegetation within the Maguse River Upland Ecoregion. The coastline predominately has low relief with occasional bedrock outcrops and cliffs, which would influence prehistoric settlement pattern. The inland topography is flat and low lying and contains a large area of "ribbed (rogen) moraine" that is characterized by radiating esker-outwash systems and linear drumlin fields (Aylsworth and Shilts 1989). Most of the area was covered by marine sediments as the result of the postglacial Tyrrell Sea, but there are some outcrops of Precambrian bedrock. After deglaciation at approximately 9000 BP, the area was inundated by glacial melt waters. The Tyrell Sea occupied lands bordering the current extent of the Hudson Bay until approximately 5000 BP (Canadian Museum of Civilization 2005) and it is after this time that occupation of the Project areas was possible.

As a result of deglaciation, the major landforms in the LSA are dominated by a large esker that runs northwest/southeast and numerous drumlins or drumlinoid ridges. Low-lying areas between the drumlins and eskers are characterized by sedge wetlands, shallow ponds, and various shallow and deep water lakes.

9.11.2.1 Palaeontology Resources

Palaeontology studies in Nunavut can be divided into 3 subcategories of inquiry: academic studies of vertebrates and invertebrates; resource exploration studies of invertebrates; and Quaternary studies focused on invertebrates (molluscs).

It is unlikely that fossils of significance to academic research will be located in the LSA because the bedrock geology of the LSA is part of the Canadian Shield Churchill Province. The rocks are Precambrian (ca.1.8 billion years old) and consist of granites, gneiss, metamorphosed volcanic rock, and migmatite (Government of Northwest Territories 1991). Precambrian organisms did not have hard body parts and while some soft jelly fish fossils have been uncovered in Australia, finding Precambrian fossils is rare (Bamber et al. 1970). The subsurface geology owing to age and genesis are unlikely to contain scientifically significant vertebrate or invertebrate fossils. Based on genesis of the bedrock geology it is also unlikely that invertebrate fossils indicative of oil, gas, or coal resources would be present.

The surficial geology includes glacial till and marine deposits associated with the last glaciations and deglaciation processes. There are Quaternary mollusc, *Hiatella arctica* within the study area (Plate 9.11-1), which were fortuitously observed in frost boils and sorted circles while conducting an Archaeological Impact Assessments (AIA) in 2011 and 2012 (Appendix 9.11-A). These fossils were not assessed as scientifically significant because they were not present in a topographic location typically targeted for sampling. For studies of glaciations and sea level fluctuation, Quaternary geologists typically target dateable emerging features, such as raised rock platforms, deltas, spits, shingle ridges, caves, lower limits of perched boulders, lower limit of

undisturbed ground moraines, and beach sands and gravel (Dredge 1991; Gray 1983; Williams et al. 1998). Beach ridges and deltas are the mostly widely used of these features in the Arctic because they are generally well developed and have not been overly disturbed by human activity; nor are they covered in vegetation (Andrews 1978).

The potential for palaeontological fossils with significance to academic research, resource exploration, or quaternary studies to be present in the LSA is low. Therefore palaeontology is not considered to be a VEC or a VSEC and has not been further assessed.

Plate 9.11-1: Fragmented Hiatella arctica, in frost boil

9.11.2.2 Archaeology Resources

A brief outline of the regional culture history can be summarized as a result of the archaeological work conducted in the study region since the mid-20th Century. It should be observed that throughout the millennia, peoples who lived in the Barrenlands relied almost exclusively on caribou for subsistence. The annual migration patterns of these animals would dictate the seasonal rounds of the highly mobile hunting and gathering populations that inhabited the region.

While not likely present in the Project area, the earliest recognized archaeological tradition in the Barrenlands is Northern Plano (8,000 to 6,500 BP), which is characterized by projectile points similar in form to Agate Basin points found in the plains of North America (Gordon 1996:219). In the Barrenlands, these long lancelate points with tapered and ground bases were manufactured largely out of quartzite. Radiocarbon dates from the Migod

site (KkLn-4) on Grant Lake suggest that Northern Plano dates from at least 8000 years BP (Gordon 1975). The concentration of Northern Plano materials on Grant Lake further suggest the Dubawnt and Thelon Rivers were major caribou migration corridors that were exploited by Northern Plano peoples (Gordon 1996).

Approximately 6500 years ago, Northern Plano evolved into Shield Archaic (6,500 to 3,500 BP) (Gordon 1996). This cultural development coincided with a warming period that resulted in the expansion of the boreal forest as far north as Dubawnt Lake. Projectile points were also manufactured primarily out of quartzite, but differed from the preceding Northern Plano Tradition in that they were “side-notched lance heads with ground, rocker [convex] bases” (Gordon 1996 p. 201).

The Shield Archaic Tradition was followed by the Pre-Dorset Tradition which lasted from approximately 3,450 to 2,650 BP (Gordon 1996). Pre-Dorset is part of the Arctic Small Tool Tradition (ASTt), well known in the high Arctic. The migration of these early Pre-Inuit groups corresponded with a cooling trend that adversely affected maritime hunting. As a result, these Arctic-adapted people were forced further south in their quest for food. They were able to exploit migrating caribou herds on the Barrenlands as a result of the southward retreating forest edge. The Pre-Dorset Tradition is characterized archaeologically by very small, finely retouched tools manufactured from fine grained, banded chert. Distinct tools include end and side blades used for harpoons and arrows, burins, and microcores.

Dorset, also part of the ASTt, follows Pre-Dorset in the Rankin Area and along the Hudson Bay coast. Dorset is not known from other areas of the Barrenlands. The Dorset period in the Canadian Arctic lasted approximately from 2,500 to 1,000 BP; however, more recent research is suggesting a later occupation in some regions.

The Taltheilei Tradition is the latest precontact archaeological culture identified in the Barrenlands, and dates from approximately 2,600 to 1,200 BP (Gordon 1996). People representing this Tradition moved into the region from the west after the preceding cooling period ended, and are generally regarded as ancestral Dene. The material culture of the Taltheilei Tradition is characterized by a continuum of lancelate and notched points, distinct discoidal hide-working tools known as chithos, and a variety of scraping tools. This archaeological culture has been divided into 3 Periods based on projectile point style: the Early Period (2,600 to 1,800 BP) characterized by long stemmed points; the Middle Period (1,800 to 1,300 BP) by unshouldered lancelate points; and the Late Period (1,300 to 200 BP) by small side and corner-notched points (Arima 1984; Gordon 1996). It is not clear if Taltheilei Tradition was present along the Rankin Inlet coast as no archaeological sites in the RSA have been definitively assigned to this cultural affiliation. Owing to the evident Dorset presence in the region, it is possible that Taltheilei Tradition may have only been present in the Late Period. Ethnographically the Taltheilei Tradition is recognized as the Dene.

It is likely only after Dene groups were decimated by European diseases and abandoned the Barrenlands in favour of the forests to the south to engage in the fur trade (Arima 1984; Gordon 1996) that the interior of the Barrenlands were inhabited by Caribou and Copper Inuit. The precontact origins of the both the Copper and Caribou Inuit ultimately lie in the Thule Tradition, which spread across the central and eastern arctic approximately 750 BP (McGhee 2009). Thule are traditionally known for their bone and antler technologies, as well as a ground stone slate technology. They are not known for chipped or flaked stone working; however, Linnamae and Clark (1975) cite McCartney’s 1970s work with the Silumiut Thule which associated the Thule with sizable quantities of flaked stone technology. The chip stone technology found around Rankin Inlet cannot easily be equated to McCartney’s finds since they relate to a possible remnant, and/or, intermingling of Dorset and Thule people.

9.11.2.3 Historic Inhabitants

In the mid-19th century as a result of Dene abandonment of the Barrenlands along with the presence of whalers, there was more Inuit-European contact (Arima 1984; Government of Northwest Territories 1991). Historic Caribou Inuit moved into the interior of the Barrenlands region approximately 200 years ago, either from the central Arctic or the east coast of Hudson Bay (Burch 1979; Gordon 1996; Linnamae and Clark 1976). There are Thule sites from the Project area which date between the 14th and 17th centuries (Linnamae and Clark 1976). The descendants of the Thule people have occupied much of the interior of Nunavut ever since, including the Kazan, Dubawnt, and lower Thelon drainage basins. The margins of these major rivers and lakes are dominated by Inuit sites, which are characterized by stone features including Inuksuit, tent rings, caches, hunting blinds, and kayak stands (Friesen 1989).

Europeans' accounts of the Rankin Inlet region began in the 17th Century in association with expeditions relating to the Northwest Passage and trading. Early European exploration of the area of the Barrenlands now known as Nunavut began with the establishment of fur trade posts on the western shore of Hudson Bay in 1670. However, trading attempts were sporadic owing to cross cultural conflict (Aboriginal-Inuit and European-Inuit) and ice conditions (Government of Northwest Territories 1991). From 1720, sloops sailed irregularly to Marble Island to encourage trade with Inuit (Arima 1984).

The most notable travels were those of Samuel Hearne who travelled from Fort Prince of Wales to the mouth of the Coppermine River between 1769 and 1772 (Tyrell 1911). The first scientific exploration of the Barrenlands would not occur until the expedition of James Tyrell of the Geological Survey of Canada (Tyrell 1898). In 1893 Tyrell travelled north from Lake Athabasca, eventually ascending the Dubawnt River to the Thelon River, then eastward through Aberdeen and Baker lakes to Chesterfield Inlet. In 1900 Tyrell embarked on another expedition, this time travelling eastward from Great Slave Lake along a series of rivers and lakes to the Thelon River, then on to Chesterfield Inlet. David Hanbury (1900; 1903) also explored and mapped the rivers of the Barrenlands at the turn of the century in 2 separate expeditions. He travelled westward through the region by canoe in 1898-99 from Chesterfield Inlet, along the Thelon River to Great Slave Lake. In the second expedition of 1901, he travelled eastward along a similar route, this time embarking from Great Slave Lake. In 1922 Knud Rasmussen entered the region as part of the Fifth Thule Expedition (Rasmussen 1926). Members of his party travelled inland from Chesterfield Inlet to Baker Lake, then south along the Kazan River to Yathkyed Lake to conduct geographic and ethnographic research.

During the middle of the 19th Century there were regular whaling activities off Marble Island (Arima 1984). However, as whaling came to an end in the early 20th Century, Inuit began to participate in the fur trade (Government of Northwest Territories 1991). In the 1950's the Canadian Government began a policy of settling the local Inuit into communities such as Baker Lake, Chesterfield Inlet, and Rankin Inlet (Stager 1977). The area is reportedly to have had few Inuit inhabitants prior to the establishment of Rankin Inlet in 1955. Its establishment owes its origins to the North Rankin Nickel Mine (Government of Northwest Territories 1991). Although year-round occupation of the Barrenland no longer occurs, seasonal caribou hunting and fishing are still important activities for local residents.

9.11.2.4 Heritage Studies

One of the earliest archaeological assessments of the Nunavut Barrenlands began with artifact collections by the Moffat Canoe expedition of 1955 (Harp 1959). Members of the expedition travelled from Black Lake, Saskatchewan, along the Chipman and Dubawnt rivers to Baker Lake. A total of 9 archaeological sites were recorded south of Aberdeen Lake along this route. This expedition was followed by an archaeological survey conducted by Elmer Harp in 1958 along Beverly, Aberdeen, and Schultz lakes, as well as the lower Thelon River (Harp 1961). A total of 42 new sites were recorded as a result of this survey. Harp proposed the first culture history of the region based on the data obtained from these sites. Subsequent research by Irving (1968) on the Upper Kazan River and in the North Henik and Dubawnt Lake areas would result in a revision of Harp's proposed cultural chronology.

Archaeological investigations continued in the region in the 1970s with more controlled excavations conducted at a number of sites first recorded by Harp. Wright (1972a, b; 1976) excavated at the Aberdeen (LdLl-2) and Grant Lake (KkLn-2) sites, while Gordon (1976) conducted excavations at the Migod (KkLn-4) site located north of Dubawnt Lake. These multi-component sites were significant in further refining the continuum of precontact occupation in the region. Additional surveys were also conducted by Gordon (1974) in the vicinity of the Baker Lake settlement; 5 of Elmer Harp's sites were revisited and 4 new sites were recorded.

Archaeological assessments in the area around Rankin Inlet were conducted in the 1970s by Urve Linnamae and Brenda Clark (1976), who recorded 191 sites. Margaret Bertulli (1998) conducted an archaeological assessment of borrow sources and wrote an overview relating to KfJm-45, Ijarilik, and recorded 1 new site. Douglas Stenton (Government of Northwest Territories 1991) conducted an archaeological assessment of the proposed Park area and recorded 14 previously unrecorded sites. Areas specifically relating to gold exploration were assessed by Elisa Hart (1998) at the Meliadine West Gold Project in 1998 for WMC International Limited under Permit 98-876.

The heritage resource surveys by Linnamae and Clark were conducted between the Meliadine River and Meliadine Lake. Hart (1998) expanded the assessments in that area by surveying west and north of the Meliadine Camp on the west side of Meliadine Lake, and the east and west quarry areas and the winter roads of the Meliadine West Gold Project. Twelve heritage resources sites were located, and the sites recorded by Hart were subject to examination by Elders from Rankin Inlet.

During these earlier studies a combination of oral history and archaeology was used to interpret recent Inuit land use of the Rankin Inlet area. The local participation of the Elders Steering Committee and the provision of a member on the field team helped to identify dwellings, inuksuit, caches, hearths, kayak related structures, and other features.

A heritage resource investigation conducted in the study area was undertaken in 2008 and included the assessment of the AWAR alignment and adjacent borrow source areas (Blower 2008). Blower recorded 18 previously unidentified sites and revisited 12 known heritage resource site locations. Murphy (2011) conducted a heritage resource investigation in 2010. The investigation included the mitigation of sites along the AWAR that would be impacted, the assessment of the laydown area, and an assessment of a proposed borrow source on which 7 new archaeological sites were recorded. The heritage resource investigations were continued in 2011 (Appendix 9.11-A) and 2012 by Ross (2012, in preparation). The 2011 investigation included additional mitigation of sites along the road and site near the proposed Discovery camp, and assessment of the mine

infrastructure. The 2011 assessment resulted in 11 new sites being recorded. The 2012 investigation included monitoring of sites along the AWAR, assessment of proposed drill target areas and proposed Discovery and Rankin Inlet Haul Roads, mitigation of sites within 30 m of drill locations proposed for 2012, and commencement of the mitigation of sites associated with the proposed mine infrastructure. The 2012 assessment resulted in 14 new sites being recorded. As was the case for earlier studies in the Rankin Inlet area, the current study had the participation of a local community member on the heritage resource study team.

9.11.2.5 Inuit Qaujimajatuqangit (IQ) Studies IQ

Few specific details regarding archaeological sites have been provided in the Inuit Qaujimajatuqangit (IQ) studies; however, when mentioned, the information provided is complimentary to the archaeological site record. However, archaeological site information obtained in IQ studies associated with the Meliadine Gold Project are not as detailed in regards to specific location; therefore specific comparisons between sites mentioned in the IQ studies and the archaeological site record are not possible. For example, culturally important areas identified along Section 3 of the AWAR in the IQ studies include tent rings and meat caches (Nanuk Enterprises 2011); however, there is no means of determining if these specifically relate to archaeological sites KfJm-63, KfJm-110 and or KfJm-116 from the archaeological site record (Appendix 9.11-A). The only feature type which has been identified in the IQ studies, but is not recorded in the archaeological record, is stone drying racks for fish. A tour of several sites with 3 Elders (Jakie Iquptaq, Paul Kanayok, and Simon Twyee) in 2012 did not result in any stone drying racks being identified.

9.11.3 Heritage Sites Located within the Local Study Area

9.11.3.1 Field Assessment and Mitigation

Heritage sites located within the Project LSA have been assessed and mitigated over the course of several field programs. All field work was conducted under valid Class II Nunavut Archaeologist Permits (2008-003A; 2010-005A, 2011-026A, and 2012-024A) issued by the GN-CH formerly the Department of Culture, Language, Elders and Youth. The pre-field studies procedures were the same and consist of a review of existing archaeological data within the region, a review of available topographic, and physical environmental data for the project areas. These pre-field studies provide the cultural context for the project and assist in identifying key land forms with potential for archaeological features. Field investigations are designed based on the pre-field information, project footprint, and project development schedules. Each field program had specific objectives and therefore followed slightly different methodologies; detailed methodologies are outlined in the yearly permit reports submitted to the Government of Nunavut along with detailed maps, site maps, and feature drawings when relevant (Blower 2008; Murphy 2010; Ross 2012a; Ross 2012, in preparation).

In general, assessment and mitigation techniques followed established practices and consisted of the following:

- low level helicopter assessment of Project area to prioritize areas with high and moderate archaeological potential;
    - visual examination of the identified areas to determine the presence of surficial features, such as standing or collapsed buildings, dumps, cache, cabin foundations, and exposed cultural materials, such as stone features, stone tool making debris, and tools;

- excavation of either shovel tests or 1 x 1 m units for the purpose of identifying the distribution, density, and nature of cultural remains associated with sites identified;
- documentation of the location (GPS coordinates), nature, size, and complexity of each identified site;
- documentation of individual site features to record content, context, potential identity, and to provide information required to develop a mitigation program;
- visual examination of bedrock exposures (if any) or gravels for precontact quarrying activity;
- interpretation of site and feature significance based on Section 3 (f) of the Nunavut Archaeological and Paleontological Site Regulations;
- partial excavation of site features to be impacted (portion of feature excavated was dependent on site feature significance and artifact recovery); and
- staking of site or features if they were within 30 m of the Project footprint and could not be mitigated (e.g., possible grave) or to assist AEM avoid sites that were just beyond 30 m of the Project footprint.

It is a requirement of the Nunavut archaeological and Paleontological site regulations to assign significance to an archaeological site. Archaeological site significance can be related to the historic, scientific, ethnic, public, and economic value of a site (Appland and Kenny 1989; Hart 1989). Historic significance might relate to sites or locations where known historic events took place, or even locations, such as Marble Island known as a historic whaling location. Sites which are assigned scientific significance are those that have at least perceived potential to answer specific academic research questions. Scientific significance designation can change during excavation depending on results obtained from the site. Ethnic significance relates to if a given site or location is of importance to a specific ethic group. A Taltheilei Tradition site in Nunavut may not be significant to a Nunavut community but may be significant to communities in Saskatchewan. Site of significance to the public are often those accessible to the public for education or recreations purposes. Economic significance often overlaps with other classifications of significance but is associated with sites which will assist an organization (local, territorial, or Federal) to accumulate revenue. Archaeological site significance is not equivalent to significance as addressed in a pathways analysis. For this assessment, archaeological site significance is predominately from a scientific perspective; however, when engagement with local residences has provided insight this was included in the significance assignment. Low archaeological significance was assigned to sites where it is anticipated that excavation would result in limited quantity of artifacts (cache, hunting, blind, tent ring, etc.). Moderate archaeological significance was assigned when there are a larger number of one feature type, a verity of features types or if proximity to other sites might provide insight in to past lifeways. High archaeological significance was assigned to features that are rare in the archaeological record based on regional cultural histories, may contain a larger number of artifacts if excavated or sacred sites (grave, sod houses, Palaeoeskimo site on the mainland etc.).

For reference, archaeological sites are predominately referred to by their Borden number. The Borden system is a Canadian wide means of labelling archaeological sites based on their location and sequence in which they are recorded. The upper case Borden letter indicates the north-south and east-west location of a site. The upper case letters represent blocks of 2 degrees latitude and 4 degrees longitude. The lower case Borden

letters indicate 10 minutes each of latitude and longitude. The numeric value is assigned sequentially (Borden and Wilson 1952). When possible the basic data record about a site include: location, number and type of features (e.g., 4 tent rings; 1 cache), cultural affiliation (Pre-Dorset, Thule, etc.), and site condition.

9.11.3.2 LSA Heritage Sites

A description of sites located within the LSA are presented in Appendix 9.11-A. The sites are presented in the order of the mine infrastructure, AWAR, and then Rankin Inlet. The sites along the AWAR are described relative to sections 1 to 4 of the AWAR as described in Appendix 9.3-A relating to TK studies (Figure 9.11-1). There are several sites which were identified in the 1970s by Linnamae (Linnamae 1977; Linnamae and Clark 1975, 1976; Linnamae and Russell 1975) for which the location could not be confirmed and site forms, field notes, and reports available do not provide information about the features.

530000 540000 550000 560000

6990000 6980000 6970000

Mine Infrastructure Area

KgJm-13 KgJm-14 KgJm-42 KgJm-12 KgJm-11 KgJm-6 KgJm-43 KgJm-4 Kgjm-51 KgJm-47 KgJm-50 KgJm-44 KgJm-10 KgJm-15 KgJm-19 KgJm-17 KgJm-18 KgJm-22 KgJm-23 KgJm-46 KgJm-45 KgJm-49 KgJm-56 KgJm-16 KgJm-61 KgJm-24 KgJm-20 KgJm-21 KgJm-25 KgJm-26 KgJm-35 KgJm-31 KgJm-48 KgJm-30 KgJm-29 KgJm-9 KgJm-34 KgJm-33 KgJm-36 KgJm-37 KgJm-32 KgJm-8 KgJm-40 KgJm-27 KgJm-28 KgJm-52 KgJm-53

Meliadine Camp

SECTION 4

KfJm-88 KfJm-87 KfJm-67 KfJm-66 KfJm-101 KfJm-104 KfJm-102 KfJm-93 KfJm-84 KfJm-99 KfJm-193 KfJm-167 KfJm-80 KfJm-192 KfJm-140 KfJm-183 KfJm-182 KfJm-59 KfJm-133 KfJm-131 KfJm-63 KfJm-191 KfJm-128 KfJm-181 KfJm-110 KfJm-109 KfJm-112 KfJm-114 KfJm-179 KfJm-180 KfJm-178 KfJm-177 KfJm-118 KfJm-116

KfJI-6 KfJI-4 KfJI-3 KfJI-5 KfJI-1 KfJI-7

SECTION 3

KfJm-163 KfJm-162 KfJm-161 KfJm-160 KfJm-156 KfJm-155 KfJm-154 KfJm-153 KfJm-166 KfJm-165 KfJm-19 KfJm-26 KfJm-18 KfJm-20 KfJm-25 KfJm-17 KfJm-16 KfJm-15 KfJm-24 KfJm-14 KfJm-12 KfJm-13 KfJm-11 KfJm-23 KfJm-10 KfJm-27 KfJm-9 KfJm-8 KfJm-49 KfJm-4 KfJm-150 KfJm-149 KfJm-148

Territorial Park

KfJm-1 KfJm-2 KfJm-28 KfJm-29 KfJm-30 KfJm-151 KfJm-164 KfJm-5 KfJm-31 KfJm-32 KfJm-3 KfJm-6 KfJm-7 KfJm-33 KfJm-46

Phase 2 All-weather Access Road

KfJm-175 KfJm-176 KfJm-174 KfJm-173 KfJm-172 KfJm-171 KfJm-169 KfJm-170 KfJm-168

SECTION 2

SECTION 1

Hudson Bay

KfJm-194 KeJm-5 KeJm-10

Rankin Inlet

Rankin Inlet

KeJm-10

400 0 400
METRES

N

LEGEND

- Non Mitigated Feature
- Mitigated Feature
- Stake
- Camp
- Proposed Project Infrastructure
- All-weather Access Road (AWAR)
- Road - New
- Road - Existing
- Watercourse
- Waterbody
- Built-up Area around Rankin Inlet
- Territorial Park
- LSA
- AWAR Road Section (as per TK interviews)

STUDY AREA

REFERENCE

Archaeological Sites obtained from the Government Nunavut Department of Culture, Language Elders and Youth. Base data obtained from Agnico Eagle Mines Limited (AEM).
Datum: NAD 83 Projection: UTM Zone 15

3 0 3
KILOMETRES

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
ARCHAEOLOGICAL SITES WITHIN LOCAL STUDY AREA

Golder Associates

PROJECT NO. 13-1428-0007			FILE No.	
DESIGN	JR	26 Sep. 2012	SCALE AS SHOWN	REV. 0
GIS	MH	13 Jan. 2014		
CHECK	JMR	12 Feb. 2014		
REVIEW	BN	12 Feb. 2014		

FIGURE: 9.11-1

N:\Bur-Graphics\Projects\2013\1428\13-1428-0007\GIS\Mapping\MXD\FEIS\Volume_9\Main_Volume\Figure_9.11-1_Arch_Sites_within_LSA.mxd

9.11.4 Relationship between Cultural Sites and Social Lives of Local Communities in the Local Study Area

Information about the social lives of local community members is located in the IQ Baseline studies (Section 9.3). The possible cultural affiliations for the archaeological sites that have been identified within the LSA include Pre-Dorset, Dorset, and Neoeskimo (Thule and Inuit). There may also be a connection with the Taltheilei tradition but the nature of this connection has not been explored. According to baseline IQ studies, it was during the period between 1956 and 1974 that Meliadine and Diana lakes and rivers became important camping areas; however, there are archaeological sites in the LSA which suggest a longer use by Thule-Inuit (KgJm-7, KgJm-8, and KgJm-9), the ASTt (KgJm-25) and Dorset (KgJm-22).

Culturally Important Areas were not clearly identified by Rankin Inlet community members; however, Chesterifield Inlet community members did cite the Melaidine River areas as important. The only specific site IQ that was mentioned as important relating to the Meliadine River was KfJm-3, which is also referred to as Meliadine-1 by archaeologists and called Qamaviniktalik by locals. This site is described by Urve Linnamae and Brenda Clark (1975) as a large site, extending approximately 0.4 km along the river edge and back along the south bank of what was probably an old channel of the river. At this location there is a nick point in the river where a major change in gradient and a constriction of the river occurs. Rapids are formed here, above which there is wide, quiet water, and below are broad gravel bars and shallow rushing water. It is the largest site in the area with several heavy, closed tent rings, caches, traps, and kayak rests. There are 5 semi-subterranean structures situated at the crest of an esker and there are 4 graves, but no skeletal remains. The graves resemble Thule stone box burials. The structures and the artifacts seem to indicate that this site has had a long history of occupation extending back to the Thule period. Also reported at the site are tent rings, caches, and fox traps (Linnamae and Clark 1975). Inuit Qaujimajatuqangit regarding the site suggests “the site was occupied during IQ the fall and early winter, before people moved in to igloos on the sea ice” (Appendix 9.11-A). This site has been identified as a significant site in the archaeological record as it is thought to contain evidence of the transition between Classic Thule when semi-subterranean structures (sod houses) were used from autumn to spring, and Modified Thule when smaller semi-subterranean structures (qarmat) were used in the autumn and earlier winter prior to the occupation of *iglu/ igloo*. This site is not within the LSA and will not be impacted by the Project.

The Elders agreed with the archaeological summary of Linnamae and Clark (1976) within Section 1 of the IQ AWAR (Figure 9.11-1) (Appendix 9.11-A). The sites are described in detail in Appendix 9.11-A, and the features identified by the Elders have been documented by the archaeological assessments. Elder consultation in 2012, specifically associated with the archaeology program, indicated that the sod house sites KgJm-7 and KgJm-9 were similar in size to KfJm-3.

Section 2 of the AWAR is identified as an area of hunting, with blinds, inuksuit, and caches (Appendix 9.11-A). These types of features were identified and documented at the archaeological sites described in Appendix 9.11-A. Of specific interest is KfJm-171, which is a large site and demonstrates the long use of the area by Thule - Inuit. The artifacts found at this site include old drill bits and more modern items, such as hinges and beer cans. Elder consultation in 2012, specifically associated with the archaeology program, indicated that IQ spirits were present at this site. The 3 Elders consulted indicated that people who slept there would have nightmares, and they personally had avoided sleeping at the location. Specifically, the IQ studies identifies an area east of Section 2 of the AWAR which has tent rings and meat caches (Appendix 9.11-A). These features

are found at KfJm-171, but the description could also refer to KfJm-36 or KfJm-37 and KfJm-184 to 190 which are outside the LSA.

Within AWAR Section 3, the IQ studies indicate that tent rings and meat caches have also been identified along the route, particularly on ridges where people camped in the wind to avoid mosquitoes and observe caribou movements (Appendix 9.11-A). In addition, the IQ studies identify some of the tent rings as quite old. There are also taluit (hunting blinds) overlooking areas where caribou might pass below a ridge or promontory, and in areas where Elders suggested people likely staged goose hunts. There are many small inuksuit, some that may have been used as game drives, and some marking places where there are storage caches (Appendix 9.11-A). IQ

Section 4 of the AWAR was not identified as a culturally important area, albeit the IQ studies note the extensive Honda trails throughout the area and it is in fact in this area that the greatest number of Land Use sites were identified (Appendix 9.11-A; Ross 2012a, in preparation). The local assistant during the baseline survey in 2008 did identify this area as important (Blower 2008). It could be that the young hunters are using different areas than the older hunters and this is why there are discrepancies between the IQ studies and the heritage evidence.

In the IQ studies, the Mine area is referenced by the importance of Meliadine Lake as both a winter and spring fishing location and a location to hunt caribou whenever they are in the vicinity (Appendix 9.11-A). In addition, berry picking and autumn hunting of geese and other waterfowl is common in the area. The southwest shore of the east arm of Meliadine Lake has the greatest concentration of archaeological sites within the LSA and contains some of the most significant sites. IQ

While IQ participants did not provide specific information about archaeological sites, the correlation between the IQ studies and archaeological studies clearly indicates that Kangiq&Inirmiut/Rankinmuit are aware of the archaeological sites surrounding the community and there is evidence that older sites have been used in recent times. The site that is most evidently a part of community members' social lives is located along Meliadine River within the Park. Since the Park areas has been chosen as significant to the community based in part on its heritage value, and specific sites within the Project footprint have not been highlighted by the IQ studies (Appendix 9.11-A), there should be little to no impact by the Project to the religious or spiritual activities that are related to cultural, historic, sacred or spiritual sites. IQ

9.11.4.1 Natural and Cultural Heritage Associated with the Meliadine River IQ

The Meliadine River has been identified in the IQ studies as an important resource both in the past by the earliest Thule occupants of the area and in recent times (Appendix 9.11-A). Other than the small portion of the river situated in Section 1 of the AWAR, the majority of the river is within the Park which is outside the LSA and these archaeological sites will not be directly impacted by the Project. KfJm-168, 169, 171, 172, and 173 are within the LSA and are briefly described in Appendix 9.11-A. Detailed descriptions are on file with the Department of Culture and Heritage (Blower 2008; Murphy 2010; Appendix 9.11-A; Ross, in preparation). Excluding KfJm-168 and 173, all or some of the features at these sites were mitigated in 2010, 2011, and 2012. It is noted that the archaeological permit application process provides the Hamlet council with an opportunity to comment on proposed mitigation plans, and since these permits were issued without restrictions relating to the mitigation of these features, it can be assumed that the community has no objections to these proposed mitigations.

According to the Iqalugaarjuup Nunanga Territorial Park management plan (Government of Northwest Territories 1991) there are 49 previously recorded archaeological sites within the immediate vicinity of the Park; the majority of these are along the Meliadine River. Most of these sites are not associated with a cultural affiliation; the few that have a cultural affiliation assignment are associated with Late Pre-Dorset, Thule, and Inuit. The majority of the sites are campsites consisting of tent rings and cache features. Some of the more unique features identified include a qaggiq (communal/ceremonial house), grave, semi-subterranean houses (winter sod-house), qarmaq (fall to early winter house), hoping stones/nangissat (game), traps, hearths, kayak stands, and inuksuit. The most prominent site is referred to as Meliadine-1, KfJm-3, and Qamaviniktalik (Government of Northwest Territories 1991; Appendix 9.11-A). The IQ studies identify the important natural heritage of the river as being predominately caribou, fish, and berry picking. According to the Meliadine River Park Master Plan (Government of Northwest Territories 1991) the goals of the Park were to protect the valuable archaeological and natural beauty of the area, stop people from damaging the land, but also to still allow people to hunt, pick berries, and camp along the river.

9.11.5 Pathway Analysis

Potential pathways through which the Project could affect the archaeological record are presented in Table 9.11-1. Environmental design features and mitigation incorporated into the design of the Project to remove a pathway or limit the effects on the archaeological record are listed, and pathways are determined to be primary, minor, or as having no linkage. The following sections discuss the potential pathways relevant to the archaeological record.

