

Magino Gold Project

Finan Township, Algoma District, Ontario

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN:

SECTION 5: FISH AND FISH HABITAT MANAGEMENT PLAN

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January 15, 2021

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EMP/OPERATIONAL STANDARD REVISION RECORD

EMP Name	Revision Number	Revision Date	Summary of Revision
Fish and Fish Habitat Management Plan	V1	October 30, 2020	N/A
Fish and Fish Habitat Management Plan	V1	November 13, 2020	Consistency Check
Fish and Fish Habitat Management Plan	V1	January 15, 2021	Consistency Check, addressed relevant authority comments

LIST OF ACRONYMS

CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
ECA	Environmental Compliance Approval
EMP	Environmental Management Plan
IPC	instantaneous pressure change
MNRF	Ministry of Natural Resources and Forestry
MRMF	Mine Rock Management Facility
ODWS	Ontario Drinking Water Standards
PPV	peak particle velocity
PWQO	Provincial Water Quality Objectives
TMF	Tailings Management Facility
TSS	Total suspended solids

5.1. INTRODUCTION

5.1.1. Purpose and Objectives

This Fish and Fish Habitat Management Plan (the Plan) is one of the Environmental Management Plans (EMPs) that Prodigy Gold ('Prodigy') has developed for the Magino Gold Project ('the Project'), as per the Environmental Impact Statement (EIS) Commitments (posted to the Impact Assessment Agency of Canada's (IAAC) Registry in December 2018¹), as well as the Environmental Assessment (EA) conditions issued to Prodigy by the federal Minister of the Environment on January 24, 2019 in the Decision Statement². These EMPs form part of the *Construction Environmental Management Plan* (CEMP). EA conditions and EIS Commitments related to fish and fish habitat management are found in Appendix 5-C (Table 5-C-1 and Table 5-C-2). This Plan has been developed in accordance with Prodigy's EIS Commitments (17-19, 88) and EA conditions (3.2, 3.10-3.13, 3.16-3.19).

Prodigy is committed to protecting the environment, safe operations, and the health and safety of employees, contractors, and the communities in which Prodigy operates. The purpose of this Plan is to document the processes to be implemented at the Project site (site) to ensure that the safety of operations including infrastructure and services and the health and safety of all peoples are protected and managed in accordance with regulatory and Project commitments for construction of the Project.

Role	Responsibility (See Section 5.3 Procedures for Details)
Environmental Manager	 Responsible for directing all aspects of Prodigy's environmental programs for the construction of the Project and reports to the Mine Manager; Responsible for ensuring appropriate Site personnel (contractors and staff) are aware of the CEMP and follow the guidance contained herein; Responsible for implementation of best management practices for the CEMP; Issue directive to alter or suspend work activities if needed to ensure environmental protection; Responsible for ensuring that staff are familiar with the applicable regulatory and other requirements as outlined in this Plan and other sections of the CEMP with relevance to this Plan;

5.1.2. Roles and Responsibilities

¹ Prodigy Gold Inc. December 2018. *Magino Project Commitments List*. <u>https://iaac-aeic.gc.ca/050/documents/p80044/125783E.pdf</u>

² Canadian Environmental Assessment Agency. January 2019. *Decision Statement Issued Under Section 54 of the Canadian Environmental Assessment Act, 2012 for the Magino Gold Project*. <u>https://iaac-aeic.gc.ca/050/documents/p80044/126612E.pdf</u>

Role	Responsibility (See Section 5.3 Procedures for Details)
	 Provide interpretation or guidance in the event of uncertainty around permit requirements or other actions which may have the potential for environmental harm; and Responsible for communications to senior mine management and coordinating communications with Indigenous communities and potentially affected members of the public; Responsible for ensuring required reporting has been completed and submitted to regulatory authorities; and Maintaining records relevant to the implementation of the conditions in the federal Decision Statement.
Construction Manager	 Responsible for ensuring all contractors and construction staff are aware of and following best practices when working in or near waterbodies; Responsible for ensuring all contractors and construction staff are aware of the requirements in the CEMP; Responsible for coordinating communications with Prodigy senior management; Responsible for ensuring that all staff are familiar with Environmental Compliance Approval (ECA) and appropriate permitting; and Responsible for coordinating with all contractors for delivery of materials to the work site;
All employees/ contractors	 Follow best practices and appropriate guidance in this document; Responsible for following direction of Environmental Manager and/or the Construction Manager as indicated in this Plan; and Responsible for ensuring they are familiar with the applicable regulatory and other requirements as outlined in this Plan and other sections of the CEMP with relevance to this Plan.

5.1.3. Related Documents

This Plan has linkages to other EMPs which take into consideration aspects related to these activities. In particular the following CEMP sections have some relation to fish and fish habitat:

- 2: Accident and Malfunction Response Plan addresses uncontrolled discharge to a watercourse and related monitoring;
- 6: Water Management Plan addresses best practices to mitigate the potential for impacts to waterbodies during the installation of crossings;
- 10: Sediment and Erosion Control Plan addresses best practices to mitigate the potential for impacts to waterbodies due to erosion and sediment;
- 9: Drilling, Blasting, Fuel and Geotechnical Plan addresses general procedures and responsibilities for the use and handling of explosives at the site; and

• 8: Site Security, Roads and Traffic Management Plan – describes procedures to be implemented to prevent, avoid, reduce, and/or mitigate adverse environmental effects of the Project arising from the construction and operation of onsite roads.

5.2. CONCERN

During the construction and operations phases of the Project, activities will result in the disturbance of work areas which could lead to potential impacts to fish and fish habitat in the receiving environment. The potential risks could include, but are not limited to:

- permanent loss or alteration of fish habitat;
- death of fish due to:
 - o sedimentation due to construction activities in or near water;
 - blasting effects from the use of explosives;
 - o changes in water and sediment quality; and
 - o impingement and entrainment of fish from the use of water intakes.

Control measures are available that when appropriately planned and implemented, effectively mitigate the risks to fish and fish habitat.

5.3. PROCEDURES

To mitigate the potential effects to fish and fish habitat, the following protection measures will be used. These measures were committed to by Prodigy as part of the EA process, are conditions of Project approval or recognized as industry best practices. These have been grouped by general impact type.

