AGNICO EAGLE

WHALE TAIL PIT

Fish Habitat Offsets Monitoring Plan

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Complex

Version 2
July, 2021

EXECUTIVE SUMMARY

General Information

This Fish Habitat Offsets Monitoring Plan (FHOMP) defines the sampling methods and criteria for success of the fish habitat offsetting features described in the Fish Habitat Offsetting Plan for Whale Tail Pit (March, 2018) and the Whale Tail Pit Expansion Project Fish Habitat Offsetting Plan (March, 2020).

Record of Changes

A record will document all significant changes that have been incorporated in the FHOMP subsequent to the latest review. The record will include the names of the persons who made and approved the change, as well as the date of the approval.

Distribution List

Agnico Eagle Mines Limited will maintain a distribution list for the FHOMP, providing information about all parties that receive the plan including mine personnel, departments, and outside agencies.

IMPLEMENTATION SCHEDULE

The implementation schedule for this plan is effective immediately subject to any modifications proposed by DFO as a result of the review and approval process.

DISTRIBUTION LIST

Agnico - Environmental Superintendent

Agnico – Environmental General Supervisor

Agnico – Environmental Coordinator

Agnico – General Mine Manager

DFO Arctic Region Representative

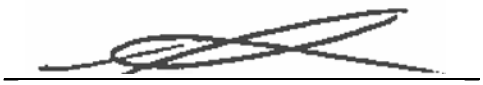
DOCUMENT CONTROL

Version	Date (YMD)	Section	Revision
Draft	2017/06/15	All	Initial document
1	2018/03/27	All	Update based on DFO consultation on offsetting concepts
2	2021/07	1.1	Updated Background to include Whale Tail Pit Expansion Project description.
		2	Updated Summary of Offsetting to include Whale Tail Pit Expansion Project offsetting
		3	Updated methods to include monitoring for Whale Tail Pit Expansion Project offsetting, including:
		3.1.2.2	Added flood zone water quality monitoring to the assessment (completed through the CREMP)
		3.1.2	Open Basin and Pit Water Quality Monitoring - Water quality monitoring for the re-flooded Whale Tail Lake (North Basin) containing the Whale Tail Pit was initially included in Version 1 of this monitoring plan. However, since re-flooding will occur for closure purposes and not as a component of fish habitat offsetting, this monitoring will be conducted under NWB Type A Water License requirements and the site's Core Receiving Environment Monitoring Plan. Open basin and pit water quality monitoring was therefore removed from this Plan.
		3.1.2.4	Added detailed description of fish use effectiveness monitoring for all Whale Tail Site habitat offsets, building on general methods described in Version 1 and following recommendations in DFO (2019) and Smokoroski et al. (2015) for various habitat types.
		6	Updated success criteria for fish use according to updated methodologies and recommendations in Smokoroski et al. (2015).
		7	Updated reporting requirements according to FAAs 16-HCAA-00370 and 20-HCAA-00275 including pre-offsetting ecological monitoring for flood zone habitat.
		Table 1	Updated current schedule of Whale Tail Site offsetting according to ERM, 2020.
		Table 2	Updated current schedule of Complementary Measures studies to incorporate COVID-related delays.

Version	Date (YMD)	Section	Revision
		Table 4	Updated according to new methods details and metrics for success.
		Table 5	New table – schedule of offset monitoring field studies and reporting.

Version 2

Prepared By: Meadowbank Environment Department

Approved By: 

Alexandre Lavallée
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SECTION 1 • INTRODUCTION

1.1 BACKGROUND

Since 2010, Agnico Eagle Mines Limited (Agnico Eagle) has operated the Meadowbank Complex (formerly Meadowbank Gold Mine), located on Inuit-owned lands approximately 70 km north of Baker Lake, Nunavut. From 2010 – 2019, operations occurred at the Meadowbank Site (Portage Pit, Goose Pit, Vault Pit and Phaser Pit). In 2018, Agnico Eagle gained regulatory approval to construct and operate the Whale Tail Pit at the satellite Whale Tail Site, located approximately 50 km northwest of the Meadowbank Mine. Operations there began in 2019, and in 2020, the Whale Tail Pit Expansion Project was permitted.

Mining activities related to Whale Tail Pit and the Whale Tail Pit Expansion Project are expected to result in serious harm to fish and the deposition of a deleterious substance in a waterbody, as described under Sections 35 and 36 and of the Fisheries Act. Therefore, Agnico Eagle was required to obtain Authorizations under Paragraph 35(2)(b) of the Fisheries Act, and an amendment to Schedule 2 of the MDMER (Section 36 of the Fisheries Act) to permit these activities. In July 2018, *Fisheries Act* Authorization (FAA) 16-HCAA-00370 was issued for the Whale Tail Pit Project, and in July, 2020, *Fisheries Act* Authorization 20-HCAA-00275 was issued for the Whale Tail Pit Expansion Project.

To effectively counterbalance serious harm or harmful alteration, disruption or destruction (HADD) of fish habitat, fish habitat offsetting requirements under these FAAs are described in the Whale Tail Pit - Fish Habitat Offsetting Plan (C. Portt & Associates, 2018a) and the Whale Tail Pit Expansion Project Fish Habitat Offsetting Plan (ERM, 2020). These plans quantify losses to fish habitat that are expected to occur, and describe the habitat gains that will be achieved through fish habitat offsetting measures.

This Fish Habitat Offsets Monitoring Plan (Version 1, March 2018) was initially developed during the FAA application process to describe the monitoring program that would be implemented to determine the effectiveness and functionality of fish habitat offsetting features for the Whale Tail Pit Project. This Version 2 has been updated to include monitoring requirements associated with the Whale Tail Pit Expansion Project Fish Habitat Offsetting Plan (March, 2020) and any supplementary offset monitoring requirements detailed in FAA 16-HCAA-00370 and 20-HCAA-00275.

Specifically, the current Version 2 of this plan addresses FAA conditions for monitoring the implementation and effectiveness of offsets, summarized as follows:

Fisheries Act Authorization 16-HCAA-00370

- Condition 4.3 – Offsetting criteria to assess the implementation and effectiveness of the offsetting measures: All fish habitat offsetting measures shall be completed and functioning according to the following criteria:

- 4.3.1 – Offsetting measures shall be carried out in accordance with the measures set out in the Proponent's Whale Tail Pit Fish Habitat Offsetting Plan (including the updated Appendix C, dated May 2018), or the most recent version approved by DFO;

- 4.3.2 – All offsetting features are to be constructed prior to re-flooding of the north basin of Whale Tail Lake in accordance to the schedule outlined in the Whale Tail Pit Fish Habitat Offsetting Plan dated March, 2018 (or most recent approved version);

- 4.3.3 – The offsetting features (e.g. shoals) have established aquatic biota and are being utilized by fish for one or more of their life history functions.

- Condition 5.1 – the proponent shall conduct monitoring of the implementation of offsetting measures according to the approved timeline and criteria;

    - 5.1.1 – List of timeline(s) and monitoring and reporting criteria:,

        - 5.1.1.4 – the Proponent shall provide an annual Whale Tail Pit Fish Habitat Offset Monitoring Report to DFO (and interested parties) following the construction of the offsetting habitat by March 31. The proponent is required to provide the report until DFO indicates this requirement has been met.

        - 5.1.1.5 – As part of the annual report, the Proponent shall include, but not limited to:

            - A digital photographic record with GPS coordinates of pre-construction, during construction, and post-construction conditions shall be compiled using the same vantage points and direction to show that the approved works have been completed in accordance with the offsetting plan;

            - A summary of field observations for each respective year as well as the as-built survey;

            - A detailed analysis report summarizing the effectiveness of the offsetting measures.

Fisheries Act Authorization 20-HCAA-00275

- Condition 4.3 – Offsetting criteria to assess the implementation and effectiveness of the offsetting measures: All fish habitat offsetting measures shall be completed and functioning according to the criteria below;

- 4.3.1 - Offsetting measures shall be carried out in accordance with the measures set out in the Proponent's offsetting plan dated June 5 2020 in the Whale Tail Pit Expansion Project - Information Requirements in Support of the Application for Authorization Under Paragraph 35(2)(b) of the Fisheries Act prepared by ERM Consultants Canada Ltd and Appendix H – Offsetting Design;

- 4.3.2 - Where Proponent did not provide the detailed engineering plans, offsetting measures shall also be carried out in accordance with the measures as agreed upon after consultation with DFO and other interested parties as per section 4.8.1;

- 4.3.3 - The Proponent shall provide DFO with sufficient information for DFO to determine if flooding of south portion of Whale Tail Lake area as a result of the Whale Tail Dike (PATH No.: 16-HCAA-00370) provides suitable habitat and enhances productivity of target species as identified through consultation with local communities prior to commencement of consultation on final design of offsetting sill. A report shall be presented to DFO as outlined in section 5.3.1 of this Authorization.

- Condition 5.1 - Schedule and criteria: The Proponent shall conduct monitoring of the implementation of offsetting measures according to the timeline and criteria below [or according to the timeline and criteria in the offsetting plan approved by DFO, referred to in section 4.2 and attached to this authorization and which are the following:

    - 5.1.1 List of timeline(s) and monitoring and reporting criteria:

        - 5.1.1.1 The Proponent shall monitor the geotechnical aspect of the proposed offsetting sill to establish its efficacy to maintain water levels as predicted and examine erosion or slumping twice a year over a 10-year period following the construction of the offsetting sill in 2026.