Table 9.11-1: Potential Pathways for Effects to the Archaeological Resources

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Archaeological Record	Mine Infrastructure (e.g., open pits, site roads, blasting, water management), All-weather Access Road, and Rankin Inlet Infrastructure	Construction activity leading to ground alteration that affects physical heritage resources	Complete heritage assessment for the Project footprint. Provide awareness training and a manual for recognizing heritage resources to all staff and contractors. Avoid previously recorded heritage resource sites. Complete additional heritage assessment for any changes to the Project footprint in areas considered to have moderate to high potential to contain heritage resources. Complete more in-depth mitigation strategies if an avoidance mitigation strategy cannot be implemented. Monitor condition of known heritage resource sites near the Project footprint.	Minor
Archaeological Record	Operations and Maintenance of Mine Infrastructure, Operation of All-Weather Access Road, and Rankin Inlet Infrastructure	Activities such as regrading embankments, shoulder stabilization or new borrow sources if required; changes in water levels; accidents or malfunction; and increased tourism to sites in project area as a result of improved access that results in site damages	Provide awareness training and a manual for recognizing heritage resources to all staff and contractors. Avoid previously recorded heritage resource sites. Complete additional archaeological assessment for any changes to Project footprint in areas considered to have moderate to high potential to contain heritage resources. Monitor condition of known heritage resource sites near the Project footprint. Complete more in-depth mitigation strategies if an avoidance mitigation strategy cannot be implemented.	Minor

Table 9.11-1: Potential Pathways for Effects to the Archaeological Resources (continued)

Valued Component	Project Activity	Effects Pathways	Environmental Design Features and Mitigation	Pathway Analysis
Archaeological Record	Closure and Post-Closure of Mine Infrastructure, All-Weather Access Road, and Rankin Inlet Infrastructure	Closure and Reclamation and post-closure activities such as scarifying roads, breaching of dikes, removal buildings and monitoring access that affects physical heritage resources	Provide awareness training and a manual for recognizing heritage resources to all staff and contractors. Avoid previously recorded heritage resource sites. Complete additional archaeological assessment for any changes to Project footprint in areas considered to have moderate to high potential to contain heritage resources. Monitor condition of known heritage resource sites near the Project footprint. Complete more in-depth mitigation strategies if an avoidance mitigation strategy cannot be implemented.	Minor
Archaeological Record	Exploration (Prospecting, Drilling)	If heritage sites are previously unrecorded, prospecting can damage rocks associated with a heritage site; drill placement covers an area of about $5m^2$ which if placed on a heritage site would damage the site	Provide awareness training and a manual for recognizing heritage resources to all staff and contractors. Avoid previously recorded heritage resource sites. Complete additional archaeological assessment for any changes to Project footprint in areas considered to have moderate to high potential to contain heritage resources. Monitor condition of known heritage resource sites near the Project footprint. Complete more in-depth mitigation strategies if an avoidance mitigation strategy cannot be implemented.	

9.11.5.1 Effects Analysis

9.11.5.1.1 Pathways with No Linkage

A pathway may have no linkage if the pathway is removed by environmental design features and mitigation so that the Project results in no detectable environmental change and residual effects to the archaeological record relative to baseline.

Only Marine transport has been identified as having as having no linkage with respect to the complete archaeological record; however, there are individual archaeological sites within the LSA for which there is no link between the Project and the individual site Table 9.11-1. The sites for which there are no anticipated detectable changes to the baseline data or current state are identified in the minor pathways section below.

9.11.5.1.2 Pathways with Minor Linkage

A pathway may have minor linkage if the pathway would result in a minor environmental change, but would have a negligible residual effect on the archaeological record relative to baseline. All sites that will be impacted by the Project have been mitigated using standard archaeological methods to document the sites. The level of documentation is appropriate for the site significance. The documentation of the site preserved the information and therefore the impact to the archaeological record is considered minor. Construction of the proposed Mine Infrastructure (e.g., open pits, site roads, blasting, water management), Project access road, and Rankin Inlet infrastructure will result in disruption of some individual sites; however, the assessment was completed at the scale of the archeological record and mitigation were or will be applied to individual sites, where required.

There are individual archaeological sites within the LSA for which there will be no impact from the Project. Some sites will be impacted; however, these sites have been, or will be mitigated such that there will be no residual impact from the Project to the archaeological record. Therefore, each of the effects pathways identified in Table 9.11-1 were assessed as being minor. Further detail on each minor pathway is provided below.

9.11.5.1.2.1 Construction Activity

Mine Infrastructure

There are 52 recorded archaeological sites within the mine infrastructure LSA (Table 9.11-2). These sites are associated with Pre-Dorset, Dorset, and Thule - Inuit. There is diversity of feature types including tent rings, cache (both square and round interiors), semi-subterranean houses (winter sod-house), qarmaq (fall to early winter house), traps, hearths, kayak caches, hunting blinds, and stone markers. Brief descriptions of these sites are contained in Appendix 9-11-A. Detailed drawings, photographs and maps are contained in yearly Archaeological permit reports and are on file with the Inuit Heritage Trust and the Department of Culture and Heritage. The details in these reports are protected by Section 19 of the *Access to Information and Protection of Privacy Act, 1999* and are not to be made available to the public.

Of the 52 archaeological sites, construction activities will not be linked to 33 sites relative to baseline, and will have a minor impact on the remainder. No linkage is assigned where construction activity will occur greater than 30 m from the site, or the site is separated from the construction activity by a geographic feature, such as a change in elevation. For the remaining sites, the pathway is minor because although the sites may be impacted

by construction activity, they have been mitigated to a degree of detail appropriate to the site and feature significance so there are no residual impacts to the archaeological record.

The archaeological sites for which construction of the water management infrastructure may have effects on the archaeological record relative to the baseline could not be fully assessed as the location of select infrastructure are conceptual at this time. However, as AEM is committed to mitigating any sites that will be impacted by water management infrastructure prior to its construction, this pathway is assessed as minor.

All-weather Access Road Phase 2

There are 43 recorded archaeological sites within the Phase 2 AWAR LSA (Table 9.11-3). These sites are associated with Thule, Inuit, and possibly Pre-Dorset. There is diversity of feature types including tent rings, cache, traps (leg hold and bee hive construction), hearths, hunting blinds, and Inuksuit/stone markers.

Of these 43 archaeological sites, construction activities will not be linked to 29 sites, and will have a minor impact on the remainder. No linkage is assigned where construction activity will occur greater than 30 m from a site. During the design stage of the AWAR the location of archaeological sites were considered (AEM 2011d). For the remaining sites, the pathway is minor because although the sites may be impacted by construction activity, they have been, or will be mitigated to a degree of detail appropriate to the site and feature significance so there will be no residual impacts to the archaeological record.

Table 9.11-2: Construction Pathway Linkages for Archaeological Sites within the Mine Infrastructure Local Study Area

Borden Number	Site Type	Archaeological Significance[84]	Environmental Design or Mitigation	Pathway Linkage	Impact Assessment of Site	Permit Detailing Mitigation
KfJl-3	Cache	low	avoidance by 230 m	no linkage	will not be impacted	
KfJl-4	Stone marker / inuksuk	low	avoidance by 145 m	no linkage	will not be impacted	
KfJl-5	Hearth	low	avoidance by 490 m	no linkage	will not be impacted	
KgJm-4	Box hearth	high	avoidance by 430 m	no linkage	will not be impacted	
KgJm-6	Box hearth	high	avoidance by 135 m	no linkage	will not be impacted	
KgJm-7	Campsite (sodhouse)	high	avoidance by 400 m	no linkage	will not be impacted	
KgJm-8	Campsite (sodhouse)	high	avoidance by 150 m	no linkage	will not be impacted	
KgJm-9	Campsite (sodhouse)	high	avoidance by 300 m	no linkage	will not be impacted	
KgJm-10	Campsite	low	avoidance by 139 m	no linkage	will not be impacted	
KgJm-11	Box hearth	high	avoidance by 195 m	no linkage	will not be impacted	
KgJm-12	Campsite	low to moderate	avoidance by 230 m	no linkage	will not be impacted	
KgJm-13	Box hearth	high	avoidance by 250 m	no linkage	will not be impacted	
KgJm-14	Cache	low	avoidance by 270 m	no linkage	will not be impacted	
KgJm-15	Campsite	low	avoidance by 48 m (change in topography)	no linkage	will not be impacted	
KgJm-16	Campsite	low	avoidance by 150 m	no linkage	will not be impacted	
KgJm-17	Hunting	low	avoidance by 80 m	no linkage	will not be	

[84] Significance may be thought of as sensitivity

Table 9.11-2: Construction Pathway Linkages for Archaeological Sites within the Mine Infrastructure Local Study Area (continued)

Borden Number	Site Type	Archaeological Significance[84]	Environmental Design or Mitigation	Pathway Linkage	Impact Assessment of Site	Permit Detailing Mitigation
					impacted	
KgJm-18	Campsite	low	location, photo documentation, feature mapping proportional excavation	minor	will be impacted	2012-024A
KgJm-19	Boat stand	high	avoidance by 95 m	no linkage	will not be impacted	
KgJm-20	Campsite	low	location not confirmed	minor	undetermined	
KgJm-21	Cache	low	location not confirmed	minor	undetermined	
KgJm-22	Mid passage	high	Mitigation in 1970s	minor	impacted	
KgJm-23	Hunting	low	location, photo documentation, feature mapping proportional excavation	minor	impacted	2012-024A
KgJm-24	Boat stand	high	location, photo documentation, feature mapping, excavation	minor	impacted	2012-024A
KgJm-25	Mid passage	high	location, photo documentation, feature mapping, excavation	minor	impacted	2012-024A
KgJm-26	Campsite	low	location, photo documentation, feature mapping proportional excavation	minor	impacted	2012-024A
KgJm-27	Hunting	low to moderate	avoidance by 47 m	no linkage	will not be impacted	
KgJm-28	Campsite	low	avoidance by 78 m	no linkage	will not be impacted	
KgJm-29	Campsite	low to moderate	avoidance by 95 m	no linkage	will not be impacted	
KgJm-30	Campsite	Low to moderate	location, photo documentation, feature mapping proportional excavation	minor	impacted	2012-024A
KgJm-31	Campsite	low to moderate	avoidance by 56 m	no linkage	will not be impacted	
KgJm-32	Hunting blind	low	avoidance by 160 m	no linkage	will not be impacted	
KgJm-33	Campsite	low to moderate	avoidance by 415 m	no linkage	will not be impacted	
KgJm-34	Campsite	low to moderate	avoidance by 295 m	no linkage	will not be impacted	
KgJm-35	Hunting	low	location, photo documentation, feature mapping proportional excavation	minor	impacted	2012-024A
KgJm-36	Campsite	low	avoidance by 470 m	no linkage	will not be	

Table 9.11-2: Construction Pathway Linkages for Archaeological Sites within the Mine Infrastructure Local Study Area (continued)

Borden Number	Site Type	Archaeological Significance[84]	Environmental Design or Mitigation	Pathway Linkage	Impact Assessment of Site	Permit Detailing Mitigation
					impacted	
KgJm-37	Cache	low	avoidance by 410 m	no linkage	will not be impacted	
KgJm-40	Cache	low	avoidance by 195 m	no linkage	will not be impacted	
KgJm-41	Campsite / possible grave	low to moderate	avoidance by 325 m	no linkage	will not be impacted	
KgJm-42	Campsite	low to moderate	avoidance by 220 m	no linkage	will not be impacted	
KgJm-43	Stone paving	high	avoidance by 77 m	no linkage	will not be impacted	
KgJm-44	Hunting	low	avoidance by 70 m	no linkage	will not be impacted	
KgJm-45	Hunting	low	location, photo documentation, mapping	minor	impacted	2010-005A
KgJm-46	Campsite (recent)	low	location, photo documentation	minor	impacted	
KgJm-47	Hunting	low	location, photo documentation, mapping	minor	impacted	2010-005A
KgJm-48	Boat stand	low	location, photo documentation, feature mapping proportional excavation	minor	impacted	2012-024A
KgJm-49	Cache	low	avoidance by 180 m	no linkage	will not be impacted	
KgJm-50	Cache	low	location, photo documentation, feature mapping proportional excavation	minor	impacted	2012-024A
KgJm-51	Hunting	low	location, photo documentation, feature mapping proportional excavation	minor	impacted	2012-024A
KgJm-52	Cache	low	location, photo documentation proportional excavation	minor	impacted	2012-024A
KgJm-53	Stone marker / inuksuk	low	location, photo documentation, shove tests	minor	impacted	2011-026A
KgJm-56	Isolated find	low	location, photo documentation, shove tests, collection	minor	impacted	2012-024A
KgJm-61	Hunting Blind	low	avoidance by 38 m (change in topography)	no linkage	will not be impacted	

Table 9.11-3: Construction Pathway Linkages for Archaeological Sites within the Phase 2 All-weather Access Road Local Study Area

Borden Number	Cultural Affiliation	Site Type	Archaeological Significance	Environmental Design or Mitigation	Pathway Linkage	Impact Assessment of Site	Permit Detailing Mitigation
KfJl-1	Neoeskimo	Cache	low	avoidance by 360 m	no linkage	not impacted	
KfJl-6	Neoeskimo	Hearth	low	avoidance by 250 m	no linkage	not impacted	
KfJl-7	Neoeskimo	Campsite	low	avoidance by 120 m	no linkage	not impacted	
KfJm-7	Neoeskimo	Campsite	low	avoidance by 150 m	no linkage	not impacted	
KfJm-33	Undetermined	Unknown		avoidance by 405 m	no linkage	not impacted	
KfJm-46	Undetermined	Unknown		avoidance by 100 m	no linkage	not impacted	
KfJm-63	Palaeoeskimo	Campsite	moderate to high	avoidance by 195 m	no linkage	not impacted	
KfJm-66	Neoeskimo	Stone marker / inuksuk	low to moderate	avoidance by 40 m (staked)	no linkage	not impacted	
KfJm-67	Neoeskimo	Stone feature	low to moderate	avoidance by 130 m	no linkage	not impacted	
KfJm-80	Neoeskimo	Campsite	low to moderate	avoidance by 180 m	no linkage	not impacted	
KfJm-84[a]	Neoeskimo	Campsite / grave	high	avoidance by 400 m	no linkage	not impacted	
KfJm-87	Neoeskimo	Campsite	low	avoidance by 355 m	no linkage	not impacted	
KfJm-88	Neoeskimo	Campsite	low	avoidance by 475 m	no linkage	not impacted	
KfJm-93	Neoeskimo	Campsite	low	avoidance by 370 m	no linkage	not impacted	
KfJm-99[a]	Neoeskimo	Stone marker / inuksuk	low	avoidance by 290 m	no linkage	not impacted	
KfJm-101	Undetermined	Unknown		avoidance by 330 m	no linkage	not impacted	
KfJm-102[a]	Neoeskimo	Campsite	low to moderate	avoidance by 175 m[a]	no linkage	not impacted	
KfJm-104	Neoeskimo	Stone marker / inuksuk	low	avoidance by 220 m	no linkage	not impacted	
KfJm-109	Undetermined	Unknown		avoidance by 460 m	no linkage	not impacted	
KfJm-110	Neoeskimo	Campsite	low to moderate	avoidance by 215 m	no linkage	not impacted	
KfJm-112	Undetermined	Unknown		avoidance by 230 m	no linkage	not impacted	
KfJm-114	Undetermined	Unknown		avoidance by 440 m	no linkage	not impacted	
KfJm-116	Neoeskimo Palaeoeskimo	Box hearth / cache	low to moderate	location, photo documentation	minor	Staked (0 m from infrastructure)	2008-003A, 2011-026A
KfJm-118	Neoeskimo	Stone feature	low to moderate	location, photo documentation, feature mapping, proportional excavation	minor	Impacted (0 m from infrastructure)	2011-026A
KfJm-128	Neoeskimo	Hunting	low	avoidance by 150 m	no linkage	not impacted	
KfJm-131	undetermined	Unknown		avoidance by 120 m	no linkage	not impacted	
KfJm-133	undetermined	Unknown		avoidance by 80 m	no linkage	not impacted	
KfJm-140	undetermined	Unknown		avoidance by 255 m	no linkage	not impacted	
KfJm-167	Neoeskimo	Hunting	low to moderate	avoidance by 270 m	no linkage	not impacted	
KfJm-168	Neoeskimo	Campsite	moderate	avoidance by 50 m	no linkage	not impacted	
KfJm-169		Hunting	low to moderate	location, photo documentation, feature	minor	impacted	2010-005A

Table 9.11-3: Construction Pathway Linkages for Archaeological Sites within the Phase 2 All-weather Access Road Local Study Area (continued)

Borden Number	Cultural Affiliation	Site Type	Archaeological Significance	Environmental Design or Mitigation	Pathway Linkage	Impact Assessment of Site	Permit Detailing Mitigation
	Neoeskimo			mapping proportional excavation		(0 to 20 m from infrastructure)	
KfJm-170	Neoeskimo	Campsite	low to moderate	avoidance by 30-54 m, topographic separation	no linkage	not impacted	
KfJm-171	Neoeskimo	Campsite	low to moderate	location, photo documentation, feature mapping proportional excavation	minor	impacted (0 to 170 m from infrastructure	2010-005A, 2012-024A
KfJm-172	Neoeskimo	Campsite	low to moderate	location, photo documentation, feature mapping proportional excavation	minor	impacted (20 to 40 m from infrastructure)	2010-005A
KfJm-173	Neoeskimo	Stone marker / inuksuk	low	avoidance by 150 m	no linkage	not impacted	
KfJm-174	Neoeskimo	Stone marker / inuksuk	low	location, photo documentation, feature mapping proportional excavation	minor	impacted (0 m from infrastructure)	2010-005A
KfJm-175	Neoeskimo	Hunting	low	location, photo documentation	minor	impacted (0 m from infrastructure)	2011-026A
KfJm-176	Neoeskimo	Caches	low to moderate	to be mitigated prior to development	minor	impacted (20 m from infrastructure)	2008-003A
KfJm-177	Neoeskimo	Stone marker / inuksuk	low	location, photo documentation	minor	impacted (0 m from infrastructure)	2008-003A 2011-026A
KfJm-178	undetermined	Lithic scatter	low	location, photo documentation, proportional excavation	minor	impacted (0 m from infrastructure)	2010-005A
KfJm-179	Palaeoeskimo	Hunting	low to moderate	avoidance by 75 m	no linkage	not impacted	
KfJm-180	Neoeskimo	Stone marker / inuksuk	low to moderate	avoidance by 240 m	no linkage	not impacted	
KfJm-181	Neoeskimo	Stone marker / inuksuk	low to moderate	avoidance by 153 m	no linkage	not impacted	
KfJm-182	Neoeskimo	Campsite	low	avoidance by 40 m (staked)	no linkage	not impacted	
KfJm-183	Neoeskimo	Campsite	low to moderate	avoidance by avoidance by 270 m	no linkage	not impacted	
KfJm-191	Neoeskimo	Hearth	low to moderate	location, photo documentation, feature mapping, proportional excavation	minor	impacted (0 m from infrastructure)	2011-026A
KfJm-192	Neoeskimo	Cache	low	to be mitigated prior to development	minor	impacted	
KfJm-193	Neoeskimo	Hunting	low	to be mitigated prior to development	minor	impacted	

[a] KfJm-84, KfJm-99 and KfJm-102 were mitigated in relation to a proposed exploration camp which is not part of this environmental impact assessment

Rankin Inlet Bypass Road and Infrastructure

Of the 3 archaeological sites located in the Rankin Inlet LSA, construction of the Rankin Inlet bypass road and other mine-related infrastructure will result in no linkage for 2 sites since construction activity will occur greater than 30 m from these sites (Table 9.11-4). The remaining site (KeJm-5) will be mitigated in the summer of 2013 to a degree of detail appropriate to the site significance so while the individual site will be impacted by the Project, there will be no residual impacts to the archaeological record.

Table 9.11-4: Linkage Construction Pathways for Archaeological sites within the Rankin Inlet bypass road and Infrastructure Local Study Area

Borden Number	Site Type	Archaeological Significance	Environmental Design or Mitigation	Linkage Pathway	Impact Assessment of Site
KeJm-5	Hunting site	low to moderate	to be mitigated prior to development	minor	impacted
KeJm-10	Lithic scatter	low to moderate	avoidance by 446 m[85]	no linkage	will not be impacted
KfJm-194	Campsite	low	avoidance by 230 m	no linkage	will not be impacted

9.11.5.1.2.2 Operations and Maintenance

Mine Infrastructure

Operations and maintenance of the mine infrastructure is assessed as a minor pathway with respect to the archaeological record (Table 9.11-1). The sites located within 30 m of the mine infrastructure will have already been mitigated prior to mine construction. Mine activities, including maintenance of mine site roads and pond operating levels, are not expected to occur outside the mine infrastructure and therefore there is limited chance that archaeological sites greater than 30 m from the mine infrastructure will be impacted. In the case of accidents or malfunctions, there is also limited chance that archaeological sites greater than 30 m from the mine infrastructure will be impacted. No new borrow sources are anticipated at this time; however, if they are found to be necessary, AEM is committed to conduct AIA for target areas with moderate to high archaeological potential and to avoiding archaeological sites present within potential borrow areas. Public access, including tourism, to the mine site area will be restricted during operations, and employees and contractors of AEM will not be permitted to go beyond the mine infrastructure while on shift.

Phase 2 All-weather Access Road

The operation and maintenance of the Phase 2 AWAR has been assessed as a minor pathway with respect to the archaeological record (Table 9.11-1). The sites will have been impacted prior to the construction phase. During operation and maintenance vehicles will remain on the Phase 2 AWAR and impacts are not expected to occur outside the general construction footprint. In the case of accidents or malfunctions, there is limited chance that archaeological sites greater than 30 m from the Phase 2 AWAR will be impacted. No new borrow sources are anticipated at this time; however, if they are found to be necessary, AEM is committed to conduct AIA for target areas with moderate to high archaeological potential and to avoiding archaeological sites present within potential borrow areas. Employees and contractors of AEM will not be permitted to go beyond the Phase 2

[85] Mitigation occurred in 1970s Archaeological Survey of Canada 1972

AWAR footprint while on shift, but the road may allow easier access to archaeological sites along its route by the general public, including tourists. However, the general public have had access to these sites by the use of ATVs prior to exploration and proposed mine activities. During the AIA no detectable environmental changes as a result of past access was identified, and easier access is not likely to influence people's behaviour toward archaeological heritage.

Rankin Inlet Bypass Road and Infrastructure

The operation and maintenance of the Rankin Inlet bypass road and other mine-related infrastructure has been assessed as a minor pathway with respect to the archaeological record (Table 9.11-1). Traffic will remain on the bypass road and within the laydown areas, and maintenance is not expected to occur outside the general construction footprint of these facilities. In the case of accidents or malfunctions, there is limited chance that archaeological sites greater than 30 m from the Project footprint in Rankin Inlet will be impacted. No new borrow sources are anticipated in Rankin Inlet; however, if they are found to be necessary, AEM is committed to conduct AIA for target areas with moderate to high archaeological potential and to avoiding archaeological sites present within potential borrow areas. These sites are located close to Rankin Inlet, and the general public have had access to these areas prior to exploration and proposed mine activities. During the AIA no detectable environmental changes as a result of past access was identified, and easier access is not likely to influence people's behaviour toward archaeological heritage.

9.11.5.1.2.3 Closure and Post-Closure

Mine Infrastructure

Mine infrastructure closure and post–closure activities, including access for monitoring if required, are assessed as a minor pathway with respect to the archaeological record. Closure and reclamation activities are not expected to occur outside the construction footprint. Mine Infrastructure will be removed, and pads and access roads scarified. No new lands will be disturbed or altered as a result of closure and post-closure activities, and no new borrow sources are anticipated to be required. In the case of accidents or malfunctions, there is limited chance that archaeological sites beyond 30 m from the closure footprint will be impacted. Employees and contractors of AEM will not be permitted to go beyond the closure footprint while on shift. Access of the general public, including tourists, to mine areas during closure will be restricted, and during post-closure will by the use of ATVs as was the case prior to exploration and proposed mine activities. During the AIA no detectable environmental changes as a result of past access was identified, and people's behaviour toward archaeological heritage are not expected to change post-closure.

All-weather Access Road

Closure and post–closure activities for the Phase 2 AWAR, including access for monitoring if required, are assessed as a minor pathway with respect to the archaeological record. Phase 2 AWAR closure and reclamation activities (scarification) are not expected to occur outside the construction footprint. No new lands will be disturbed or altered as a result of closure and post-closure activities, and no new borrow sources are anticipated to be required. In the case of accidents or malfunctions during closure activities, there is limited chance that archaeological sites beyond 30 m from the closure footprint will be impacted. Employees and contractors of AEM will not be permitted to go beyond the closure footprint while on shift. Access of the general public, including tourists, to archaeological sites along the scarified road during post-closure will by the use of ATVs as was the case prior to exploration and proposed mine activities. During the AIA no detectable environmental changes as a

result of past access was identified, and people's behaviour toward archaeological heritage are not expected to change post-closure.

Rankin Inlet Bypass Road and Infrastructure

Closure and post–closure activities for the Rankin Inlet bypass road and other mine-related infrastructure, including access for monitoring if required, are assessed as a minor pathway with respect to the archaeological record. Closure and reclamation activities are not expected to occur outside the construction footprint. No new lands will be disturbed or altered as a result of closure and post-closure activities, and no new borrow sources are anticipated to be required. In the case of accidents or malfunctions during closure activities, there is limited chance that archaeological sites beyond 30 m from the closure footprint will be impacted. Employees and contractors of AEM will not be permitted to go beyond the closure footprint of the Rankin Inlet bypass road while on shift. Non-mine employees, including tourists, will have access to archaeological sites along the scarified road during post-closure by the use of ATVs, as was the case prior to exploration and proposed mine activities. During the AIA no detectable environmental changes as a result of past access was identified, and people's behaviour toward archaeological heritage are not expected to change post-closure.

9.11.5.1.3 Pathways with Primary Linkage

A pathway may have primary linkage if the pathway is likely to result in a measurable environmental change that could contribute to significant residual effects on archaeological record baseline. Since all sites which will be impacted by the Project either have, or will be mitigated using standard archaeological methods, none of the impacts to the archaeological sites are considered to contribute to significant residual effects on the overall archaeological record baseline because a record of the site has been document and will be preserved in permit reports. Therefore, no primary linkages are assessed, and a residual effects assessment and classification is not required with respect to Project impacts on the archaeological record.

9.11.5.1.4 Effects Analysis Summary

There are 98 archaeological sites identified within the LSA, and 266 archaeological sites within the RSA. Most of the sites within the LSA have low to moderate archaeological significance; 13 have high archaeological significance. Thirty-four sites are considered assessed as associated with minor pathways impacts; of these only 2 are associated with high archaeological significance. To date the majority of these site been mitigated with appropriate archaeological methods. There are 3 sites known to require mitigation prior to construction and possible others that will require mitigation in relation to the Site Water Management Plan (SD 2-6) implementation.

The increase human presence and easier access to the Project area may result in indirect impacts. Employees and contractors of AEM will not be permitted to go beyond the mine infrastructure. While there is more uncertainty associated with none mine related activity in the area, past evidence suggests that the majority of sites within the LSA, while known, have not been disturbed in the past, and easier access is expected not likely to influence people's behaviour toward archaeological heritage.

No primary linkages are assessed for potential Project effects to the archaeological record, and a residual effects assessment and classification is not required.

9.11.6 Cumulative Effects

A cumulative impact (or effect) can be defined as the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions (Tilleman 2005). Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time.

Activities anticipated to have possible impacts on the archaeological record within the RSA include the AEM exploration program, the municipality of Rankin Inlet, use and development of the Iqalugaarjuup Nunanga Territorial Park, and traditional and recreational land use. The Phase 1 and Phase 2 AWAR surface footprint are largely the same and therefore both have been considered. The AEM exploration program implements an AIA prior to drilling and avoids recorded archaeological sites present within the target drill areas (Ross 2012b, in preparation). The expansion of infrastructure within the municipality of Rankin Inlet has impacted previously recorded sites and has the potential to impact others. No evidence was observed during the 2008, 2010, 2011, and 2012 field programs to suggest that either traditional or recreational land use was negatively impacting sites; Park development documents suggest that sires in the park had been impacted by land use activities (Government of the Northwest Territories 1991). Beyond the activities mentioned above, there are no anticipated future developments within the heritage RSA.

9.11.7 Monitoring and Follow-Up

Upon approval of the Project, Cultural and Heritage Resources Protection Plan (SD 9-1) will be implemented to limit effects to heritage resources. The principal goal of the Cultural and Heritage Resources Protection Plan is to continue to actively manage potential damages to heritage resources.

There are 4 main components of the Cultural and Heritage Resources Protection Plan:

- conduct archaeological impact assessment for new proposed development (exploration);
- monitor sites close to the Project footprint; and
- mitigate archaeological sites known to be within Project footprint.

9.12 References

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APPENDIX 9.1-A

Research Licenses issued by Nunavut Research Institute for Project Socio-Economic and Traditional Knowledge Studies

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SCIENTIFIC RESEARCH LICENSE

LICENSE # 03 031 10N-A

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TITLE: Socio-Economic & Traditional Knowledge Studies for the Comaplex minerals Corp. Meliadine Gold Project Environmental Impact Assessment

OBJECTIVES OF RESEARCH:
The socio-economic and traditional knowledge studies may include, in addition to reviews of secondary data sources, key informant interviews and focus group discussion in Rankin Inlet, Whale Cove and Chesterfield Inlet. Key informant interviews and focus groups discussions complement official socio-economic data from secondary sources, providing qualitative information on socio-economic dynamics and trends, as well as on community/sub population strengths, weaknesses, opportunities and constraints and on people's concerns and interests with regard to the Meliadine Project development. Interviews with people who are knowledgeable about the land and its resources provide information that can be integrated into the environmental impact assessment, in combination with scientific knowledge, such that the quality of the assessment is enhanced.

TERMS & CONDITIONS:

DATA COLLECTION IN NU:
DATES: May 21, 2010-December 31, 2010
LOCATION: Rankin Inlet,Whale Cove,Chesterfield Inlet

Scientific Research License 03 031 10N-A expires on December 31, 2010
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OBJECTIVES OF RESEARCH:
The socio-economic and traditional knowledge studies may include, in addition to reviews of secondary data sources, key informant interviews and focus group discussion in Rankin Inlet, Whale Cove and Chesterfield Inlet. Key informant interviews and focus groups discussions complement official socio-economic data from secondary sources, providing qualitative information on socio-economic dynamics and trends, as well as on community/sub population strengths, weaknesses, opportunities and constraints and on people's concerns and interests with regard to the Meliadine Project development. Interviews with people who are knowledgeable about the land and its resources provide information that can be integrated into the environmental impact assessment, in combination with scientific knowledge, such that the quality of the assessment is enhanced.

TERMS & CONDITIONS:

DATA COLLECTION IN NU:
DATES: July 01, 2011-December 31, 2011
LOCATION: Rankin Inlet,Whale Cove,Chesterfield Inlet

Scientific Research License 03 064 11R-M expires on December 31, 2011
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AFFILIATION:

TITLE: Socio-Economic and Traditonal Knowledge Studies for the Agnico-Eagle Mines Limited,Meliadine Gold Project, Environmental Impact Statement.

OBJECTIVES OF RESEARCH:
The objective of the socio-economic and traditional knowledge studies is to collect baseline data to enhance Agnico-Eagle's understanding of conditions in communities potentially affected by the Meliadine Project. The information will be used to assess the potential and residual impacts of the Meliadine Project on socio-economic conditions and resource use and to frame impact mitigation and benefit enhancement measures to be implemented by Agnico-Eagle as conditions for Meliadine Project approvals.

TERMS & CONDITIONS:

DATA COLLECTION IN NU:
DATES: March 15, 2012-December 31, 2012
LOCATION: Arviat,Whale Cove,Rankin Inlet,Chesterfield Inlet,Baker Lake,Repulse Bay, Coral Harbour

Scientific Research License 03 008 12N-A expires on December 31, 2012
Issued at Iqaluit, NU on April 10, 2012

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APPENDIX 9.3-A

Results of Inuit Qaujimajatuqangit interviews and focus groups held in Rankin Inlet, Chesterfield Inlet and Whale Cove (Nanuk Enterprises 2011)

APPENDIX A

DRAFT

RESULTS OF INUIT QAUJIMAJATUQANGIT INTERVIEWS AND FOCUS GROUPS HELD IN RANKIN INLET, CHESTERFIELD INLET, AND WHALE COVE

Prepared by:

Nanuk Enterprises Ltd.

For

Agnico-Eagle Mines Ltd. Meliadine Gold Project

2011

EXECUTIVE SUMMARY

Inuit Qaujimajatuqangit (IQ), or Traditional Knowledge studies for the Meliadine Gold Project were done over two different periods for WMC International Ltd. and Comaplex. The first set of studies was undertaken in the winter of 1998–1999 and a second set of studies were undertaken in the winter of 2010–2011 for Agnico-Eagle Mines. This presents Inuit knowledge of the proposed route of an all-weather road from the Char River Bridge to the infrastructure area of the project. A photo section illustrates specific topics, and is attached as Appendix B. The summary is based on interviews and focus groups held in Rankin Inlet, Chesterfield Inlet, and Whale Cove. Interviews and focus groups were held with elders, young adults, other hunters and trappers who are very experienced on the land. Interview data found that knowledge of the land and its uses up to the late 1970s parallels the information contained in Milton Freeman's study entitled "Inuit Land Use and Occupancy Project" (1976). This data has been updated with any additional information, and has been added to regional maps produced by the previous traditional knowledge studies done for WMC/Comaplex Minerals (Nanuk Enterprises 1999).