All procedures described herein are subject to revision according to any final environmental approval/permit conditions, where applicable.

5.3.1. Protective Measures for Fish due to Work in or near Water

The following measures are to be implemented when work is undertaken in or near water. They are consistent with the direction provided in EIS Commitment 17, EA condition 3.10, 3.11, and best practices.

 In-water works will not occur during the restricted timing windows (Table 5-1), unless otherwise approved by Fisheries and Oceans Canada (DFO) and/or the Ministry of Natural Resources and Forestry (MNRF);

Fish Species	Restricted Timing Window (no in-water work)
Spring Spawning species (e.g. Walleye, Northern Pike, baitfish)	April 1 to June 20
Fall Spawning species (e.g. Lake Whitefish)	September 1 to June 15

Table 5-1: Restricted In-water Work Window

- If the in-water works cannot be completed outside the restricted timing windows, additional measures will be developed to mitigate impacts to fish during sensitive life stages and approved by Fisheries and Oceans Canada (DFO) and/or the MNRF prior to undertaking the work. Suitable isolation measures are outlined in the Erosion and Sediment Control EMP;
- Where specific waterbodies are to be dewatered or permanently lost, a Fish Salvage Plan will be prepared and submitted to the MNRF and Forestry for approval and issuance of a License to Collect Fish for Scientific Purposes prior to work being undertaken. In accordance with EA condition 3.12, Fish salvage activities are to be undertaken in accordance with the Plan and conditions of any applicable regulatory permits such as the License to Collect Fish for Scientific Purposes, *Fisheries Act* Authorizations and *Lakes and Rivers Improvement Act* Permits;
- Before undertaking any work in or near waterbodies, a Site-specific erosion and sediment control plan is to be prepared in accordance with the *Sediment and Erosion Control Plan* in the CEMP (section 10). The Plan will identify:
 - Risks to the aquatic environment, specifically fish and fish habitat
 - Erosion and sediment control measures to mitigate the environmental risks
 - o Monitoring requirements to ensure the effectiveness of the measures
 - Contingency measures that can be implemented, if necessary;
- Any water discharged from Project activities, including dewatering and effluent discharge, will include measures to dissipate energy and minimize disturbances to the bed of the receiving waterbody. These measures will be dependent on the duration and volume of the water to be discharged and may include splash pads, filter bags, discharge to vegetated areas set back at least 30 m from the receiving waterbody; and
- Discharge locations will be inspected by Project environmental staff for scour, erosion, or other signs of excess energy, and if needed, the above measures are to be implemented or improved.

5.3.2. Protective Measures to Mitigate Effects to Fish due to Blasting

The following measures are to be implemented when using explosives in or near water to mitigate the effects to fish due to blasting. See also additional measures related to blasting in the *Drilling/Blasting, Fuel and Geotechnical Plan* in the CEMP (section 9):

- The use of explosives in or near water is discouraged, and other potentially less destructive methods are to be used wherever possible;
- Time in-water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries timing windows (see Table 5-1);
- Isolate the work Site to exclude fish from within the blast area by using bubble/air curtains (i.e., a column of bubbled water extending from the substrate to the water

surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams;

- Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting (See Section 5.3.1);
- Do not use ammonium-nitrate based explosives in water due to the production of toxic by-products;
- No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change greater than 100 kPa (14.5 psi) in the swim bladder of a fish;
- No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 mm/sec in a spawning bed during the period of egg incubation;
- Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e., decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations;
- Back-fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast;
- Place blasting mats over top of holes to minimize scattering of blast debris around the area; and
- Remove all blasting debris and other associated equipment/products from the blast area.

5.3.3. Protective Measures to Mitigate Effects to Fish due to the Operation of Water Intakes

Taking into account DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline*, the following measures are to be implemented when water intakes are constructed and operated in water. These measures are consistent with the direction provided in EIS Commitment 19 and EA condition 3.13.

- To the extent possible, screens will be located in areas and depths of water with low numbers of fish throughout the year;
- Screens will be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat;
- The screen face will be oriented in the same direction as the flow;
- The openings in the guides and seals will be less than the opening criteria to make "fish tight";
- Screens will be located a minimum of 300 mm (12 in.) above the bottom of the water body to prevent entrainment of sediment and aquatic organisms associated with the bottom area;
- Structural support will be provided to the screen panels to prevent sagging and collapse of the screen;
- Provision will be made for the removal, inspection, and cleaning of screens;

- Regular maintenance and repair of cleaning apparatus, seals, and screens will be carried out to prevent debris-fouling and impingement of fish; and
- Pumps will be shut down when fish screens are removed for inspection and cleaning.

5.3.4. Protective Measures to Mitigate Effects to Fish due to Changes in Water Quality

The following measures are to be implemented when managing non-contact and contact water from the Project:

- At all time, the Project will comply with the Metal and Diamond Mining Effluent Regulations and the pollution prevention provisions of the *Fisheries Act* (EA condition 3.2);
- During construction and operation, contact water will be collected and reused by the Project, with excess water being treated prior to discharge under the conditions of the applicable ECA – Industrial Sewage Works;
- Groundwater pumped from the open pit area will not be released to the receiving environment without first being discharged through the approved Industrial Sewage Works under the conditions of the ECA (approval pending);
- Seepage control measures at the tailings management facility will be implemented, operated and maintained during the operation and decommissioning of the Project; and
- A cyanide destruction circuit will be installed prior to mine operation and used during operations to reduce cyanide concentrations in tailings prior to discharging to the tailings management facility.

In addition, to mitigate impacts from deleterious substances (e.g. oil, fuel, sediment), the following measures are to be implemented when undertaking Project works in and around water:

- Develop and implement a containment and spill management plan (or equivalent) that minimizes risk of accidental spills or releases from entering a watercourse or water body during all phases of the crossing (see the *Accident and Malfunction Response Plan* in the CEMP (section 2));
- Ensure that machinery arrives on Site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds;
- Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water;
- Installation and maintenance of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body:
 - Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction (see the *Sediment and Erosion Control Plan* in the CEMP (section 10));

- Repairs to erosion and sediment control measures and structures, if damage occurs or in ineffective working conditions; and
- Removal of non-biodegradable erosion and sediment control materials (e.g., silt fence) once Site is stabilized. Avoid the use of non-biodegradable materials in remote or difficult to access locations.