        - 5.1.1.2 The Proponent shall monitor both biological (fish use, health and biological traits) and ecological (water quality, periphyton productivity) properties of the offsetting habitat expanding on required monitoring in the Fisheries Act Authorization for the Approved Project (PATH No.: 16-HCAA-00370). The proponent shall conduct the biological monitoring programs every year from the date of issuance of the Authorization to the construction of the offsetting sill to show compliance with criteria 4.3.3 and in years 1, 3, 5 and 10 following the construction of the offsetting habitat to establish efficacy of the offsetting measures to provide suitable habitat and enhance productivity of target species.

- Condition 5.2 - List of reports to be provided to DFO: The Proponent shall report to DFO on whether the offsetting measures were conducted according to the conditions of this authorization by providing the following:
    - 5.2.1 The Proponent shall provide a Whale Tail Expansion Fish Habitat Offset Monitoring Report to DFO including geotechnical and biological and ecological monitoring as per section 5.1.1. The Proponent is required to provide the Report by March 31 of 2027 and update annually for 10 years or until DFO indicates requirements of this Authorization have been met
    - 5.2.2 As part of the annual report the Proponent shall include, but is not limited to:
        - 5.2.2.1 a digital photographic record with GPS coordinates of pre-construction, during construction and post construction conditions shall be compiled using the same vantage points and direction to show that the approved works have been completed in accordance with the offsetting plan, and as-built plans and engineering diagrams;
        - 5.2.2.2 a summary of field observations for each respective year; and,
        - 5.2.2.3 a detailed analysis report summarizing the effectiveness of the offsetting measures including the final engineering designs, and maps from flooding models.
    - 5.2.3 The Proponent shall provide a summary report of all Whale Tail Expansion Fish Habitat Offset Monitoring Reports described in section 5.2.1 before March 31, 2036 to DFO (and interested parties) which shall analyse results from the offsetting measures of the Whale Tail Expansion Project following the construction of the offsetting habitat. DFO reserves the right to request additional Summary Report if annual reporting were to continue until requirement has been met.
- Condition 5.3 Other monitoring and reporting conditions for offsetting:
    - 5.3.1 The Proponent shall provide a detailed Impact Analysis of Fish Habitat from Flooding by March 31 2024. The content of this report shall be discussed and approved by DFO (and interested parties) and will be used to establish if the proposed offsetting measures are likely to provide suitable habitat and enhance productivity of target species.

This plan is organized to meet the requirements of the FAAs listed above and, in accordance with monitoring recommendations in DFO guidance documents (e.g. Smokoroski et al., 2015), two types of monitoring are specified:

1. “Compliance” monitoring assesses the physical structure and stability of offsetting features to verify that they were constructed as designed.

2. “Effectiveness” monitoring of biological and ecological endpoints (water quality, periphyton growth, fish use) to assess whether offsetting features are functioning effectively as fish habitat.

The endpoints assessed are consistent with Traditional Knowledge concerns related to protecting fish, fish habitat and ensuring clean water (Whale Tail Pit FEIS Appendix 7-A: IQ Baseline, Agnico Eagle 2016). The overall approach is focused on enhancing understanding of regional fish, fish habitat, ecosystem function and fisheries productivity.

1.2 OBJECTIVES

The majority of habitat gains for Whale Tail Site offsetting are planned to be achieved through habitat creation and enhancement efforts. These include:

- Construction of two water retention sills (Mammoth Sill and A18 Sill) to maintain elevated water levels in Whale Tail Lake and the area southwest of Whale Tail Lake that will be flooded during operations (Lakes A18-A22 and A63);

- Scarification of roads within the dewatered Whale Tail Lake (North Basin) area to convert them from mixed substrate to coarse substrate prior to re-flooding, creating shoals;

- Construction of new habitat enhancement features (coarse substrate shoals) within the dewatered Whale Tail Lake (North Basin) area prior to re-flooding.

To ensure that offsets are functioning as effective fish habitat, assessment of the structure, stability, and successful utilization of these features by fish are the primary goals of the monitoring program for habitat enhancement/creation offsets.

The overall objectives of this plan are:

a. To describe compliance and effectiveness monitoring methods for each feature.
b. To describe the quality assurance and control measures to be included in the monitoring program.
c. To define the criteria for success.
d. To present the monitoring frequency and reporting schedule.

In addition to the constructed habitat offsetting features to be monitored through this plan, a portion of offsetting for Whale Tail Pit (FAA 16-HCAA-00370) will be provided through a suite of complementary measures (research projects). Progress reporting is completed for these programs under separate cover and provided to DFO by May 30 annually. Study plans and success criteria for the complementary measures are described in the Fish Habitat Offsetting

Plan for Whale Tail Pit – Appendix C (May 2018), and referred to minimally here. However, annual offset monitoring reports (see Section 7) will include a summary of research study progress and indicate when criteria for success have been achieved.

Finally, while not a component of this Plan, effectiveness monitoring methods outlined in this plan have been designed to support future work in Habitat Suitability Index (HSI) validation for the Whale Tail Site Habitat Evaluation Procedure (HEP), according to Conditions 5.2.1 and 5.3.2 of FAA 16-HCAA-00370 and 20-HCAA-00275, respectively.

SECTION 2 • SUMMARY OF OFFSETTING MEASURES

The following constructed features will create or enhance fish habitat to offset losses occurring as a result of the Whale Tail Pit and Whale Tail Pit Expansion Projects. Complementary measures included in the offsetting plan for Whale Tail Pit are also summarized. Further details are provided in the Whale Tail Pit - Fish Habitat Offsetting Plan (March, 2018 and its Appendix C, May 2018) and the Whale Tail Pit Expansion Project Fish Habitat Offsetting Plan (March, 2020).

The current general schedule for offset construction is provided in Table 1.

2.1 CONSTRUCTED SHOALS AND ROAD SCARIFICATION

Placement of rock material to change lake basin substrate from fine or mixed to coarse (i.e. the creation of rock shoals) is a common fish habitat enhancement technique. In total, 8.77 ha of rock shoals will be constructed in fine sediment basin areas within the portion of Whale Tail Lake that is dewatered during operations. These works will be conducted prior to commencement of re-flooding. In addition, roads within the dewatered area will be scarified or converted to coarse substrate as necessary, prior to closure, to create shoal-like features.

2.2 WATER RENTENTION SILLS AND FLOODING

During the operations period for the Whale Tail Site, flooding of terrestrial zones in Whale Tail Lake (South Basin) and areas to the southwest (Figure 1) is required for water management purposes. Flooding was initiated in 2019 and was complete in 2020. The majority of fish habitat offsets for the Whale Tail Pit and Whale Tail Pit Expansion Projects will be obtained by constructing two permanent water control structures (sills) to maintain elevated water levels in this area in perpetuity.

Prior to the reflooding period when Whale Tail Lake (North Basin) is dry, one sill will be constructed just upstream (east) of Mammoth Dike. Once the Whale Tail Dike is breached and flows resume their natural direction from Whale Tail Lake to Mammoth Lake, this feature will ensure that water levels in the re-flooded Whale Tail Lake remain at 1 m higher than baseline conditions. Offsetting calculations indicate that a 1 m increase in water levels upstream of the Mammoth Dike will create approximately 46.6 ha of new aquatic habitat. This