For the purpose of this IQ study, the proposed road corridor has been divided into four sections and the various activities in each section are described. As expected, the area in the lower Meliadine valley and the lowland area just to the north of the proposed bridge is most intensively used by traditional knowledge holders.

To briefly summarize the key results of IQ studies in Rankin Inlet, Chesterfield Inlet, and Whale Cove, it was apparent that Inuit caribou hunting is by far the most important (and most treasured) activity in this area. The IQ information found that caribou hunting occurs whenever the migrations of the caribou bring them within boat, Honda (ATV), or snowmobile reach of any of the three communities. The people from Chesterfield Inlet tend to hunt to the north and west of the community along the inlet of the same name, and some hunt south toward Rankin and the Project. People from Rankin Inlet hunt to the northwest, and west beyond the Project, and to the southwest. They also hunt along the coast by boat. Those from Whale Cove hunt along the coast and into Corbett Inlet and Pistol Bay, and inland, but seldom go in the area of the Meliadine Project. The studies also revealed that muskoxen were not hunted frequently in the past, but their populations are increasing in the Rankin Inlet area. As a result, more are currently hunted, especially when caribou are scarce. Marine mammals (seals, walrus, belugas, and other whales) are hunted wherever seen, and the people of Chesterfield Inlet are of the opinion that fewer marine mammals are appearing close to the community or in Chesterfield Inlet generally. Polar bears are hunted when people have tags. Wolves and wolverines are hunted whenever

seen, especially when fur is prime. Waterfowl (mostly ducks and geese) are hunted when they pass through the area, and ptarmigan are hunted whenever seen, but mostly in spring when they are migrating. Trapping is far less important than in the past, but a few people still trap. Fishing is done when the char are running, or when either lake trout or arctic char are available through the ice. Berry-picking is a fall activity enjoyed by whole families, as it provides a chance for all generations to get out on the land together.

While information obtained through the interviews and focus groups is similar to that found in Freeman (1976), the current use of skidoos, ATVs, and faster boats allows people to range further afield in their daily hunting efforts. This is offset by the fact that they are no longer nomadic, and no longer make long journeys with their families. Temporary camps far from the coast, near cached meat, have been replaced by homes in the community; and, although people do camp while hunting or fishing, they no longer live a nomadic-subsistence lifestyle. Few are left who truly lived that lifestyle on the land.

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Attachment A
Attachment B

1 INTRODUCTION

This report summarizes information obtained from Elders in Rankin Inlet, Chesterfield Inlet and Whale Cove during the winter/spring of 2010 – 2011, which is used to augment and update the information obtained during the original Inuit Qaujimajatuqangit (IQ) studies done in the late 1990s (Nanuk Enterprises 1999). Interviews and focus groups were undertaken in Rankin Inlet, Chesterfield Inlet, and Whale Cove in 2010 and 2011. Participants included elders, young adults, and members of the Hunters and Trappers Association (HTO). A copy of the interview guide used for the interviews and focus groups is found in Attachment A.

The first half of the report summarizes the use of the land along the proposed road route, and is divided into four geographical sections. These sections are broken out roughly by terrain – the Road Section 1 is located between the existing road and the bridge over the Meliadine River (Attachment B, Photo 1). After crossing the Meliadine River, the proposed road will cross an area of low topography (Road Section 2) before climbing to the height of land and following the existing ATV trail to the Meliadine site (Road Section 3). Road Section 4 is the side road route to the Discovery Deposit.

The second half of the report is a summary of IQ of past and present land use for the larger region, obtained through interviews and focus groups in Rankin Inlet, Chesterfield Inlet, and Whale Cove.

2 TRADITIONAL USE OF THE PROPOSED ALL WEATHER ROAD ROUTE

The proposed route of the all-weather road from Rankin Inlet to the Meliadine Gold Project (the Project) has seen considerable use during the past 30 years, as the road route follows a traditional “Honda” (ATV) trail from a lake to the northeast of the proposed river crossing, to the general area where the Meliadine Camp and gold deposits are located. The initial part of the proposed road, between the existing Honda (ATV) trail and the river crossing is located in the lower Meliadine River (Iqalugaarjuk) valley, which has been home to various groups of people since about 1000 BC, when the Pre-Dorset (also known as the Arctic Small Tool Tradition People) hunted along the Meliadine Esker. It was heavily used by the Thule Inuit after their arrival along the western Hudson Bay coast in about 1200 AD through their transition to the modern Caribou Inuit right up to the present time. The upland areas were less heavily used but still afforded good hunting, berry-picking, and offered travel routes to other hunting areas.

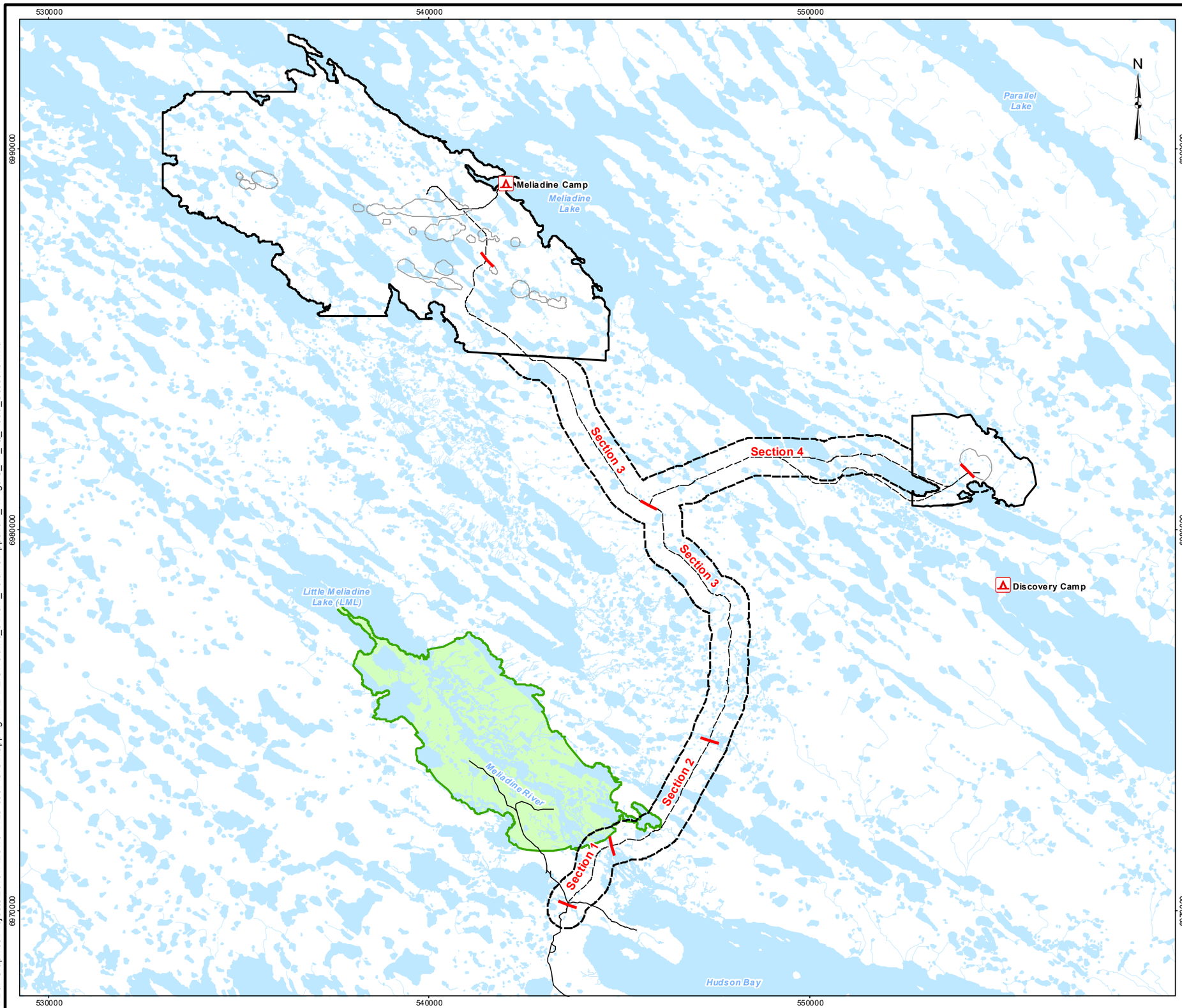
The four road sections used to delineate the following descriptions are shown in Figure 1.

2.1 ROAD SECTION 1 - LOWER MELIADINE VALLEY

According to local elders (and the archaeological record) the lower Meliadine River (Iqalugaarjuk) has been used by Inuit since prehistoric times. It was an important dwelling and hunting area, and has figured prominently in legends of the area as well.

The Rankin Inlet area, including the lower Meliadine valley, was surveyed by archaeologists Urve Linnamae and Brenda Clark in the early 1970s and results were published in Musk-Ox (Linnemae and Clark 1976).

The Thule people occupied the lower Meliadine area from the early 1600s to the mid-1700s when the culture changed to what is now known as the Caribou Inuit. Regular occupation of the area continued up to the 1060s. (Burt and Hickes 2004).



LEGEND

- Camp
- Infrastructure
- Phase 2 AWAR Road Alignment
- Phase 2 AWAR Road Section (as per TK interviews)
- Road - Existing
- Watercourse
- Local Study Area - Mine
- Local Study Area - Road
- Territorial Park
- Waterbody

DRAFT

REFERENCE

Base data obtained from Agnico Eagle Mines Ltd (AEM).
Datum: NAD 83 Projection: UTM Zone 15

2 0 2
KILOMETRES

PROJECT
AGNICO EAGLE
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
INUIT QAUJIMAJATUQANJIT ROAD SECTIONS

Golder Associates
Greater Vancouver Office, B.C.

PROJECT NO. 10-1373-0076			FILE No.	
DESIGN	MG	02 Mar. 2012	SCALE AS SHOWN	REV. 0
GIS	CDB	02 Mar. 2012	FIGURE: A1	
CHECK				
REVIEW				

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A major archaeological site known as KfJm3 to archaeologists and as "Qamaviniktalik" to the Elders is located approximately 1 km upstream from the proposed bridge site. Qamaviniktalik refers to the old semi-subterranean sod houses, and it is thought that the site was occupied during the fall and early winter, before people moved into igloos on the sea ice. The entire lower valley has many stone structures (qayaq cradles, fox traps, storage caches, tent rings, drying racks, hearths, and more) that indicate how the area was used (See Attachment B, Photo 2 for an example of an uplisautit fox trap, located in the territorial park). Elders participating in the IQ studies generally agreed with the archaeological evidence, and added anecdotal evidence of their own (Hickes and Logan 2011).

Fishing for both char and arctic grayling was important to people. There are remnants of stone fishing weirs near the mouth of the Meliadine River, and stone drying racks scattered through the valley. "Iqalugaarjuk" translates as "the river of little fishes," which refers to the grayling. Rectangular stone "caches" were used to store frozen char for winter use. Meliadine and Char rivers are still considered good fishing sites today. Lake trout are often caught in Landing Lake, at the outlet to the Char River, while this short river itself offers good grayling fishing, and char fishing during the char runs.

The lower Meliadine was an important caribou hunting area when the herds migrated along the coast. There are numerous taluit (hunting hides) in the valley (Attachment B, Photo 3). These concealed hunters from the migrating caribou so they could take animals with bows and arrows, and later, with rifles obtained from the traders. Periodically, large herds migrate through the area and many people hunt when caribou are present. This was particularly true in the summer of 2011 when a large herd of caribou passed through the Meliadine area in early August (Attachment B, Photos 4, 5, and 6). Inuit are allowed to hunt caribou at any time, but others must wait until August 15th and must obtain tags in order to hunt. During the 2011 migration, many people were hunting caribou throughout the park and along the slopes on the far side of the river, as well as anywhere that caribou were to be found within Honda reach.

With the rebounding of the muskoxen populations, muskoxen hunting is becoming popular once again. As far as we know, no musk oxen have been hunted in the vicinity of the road or bridges, but muskoxen have definitely been hunted in the general vicinity of Rankin Inlet, mostly around the Dianne River.

Polar bear hunting has been restricted in the last three years. When people do hunt polar bears they tend to follow the coast. The exception is when people who are hunting caribou encounter a bear that has travelled inland, perhaps following

calving caribou in the spring. Polar bear hunting is important to the people from Rankin Inlet, Chesterfield Inlet, and Whale Cove communities, although it likely doesn't occur very often in the general area along the access road and proposed mine site. The most likely area for this is in the lower Meliadine valley, and in the next section of the road which crosses mostly lowland areas (Road Section 2 on Figure 1). Polar bears are valued for food, especially by the Elders.

The occurrence of the grizzly bear is increasing along the Hudson Bay coast, with far more grizzlies being seen in the last six years than any time within living memory. Grizzly bears are not normally hunted for food. In Kivalliq, especially along the coast, grizzlies seem mostly to be considered threats to cabins and human safety, and hunted as a reaction to their presence, or after damage has occurred. Grizzlies have been seen in a number of places in the larger region, but come into conflict with people mostly in the areas between the Dianne River and Meliadine River. None of the Elders interviewed mentioned grizzlies on their own, but did say they would hunt them if they saw them. Most people spending time out on the land do take precautions against grizzlies.

Some of the taluit (Attachment B, Photo 7) likely did double duty as hunting blinds for geese, other waterfowl, or sandhill cranes. Thousands of snow geese, Canada geese, and white-fronted geese stop in the lower Meliadine area to rest and feed during both spring and fall migrations. People hunted there in the past and continue to do so now. Many still use the old taluit as blinds, as evidenced by the large quantities of shotgun shell casings, .22 calibre bullet holders, and general plastic litter in the structures.

Ptarmigan were and are highly prized locally as a delicacy, and are taken wherever they are encountered. People have favourite ptarmigan hunting locations, but did not say much about ptarmigan when discussing their hunting activities. When asked where they hunt them, IQ knowledge holders typically say, "Wherever….!"

Arctic foxes (Attachment B, Photo 8) are frequently seen in the area, and in the past were trapped for their fur, providing local Inuit with skins for trade at the small posts along the coast. A few people still trap today and the Meliadine valley area is used for that purpose. Wolverine and wolves are hunted whenever and wherever seen.

In the past, sik siks (arctic ground squirrel) (Attachment B, Photo 9) were trapped and hunted, particularly by women. They were eaten, especially in fall, and their skins were used for garments for children, bags and cleaning rags. They are only rarely hunted by Elders today, most probably as a nostalgic activity.

Berry picking was and is an important fall activity throughout the Meliadine valley (Attachment B, Photo 10). Berries are found wherever there are low slopes with heath tundra and in hummocky areas at the edges of wetlands. Elders involved with the plant IQ and TLU studies during the summer of 2010 said that their families always picked berries in that area. The berries most commonly picked include paungait, or "black berry"; crowberry (*Empetrum nigrum*), kigutangirnaq; blueberry (*Vaccinium uliginosum*); and kakautit, or lingonberry (*Vaccinium vitis-idaea*) (Attachment B, Photo 11). Lesser quantities of the highly-prized aqpik, or cloudberry (*Rubus chamaemorus*); and kablautitit, or bearberry (*Arctous alpina*) are picked as well. Mahok, or liquoriceroot (*Hedysarum alpinum*) (Attachment B, Photo 12) grows abundantly in the floodplain of the river, and in the past was dug for its roots, which are highly nutritious in the fall, tasting vaguely like carrots (Burt 2011).

2.2 ROAD SECTION 2 - NE OF MELIADINE BRIDGE THROUGH LOW TOPOGRAPHY TO ASCENT OF RIDGE SYSTEM

The next section of the road crosses a flat area north of the proposed bridge site. Immediately to the right of the road as it leaves the river is a low knoll with a number of well-defined tent rings and meat caches (Attachment B, Photos 12, and 13). It likely has been identified by the archaeological team, but appears to be a spot where people have camped for many years, mostly while they hunted or fished near the mouth of the Meliadine River.

From the number of caribou bones on the land and even incorporated into the moss of the tundra, it is clear that this area has been and is a major caribou hunting area. Caribou, including many cows and calves, migrated through this area in early August, 2011 (Attachment B, Photo 14) in large numbers and were hunted throughout the lower Meliadine River Valley and on the slopes of this section of the road. Comments from hunters revealed that they were hunted all the way out to the Meliadine camp and beyond. There are many old caribou trails that weave among the lakes and ponds indicating that this was a good migration area in fall (in spring, caribou simply walk across the water bodies, and leave less trails). Many of these trails are deeply incised into the land, indicating the passage of many caribou (Attachment B, Photo 15). Most trails, however, are completely re-vegetated with rooted vegetation and with lichens (Attachment B, Photo 16). This indicates heavy caribou use in the past, but lighter use in recent times.

Snow geese, Canada geese, occasionally white-fronted geese (Attachment B, Photo 17), tundra swans, and sandhill cranes (Attachment B, Photo 18) forage throughout this section of the road in spring and fall, and tundra swans, sandhill cranes, and a few geese nest in the area. The geese are hunted in spring when the meat is better because, because have just left the grain fields in the south. In the fall, some Elders occasionally hunt sandhill cranes or swans, although these do not form a large part of the diet today. A wide sedge and tussock sedge wetland in this area is bisected by many Honda (ATV) trails. There is much damage to the land with many wide areas where the plants have been removed, or ground into the mud (Attachment B, Photo 19). With a proper road alignment in this area, and culverts to correct drainage problems, this area is expected to re-vegetate rather quickly.

Meat caches on a rocky ridge above a wide wetland provide evidence of past hunting activities in this area (Attachment B, Photo 20). There are also several tent rings, and small inuksuit and/or drying racks along the ridges (Attachment B, Photo 21). People spent time here in the past; long enough to dry meat and store it in the caches. It was also a good area from which to watch the lowlands for approaching herds or flocks.

On and beyond the ridge, the access road runs through an area of heath tundra with many perched glacial boulders. Blueberries (Attachment B, Photo 22) occur in abundance in this area and there are also many lingonberries, bearberries and crowberries. It is a good berry-picking area. It is also heavily used by geese in the fall.

With bridge and road access, this area would likely be used by far more people in the fall for berry picking.

2.3 ROAD SECTION 3 - SE OF THE MELIADINE PROJECT, WHERE ROAD FOLLOWS RIDGE AND ESKER SYSTEMS TO THE MINE SITE

As previously mentioned, the proposed road follows a ridge and esker system, plus established Honda (ATV) trails. This section of the road is southwest of the project development area. Historically, this network of Honda (ATV) trails has been a major transportation route to caribou hunting and fishing areas, and to cabins on Meliadine Lake.

There is ample evidence of human use of the Honda (ATV) trails in the area, distinct trails worn through the vegetation into the soil, especially in wetlands, and

debris left behind by travellers, and those hunting or camping in the area. There are tent rings and meat caches scattered along the route, especially on ridges where people camped in the wind to avoid mosquitoes, and to observe caribou movements (Attachment B, Photo 23). Some of the tent rings are quite old. For example in Attachment B, Photo 24, this ring is from a circular caribou skin tent supported by a pole in the middle, with radiating lines going from the edge of the top of the tent out to large anchor stones. There are taluit (hunting blinds) overlooking areas where caribou might pass below a ridge or promontory, and in areas where people likely hunt geese, in the past or today. And there are many small inuksuit, some that may have been used as game drives, and some marking places where there are storage caches.

Some of the stone structures are quite old. This can be determined because the stones are covered by lichens that grow stone to stone. Others, especially some of the tent rings or caches are likely much more recent, most probably constructed in the last 40 years. Archaeological sites in the area were mapped as part of the archaeological studies for the project and can be found in DEIS Volume 9, Section 9.11.3.2

The IQ studies with Elders in Rankin Inlet, Chesterfield Inlet, and Whale Cove identified information about general use of the area between Chesterfield Inlet and Whale Cove, and inland to include the Project area. Few details about use of the specific areas of land along the proposed road were found during studies with elders. One challenge is if Elders are not on the land at the time of the interviews or focus groups, it is difficult to speak about exact locations, and descriptions of activities may be vague. Generally, the Elders participating in the IQ studies in 2010 and 2011 agreed with the concepts and locations identified in the earlier IQ Study on the Meliadine Gold Project (Nanuk Enterprises 1999). They said the caribou migrate through the area approximately every 6 to 12 years, and that although it is an important hunting area when caribou are present, it is not unique, and caribou are hunted throughout the general region and beyond.

Some details about past use of the proposed road route can be deduced from signs on the land. For example, there is considerable use of the area whenever caribou are present in the area. People go out caribou hunting from Rankin Inlet by snow machine in winter, and by boat and Honda (ATV) in the summer. In winter, people are not limited by trails, and can travel wherever they want to find caribou. In the summer, they are somewhat limited to the Honda (ATV) trails, but readily leave them to get closer to animals if the terrain is not too rocky to permit the passage of the Honda (ATV) wheels.

Observations during the recent caribou migration through the Rankin Inlet area and especially in the area of the proposed road route revealed that hunters on ATVs readily leave the trails to hunt, often following ridge crests because of the increased field of view, and because they can travel faster along the ridges.

Muskoxen are increasing in numbers in the Rankin Inlet area. Community consultations found that there are far more sightings, and far more hunting of muskoxen than when the earlier TK study was done in the late 1990s. In the 1800s, muskoxen were abundant on the mainland Canadian arctic, but probably more common north of Chesterfield Inlet than south along the Hudson Bay coast. They were hunted for their meat and hides during the trading era, and extensively for meat and hides for overwintering whalers along the Hudson Bay coast (Tener 1965). Records of oxen taken by the whaling crews are practically nonexistent, but anecdotal evidence indicates that the harvest by Inuit hunting to supply the whaling crews was an important cause of the decline of the muskoxen along the western coast of Hudson Bay (Tener 1965). Muskoxen vanished from the coast by the early 1900s. They were hunted almost to extinction but the establishment of the Thelon Game Sanctuary allowed recovery to take place in the barrenlands. Muskoxen are steadily increasing in the Kivalliq Region, with more being seen around Rankin Inlet each year. They are hunted, although not nearly as heavily as caribou. Although elders talked of hunting muskoxen, they were not an important food source to them in the historical past, and are not so today.

Waterfowl are also hunted along the proposed road route, and people can use the existing Honda (ATV) trails to access important feeding areas for waterfowl. In the fall, large flocks of snow geese (Attachment B, Photo 25) and smaller flocks of Canada geese pass through the area and feed on berries on the slopes. The geese are hunted where present throughout the area.

Berry-picking is practiced by families, including grandparents and children, anywhere the berry areas are accessible from Rankin Inlet by Honda (ATV). People are less likely to cross the Meliadine River to pick berries, especially if they are carrying young children on their Hondas (ATVs). People tend to pick berries in Iqalugaarjuup Nunanga Territorial Park, near Second Landing Lake, and along the Diane River Trail. A few people do cross the river to pick berries, mostly in conjunction with hunting of caribou or geese. It is evident that a bridge across the Meliadine River would make far more good berry-picking areas accessible to families. This has been mentioned in several interviews and focus groups.

There are many areas along the ridges along which the proposed road will pass that are rich in crowberries, and thus productive berry-picking areas. Almost every flat terrace, drumlin, or esker ridge offers abundant crowberry habitat (Attachment B, Photo 26). Slopes and lower heath tundra terraces are often rich in blueberries. Lingonberries are commonly found in sandy areas and in mixed heath tundra. Cloudberries (Rubus chamaemorus) (Attachment B, Photo 27) grow in wet areas along the edges of sedge wetlands, and are eagerly sought.

2.4 ROAD SECTION 4 - PROPOSED SIDE ROAD TO DISCOVERY DEPOSIT

This proposed sideroad extends from the main proposed road northeast along the end of Meliadine Lake to the Discovery Deposit. The route follows a height of land and a prominent esker along the end of Meliadine Lake. Part of the route may or may not follow existing Honda (ATV) trails. There is ample evidence of human use of the land here, especially along the esker; including pieces of old cabins, inuksuit, tent rings, and storage caches; and modern debris left behind (Attachment B, Photo 28).

This area was not specifically mentioned by any of the interview or focus group participants, but people were not really specific about areas along the proposed road. There is, however, some specific information known about this area.

Meliadine Lake was mentioned in all focus groups held in Rankin, as it is a popular fishing location in the late winter and springtime, and a good hunting spot whenever caribou are in the area. Many people follow the winter road toward the Meliadine Camp and then follow snowmobile trails to the southeast end of the lake. There are many ice fishing holes made in Meliadine Lake in the spring. Kivalliq Counselling and Support Services holds family fishing events at Meliadine Lake (Attachment B, Photos 29 and 30), and it is a popular fishing spot during the fishing derby. Some people commented that they appreciate the idea of Agnico-Eagle putting in a spur road and boat ramp/dock at the southeast end of Meliadine Lake, as they will be able to get boats out to the lake once there is a road.

Consultations also revealed that many people are concerned about the health of Meliadine Lake. Several comments were made about gravel being removed from islands in the lake, and those expressing concern about this further indicated that birds nest on those islands. Additionally, people also use the islands while hunting caribou. People further indicated that they were concerned about fish populations in Meliadine Lake; asking if the fish would be affected by the tailings ponds or potential sewage runoff. Some were under the impression that

Meliadine Lake or part of it would be drained and the fish moved. The researchers undertaking IQ studies tried to correct this perception, and were under the impression that the community understood this clarification.

Aerial surveys also found evidence of several Honda (ATV) trails extending into the Meliadine Lake area. Research undertaken on summer vegetation in the area also found numerous Hondas (ATVs) travelling toward the lake or on the ridges to the southeast of the lake.

The Meliadine Lake area is also good for hunting geese and other waterfowl in the fall. Every ridge and slope also offers good berry-picking. There is likely little berry picking done here now except when families are camped on the land, but the presence of a road would make this much more accessible to those who wish to pick berries.

3 REGIONAL LAND USE, PAST AND PRESENT

3.1 RESULTS OF FOCUS GROUPS IN RANKIN INLET

Several meetings were held in Rankin Inlet for the purpose of obtaining IQ information, plus incidental comments were recorded from other meetings held by the research team, or Agnico-Eagle in Rankin Inlet. Most Elders presented their comments and concerns in group meetings, rather than in individual interviews. Focus groups were held in Rankin Inlet with elders (June 2, 2011), young adults (June 8, 2011), and members of the Hunters and Trappers Association (February 2011). An interview was also held with a male elder in May, 2011.

Two main meetings in Rankin Inlet provided opportunities for elders to update the information in the previous Traditional Knowledge study (Nanuk Enterprises 1999).

During the focus groups, participants reviewed the IQ information contained in the earlier Traditional Knowledge study done for the WMC International Ltd. Meliadine West Gold Project (Nanuk Enterprises 1999) and had the opportunity to the information. Participants generally indicated they agreed with it. Participants made a few additions to the maps, but did not believe that substantial additions were needed. Comments made by participants were more related to concerns about the Project, or supporting the speedy development of the Project. In many ways it appeared that focus group participants preferred to move beyond discussion of information related to land use, and express the desire to 'get the Project going'.

The information gathered in the focus groups regarding the use of the land prior to the mid-1970s parallels the information found in Freeman (1976). By the 1970s, Rankin had been a mining town, gone through the depression following the end of the nickel mine, experienced some government efforts to promote economic development, become a regional centre, and was starting to experience the development of a solid business base.

During the 1970s, People were still going out on the land for long periods in the spring and summer to camp, fish, and hunt. They were accessing coastal areas from Baker Foreland to Corbett Inlet and sometimes beyond by boat. Inland camps near Peter, Machum, Twin, and McManaman lakes, were reached by snow machine and Honda (ATV). A commercial fishery existed, and some inland fishing locations (Henik Lake, Kaminak Lake, and Kaminuriak Lake) were

accessed by floatplane, and coastal ones (Barbour Bay, Winchester Inlet) by boat to obtain fish for the fish plant (Freeman 1976).

Trapping was on the decline, but a few continued to trap in the winter, along inland travel routes, near meat caches and in fox denning areas. Trapping also occurred along the coast from the Pangertot Peninsula to Baker Foreland; along the coast to Whale Cove and Bibby Island; inland to Kaminuriak Lake, Banks Lake, and Gibson Lake; or to Chesterfield Inlet (body of water) and the Quoich River area. A very few people lived inland and trapped on the Maguse River, at Ferguson Lake, and even toward the Manitoba border.

Caribou hunting was very important for food during the 1970s, and caribou were hunted inland in late fall to spring by snow machine, up to 100 miles west (Kaminuriak Lake), 120 miles northwest to Quoich River, and 100 miles north to Armit Lake. In the summer, caribou hunting occurred along the coast by boat, mostly between Whale Cove and Baker Foreland.

In February, 2011, a focus group was held for members of the Rankin Inlet HTO. Members spoke mostly about Project-related concerns, or in support of the Project. Members spoke of fish migration patterns during the operation of the North Rankin Nickel Mine. Members explained that there was much blasting, but the mining operations did not seem to discourage the char from using the Char and Meliadine rivers. Members indicated that construction and mining operations at the Meliadine Project could affect the caribou, but also believe that constraints should be placed on Agnico-Eagle when caribou are in the area. For example, the participants believe that when the caribou are in their birthing season, mining activity should stop for a while. The members recommended that the Project access road be patrolled to ensure that people follow the rules, especially when caribou are in the area. The HTO members discussed the movements of the caribou, and believe that there are definite fluctuations in caribou populations; that caribou change their migration patterns in response to predators, snow conditions, and food availability; that traffic on the road will likely have only a minor effect on caribou populations; and that uncontrolled hunting can have a larger effect on the populations. Members were also concerned about the prospect of being told they could not hunt near the mine, and want an opportunity to discuss this before rules are made.

Members of the HTO indicated they believe that Agnico-Eagle will follow policies regarding caribou, but also said they believe that people from Rankin Inlet may not follow the policies: “The mining people will listen to what they are allowed to do, but local people will not.”

Because people still involved with trapping would tend to be involved with the HTO, the topic of wolves and trapping, and potential effects on carnivores was raised. The HTO members did not pursue this topic very far, but did indicate they believe that wolves used to stay the larger area even when mining was occurring, but now carnivores such as wolves and wolverines are often chased away by snow machines.

During the focus groups, the HTO members expressed some concerns about fish. They had heard that some lakes would be drained and fish harvested or moved to another lake. There was some concern about this, until it was explained that only small lakes would be drained, and that Meliadine Lake was not to be disturbed.

Some concerns were expressed about the tailings ponds, with regard to birds settling on them, or caribou trying to drink from the ponds. Participants asked how their concerns could be expressed to Agnico-Eagle, and it was suggested that they ask Agnico-Eagle for regular consultation with the HTO, as it represents Rankin Inlet hunters.

A focus group with elders was held in Rankin on June 2, 2011, to review the maps prepared for Nanuk Enterprises (1999), and allow them to comment on changes in wildlife movements during the last 10 years. Seventeen Elders attended; of these, eight either worked in the North Rankin Nickel Mine or had a spouse who did. About half the group were members of the earlier Traditional Knowledge Committee which oversaw the original work on the Meliadine West Gold Project for WMC International Ltd.

Generally, Elders indicated that not many changes were necessary to the original IQ studies reported in Nanuk Enterprises (1999). Elders made a few small changes to the maps. For example, they mentioned that the caribou migrate through the area in cycles, and that the caribou numbers seem to fluctuate over time. One of the elders reported that “a few herds used the routes along the shore (of Rankin Inlet) less than 10 years ago. They will use these routes again. Some caribou use it in the fall.” In 2011, subsequent to this focus group, several large herds of caribou moved through the Regional Study Area, and when they first came, they were migrating along the shore routes.

The elders also provided observations on caribou behavior: “It is my experience that caribou won’t run away much. They know when I am hunting…. If I don’t try to hunt them, they don’t run. When you ARE hunting, they know, and they run away right then. In the past, the caribou used to take off right away when the see you. Now it is different – they don’t flee, even from skidoos.”

However, elders had strong opinions of some current hunting practices and lack of hunting knowledge, patience and skills. One of the elders stated “early caribou are usually scared off their route by too many skidoos and Hondas (ATVs), and early hunting. They change their route and go past to the west, avoiding all the people that are out there looking for them. People no longer know how to correctly hunt caribou. The first herds must pass without being hunted, and the others, later, are more likely to follow. People are too anxious to hunt today.”

The elders did not talk much about musk ox, but did mention that there were muskoxen in their ancestors’ time, but no muskoxen when they were young. As a result, muskoxen were not hunted. The elders added that the muskoxen have come back and that there are more of them now. Elders spoke of hard times, when the caribou did not come: “The animals are important to us. In the past, when we had no oil or fat from animals, we had nothing; no way to live. It was hard. The animals come and go. Sometimes the animals come around again after many years. When they were not around, people did not know where to go to hunt.”