5.3.5. Protective Measures to Mitigate Effects to Fish Habitat

The following measures are to be implemented when undertaking Project works in or near water:

- Only works approved by the regulatory authorities through authorizations and Letters of Advice under the federal *Fisheries Act* or provincial *Lakes and Rivers Improvement Act* are to be conducted in or near waterbodies. Confirmation of approval is to be sought through the Environmental Manager;
- Minimize the duration of any in-water work;
- Conduct in-stream work during periods of low flow wherever possible. To further reduce the risk to fish and their habitat, isolate the work area during construction and manage any flows in accordance with the *Sediment and Erosion Control Plan* in the CEMP (section 10);
- Schedule work to avoid wet, windy and rainy periods that may increase the likelihood of erosion and sedimentation;
- Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the water body;
- Minimize clearing of riparian vegetation; use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction;
- Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the watercourse or water body below the high water mark. If material is removed from the water body or watercourse, set it aside and return it to the original location once construction activities are completed;
- Construct and operate watercourse crossings, including the operation of machinery in accordance with the *Water Management Plan* in the CEMP (section 6);
- Stabilize the construction area during and after works are completed in accordance with the *Sediment Erosion and Control Plan* in the CEMP (section 10); and
- Remove all construction materials from Site upon crossing completion.

5.4. MONITORING AND FOLLOW-UP PROGRAMS

The environmental monitoring team will use a plan-do-check-act approach to meeting the requirements of regulatory instruments and applicable law. The objective of the environmental monitoring approach will be to ensure that adjacent environments including the aquatic environment are not harmed as a result of the works.

The environmental monitoring team will implement a risk-based approach that will dictate monitoring requirements and frequency. Daily inspections of the high-risk work areas and key fish habitat mitigation measures are expected, although risk modifiers such as weather conditions may increase or decrease monitoring frequency at the discretion of Site environmental staff.

A core aspect of the monitoring will be visual inspections of the work areas, and an assessment of the effectiveness of the mitigation measures for fish and fish habitat. Monitoring of the construction and operation activities will be split into three phases:

- Construction period monitoring (i.e. during active construction of the works);
- Commissioning period monitoring (i.e. the period immediately following active construction of the works); and
- Operating period monitoring (i.e. following construction, once the constructed system has stabilized and is performing as intended based on the monitoring program).

A construction inspection program will be implemented for all phases of the Project. As part of the program, the conditions of regulatory permits will be monitored. Specifically, a surface water monitoring program has been developed as part of the ECA application process with the Ontario Ministry of Environment, Conservation and Parks. Total suspended solids (TSS)/turbidity threshold values will be established in the first year of construction by Project environmental staff for the surface water receivers using available TSS and turbidity data from the project baseline database. If water quality monitoring finds that TSS/turbidity concentrations are greater than threshold values, activities will stop until sufficient sediment and erosion control measures are in place, or alternative construction methods will be required that do not cause runoff to surface water receivers.

5.4.1. Construction Period Monitoring

For the construction period, conditions of regulatory permits for the protection of fish and fish habitat including water quality compliance monitoring will be conducted as per the regulatory requirements/approvals. In addition to compliance monitoring, a construction environmental monitoring approach will be implemented by the Site environmental team and their specialist consultants to ensure the effectiveness of the measures.

5.4.2. Commissioning Period Monitoring

Environmental monitoring for the commissioning period would be similar to that of the construction period and would include sampling as required by regulatory requirements/approvals. Once the constructed Project components are operational, the areas will be monitored through continued inspections until the Environmental Manager is satisfied that conditions are stable. Changes in flow conditions, such as during storm events, would trigger enhanced monitoring, but at this time the risk of erosion should be greatly diminished.

5.4.3. Operational Period Monitoring

During the operating period, a program of Site-wide inspections will be implemented as part of the overall Environmental Management System. This program will be augmented with eventbased inspections such as prior to and during spring break-up, following extreme events or other upset conditions. Further, conditions of regulatory permits (i.e. monitoring conditions of a *Fisheries Act* Authorization, and the Environmental Effects Monitoring Program under the *Fisheries Act*) will be undertaken during the operational period of the Project.

5.5. FOLLOW-UP PROGRAMS

This Plan is a tool to ensure that Prodigy's objectives and environmental commitments are achieved. As part of adaptive management, these Plans will be living documents and will be updated on a regular basis to ensure that they capture/incorporate the requirements outlined in the terms and conditions of the Project authorization and permits, as well as other commitments made to Indigenous and other local communities.

5.5.1. Effectiveness of Protection Measures for Fish due to Blasting Effects

In accordance with EA condition 3.16, and EIS Commitment 18, a follow-up program will be implemented to determine the effectiveness of the mitigation measures as it pertains to the adverse environmental effects on fish and fish habitat, including spawning habitat, caused by blasting. Monitoring for the follow-up program will be implemented prior to the first blasting event and include the following as noted in Table 5-2:

- Instantaneous pressure change (IPC);
- Peak particle velocity (PPV); and
- Use of habitat for spawning in West Bay relative to other habitat in Goudreau Lake.

Mitigation measures to protect fish and fish habitat, including spawning habitat will be reviewed and modified or enhanced prior to the next blasting event, if the results of the monitoring indicate:

- An IPC that is greater than 100 kiloPascals in the swimbladder of fish;
- A PPV that is greater than 13 millimetre per second in a spawning bed; and/or
- Changes in the use of fish habitat adjacent to the open pit where blasting is occurring.

Scope of the Program	Project Phase	Locations to	Methods	Duration and
		be Monitored		Frequency
PPV and overpressure	Site Preparation	Goudreau	Installation of	Prior to first blasting
measurements in the	and	Lake (West	hydrophones to measure	event and
western portion of	Construction	Bay)	peak particle velocity and	throughout
Goudreau Lake			overpressure	operation of mine

Table 5-2: Monitoring parameters for fish due to blasting effects

Use of habitat for	Operation	Goudreau	Conduct detailed habitat	Before and after the
spawning in West Bay		Lake (West	survey in the spring to	assessment of over
relative to other		Bay)	determine usage of habitat	pressure and
habitats in Goudreau			in Goudreau Lake (West	vibration and the
Lake.			Bay) for spawning and	implementation of
			conducted follow-up	mitigation
			young-of-the-year survey	
			to assess potential effects	
			and the need for	
			additional mitigation	

Refer also to the *Air / Atmospheric Environment Management Plan* in the CEMP (section 3) for further direction in accordance with EIS Commitment 18.