PROJECT: DA111-062-08

CLIENT: Agnico-Eagle Mines Ltd. Meadowbank Division

DATE: 12, July 2021

DRAWN BY: Janel Sauder

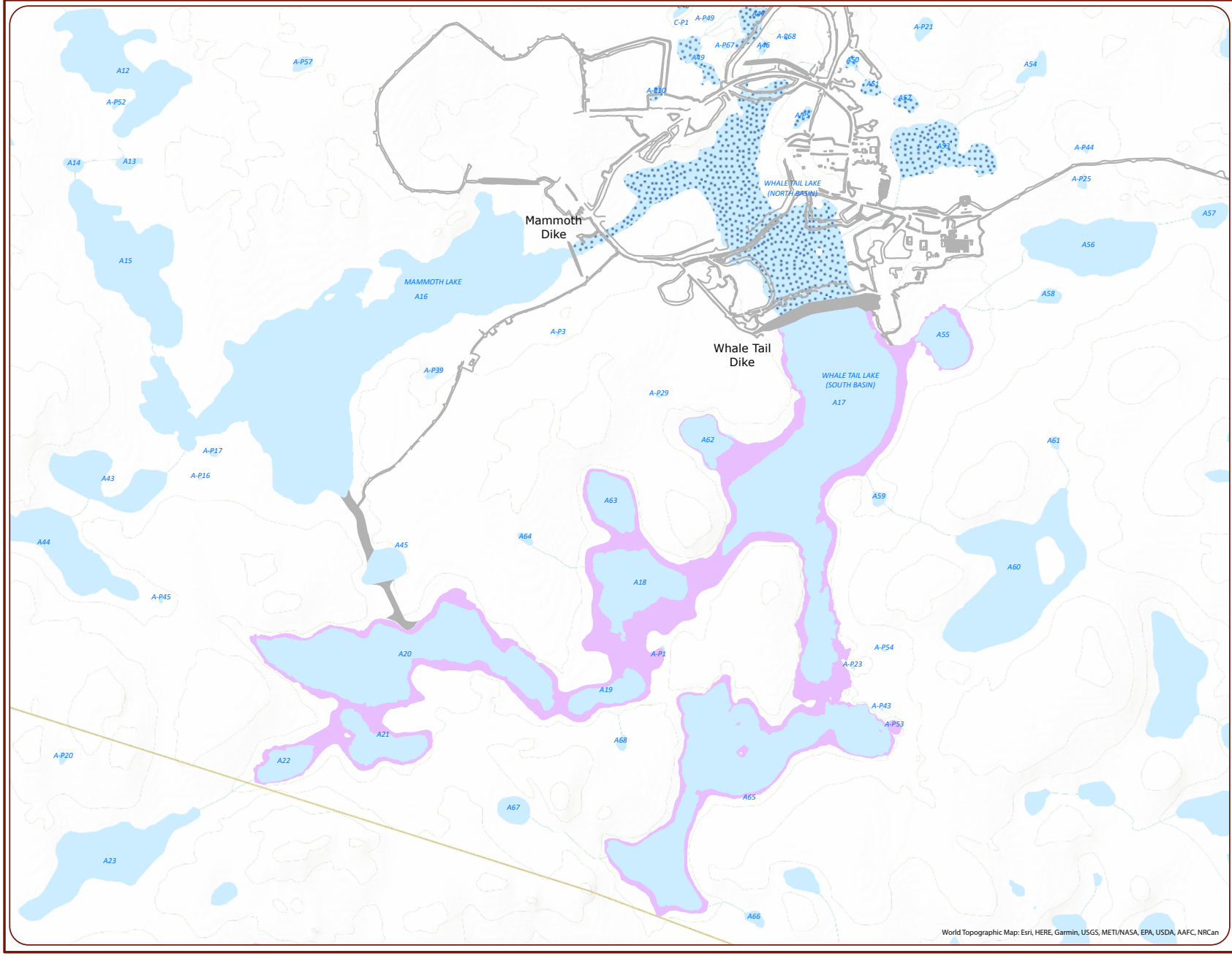

Figure 1 - Whale Tail South Flood Zone

Legend

- Infrastructure
- Dewatered Lake

South Whale Tail Lake Elevations

- Baseline Water Level
- 2020 Measured Peak Flood Level (155.7 masl, June 23)

0 0.25 0.5 1

Kilometres

SCALE: 1:22,000

N

UTM Zone 17N NAD83

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sill is associated with offsetting for the Whale Tail Pit Project, and is further described in the Whale Tail Pit - Fish Habitat Offsetting Plan (March, 2018).

Similarly, a sill is planned to be constructed between lake A18 and Whale Tail Lake. This structure will maintain water levels in the southwest flood zone (A18 – A22 & A63, termed "Lake A18" in the offsetting plan) at 1.3 m above baseline, creating approximately 31.35 ha of permanent aquatic habitat. This sill is associated with offsetting for the Whale Tail Pit Expansion Project, and is further described in the Whale Tail Pit Expansion Project Fish Habitat Offsetting Plan (March, 2020).

2.3 COMPLEMENTARY MEASURES

A suite of complementary measures (research projects) is included as offsetting for the Whale Tail Pit Project. These studies include:

- Study 1: Assessment of changes in aquatic productivity and fish populations due to flooding of Whale Tail South and downstream lakes during operations
- Study 2: Assessment of impacts of the Baker Lake wastewater outflow on aquatic systems including fish and fish habitat
- Study 3: Literature review and field validation of northern lake fish habitat preferences
- Study 4: Arctic grayling occupancy modeling
- Study 5: Pit lake habitat use assessment
- Study 6: eDNA methods development

These programs have been developed in collaboration with research partners at academic institutions, and generally consist of 2-5 year study plans initiated in 2018 or 2019 (Table 2). One study (pit lake habitat use assessment) is planned to begin in or around 2027 at the Meadowbank site, following completion of flooding for the Phaser and Vault Pits, unless a suitable alternate research site is identified in the nearer term.

These studies continue to inform Agnico Eagle's offset planning in Nunavut as well as fish and fish habitat monitoring techniques. The complete scope of these complementary measures including methods, timelines, deliverables, and budgets is provided in Appendix C (May, 2018) of the Whale Tail Pit - Fish Habitat Offsetting Plan (March, 2018).

SECTION 3 • OFFSET MONITORING METHODS

3.1 CONSTRUCTED HABITAT

In accordance with DFO's "Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act" (December 2019), compliance and effectiveness monitoring of constructed fish habitat offsets will be conducted and results reported to DFO. This monitoring program has been developed using the guidance provided in Smokoroski et al. (2015), as recommended in DFO's policy document (December, 2019).

As described in the sections above, constructed habitat offsets for the Whale Tail Pit and Whale Tail Pit Expansion Projects consist of rock shoals (including scarified road surfaces), and two water retention sills to maintain specified flood levels. The monitoring plan for these habitat features consists of both physical and ecological components, to record whether each feature is constructed as designed and is functioning effectively. Monitoring of physical components is intended to confirm and report compliance with requirements of the associated Fisheries Act Authorizations to construct specific habitat offsets. Ecological monitoring will be conducted to assess the effectiveness of these features in counterbalancing HADD and eventually assist in validating the offsetting plans' Habitat Suitability Indices (HSIs).

The overall assessment of habitat offsetting function incorporates monitoring methods with specific quantitative criteria for success related to compliance monitoring (physical structure, stability), and effectiveness monitoring (flooded area water quality, interstitial water quality, periphyton growth and fish use). All lines of evidence are then integrated in a weight-of-evidence approach to make the final determination regarding effectiveness of the offsetting.

Details for each monitoring component are provided below.

3.1.1 Physical Structure (Compliance) Monitoring

The Habitat Evaluation Procedure (HEP) for Whale Tail Site offsetting quantifies losses and gains to fish habitat using physical characteristics (area, depth and type of substrate). The relative habitat value of different combinations of these characteristics for resident fish species and life stages is inferred from existing literature, and overall habitat changes are thereby quantified. Confirmation that habitat features have been constructed as designed is viewed as the primary method of establishing compliance with offsetting requirements of the Whale Tail Site Fisheries Act Authorizations.

Structural evaluations will be conducted for flood zone areas (to confirm area of terrestrial to aquatic habitat conversion), and structural and stability evaluations will be conducted for water retention sills and constructed shoals. To evaluate compliance, results will be recorded for each feature and compared to the associated offsetting plan estimate, making use of the example provided in Table 3.

Methods for structural evaluations and stability monitoring are described below and summarized in Table 4 for all offsetting features.

3.1.1.1 Structure Monitoring

As recommended in Smokoroski et al. (2015) and by DFO (December 2019), all habitat offsetting features will be assessed post-construction to determine whether they meet the assumptions of the offsetting plan. Depending on the specific feature, the assessment may include area, depth below surface, and substrate characteristics. For each feature, a comparison will be made to the specifications described in the related offsetting plan, to determine whether expected physical habitat gains are achieved in the as-built state (i.e. to confirm features were constructed as planned).

Methods of structural evaluations will depend on the specific offsetting feature and are identified in Table 4. These methods may include:

Water Level Monitoring - To confirm habitat creation through flooding, water levels within the Whale Tail flood zone will be monitored by piezometer or staff gauges. Water levels will be used to determine area of the terrestrial flood zone based on established elevation-area relationships derived from topographic data and developed as part of the Whale Tail Pit Expansion Project FEIS (Agnico Eagle, 2018; Appendix 6-F). Area of the habitat created will be compared to offsetting plan projections using baseline water levels assumed in those plans.

Construction Summary Reports (As-builts) – relevant data such as final footprint area and material types will be identified from Construction Summary Reports that are prepared by engineering teams following construction of offsetting features (especially sills).

On-the-ground or aerial photos – a digital photographic record with GPS coordinates of offsetting features will be obtained to document pre-construction, during construction and post construction conditions.

Field survey – conducted in the dry or following re-flooding to determine depth-below-surface of offsetting features such as shoals and scarified roads.

3.1.1.2 Stability Monitoring

In addition to confirmation of the as-built characteristics for each feature following construction, structural integrity will be qualitatively assessed. For the A18 Sill, visual inspections of erosion and slumping will occur twice annually following construction (according to Condition 5.1.1.1 of 20-HCAA-00275). For shoals to be constructed within the dewatered Whale Tail North Basin and for the Mammoth Sill, visual inspections of stability will occur annually during ecological monitoring events (years 1, 3, 5, 10 post-reflooding), to record any movement occurring during the reflooding process.

Specific methods for visual inspections of stability will depend on water clarity, but may include underwater camera techniques as necessary.

3.1.2 Ecological (Effectiveness) Monitoring

Ecological monitoring elements include interstitial water quality, flood zone water quality, periphyton biomass development, and fish use.

3.1.2.1 Interstitial Water Quality

Modeling during the Whale Tail Pit and Whale Tail Pit Expansion Project environmental impact assessment process did not indicate any significant potential for metals leaching from quarried rock used to construct underwater offsetting features such as shoals and roads. Nevertheless, interstitial water quality of constructed habitat offsetting features (roads/shoals) as feasible based on depth will be assessed to verify these predictions.

In order to collect a representative water sample from the interstitial space between rocks, an electric diaphragm pump with food-grade silicon tubing will be used. Samples will be taken at water depths between 1 and 4 m, and analyzed in an accredited laboratory for total suspended solids, and total and dissolved metals. Results will be compared to reference locations in adjacent lakes, and CCME Water Quality Guidelines for the Protection of Aquatic Life, or established Site Specific Water Quality Objective (SSWQOs) where available.

As summarized in Table 4, interstitial water quality monitoring for constructed shoals (in areas < 4m) will begin following re-flooding of Whale Tail North Basin (est. 2038), where they will be constructed.

3.1.2.2 Flood Zone Water Quality

Water quality analyses conducted under the CREMP will be used to confirm suitable water quality within the Whale Tail area terrestrial flood zones that form part of offsetting plans (i.e. the flooded terrestrial areas in Whale Tail Lake, and Lake A18). Under this program, mid-water column samples in areas > 5 m deep are collected at two sites from each of two formerly separate lakes in the flood zone (Whale Tail South and A20), up to 5x/year.