People’s hunting techniques were highly adaptable. One of the elders explained that “when there were no land animals available, we hunted on the ocean. This was our lifestyle. Today is different. No one starves. There are hardships, but not as severe as then. When there are caribou, you hunt. Even now, I try to hunt.”

There was concern about wildlife, and what will happen to the wildlife before and after the Project. Elders stated that the caribou population around Rankin Inlet was affected during the early days of the community. “Before the nickel mine opened, the caribou changed their migration routes, so there were no caribou around where Inuit camped. Animals were scarce, and there was hunger in Arviat, Chesterfield Inlet, and the Rankin area.” There was hunger then, and many people either came close to starvation, or actually starved to death. All the Elders indicated they have known real hunger.

It was also clear that elders believed that mining and exploration were not the only things that affect wildlife, and that activities of residents on the land can also have a large effect on widlife. Several people mentioned that there are more private boats today, resulting in a lot more activity on the sea, which may affect marine mammals. Other elders mentioned that there are a lot of irresponsible people chasing caribou, which affects their migration paths.

There were few concerns related to the interactions of helicopters and wildlife. One of the elders reported that “my observation of helicopters is that the wildlife run a little bit, but once the helicopter is gone, they come back.” Another elder said “I am not against mining companies if they are careful. When we heard they were opening the North Rankin Nickel Mine, many people came here and worked. We are thankful that the company supported us. Now, we have government support too. We have houses, but the youth need jobs as everything is expensive now.”

Regarding the Project access road, the elders indicated their support, anticipating that it would be available for their use. The following comment was typical: “When will the road be built? I would like to use the road. I can drive a vehicle and would like to see this done so I can go hunting along the road. Will it be available for our use? Elders still have to hunt. We don’t have a lot of money to buy food from the store. The youth don’t eat much country food, but will eat it if we have it. I would like to see the route of the road on the map. What needs to be done to get this started?”

Elders mentioned that the mining activities may affect some fishing areas, especially those in Meliadine Lake. There was concern about the potential for islands in Meliadine Lake being used to supply gravel. Elders said they would be very opposed to that, and quite concerned about the effect of gravel quarrying on sedimentation and fish in the lake. The elders emphasized that Meliadine Lake is a very popular fishing spot, and any damage to the water or fish would elicit a lot of concern.

Concerns were raised over the perception that Meliadine Lake would be drained as part of the Project. Elders were not as concerned about the potential for other smaller lakes to be drained. Regarding the transfer of fish between water bodies, some of the elders found this amusing, but all believed it was ok to do this.

One elder spoke to a concern that had been brought forth in the community regarding the potential effects of the mine on fish in the Meliadine River: “Where the Meliadine [Project] site is located, the Meliadine River system will not be affected. There is a perception they are connected, but they are not connected.”

Elders were invited to speak about their overall perceptions of the Project. One Elder after another spoke out in very clear support of the development of the Project. They indicated they are concerned about the environment, but are also concerned about the economic future of the youth, and the area. One Elder summarized as follows: “It is important that the land is looked after. The land is an important part of our culture. Due diligence on the part of the company is

necessary. Employment is important. We don't have much access to employment. We need more opportunities for youth. I support the opening of this mine, but think that environmental issues should be addressed." Another said, "we must manage the risk, and address environmental issues as they arise. I'm sure we can put our minds together to do this."

3.2 RESULTS OF THE FOCUS GROUP AND INTERVIEWS IN CHESTERFIELD INLET

Information obtained during the focus groups and interviews in Chesterfield Inlet and Whale Cove closely parallels the information about land use contained in the Report for the Inuit Land Use and Occupancy Project (Freeman 1976).

According to Freeman (1976), in the fall, people from the community of Chesterfield Inlet hunted caribou in the area of the Inlet itself, north of the Inlet to Wager Bay, and south of the Inlet inland to Banks Lake, Gibson Lake and Peter Lake, and in the country south to Rankin Inlet. They camped near where they had cached meat and fat for fuel. In winter, they lived mainly on cached caribou meat, and dried and frozen fish. They trapped over large areas of land, between Wager Bay and Rankin Inlet, west to Banks Lake. In the spring, people hunted caribou wherever found, and fished through the lake ice for whitefish, lake trout, and char. Before the snow was gone, they went to the community of Chesterfield Inlet to trade furs, and hunt seals. As the birds returned in the spring, they hunted ducks and geese and collected eggs, but also hunted baby seals, and adult seals moulting on the ice.

During interviews, elders emphasized that caribou do not follow the same paths from year to year, but tend to wander in search of good forage. Some elders believe that exploration activities affect the caribou, causing them to change their migration routes. Others did not believe there was much effect. Elders were very concerned about anything that might affect caribou populations, and emphasised how strongly they depend on caribou for food, which is their main diet.

Regarding the potential marine life, elders indicated that during the summer of 2010, far fewer fish were caught in Chesterfield Inlet for the fish processing plant. Elders further wondered whether the decline in the fish catch was due to increased shipping traffic going up the inlet to Baker Lake. Elders also expressed their belief that there are far fewer whales, walrus, and harp seals, than in the past. Some attributed this to increased marine shipping, but a few elders mentioned that many more people have fast motor boats today, which in itself could account for less marine mammal activity near the community of Chesterfield Inlet. Others mentioned that there are fewer capelin close to the

community, and that these small prey fish appear to have moved their spawning areas, perhaps due to increased boat traffic. Elders were very concerned about the perceived changes the numbers of marine mammals, and believe it is an indication that something is happening in the waters of the Chesterfield Inlet.

The people in Chesterfield Inlet are strongly connected to hunting areas north of Chesterfield Inlet. Focus group and interview participants recommended that the areas between the Inlet and Wager Bay should be protected from exploration and mining activities, as it holds great meaning to them and remains an important hunting area.

The Elders expressed hope for jobs for young people once the Project becomes a mine, and the hope that some jobs would be available for people with lower levels of education. They mentioned the offloading of many materials destined for Baker Lake from ships onto barges or smaller boats, and expressed interest in providing port facilities for this as a business opportunity for the community. The elders were particularly concerned about communications regarding all mineral development, and said that they believe that information is not getting back to their community in a way that keeps people informed. They would like more information from NTI and KIA, and more communication through the Board members and community liaison people to the Inuit organizations.

3.3 RESULTS OF FOCUS GROUP AND INTERVIEWS IN WHALE COVE

Interviews in Whale Cove also strongly suggested that historic use of the land is similar to that reported in Freeman (1976), with intensive use of the land 60 to 70 miles inland, and less intensive use out to 100 miles; often sharing hunting and fishing areas with people from Rankin Inlet. This area undoubtedly included the area of the Meliadine Project. Whale Cove was established in 1959, as families relocated from Rankin Inlet after the North Rankin Nickel Mine closed. As a result they were familiar with hunting in the Rankin Inlet area. Whale Cove is located on the tip of a long peninsula, and the people who settled there were traditionally “inlanders”. As a result, people often travelled inland as far as Henik Lakes, Kaminak Lake, or the Padlei area to hunt caribou, or to run their traplines.

Today, Whale Cove people continue to hunt intensively in the coastal areas, around Corbett Inlet, Pistol Bay, and south to Sandy Point and beyond, for marine mammals. In the fall and spring, waterfowl are hunted in these areas. Interview participants indicated that they hunt inland for caribou, but do not normally go as far as the Project development area. Not many people trap today, but if they do, they usually stay close to the community. Families may go

out camping in summer to collect eggs and hunt seals, caribou, geese, and belugas; or in late summer, to pick berries and hunt passing waterfowl and caribou, and to fish.

Focus group participants and elders interviewed in Whale Cove believe that there are less caribou around than in the past, and wondered if it was because of increased mineral exploration. The elders reviewed the map prepared for Nanuk Enterprises (1999), adding that while they agreed in principle with the map, they do not really know the details of movement of animals around the Meliadine Project site. One of the elders stated that after the North Rankin Nickel Mine started in Rankin Inlet, the caribou decreased in the area. The elder added that "if people indicate that there are no more caribou due to too many mining activities, I do not believe that. The reason is today the weather has changed. The way the caribou migrate, they will roam to another area for a while….but will return."

The focus group further identified questions and concerns. Identified concerns were similar to those expressed in Chesterfield Inlet; that many youth do not have a good education yet still need jobs. Elders wondered if young people could be sent to other mines for on-the-job training. They also requested that someone from Agnico-Eagle talk to the high school students about jobs at the mine, and what it takes to be prepared for those jobs.

Elders were concerned that there is little employment in Whale Cove. They mentioned that there is a fish plant, and asked if they would be able to provide packaged and frozen fish or caribou for use as country food at the mine site, essentially looking for business opportunities for people living in that community.

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ATTACHMENT A

TRADITIONAL KNOWLEDGE STUDY INTERVIEW AND FOCUS GROUP GUIDE

ATTACHMENT A

Traditional Knowledge Study Interview and Focus Group Guide

This Traditional Knowledge study is one of a number of studies being conducted under contract with Agnico-Eagle concerning the Meliadine Gold Exploration Project impact area.

Background to set stage and let individual know how their information and ideas are important to this study.
The purpose of the study is:

- to have Elders and other individuals having knowledge concerning the traditional and present day use of lands and wildlife resources in the impact area identify past use of the area;
- to have Elders and other individuals having knowledge of the impact area identify and provide locations of sites of historic and cultural importance;
- to have Elders and other individuals having knowledge of the impact area identify and provide locations of importance to various types of wildlife found in and using the impact area;
- to have Elders and others having knowledge of the impact area identify and indicate locations of importance to plants in the impact area;
- to have cabin and outpost camp owners and users identify the location and uses of cabins and outpost camps;
- to have Elders and others having knowledge of the impact area identify and locate land marks of importance within the impact area;
- to have Elders and others who use the lands and resources within the impact area identify and describe concerns they may have with the present and proposed exploration and mine development and operations; and,
- to have Elders and others who use the lands and resources within the impact area identify and describe concerns that may have with the proposed road into the AGNICO-EAGLE operations locations -present and planned.

The Study Team is using a number of approaches to gather the information required. Approaches used include:

Interviews

- Individual interviews with Elders and other individuals having information concerning the impact area.

Meetings

- Community meetings with individuals with a common interest in the impact area, for example, Cabin Owners and individuals with Outpost Camps in the area; individuals who hunt and fish within the area; and individuals using the area for recreational purposes. We recognize that in some cases, membership in Focus Groups may overlap dependent upon interest areas;

AGNICO-EAGLE Meliadine West Gold Project
Traditional Knowledge Study

Consent to Interview

Interview Subject: _____
(please print)

Interview Location: _____

Interviewer: _____

I understand that:

- Agnico-Eagle is planning to develop a gold mine and related infrastructure in the Meliadine Lake area and is undertaking a number of impact studies.
- Nanuk Enterprises of Rankin Inlet has hired to interview individuals on traditional knowledge of land, waters and animal life in impact area. There will also be meetings with various community groups, to ensure that Agnico-Eagle hears about all uses of the land and the concerns of all sectors of the community.
- A committee group of Elders is overseeing the collection of traditional knowledge.
- This interview will be audio taped and the information on the tape translated into English, if required. Information from this interview may be used in the preparation of a written report to AGNICO-EAGLE.
- The interview subject retains ownership of the information he or she provides, and explicit consent is required for any other use of the information.
- Tapes of this interview and the interview transcripts will be held at a location to be determined by the committee groups overseeing the project.

I understand the purpose of this study and the uses to which the information will be put, as explained above and consent to being interviewed under these terms.

I consent to quotes being taken from my interview, as required to clarify or strengthen a point in the report to AGNICO-EAGLE.

Yes _____ My name may be used _____ My name should not be used _____

OR

No, I do not wish my words to be quoted _____

_____ _____

Signature of interview subject Date

I have reviewed this form with the individual being interviewed and explained the purpose of the interview and the project.

Interview Guide

Today we would like to hear from you how you have lived on the land in the study area. The mining company wants to learn about Inuit knowledge and use of the land.

Personal and Family History

Where did your parents live? Where were you born? When?
When did you first come to live in this area?
- How long have you been familiar with this study area?
- Did you come by yourself? With your family or other group?

Was your family part of a larger group?
- Which other families were part of the group?

Can you show me the territory you have travelled and the routes you used?
- with your family group?
- for different seasons?
- when you first were an independent adult?
- now?

Can you show on the map major land forms that you used for travel?
- Are these different for different seasons?
- What are the names of these land forms? What do the names mean?

Can you indicate on the map sites where you and your family camped?
- During which seasons?

Can you show us where your family or group got together with other Inuit? with Dene? with Kabloonaqs?
- When did you meet other people?

Were there special ways that were used by different family groups to cooperate on the land and not get in each other's way while hunting and fishing in the different seasons?
How did your family hunt, fish and gather the necessities for survival in your first memories of this area?
- which animals
- which seasons
- did this change over the years? why?

How was food stored?
How do you hunt, fish and gather in this area now or in recent years?
- Which animals
- Do you have a camp or cabin? Where?

Has there been a change over the years in your use of the land?
- What kind of change
- Why?

Traditional Use of Study Area

What can you tell us or show us on the map about Inuit living or hunting in this area?
- Where? When?
- How do you know this?
  - from family
  - from other people? Who?
  - archaeological sites
  - camp sites
  - burial sites
  - food caches

Are there any stories, legends or songs about the land we are discussing?
Are there special names for any of these places?
- What do the names mean?

Animal Habits and Migrations
Can you show on the map where you have encountered any animals? Are any land forms important to the animals? Why?

Which animals have you hunted for food? How? What seasons, what years?
Are there any egg collecting spots in the area of Meliadine Lake?
Are there any special uses to the Inuit of any of these animals other than food?

caribou
grizzly bear
polar bear
red fox
Arctic fox
wolf
wolverine
hare
ground squirrel
cranes
gulls
birds of prey – falcons, hawks, owls
waterfowl – geese, ducks, cranes, gulls
marine mammals – whales, seals
other

<u>More about Caribou</u>
Are there any important caribou migration trails in the land we are talking about?
Water crossings for caribou while they are migrating?
Have caribou ever used these lands as a calving ground?
Dates
Where
What is the largest number of caribou you have ever seen at one time?
Where?
When? (date and season)
How often have caribou spent the winter near Meliadine Lake in large numbers?
how many caribou?
which years?
is this a common event?

What is the best way to protect yourself and your camp from a bear?
From a wolverine?
Is rabies in foxes a common problem?
How did your family react to foxes that were sick?

Water and Fish
Can you show on the map where you and your family fished? Where do you fish now?
Which kinds of fish were caught there?
How?
In which season?
Have there been changes in the number or size of fish in any of these areas?
Describe these please.
Do you know the reason for these changes?
Have there been changes to water quality in your lifetime?
Describe these please.

Do you know the reason for these changes?

Weather

Do you remember any floods or very high water in your lifetime?
- When?
- Date? season?

Are there any memorable snow storms or rain storms that stand out as being records?
- When?
- Where?
- How much?

Ar there any other memorable weather events – e.g. very warm or cold years?

Other

Have you ever collected other material in this area? where? when? why?
- wood
- carving stone
- whale bone

Are there any useful or interesting plants in this area
- what are their names?
- where are they found?
- what uses do they have?

Are there any interesting rocks or minerals in this area?

Impact of Mining Activities

Do you have knowledge of any previous mining activity in this area?
- Were there any harmful effects on the land, animals, fish or water due to this mining activity?

Do you have knowledge of AGNICO-EAGLE'S exploration and mining activities in this area in recent years?
- Have there been any harmful effects due to their activities?

What are your concerns if a gold mine is developed near Meliadine Lake?
- for the land?
- for animals?
- for fish and water?
- for people?

Are there any areas that AGNICO-EAGLE should avoid during their mineral explorations and mining and related activities (buildings, roads, storage tanks, airstrips, etc.)
- Why?

Is there anything you would like to say to AGNICO-EAGLE concerning land use, environmental protection, social issues or economic matters?

How will exploration and/or development affect the study area and Rankin Inlet (or Chesterfield Inlet)?

Mentally and spiritually, how will these emotions be affected?

Has you community ever had any dealings with mining companies or other corporations

Do you have any other concerns?

Meliadine West Gold Project
Traditional Knowledge Study

1. Community Meeting Guide

Suggested Agenda

Prayer
Welcome and introductions
Attendance sheet
Background information on project

- Current and planned activities
  - – exploration and mining
  - – other impact studies (fish, water, caribou, etc.)
- AGNICO-EAGLE Indigenous Peoples Policy (distribute English/Inuktitut copies)

Who are we?

- Nanuq Enterprises Ltd. has been contracted to carry out a Traditional Knowledge Study on the area in which AGNICO-EAGLE proposes to develop a mine.
- We are attempting to ensure that people who use this land have an opportunity to tell how they have used the land in the past, how they use it now and what concerns they may have if a mine is developed.

What is Traditional Knowledge?

- There are many definitions of Traditional Knowledge.

The Objectives of Traditional Knowledge Study

- – to gather and document information on traditional and current use of land and natural resources within the study area
- – to gather and document people's ideas on the potential impact of a gold mine at Meliadine Lake – potential benefits and potential problems
- Impact area map

Small group discussion (see questions below)
Report back
Closing

- Thank everyone for input
- Information on how to contact

Adjournment

Meliadine West Traditional Knowledge Study Key Words

Personal and Family History
family
travel routes
land forms
trade
Dene
Kabloonaqs
camps
hunting
fishing
gathering
food storage
seasons

Traditional Use
archeological sites
burial sites
legends, songs, stories
place names

Animals
caribou
- caribou migration
- caribou calving

bear
fox
rabies
wolf
wolverine
hare
ground squirrel
ducks
geese
cranes
gulls
falcons
hawks
owls
whales
seals

Water and Fish
[kinds of fish]
water quality

Weather
flood
snow storm
rain storm

Other
wood
carving stone
whale bone
[kinds of plants]
minerals

Mining Impact
previous mining activity
AGNICO-EAGLE
concerns
areas to avoid

Process for Group Discussions and Report Back

Divide large group into groups of 4-5 by numbering people 1 to 4 or 5 accordingly. Instruct each group to select a chairperson, recorder and a reporter (these aren't necessarily all different people). Provide each group with:

- list of questions
- flip chart paper
- study area map
- markers.

Suggested time for small group work is 1 – 1.5 hours. The facilitator should advise groups of the time available beforehand and also periodically, circulating to answer questions and to see how groups are doing for time.

Discussion Questions

How do you use the land in the study area? Each person should mark on the map, where applicable

- your camp (use an X)
- where you go fishing (write the name of the fish on the map)
- where you go hunting (write the name of the animal on the map)
- travel routes across the area
- any other important sites and activities

As you mark these on the map, identify when you usually do this (months of the year or conditions) and record the information on the flip charts.

What are your thoughts and concerns about a gold mine at Meliadine Lake?

- What are the potential benefits from mining?
- What are the potential problems from mining?
- Are there any areas where AGNICO-EAGLE should be especially careful or areas that should be avoided completely during mineral exploration, mining and related activities (pits and underground mines, buildings, roads, tailings disposal sites, storage tanks, etc. – refer to study map) Why?

AGNICO-EAGLE wishes to work co-operatively with the community to ensure mutual benefit from mining. (Refer to AGNICO-EAGLE Indigenous Peoples Policy.)

- Which people or what organizations should AGNICO-EAGLE talk to?
- How can AGNICO-EAGLE get the best input on community concerns?
- How can AGNICO-EAGLE ensure an ongoing relationship of mutual understanding and respect with Inuit?

Do you have any further comments or questions for AGNICO-EAGLE?

Report back (approximately 1 hour)

Reporter and/or recorder brings flip charts and group map to front of the room and presents key points to group as a whole.
During this process, Bill Logan should take notes. In particular, he should write in English on maps to translate and clarify information from the reports back.

ATTACHMENT B

PHOTOGRAPHIC PLATES

Agnico-Eagle Mines, Meliadine Gold Project

Traditional Knowledge Regarding Inuit Use of Areas Affected by the Meliadine Gold Project

AűűlˑǒKϒŜyű B. Photos

Photo 1. Meliadine River crossing, site of future bridge.

Photo 2. Fox trap, uplisautit type, cone-shaped.

Photo 3. Talu (hunting blind) near proposed bridge site.

Photo 4. Caribout, August 2011, in wetland.

Photo 5. Herds passing in Aug. 2011, many cows and calves.

Photo 6. Caribou calf.

Photo 7. Hunting hide (talu) at end of Meliadine Lake.

Photo 8. Arctic fox kits, summer pelage.

Photo 9. Arctic ground squirrel, sik sik.

Photo 10. Berry-picking is a favourite fall activity for all ages.

Photo 11. Lingonberries, kakautit.

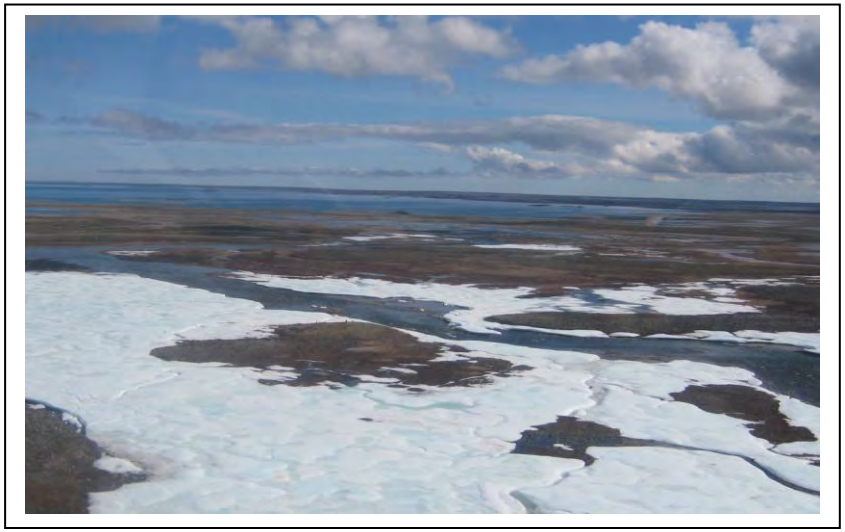


Photo 12. Bridge crossing and adjacent knoll with old sites.

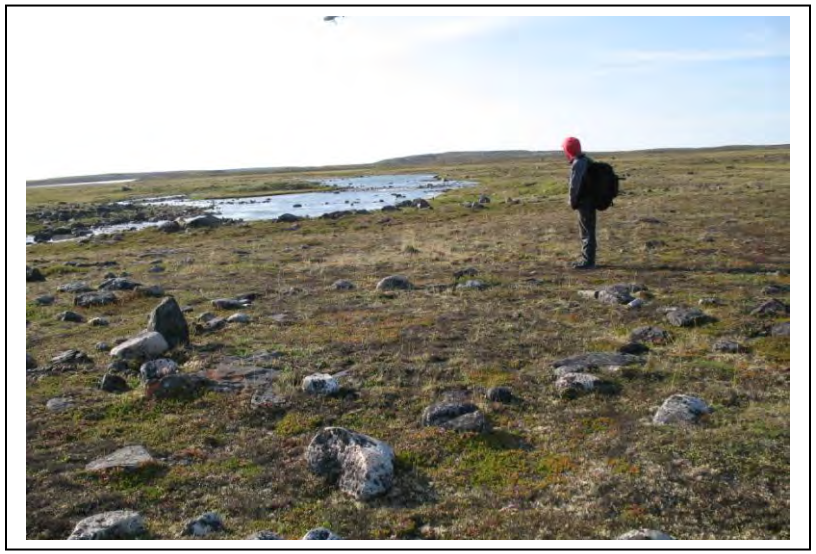


Photo 13. Tent ring on knoll adjacent to proposed bridge site.

Photo 14. Caribou cow and calf, August 2011.

Photo 15. Incised caribou trail, revegetated.

Photo 16. Old caribou trails at southeast end of Meliadine Lake.

Photo 17. White-fronted geese in flight.

Photo 18. Sandhill cranes.

Photo 19. Honda trails in wetland, Section 2.

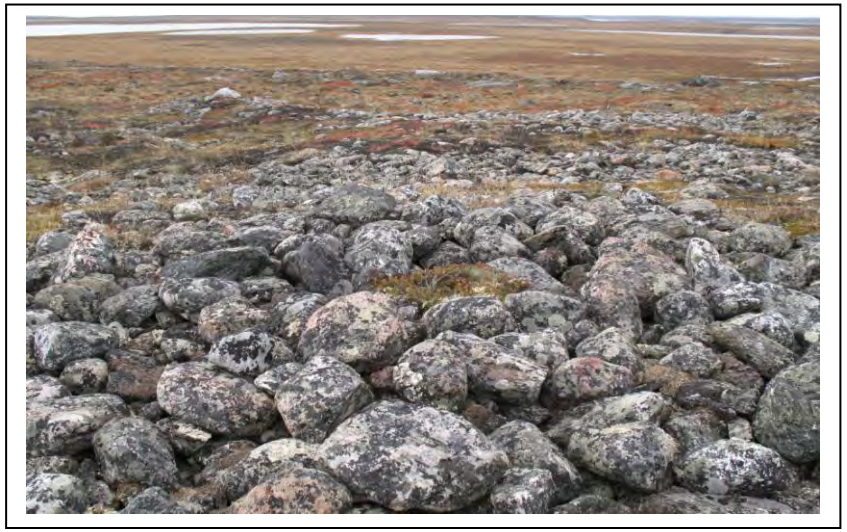


Photo 20. Storage cache on low ridge near wetland, Section 2.

Photo 21. Inukshuk. Caribou hunting area near ridge, Section 2.

Photo 22. Blueberries, kigutangirnaq.

Photo 23. Storage cache and tent rings on ridge, Section 3.

Photo 24. Tent ring, centre-support tent with boulder

Photo 25. Snow geese.

Photo 26. Crowberries or black berries, paungait.

Photo 27. Cloudberries, aqpik, in wetland edges.

Photo 28. Tent rings and modern debris at SE end of Meliadine Lake.

Photo 29. Ice-fishing, Meliadine Lake, elder.

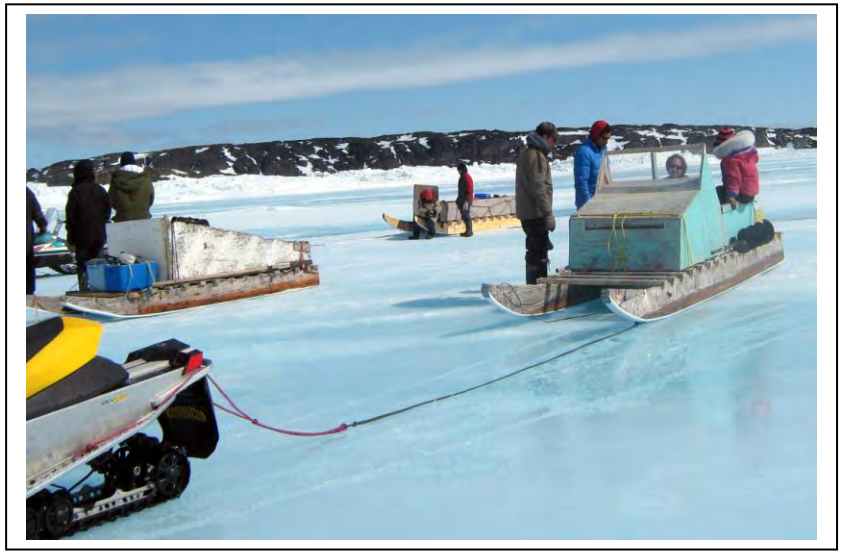


Photo 30. Crowberries or black berries, paungait.

Photo 31. Comaplex elders' meeting 2007.

Photo 32. Elders' visit to Meliadine site, 2007.

Photo 33. Elder's tour of portal, 2008.

Photo 34. Elders Manernaluk and Kimmaliardjuk, Plant IQ workshop.

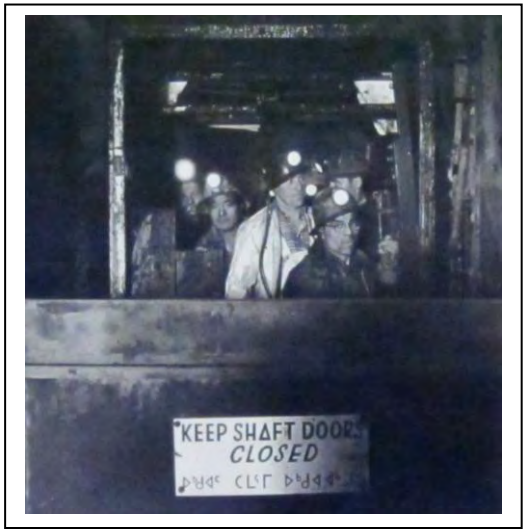


Photo 35. Inuit underground miners, North Rankin Nickel Mine.

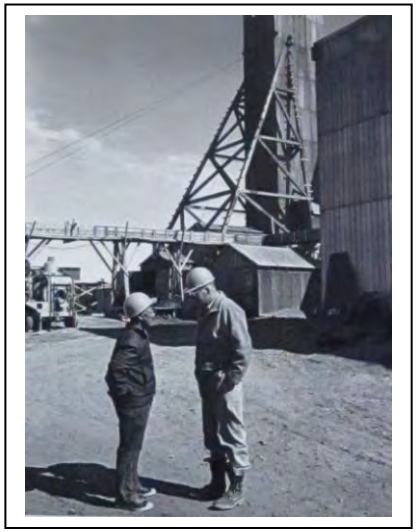


Photo 36. North Rankin Nickel Mine.

Photo 37. Chesterfield Inlet, John Hickes marking map.

Photo 38. Chesterfield Inlet, Lena Autut interpreting for Elders.

Photo 39. Chesterfield Inlet, input from Elder on map.

Photo 40. Berrypicking on esker slopes near Meliadine River.

APPENDIX 9.3-B

Inuit Qaujimajatuqangit Traditional Ecological Knowledge of Plant Use: Summary Report, Elders' Workshop in Rankin Inlet (Burt 2010)

Meliadine Gold Project
Agnico-Eagle Mines
Inuit Qaujimajatuqangit Traditional Knowledge of Plant Use
Summary Report, Elders" Workshop in Rankin Inlet

September 3, 2010

Elders: Marianne Tattuinee, Tony Manernaluk, Eli Kimmaliardjuk, Annie Napayok

Interpreter: Donna Adams

Facilitator: Page Burt

Filming: Helen AbenReynen

Introduction and Methods

This study complements the Traditional Knowledge studies done on the Meliadine Gold Project, as well as the Vegetation Baseline Studies on this project. The main difference between this study and the Traditional Knowledge studies is that this work was done on the land, and the main focus was to identify traditional uses of plants, rather than localities of importance.

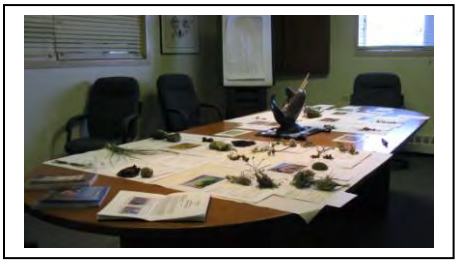
Two elders from Rankin Inlet, Marianne Tattuinee and Tony Manernaluk, one elder from Chesterfield Inlet, Eli Kimmaliardjuk, and one from Whale Cove, Annie Napayok, were asked to participate in this study, based on their familiarity with the traditional use of plants by Inuit. Page Burt designed the study, Donna Adams interpreted and assisted, and Helen AbenReynen videotaped the outdoor session.

A half day workshop was held out on the land in the valley of the Meliadine River, at the Qamaviniqtalik archaeological site in Iqalugaarjuup Nunanga Territorial Park, about one km upstream from where the proposed road will cross the Meliadine River (Iqalugaarjuk). We chose this site as it is possible to drive right to the river, enabling us to sample plant associations ranging from the upland on the esker to the sedge wetlands in the floodplain.

Plants were collected by the elders and discussions held about their use, while out on the land. Comments were videotaped so that the original words of the elders were preserved, and written notes of the interpretation were made regarding the uses of the plants. Each plant was identified as to scientific name, so that in the end we will have captured the Inuktitut name in syllabics, Inuktitut name in Roman orthography, English common name and scientific name.

They responded with enthusiasm, and the comment was made, "We are really happy you chose us to do this, as it reminds us of the past and the happy times we spent out on the land." They also commented that they would have liked to have done this twice in the

summer season as there are a number of plants that are out earlier, which are not found at the end of the summer.



The following day, we met inside, and the plants were laid out, names written beside the specimens. We all gathered around and discussed the use of each plant, trying to confirm all Inuktitut names, as well as the uses.