5.5.2. Effectiveness of Protection Measures for Fish due to Fish Salvage Operations

The target for fish salvage efforts is to obtain an 80% reduction in fish densities, within salvaged areas. Depletion from fish salvage operations will be calculated as the total number of fish captured, divided by the total population estimate, where the total population is estimated using a standard depletion estimator commonly applied in fisheries science; these operations will be carried out under an area-specific Licence to Collect Fish for Scientific Purposes under the supervision of one or more experienced aquatic biologists/technicians.

In accordance with EA condition 3.17, a follow-up program will be implemented throughout the construction of the Project to determine the effectiveness of the mitigation measures for fish salvage and relocation. The monitoring parameters to be used for the follow-up program are outlined in Table 5-3.

Table 5-3: Monitoring parameters for fish due to fish salvage and relocation

Scope of the Program	Project Phase	Locations to	Methods	Duration and
		be Monitored		Frequency
Determine the	Site Preparation	All habitats to	Use mark recapture	Conduct once
number and species of	and	be lost /	methods to determine %	during the
fish moved and	Construction	dewatered	of population captured,	relocation of fish
monitor the			monitor water	from areas
conditions in the			temperature and dissolved	approved for
habitats involved and			oxygen during relocation	dewatering.
transportation vessels			in habitats and transport	
			vessels	

5.5.3. Effectiveness of Protection Measures for Fish due to the Operation of Water Intakes

A follow-up program will be implemented throughout the life of the Project to determine the effectiveness of the mitigation measures for the incidental capture of fish by entrainment and impingement from the Project (in partial fulfilment of EA condition 3.17). The details of monitoring for the follow-up program will include the following:

- Ensuring the water intake has been designed and constructed to be consistent with DFO Freshwater Intake End-of-Pipe Fish Screen Guidelines;
- Intake velocity during operation is effective at preventing entrainment and impingement of fish; and
- The placement and operation of the water intake does not result in impacts to fish and fish habitat.

Mitigation measures to protect fish will be reviewed and modified/enhanced, if the results of the monitoring indicate:

- Excessive intake velocities that result in entrainment and impingement of fish, or
- Measurable effects to fish habitat due to the location of the water intake.

5.5.4. Effectiveness of Protection Measures for Fish due to Changes in Water and Sediment Quality

In accordance with EA condition 3.18, a follow up program will be implemented throughout the operation and decommission of the Project to determine the accuracy of the environmental assessment predictions and the effectiveness of the mitigation measures for changes to water and sediment quality due the Project. The details of the monitoring for the follow-up program are found in the Construction ECA – Surface Water Monitoring Plan (see Appendix 6-D in the *Water Management Plan* in the CEMP (section 6)). The Surface Water Monitoring Plan also fulfills the requirement for a follow-up program as it pertains to the adverse environmental effects on health of Indigenous Peoples caused by contamination of water and fish (EA condition 5.4) and is consistent with the direction in EIS Commitment 53.

If the results of the monitoring indicate:

- Adverse environmental effects to fish and fish habitat (due to fish health studies during the first three years of operation) is occurring from Project activities, additional monitoring will be undertaken at a frequency and duration determined in consultation with regulators and stakeholders; or
- A statistically significant difference in baseline conditions (specifically nutrient levels, algae abundance, and dissolved oxygen levels), a fish habitat utilization survey will be developed and conducted to verify there are no adverse environmental effects to fish and fish habitat.

Mitigation measures to protect fish and fish habitat will be reviewed and modified/enhanced, if the results of the monitoring indicate changes are necessary. Mitigation measures will include consideration for the installation and use of an effluent treatment facility.

Scope of the	Project Phase	Locations to be	Methods	Duration and Frequency
Program		Monitored		
Water quality and erosion control measures	Site Preparation and Construction	Downstream of construction activities and storm water management ponds	As noted in the Sediment and Erosion Control Plan in the CEMP (section 10), including turbidity meter, periodic samples for TSS, and inspections of erosion control measures.	Daily during active construction for turbidity and then periodic following construction to ensure any on-going mitigation continues to perform. TSS can be monitored weekly during construction. Inspection of erosion control measures weekly, except during precipitation events when
				some mitigation may need to be inspected hourly.
Water quality, sediment, benthos and fish	Operation	Otto and Herman Lake and two reference lakes	As noted in the Construction ECA – Surface Water Monitoring Plan and the Environmental Effects Monitoring Program under the Fisheries Act	As noted in the Construction ECA – Surface Water Monitoring Plan and the Environmental Effects Monitoring Program under the Fisheries Act
Water quality, sediment, benthos and fish	Closure/Post Closure	Otto and Herman Lake and two reference lakes	As noted in the Construction ECA – Surface Water Monitoring Plan and the Environmental Effects Monitoring Program under the Fisheries Act	As noted in the Construction ECA – Surface Water Monitoring Plan and the Environmental Effects Monitoring Program under the <i>Fisheries Act</i>

Table 5-4: Monitoring parameters for fish due to changes in water and s	
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5.5.5. Effectiveness of Protection Measures for Fish due to Changes in Groundwater Quality

In accordance with EA condition 3.19, a follow up program will be implemented throughout the operation and decommission of the Project to determine the accuracy of the environmental assessment predictions and the effectiveness of the mitigation measures for changes to groundwater quality due the Project. The monitoring for the follow-up program will include a comparison to the water quality benchmarks (Appendix 5-A), as noted in the EIS.

Mitigation measures to protect fish and fish habitat will be reviewed and modified/enhanced, if the results of the monitoring indicate adverse environmental effects to fish and fish habitat. See also the Groundwater Monitoring Plan (Appendix 6-F in the *Water Management Plan* in the CEMP (section 6)).