Receiving environment sampling (e.g. Azimuth, 2021) has confirmed that lakes at the Whale Tail Site are well mixed, with turn-over occurring by mid-July, so these CREMP water quality samples are expected to be representative of conditions throughout the flood zone.

Methods of collection will follow CREMP procedures (see Azimuth, 2021). Samples will be analyzed for the full suite of parameters for which CREMP thresholds are available, including:

- Total and dissolved metals
- Anions and nutrients
- Physical tests - TSS and pH

Results of this water quality monitoring will be compared to CREMP thresholds and/or FEIS predictions as appropriate (if/where predictions exceed thresholds).

General locations for CREMP water quality sampling are described in Table 4. The CREMP schedule for use in offset monitoring is presented in Table 5, but monitoring under that program is generally expected to occur annually (with samples collected up to 5x/year) from the construction through closure periods.

3.1.2.3 Periphyton Growth

The periphyton community consists of a collection of microorganisms, including algae, that grow attached to or in very close proximity to submerged substrate. Colonization of the community occurs over time, with rates depending on factors such as nutrient and light availability. Periphyton is an important food source for benthic invertebrates, and has been broadly used as an indicator metric in biomonitoring protocols for many years. Periphyton-based monitoring offers a number of advantages over other biological endpoints, including relatively short generation times and non-motile behaviour, allowing a wholistic analysis of longer-term water quality conditions at specific targeted sites.

For the Whale Tail Site, colonization of periphyton will be monitored to provide a commentary on growth in created flood zone habitat compared to established habitat areas. Due to depth of constructed shoals (>4 m) periphyton monitoring will not be suitable for these features.

Historical data analysis at the Meadowbank site as part of the 2015 CREMP design update (see Azimuth, 2015) has indicated that due to extreme natural variability, statistical comparisons of periphyton on in-situ substrate (e.g. submerged rock faces) are not well suited for receiving environment monitoring in this area. Periphyton development is limited to the photic zone of the shoreline, and as a result is particularly susceptible to ice scour, which potentially has a significant impact on development and variability. With this in mind, periphyton monitoring for the Whale Tail Site will incorporate two components:

1) Visual surveys in designated locations within newly created flood zones to qualitatively assess progression of periphyton development on underwater rock substrate.

2) Deployment of artificial substrate samplers to confirm whether colonization rates are comparable to reference systems, indicating that a healthy periphyton community can become established.

Visual Surveys: Qualitative observations of epilithic periphyton growth will be recorded in pre-determined locations throughout the shoreline habitat of the Whale Tail flood zone. Written descriptions of the location characteristics and a periphyton development rating (e.g. 1-5, where 1 represents bare rock and 5 represents a well established reference site) will be recorded along with photographic evidence using underwater camera images at each location. A periphyton development rating guide with visual cues (e.g. photographs from reference systems) will be created prior to the first field season to assist technicians and provide consistency in field interpretation. Locations will be chosen in the first field season and repeated each monitoring year to track changes over time. Surveys will be completed at the end of the ice-free season to optimize potential for observing that season's growth.

Artificial Substrate Periphyton Sampling: Following standard procedures such as Barbour et al. (1999), commercially available or custom-made periphyton samplers (e.g. glass slide, Plexiglass or polypropylene artificial substrate) will be deployed at selected locations throughout the assessment area and reference area in July, following the stabilization of freshet-based flooding. Samplers will be attached to slides on a stabilizer pole (such as rebar) or anchor weight in the near-shore area (1 – 2 m depth), such that they can remain floating as water levels fluctuate. Samplers will be retrieved at the end of the summer season (late August – early September) prior to ice-up, and the substrate will be appropriately scraped and preserved prior to shipment and laboratory analysis for biomass metrics. Basic development of the periphyton community will be assessed through analysis of biomass (ash-free dry mass) and/or other metrics (e.g. chlorophyll a) for assessment site and reference site slides.

Locations and schedules for periphyton sampling are described in Tables 4 and 5.

This method of periphyton sampling has not previously been used at the Meadowbank site, so a pilot study will be initiated in 2021 with a limited set of lakes (one flood zone lake and one reference lake) to assess feasibility, test methods, and determine data analysis options. If the pilot test determines that artificial substrate sampling is not a viable option, alternate methods such as sampling of natural rock substrate (using a specialized scrubber and following methods as described in Azimuth, 2016) will be implemented beginning in 2022.

3.1.2.4 Fish Use

As recommended by DFO (December, 2019) and in Smokorosky et al. (2015), the primary biological variable used to determine effectiveness of offsetting habitat will be use by resident fish. Since a variety of habitat types are created by the Whale Tail Site habitat offsets, effectiveness will be assessed for the highest-value use of each type of newly created habitat (i.e. fish species/life stage combination with the highest HSI in the offsetting HEP model).

According to the Whale Tail Site HEP (see C. Portt & Associates, 2018a or ERM, 2020), the newly created shoreline in Whale Tail Lake that will be realized as fish habitat in perpetuity following construction of the Mammoth Sill is primarily expected to be HT 2 (7 ha; 0 – 2 m depth with mixed substrate), which has the highest value (near-optimal suitability; HSI of 0.75) as nursery habitat for round whitefish and burbot, and as foraging habitat for ninespine stickleback. Additional habitat gains are expected in HT 6 and 9 (2 – 4 m and > 4 m, respectively, with coarse substrate) due to road scarification and creation of shoals. HT 6 provides near-optimal or optimal habitat (HSI of 0.75 or 1) for all life stages of all resident species except ninespine stickleback and burbot, and HT 9 provides optimal overwintering habitat for all species as well as optimal spawning and foraging habitat for Arctic char and lake trout.

Following construction of the A18 Sill, the created permanent shoreline habitat in Lake A18 (designation for lakes A18 – A22 and A63 that are joined by flooding) will be entirely HT 3 (net gains of 19 ha; <2 m, coarse substrate). The highest value of shoreline HT 3 (HSI of 1) is as nursery habitat for lake trout and burbot, and for all life stages of slimy sculpin except overwintering. Due to flooding upgradient of A18, significant gains are also achieved for HT 6

(15 ha) as depth is increased in existing shallower habitats. As described above, HT 6 is expected to provide near-optimal or optimal habitat (HSI of 0.75 or 1) for all life stages of all resident species except ninespine stickleback and burbot.

Based on these assumed optimal uses, effectiveness monitoring has been developed for each offsetting feature as follows:

3.1.2.4.1 Flood Zone Habitat - Habitat Types 2 & 3 (Shoreline)

The conversion of terrestrial habitat to new shoreline aquatic habitat will be the primary focus of effectiveness monitoring for the Whale Tail Site, since this new habitat creation has the highest uncertainty of success. Based on the identified optimal use functions (above), effectiveness monitoring for new shoreline habitat will focus on evaluating nursery use by the target large bodied species (lake trout and round whitefish), and nursery/foraging use by small bodied species (ninespine stickleback and slimy sculpin).

3.1.2.4.1.1 Nursery Function – Large Bodied Species

As described in Smokoroski et al. (2015), growth and survival are important but the main contribution of nursery habitat is to provide better than average conditions for recruitment to the subsequent life stage. Therefore as recommended, the nursery function of new shoreline habitat for large bodied species will be evaluated indirectly through measures of relative abundance of juvenile and adult fish compared to reference sites (i.e. inferred production – demonstrating that larvae have suitable habitat to reach later life stages). This evaluation will be conducted primarily as part of the flood zone deep water habitat assessment (see Section 3.1.2.4.2), since juvenile and adult lake trout and round white fish are expected to prefer foraging in those areas as opposed to shoreline habitat. However, since habitat use by juveniles is not well understood for these Arctic lakes, shoreline assessments conducted to evaluate use by small bodied species (Section 3.1.2.4.1.2) will opportunistically record any catch of lake trout and round whitefish. If they are found to use shoreline habitat, the effectiveness evaluation (relative abundance of juveniles and adults in flood zone lakes compared to reference lakes) will make use of this data.

3.1.2.4.1.2 Combined Nursery/Foraging Function – Small Bodied Species

According to the Whale Tail HEP, new shoreline habitat is expected to provide both nursery and foraging functions for small bodied species. For the purpose of developing monitoring methods, this foraging function is considered similar to the rearing function described in Smokoroski et al. (2015). Since nursery & rearing habitat cannot readily be distinguished from each other for the resident small bodied species, the combined nursery/foraging function of new shoreline habitat will be evaluated by demonstrating residence of fish (abundance) and evidence of growth (e.g. size at age), survival (e.g. age/length frequency distribution), and reproduction (e.g. % composition of YOY) in newly flooded habitat.

This assessment will be conducted following methods that were developed for the Whale Tail Pit offsetting plan's complementary measures Study 1: *Assessment of changes in aquatic*

productivity and fish populations due to flooding of Whale Tail South and downstream lakes (H. Swanson). This study was initiated in 2018, prior to flooding, and field studies are currently planned to be completed annually until 2021, with a possible extension of 1 – 2 years which would encompass the full pre-offset monitoring period. Objectives and methods are further described in Appendix C of C. Portt & Associates, 2018a.

Based on the methods used in this study, ongoing shoreline surveys will be completed for the purposes of offset monitoring, to evaluate fish use of this habitat.