The following are the general questions that were asked, with the plant in hand:

1) What do you call this plant?
2) What parts do you use?
3) At what time of year?
4) Is it used at any other time of year?
5) How is it collected? (Are any tools used; if so, what are these called?)
6) How is it prepared for use?
7) Is there another name for the part of the plant that is used?
8) Can you share some stories about the use of this plant?

NOTE: Due to wind, and people talking, there were considerable constraints to the outdoor taping. We have not attempted to transcribe these exchanges, but made notes as to what the elders were saying. In some cases, the elders did not recall the exact name of the plant. We have approximated this, checking with several sources, and were able to get Inuktitut names for most plants. (We did not omit a plant just because we had no name.)

Results, Plant Names and Uses

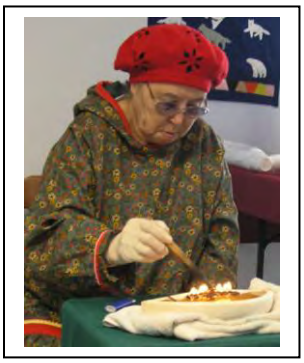
ᑲᖏᒍᐅᑦ ARCTIC COTTON

Local name for plant: ᑲᖏᒍᐅᑦ (single-flowered type)
And: ᓴᐊᓗᖏᒍᐊᑦ (multiple-flowered type)
Roman orthography: kanguujait (single-flowered type) "looks like snow geese"
And: pualunnguat (multiple-flowered type) "imitation mittens"
Scientific name: *Eriophorum schwecherzi* (single-flowered arctic cotton)
And: *Eriophorum angustifolium* (multiple-flowered arctic cotton)
English common names: arctic cotton, cottongrass
Plant family: Cyperaceae, sedge family

This is a wetland plant, growing in small ponds or marshy wetlands, where the soil is saturated throughout the growing season. There are many species, but two general forms,

one with a single globular flower head at the top and another with several silky tassles which blow in the wind. The flowering heads/seedheads are harvested in August and September.

The white flowers and fibrous seedheads of this plant have long been used to form the wick in the qulliq, the soapstone lamp. The flowers and later the seed heads are collected and allowed to dry, and the seeds are removed as much as possible. The remaining fibers are stored in small bags made of fabric, or, in the past, of caribou gut, or fish skin.



To set up the lamp, oil is worked into the long silky fibers, which are then arranged on the side of the qulliq that faces the one tending the lamp. The wick is made as thin as possible before lighting. The flame is applied to one end of the wick, and, once a few fibers are burning, the flame is teased out along the rest of the wick with a "tender" made of willow or soapstone until the flame spreads along the entire wick. This produces the most heat and is used for cooking. The oil generally burns, and not the wick itself, although the wick gradually burns up, and must be replaced. The height of the flame can be controlled by pulling the wick down into the oil, shortening it, which also reduces the amount of smoke produced. Sometimes the fibers are mixed with dry moss to produce a stiffer wick, which will stand up longer.

Wick for qulliq: Inuktitut: ᐃᓪᓕᖅ Roman orthography: **iparaq**

ᐃᒪᑦ **BEACH-RYE GRASS**

Local name for plant: ᐃᒪᑦ, ᐃᒪᓗᐊᖅ, ᐃᒪᒃᓯᒃᑦ, ᐃᒪᐊᓗᐃᑦ
Roman orthography: ivit (general term, all grasses); iviksukat, ivialuit, ivigjuaq
Scientific name: *Leymus mollis*
English common name: beach-rye grass, lyme-grass
Plant family: Poaceae or Graminae, grass family.

This coarse grass grows along sea shores, river shores, and on eskers close to the coast. Leaves are a dusty bluish green, and when the seed heads are formed, the plant is about one meter tall.

According to the Kivalliq elders, these grass plants serve as an incidental food. The plant is pulled up, and the white lower portion of the stem, which is quite tender, is eaten. Adults sometimes eat it, especially while out hunting, but it is eaten mostly by children. It is said to be quite sweet while the plant is growing, and is nutritious. The food part is not preserved in any way; it is just eaten where it grows.

ᐊᕿᓗᖏᐊᑦ **DWARF BIRCH**

Local name for plant: ᐊᕿᓗᖏᐊᑦ
Roman orthography: avaalaqqiat, "little trees"
Scientific name: *Betula nana*
English common name: dwarf birch
Plant family: Betulaceae, birch family.

Dwarf birch grows in a variety of habitats, either as a prostrate plant lying flat on the ground, or as an upright shrub, where there is more protection from the scouring of the wind-blown snow particles in winter. The dwarf birch is "deciduous" – it loses its leaves in winter. This makes the twigs ideal for being made into mats.

The elders told us that birch twigs were used as firewood, or laid in the bottom of stone storage caches to lift whatever was being stored off the damp ground, protecting it from being destroyed by being constantly wet.

Also, mats were made by tying birch twigs together side by side, and these were used beneath the sleeping skins on top of the sleeping platform in the autumn house or in a snow house. The mat provided additional insulation from the snow or rock platform in the qamat.

Twig mat for use under sleeping skins:
Inuktitut: ᐅᒡᒐᖅ
Roman orthography: **Ugvak**

ᓯᐳᑎᐃᑦ **ARCTIC WILLOW**

Local name for plant: ᓯᐳᑎᐃᑦ
Roman orthography: suputiit: "taken by the wind"
Scientific name: *Salix arctica*
English common name: arctic willow
Plant family: Salicaceae, willow family

This small willow usually grows prostrate on the ground, in lots of different habitats.

Willow plants are used for firewood, and occasionally larger branches are carved into flattish shapes for the tender for the qulliq.

In the Kitikmeot, the cambium layer of several larger shrub willows is eaten, especially in the springtime, as a sweet treat, and in some cases as a remedy for rheumatism. This makes sense, as the willow (family Salicaceae) contains salicylic acid, the precursor to aspirin. In Kivalliq, this seems to be less known, although a couple of the elders said they had heard of people eating the layer under the bark, and of people eating the leaves and sometimes the green twigs.

Willow "fluff" in the seed head is the fibers bearing the seeds. Inuktitut: ᓯᐳᑎᐃᑦ
Roman orthography: **suputiit**. This is used for the wick

According to the elders, the fluff of the willow was also used:

1) As a wound dressing; the fluff absorbs moisture and stops bleeding, but does not stick to the wound. It promotes rapid healing.
2) For the wick in the qulliq, especially when mixed with dry moss.
3) As tinder for lighting the qulliq or small fires, before matches were available.
4) In the Baffin, suputiit was mixed with moss and used to treat diarrhea as well.

Another ground-hugging willow, the net-veined willow (*Salix reticulata*) is called **quarait** in Baffin, where it is eaten regularly, brewed as a tea for upset stomachs, and used as bandaids on minor injuries (Ziegler, Joamie and Hainnu, 2009). In the Kivalliq, the elders said they had not heard of anyone eating or using this species, however.

ᓄᐳᑎᐃᑦ FELT-LEAF WILLOW

Local name for plant: ᓄᐳᑎᐃᑦ
Roman orthography: avaalaqiat or suputiit
Scientific name: *Salix calcicola* or *S. lanata calcicola*
English common name: Felt-leaf willow
Plant family: Salicaceae, willow family

This is a taller, sturdier willow, often growing up to a meter in height. The leaves are covered with silky hairs, as are the growing ends of the twigs. Before the leaves come out, the twigs resemble caribou antlers in velvet. This willow grows in hummocky areas where there is a reliable source of water throughout the growing season, yet the soil is not saturated.

This willow was used for firewood and branches could be placed in the bottom of a storage cache to keep the contents off the wet ground. Larger twigs might be used for ribs in a kayak, or for the tender for the qulliq. The fluffy seedheads were used for the wick in the qulliq, or mixed with dry moss or lichen and used for tinder in starting fires.

ᐊᐃᕐᖅ MOSS CAMPION

Local name for plant: ᐊᐃᕐᖅ
Roman orthography: airaq
Scientific name: *Silene acaulis*
English common name: moss campion
Plant family: Caryophyllaceae, carnation or pink family

A small cushion plant that grows on eskers, sandy areas, rock outcrops, and areas of well-drained tundra, the moss campion is essentially a tree that is level with the ground. It is a woody plant with branches, leaves, bright pink flowers, and a long fleshy taproot.

According to the elders, the taproot is edible and is sometimes eaten, especially in summer when it can easily be pulled from the ground.

(Note from author: Please don‟t pick this plant just to taste the root, as pulling it up will kill the plant. A cushion 15 cm in diameter may be 100 years old, and it is a pity to destroy such a lovely plant for a brief taste of the root.)

ᓚᓕᒃᓯᐊᓗᐃᓪᓗᑦ SEABEACH SANDWORT

Local name for plant: ᓚᓕᒃᓯᐊᓗᐃᓪᓗᑦ
Roman orthography: maliksuagaiit
Scientific name: *Honckenya peploides*
English common name: seabeach sandwort
Plant family: Caryophyllaceae, carnation or pink family

This plant grows in mats along the sea shore, in rocks or on sandy beaches. It has succulent leaves, and produces seeds in bladderlike pods which detach and float away on the tide, drifting in elsewhere to start new plants.

The elders searched for this along the shore near Mrs. Tattuinee‟s cabin, but did not find it. When shown a photo of the plant, they all reacted, “Yes, that‟s the plant we were looking for!” They said that the leaves were (and still are) eaten.

In some parts of the arctic, seed pods are eaten. When asked about this, the elders said they did not know of them being eaten here, but all intended to try them.

ᑐᖅᓪᖅ **BISTORT**

Local name for plant: ᑐᖅᓪᖅ, ᐅᑉᐱᓚᐃᑦ, ᓴᕐᓂᖏᓪᓗᒍᐃᑦ
Roman orthography: tuqlak, uqpigait (roots), or sapangaralannguat (Baffin, means "imitation small beads")
Scientific name: *Polygonum viviparum,* or, *Persicaria vivipara*
English common name: bistort
Plant family: Polygonaceae, smartweed or buckwheat family.

This very common small plant grows throughout the tundra, on slopes, in hummocky areas, and on sites with some moisture, not very dry. It is entirely herbaceous, and does not last through the full season.

The small buds along the stem of the bistort are eaten by the Inuvialuit and the Inupiat in the western arctic, and the somewhat tuberous roots are eaten in the eastern arctic, especially on Baffin Island. The name **sapanagaralannguat** means "imitation small beads", referring to the edible bulblets along the stem; **uqpigait** refers to the edible rhizomes (roots). Inuinait children (in the Kitikmeot) strip the bulblets off the stems and eat them. The Kivalliq elders did not recognize this plant from photos, but talked of a small plant with edible roots, which they said was very common. This may be that plant.

ᖁᓇᒍᑦ and ᓯᕗᓕᑦ **MOUNTAIN SORREL**

Local name for plant: ᖁᓇᒍᑦ and ᓯᕗᓕᑦ
Roman orthography: qunguliit and siirnat
Scientific name: *Oxyria digyna*
English common name: Mountain sorrel, "sweetleaf"
Plant family: Polygonaceae, buckwheat or smartweed family

This plant grows in damp spots in open tundra slopes, and sometimes along upper beaches and in sandy areas along esker slopes, but not where the slopes are dry. Its red stems and developing seeds make it quite visible. In places, it is common and can be collected in large quantities.

The fleshy leaves and stems are eaten fresh throughout the summer, and are regarded as a tasty treat. **Qunguliit** is the older name for this plant. The name **siirnat** refers to the sweetness of the leaves, and is of more recent usage. Once the leaves become red in the fall, they are no longer as succulent. Whenever people are out on the land, they pick and appreciate this plant.

In some parts of the eastern arctic, this plant is boiled, and the resulting juice is considered a refreshing drink, or, with the pulp, is added to boiled caribou to make a kind of gravy (Ootova, Atagutsiak, et.al., 2000).

ᓚᓕᒃᑲᐸᑦ MOUNTAIN AVENS

Local name for plant: ᓚᓕᒃᑲᐸᑦ, ᐃᓯᖏᓗᐸᑦ
Roman orthography: malikkaat “follows the seasons”; isurramuat “follows the sun”
Scientific name: *Dryas integrifolia*
English common name: Mountain avens
Family name: Rosaceae, rose family

This beautiful plant covers large areas of well-drained tundra, tops of hummocks, patches on eskers. The white flowers are solar collectors and reorient constantly to face the sun by elongation of cells on the side of the stem away from the sun.

When dry, the seedheads with their silky strands are used as part of the wick in the qulliq, sometimes mixed with willow fluff. These were also used as tinder when starting fires with flint, flint and steel, or with a bow drill. The seed heads become dried out in mid-August and are collected then.

In some parts of the Baffin, the mountain avens seedhead is used to indicate time. When the seedheads are twisted, it is time to go caribou hunting; when they open out, the women know that the hunters are coming home (Ootova, Atagatsiak,et.al., 2000). Elder Tony Manernaluk remembered something of this use in the Kivalliq, but wasn‟t sure as to the actual timing.

ᐊᖅᐱᒃ CLOUDBERRY

Local name for plant: ᐊᖅᐱᒃ
Roman orthography: aqpik or aqpiit (refers to the berry)
Scientific name: *Rubus chamaemorus*
English common name: Cloudberry, bake-apple
Plant family: Rosaceae, rose family

The **aqpik** grows in moist areas near wetlands, along the shores of lakes or small ponds, and in hummocky areas, often on the sides of hummocks or tussocks. Its maple-like leaves are larger than the leaves of most arctic plants, and its white flowers last only a couple days, but indicate where the berries can later be found. The berries ripen in mid-August, only lasting a few days.

The peach to orange-coloured berries are prized as treats and collected whenever they are found. They are usually eaten straightaway, but in modern times are often taken home and made into jam. They do not travel well, as they are quite soft.

The elders told us that the old leaves of the aqpik were collected and steeped in hot water to make a tea or used in combination with other leaves for tea.

ᐅᖅᑲᐅᔭᑦ LARGE-FLOWERED WINTERGREEN

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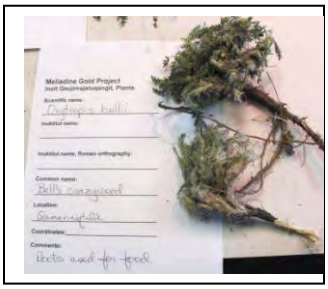
Local name for plant: ᐅᖅᑲᐅᔭᑦ (leaves); **ᑭᔪᑕᐅᔭ** (flowers)
Roman orthography: uqkaujat (leaves); **kigutauja** (flowers)
Scientific name: *Pyrola grandiflora*
English common name: large-flowered wintergreen
Plant family: Pyrolaceae, wintergreen family

This waxy-leafed plant grows under birches, and on shady slopes. It has a very showy white flower on a red stalk. The leaves were sometimes steeped in hot water and used as a tea.

In the Baffin, the leaves were fried in seal oil or fat, probably to destroy the waxy coating on the leaves, and the remains were steeped in hot water to make the tea. Kivalliq elders Tony Manernaluk and Eli Kimmaliardjuk had heard of the use of this plant for tea, but had no knowledge of the frying aspect – that may be a Baffin custom. Tony commented that the taste of the tea is "something like berries". He commented, "It's very good."

ᐊᐃᕐᖅ BELL'S CRAZYWEED



Local name for plant: ᐊᐃᕐᖅ
Roman orthography: airaq or airait (general term, "stem")
Scientific name: *Oxytropis belli*
English common name: Bell's crazyweed
Plant family: Fabaceae (Leguminosae), pea family

This attractive plant has silky-hairy pinnate leaves that form a tuft with flowers on longer stems extending out of the silky grey cushion. It grows on hummocks and dry ridges along eskers.

The elders identified this as a plant that has an edible root. The root is a taproot, but becomes fibrous when chewed. It has a faintly sweetish taste. They ate it with relish.

There are three *Oxytropis* species in the area, *Oxytropis belli*, *O. maydelliana*, and *O. hudsonica*. It is not apparent that all have edible roots, but possible that all three are edible, as the root of the yellow crazyweed (*Oxytropis maydelliana*) is eaten in the Baffin, and the elders recall it being eaten here.

The Kivalliq elders did not discuss *when* they dug these roots, but in plants like the peas, the nutrients (including sugars) are concentrated in the roots when the plant is not actively producing leaves or flowers/seeds. Therefore, the roots of plants in the pea family were likely harvested in early summer (June) or early fall (August - September).

ᐊᐃᕐᖏᑦ HUDSON BAY CRAZYWEED

Local name for plant: ᐊᐃᕐᖏᑦ
Roman orthography:_airaq or airait (general term for "stem")
Scientific name: *Oxytropis hudsonica*
English common name: Hudson Bay crazyweed
Plant family: Fabaceae (Leguminosae), pea family

This is a close relative of the Bell"s crazyweed, but does not form the dense cushions, and the leaves are not as hairy or silky. It is fairly common on rocky, well-drained ridge crests where the competition from other plants is limited.

The elders identified this as a food plant, and said that the root was the part eaten in the past. It could be eaten raw or boiled, supplying a welcome source of carbohydrates. The covering of the root was scraped off, and the rest eaten.

ᐊᐃᕐᖏᑦ YELLOW CRAZYWEED

Local name for plant: ᐊᐃᕐᖏᑦ
Roman orthography: airaq (a general term for "stem")
Scientific name: *Oxytropis maydelliana*
English common name: yellow crazyweed, Maydell's oxytrope
Plant family: Fabaceae (Leguminosae), pea or legume family

This plant is larger than the Bell"s oxytrope, with yellow flowers, and a looser tuft, and green leaves with far fewer hairs. It grows all over in tundra vegetation, sometimes on the tops of ridges, but not in very dry areas or terrain.

According to the elders, the roots of this plant are occasionally eaten, but not as much as in the past. Usage here did not seem nearly as intense as in the Baffin area.

In the Baffin, the roots are often cooked and eaten much like potatoes, and the older roots are eaten to relieve stomachaches. When the roots were sweet, they were often given to babies being carried in the amautiit, and would help them fall asleep (Ootoova, Atagutsiak, et.al., 2000).

A word of caution about the genus *Oxytropis*: the oxytropes are called "locoweed" because of their effect on ungulates that graze on these plants in the American west, either because there is little other forage, or because they have developed a taste for these species. Some oxytropes accumulate swansonine, a chemical produced by a fungus in the soil, forming a toxic chemical that strongly affects the behaviour of grazing ungulates like cattle, sheep, horses, elk and deer, causing staggering, wildness, abortion, or deformities in the fetus. However, a search of the literature turned up no entries indicating that this type of poisoning has occurred in caribou, nor in humans in the arctic.

ᒪᓴᖅ LIQUORICEROOT

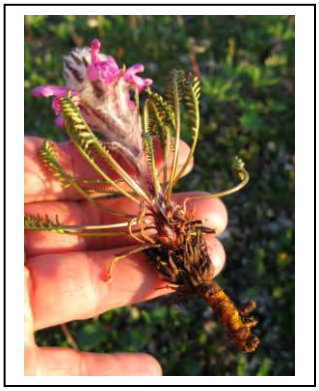
Local name for plant: ᒪᓴᖅ
Roman orthography: masu (Inuvialuktun), mahok (Inuinnaqtun)
Scientific name: *Hedysarum alpinum*
English common name: liquoriceroot, Eskimo potato (Alaska)
Plant family: Fabaceae (Leguminosae), pea family

This species is present but not very common in the Kivalliq region, but is more common to the west, and more common around Baker Lake. The pink flowers reach a height of about 30 cm, and, in the fall, the leaves fall off, leaving the "Y"-shaped twigs, which are indicators as to where to dig for the roots. The roots are the diameter of a finger, whitish to yellowish inside and do not taste like liquorice, but somewhat like carrots.

Mahok was a staple of the diet of the inland Inuit in the past. They looked for the twigs and dug the roots in the spring and in the fall, when the plant was dormant and the nutrients stored in the roots (Burt, 2004). Special antler diggers were used almost like hoes to loosen the roots from the soil and to pull the thicker roots to the surface. The bark was peeled off, and the roots eaten raw or boiled. They were sometimes stored and used during the winter. Grizzly bears are particularly fond of the mahok roots, and dig up large areas of tundra foraging for these roots.

We did not find this species during the workshop, and the elders did not recognize it from photos, but it was present on the Meliadine Project, so is included here.

ᐊᐃᕐᖅ WOOLLY LOUSEWORT



Local name for plant: ᐊᐃᕐᖅ (refers to stem/root only)
Roman orthography: airaq
Scientific name: *Pedicularis lanata*
English common name: woolly lousewort
Plant family: Scrophulariaceae, snapdragon family

One of the most striking plants of the tundra, the woolly lousewort starts out as a silvery-woolly ball on the ground and extends into a column of silvery hair. Pink flowers push out from within the translucent hairs and are visited by bumblebees, which pollinate the flowers.

This plant has a yellow taproot that is often about the diameter of a pencil. It is eaten throughout the arctic, especially by hunters that are out on the land. The elders say that boiling the roots makes them more tender, but they hasten to say that the roots were often eaten raw.

Children pull the flowers off these plants and suck the nectar in the flowers, often wandering from plant to plant. In some parts of the arctic, these are called “bumblebee flowers” due to the fact that bumblebees are often seen on the flowers.

ᐸᐅᓇᐃᑦ DWARF FIREWEED

Local name for plant: ᐸᐅᓇᐃᑦ (plant); ᑲᑲᐅᑎᑦ (leaves)
Roman orthography: paunait (plant); **kakkautit** (leaves)
Scientific name: ***Chamerion latifolium***
English common name: dwarf fireweed, river beauty, broad-leafed willowherb
Plant family: Onagraceae, primrose family

This is one of the showiest, most obvious plants in the area. The grey-green foliage sets off the bright pink flowers, each with four petals, among the largest flowers on the tundra. It grows in disturbed areas, along eskers, sandbars in rivers, and along beaches on lakes. Dwarf fireweed flowers in mid-to-late July, so the flowers were collected at that time.

The flowers were often eaten as a treat, as they are quite sweet due to their nectar. The elders mentioned that the old leaves were often steeped in hot water to make a tea, and new leaves were sometimes eaten right off the plant. Old leaves would generally be obtained in August or September, before snow covered the land.

ᐊᐅᐱᓪᓕᖏᐊᑦ PURPLE MOUNTAIN SAXIFRAGE

Local name for plant: ᐊᐅᐱᓪᓕᖏᐊᑦ
Roman orthography: aupilattunguat
Scientific name: ***Saxifraga oppositifolia***
English common name: purple mountain
Plant family: Saxifragaceae, saxifrage family

This is the official flower of Nunavut, and is the earliest plant to bloom, appearing as the snow is disappearing from the land. It grows in tight mats on rocky outcrops, on moist tundra slopes, and on high exposed ridges.

The bright pink flowers were and still are picked and eaten as a sweet treat all across Nunavut, and are sometimes combined with fat or seal oil to preserve them for later consumption. The film *Atanarjuat* shows people picking and eating these flowers, and the elders referred to this film when mentioning this plant. As it flowers early in the arctic summer (June), these flowers would be a welcome treat after a long winter.

ᑲᑭᓪᓗᖅ PRICKLY SAXIFRAGE

Local name for plant: ᑲᑭᓪᓗᖅ
Roman orthography: kakilarnaq
Scientific name: *Saxifraga tricuspidata*
English common name: prickly saxifrage
Plant family: Saxifragaceae, saxifrage family

The only prickly plant in our area, the prickly saxifrage grows in dense mats in dry places, on sandy or gravelly eskers, and even on bare rock. It is green all year, but flowers in July.

The elders mentioned that the flowers of this plant were eaten as sweet treats, and could be used along with the leaves to make a sweet tea. Mostly the older leaves, even those turning brown, were used to make tea. Eli Kimmaliardjuk said that these plants were sometimes picked and put into an area where a dog was due to whelp (give birth to puppies), for bedding. They were said to reduce the bleeding during birthing. (There was no reference made to the use of this plant to control bleeding in human birthing, only for dogs.)

The elders also commented that these plants were sometimes put into a pen where puppies were being raised. The prickly leaves were thought to toughen the feet of the puppies, making them better sled dogs, and more able to cope with running on sharp sea ice.

ᐃᑲᔪᑎᑦ WHITE ARCTIC HEATHER

Local name for plant: ᐃᑲᔪᑎᑦ
Roman orthography: iksutit
Scientific name: *Cassiope tetragona*
English common name: white arctic heather
Plant family: Ericaceae, heath family

This plant grows in abundance on hillsides and esker slopes where there is some moisture throughout the summer, often forming large patches in the lee of an esker. The white flowers make it very obvious in early July. The foliage and stems are the part which is used by Inuit. Heather is green all year, so the oily foliage can be collected at any time.

The Kivalliq elders felt that, in the past, this was one of the most useful plants. Iksutit was used as a mattress in the tents, or snow houses of the past. It was pulled and scraped up and made into a bouncy pad that kept the sleeping skins from contacting the snow or damp ground. Heather does not absorb as much moisture as moss does, so was preferred for this use.

This plant is also used as firewood, especially while traveling, and this use persists today. Large quantities are piled up, the soil is removed, and the plants fed into small fires used for cooking today as well as in the past.

They emphasized that heather makes a good emergency fuel as it is rich in oil and will burn even when it is quite wet. Tony Manernaluk keeps a supply in a bag that he uses as an emergency survival kit while traveling on the land. When he mentioned this, there was general agreement that this was advisable.

ᖃᓪᓗᐊᑦ **LABRADOR TEA**

Local name for plant: ᖃᓪᓗᐊᑦ
Roman orthography: qisiqtuutit
Scientific name: *Ledum palustre* ssp. *groenlandicum,* formerly *Ledum groenlandicum*
English common name: Labrador tea
Plant family: Ericaceae, heath family

This small shrub grows prostrate on the ground where the snow is thin, and taller where drifts protect the plants from wind erosion and pruning. It is common in the lee of hillsides and eskers, often growing abundantly where the snow stays long on the land. The leaves are very aromatic, due to oils in the plant tissue, and they stay green through the winter, retaining the oil.

According to the elders, qisiqtuutiit (Labrador tea) is frequently used for firewood. It is good as an emergency fuel as it burns well when wet, due to the oil in the leaves. It can also be used as a tea, as it makes an aromatic tea when steeped. One must be careful, however, as these leaves, when boiled a long time, release a chemical called ledol, which can slow the heart rate.

The elders mentioned that tea made from this plant can be used medicinally, as a treatment for arthritis, and as a cold remedy.

ᑲᑲᐅᑎᑦ **LINGONBERRY**

Local name for plant: ᑲᑲᐅᑎᑦ
Roman orthography: kakautit
Local name for dried plant: ᐊᑐᖏᒃᐳᐃᑦ
Roman orthography: atungaujait
Scientific name: *Vaccinium vitis-idaea*
English common name: lingonberry, mountain cranberry
Plant family: Ericaceae, heath family

This small heath grows nearly everywhere on the tundra around Rankin Inlet, mixed in with hair lichen on the crests of the eskers, with other heaths on the slopes, and on the sides of the hummocks and tussocks in the edges of the wetlands, even as small mats on polished bedrock when it can find a place to root. The only place it is not found is in the sedge marshes. It produces beautiful red berries that ripen in August, and are food to many species of wildlife, and to humans, of course. The berries are eaten by geese, ptarmigan, gulls, sik siks, foxes, bears, and man, of course. They are eaten in the fall in which they form, and again after spending the winter under the snow. At that point, they are deep burgundy in colour, and taste very sweet, sometimes lightly fermented.

The elders told us that the berries of kakautit have always been eaten by Inuit, both fresh, and preserved in seal blubber or caribou fat. Today, they are most often baked into bannock or muffins, or made into sauce or jam. In the Rankin area, many liters of berries are picked and frozen for winter use. The berries can be picked when not completely red. If they are frozen, they cook up exactly as if they were fully ripe.

According to the elders, the leaves, especially the old, dry leaves, were in the past used as a tobacco substitute. They were carefully collected, cut up with an ulu, and smoked, especially in a pipe. Both men and women smoked pipes.

ᑲᖏᓐᓄᑦ BLACK BEARBERRY

Local name for plant: ᑲᖏᓐᓄᑦ
Roman orthography: kablaqutit
Scientific name: *Arctous alpina*, or *Arctostaphylos alpina*
English common name: black bearberry
Plant family: Ericaceae, heath family

Kablaqutit (black bearberry) grows in mixed tundra, especially in drier areas, often forming mats on higher ground. The leaves turn scarlet for a time in the fall, and later, bronze-coloured. The black berries are rather bland, and ripen in August.

The berries of the black bearberry are eaten by some, but avoided by others, as their taste is not memorable. The elders mentioned that, in the old days, when food was relatively scarce, they were picked and eaten, or preserved in oil or fat for later consumption. The leaves, especially the old ones, are occasionally used to make a tea.

ᑭᔪᑦᕋᖅᓯᒪᑦ BLUEBERRY

Local name for plant: ᑭᔪᑦᕋᖅᓯᒪᑦ
Roman orthography: kigutangirnaq
Scientific name: *Vaccinium uliginosum*
English common name: blueberry, bilberry
Plant family: Ericaceae, heath family

Blueberries (**kigutangirnaq**) occur on small bushes under willows in riparian areas, on open tundra slopes, and in small ravines or low areas where the soil is well-drained but where the supply of water is constant through the growing season. They also are found on the tops and sides of hummocks.

Although not as common as lingonberries (**kakautit**) or crowberries (**paungait**) in the Rankin Inlet area, blueberries are an important berry due to their versatility and taste. They are picked in August, for immediate consumption, or, in the past, were preserved in seal oil or caribou fat for use during the winter. Today, those not immediately eaten are frozen for baking, or made into jam.

According to the elders, the old leaves of the blueberry plant were used to make tea. They were dried somewhat, then steeped in hot water.

ᐸᐅᖁᓗᐃᑦ CROWBERRY

Local name for plant: ᐸᐅᖁᓗᐃᑦ
Roman orthography: paungait
Scientific name: *Empetrum nigrum*
English common name: crowberry, black berry
Plant family: Empetraceae, crowberry family

This plant forms low mats on tops of eskers and in sandy or well-drained areas, sometimes on rock outcrops. The branches resemble branches of small evergreens, and the shiny black berries contain four seeds. The berries usually ripen in mid-August and are picked until snow covers the ground.

Paungait (crowberry) is the berry most often collected in large numbers in Kivalliq, as it is very common along most roads and in any sandy area. Families spend much time picking these berries, for immediate consumption, and for freezing for baking and making jellies and jams. In the past, they were combined with seal oil and eaten as a mixture of whipped seal fat and berries. Some people still prepare “black berries” this way.

The foliage and twigs of the paungait were and occasionally are used for firewood, scraped up and fed into small fires for making tea. This plant was also often used as bedding, piled on the sleeping bench in the qaumat to insulate the sleeping skins from the damp ground. According to the elders, this was often used in the sleeping shelters built out on the land while caribou hunting.

ᐅᖅᓯᒃ GREY MOSS

Local name for plant: ᐅᖅᓯᒃ
Roman orthography: uqjuk
Scientific name: *Racomitrium lanuginosum*
English common name: grey moss, grey fringe moss
Plant family: Grimmiaceae

This moss occurs in large soft patches on tundra, on gravel, and often on rocks. When dry it is very grey, turning grey-green when wet. It is very common in our area.

According to the elders, grey fringe moss was and is occasionally used by hunters to make a "mattress" in a sleeping shelter while hunting. The shelter itself is a ring of rocks, piled up to waist height. The walls slant in at the top somewhat like an iglu, but do not form a roof. Hunters made these when it was necessary to stay out overnight while hunting. If the weather was dry, they would use the grey moss as a bed in the "siniktarvik". If it was wet, they used heather, which did not soak up water. Fresh caribou skins could be draped over the top of the shelter to form a roof.

ᓚᓂᖅ CUSHION or LAMP MOSS

Local name for plant: ᓚᓂᖅ
Roman orthography: maniq
Scientific name: There are several species.
English common name: cushion moss
Plant family: probably Leucobryaceae

This moss forms dense cushions in hummocky tundra at the edges of lakes, along streams, and in damp areas in the open tundra. Chunks up to 25 cm in length can be pulled out, and are far denser than Sphagnum moss, forming dry columns.

The elders mentioned that pieces of cushion moss were crushed with the ulu and mixed with supputit (willow fluff) and used for the wick in the qullit. Pencil-sized pieces were pulled apart and used as tinder in starting fires, or to light a qullik.

Sometimes the moss was soaked in oil or fat to enhance its ability to burn slowly. Hand-sized pieces of this moss could be soaked in oil and then used as small torches to light the way for work in darkness.

In the Baffin, lamp moss could be used to treat heartburn caused by eating too much fat. A small piece (about the size of a toonie) would be swallowed, and would absorb the fat in the stomach. (Ziegler, Joamie and Hainnu, 2009)

ᐳᓪᐊ PUFFBALL

Local name for plant: ᐳᓪᐊ
Roman orthography: pujuaa
Scientific name: There are many species.
English common name: puffball
Plant family: probably Lycoperdaceae

White puffballs appear on the tundra in July, turning brown as the spores inside mature. Eventually a hole develops in the top and the spores puff out if the fungus is touched.