5.6. RELEVANT EMP-SPECIFIC AUTHORIZATIONS AND PERMITS FOR THE PROJECT

The applicable regulatory requirements or permits/approvals that require the implementation of protective measures during construction, operation and decommissioning for fish and fish habitat include the following:

- Fisheries Act Authorization
- Permit to Take Water
- Environmental Compliance Approval
- Lakes and Rivers Improvement Act authorization
- Authorization under federal Explosives Act
- Licence to Collect Fish for Scientific Purposes

This Plan is subject to revision based on the final terms and conditions of any Site approvals, as applicable to the related activities.

5.7. REPORTING

The Plan is only as effective as the persons responsible for its implementation. Depending on employee turnover, it is recommended that regular training on the contents of this management plan be conducted for those with responsibility for its implementation. While it is a confidential document, persons responsible for the various parts need to be informed and trained as necessary.

Overall, the Environmental Monitor will be responsible for coordinating the regular inspections of the Project. The Environmental Monitor will also be responsible for ensuring the following reporting:

- Reporting on the results of monitoring as required by regulatory agencies, such as *Fisheries Act* Authorizations, Environmental Effects Monitoring Program under the *Fisheries Act*, ECAs; and
- Reporting to the Environmental Manager of any incidents or requirements for corrective action due to deficiencies in the erosions and sediment control measures for the Project.

Annual monitoring reports will include a description of the work undertaken, the effectiveness of mitigation measures, corrective actions taken, and the implementation of fish offsetting measures. The monitoring results and corrective actions will be included in the Site documentation management system and reported to senior management and regulatory agencies, as required. Monitoring parameters, monitoring frequency, and performance objectives are outlined in the Fish Habitat Monitoring Plan and the Environmental Effects Monitoring Program.

A communications protocol will be established on the Project Site to report on the effectiveness of the plan(s) to the Environmental Manager. In the event of a failure of a mitigation measure, notifications will be given immediately to appropriate supervisors. As appropriate, these

notifications will be extended to the management team, and regulatory agencies, such as for incidents in which fish and aquatic habitat could be adversely affected, or if potential geohazards result from the erosive event.

5.8. FORMS Not applicable

APPENDIX 5-A: WATER QUALITY COMPARISON (FROM TABLE 7-54 OF THE ENVIRONMENTAL IMPACT STATEMENT)

		Baseline Groundwater			Comparative Standards		TMF	MRMF	
Constituent	Units	Overburden	Shallow Bedrock	Deep Bedrock	ODWS	PWQO	Water	Leachate	Pit Water
Alkalinity (as CaCO₃)	mg/L	48 - 236	44 - 319	96 - 219	-	-	-	-	149
Chloride	mg/L	0.13 - 4.4	0.18 - 19.7	0.14 - 4.9	-	-	42	15.5	8.6
Sulfate	mg/L	<2 - 102	<2 - 138	<2 - 21	500	-	5800	420	394
рН	mg/L	6.6 - 8.2	6.81 - 8.17	7.52 - 10.98	6.5 - 8.5	6.5 - 8.5	7.7	7.9	7.8
Phosphorus (T)	mg/L	<0.03 - 0.112	0.192	<0.03 - 0.178	-	0.01 - 0.03	0.49	0.055	0.040
Ammonia N	mg/L	<0.02 - 0.65	<0.02 - 0. 392	<0.02 - 0.337	-	0.0156	9.3	< 0.02	0.080
Nitrate - N	mg/L	0.039 - 1.25	<0.03 - 0.385	<0.03 - 0.12	1	-	13.4	0.21	0.31
Organic Carbon (D)	mg/L	1.5 - 24	1.5 - 22.6	<1 - 24.5	5	-	-	-	3.2
Total Dissolved Solids	mg/L	75 - 454	94 - 577	122 - 267	500	-	-	-	630
Cyanide (Total)	mg/L	<0.002 - 0.0054	<0.002 - 0.0049	<0.002	0.2	-	7.28	<0.002	0.0005
Aluminum	mg/L	<0.01 - 41	<0.01 - 12.9	<0.01 - 13.9	0.1	0.075	0.24	0.055	0.060
Arsenic	mg/L	<0.001 - 0.019	<0.001 - 0.0118	<0.001 - 0.0042	0.025	0.005	0.020	0.0047	0.0033
Boron	mg/L	<0.01 - 0.093	<0.01-0.193	<0.01 - 0.095	5	0.2	0.10	0.086	0.055
Cadmium	mg/L	0.000111 - 0.00254	0.000119 - 0.000585	0.000108 - 0.000269	0.005	0.0005	0.0010	0.0004	0.0002
Calcium	mg/L	18 - 142	19 - 111	24.6 - 89.8	-	-	631	177	127
Chromium	mg/L	<0.0005 - 0.122	<0.0005 - 0.0276	<0.0005 - 0.011	0.05	0.0089	0.005	0.013	0.006
Cobalt	mg/L	<0.0005 - 0.0713	<0. 0005 - 0.0131	<0.0005 - 0.0148	-	0.0009	0.04	0.004	0.003
Copper	mg/L	<0.001 - 0.356	<0.001 - 0.0482	<0.001 - 0.153	1	0.005	0.49	0.011	0.018
Iron	mg/L	<0.05 - 85	<0.05 - 28.8	<0.05 - 25.5	0.3	0.3	0.30	0.42	0.40
Lead	mg/L	<0.0005 - 0.0275	<0.0005 - 0.0049	<0.0005 - 0.0163	0.01	0.005	0.0020	0.0007	0.0003
Manganese	mg/L	<0.001 - 6.4	<0.001 - 1.2	<0.001 -0.735	0.05	-	0.20	1.12	0.14
Mercury	mg/L	< 0.0001	<0.00002 - 0.000047	< 0.00002	0.001	0.0002	-	-	0.000025
Molybdenum	mg/L	<0.0005 - 0.0069	<0.0005 - 0.112	<0.0005 - 0.0255	-	0.04	0.010	0.032	0.016
Nickel	mg/L	<0.001 - 0.136	<0.001 - 0.0142	<0.001 - 0.0256	-	0.025	0.010	0.007	0.004
Selenium	mg/L	<0.0004 - 0.00086	< 0.0004	<0.0004 - 0.00059	0.01	0.1	1.5	0.004	0.003
Silver	mg/L	<0.0001	<0.000 1 - 0.00041	<0.0001 - 0.00664	-	0.0001	0.008	0.002	0.001
Thallium	mg/L	<0.0003 - 0.00093	< 0.0003	<0.0003	-	0.0003	0.0005	0.0007	0.00035
Vanadium	mg/L	<0.0005 - 0.217	<0.0005 - 0.109	<0.0005 - 0.0755	-	0.006	0.053	0.002	0.002
Zinc	mg/L	<0.003- 0.262	<0.003- 0.166	<0.003 - 0.151	5	0.02	0.010	0.007	0.006

January 15, 2021

APPENDIX 5-B: FISH HABITAT COMPENSATION PLAN AND OFFSET PLAN (NOV. 2019)

Please note: This appendix has been provided as a separate stand-alone document.