- Pre-offset monitoring (2021 & 2022, with possible extension to 2023 depending on results):
    - Shoreline electrofishing surveys in flood zone locations and reference locations (continuation of research study methods to facilitate data comparison across years)
    - Variables recorded: species, length, weight, age (subset of individuals)
- Offset monitoring period (years 1, 3, 5, 10 following sill construction – see Table 5):
    - Shoreline electrofishing and/or minnow trapping and/or fyke net surveys in flood zone locations and reference locations (adapted methods as required to facilitate surveys by alternate personnel, with the final method(s) chosen prior to initiation of this monitoring period)
    - Variables recorded: species, length, weight, age (subset of individuals)

As indicated above, the key metrics investigated for the evaluation of offsetting success will be population relative abundance compared to baseline/reference sites (CPUE; electrofishing seconds/trap hours) and population dynamics indicators (e.g. growth, reproduction, and survival). The success criteria are further described in Section 6.

3.1.2.4.2 Flood Zone Habitat – Habitat Types 6 & 9 (Deeper Water)

While flooding creates new shoreline habitat, it also converts former shoreline to deeper water habitat. Within the Whale Tail Site flood zone, an increase in habitat types 6 and 9 is achieved as a result of flooding. Although a relatively high certainty of success is associated with this habitat conversion (increased depths in existing aquatic habitat) compared to creation of new shoreline habitat, effectiveness monitoring will be conducted to confirm fish use.

HT 6 and 9 (2 – 4 or > 4 m, coarse substrate) are considered to provide optimal or near-optimal use for all life functions of most resident large bodied species. Effectiveness will therefore be primarily evaluated for the most common optimal use case across species for these habitat types (the rearing/foraging function), and for the species receiving the optimal use rating (HSI of 1 – lake trout and Arctic char). However, since HT 6 and 9 also provide optimal spawning habitat, a field analysis will be conducted in follow-up to baseline surveys

to confirm continued spawning use following flooding. The quantitative evaluation of rearing/foraging use and qualitative evaluation of spawning use are described below.

3.1.2.4.2.1 Rearing/Foraging Use Evaluation

As stated in Smokorsky et al. (2015) and in the HEP model, rearing/ foraging habitat is usually less specialized in terms of depth and substrate, but is an important life stage that is required to determine the carrying capacity (maximum abundance or maximum fish biomass) of a fish population. Effectiveness of habitat for rearing/foraging use is demonstrated with evidence of persistent seasonal abundance of fishes (demonstrating residence) and evidence of growth and survival of fishes. According to recommendations in Smokoroski et al. (2015), specific target metrics for evaluating success as rearing/foraging habitat will be population abundance and/or biomass relative to baseline/reference sites, along with growth and survival endpoints (e.g. size at age, length frequency distribution analysis).

The following field survey methods are proposed (see schedule Table 5) to capture population data in these habitat types that are generally occupied by large-bodied fish, and assess their effectiveness as rearing/foraging habitat. As indicated, some are exploratory and use will be based on pending recommendations from complementary measures studies in progress:

- Deep water electrofishing (with underwater camera) for analysis of population relative abundance compared to reference sites, and possibly growth parameters, particularly in deepwater benthic habitats (exploratory; use is TBD pending Complementary Measures Study 3 recommendations, so earliest use would be 2023.). Baseline data is not available for the flood zone, so targets would be based on reference systems.

- Hydroacoustic surveys for community density/biomass estimates (exploratory; use is TBD pending Complementary Measures Study 3 recommendations, so earliest use would be 2023). Baseline surveys were conducted prior to flooding (2018) in Whale Tail Lake and A20. Post-flooding results can potentially be compared to assess changes in total density/biomass for pelagic habitat using this method;

- Short set gillnetting – primary method for evaluation of the rearing/foraging function for offsetting purposes. Will follow fish-out CPUE phase protocols, and data will be evaluated in comparison to Whale Tail North Basin fish-out results for net-sets in habitat types 6 and 9.

    - Variables recorded for all individuals: species, sex, length, weight, fecundity

    - Variables for subset (e.g. individuals not surviving capture): age

Using any or all of these methods (final selection is pending results of Complementary Measures Study 3), the key metrics investigated for the evaluation of offsetting success will be population relative abundance and/or biomass (CPUE) of Arctic char and lake trout, along with growth and survival endpoints, evaluated in comparison to baseline data (as available –

gill net methods or hydroacoustics methods only) and/or a suitable reference site. The analysis and success criteria are further described in Section 6.

Large-bodied fish use of flood zone deeper water habitat for foraging/rearing is planned to occur once during the pre-offset monitoring period (2023), and at least twice during the offset monitoring period (2026, 2029; see Section 7 and schedule in Table 5).

3.1.2.4.2.2 Spawning Use Evaluation

In follow up to spawning surveys completed by C. Portt and Associates in Whale Tail Lake in 2016 (C. Portt & Associates, 2018b – provided as Appendix E of ERM, 2020), underwater camera methods combined with temperature logger data surveys will be used to confirm ongoing spawning use of this high-value habitat type post-flooding by lake trout. Spawning by other target species (Arctic char) which spawn slightly later in the year will not be assessed due to access difficulties after onset of ice-up.

Building on methods described in C. Portt & Associates (2018b), the previously identified lake trout spawning shoals will be re-visited in Whale Tail Lake South Basin, along with any newly created high-potential spawning areas and a similar number of shoals to be identified in Lake A18. Temperature loggers will be installed at a subset of these sites to assist in identifying spawning habitat/windows and planning timing of underwater camera deployment.

Underwater motion cameras will be installed for approximately 15 h per location (est. 5 locations in each of Whale Tail Lake South and Lake A18, to revisit baseline locations), and videos reviewed to identify fish presence and spawning behaviour.

Since a relatively high certainty of success is associated with ongoing spawning use of previously existing habitat, this assessment is planned to be completed once in the pre-offset monitoring period (2023; see Section 7 and schedule in Table 5), with follow-up surveys if required. However, since assessment of spawning use has historically been difficult to demonstrate (as in C. Portt & Associates, 2018b), success criteria will be qualitative only (see Section 6).

3.1.2.4.3 Constructed Shoals - Habitat Types 6 & 9

As described above, shoal construction will create gains in habitat types 6 & 9 in Whale Tail North Basin in areas of previously fine substrate. While HTs 6 and 9 provide optimal habitat for most life functions, effectiveness monitoring for shoals will focus on documenting spawning use by Arctic char and lake trout, because these cases represent the greatest increase in HSI between the baseline habitat in the area of shoals (HT 4 or 7, i.e. fine substrate) and the enhanced coarse substrate shoal habitat (HT 6 or 9). For both Arctic char and lake trout spawning, HSIs of 0 are associated with fine substrate zones, and creating coarse substrate shoals in these areas converts this to optimal spawning habitat (HSI of 1). While overwintering is another important function of this habitat, the literature and Whale Tail HEP suggests it is not relatively more important to most resident species than the baseline moderate to deep water fine substrate habitat, so this use is not targeted for monitoring. Use by burbot will also

not be evaluated, since this species formed just 4% of the population by biomass during the Whale Tail Lake fish-out.

Effectiveness of the created shoals as spawning habitat will be assessed quantitatively and/or qualitatively through methods to be developed at least three years prior to fish use of these features. Currently, the Whale Tail Dike is planned to be breached, allowing fish re-entry into the re-flooded Whale Tail North Basin in 2042. Methods for evaluating the effectiveness of the enhanced Arctic char and lake trout spawning habitat features (shoals) located in this area will be finalized by 2036, making use of future monitoring guidelines and the state of the science at that time.

3.1.2.4.4 Whole-System Productivity using eDNA Models - Exploratory Method

As a complement to traditional methods of fish population surveys, eDNA analyses for abundance/biomass estimates will be explored. Environmental DNA (eDNA) has transformed our ability to identify the presence of fish species in aquatic environments. Although the application of eDNA in fisheries science continues to be developed, various studies have found a positive relationship between eDNA concentrations and the abundance and/or biomass of studied species (Rourke et al, 2021, Baille et al 2019, Klobucar et al. 2017, Lacoursiere-Roussel et al. 2016, and Takahara et al 2012). Although we understand that environmental factors, species of fishes and timing of sampling can influence the rate of eDNA release and degradation rates, overall, numerous studies have demonstrated that eDNA techniques can produce effective estimates of relative fish abundance in natural lakes (Klobucar et al. 2017) and suggest that this tool as equally as effective and has a lower cost than traditional methods of monitoring. Furthermore, given the low species diversity, high lake turnover/ mixing and stable/low water temperatures, eDNA has great promise for applications in the North.

Since 2017, Agnico has been working with the COGRAD group from the University of Manitoba on a study to develop eDNA sampling and laboratory analysis methods for Arctic lakes (Complementary Measures Study 6). As a result, eDNA samples are available for the Whale Tail Site lakes for the baseline and post-flooding period. Agnico will work with these researchers to determine whether an analysis of fish population abundance/biomass in the Whale Tail flood zone is feasible using available data and established eDNA models. This assessment will be developed (if feasible) as part of Complementary Measures Study 6, which is planned to be completed by 2023.

3.2 COMPLEMENTARY MEASURES

No field monitoring methods are associated with complementary measures projects.

Progress reports for each research project are provided annually to DFO and summarized in the Fish Habitat Offsets Monitoring Report (see Section 7) from study initiation until criteria for success are met. Results of the complementary measures studies will also be shared on an

annual basis with the Meadowbank Fisheries Advisory Group to further mutually inform research projects and future monitoring programs.

SECTION 4 • FREQUENCY

The sampling schedule and general locations of monitoring for each feature and method are described in Tables 4 and 5. Specific sampling locations will be determined in the field by a qualified environment technician or biologist. Monitoring will be conducted at a minimum for the time period specified in Table 5, and may be continued if criteria for success are not met within this time frame.