According to the elders, these fungi were harvested when dry and stored in fabric or skin bags, or between pieces of paper once that was available. Pieces were broken out and the spores were used to stop bleeding, and as an antiseptic and healing agent. They are sprinkled on open wounds and often a lemming skin is bound in place over the wound to exclude air and dirt. In parts of the Baffin, the spores were used to treat skin rashes and irritations. Th outer skin of the puffball could be bound in place on a wound to act as a bandage. The spores were also used as medicine to treat indigestion caused by eating too much fat.

Puffball spores could also be used as tinder to assist in starting fires.

According to the elders, ᐊᕐᓯ ᓚᖏᐊ ᖁᒥᐅᑦ (**avaalaqiarmiutat**) is a general term for “mushroom”. No one ate mushrooms in the past, and an often quoted simile is: “We don‟t eat mushrooms except from the store.”

ᑎᖏᑐᕆᐃᑦ BLACK HAIR LICHEN

Local name for plant: ᑎᖏᑐᕆᐃᑦ
Roman orthography: tingaujait
Scientific name: *Alectoria nigricans*
English common name: black hair lichen
Plant family: Parmeliaceae

Hair lichen occurs on the dry tops of eskers and ridges, usually on sandy or gravelly soil, which is always well-drained. The elders told us that the Inuktitut name, tingaujait, comes from the name for pubic hair, always a joke and very understandable.

They said that, when dry, this lichen is used a tinder, or fuel for small fires, as it will ignite readily and burn quickly. It is mixed with other vegetation when used as fuel, as it will burn too fast. When it is wet, it cannot be used as fuel. It was often combined with other lichens and heather and used as "firewood" under a flat cooking rock.

ᓂᕐᓗᐃᑦ SNOW LICHEN

Local name for plant: ᓂᕐᓗᐃᑦ
Roman orthography: nirnait
Scientific name: *Flavocetraria nivalis* (formerly, and in most texts: *Cetraria nivalis*)
English common name: crinkled snow lichen
Plant family: Parmeliaceae

The light-coloured crinkled snow lichen grows on the sides of ridges and on terraces, where the soil is well-drained, but holds more moisture than the ridge tops. It forms light bands along the slopes, clearly visible from the air.

According to the elders (and backed up by scientific research), this lichen is an important caribou food. It is not eaten directly by Inuit here, but is eaten in Iceland, either as a porridge or cooked vegetable.

However, in the past, and sometimes in the present, Inuit do eat part of the rumen contents of caribou, often dipping bits of kidney or liver into the opened rumen while butchering a caribou. As crinkled snow lichen forms a large part of the rumen contents, the lichen is certainly consumed this way.

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APPENDIX 9.3-C

Meliadine Gold Project Traditional Knowledge, Marine Approaches to Rankin Inlet Report (Burt and Hickes 2012)

Meliadine Gold Project
Traditional Knowledge, Marine Approaches to Rankin Inlet
Report, 2012

Abstract: As a part of the Inuit Qaujimajatuqangit studies for the Meliadine Gold Project, traditional knowledge regarding the shipping routes through Hudson Bay and the marine approaches to Rankin Inlet was examined through interviews with experienced hunters, fishers, boat tour guides, and people who spend a lot of time on the water in the Rankin Inlet area. Knowledge of the areas and impacts on the marine mammals, fish, marine invertebrates, and birds were compiled. Activity areas for many species were compiled and added to hydrographic charts of the areas near Rankin Inlet and the middle portion of Hudson Bay. Major issues of concern include the waters around Marble Island and Hudson Strait, the effects of increased shipping noise and potential effects of a growing population of killer whales on the resident marine mammals in Hudson Bay. Effects of climate change over the past twenty years were discussed, and areas and times of concern were recorded.

1. Objectives:

In this study, we were asked to determine the recent to present traditional use of marine areas around select Kivalliq communities, especially Rankin Inlet but also Chesterfield Inlet and Whale Cove, with particular attention to areas near the shipping lanes, ship anchorages, and the port/laydown areas to be used by Agnico-Eagle for the supply to the Meliadine Gold Project.

2. Methods:

John Hickes spoke with several members of the Rankin Inlet Hunters' and Trappers' Organization (HTO) in Rankin Inlet asking for their recommendations as to who to talk to about marine issues. It is not necessarily Elders that are needed for this work, but people who currently hunt marine mammals and/or spend a lot of time on the water during the open-water season.

The Rankin Inlet HTO suggested John Tatty, who is a respected Elder who has spent his entire life on and around the sea. They also suggested Harry Ittinuar, who is the only licensed tourism operator doing sea trips out of Rankin Inlet, and who knows the marine areas intimately. He and his family also hunt marine mammals throughout the year.

The Chesterfield Inlet HTO had earlier (in October 2011) suggested Louis Autut, a respected elder who still hunts and fishes. We were also able to talk briefly to Jackie Nakoolak, who is an active hunter who lives in Coral Harbour, and is also on the Board of Ukkusiksalik National Park.

We developed a set of guideline questions (**Appendix 1**) for the interviews and were able to follow these. Consideration was also given to birds, fish, marine invertebrates, weather and climate change.

We met with John Tatty and Harry Ittinuar (both from Rankin Inlet) on May 10, 2012, discussing marine use in detail, and annotating maps provided by Agnico-Eagle Mines, and again with Harry Ittinuar on Oct. 18, to update information from the summer of 2012, and to finish annotating the maps. Full sized printed maps provided by Agnico-Eagle were used, and annotations made on the printed maps. These annotations were later transferred to digital copies of the maps. The annotated maps are attached in Appendix 2.

John Hickes has talked to representatives of the HTOs in both Whale Cove and Chesterfield Inlet. We were able to meet with Louis Autut (Chesterfield Inlet) while he was in Rankin Inlet for a meeting. We were unable to talk to anyone from Whale Cove, but have taken pertinent comments from Louis Voisey's interview regarding general traditional knowledge along the coast in the Whale Cove area.

Since this is a traditional knowledge report, the summaries of information presented in the Results section are from material gained in the discussions with the hunters. Since a lot of the information was disseminated in conversations, it is difficult to attribute it to a single person. The information from one person stimulates discussion from another and stimulates a back-and-forth discussion. Unless otherwise cited, the information can be attributed to John Hickes, John Tatty, and Harry Ittinuar, all from Rankin Inlet.

3. Results:

3.1 Species of marine mammals hunted

The marine mammals hunted out of Rankin Inlet are the same as those hunted everywhere on the southern part of Hudson Bay. These include: belugas, seals (ringed, bearded, harp, and harbour seals), walrus, and polar bears. (See sidebar for scientific and Inuit names of marine mammals and fish.)

Belugas are hunted in the open-water season only, but seals are taken on the sea ice as well as in the open water. Walrus are not common in the Rankin Inlet area, but are occasionally taken north of Marble Island. Polar bears are hunted mostly on the sea ice, but occasionally are taken in summer. There are always a few "defense kills" of polar bears.

In the past, belugas were hunted from Peterhead boats with harpoon and rifle, wherever they were encountered.

Marine Mammal Taxonomy:

Ringed seal: *Pusa hispida* Netsik

Bearded seal: *Erignathus barbatus* Ugyuk

Harbour seal: *Phoca vitulina* Qasigiaq

Harp seal: *Phoca groenlandica* Kaigulik

Beluga: *Delphinapterus leucas* Qinalugaq

Bowhead: *Balaena mysticetus* Arviq

Orca: *Orcinus orca* Aarluk

Walrus: *Odobenus rosmarus* Aiviq

Polar bear: *Ursus maritimus* Nanuq

Fish Taxonomy:

Arctic char: *Salvelinus alpinus alpinus* Tariuqmiutaq

Lake trout: *Salvelinus namaykush* Iluuraq

Narwhals and bowhead whales have not been common in the Rankin Inlet area during the past hundred years, so hunting of these species has been minimal in the recent past. The Thule hunted the larger whales during a warm phase in the earth's climate, but not since the early 1800's (Taylor 1979). The Thule migrated into Hudson Bay beginning about 900 AD, but the Thule along the coast between Chesterfield Inlet and the Churchill River likely did little bowhead hunting (Clark 1979).

All the seal species were hunted by harpoon at breathing holes in the sea ice, and, by rifle when they haul out on the ice to moult. In recent years, harpoon hunting has gained in popularity, as a way of preserving past skills. Rifle hunting is done by stalking a hauled-out seal (sometimes from behind a white screen), and shooting once the animal is within range.

Once the people had rifles, they could hunt seals in the open water from boats, usually in the late summer, when the seals would float. Seals are thin in mid-summer and will not float until they have built up blubber layers, and/or the salinity of the water has increased due to the cessation of the spring run-off. Seal hunting continues into the fall until the sea ice begins to freeze, then stops until people can travel on the ice.

Walrus were hunted in the water and on the land in their haul-out areas, originally by harpoon, and later by rifle. Louis Autut, an Elder from Chesterfield Inlet, mentioned that people travelled from Chesterfield Inlet to Coats and Bencus Islands by Peterhead boat to hunt walrus in the old days, hunting in late summer and fall, once it was cool enough to keep the meat from spoiling on the way back. He added, "The RCMP were the best at walrus hunting to feed their dog teams – they got *lots* of walrus."

Polar bears were and are hunted in the Rankin Inlet area. In the past, they were hunted for skins and meat, first by harpoon, using dogs to bring the bear to bay. At present, polar bears are hunted under a quota system, with some tags being allocated to sport hunters and the rest used by community residents under a lottery-type "draw" system. Quotas are determined by the Dept. of Environment in collaboration with the Nunavut Wildlife Management Board. The quota for western Hudson Bay populations of bears was lowered to eight for 2011 due to concerns about bear populations, then raised to 21 for 2012 (Pepper 2011) when Inuit protested that there were many bears causing problems in the communities. It is not known what will happen regarding future quotas.

All marine mammals, from seals to whales, walrus, and polar bears, are hunted in the Chesterfield Inlet, Rankin Inlet and Whale Cove areas. See following sections for specifics.

3.1.1 Whales

Whales are quite important to the people due to a strong desire to obtain the maktak (epidermis with a small amount of blubber attached). This is a highly valued traditional food, often shipped to people in other areas of Nunavut with less access to whales.

Belugas are by far the most common whale taken in the Rankin Inlet area, and the only species hunted locally in significant numbers. All ages and sexes are hunted, mostly during the open-water season. August and September are the most important months for beluga hunting. Marble Island is an important beluga hunting area, especially in August. These whales are hunted mostly by harpooning and shooting, but occasionally nets are set for belugas. According to Louis Autut (Chesterfield Inlet) people from Chesterfield Inlet hunt belugas when they are around, but do not get as many as the people from Whale Cove do. Belugas are migrating along the coast, heading north, in August and September. Mr. Autut (Chesterfield Inlet) commented that people do not usually go out hunting for belugas, but hear about them being nearby and then go to hunt them. He said that small numbers of beluga used to go up into Chesterfield Inlet, but not many are seen there now. There are also fewer whales seen near the community at present. They hunt beluga mostly north of the Chesterfield Inlet waterway, past Cape Fullerton.

Narwals used to appear in local waters, and were hunted for their maktak, for bone for carving, and for their long tusks (also used in creating artwork), but are seen much less frequently today. They occur in the waters of the northern part of Hudson Bay, and are hunted out of Repulse Bay and Coral Harbour, but people from Rankin Inlet and Chesterfield Inlet do not really expect to see them south of the Chesterfield Inlet waterway. However, in a 2010 interview, Louis Voisey (Whale Cove) mentioned seeing whales in winter, even narwhals in March, a few years back. He was unsure how they were surviving with the complete ice cover.

Killer whales or **orcas** are increasing in frequency, especially near Marble Island, but are not currently hunted here. They are intelligent, large and aggressive, and travel in family groups or pods. Most hunters do not want to risk their lives and equipment trying to take a killer whale. Louis Autut (Chesterfield Inlet) told of a legend about killer whales – he said that many people believe that if you kill one, then the others in the pod will hunt and kill you.

Concern was expressed as to the effect of increasing populations of orcas on other marine mammals due to predation. Bowheads are apparently most vulnerable to orca predation (Beckett et. al. 2008). See information below (in the bowhead section) regarding a possible bowhead kill by orcas near Rankin Inlet and Chesterfield Inlet in the summer of 2012.

On August 26, 2012, Harry Ittinuar (Rankin Inlet) also mentioned that many seals were seen in shallow water near Crane Island, during the week of Aug. 23, and mentioned that this is too early for seals to be close to shore. In a special meeting of the Rankin Inlet HTO (Aug. 24) regarding the presence of orcas, the hunters were interpreting this as an indication of the presence of orcas in that area. At least eight orcas were seen near Churchill during July, 2012 (personal communication, Jack Batstone, Churchill, Aug. 20, 2012). There is evidence that killer whales are increasing in numbers in Hudson Bay, and that increased predatory pressure could affect other marine mammal populations (Higdon et al. 2012, and Fisheries and Oceans Canada website, 2012, killer whales).

Bowhead whales were occasionally seen near Rankin Inlet in the past, but apparently seldom use this portion of western Hudson Bay. Rankin Inlet was awarded a bowhead permit in 2009. A hunt was held and a bowhead taken, but it was taken north of Chesterfield Inlet, not near any community. On August 23, 2012, hunters reported a dead bowhead floating in the area north of Marble Island near some coastal islands, reported that there were bite marks on the carcass, and that strips of maktak were apparently pulled off the whale. In their opinion, as expressed by HTO member Harry Ittinuar on Aug. 26, 2012, this whale was killed by orcas. This whale carcass washed up on the east end of Marble Island, and may affect the distribution of polar bears during the winter of 2012-2013 by providing a reliable source of food.

3.1.2 Seals

Several species of true seals (family Phocidae) occur around Rankin Inlet, and all are hunted both during the time when ice covers the sea and during the open water season.

Ringed seals are the most common and most important locally. They are taken for their skins and meat. They are hunted in the winter at the breathing holes in the sea ice, at the floe edge in springtime, and in the open water, from boats, in August. They used to be taken in nets, but this is seldom done now.

Bearded (or **square-flipper**) **seals** are much larger than ringed seals, and are harder to handle (get out of the water), but are also hunted actively. Their skins are valued for their durability and thickness and are used for making the foot part of the kamiit (boots).

Harp seals are becoming more common in the Rankin Inlet area, and are taken regularly. Both hunters thought the increase in harp seals near Rankin Inlet might be due to increased shipping in Chesterfield Inlet (shipping to service the Meadowbank Mine and various exploration sites), as hunters from Chesterfield Inlet community have noticed a distinct drop in harp seal populations near their community. Louis Autut (Chesterfield Inlet) said they felt the harp seals might be moving away to avoid boat traffic and shipping noise. He also said that the harp seals stay out in Hudson Bay, and are generally not in the Chesterfield Inlet waterway itself. According to Mr. Autut, the harp seals are much harder to hunt; they travel in pods, and flee from boats.

Harp seal skin is thicker than ringed seal skin, but not as thick as the skin of bearded seals. In the past, harp seal skins were used for tents, but now it is valued for mitts and clothing.

Harbour seals are present but not nearly as common as they are along Labrador and the eastern coast of the continent. Harbour seals can tolerate a wide range of salinity and temperature, and are often found in or adjacent to the river mouths, where fresh water enters the sea (Forsyth 1999). Harbour seals do not seem to represent a high percentage of the local seal hunting. According to Louis Autut (Chesterfield Inlet), there used to be many harbour seals off the mouths of rivers flowing into the Chesterfield Inlet waterway, but after 2010, there have been far fewer seen in that area. He says that

the harbour seals stay in the area all winter, at leads close to shore. Their meat is not as highly prized as that of the ringed and bearded seals.

John Tatty and Harry Ittinuar (Rankin Inlet) also spoke of “jar seals”, “ranger seals”, and “dwarf seals”. They appeared to use the terms interchangeably. These were said to occur as much as 60 miles inland in certain river systems, or in landlocked lakes, near the sea. They described these as “dark” and “spotted”. They may simply be harbour seals that have adapted to a much more freshwater environment. They said the “dwarf seals” are, as adults, less than a meter in length, and occur only at the heads of inlets and where rivers flow into the sea. (It is likely these are also harbour seals, perhaps stunted in growth.)

3.1.3 Walrus

Walrus used to be seen and hunted much more frequently in the Rankin Inlet area, but in recent years have become much less common. According to John Tatty and Harry Ittinuar (Rankin Inlet), when seen or hunted today, they occur in the area to the north of Marble Island. The sea floor there supports a population of scallops, and perhaps clams (the hunters were not sure), both of which are a preferred food of the walrus. These large pinnipeds are somewhat migratory, moving with the sea ice. In summer, large numbers of walrus haul out on Bencus, Coats, and Walrus Islands near Southhampton Island and on some parts of Southhampton Island itself. Walrus are hunted for their meat, hides, and tusks. The stomach contents (mostly clams) are eaten as a delicacy, and the cleaned and braided intestines are also a favourite food.

3.1.4 Polar Bears

Polar bears are, in many Inuit hunters’ opinions, the most important marine mammal. Polar bear hunting remains an important cultural activity. Polar bears are hunted for their skins and meat. In some communities, polar bears constitute a lucrative industry, guided sports hunts. Recent cuts to polar bear hunting quotas have reduced the number of polar bear hunts out of Rankin Inlet, and thus the derived income from leading hunts, or from selling the skins.

Psychologically and monetarily, polar bears are extremely important wherever they occur, both to locals and to the tourism industry. Harry Ittinuar (Unainak Tours, Rankin Inlet) offers boat tours to Marble Island and along the coast. Polar bear sightings are highly prized among his clients.

There are some polar bears around during the summer months (often on Marble Island, where they feed on carcasses left behind by hunters), and these often swim from island to island or are seen far out at sea. They are also occasionally a problem in summer at the Rankin Inlet dump, and sometimes will approach campers out on the land. At times, polar bears wander far inland, likely in search of birds’ eggs or small mammals.

The individuals consulted felt strongly that the increase in shipping does increase the risk to individual bears, from the possibility of actual collision with ships to general disturbance causing the bears to have to swim further to avoid conflicts with ships.

3.2 Importance of marine animals in diets

3.2.1 Marine mammals

Seal meat/blubber, maktak (beluga or whale skin), and walrus and polar bear meat are all components of local diets of Inuit, especially elders. In many households, these are staples in the diet, allowing people to avoid the very high prices for meat in local stores.

However, in the past, these formed a much higher percentage of the diet than they do today. Despite this decrease in popularity, marine mammal products are still important, and a vital part of the cultural identity of Inuit.

3.2.2 Fish from the Sea

Fish are caught in inland rivers and lakes and in the sea. Inland fisheries have been addressed in other parts of the EIS, and studies done to quantify their use.

Marine and anadromous fish are also very important in local diets, and as an export item.

Arctic char are caught inland, in the rivers, and in the sea. “Sea run” char are highly regarded in terms of taste, texture, and nutritive value. They are cooked, dried (pipsi), or eaten frozen (qaaq). The eggs are highly regarded as well.

Gill nets are set along the shores of many islands, peninsulas, and along the shores of bays leading to river mouths. People also fish in the leads that develop in the sea ice in spring, jigging with hooks for char and cod.

Char are caught in the sea during most of the open water season. Many families fish with nets during August and September. Many people (Inuit as well as qalunaat) enjoy fishing with rod and reel, and often do this in summer.

Lake trout are usually taken in inland lakes (by net and line), and, much less frequently, in the sea.

Whitefish are mostly fished in lakes, but occasionally are caught in nets in the sea.

Char, lake trout, and whitefish use both lakes and the sea during different parts of their life cycle. Whitefish are only rarely caught in the sea around Rankin Inlet.

Cod are caught at leads in the sea ice, and occasionally are eaten. In the past, these mostly were fed to dogs, but today, less are taken, but some are eaten. Cod are heavily fished in the spring due to the local practice of holding "fishing derbies", with high cash or merchandise prizes for the largest fish.

Sculpins are caught and eaten by some elders who like the taste, but the numbers are not significant.

Capelin are small herring-like fish that gather on the surface in tight schools in July and August. They spawn in gravel in very shallow water, and in some places can be simply picked up in buckets. They are dried on racks for later eating. Those we consulted said they did not think capelin are harvested near Rankin Inlet, and seldom see the spawning schools. However, they said they are often caught in this manner near Churchill, so they may be around Rankin Inlet as well.

Seal hunting and fishing for cod, lake trout and arctic char were important not only for human food, but also to feed the dog teams of the past. It took about the same amount of food to feed a working dog as was required for an adult human, so having a large dog team put considerable pressure on the owner to hunt. Today, dog mushers in Rankin Inlet sometimes set nets for whitefish for dog feed.

3.2.3 Marine invertebrates

The utilization of marine invertebrates is not as well developed in Kivalliq as in the eastern areas of Nunavut, where huge tides expose large areas of the seabed, thus increasing access to bottom dwelling invertebrates.

The **blue mussel** (*uviluq*) is the most important marine invertebrate harvested in the Rankin Inlet area. Mussels grow on rocks and rocky bottoms in the intertidal zone and can be collected at low tide. The most popular collecting areas are near the Diana River and the Tudlik Peninsula, but many people collect in mussel beds in many locations around the main inlet, and near the barrier islands. There are mussels in abundance at the head of the inlet near the swan staging lake, but most people don't collect there as they are concerned about contamination from the sewage outflow and the old nickel mine.

Clams (*ammuumajuq*) occur in mud bottom habitat without many rocks, but this type of habitat isn't common around the community of Rankin Inlet, and few clams are harvested here. There are better clam beds further north, past Wager Bay and around Southampton Island (as shown in figure 3-1).

Scallops (*tavlurunnaq*) are present but below the tidal zone, so can't be collected directly. They are eaten in a half-digested state from walrus stomachs, and are highly regarded by elders.

There are **crustaceans** in Rankin Inlet, but most shrimp and crabs are too small to be utilized for food. They are often caught while people are jigging for cod.

3.2.4 Birds associated with the sea

There are a number of birds that commonly feed on the sea, and/or nest on islands, peninsulas, or cliffs in the Inlet.

Some of these (eider ducks, black guillemots, arctic terns, and some gulls) nest on small islands near the water's edge, and may be affected by boat wakes. However, for the most part, the shipping season does not coincide with the incubation season in these birds, so the likelihood of affecting nesting success is small. Wakes from fast pleasure boats likely affect these birds more.

Egg collecting is common in spring; many people prefer the taste of goose, eider duck, swan, guillemot or gull eggs to that of chicken eggs, so whole families go out egg collecting. According to Mr. Autut (Chesterfield Inlet), now that they are no longer trapped, foxes are much more common, and take a heavy toll of bird eggs on islands before the sea ice melts.

Common eiders nest on small islands and peninsulas, and feed on mussels, crabs and other marine invertebrates along the shoreline. They can dive to considerable depths, so are often found some distance from land. Louis Autut (Chesterfield Inlet) commented that eider ducks are much less common now than in the past. He remembers many, many eiders in 1951, but says they are much less numerous now. Common eiders are in danger everywhere in their range, and particularly around Hudson Bay (especially on Southampton Island), due to outbreaks of avian cholera (Deschamps et al. 2012). Many people collect eider eggs in season, but few eat eiders.

King eiders are less common and usually do not nest in the area, but pass through on migration. Sightings are highly prized by birders.

Scoters (surf and white-winged scoters) are small sea ducks that are frequently seen at sea. They are not hunted for food in this area.

Long-tailed ducks (formerly called oldsquaw ducks) are common when the sea ice is vanishing. They nest on small tundra ponds, but often feed on the sea. According to Tatty and Ittinuar (both of Rankin Inlet), they are not hunted for food in this area.

Black guillemots (*pittiulaaq*) are related to auks, and nest on bouldery islands in the inlet and along the coast, usually in crevices in the rocks. They are diving birds that feed on small fish. Their eggs are collected by Inuit, so black guillemot nesting islands are valued for this food source.

Common gulls in the Rankin Inlet area include **glaucous, Thayer's and herring gulls**. These nest on islands in the inlet and along the coast, and on tips of peninsulas, especially areas not often visited by people or dogs. Less common gulls include the Iceland gull and Sabine's gull. These likely do not nest in the area. Gulls are not eaten by the people, but gull eggs are collected and eaten.

Two species of **jaeger** are sometimes seen in Hudson Bay, the **parasitic and long-tailed jaegers**. These are often seen near gull colonies or feeding groups of gulls, as they harass the gulls in the air, forcing them to regurgitate their recently swallowed food. The jaeger swoops down and picks up the regurgitated fish before it hits the water, or scoops it off the water. Jaegers are not used by people, but contribute to the diversity of the bird fauna.

Arctic terns (*imitqutailaq*) are often seen on western Hudson Bay, especially once the young are off the nest and flying with the adults. They nest on some islands, mostly where there is a lot of gravel, and on gravel bars in rivers. Tern eggs are collected, and are highly prized for their taste.

Canada geese (*niqliq*) often nest on low islands in the sea, and can often be seen with broods on the sea near islands. They are hunted but usually are hunted inland, along the Meliadine and Diane Rivers and around inland lakes and ponds. **Snow geese** (*kanguq, kanguit*) are common on migration in spring and fall, but tend to gather on inland lakes and slopes, where they feed on berries, grasses, and sedges. They are hunted inland, but not on the sea. **White-fronted geese** *(niqlingnaq)* are present but not common; these are also hunted inland, not usually on the sea.

Shorebirds are small to medium-sized birds that forage along in the intertidal zones, along rocky shores, and in wetlands, fresh and salt water. These are not utilized by Inuit, but are recognized as indicators of the health of the marine environment as they depend on small marine invertebrates and their eggs, as well as juvenile fishes, fish eggs, and other small prey.

There are many shorebirds that frequent the shores of Rankin Inlet, some nesting in the area, and others simply migrating through. Common species often seen in the intertidal or on sandy shores include the lesser yellowlegs, least sandpiper, semipalmated sandpiper, white-rumped sandpiper, dunlin, Baird's sandpiper, stilt sandpiper, semipalmated plover, and red-necked phalarope. None are used by Inuit.

Raptors [peregrine falcons (*kiggiviaqjuk*)**, gyrfalcons, and rough-legged hawks** (*kaajuut*)**]** nest on steep slopes or cliffs on many of the islands and peninsulas near Rankin Inlet. These islands offer valuable nesting habitat for these predators of small mammals and birds.

Almost any cliff with even small ledges can provide a nest site for peregrine falcons. These falcons do not construct a stick nest, but simply nest on the ground on a ledge. They do not deposit much "whitewash" in the area of the nest, but sometimes streaks of whitewash can indicate lookout posts. Traditional nesting cliffs may be marked by the orange "jewel lichen" which grows where nutrients are added by the birds.

Rankin Inlet has one of the highest densities of nesting peregrine falcons in the world (Franke et al. 2010), and concern is high regarding the safety of the nesting habitat for these birds. The map below illustrates approximate traditional nesting areas for peregrines near Rankin Inlet.

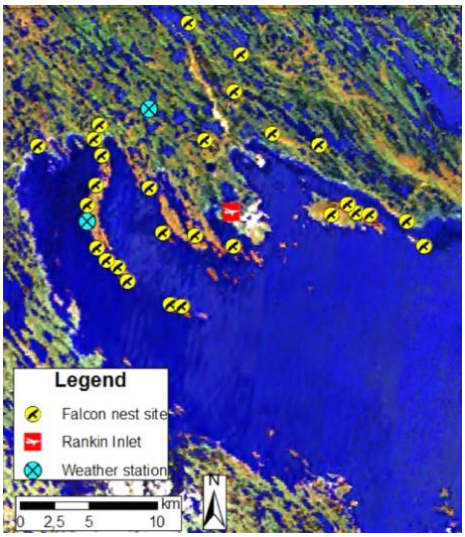

Figure 1. Map showing traditional peregrine falcon nesting areas around Rankin Inlet. From: Anctil et al. 2010. Growth and survival of Peregrine falcon nestlings in Nunavut. (Poster, ArcticNet)

Current research, corroborated by the hunters, indicates that changing weather and longer periods of rain in summer may be causing problems for peregrines as eggs are frequently submerged on the ledges, making incubation impossible, adults are unable to obtain enough food for the brood, or are unable to provide adequate shelter for the young (Anctil et.al. 2010). This may result in changes in nest site selection over time or may impact peregrine populations around Hudson Bay.

As these raptors do not feed on fish, the danger from marine shipping is almost negligible other than possible discouragement during the laying and incubation periods. These periods do not coincide with the shipping season in Hudson Bay.

However, viewing of peregrines and other raptors is high on the list of "wants" by tourists, so this needs to be taken into consideration when determining the effects on marine tourism in the Rankin Inlet area.

3.3 Non-biological factors and traditional knowledge

Weather, winds, sea ice (conditions and movement), currents, and tides control all marine activities along the Hudson Bay coast. Experienced hunters simply live with these conditions and work within the parameters set by the weather and environmental conditions. They do not talk much about it, but adapt their activities to the conditions of the time. It is generally the inexperienced or foolish that venture out without proper preparation, and have to be rescued.

The weather along the Kivalliq coast is highly unpredictable and can be quite severe. Fog can be a problem during all the open water season, and can be particularly bad when the sea ice is deteriorating

in the spring and early summer. There is often another period in the fall, usually late August through October, when fog is likely along the coast in the Rankin Inlet area.

The tides at Rankin Inlet average around 3- 4 m, and are visually interpreted on the following website: http://www.tide-forecast.com/locations/Rankin-Inlet-Nunavut/tides/latest. All experienced hunters watch the tides closely, and adjust their activities to the tidal cycles.

In 2010, the freeze-up was unlike most other years in recent memory. The sea ice did not form until late November, which affected all marine wildlife, and hunting practices. Hunters continued going out in boats, and brought back many more seals than normally, as they were still hunting them in the open water. The late freeze-up also affected the migration of polar bears along the coast, and both Whale Cove and Rankin Inlet experienced far more bear problems than normally, due to the lack of ice confining the bears to the land – they just kept walking north along the coast.

Harry Ittinuar (Rankin Inlet) remembered one other year (he thinks it was 2005) when freeze-up was very late. He recalls boating right through November that year. He commented that this does not happen very often, but that in his opinion freeze-up seems to be occurring later each year.

In general, major changes observed by these hunters in the Rankin Inlet area over the past 20 years include:

- Later freeze-ups;
- Shorter periods of sea ice;
- Less landfast ice;
- More uncertainty about the weather;
- More short periods of severe weather, following one storm after the other;
- Few sea mammals seen in July [They commented that sea mammals are often associated with floating ice pans; if there is no ice, fewer mammals are seen. This may be a response to the food chain associated with the sea ice, zooplankton feeding on algae and phytoplankton attached to the sea ice, and small fish feeding on the zooplankton, on up the food chain. (Krembs and Deming, 2012; Legendre et.al 1992)];
- Changes in moulting season in seals – most ringed seals used to start moulting in May/June, but now often start in April.

3.4 Commercial shipping routes

Ships navigating across Hudson Bay and into Rankin Inlet follow a sea route that takes them through the centre of the Hudson Strait, then north of Charles Island, south of Salisbury and Nottingham Islands, and through Evans Strait between the Bell Peninsula on Southampton Island and Coats Island, running just to the north of Coats and Bencus Islands. Just southwest of Walrus Island, the route turns southwest (in Fisher Strait) to clear Cape Low, then runs west to just south of Marble Island. It continues west toward

Rankin Inlet. (This route is shown on **Shipping Route Map 1**, which covers the route from Hudson Strait to western Hudson Bay.)

The shipping route to Churchill runs to the southeast of Coats Island, between Coats Island and Mansel Island directly southwest to the port at Churchill.

On a finer scale, after passing to the south of Marble Island, the Rankin Inlet route goes north of the Mirage Islands and between Middle and South Shoals and north to clear Guillemot Bank. It then proceeds west through Horseshoe Deep to the north of Guillemot Island and Kelp and Harp Rocks. (This route is shown on **Shipping Route Map 2**, which covers the route from near Marble Island into anchorages around Rankin Inlet.) At this point, based on winds and currents, the ship's captain selects a suitable anchorage for the unloading of the cargo, which is lightered in to the dock at Itivia.

Shipping routes near Rankin Inlet have land-based navigation markers located on islands.

The ships carrying fuel for the Rankin Inlet community proceed through a channel between Cur and Kresik Islands to tie up to shore mooring bollards on the peninsula at Johnston Cove. They then discharge fuel through floating pipelines to onshore tanks. These ships come in at intervals from early August right through to freeze-up (October). They do not break ice.

Private boats are anchored in a community small craft harbour (locally called "Johnston Cove") inshore from a point called "Esker Point" on some old maps, but not identified on the hydrographic charts. This means that there is an area offshore from this harbour that receives relatively heavy boat traffic when people are using their own boats. A boat ramp and dock in Johnston Cove also allows people to put their boats into the water at that location, further increasing traffic.