APPENDIX 5-C: EA CONDITIONS/EIS COMMITMENTS RELATED TO FISH AND FISH HABITAT

The federal EA approval received via the Decision Statement issued on January 24, 2019³ included a suite of EA conditions; those relevant to Fish and Fish Habitat are included in Table 5-C-1 below. In addition, Prodigy made commitments in the EIS with respect to Fish and Fish Habitat (December 2018⁴); these are summarized in Table 5-C-2.

EA Conditions Relat	ed to Fish and Fish Habitat (January 2019)
Condition #	Action Required
EA Condition 3.1	"The Proponent shall develop, prior to construction, and implement, during all phases of
	the Designated Project, measures to control erosion and sedimentation within the
	project study area. The Proponent shall submit these measures to the Agency before
	implementing them. Among other measures, the Proponent shall:
	3.1.1 use ditches and diversion berms to maintain stream bank stability; and
	3.1.2 use physical barriers to reduce runoff from disturbed areas."
EA Condition 3.2	"The Proponent shall comply with the Metal and Diamond Mining Effluent Regulations
	and the pollution prevention provisions of the Fisheries Act."
EA Condition 3.3	"The Proponent shall collect, during construction and operation, contact water for reuse
	in Designated Project activities, and treat excess contact water that cannot be reused."
EA Condition 3.4	"The Proponent shall control the flow at which excess water referred to in condition 3.3
	is discharged to limit disturbance of lake bed material."
EA Condition 3.5	"The Proponent shall install, prior to operation, and use a cyanide destruction circuit
	during operation to reduce cyanide concentrations in tailings before the tailings are
	directed to the tailings management facility."
EA Condition 3.6	"The Proponent shall, after the end of operation and until the open-pit lake is filled,
	collect and direct contact water to the open-pit lake."
EA Condition 3.7	"The Proponent shall, prior to operation, implement seepage control measures at the
	tailings management facility and maintain these measures during operation and
	decommissioning."
EA Condition 3.8	"The proponent shall not connect the open-pit lake until such time as water in the open-
	pit lake complies with the pollution prevention provisions of the Fisheries Act."
EA Condition 3.9	"The Proponent shall treat water taking into account the Canadian Council of Ministers
	of the Environment's Canadian Water Quality Guidelines for Protection of Aquatic Life."
EA Condition 3.10	"The Proponent shall develop, prior to the start of blasting activities in or near water and
	in consultation with Indigenous groups, and implement, during blasting activities in or
	near water, mitigation measures to avoid or prevent adverse effects to fish and fish

Table 5-C-1: Federal EA Cor	nditions Related to Fish and	Fish Habitat (January 2019)
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³ Canadian Environmental Assessment Agency. January 2019. *Decision Statement Issued Under Section 54 of the Canadian Environmental Assessment Act, 2012 for the Magino Gold Project*. <u>https://iaac-aeic.gc.ca/050/documents/p80044/126612E.pdf</u>

⁴ Prodigy Gold Inc. December 2018. *Magino Project Commitments List*. <u>https://iaac-aeic.gc.ca/050/documents/p80044/125783E.pdf</u>

EA Conditions Relat	ed to Fish and Fish Habitat (January 2019)
Condition #	Action Required
	habitat from the use of explosives in a manner consistent with the Fisheries Act and its regulations. When developing these measures, the Proponent shall take into account Fisheries and Oceans Canada's Measures to avoid causing harm to fish and fish habitat including aquatic species at risk as it pertains to the use of explosives in or near water. The Proponent shall submit these measures to the Agency before implementing them."
EA Condition 3.11	"The Proponent shall conduct in-water construction activities during timing windows of least risk for the area, unless otherwise agreed to by relevant federal and provincial authorities. If in-water construction activities cannot be conducted during identified timing windows of least risk, the Proponent shall develop and implement additional mitigation measures, in consultation with Indigenous groups and Fisheries and Oceans Canada, to protect fish during sensitive life stages."
EA Condition 3.12	"The Proponent shall salvage and relocate fish prior to conducting any Designated Project activity requiring removal of fish habitat in a manner consistent with any license issued under the Fisheries Act and its regulations. The Proponent shall salvage and relocate fish in consultation with Indigenous groups and to the satisfaction of Fisheries and Oceans Canada and other relevant authorities."
EA Condition 3.13	"The Proponent shall design, install and operate the water intake structures in Goudreau Lake in a manner which reduces the incidental capture of fish by entrainment and impingement through the use of an appropriately sized fish screen, taking into account Fisheries and Oceans Canada's Freshwater Intake End-of-Pipe Fish Screen Guideline and in a manner consistent with the Fisheries Act and its regulations."
EA Condition 3.14	"The Proponent shall develop, to the satisfaction of Fisheries and Oceans Canada and Environment and Climate Change Canada and in consultation with Indigenous groups, any offsetting plan(s) related to any residual serious harm to fish associated with the carrying out of the Designated Project. The Proponent shall implement the plan. The Proponent shall submit any approved offsetting plan(s) to the Agency prior to implementation."
EA Condition 3.15	"The Proponent shall, for any fish habitat offsetting measure(s) proposed in any offsetting plan(s) referred to in condition 3.14 that may cause adverse environmental effects not considered in the environmental assessment, develop and implement, following consultation with Indigenous groups, Fisheries and Oceans Canada and Environment and Climate Change Canada, measures to mitigate those effects. The Proponent shall submit these measures to the Agency before implementing them."
EA Condition 3.16	"The Proponent shall develop, prior to the start of blasting activities in or near water and in consultation with Indigenous groups and relevant authorities, a follow-up program to determine the effectiveness of the mitigation measures as it pertains to the adverse environmental effects on fish and fish habitat, including spawning habitat, caused by blasting. The Proponent shall implement the follow-up program during blasting activities. As part of the implementation of the follow-up program, the Proponent shall: 3.16.1 monitor instantaneous pressure and particle velocity during the first blasting event; 3.16.2 if results of the monitoring referred to in condition 3.16.1 indicate an instantaneous pressure change greater than 100 kiloPascals in the swimbladder of fish or that blasting produces a peak particle velocity greater than 13 millimetre per second in a spawning bed, develop, prior to the next blasting event and in consultation with relevant authorities, modified or additional mitigation measures pursuant to condition 2.7 in order to protect fish and fish habitat, including spawning habitat; and