SECTION 5 • QA/QC

The following QA/QC procedures are presented for general consideration, and primarily apply to assessments of habitat enhancement features.

QA/QC procedures for research programs will be encouraged by Agnico but will ultimately be determined by academic partners based on individual project components.

5.1 LABORATORY QA/QC

Water Quality – Data Quality Objectives (DQOs) are numerically definable measures of analytical precision and completeness. Analytical precision is a measurement of the variability associated with duplicate analyses of the same sample in the laboratory. Completeness for this study is defined as the percentage of valid analytical results. Duplicate results will be assessed using the relative percent difference (RPD) between measurements.

The laboratory DQOs for this project are:

Analytical Precision = 25% RPD or less for concentrations that exceed 10x the method detection limit (MDL).

Completeness = 95% valid data obtained.

Periphyton Community – Laboratory analyses for periphyton samples will be conducted by experienced scientists following a standardized procedure (i.e., quality assurance). Internal quality control samples (e.g., duplicate counts) will be included as feasible to document analytical variability.

5.2 FIELD QA/QC

Water Sampling – Field QA/QC standards during water sampling will be maintained for every sample. The standard QA/QC procedures include thoroughly flushing the flexible tubing and

pump to prevent cross-contamination between stations and thoroughly rinsing the sample containers with site water prior to sample collection. Trip blanks and field duplicates will be collected (approximately 1 per 10 samples). Field duplicates assess sample variability and sample homogeneity; a RPD of 50% or less for concentrations that exceed 10x the MDL is considered acceptable.

Periphyton Community – Standard procedures will be used to collect biota samples. All sampling gear will be thoroughly rinsed between sampling stations to ensure that there was no inadvertent introduction of biota from one station to another. A field duplicate will be collected for periphyton at one sampling station per sampling event to assess sampling variability and sample homogeneity. Due to large natural variability and the qualitative nature of this component, no specific RPD acceptability criterion is recommended.

Fish Use – These study components will be conducted in accordance with the general practices listed previously. All relevant spatial and depth information will be recorded. Fish biological data will be recorded as will reference spatial information. Field notebooks or field sheets will be used to compile notes and observations relevant to the studies. Fishing will be carried out by experienced technicians or biologists who are familiar with this kind of work. Video/photo survey data will be conducted carefully to provide representative images of target communities. All relevant spatial and depth information will be recorded and identified by the time stamp (or photo number) and tape number (or memory card number).

SECTION 6 • CRITERIA FOR SUCCESS

6.1 CONSTRUCTED HABITAT

In accordance with DFO guidance (e.g. Smokoroski et al., 2015), specific criteria for success have been established to guide offsets monitoring for the Whale Tail Site. If these targets are met, offsetting is considered successful and complete upon termination of the monitoring program. If targets are not met in the specified time frame, a supplemental monitoring period or adapted approach will be developed in consultation with DFO to determine why offsets are not performing as anticipated.

Specific criteria have been established for physical structures, water quality, and fish use. However, as described in Version 1, a weight-of-evidence approach will continue to be used to determine whether habitat offsetting features are functioning as intended overall, and to make decisions regarding offsetting achievements.

6.1.1 Physical Structure

In order to provide the required habitat gains, constructed features should meet the specifications described for area, depth and substrate in the offsetting plan. Where specifications are not met within a reasonable margin of error, the total habitat units afforded

by the feature in its as-built state will be calculated. If there is a deficiency in habitat units site-wide, DFO will be consulted.

6.1.2 Interstitial Water Quality

Water chemistry results will be compared to CCME water quality guidelines as available. If guidelines are exceeded, follow-up sampling will be conducted as soon as practical during ice-free conditions. If water quality criteria do not meet CCME guidelines or SSWQOs after two monitoring events, risk-based toxicity reference values will be compared, and additional testing, such as laboratory toxicity tests will be considered. Because dike monitoring results to date for the Meadowbank Site indicate that adverse effects are unlikely, any additional testing would be determined in consultation with DFO if required. Criteria for success will be maintenance of acceptable water quality conditions for aquatic life according to the above comparisons throughout three monitoring events.

6.1.3 Flood Zone Water Quality

Water quality in the flooded Whale Tail Lake and Lake A18 is monitored under the CREMP, and results are statistically compared to baseline/reference conditions using a BACI model. Water quality criteria for success from a fish habitat offsetting perspective will be no statistically significant exceedances of CREMP threshold values[1] or FEIS predictions (if/where predictions are greater) throughout three monitoring events.

6.1.4 Periphyton Community

Since lakes in the Meadowbank region are ultra-oligotrophic and ice-covered for the majority of the year, periphyton development is expected to be slow. Results from monitoring of habitat features at the Meadowbank site (East Dike) demonstrate that periphyton biomass is not fully established to reference values within 5 years following construction, although year-over-year improvements are considerable. Since periphyton growth has been extremely variable in reference sites historically (Azimuth, 2008), no specific quantitative criteria for success for this metric are proposed. However, within the weight of evidence assessment, periphyton visual assessments should document increases in biomass between monitoring events. Periphyton biomass on single-season artificial substrate samplers should be quantitatively similar to reference sites. Since this method has not yet been explored at the Meadowbank site, the feasibility of a statistical comparison for periphyton biomass will be determined following the initial year's pilot study.

6.1.5 Fish Use

Based on recommendations in Smokoroski et al. (2015), success criteria for fish use were developed as follows to evaluate the effectiveness of offsetting habitat.

[1] Different from trigger values; thresholds are equivalent to regulatory standards such as CCME guidelines or SSWQOs.

6.1.5.1.1 Flood Zone – Habitat Types 2 & 3 (Shoreline)

6.1.5.1.1.1 Nursery Function – Large Bodied Species

Nursery function for large bodied species will be evaluated indirectly (inferred production – Smokoroski et al. 2015) through measures of the relative abundance of juvenile and adult fishes (i.e. proportional size distribution) within the flooded lake system. This evaluation will be conducted as part of the flood zone deep water habitat assessment, since juvenile and adult lake trout and round white fish are expected to prefer foraging in those areas. However, since habitat use by juveniles is not well understood for these Arctic lakes, shoreline assessments conducted to evaluate use by small bodied species will opportunistically record any catch of lake trout and round whitefish. If they are found to use shoreline habitat, the effectiveness evaluation (relative abundance of juveniles & adults in flood zone lakes compared to reference lakes) will make use of this data.

The data analysis and success criteria are described in Section 6.5.1.1.2.

6.1.5.1.1.2 Combined Nursery/Foraging Function – Small Bodied Species

As described in Smokoroski et al. (2015), the combined effectiveness of new shoreline in flood zones as nursery and rearing/foraging habitat for the targeted small-bodied species will be evaluated (for each species) using population relative abundance compared to baseline/reference sites (CPUE), evidence of growth (e.g. size at age), survival (e.g. age/length frequency distribution), and reproduction (e.g. % composition of YOY) as metrics of success.

For the pre-offset monitoring period (present to min. 2023), effectiveness will continue to be assessed using shoreline electrofishing methods, to facilitate a BACI analysis. Using available small-bodied fish population baseline data for the flood zone (Whale Tail Lake, A20 A63, and A65 - 2018 data, prior to flooding) and reference system data collected annually since that time through shoreline electrofishing studies, these metrics will be analyzed using a BACI model to confirm effectiveness of the offsetting habitat. The offsetting target will be no statistically significant reduction in CPUE and/or population dynamics statistics between flood zone habitat and baseline/reference systems. As recommended by Smokoroski et al. (2015) our current statistical design and success criteria are based on a BACI design. However, it is important to understand that a BACI design has limitations as it assumes a single consistent effect will occur. If a subtle or change in direction occurs, other statistical approaches using existing data such as control impact (CI) or a spline regression may be used.

For the post-offset monitoring period (2027+), small-bodied fish assessment methods may be adjusted (e.g. minnow trapping or fyke nets) to improve efficiency of field studies. Recommendations for field methods determined through complementary measures Study 3 will be reviewed to confirm the approach, but the same variables will be recorded as in electrofishing studies (species, length weight, age) and metrics analyzed to determine success will remain consistent (relative abundance, growth, reproduction, and survival). Since

baseline data is not available for these other field methods, analysis would follow a control-impact design using reference systems (rather than a BACI model).

To support future HSI validation studies (per Conditions 5.2.1 and 5.3.2 of Authorization 16-HCAA-00370 and 20-HCAA-00275, respectively), a commentary on habitat selection among species and differences from offsetting HEP assumptions will be provided. This analysis will seek to demonstrate whether observed habitat preferences for these species and life stages align with those determined from the literature and assigned in the offsetting plan HEP – namely, that new shoreline in Whale Tail Lake (HT2) attracts primarily ninespine stickleback, while new shoreline in Lake A18 (HT3) attracts primarily slimy sculpin.

6.1.5.1.2 Flood Zone – Habitat Types 6 & 9

6.1.5.1.2.1 Rearing/Foraging Use Evaluation

As described in Section 3.1.2.4.1.2 and according to recommendations in Smokoroski et al. (2015), target metrics for evaluating success of deeper water flood zones as rearing/foraging habitat will be population abundance and/or biomass relative to baseline/reference sites, along with growth and survival endpoints (e.g. size at age, length frequency distribution analysis). The primary field assessment methodology will be short-set gill netting in flood zone and reference habitat, to enable comparisons with baseline data collected for similar habitat types during the Whale Tail Lake North Basin fish-out (2018).