A second boat ramp near the barge docks at Itivia permits launching of boats from boat trailers. A few boats are moored at Itivia, and two old NTCL (Northern Transportation Company Limited) fuel barges remain anchored off Itivia in Melvin Bay. There is considerable boat traffic from private boats in the Itivia area inshore from Panorama Island.

Private boat traffic and constant hunting of any marine mammals that might venture near Rankin Inlet have likely already resulted in whales avoiding areas with the constant and erratic boat traffic generated by small craft. Seals are sometimes seen, but are much less common near the community than they are in areas less exposed to private boat traffic.

3.5 Specific areas of importance or concern along shipping routes

Discussions with the interviewees indicated several areas of concern, mostly where shipping might interfere with whale activity or actual whale hunting, or areas where shipping activity has already caused changes in the areas used by marine mammals. These are described by geographical area, but in some cases, activity areas overlap somewhat.

3.5.1 Areas of importance along shipping route near Rankin Inlet

From what we heard from the two hunters, the only area near Rankin Inlet where the commercial shipping route might cause concern is its proximity to Marble Island. The mapped route comes fairly close to Marble Island (within 1 km), which may interfere with whales when they are close to the island, and with hunting boats which also may be close to the island. However, we understand that Agnico Eagle committed to keeping commercial shipping done for their company to come no closer than 2 km to Marble Island. This should be sufficient to protect the marine mammals using the shallows near the island.

3.5.2 Areas of importance near Whale Cove

Louis Voisey (Whale Cove) has spent many years hunting and fishing along the Hudson Bay coast. He had several concerns regarding the impact of increased shipping on marine mammals along the coast in general (from Rankin Inlet to Churchill). He mentioned that there are far fewer seals (of all species) than in the past, and felt this might be tied to shipping as the decline started when NTCL (Northern Transportation Company Ltd.) started regular shipping along the coast. He also mentioned increased noise from boats of all kinds in the summer, and noise from Bombardiers and ski-doos on the sea ice in winter. According to Louis, there are also far fewer whales around Whale Cove: "They used to come in here by the hundreds. And now, they still do come in here, but maybe 20-30, no more…. I think hunting is probably cutting them down. Lately, every whale that comes in sight, they kill."

He mentioned that they are seeing many more polar bears in Whale Cove (this interview took place in November, 2010), and that these were adult bears, very few cubs. (The sea ice became established very late in 2010, and many bears that normally go out on the sea ice as the ice forms stayed on land and kept walking north, so reached Whale Cove and Rankin Inlet before they were able to access the sea ice.)

3.5.3 Areas of importance near Chesterfield Inlet

Louis Autut (Chesterfield Inlet) spoke of disruption of marine mammal migration routes and activity areas near the community of Chesterfield Inlet and in Chesterfield Inlet, in his opinion due to ship traffic serving the Meadowbank Mine. He said there are fewer seals and whales near the community and in areas in the Chesterfield Inlet waterway itself. He also mentioned changes in char runs in rivers and streams flowing into Chesterfield Inlet, fewer char at times when they used to be plentiful.

Mr. Autut mentioned that people never fish in deep water, so it is shallow areas that are mostly of concern, especially their traditional fishing areas in the Chesterfield Inlet waterway. Inuit fish mostly by net, and Chesterfield Inlet community used to have a commercial quota of 20,000 to 30,000 lbs. They usually attained that quota between 2001 and 2010, but between 2010 and the present, are having a hard time reaching that quota.

He also mentioned that they used to catch many char with red flesh (as opposed to red-pigmented skin) in the waterway, but now seldom find ones with red flesh; all seem to have pale flesh. He said that Inuit believe that the red colour in the flesh of the char is due to things like krill in their diet, and wonders if the shipping traffic has caused the great schools of krill to go elsewhere.

Mr. Autut mentioned that char and seals often feed on capelin, and that in their experience, capelin are not nearly as common as in the past. He feels that the main food of the char seems to be moving offshore, and the fish may be following the food. He mentioned that shore-set nets used to be filled with char, but that they now get only 2-3 char per set.

The Chesterfield Inlet (waterway) has always been an important area for seal hunting for the people from Chesterfield Inlet. The seals hunt fish going upriver and staging at the entrance of the inlet. Ringed seals and harbour seals feed on char off the river mouths, some as much as 80 miles up the inlet. From 2000 to 2010 there were many harbour seals, especially in the deep water off the mouths of the rivers flowing into Chesterfield Inlet. Today, they do not see nearly as many seals there. In June and July, the seals leave the waterway and migrate out into deeper water in Hudson Bay.

The cargo ships supplying the Meadowbank Mine anchor where people from Chesterfield Inlet used to fish. He mentioned that there are many barges operating 24 hrs per day to unload those ships.[1] He feels that level of activity may have an effect on marine mammals and fish. He said that they used to be able to get fish, seals, and whales close to the community, but now have to travel 30 to 50 miles to hunt. With fuel prices rising, people find it more difficult to hunt when required to travel these distances.

Louis Autut was the only one who made a point of offering advice – he said he feels it is important to tell the young people of the dangers that might arise from mining. He said, “The mine will operate maybe 15 years. During this time, they will use the waterway heavily. This use may cause deterioration of the environment there, and the animals will no longer use it, char will not be spawning there and the animals that feed on the char will no longer come.” He asked, “What will you tell our children when the animals are gone?”

3.5.4 Areas of importance near Southampton Island and Coats Island

Jackie Nakoolak, a well-known hunter from Coral Harbour who used to live in Rankin Inlet, a member of the Advisory Board for Ukkusiksalik National Park, was also consulted when in Rankin Inlet in September of 2012. Jackie said that there is great concern among Coral Harbour hunters regarding the increased traffic from all potential mining projects supplied by shipping into the western and northwestern portion of Hudson Bay. He said that there are changes occurring in walrus distribution on Coats Island and on the eastern peninsula of Southampton Island, dating from the time of the increase of shipping to supply the Meadowbank Mine. Shipping to supply several advanced exploration projects or potential mines,

[1] It takes 6 ships to resupply the Meadowbank Gold Mine each year. It only takes 4 barges to lighter each ship.

such as the Baffinland Iron Mines Project or the Roche Bay Project, may add to the effects of shipping on marine mammals using the waters around Southampton Island.

3.5.5 Areas of importance: Hudson Strait

From all indications and information on migration routes for marine mammals, the Hudson Strait is an area of great concern for marine mammals from all parts of Hudson Bay and the Foxe Basin. Migratory marine mammals funnel through the Hudson Strait as soon as the ice cover permits in the summer, and back out through the strait beginning in August and continuing through September.

The Hudson Strait is a migration route for whale populations in Hudson Bay, including belugas, narwhals, and bowheads. Jackie Nakoolak was particularly concerned about the effects of increased shipping traffic through Hudson Strait on all species of marine mammals that use the areas around Southampton Island, Coats Island, and Bencus Island. He mentioned concern especially about shipping traffic that occurs in the fall as this is when many whale species are migrating out of Hudson Bay via the Hudson Strait, and any winter traffic that involves ice-breaking (which is not an issue for the Meliadine Project). Mr. Nakoolak (Coral Harbour) mentioned, supported by the literature, that marine mammals appear to be particularly sensitive to shipping noise (noise from engines and propellers of ships), and to the more erratic noise from smaller boats. In whales low-frequency vibrations from ships interfere with long range communications between individuals and pods (Richardson et al. 1995).

Belugas migrate through the Hudson Strait or down the west coast of Hudson Bay when ice conditions permit in the spring. Many summer in the estuaries of the Seal, Churchill and Nelson Rivers, as well as smaller rivers along the southern coast of Hudson Bay. They migrate north along the west coast of Hudson Bay beginning in late August, and many winter in the Hudson Strait area or, when ice conditions permit, in Roes Welcome Sound or other areas in northwestern Hudson Bay (Fisheries and Oceans Canada website, 2012, belugas). According to the hunters as well as the literature, belugas are particularly sensitive to shipping and erratic boat traffic and noises (Beckett et al. 2008).

Narwhals migrate through the Hudson Strait to summer along the northwestern coast of Hudson Bay between Daly Bay through Roes Welcome Sound and in the western part of the Foxe Basin almost to the Hall Beach/Igloolik areas. Little is known of their exact migration route to the Hudson Strait, but they pass through the northern part of the Strait and apparently winter in the pack ice of the eastern portion of the Hudson Strait and in Davis Strait (Fisheries and Oceans Canada website, 2012, narwhals).

Bowhead whales are not as common in Hudson Bay as they are on the east coast of Baffin Island, or in the Lancaster Sound/Eclipse Sound areas, but they do occur, most frequently in northwestern Hudson Bay, near Repulse Bay and in Frozen Strait, as well as around Southampton Island (at Duke of York Bay and around the Bell Peninsula), and very occasionally, near Chesterfield Inlet. There is evidence, from Inuit Qaujamajatuqangit and old whaling records, that bowhead whales migrate through the Hudson Strait, and some evidence that bowheads may winter in western Hudson Strait, near Nottingham and

Salisbury Islands (Fisheries and Oceans Canada, website, 2012, bowhead whale)and (COSEWIC 2009, on SARA site).

Walrus move westward through the Hudson Strait in early summer. Large numbers of walrus haul out on Coats and Bencus Islands, and on the Bell Peninsula of Southampton Island, and walrus are found in small numbers as far south as Chesterfield Inlet and just north of Marble Island. Significant numbers of walrus winter in leads along Southampton Island, near Coats Island, and in Roes Welcome Sound, and in spring some walrus move eastward through Fisher and Evans Straits into western Hudson Strait as the sea ice begins to break up. All this moving around does put walrus directly in the path of ships entering Hudson Bay (Fisheries and Oceans Canada website, 2012, atlantic walrus) and (COSEWIC 2006, walrus status, on SARA site).

The Hudson Strait is also important for migrations of harp seals. The harp seals occurring in Hudson Bay are members of the population that whelps on the ice off Newfoundland, migrating northward in April and May and then west through the Hudson Strait into Hudson Bay. Harp seals are regularly taken in Roes Welcome Sound, and around Chesterfield Inlet, but are reported to be less common around Chesterfield Inlet and more common around Rankin Inlet in recent years. They migrate eastward through the Hudson Strait in the fall. (Forsyth 1999)

Hudson Strait is a large waterway, but is used by all shipping entering Hudson Bay, shipping to Ungava Bay for the Raglan Mine in Nunavik, and all current and future shipping to the Foxe Basin. The critical periods for marine mammal migrations are early summer (June- July), and fall (late August-early October). This means that the shipping traffic in the strait will coincide with the migrations of marine mammals, especially whales, especially in the fall.

4. Conclusions

This is a compendium of information gained from several people who spend a lot of time on the water near Rankin Inlet, Chesterfield Inlet and Whale Cove, and in general from elders in the Rankin Inlet area. The areas of most urgent concern are clearly Marble Island and the Hudson Strait. As more projects are started which require shipping into Hudson Bay, cumulative effects will become of great concern. Adding to the cumulative effects of human activity are the effects of climate change, especially the reduction in duration and extent of sea ice, lengthening of the ice-free period (which may also lengthen the shipping season), weather uncertainties, and the increase in numbers of killer whales along the west coast of Hudson Bay.

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Appendix 1

Agnico-Eagle Mines, Meliadine Gold Project
Marine Traditional Knowledge
Questions Guidelines

These are the guidelines followed for interviews with hunters for the traditional knowledge regarding the marine approaches to Rankin Inlet.

Background:

As a part of the Environmental Impact Assessment for the Meliadine Gold Project, Agnico-Eagle Mines needs information from local hunters and fishers regarding Inuit Qaujimajatuqangiit for the marine approaches to Rankin Inlet, including areas near Whale Cove and Chesterfield Inlet.

We are meeting with a number of people who spend a lot of time hunting marine mammals during the open water season in order to identify areas of concern and areas important to marine wildlife.

Once these areas are identified, AEM can inform shipping companies of areas to avoid, or times when shipping needs to be re-routed to avoid harm to wildlife.

AEM has provided a series of maps for us to annotate; we can add info to the maps, and this will be included in the Environmental Impact assessment for the project.

They are also interested in your comments and advice as to how to minimize impact on marine wildlife including birds that use coastal areas or islands for nesting or feeding.

Use of the information:

The information obtained in these sessions will be used to create a report which will then be used in the Environmental Impact Assessment, and will also be used to help plan the shipping season and program.

Release:

We need to ask you to sign a release regarding the use of this information and the recordings made in these sessions.

Information gathering session:

The following questions are intended to guide the discussion, but can be skipped or changed to suit the participants.

1) **What marine mammals are commonly hunted out of Rankin Inlet?**

Whale species?

Seal species?

Walrus?

Polar bears?

2) **Which marine mammals are important in the local diets of the people?**

3) **What fish are commonly taken in the sea near Rankin Inlet?**

Char? Cod? Lake trout?

Others? Kanuyak? Capelin? Cisco? Whitefish?

4) **Which fish use both the lakes/rivers and the sea?**

5) **What marine invertebrates are important sources of food for animals or humans in this area?**

Mussels? Clams? Others?

6) **What birds are commonly observed feeding at sea around Rankin Inlet?**

Sea ducks – eiders, scoters, long-tailed ducks, other?

Guillemots and related?

Loons and others?

Gulls, jaegers?

7) **What birds use coastal nesting areas, or nest on islands in the area?**

Gulls?

Raptors? Peregrines, gyrfalcons, rough-legged hawks

Others? Jaegers? Shorebirds?

8) **Using the maps and charts, identify areas of importance to marine mammals, by species.**

9) **What changes have you seen in abundance or location of marine mammals in the past 10 – 15 years?**

10) **What areas do you use most in your travel on the sea around Rankin Inlet?**

11) **What areas seem to be most used by people from Rankin Inlet going out by boat?**

12) **What changes in use of the marine sea lanes have you seen in the past 10-15 years?**

13) **Are there areas that should be avoided by shipping? Why?**

14) **What areas, and how much avoidance (distance), and when?**

15) **What changes in weather have you seen in the last 20 years?**

16) **What changes in the sea ice (dates of forming and disappearing, thickness, movement, etc.) have you seen in the past 20 years? In the past 10 years?**

17) **How have these changes affected your hunting on the sea? Fishing?**

18) In order to construct and run a major gold mine, the company must move in large quantities of fuel, construction materials, and equipment, in a very short period of time.

With this understanding, what advice would you like to give them regarding use of the marine environment and impact on its inhabitants?

Appendix 2. Annotated Maps of Hudson Bay and Rankin Inlet area

MAP 1. Northern Portion of Hudson Bay, Traditional Marine Knowledge and Shipping Routes

5449

Canada

HUDSON BAY
BAIE D'HUDSON
NORTHERN PORTION / PARTIE NORD

Scale 1:1 000 000 (61° 20' N) Echelle

Projection: Mercator

DEPTHS in FATHOMS / PROFONDEURS EN BRASSES

Ranger Seal Bay
Seals often seen in fresh water lake
Char spawning area
Beluga migration
Beluga migration
Important hunting & fishing area (mouth of Chesterfield Inlet)
Beluga migration
Important beluga hunting area
Important peregrine nesting area (All of Rankin Inlet)
Beluga migration
Walrus
Snow goose nesting area, along coast
Beluga migration, July - August
Belugas foraging here, in July
Orcas seen July 2012
Beluga calving area

Narwhals

Summer denning area for polar bears to northwest of thus area.
Many polar bears along coast here
Narwhal migration
Great concern expressed by Coral Harbour hunters re this area.
Important hunting area
Traditional walrus hunting
Major eider & snow goose nesting area
Many marine mammals in this area.
Important hunting area
Walrus haulout area
Walrus haulout area
Walrus haulout area
In the past, Peterhead boats from Chesterfield Inlet to Coats Island.
Much RCMP walrus hunting to feed dog teams.
Shipping route, confirmed
Confirmed shipping route into Rankin Inlet

Seismic ships (1980s) reported relatively LITTLE marine mammal or bird life in central Hudson Bay.

AREA / ZONE A
AREA / ZONE B
AREA / ZONE C
AREA / ZONE C
AREA / ZONE D

TO PRINT: Select "Document & Markups"

HUDSON BAY / BAIE D'HUDSON
NORTHERN PORTION / PARTIE NORD

5449

Fisheries and Oceans Canada / Pêches et Océans Canada

Canada

5628

Char fishing, nets along shore

Seals, fall, ringed & bearded

Mussel collecting

CANADA

NORTHWEST TERRITORIES

TERRITOIRES DU NORD-OUEST

HUDSON BAY/BAIE D'HUDSON

RANKIN INLET

INCLUDING/Y COMPRIS

MELVIN BAY AND/ET PRAIRIE BAY

Scale 1:15 000 at 62°48'N/N Latitude

Projection : Mercator

PRAIRIE BAY

THOMSON PASSAGE

Ptarmigan & goose hunting

THOMSON ISLAND

Drying meat

Sewage outfall

Fuel ship anchorage

Belugas (occasionally)

Char - net fishing along shore

Char migration

Char fishing along shore

Belugas (occas.)

MELVIN BAY

RANKIN INLET

KUDLULIK PENINSULA

HORSESHOE DEEP

Guillemots nesting

Peregrines

Peregrines and gyrfalcons

Seals (in fall)

Eiders

Belugas (occas.)

Common eiders nesting

Seals(in fall)

Peregrines

Eiders

Mussel picking

Ship anchorage

LARGE SHIP ANCHORAGE

GUILLEMOT BANK

Guilllemot nesting

Eiders and guillemots nesting

Common eiders nesting

Occasional polar bears

Common eiders nesting

Eiders and guillemots nesting

SEPARATION SHOALS

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5628

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Nautical Charts Printed Lines, Projects and the Marine Environment

METRIC/MÉTRIQUE

Map 3. Near Approaches to Rankin Inlet, Traditional Knowledge, Wildlife

Char fishing, nets along shore

Seals, fall, ringed & bearded

Mussel collecting

Ptarmigan & goose hunting

Drying meat

Sewage outfall

Fuel ship anchorage

Char - net fishing along shore

Belugas (occasionally)

Char migration

Char fishing along shore

Belugas (occas.)

Guillemots nesting

Peregrines

Peregrines and gyrfalcons

Belugas (occas.)

Seals (in fall)

Eiders

Common eiders nesting

Seals(in fall)

Peregrines

Eiders

Fuel ship route (approximate)

Mussel picking

Ship anchorage

Lighter route to dock at Itivia

LARGE SHIP ANCHORAGE

Guilllemot nesting

Eiders and guillemots nesting

Occasional polar bears

Common eiders nesting

Common eiders nesting

Eiders and guillemots nesting

Freight ship route (approximate)

METRIC/MÉTRIQUE TO PRINT: Must select "Documents and Markups"

APPENDIX 9.11-A

Detailed Archaeological Site Description

1.0 MINE INFRASTRUCTURE AREA

The following describes the heritage sites that have been identified in the general mine site area. Community consultation has not identified any specific locations within the general mine site areas as sacred or spiritual sites. Only one site has been identified as having historical material culture (KgJm-53). A burial site (KfJm-84) was also identified (Figure 9-11-A1).

KfJl-3 is near but outside the proposed Discovery waste rock storage facility and consists of 2 caches situated on the lower portion of a bedrock outcrop, near a lake in an otherwise flat topography. The caches are approximately 5 m apart and the site in total covers an area about 8 m north-south by 15 m east-west. The external measurements on cache 1 are 4.7 m long and 4.4 m wide, the internal measurements are 1.9 m by 1.85 m; the height of the open cache is 0.40 m. The external measurements on cache 2 are 3.2 m long and 3 m wide, the internal measurements are 1.25 m by 1.23 m; the height of the open cache is 0.55 m. The site has low archaeological significance because there are a limited number of caches and little cultural information can be inferred from caches. The site will not be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJl-4 is located outside the proposed Discovery waste rock storage facility and is a probable stone marker/inuksuk made of 2 stones propped up between 2 large boulders. The marker stones are approximately 0.60 m above the boulders which are about 1 m high. Its relatively low position in the landscape makes its designation as a site uncertain. According to Pre-hearing Conference, Questions, Concerns and Opinions (2013) “usually inuksuks/markers are in place to tell [Inuit] where the caribou pass…. Little inuksuks near rivers are indicators of crossing locations….. Small inuksuks are the indicators of where caribou did or will cross.” There are other similar features in the vicinity that have been designated as Land Use sites; however, the attribute that differentiates this feature from the others is the amount of lichen coverage. The site is near a pond in a relatively flat topography with several small bedrock outcrops. The site has low archaeological significance because there is little cultural information which can be inferred from a single marker. The site will not be impacted, no further archaeological work is recommended. IQ

KfJl-5 is outside the proposed Discovery waste rock storage facility. The site is a fairly recent hearth with a wind break feature. The large wind break stone is 0.90 m by 0.50 m, the internal opening of the hearth is 0.37 m, the side stones are 0.29 m and 0.26 m, and the back stone is 0.43 m. There are 2 inuksuit close to the hearth. The site covers an area measuring 200 m east-west by 30 m north-south. The site has low archaeological significance as the site is fairly recent and does not likely contain a lot of material culture. The site will not be impacted, no further archaeological work is recommended.

KgJm-4 was recorded by Linnamae and Russell (1975) and is described as containing rectangular, box shaped hearths made from flagstone and remains of flag paved passages. Such features are generally characteristic of early or late Palaeoeskimo occupations. The site based on Linnamae description has high archaeological significance owing to its cultural affiliation. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KgJm-6 was recorded by Linnamae and Russell (1975) and is described as containing rectangular, box shaped hearths made from flagstone and remains of flag paved passages. Such features are generally characteristic of early or late Palaeoeskimo occupations. The site based on Linnamae description has high archaeological significance cultural affiliation. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

530000 540000 550000 560000

6990000 6980000 6970000

KgJm-13 KgJm-14 KgJm-42 KgJm-12 KgJm-11 KgJm-6 KgJm-43 KgJm-4 KgJm-51 KgJm-47 KgJm-50 KgJm-44 KgJm-10 KgJm-15 KgJm-19 KgJm-17 KgJm-18 KgJm-22 KgJm-23 KgJm-46 KgJm-45 KgJm-49 KgJm-56 KgJm-16 KgJm-61 KgJm-24 KgJm-20 KgJm-21 KgJm-25 KgJm-26 KgJm-35 KgJm-31 KgJm-48 KgJm-30 KgJm-29 KgJm-9 KgJm-34 KgJm-33 KgJm-36 KgJm-37 KgJm-32 KgJm-8 KgJm-40 KgJm-27 KgJm-28 KgJm-52 KgJm-53

Meliadine Camp

Mine Infrastructure Area

KfJm-140 KfJm-183 KfJm-182 KfJm-59 KfJm-133 KfJm-131 KfJm-128

SECTION 4

KfJm-88 KfJm-87 KfJm-67 KfJm-66 KfJm-101 KfJm-93 KfJm-84 KfJm-99 KfJm-167 KfJm-80 KfJm-6 KfJl-4 KfJl-3 KfJl-5 KfJl-7 KfJl-1 KfJm-192 KfJm-193 KfJm-102 KfJm-104

SECTION 3

KfJm-181 KfJm-63 KfJm-109 KfJm-110 KfJm-112 KfJm-114 KfJm-191 KfJm-118 KfJm-116 KfJm-179 KfJm-180 KfJm-178 KfJm-177

Phase 2 All-weather Access Road

Territorial Park

KfJm-175 KfJm-176 KfJm-173 KfJm-172 KfJm-171 KfJm-32 KfJm-170 KfJm-169 KfJm-168 KfJm-174

SECTION 2

SECTION 1

KfJm-7 KfJm-33 KfJm-46

Hudson Bay

KfJm-194 KeJm-5

Rankin Inlet

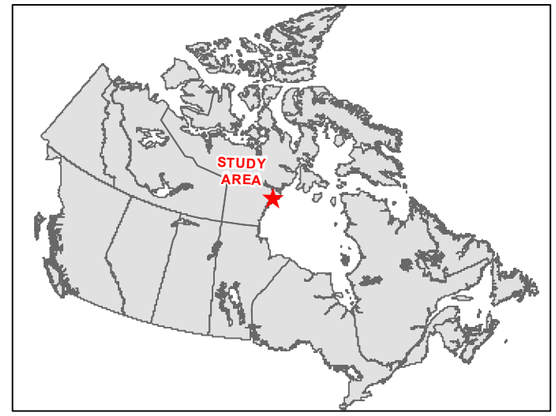
KeJm-10

Rankin Inlet

N

LEGEND

- Non Mitigated Feature
- Mitigated Feature
- Stake
- Camp
- Mine Infrastructure Area
- Phase 2 All-weather Access Road
- Rankin Inlet
- Proposed Project Infrastructure
- All-weather Access Road (AWAR)
- Road - New
- Road - Existing
- Watercourse
- Waterbody
- Built-up Area around Rankin Inlet
- Territorial Park
- LSA
- AWAR Road Section (as per TK interviews)



REFERENCE

Archaeological Sites obtained from the Government Nunavut Department of Culture, Language Elders and Youth. Base data obtained from Agnico Eagle Mines Limited (AEM).
Datum: NAD 83 Projection: UTM Zone 15

400 0 400
METRES

3 0 3
KILOMETRES

PROJECT
AGNICO EAGLE
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
ARCHAEOLOGICAL SITES WITHIN LOCAL STUDY AREA

Golder Associates

PROJECT NO. 13-1428-0007			FILE No.		
DESIGN	JR	26 Sep. 2012	SCALE AS SHOWN	REV.	0
GIS	MH	15 Jan. 2014			
CHECK	JMR	12 Feb. 2014	FIGURE: 9.11-A1		
REVIEW	BN	12 Feb. 2014			

N:\Bur-Graphics\Projects\2013\1428\13-1428-0007\GIS\Mapping\MXD\FEIS\Volume_9\Main_Volume\Appendix_9_11-A\Figure_9.11-A1_Arch_Sites_within_LSA.mxd

KgJm-7 was recorded by Linnamae (1977) and consists of 3 semi-subterranean houses and other features with unknown functions. Linnamae placed a 2 m by 3 m unit in one house. No artifacts were recovered, but there were abundant faunal remains. Samples were submitted for radiocarbon dating and provide a calibrated date between 300 to 700 BP. The site has high archaeological significance because it represents one of the few semi-subterranean house sites located inland. The site will not be impacted, no further archaeological work is recommended.

KgJm-8, Ahmai site, was recorded by Linnamae (1977). Ahmai is an Inuktitut word that roughly means 'don't know'. The site consists of 3 house-pits and many other surface structures, including 2 tent rings. Test excavations in house 1 and 3 were conducted by Linnamae (1977). Based on calibrated radiocarbon dates the site dates from 700 to 900 BP. Of note a stemmed point, not characteristic of ASTt or Neoeskimo technology, was found and Linnamae suggests it may date to the Late Taltheilei or Shield Archaic culture. The site has high archaeological significance because it may contain evidence of Late Taltheilei or Shield Archaic culture. The site will not be impacted, no further archaeological work is recommended.

KgJm-9, Rainbow, was recorded by Linnamae (1977), and partially excavated. A radiocarbon sample taken dates to between 300 to 400 BP. There are 4 well defined semi-subterranean house pits, 3 other possible pit structures, and the scattered remains of several caches, kayak rests, and 2 low inuksuit. The site has high archaeological significance because it represents one of the few semi-subterranean house sites located inland. The site will not be impacted, no further archaeological work is recommended.

KgJm-10 was recorded by Linnamae and Russell (1975) and consists of a single tent ring. Some lithic material was subsequently collected in 1976. The site based on Linnamae description has low archaeological significance owing to the limited number of features and limited material culture. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KgJm-11 was recorded by Linnamae and Russell (1975) and is also described as containing rectangular, box shaped hearths made from flagstone and remains of flag paved passages. Such features are generally characteristic of early or late Palaeoeskimo occupations. The site based on Linnamae description has high archaeological significance owing to its cultural affiliation. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KgJm-12 was recorded by Linnamae and Russell (1975) and consists of at least 6 rock caches, 2 fox traps (one box style, the other a bee hive construction), 2 tent rings; one with a possible defined sleeping platform, and a rock shelter, which is likely a hunting blind. The site based on Linnamae description has low to moderate archaeological significance, owing to the number of features. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KgJm-13 was recorded by Linnamae and Russell (1975) and is described as rectangular, box shaped hearths made from flagstone and remains of flag paved passages. Such features are generally characteristic of early or late Palaeoeskimo occupations. The site based on Linnamae description has high archaeological significance owing to its cultural affiliation. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KgJm-14 was recorded by Linnamae and Russell (1975) and is a small site consisting of a cache. The site based on Linnamae description has low archaeological significance because there are a limited number of

caches and little cultural information can be inferred from caches. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KgJm-15 was recorded by Linnamae and Russell (1975) and is a recent site based on brown glass evident at the site. There are 2 features. The site based on Linnamae description has low archaeological significance because of the relatively recent occupation of the site. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KgJm-16 was recorded by Linnamae and Russell (1975). The field notes describe 8 features including tent rings, boat rests, and 4 caches in a boulder field. In 2011, 10 features were recorded including 3 tent rings, a hunting blind, 2 lines of stones with an unknown function, 2 oval depressions, and a cache. The site has low to moderate archaeological significance owing to the number and diversity of features. The site will not be impacted, no further archaeological work is recommended.

KgJm-17 was recorded by Linnamae and Russell (1975). The field notes suggest a box shaped fox trap on the south side of an esker. The feature was likely reworked into a cache. The site has low archaeological significance because little cultural information can be obtained from caches. The site will not be impacted, no further archaeological work is recommended.

KgJm-18 was recorded by Linnamae and Russell (1975). The field notes describe a “U” shaped tent ring. The continued presence of the feature has not been confirmed. The site based on Linnamae description has low archaeological significance. Based on the coordinates provided by the Canadian Museum of Civilization the site will be impacted

KgJm-19 site consists of 5 features, including 3 kayak caches/storage places (*qajakuvik*), which were to store kayaks over the winter. These 3 forms were also recorded in 1975 (Linnamae and Russell); however, a possible fourth smaller kayak form, and a small stone circle (Feature 1) were added to the site inventory in 2011. The site covers an area measuring 115 m north-south by 40 m east-west. The site has high archaeological significance, since kayak caches are not common in the archaeological record. For added projection a row of stakes have been placed 30 m from the feature. The site will not be impacted, no further archaeological work is recommended.

KgJm-20 was recorded by Linnamae and Russell (1975). The field notes describe 3 tent rings. The continued presence of the features has not been confirmed. The site based on Linnamae’s description has low archaeological significance because there are few tent rings and tent rings often contain a limited about of material culture. Based on the coordinates provided by the Canadian Museum of Civilization the site will be impacted

KgJm-21 was recorded by Linnamae and Russell (1975) as recent cache. The site could not be relocated during the recent baseline surveys. The site based on Linnamae description has low archaeological significance because there is little cultural information which can be inferred from caches. Based on the coordinates provided by the Canadian Museum of Civilization the site will be impacted

KgJm-22 was reported on and excavated in 1975 and consisted of 4 definite Dorset mid-passage houses and 2 other less definite structures (Linnamae 1977; Linnamae and Russell 1975). The site has high archaeological significance because of the cultural affiliation of the site. The site was excavated by Linnamae. Based on the

coordinates provided by the Canadian Museum of Civilization the site will be impacted. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-23 consists of a cache, a hunting blind, and a modern stone marker. The rock shelters identified by Linnamae and Russell (1975) at this site are likely what were identified in 2011 as hunting blinds and in some cases a *siniktarvik*. A hunting blind (*talu*) function is more likely as they are similar to structures found in Taloyoak (Ross 2009). In general these features are small, 1 to 2 m in diameter, continuous stone circles made of large boulders or multi courses of stones. This site measures 50 m north-south by 20 m east-west and is within the proposed camp infrastructure. The site has low archaeological significance because like caches beyond presence and location limited cultural information can be inferred from hunting blinds. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended

KgJm-24 was originally recorded by Linnamae and Russell (1975). At least 2 and possibly a third kayak form were identified within 115 m of the plotted 1975 site location in 2011. A stone marker and a possible inuksuk were also identified. The site has high archaeological significance. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended

KgJm-25 was recorded by Linnamae and Russell (1975). The site consists of a mid passage or paved area, a square hearth, and a possible tent ring. The site has high archaeological significance because of the cultural affiliation of the site. The site will be impacted, the mid passage was excavated, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-26 consists of 5 features that includes 2 tent rings, a cache, 2 stone features, and a triangular stone marker spread over an area measuring 30 m north-south by 40 m east-west. The site has low archaeological significance because there are a limited number of features and little cultural information can be inferred from features present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-27 consists of 5 features. These include 2 possible hunting blinds, thought to be the “boat rests” identified by Linnamae and Russell (1975) based on field note sketches. Also included are a cache, a recent stone marker, and an old kayak cache. This site is spread over an area measuring 45 m north-south by 30 m east-west and is located within 100 m from the proposed camp development. However, the features are separated from the proposed development by elevation and therefore are unlikely to be influenced by development. The site has low to moderate archaeological significance owing to the limited number of kayak cache in the archaeological record. For added projection, a row of stakes have been placed 30 m from the features. The site will not be impacted, no further archaeological work is recommended.