EA Conditions Relat	ed to Fish and Fish Habitat (January 2019)
Condition #	Action Required
	3.16.3 implement the modified or additional mitigation measures referred to in
	condition 3.16.2 during all subsequent blasting events. The Proponent shall submit these
	measures to the Agency before implementing them."
EA Condition 3.17	"The Proponent shall develop, prior to construction and in consultation with Indigenous
	groups and relevant authorities, a follow-up program to determine the effectiveness of
	the mitigation measures for the salvage and relocation of fish and as it pertains to the
	incidental capture of fish by entrainment and impingement from the Designated Project.
	The Proponent shall implement the follow-up program during all phases of the
	Designated Project."
EA Condition 3.18	"The Proponent shall develop, prior to construction and in consultation with Indigenous
	groups and relevant authorities, a follow-up program to verify the accuracy of the
	environmental assessment and to determine the effectiveness of the mitigation
	measures as it pertains to adverse environmental effects on fish and fish habitat caused
	by changes in water and sediment quality in Otto Lake and Herman Lake. The Proponent
	shall implement the follow-up program during all phases of the Designated Project,
	including the environmental effects monitoring requirements set out in Schedule 5 of the
	Metal and Diamond Mining Effluent Regulations. As part of the implementation of the follow up program the Proposant challs
	follow-up program, the Proponent shall: 3.18.1 monitor, at least quarterly, concentrations of total phosphorus, mercury, copper,
	silver, sulphate and ammonia in water during operation;
	3.18.2 monitor, at least annually, concentrations of copper, arsenic, cadmium,
	manganese, mercury and total phosphorus in sediments during operation;
	3.18.3 monitor fish health through fish tissue sampling and fish population studies.
	Monitoring shall include lower trophic level indicator species and shall include
	monitoring of fish abundance, fish population structure and other fish health metrics
	that shall be determined in consultation in Indigenous groups and relevant authorities.
	The Proponent shall conduct monitoring for one year prior to operation and at least
	twice a year for the first three years of operation and shall:
	3.18.3.1 if the results of monitoring during the first three years of operation demonstrate
	that no adverse environmental effects to fish and fish habitat from Designated Project
	activities are occurring, continue monitoring every three years after the first three years
	for a duration that shall be determined in consultation with Indigenous groups and
	relevant authorities; or
	3.18.3.2 if the results of monitoring during the first three years of operation demonstrate
	that adverse environmental effects to fish and fish habitat from Designated Project
	activities are occurring, determine, in consultation with Indigenous groups and relevant
	authorities, with what frequency and for what duration additional monitoring shall
	occur;
	3.18.4 monitor nutrient levels, algae abundance, and dissolved oxygen levels. In doing so
	the Proponent shall:
	3.18.4.1 conduct monitoring one year prior to operation;
	3.18.4.2 conduct monitoring at least twice a year for the first three years of operation
	and:
	3.18.4.2.1 if the results of the monitoring referred to in condition 3.18.4.2 demonstrate a
	statistically significant change with the results of monitoring referred to in condition
	3.18.4.1, conduct a fish habitat utilization survey to verify that these changes do not
	cause adverse environmental effects to fish and fish habitat. The Proponent shall

EA Conditions Related to Fish and Fish Habitat (January 2019)			
Condition #	Action Required		
	determine the methodology, the frequency and the duration of this survey in		
	consultation with Indigenous groups and relevant authorities.		
	3.18.4.3 after the third year of operation, the Proponent shall:		
	3.18.4.3.1 continue monitoring of nutrient levels, algae abundance and dissolved oxygen		
	levels every three years for a duration that shall be determined in consultation with		
	Indigenous groups and relevant authorities, if the results of monitoring referred to in condition		
	3.18.4.2 demonstrate that no adverse environmental effects to fish and fish habitat from		
	Designated Project activities are occurring; or		
	3.18.4.3.2 continue monitoring at a frequency and duration that shall be determined in		
	consultation with Indigenous groups and relevant authorities, if the results of monitoring		
	referred to in condition		
	3.18.4.2 demonstrate that adverse environmental effects to fish and fish habitat from		
	Designated Project activities are occurring.		
	3.18.5 if results of the monitoring referred to in conditions 3.18.1, 3.18.2, 3.18.3 or		
	3.18.4 or the results of the fish habitat utilization survey referred to in condition		
	3.18.4.2.1 demonstrate that modified or additional mitigation measures are required to		
	protect fish and fish habitat from changes to water and sediment quality, develop and		
	implement modified or additional mitigation measures pursuant to condition 2.7, which		
	shall include, at a minimum, the installation and use of an effluent treatment facility. The		
	Proponent shall submit these measures to the Agency before implementing them."		
EA Condition 3.19	"The Proponent shall develop, prior to construction and in consultation with Indigenous		
	groups and relevant authorities, a follow-up program to verify the accuracy of the		
	environmental assessment and to determine the effectiveness of the mitigation		
	measures as it pertains to the adverse environmental effects on fish and fish habitat in		
	Otto Lake, Herman Lake and Goudreau Lake from changes in groundwater quality caused		
	by the Designated Project. The Proponent shall implement the follow-up program during		
	all phases of the Designated Project in consultation with Indigenous groups. As part of		
	the implementation of the follow-up program, the Proponent shall:		
	3.19.1 monitor groundwater quality using as benchmarks the comparative standards for		
	water quality identified by the Proponent in Table 7-54 of the Environmental Impact		
	Statement; and		
	3.19.2 if the results of the monitoring referred to in condition 3.19.1 demonstrate that		
	modified or additional mitigation measures are required to mitigate adverse		
	environmental effects on fish and fish habitat of changes in groundwater quality caused		
	by the Designated Project, develop and implement modified or additional mitigation		
	measures pursuant to condition 2.7. The Proponent shall submit these measures to the Agency before implementing them.		
EA Condition 5.4	"The Proponent shall develop, prior to construction and in consultation with Indigenous		
LA CONULION J.4	groups and relevant authorities, a follow-up program to verify the accuracy of the		
	environmental assessment and to determine the effectiveness of mitigation measures as		
	it pertains to the adverse environmental effects on health of Indigenous Peoples caused		
	by contamination of water and fish. As part of the follow-up program, the Proponent		
	shall:		
	5.4.1 identify, prior to construction, fish species that shall be monitored, waterbodies		
	where Indigenous use is expected and where contaminants shall be monitored;		
	where magenous use is expected and where contaminants shall be monitored,		