Making use of this information, relative abundance and biomass will be analyzed using a BACI model. The offsetting target will be no statistically significant reduction in relative abundance and/or biomass for target species (Arctic char and lake trout) between flood zone habitat and baseline/reference systems. Growth and survival endpoints will be analyzed based on available reference data (e.g. no baseline age data is available so a CI design will be required) and used to support the final weight-of-evidence assessment.

As described in Section 3.1.2.4.1.2, supplemental or alternate field methods such as deep water electrofishing or hydroacoustic surveys may be reviewed and potentially adopted in consultation with DFO prior to the initial offset monitoring field season (est. 2027). Method selection may affect statistical methods (e.g. control-impact design instead of BACI) but effectiveness targets will remain as described here.

6.1.5.1.2.2 Spawning Use Evaluation

With a high likelihood of success from an offsetting perspective, ongoing effectiveness of existing aquatic habitat for spawning use is planned to be assessed qualitatively. Effectiveness targets for use of spawning habitat in the flood zone lakes will be any demonstrated evidence of spawning in the target locations.

6.1.5.1.3 Constructed Shoals - Habitat Types 6 & 9

Success criteria for demonstrating spawning habitat effectiveness will be developed along with methods of evaluation at least three years prior to fish use of the enhancement features.

Currently fish re-entry into the re-flooded Whale Tail North basin is scheduled for 2042, so the spawning habitat evaluation will be finalized by 2039 in consultation with DFO.

6.1.5.1.4 Whole-System Productivity Using eDNA Models – Exploratory Method

As an exploratory study to determine the feasibility of estimating system abundance and/or biomass using eDNA methods, no success criteria are associated with this method.

6.2 COMPLEMENTARY MEASURES

The main goal for all complementary measures is publication of research or methods development studies in the peer-reviewed literature (one or more publications per study). However, it is recognized that not all factors affecting outcomes of research projects and suitability of studies for such publication are within the control of Agnico, academic partners, or DFO. As a result, in certain instances, peer-reviewed publication may not be a viable route for dissemination of knowledge gained through these projects. In such cases, Agnico suggests discussions be undertaken between researchers, DFO, and Agnico to determine a mutually agreeable solution (e.g. conference presentations, inter-agency workshops). Criteria for success of complementary measures are thus considered to be submission of one or more manuscripts per study for publication in a peer-reviewed journal.

SECTION 7 • REPORTING AND PLAN REVIEW

Annual reports describing activities conducted under this Fish Habitat Offsets Monitoring Plan will be submitted with Agnico's Annual Report to the NIRB by March 31 of the following year, for all years in which monitoring occurs, and annually for Complementary Measures until those projects are complete.

A summary of the annual monitoring and reporting schedule (by year) is provided in Table 5.

7.1 PRE-OFFSETTING ECOLOGICAL MONITORING PROGRAM REPORTING

Along with various FAA conditions listed Section 1, the monitoring program has been tailored to specifically address Conditions 4.3.3, 5.1.1.2, and 5.3.1 of 20-HCAA-00275, which together require Agnico Eagle to develop a pre-offsetting effectiveness monitoring program to determine whether existing flooding provides suitable habitat and enhances productivity of target species.

The pre-offsetting monitoring program has been conceptualized as an extension of the planned post-offsetting monitoring program, and will follow the same field methods for shoreline habitat assessment. This program will run field studies from 2021 – 2023, and annual data reports provided as a component of reporting under this Plan. By March 31, 2024, a final analysis report ("Impact Analysis of Fish Habitat from Flooding" – per Condition 5.3 of 20-HCAA-00275) will be produced for discussion with DFO and interested parties. If biological

targets (success criteria) are not met at that time, the evaluation will demonstrate whether there is progression towards those targets, and whether the proposed offsetting measures (constructed sills) are likely to provide suitable habitat and enhance productivity of target species by the end of the planned post-offsetting monitoring period (10 years).

The schedule for the pre-offsetting ecological monitoring program is described in Table 5.

7.2 OFFSETTING REPORTING

The offsets monitoring period will be initiated in year one following construction of the permanent offsetting features (est. 2027 for Whale Tail South flood zones; and 2042 for Whale Tail North flood zones and shoals), and is planned to run for a period of 10 years, to establish effectiveness of the offsetting measures to provide suitable habitat and enhance productivity of target species (per Conditions 5.1.1.2 and 5.2.1 of 20-HCAA-00275).

For the offsets monitoring period, annual reports will include:

- Results of physical structure monitoring according to Section 3.1.1.1 and 6.1.1 to confirm construction specifications with regards to offsetting requirements are met (i.e. features were constructed as designed). This assessment occurs in year 1 post-construction for the A18 sill and flooding, and in year 1 post-reflooding of Whale Tail North for the Mammoth Sill and constructed shoals.

- Results of stability monitoring, according to Section 3.1.1.2, consisting of twice annual inspections of sills for erosion and slumping according to Condition 5.1.1.1 of 20-HCAA-00275, and inspections of constructed shoals in years 1 & 3.

- Results of ecological (effectiveness) monitoring according to Section 3.1.2 for years 1, 3, 5, and 10, including analysis to determine whether success criteria/biological targets have been met based on current data.

For Whale Tail Pit Expansion Project offsets (Lake A18 flooding), a summary report will be produced by March 31, 2036 (according to Condition 5.2.3), which analyzes data from all monitoring years and provides a final commentary on success and effectiveness of the offsets. Similarly, a final summary report will be provided in post-construction year 10 for Whale Tail Pit offsetting (est. 2053).

Final summary reports will clearly demonstrate whether offsetting success criteria have been met. If the established criteria have not been met by the end of the planned monitoring period (Table 5), Agnico will consult with DFO to determine the appropriate course of action (e.g. supplemental monitoring period or change to monitoring methods).

7.3 COMPLEMENTARY MEASURES REPORTING

Annual progress reporting for complementary measures is completed under separate cover, and provided to DFO by May 30 annually (per Condition 4.2.1.4 of 16-HCAA-00370). However, while research studies are ongoing, annual Fish Habitat Offset Monitoring Reports will include a summary of progress and indicate when criteria for success have been achieved.

7.4 PLAN REVIEW

The FHOMP will be reviewed as required by the Meadowbank Environment & Critical Infrastructure Superintendent and updated as necessary based on changes to mine site designs. All changes will be provided to DFO for approval as a revised document in the Annual Report.

SECTION 8 • REFERENCES

Agnico Eagle. 2016. Inuit Qaujimajatuqangit Baseline Report. Whale Tail Pit FEIS Appendix 7-A. June 2016.

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TABLES

Table 1. Current estimated timeline for fish habitat offsetting for the Whale Tail Site. Project activities associated with the Whale Tail Pit Project (FAA 16-HCAA-00370) are referred to as "Phase 1", and activities associated with the Whale Tail Pit Expansion Project (FAA 20-HCAA-00275) are referred to as "Phase 2". *While offsets will be considered "complete" if success criteria are met following a 10-yr monitoring period, the majority of offsets are available for fish use from the completion of flooding in 2020.

Authorization	Activity	Date
Whale Tail Pit – 16-HCAA-00370	Phase 1 losses complete (Whale Tail Fish Out/Dewatering)	2018
Whale Tail Pit Expansion Project -20-HCAA-00275	Phase 2 losses complete (IVR Area Fish Out/Dewatering)	2020
-	Flooding of Whale Tail South complete (for water management)	2020
Whale Tail Pit – 16-HCAA-00370	Construction of offsetting shoals/road scarification in dewatered Whale Tail North basin	Est. 2025 (or prior to reflooding)
Whale Tail Pit – 16-HCAA-00370	Construction of Mammoth Sill	Est. 2026 (or prior to reflooding)
Whale Tail Pit Expansion Project -20-HCAA-00275	Construction of A18 Sill	Winter 2025-2026
-	Begin flood zone drawdown	Summer 2026
-	Water elevations upstream from Whale Tail Dike reach post-closure levels	Fall 2026
Whale Tail Pit Expansion Project -20-HCAA-00275	Phase 2 offsets monitoring (A18 flood zone)	2026 - 2036
Whale Tail Pit Expansion Project -20-HCAA-00275	Phase 2 offsetting complete*	2036
-	Breach of Whale Tail Dike to allow fish entry to Whale Tail North	2042
Whale Tail Pit – 16-HCAA-00370	Phase 1 offsets monitoring	
	Whale Tail South flood zone	2026 – 2036
	Whale Tail North flood zone and shoals	2043 - 2053
Whale Tail Pit – 16-HCAA-00370	Phase 1 offsetting complete*	2053

Table 2. Estimated timeline for complementary measures (research projects). Incorporates delays occurring in 2020-2021 due to the COVID-19 pandemic. *Being considered for extension to 2024 to fully incorporate pre-offset ecological monitoring period.

Project	Lead Researcher	Study Period (inc. delays)
Study 1: Changes in Aquatic Productivity	H. Swanson – U Waterloo	2018 – 2022*
Study 2: Baker Lake Wastewater Assessment	H. Swanson – U Waterloo	2019 - 2026
Study 3: Lake Fish Habitat Preferences	S. Doka – DFO	2018 - 2022
Study 4: Arctic Grayling Occupancy Modelling	H. Swanson – U Waterloo	2018 – 2021 (complete)
Study 5: Pit Lake Habitat Assessment	TBD	2027 – 2035 (est.)
Study 6: eDNA Methods Development	J. Stetefeld – U Manitoba	2018 - 2023

Table 3. Example table for comparison of designs and as-built physical properties of habitat compensation features.