KgJm-28 consists of one clear tent ring, 2 stone circles, and a second tent ring with a shrub growing from its center. The site has low archaeological significance because there are only 2 tent rings and tent rings often contain a limited about of material culture. The site will not be impacted, no further archaeological work is recommended.

KgJm-29 consists of 4 features and was revisited in 2011. A bi–loped tent ring was identified in Linnamae and Russell’s 1975 data. The other features include a second tent ring and 2 stone features of unknown function. This site measures 40 m north-south by 45 m east-west. The site has low to moderate archaeological significance because there are few tent rings and tent rings often contain a limited about of material culture. However the bi-lobed tent ring is not often described in the archaeological literature and is somewhat unique. The site will not be impacted, no further archaeological work is recommended.

KgJm-30 consists of 2 caches, a stone circle that may be a possible hunting blind (*talu*), 2 tent rings, 2 stone features of unknown function, and at least 2 house features excavated into the hill side. These features slightly resemble Dorset features; however, some Thule spring/autumn houses (qarmat/qarmaq) have similar forms (D. Stenton, Government of Nunavut, 2012, pers. comm.). The site measures 60 m north-south by 50 m east-west. The features vary in distance from the proposed camp development by approximately 25 to 70 m. The site has low to moderate archaeological significance because of the number and diversity of the feature present. Portions of the site will be impacted. Some of the features were mitigated and a row of stakes have been placed 30 m from the remaining features. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-31 is on the north-northeast slope of a small circular esker in a chain of eskers bordering the south side of Meliadine Lake. In 1975, 8 features were recorded, 2 caches, 3 tent rings, and other stone features (Linnamae and Russell 1975). In 2011, 9 features were recorded including 2 tent rings, a house feature cut into a hill, 2 caches, 3 stone features for which the function are unclear, and a modern inuksuk/stone marker. The site measures 40 m north-south by 75 m east-west. The site has low to moderate archaeological significance because of the number and diversity of the feature present. For added projection, a row of stakes have been placed 30 m from the features. The site will not be impacted, no further archaeological work is recommended.

KgJm-32 was recorded by Linnamae and Russell (1975). The field notes indicate that this site contains several features described as rock shelter, complex rock shelter, a double rock shelter, and a shelter pit with high walls. The site was revisited in 2012 and identified based on the double rock shelter, which is a double *taluuk* (dual of *talu).* The complex rock shelter may be 3 natural sorted circles. The site has low archaeological significance because like caches beyond presence and location limited cultural information can be inferred from hunting blinds. The site will not be impacted, no further archaeological work is recommended.

KgJm-33 was recorded by Linnamae and Russell (1975) and photo documentation occurred in 2012. Linnamae's field notes suggest a rectangular tent ring slightly built into slope, an old tent ring, and a possible fox trap. A frost crack runs through a feature with an unknown function and there are 3 other possible tent rings, a kayak frame (*qajakuvik*), and a boat rest. The location of the fox trap and the feature with the unknown function were not confirmed during the recent baseline surveys. Three stone circles were recorded. The interpretation of these features as tent rings cannot be confirmed. The site has low to moderate archaeological significance owing to the number and diversity of features. The site will not be impacted, no further archaeological work is recommended.

KgJm-34 was recorded by Linnamae and Russell (1975). The field notes suggest 2 tent rings, a beehive like feature, a ring of stone, and 2 possible boat rests. Photo documentation of these features occurred in 2012 at the location of the tent rings, possible beehive feature, and 2 boat rests. The boat rests are now interpreted as hunting blinds (*talu*). The site has low to moderate archaeological significance owing to the number and diversity of features. The site will not be impacted, no further archaeological work is recommended.

KgJm-35 consists of a cache, 3 possible hunting blinds, and a hearth feature. These features cover an area measuring 25 m north-south by 45 m east-west and are within 30 m of the proposed camp development. The site has low archaeological significance because of the limited cultural information that can be inferred from these features. The site will be impacted, no further archaeological work is recommended.

KgJm-36 was recorded in 1998 by Hart. The site consisted of a stone hearth, a small tent ring, a possible cache, and 2 possible tent rings. Most features were mitigated by Hart in 1998. The site has low archaeological

significance because limited cultural information was recovered. The site will not be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-37 was recorded by Hart (1998). The site consists of a boulder cache with caribou mandible and is within a few metres from shore. About 30 m away is a very recent tent ring. There is an abundant amount of lichen piled up within the tent ring to serve as cushioning. The site has low archaeological significance because of its fairly recent age. The site will not be impacted, no further archaeological work is recommended.

KgJm-40 was recorded in 1989 by Hart. The site consists of 4 boulder caches and plots at the bottom of a bay on the south side of Meliadine Lake. The site covers an area measuring 70 m north-south by 70 m east-west. The caches were photographed and measurements taken; no cultural material was found around or within them. The site has low archaeological significance because there are a limited number of caches and little cultural information can be inferred from caches. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-41 was recorded by Hart (1998) and consists of a toy tent ring, a cache, and a possible fox trap/ grave. The site was revisited in 2011 to assess the possible grave. The cone shape is more reminiscent of a fox trap with no evidence for a grave. The site has low to moderate archaeological significance because of the possible evidence of children in the archaeological record which us rare. The site will not be impacted, no further archaeological work is recommended.

KgJm-42 was recorded by Hart (1998) and consists of a tent ring and a kayak stand. The location of this site could not be confirmed during the recent baseline surveys. The site has low to moderate archaeological significance because little cultural information can be inferred from the features present. The site will not be impacted, no further archaeological work is recommended.

KgJm-43 was recorded by Hart (1998) and consists of a stone pavement that may be associated with Dorset use of the region. The site based on Hart's description has high archaeological significance because there are not many Dorset sites recorded on the mainland. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KgJm-44 was recorded by Hart (1998) and consists of a cache or a fox trap and a scatter of lithic debris, which Hart suggests might have been a tool production area. The location of the site was confirmed in 2012 as a box fox trap. There is a wooden stake propped up by stones, but it is unclear if this is a modern feature or associated with the fox trap. The lithic debris was not noted. The site has low to moderate archaeological significance because little cultural information can be inferred from caches or foxtraps; however depending on the content of the lithic debris cultural affiliation might be inferred from it. The site will not be impacted; no further archaeological work is recommended

KgJm-45 is a stone feature site that was recorded in 1998 under permit 98-876 (Hart 1998). The site was originally recorded as consisting of 7 stone features including an overnight camping structure or siniktarvik, a lookout/windbreak, boulder cache, 2 directional markers, a recent cache, and 2 possible boulders caches (Hart 1998). The esker that the site is located on has been used as a survey location and there are numerous modern rock piles, drilling sites, and wooden stakes around the site area. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature types present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended

KgJm-46 was recorded by Hart (1998) and is located beside a small pond south of the ridge 1.6 km inland from the Meliadine Lake narrows. The site was originally designated as a prospecting camp site but reinterpreted as an Inuit land use site with items associated with fall caribou hunting. The site is located beside a small pond a few metres of elevation below a ridge. Remains here include rocks that outline a wall tent, a small feature outlined by stones thought to be a place to burn garbage, a deposit of rusted nails and other metal objects that were in wood that was burned, a wood jigging stick with fishing line on it, a kipper can and tin can lid, a plywood door for the tent with a section of hose for a hinge. A pathway to the pond is still faintly visible in the vegetation. The entrance to the tent is seen where the vegetation is worn away. There may be a faint outline of a second wall tent. The site has low archaeological significance because of fairly recent age of the site. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended

KgJm-47 consists of 5 features, 2 on the top of a small mound and the others below. On top of the mound, is an Inuksuk and 2 caches/cairns, one of which has a caribou bone placed in the middle. Below, on the northwest side, there are 3 other cache depressions in a small boulder field. The features on top of the mound appear to be relatively recent and not contemporaneous with the caches below. The site has low archaeological significance because little cultural information can be inferred from the feature types present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended

KgJm-48 is north of Lake H1 on a small point of land that juts out into Meliadine Lake from the lake's southern shore. The area is scattered with rocks and 4 features are evident. There is a boat stand, a stone feature with unknown function, a kayak stand, and a second stone feature with an unclear function, but may be a location of caribou hide preparation. The site covers an area of 30 m north-south and 50 m east west. The site has low archaeological significance because little cultural information can be inferred from the feature types present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended

KgJm-49 is located on the edge of an esker between Pond B38 and Lake A8. The site consists of 2 open caches. One cache is located 14 m southwest of cache 2 The exterior measurements of cache 2 is 2.13 m by 1.95 m and 0.48 m high, the interior measurements are 0.90 m by 0.65 m. The exterior measurements of cache 1 are 2.0 m by 1.6 m by 0.28 m high, and the interior measurements are 0.77 m by 0.65 m. Based on the iron bar on top of one of the caches, the site has been reused in more recent times. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will not be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended

KgJm-50 is located on the edge of the proposed B7 East waste rock storage facility, and consists of a closed cache. Age assessment of the site is difficult, because some of the rocks are covered with lichen, which would suggest some antiquity, while others do not have lichen cover. In addition, bone is still present. This is likely an old feature that has been reused more recently. The external measurements of the cache are 1.35 m by 1.28 m by 0.49 m; the internal measurements are 0.76 m by 0.73 m. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-51 is located on the lower slope of an esker situated between Lakes H15G and H15D and will be within the proposed B7 tailings and waste rock storage facilities. The feature uses a large erratic and smaller boulders to form an oval shaped ring. The feature is a hunting blind. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-52 is 2.6 km south of the Meliadine exploration camp within the F Zone area. The site consists of a cache and 2 modern inuksuuk (dual of inuksuk). One inuksuk is 11 m west of the cache, and the second inuksuk is 160 m northwest of the first. It is likely that the inuksuuk are recent, based on limited lichen coverage and evidence of recent stone removal from the ground. The cache is more clearly archaeological; the external measurements of the cache are 2.03 m by 1.52 m by 0.58 m high, and the interior measurements are 1.08 m by 0.80 m. Including the modern inuksuit, the site covers an area approximately 100 m north-south by 170 m east-west. The site has low archaeological significance because little cultural information can be inferred from the feature types present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-53 is located just southeast of the B4 waste rock storage facility and is within Phase 2 AWAR borrow pit B5. The site is made up of one large upright stone marker with several supporting stones. The stone base scatter is 1.03 m long and 0.89 m wide. The upright stones are 0.68 m high. There were tin cans and a metal Bee Hive corn syrup can found in the area. The syrup can dates anywhere from 1940 to 1970 with the plastic lid suggestive of a later date (Queens Printer for Ontario 2009). The tin cans and corn syrup can were photographed but not collected during the recent baseline surveys. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KgJm-56 consists of an isolated find where Michael Suvissak spotted, identified and provided the Inuktitut name for a snowknife (*Pana)* during the 2012 baseline surveys. The item is likely not over 50 years of age since the handle is made from polyethylene and the blade is made of metal. The site has low archaeological significance (Ross in preparation) because it is an isolated find and has a relatively recent date. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended

KgJm-61 was recorded in 2012 and consists of a *talu* located at the base of the northern side of the esker. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

2.0 PHASE 2 ALL-WEATHER ACCESS ROAD

The heritage sites along the Phase 2 AWAR are referenced with respect to Phase 2 AWAR Sections 1 to 4 as described in the Nanuk Enterprises 2011 IQ report (Appendix 9.3-A) and shown in Figure 9.11-A1.

KfJl-1 is located in Phase 2 AWAR Section 4. There is limited information available about this site; however, it may be that this site is included in the concentration of small tent rings at the east end of Meliadine Lake (Archaeological Survey of Canada 1972). In 2012, an attempt was made to confirm the location of this site. Cache features and stone markers were present in the area. The site has low archaeological significance because little cultural information can be inferred from the feature types present. The site will not be impacted, no further archaeological work is recommended.

KfJl-6 is located in Phase 2 AWAR Section 4. The site consists of a single hearth feature. The site has low archaeological significance. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will not be impacted, no further archaeological work is recommended.

KfJl-7 is located in Phase 2 AWAR Section 4. The site consists of a square cache and a tent ring. The tent ring is slightly built into a small shallow slope and Johnny Hakulak, a bear monitor during the 2012 baseline survey, referred to the site as a qarmaq. The site has low to moderate archaeological significance. If the feature is a qarmaq there are few recorded in the area. The site will not be impacted, no further archaeological work is recommended. IQ

KfJm-7 is located in Phase 2 AWAR Section 1 and was recorded in the 1970s by Linnamae (Archaeological Survey of Canada 1972). The site is described as a small tent ring site with an undetermined cultural affiliation. The site based on Linnamae description has low archaeological significance because little cultural information can be inferred from the feature type present. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-33 is located in Phase 2 AWAR Section 1. It was recorded by Linammae (Archaeological Survey of Canada 1972), but there is no description associated with this site. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-46 was recorded by Linammae (Archaeological Survey of Canada 1972) and is described as being located on the west side of the mouth of the Char River and the shore of Prairie Bay. However, there is no additional information about the site. In 2012, the area was passed and it was noted that there is a lot of current activity in the region, including the construction of a house/cabin. There were modern hearths and a possible stone circle feature. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-63 is located in Phase 2 AWAR Section 3. This site has a tent ring that is similar to the Dorset style with central feature. However, there is also recent evidence of camp use in the form of metal tins present. The site is spread over an area 20 m by 50 m but there is a concentration of features in one location, with an outlier that might be from a different chronological occupation. The site has moderate to high archaeological significance because of the possible cultural affiliation of the site. The site will not be impacted, no further archaeological work is recommended.

KfJm-66 is located in Phase 2 AWAR Section 4. The site consists of 6 single stone Inuksuit and one cache with caribou racks extending out of it. The single stone markers are aligned along a 70 m linear distance. This site is located on a narrow rocky ridge slightly elevated above the surrounding barrens by only a few metres. Mark Inuar of Rankin Inlet indicated that from this vantage point caribou could be hunted from either side of the ridge behind the markers. It is located west of the east end of Meliadine Lake. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature type present. For added projection, a row of stakes have been placed 30 m from the features. The site will not be impacted, no further archaeological work is recommended. . IQ

KfJm-67 is located in Phase 2 AWAR Section 4. This is an ovoid stone feature on the same small rocky ridge/esker that KfJm-66 is located. The feature consists of 60 stones and measures 3.2 m by 2.2 m. It appears to have collapsed and the extent of lichen growth indicates that it has not been recently built or disturbed. It may have been a sleeping area (siniktarvik) or hunting blind. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature type present; however siniktarvik are not well represented in the archaeological record. The site will not be impacted, no further archaeological work is recommended.

KfJm-80 is located in Phase 2 AWAR Section 4 and consists of 2 tent rings, 2 caches, and a hunting blind. The 2 rings are adjacent to each other. Both are 4.5 m in diameter and situated on the highest part of the knoll providing good visibility in all directions. The hunting blind overlooks a small lake to the east. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature types present; however, the site is an example of a short term camping and hunting location. The site will not be impacted, no further archaeological work is recommended.

KfJm-84 is located in Phase 2 AWAR Section 4. The site consists of 3 tent rings with internal hearth features, a possible grave, and a hunting blind (*talu*). The site measures 65 m north-south by 100 m east-west. There were no evident human remains in the possible grave and no artifacts. The feature is assigned a grave function based on the 2012 Elder consultation and because it has small white stones outside and inside the feature. The placement of white stones in graves is known from eastern Barrenlands. Examples of graves from Arviat vary in architectural detail according to age, but some are described as being "oval shaped rings or piles of rocks. In some instances, the remains had no roof covering, while in others cases, they were completely hidden from view" (Keenleyside 1989 p. 10). "[O]lder graves, some of which were marked with whites quartzite stones were located. Such stones, designed to keep evil spirits away and to reflect the individual's soul upward to heaven." (Keenleyside 1989 p. 9). Linnamae and Clark (1975 p. 28) also report graves at Meliadine-2, (KfJm-32), with "lumps or pebbles of whites quartzite ..., in varying quantities, with all but one grave". The site has high archaeological significance because it contains a grave. Test excavation were done of the tent rings and for added projection, a row of stakes have been placed 30 m from the grave. The site will not be impacted by the proposed mine development; however, exploration activities might occur in the area. The site is considered sufficiently mitigated; no further archaeological work is recommended. IQ

KfJm-87 is located in Phase 2 AWAR Section 4. The site was recorded in the 1970s and consists of a small tent ring (Archaeological Survey of Canada 1972). Based on Linnamae's description, the site has low archaeological significance because little cultural information can be inferred from the feature type present. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-88 is located in Phase 2 AWAR Section 4. The site was recorded in the 1970s and consists of a small tent ring (Archaeological Survey of Canada 1972). Based on Linnamae's description, the site has low archaeological significance because little cultural information can be inferred from the feature type present. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-93 is located in Phase 2 AWAR Section 4 and includes a recent cairn with wood lathing inserted into it, a recent tent ring, and a partially buried tent ring approximately 14 m to the northeast that is also relatively recent in form and style. Recent use is evidenced by the presence of tin cans. It is a natural vantage point and overlooks the southern portion of the east basin of Meliadine lake. The site has low archaeological significance because of it is a fairly recent site. The site will not be impacted by the proposed mine development; however, exploration activities might occur in the area. The site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-99 is located in Phase 2 AWAR Section 4 and is a single stone Inuksuk located on the west side of a small pond below the esker where the proposed road alignment extension into the Discovery area will traverse. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will not be impacted, no further archaeological work is recommended.

KfJm-101 is located in Phase 2 AWAR Section 4. The site was recorded in the 1970s and no additional information is provided with the original site records (Archaeological Survey of Canada 1972). Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted

KfJm-102 is located in Phase 2 AWAR Section 4. The site has 7 features, including 3 older tent rings, one more recent tent ring, 2 caches, and a recent component that includes stacks of building materials that may be used for constructing a cabin along with refuse that includes garbage and pieces of children's toys. The site has low to moderate archaeological significance because of the fairly recent age of the site. The site will not be impacted by the proposed mine development; however, exploration activities might occur in the area. The site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-104 is located in Phase 2 AWAR Section 4 and consists of an Inuksuk that overlooks the east end of Meliadine Lake on the east side slope of an esker. It is positioned above a steep drop off approximately 20 m above the water. The base appears to be older than the top half which appears to have been rebuilt from rocks dug out of the surrounding area. It may be that the original base of the Inuksuk was in place when the site was originally located and recorded in the 1970's (Archaeological Survey of Canada 1972). The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will not be impacted by the proposed mine development; however, exploration activities might occur in the area. The site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-109 is located in Phase 2 AWAR Section 3 and was recorded by Linnamae in the 1970s (Archaeological Survey of Canada 1972). Other than its location, there are no details regarding this site. The location of this site could not be confirmed during the recent baseline surveys.

KfJm-110 is located in Phase 2 AWAR Section 3 and consists of series of 5 caches, 4 tent rings, and a collapsed Inuksuk located on the east side of a rocky ridge. Site KfJm-110 is a campsite where each of the tent rings has a small hearth inside of the south wall, but there are also some stand-alone hearths. The collapsed Inuksuk is on top of a near-by the ridge. Seventy-five metres to the east is the area where the 3 caches are located. Another ring and cache are located in a boulder field 40 m to the northwest. This is a large site and may have originally been identified separately and recorded as other sites such as KfJm-112, but there is not enough to discern whether or not that is actually the case (Blower 2008). The site has low to moderate archaeological significance because of the size of the site. The site will not be impacted, no further archaeological work is recommended.

KfJm-112, is located in Phase 2 AWAR Section 3 and was recorded by Linnamae in the 1970s (Archaeological Survey of Canada 1972). Other than its location, there are no details regarding this site's attributes. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-114 is located in Phase 2 AWAR Section 3 and was recorded by Linnamae in the 1970s (Archaeological Survey of Canada 1972). Other than its location, there are no details regarding this site's attributes. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-116 is located on borrow pit B11A in Phase 1 AWAR Section 3 and consists of 2 caches. A box hearth was recorded at this site in the 1970s, but may have been used in the construction of the caches (Archaeological Survey of Canada 1972). Cache one is 2.5 m by 2.10 m and 0.30 m high, and cache two is 1.95 m by 1.90 m and 0.50 m high. The site has low to moderate archaeological significance. Little cultural information can be inferred from caches; however if there is Palaeoeskimo material culture in the vicinity the site would be more

significant. For added projection, a row of stakes have been placed 30 m from the features. The site will not be impacted, no further archaeological work is recommended.

KfJm-118 is located in Phase 2 AWAR Section 3 and is a stone feature identified as either a cache or *siniktarvik* (a temporary sleeping place). The site has low to moderate archaeological significance because little cultural information can be inferred from the feature type present; however siniktarvik are not well represented in the archaeological record. The site will not be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-128 is located in Phase 2 AWAR Section 3. The site was originally recorded Linammae and Clark (1975) and plotted 35 m north of the AWAR center line next to a pond; however, further details about the site are not available from the Linammae and Clark report. Two features including a cache and a stone circle, likely a hunting blind, were identified in 2011 in a location that matched the report map, albeit not the co-ordinates provided by the Canadian Museum of Civilization site records. This site is approximately 150 m from the road. The site has low archaeological significance because little cultural information can be inferred from the feature type present; however siniktarvik are not well represented in the archaeological record. The site will not be impacted; no further archaeological work is recommended.

KfJm-131 is located in Phase 2 AWAR Section 3 and was recorded by Linnamae in the 1970s (Archaeological Survey of Canada 1972). Other than its location, there are no details regarding this site attributes. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-133 is located in Phase 2 AWAR Section 3 and was recorded by Linnamae in the 1970s (Archaeological Survey of Canada 1972). Other than its location, there are no details regarding this site's attributes. The location of this site could not be confirmed during the recent baseline surveys. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-140 is located in Phase 2 AWAR Section 3; the site was recorded in the 1970s (Archaeological Survey of Canada 1972). No additional information is provided from the original site records. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-167 is located in Phase 2 AWAR Section 4 on knoll overlooking a small lake to the north and a larger lake to the southwest. There are 2 hunting blinds and a cache on top of the knoll and a third hunting blind on the northern down slope of the knoll closer to the lake. The site area covers approximately 80 m by 20 m. According to Mark Inuar of Rankin Inlet, this is still a prime location for hunting. There are several other possible caches or rings in the area, but they are not well defined as they may have been scavenged for rocks and, as such, are not identified as features for this site. The site has low to moderate archaeological significance based on Mark Inuar comments on the site. The site will not be impacted, no further archaeological work is recommended. IQ

KfJm-168 is located in Phase 2 AWAR Section 1 and consists of a hunting blind and tent rings. The blind has been used recently with many shotgun shells located within. The rings are well formed. Two rings consist of partially buried rocks that appear to be a more recent style. The remaining 2 contain larger piled surface rocks. The site extends over an area of 15 m by 50 m. The 2 types of tent ring construction may indicate multi-component use of the site and/or that the rings are from different seasons, or time periods. The site has moderate archaeological significance because the location may have been repeatedly used. The site will not be impacted, no further archaeological work is recommended.

KfJm-169 is located in Phase 2 AWAR Section 1 and consists of 5 collapsed fox traps and one single stone inuksuk. Based on uninterrupted lichen growth at the rock joins and colouring (orange, black, and green lichens are present), the stones appear to have been untouched for a long time. However, there are shotgun shells abundant in the area indicating recent activity. The Inuksuk is located in the middle of the stone features and is positioned at the narrowest point of the river. The site has low to moderate archaeological significance because a cluster of fox traps is not common in the archaeological record; however, little cultural information can be inferred from the feature type beyond that available form recording its presence. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-170 is located in Phase 2 AWAR Section 1 and consists of 5 tent rings and one stone feature. The rings are spread over a 15 m by 20 m area and extend from the top of an esker down the south side slope overlooking the floodplain of the braided channel. There is evidence that one of the rings has been turned into a hunting blind for current use. The stone feature is comprised of a long narrow boulder approximately 2 m long with a stone semi-circle extending from the ends of it. The site has low to moderate archaeological significance because of the number of features and its proximity to other sites. The site will not be impacted; no further archaeological work is recommended.

KfJm-171 is located in Phase 2 AWAR Section 2 and is a large site located on an esker overlooking the east side of the Meliadine River narrows. Nine tent rings, 5 caches, 3 hunting blinds, and 3 stone features with unknown function are identified over an area of approximately 100 m by 300 m. There is also evidence of flat stone paving on the floor of at least one ring. There is abundant rock in this area which provides building material and becomes more predominant from outcrops on the down slope to the floodplain. It is likely that that some of the rocks have been moved and some features have collapsed or scavenged for rocks. Recent use of the area is indicated by shotgun shells, rusty cans, and pull-tab cans from the 1970s. The blinds have been rebuilt for recent hunting and face south into the lowland/river areas. During the 2012 Elder consultation it was indicated that this location contained spirits. The site has low to moderate archaeological significance because of the number of features, its proximity to other sites and community knowledge of the site. Some feature at the site will be impacted. For added projection, a row of stakes have been placed 30 m from the features which will not be impacted. No further archaeological work is recommended. IQ

KfJm-172 is located in Phase 2 AWAR Section 2 and consists of 2 tent rings and one fox trap over an area of 5 m by 20 m. Half of one of the rings is missing due to erosion and undercutting on the river bank. This site is separated from KfJm-171 by approximately 40 m and a small drainage area. It may be related to KfJm-171, but its physical separation from that site, and the poor quality of the stone features warranted a separate Borden designation. The site has low to moderate archaeological significance because its proximity to other sites and its condition. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-173 is located in Phase 2 AWAR Section 2. The site consists of a large erratic on the east side of the river that is highly visible (3 m high) with a single stone Inuksuk on top. The marker is very clearly seen from the Meliadine River narrows and beyond. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will not be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-174 is located in Phase 2 AWAR Section 2 and consists of a single stone Inuksuk on the west side of the existing all-terrain vehicle (ATV) trail. It can be lined up with other markers in the distance and may identify the route from Rankin Inlet through this region. The site has low archaeological significance because little cultural

information can be inferred from the feature type present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-175 is located on rock quarry 14 in Phase 2 AWAR Section 2 and was identified in 2008 (Blower 2008). This is a large site which is situated on a bedrock outcrop proposed for use as a quarry. The site extends approximately 275 m north-south by 250 m east-west in an L shape following the contour of the bedrock outcrop. The feature classes include 6 stone markers, 4 fox traps, 10 caches, 3 stone features with unknown function, and one tent ring. Not all of the Inuksuit are contemporary, and there is some indication that some of the features are relatively recent. The view from this ridge is extensive in all directions, and provides excellent visibility of the Inuksuit and as a location for hunting. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature types present; however, the site is large and there are a variety of feature types and evidence that the site is a multi-use site. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-176 is located just outside of rock quarry R14 in Phase 2 AWAR Section 2 and includes 2 caches that are located within 5 m of each other. They appear to have been excavated out of existing cobble piles, and caribou remains are intermingled with some of the surface rocks. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature type present. The site will be impacted, mitigation is recommended prior to deelopment.

KfJm-177 is located on borrow pit B12 in Phase 2 AWAR Section 3 and was identified in 2008 (Blower 2008). The site measures 40 m north-south by 300 m east-west and consists of several Inuksuit. This site is approximately 11 km north of Rankin Inlet, overlooks a small lake on the west side of the proposed road alignment, and is located on a borrow pit B12. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-178 is located in on borrow pit B12 Phase 2 AWAR Section 3 and is the only lithic flake site identified on the AWAR alignment. One small white quartzite flake scraper with use wear and nibbling on 2 sides, and a smaller flake were recovered along with several pieces of shatter. The artifacts are spread over an area of several metres and possibly were impacted by use of the area as an ATV trail. The scraper is 3.5 cm by 2.4 cm in size and has several platform and dorsal scars. The site has low archaeological significance because no diagnostic material was recovered. The site will be impacted, the site is considered sufficiently mitigated; no further archaeological work is recommended.

KfJm-179 is located in Phase 2 AWAR Section 3 and is a large multi-component site. The site consists of 6 large caches, all made of large boulders with sufficient lichen cover to indicate they have not been disturbed recently. Two more caches are identified as recent constructs. A hunting blind, or recent remnants of a house feature are also present. Additionally, 3 Dorset style house outlines with central features are present on the south and eastern edges of the boulder field where the transition to a flatter, less rocky surface begins. The site has low to moderate archaeological significance because of the diversity of features and the unconfirmed cultural affiliation of the site. The site will not be impacted; no further archaeological work is recommended.

KfJm-180 is located in Phase 2 AWAR Section 3 and is an Inuksuk that is located on a high promontory looking south towards Rankin Inlet. To the north, a line of Inuksuit appear on 4 other peaks roughly paralleling a small ATV trail that extends through the area. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature type present; however; the feature seems to be part of a larger complex of Inuksuk. The site will not be impacted, no further archaeological work is recommended.

KfJm-181 is located in Phase 2 AWAR Section 3 and consists of an Inuksuk constructed of 2 rocks on a high ridge. Beside the Inuksuk is an old rusted leg-hold trap. Close by in the bedrock is a vein of white quartzite that may have served as a tool material source. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature type present; however; the feature seems to be part of a larger complex of Inuksuk. The site will not be impacted, no further archaeological work is recommended.

KfJm-191 is located in Phase 2 AWAR Section 3 on the lee of a hill just 300 m north west of KfJm-118. The site consists of 2 recent U-shaped hearths. The hearths measure 80 cm by 90 cm and 80 cm by 70 cm, respectively. Hearth 1 is located approximately 5 m north of Hearth 2 on a west-facing slope. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature type present. The site will not be impacted, no further archaeological work is recommended.

KfJm-182 is located in Phase 2 AWAR Section 3. The site is a single tent ring of embedded rocks on a small bench along the east side of an esker. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will not be impacted, no further archaeological work is recommended.

KfJm-183 is located in Phase 2 AWAR Section 3 and is a campsite. The site includes a recent hunting blind, hearth, tent ring, and 2 square/rectangular areas of smaller stones used to keep hides flat for drying when placed on top of large flat rocks. The tent ring is located adjacent to the side of the rock ridge, as is the hearth. The hunting blind faces south towards an open wet area. The site has low to moderate archaeological significance because little cultural information can be inferred from the feature type present; however, there are a diversity of feature types present. The site will not be impacted, no further archaeological work is recommended.

KfJm-192 is located in Phase 2 AWAR Section 4 and consists of an open cache site. The external measurements are 2.5 m north by 3.2 m east and internal measurements are 0.9 m north by 1.2 m east. The site is situated near a large white quartzite boulder. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will be impacted; further archaeological work is recommended prior to construction of the road.

KfJm-193 is located in Phase 2 AWAR Section 4 and consists of 3 features. These include a metal leg fox hold, a stone marker, and a stone feature of unknown function. The site has low archaeological significance. The site has low archaeological significance because little cultural information can be inferred from the feature type present. The site will be impacted; further archaeological work is recommended prior to construction of the road.

3.0 RANKIN INLET

The following describes the heritage sites that have been identified in the Rankin Inlet area.

KeJm-5 was recorded by Linammae and is described as located on the southwest shore of Lake Nipissak/ Nipissar (Archaeological Survey of Canada 1972). KeJm-5 was located on the edge of a low ridge, and apparently had been disturbed by solifluction. The site is immediately west of the airport and portions may be under the runway approach. One stone feature currently exists, and there is an old komatiq and other evidence of land use in the immediate vicinity. The site has low to moderate significance, owing to its proximity to Rankin Inlet and its possible tourist and educational value. The site will be impacted; further archaeological work is recommended prior to construction of the road.

KeJm-10, Itivia, is assigned a Late Dorset cultural affiliation. The site was brought to Linnamae's attention by Dr. R.G. Williamson of Rankin Inlet. A small collection was made in 1975 and more material was collected in 1976 (Archaeological Survey of Canada 1972). The site apparently contained no structural remains but was small and rich in terms of artifacts which were close to the surface. The site has low to moderate significance. Based on the coordinates provided by the Canadian Museum of Civilization the site will not be impacted.

KfJm-194 is a tent ring feature site, the location of which was reported by Page Burt (2012), of Rankin Inlet. The site is located within the municipal boundary of Rankin Inlet, just below the road that goes to the shooting range and golf course. It consists of a possible tent ring, a metal leg hold fox trap, and a stone marker. There is a claim post with tag number 23215 near the site. This tag was issued in 1992 and therefore the features unlikely relate to the exploration activity. The site has low significance because of its recent age. The site will not be impacted, no further archaeological work is recommended.

4.0 REFERENCES

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