EA Conditions Related to Fish and Fish Habitat (January 2019)			
Condition #	Action Required		
	5.4.2 monitor mercury, methylmercury, cobalt, lead and arsenic in surface water in Otto		
	Lake and other downstream waterbodies identified pursuant to condition 5.4.1 during all		
	phases of the Designated Project;		
	5.4.3 monitor mercury, methylmercury, cobalt, lead and arsenic in surface water in		
	Goudreau Lake and other downstream waterbodies identified pursuant to condition		
	5.4.1 during decommissioning;		
	5.4.4 monitor mercury, methylmercury, lead, arsenic and cobalt in fish tissue in Otto		
	Lake and other downstream waterbodies identified pursuant to condition 5.4.1 every		
	three years during all phases of the Designated Project, starting the first year of		
	construction, and every five years until the end of decommissioning. The Proponent shall		
	determine, in consultation with Indigenous groups and relevant authorities, if additional		
	monitoring must be implemented after the end of decommissioning; and		
	monitor mercury, methylmercury, lead, arsenic and cobalt in fish tissue in Goudreau		
	Lake and other downstream waterbodies identified pursuant to condition 5.4.1 every		
	three years starting at the beginning of decommissioning and for a duration that shall be		
	determined in consultation with Indigenous groups and relevant authorities."		

Table 5-C-2: Prodigy's EIS Commitments Related to Fish and Fish Habitat (December 2018)

EIS Commitments Related to Fish and Fish Habitat (December 2018)			
Commitment #	Action Required		
EIS Commitment 11	 "Prodigy has committed to the Department of Fisheries and Oceans Canada (DFO) to establish a Fisheries Working Group in January of 2018 in order to serve two main purposes: 1. Provide a venue for Prodigy, the technical consultant and the DFO to interact on a regular basis to establish a shared understanding of areas that will need fisheries offsetting and compensation under the Fisheries Act. 2. Provide a regular venue for Indigenous groups to participate in the development of 		
	the fisheries offsetting, compensation and subsequent monitoring plans that will be required prior to construction."		
EIS Commitment 12	"Indigenous groups will be invited for additional site visits as fish habitat compensation and offsetting works are underway."		
EIS Commitment 13	"Upon discussion with Indigenous communities, at closure, the feasibility of fish spawning area construction within the pit will be assessed in order to assist with aquatic biota diversity emergence."		
EIS Commitment 14	"During site clearing (construction), sediment mitigation and erosion control plans will be developed to ensure protection of fish and fish habitat during construction."		

EIS Commitments Rela	ted to Fish and Fish Habitat (December 2018)
Commitment #	Action Required
EIS Commitment 15	"The finalization of the Fish Habitat Compensation Plan will occur once the Project receives environmental approval and is released from the Canadian Environmental Assessment Agency review process. The general approach will be to design habitat to meet the current life history requirements of the resident fish (McVeigh Creek re- alignment will be a channel designed with form and function considered). Consideration with respect to spawning, juvenile, adult foraging and over wintering habitat will be incorporated into the compensation design as appropriate. The compensation plans will consider not only the physical habitat requirements (i.e., flow, depth, fish passage, cover, and substrate) but also the biological requirements (e.g. food)."
EIS Commitment 16	"Prodigy Gold commits to continue to consult with Indigenous groups to seek input into the development and implementation of the fish habitat offsets and compensation offset and compensation plans."
EIS Commitment 17	"Fish salvage following industry best practices will be undertaken to the extent practicable. The timing of fish relocations will be scheduled with respect to fish life history requirements (e.g., spawning periods) and conditions in the watershed (e.g., water temperature)."
EIS Commitment 18	"Prodigy will undertake an adaptive approach to the management of any effects from vibration of fish and fish habitat, using field observations to characterize the effects of vibrations on fish habitat."
EIS Commitment 19	"In order to avoid effects of water intake structures on fish, the design of the screens or fish exclusion measures will comply with DFO guidance documents and industry best practice."
EIS Commitment 24	 "Monitoring shall be undertaken to confirm the effectiveness of: Wildlife/human interactions that include wildlife use of water quality ponds and the pit, the mortality due to vehicular collisions, and the use of ecopassages."
EIS Commitment 53	 "Further details of the monitoring plan are provided below and will be formalized in an environmental monitoring plan during the permitting process: If monitored water quality concentrations are greater than baseline concentrations past the mixing zone, then fish tissue monitoring would be triggered in the locations where exceedances were identified and would be monitored for the same chemicals identified to exceed baseline concentrations. Monitored fish tissue concentrations would be compared to baseline fish tissue concentrations monitored in the nearby water bodies. If fish tissue concentrations are greater than established baseline concentrations, further assessment would be required to determine whether changes to current fish consumption advisories would be warranted or whether additional mitigation measures would be required to lower fish tissue concentrations."
EIS Commitment 88	"Sediment will be sampled every three years, as changes to sediment quality occur slowly, and three years will provide sufficient temporal resolution to track changes."