Feature	Assessment Metric	Method	Design	As-Built
Flooded terrestrial area	Area	Water level surveys and established water elevation-area relationships derived from topographic data and developed as part of the Whale Tail Pit Expansion Project FEIS (Agnico Eagle, 2018; Appendix 6-F)	X ha	X ha
	Substrate	Visual observations	Mixed/coarse	TBD
	Depth	Water level surveys	+1 or 1.3 m above baseline	TBD
Shoals	Area	Air photo/Construction Summary Report	X ha	X ha
	Substrate	Visual observation/Construction Summary Report	Coarse	TBD
	Depth	Field survey	2 – 4 m; > 4 m	TBD
	Stability	Visual observations/Underwater video	-	TBD

Table 4. Summary of monitoring methods, analytical parameters or biological metrics, and sampling locations for Whale Tail Site habitat offsetting features. *Current schedule provided in Table 5.

Feature	Component	Method	Parameters/Metric	Sampling Locations	Frequency*
Mammoth Sill and A18 Sill	Structure	Construction Summary Report On-the-ground or aerial photos (pre-, during and post-construction)	Confirm as-built state meets offsetting design intent	-	Once
	Stability	Visual assessment documented with photos	Erosion/slumping	Full length of sill	A18 Sill: 1x/year, years 1 - 10[2] post-construction Mammoth Sill: 1x/year, year 1 post-reflooding; and years 1, 3, 5 following WT dike breach
Constructed Shoals/ Scarified Roads	Structure	Construction Summary Report and/or field survey (TBD) On-the-ground or aerial photos (pre-, during and post-construction)	Area, substrate depth	-	Once post-construction

[2] Note this represents a change in the required monitoring frequency described in FAA 20-HCAA-00275 Condition 5.1.1.1, which indicates stability assessments 2x/year for years 1 - 10. Given the short open-water season, Agnico is proposing once annual monitoring following ice-off (est. early July), with the view that little information will be gained from a second monitoring event prior to freeze-up (est. early Sept).

Feature	Component	Method	Parameters/Metric	Sampling Locations	Frequency*
	Stability	Underwater camera or visual observations (depending on depth/clarity)	Erosion/slumping	Representative transects TBD by field staff	1x/year; Year 1 post-reflooding; and years 1, 3, 5 following WT dike breach
	Interstitial water quality (as feasible based on final depth)	Tube sampler	Metals, TSS	Representative locations TBD based on final depth zones (1 – 4 m) Similar number of reference locations	1x/year; Year 1 post-reflooding; and years 1, 3, 5 following WT dike breach
	Fish use – Lake Trout and Arctic Char spawning	TBD	TBD	TBD	1x/year, years 1, 3, 5, 10 following dike breach
Flood zone (includes Whale Tail South and Lake A18 flood zone and eventual reflooded Whale Tail North Basin)	Structure	Water level surveys and established water elevation-area relationships Visual observations	Area, depth of flooding Substrate	Established piezometer installation in Whale Tail South Lake A18 – GPS survey	Once after final elevations are reached. Lake A18/WT South: est. 2027 Whale Tail North: est. 2040
	Water quality	Sampling conducted through CREMP	Total and dissolved metals Anions and nutrients Physical tests - TSS and pH	Whale Tail South flood zone: Two locations in Whale Tail South Basin and A20 per CREMP Whale Tail North: locations TBD in post-closure period per	# events/year according to CREMP schedule. Pre-offsetting period: years 2021 – 2023 Offsetting period: years 1, 3, 5 10 (see

Feature	Component	Method	Parameters/Metric	Sampling Locations	Frequency*
				CREMP	Table 5)
	Periphyton	Periphyton sampler (artificial substrate) Visual assessment	Sampler: Seasonal biomass accumulation (ash-free dry mass and/or chlorophyll a) Visual: Increasing periphyton biomass development over time	Sampler: Three representative locations each in flood zone and reference lake (further refined based on pilot) Visual assessment: Six to ten representative locations in flood zone.	1x/year; Pre-offsetting period: 2021 – 2023 Offsetting period: years 1, 3, 5 10 (see Table 5)
	Fish use - Habitat Types 2 & 3 – Small Bodied Fish	Pre-offsetting period: Electrofishing Offsetting period: Minnow trapping, fyke netting, and/or electrofishing	Population relative abundance (CPUE) Population dynamics indicators (e.g. growth, survival and reproduction)	New shoreline areas created by flooding in Whale Tail Lake, A20, A63, A65 Reference lake(s)	1x/year; Pre-offsetting period: 2021 – 2022, (2023 TBD) Offsetting period: years 1, 3, 5, 10 (see Table 5)
	Fish Use - Habitat Types 2 & 3 – Large Bodied Fish	Conducted as part of Habitat Type 6/9 assessment (see below)	Conducted as part of Habitat Type 6/9 assessment (see below)	Conducted as part of Habitat Type 6/9 assessment (see below)	Conducted as part of Habitat Type 6/9 assessment (see below)
	Fish Use - Habitat Types 6 & 9 – Large Bodied Fish	Short set gill netting (foraging/rearing habitat evaluation) Underwater camera & temperature loggers (spawning	Foraging/rearing: Relative abundance and/or population biomass Population dynamics indicators (e.g. growth	HT 6 & 9 areas created by flooding in Whale Tail Lake, Lake A18 Reference lake	1x/year; Pre-offsetting period: 2023 (foraging and spawning assessments) Offsetting period:

Feature	Component	Method	Parameters/Metric	Sampling Locations	Frequency*
		habitat confirmation) (Hydroacoustic Survey – potential method, TBD) (Deepwater Electrofishing – potential method, TBD) (eDNA abundance methods – potential method, TBD)	and survival) Spawning: Evidence of spawning fish		years 1 & 3 (with extension to years 5 & 10 TBD based on results) – foraging assessment See schedule Table 5

Table 5. Current schedule of fish habitat offsets monitoring and reporting. *All reporting will be provided as a component of Agnico Eagle's Annual Report to the NIRB, under the Fish Habitat Offsets Monitoring Report, by March 31 of the following year.

Field Year	Field Studies	Report Type (Report Date)
Pre-offsetting Ecological Monitoring Program *– Whale Tail South and Lake A18 flood zones*		
2021	Flood zone water quality - CREMP Periphyton pilot test Fish use – small-bodied fish use of shoreline habitat	Data report (March 2022)
2022	Flood zone water quality - CREMP Periphyton Fish use – small-bodied fish use of shoreline habitat	Data report (March 2023)
2023	Flood zone water quality - CREMP Periphyton Fish use – small-bodied fish use of shoreline habitat (TBD based on results through 2022) & large-bodied fish use of flood zone HT 6 & 9 (foraging and spawning)	Final report - *Impact Analysis of Fish Habitat from Flooding* per Condition 5.3.1 of 20-HCAA-00275 (March 2024). Evaluation of effectiveness according to established success criteria.
Offsets Monitoring Program *– A18 Sill, Whale Tail South and Lake A18 flood zones*		
2027 (Year 1)	Whale Tail South and Lake A18 flood zone structure A18 Sill structure and stability Flood zone water quality - CREMP Periphyton Fish use – small-bodied fish use of shoreline habitat & large-bodied fish use of flood zone HT 6 & 9 (foraging)	Annual Monitoring Report (March 2028)
2028 (Year 2)	A18 Sill stability	Annual Monitoring Report (March 2029)
2029 (Year 3)	A18 Sill stability Flood zone water quality - CREMP Periphyton Fish use – small-bodied fish use of shoreline habitat; large bodied fish use of HT 6 & 9 (foraging)	Annual Monitoring Report (March 2030)

Field Year	Field Studies	Report Type (Report Date)
2030 (Year 4)	A18 Sill stability	Annual Monitoring Report (March 2031)
2031 (Year 5)	A18 Sill stability Flood zone water quality - CREMP Periphyton Fish use – small bodied fish use of shoreline habitat; large bodied fish use of HT 6 & 9 (foraging; necessity TBD pending results of earlier surveys)	Annual Monitoring Report (March 2032)
2032 (Year 6)	A18 Sill stability	Annual Monitoring Report (March 2033)
2033 (Year 7)	A18 Sill stability	Annual Monitoring Report (March 2034)
2034 (Year 8)	A18 Sill stability	Annual Monitoring Report (March 2035)
2035 (Year 9)	A18 Sill stability	Annual Monitoring Report (March 2036)
2036 (Year 10)	A18 Sill stability Flood zone water quality - CREMP Periphyton Fish use – small bodied fish use of shoreline habitat; large bodied fish use of HT 6 & 9 (foraging; necessity TBD pending results of earlier surveys)	Final Summary Report (March 2037) – evaluation of effectiveness according to established success criteria
Offsets Monitoring Program *– Mammoth Sill, Whale Tail North Basin flood zone and constructed shoals (approximate current schedule)*		
2040 (Offsetting Year -2 – year 1 post-reflooding and 2 years prior to fish access to WT North Basin)	Mammoth Sill structure and stability Constructed shoals structure, stability and interstitial water quality Flood zone water quality - CREMP	Annual Monitoring Report (March 2041)
2043 (Year 1 – one year	Mammoth Sill stability (years 1, 3, 5 only) Constructed shoals stability & interstitial water quality (years 1,	Annual Monitoring Report (March 2044, 2046, 2048)

Field Year	Field Studies	Report Type (Report Date)
following dike breach) 2045 (Year 3) 2047 (Year 5) 2052 (Year 10)	3, 5 only) Flooded shoreline zone water quality - CREMP Periphyton Fish use – small bodied fish use of flood zone shoreline habitat; large bodied fish foraging/rearing use of flood zone HT 6 & 9 (years 1 & 3 only with extension TBD); large bodied fish spawning use of constructed shoals	Final Summary Report (March 2053) – evaluation of effectiveness according to established success criteria