Fish Habitat Design, Operation and Reclamation Workbook and Worksheets for Placer Mining in the Yukon Territory

Version 1.3

November 2010

This document is available from:

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Overview

This workbook and associated worksheets are provided to assist with compiling information to support project proposals for submission to the Yukon Environmental and Socio-economic Assessment Board (YESAB) and the Yukon Water Board (YWB). The guidance provided focuses on the requirements of the ***Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*** (Federal *Fisheries Act*) for watersheds in the Yukon. Additional details pertaining to technical information on various aspects related to best management practices, mitigation measures, and design consideration are provided in the ***Guidebook of Mitigation Measures for Placer Mining in the Yukon***. Please note that this workbook and associated worksheets may undergo revisions in the future, and as such, users are encouraged to ensure that the version they employ is the current version.

In order to achieve compliance with the ***Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat***, the placer mining proposal must meet the requirements outlined in this workbook for the watershed type and specific habitat suitability type at the location where the activities are to occur (see ***Yukon Placer Fish Habitat Suitability Maps***).

Placer mine operators are encouraged to design proposals that comply with the requirements described in this workbook. However, if the proposal is not able to achieve these requirements and the operator would like to proceed with the regulatory review process, an application for site-specific review and authorization should be submitted to Fisheries and Oceans Canada (DFO) for consideration **prior to the submission of the proposal to YESAB and the YWB**.

When a proposal is submitted for site-specific review, DFO will review the information and notify the proponent if the project will require a site-specific authorization. In some cases DFO may recommend additional measures or request redesign of aspects of the project to provide adequate protection of fish and fish habitat resources, prior to proceeding with submission of the application to YESAB and the YWB. Upon completion of the YESAB and YWB process, DFO may issue a site-specific authorization for the proposed activities. This site-specific authorization must be issued prior to initiating any placer mining works or undertakings in or around fish habitat. Please contact DFO if you have any questions regarding this process.

Refer to the relevant Habitat Suitability type in which proposed placer mining works or undertakings are planned to occur. In addition to this workbook and worksheets, the following documents provide the required information to support the development and submission of proposals for placer mining activities:

1. ***Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat –*** Provides the legal authority to conduct works or undertakings related to placer mining that may result in the harmful alteration, disruption or destruction of fish habitat. Also specifies sediment discharge standards for placer mine effluent.

2. ***Yukon Placer Fish Habitat Suitability Maps*** – Identifies the watershed sensitivity and habitat suitability of the watercourse where placer mining activities are proposed to occur.

3. ***Guidebook of Mitigation Measures for Placer Mining in the Yukon*** - Provides design requirements to achieve compliance with the ***Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*** and to assist with proposal development.

Quick Reference Table

The quick reference table provides the page number of the specific section of the workbook that applies to placer mining works or undertakings proposed for a particular habitat suitability type. For additional information operators are encouraged to refer to the ***Guidebook of Mitigation Measures for Placer Mining in the Yukon***.

Fish Habitat Design, Operation and Reclamation Requirements for High Habitat Suitability Watercourses (Chinook Salmon Production)

Fish Habitat Design, Operation and Reclamation Requirements for High Habitat Suitability Watercourses (Chinook Salmon Production)

High suitability habitats are defined as watercourses that provide spawning habitat for salmon or critical migratory corridors required to access salmon spawning habitat. Typically, the distribution of this habitat type is the most limited in watersheds. High suitability habitats require effective management of mining activities to provide protection from potentially harmful effects resulting from development activities and achieve conservation and protection of habitats. As such, **placer mining works or undertakings will be highly restricted in this habitat type**.

In **all cases**, any placer mining activities (other than those listed in the following operational requirements) that are likely to result in the harmful alteration, disruption or destruction of High suitability habitats require a site-specific review, and if the activity is deemed to be acceptable, a site-specific authorization issued by Fisheries and Oceans Canada. A full compensation and fish habitat restoration plan must be submitted to Fisheries and Oceans Canada with any proposal to conduct works in or around High suitability habitats.

Summary of general restrictions on works or undertakings in High suitability habitats

Activity Type / Operation	Restriction in High suitability habitats without site-specific authorization.
Effluent Discharge	Discharge of sediment concentrations above background levels not authorized
Riparian Zone	Work within 30 metres from the high water mark not authorized.
Fords	Construction of new fords not authorized.
Diversion Channels	Construction of diversion channels not authorized.
In-stream Works	In-stream works not authorized.

Please refer to the following information regarding works or undertakings in or around High suitability habitats.

Do you propose to undertake placer mining activities in or near a watercourse? Activities may include discharging effluent, constructing stream crossings, clearing riparian vegetation, constructing channel diversions, or withdrawing water.

NO – No further review pursuant to the *Fisheries Act* is required.
YES – Proceed to Step A, Identification of Project Location

A) Identification of Project Location

The first step in compiling a project proposal that involves activities proposed to occur in or around fish habitat areas is the completion of the ***Project Location Worksheet*** (Appendix A).

A1. *On the **Project Location Worksheet** enter the stream name, the watershed name (as per **Yukon Placer Fish Habitat Suitability Maps**), identify the watershed sensitivity and habitat suitability classification for the reaches you proposed to work in, determine if any reaches are designated as "prior development", provide a short description of the location, describe the proposed duration of activities and include a copy of a map of the specific location of the site.*

Once the sections noted above are completed on the ***Project Location Worksheet***, proceed to the next question.

Do you propose to discharge effluent from your mine site?

NO – Proceed to Step C, Riparian Zones.

YES - Proceed to Step B, Settling Pond Discharge. ***Note – discharge of sediment concentrations above background levels is not authorized in High suitability habitats.***

B) Settling Pond Discharge (effluent concentration)

Point source sediment discharges from gold recovery processes are typically managed through the use of settling facilities. The action level approach is a key element of the risk-based approach to sediment management for Yukon placer mining. For more information on the action level approach or settling pond design, operation, recirculation systems, and settling pond reclamation refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

Water quality objectives and sediment discharge standards for High suitability habitats are identified in the *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* for the specific watershed you propose to work in (general requirements summarized below). Please verify your specific discharge standard in the respective watershed you plan to work in (specifically if any exemptions exist) prior to proceeding with your application.

Discharge Standard (High Habitat Suitability)	**Requirement**
Design Target	0 mg/L*
Action Level	0 mg/L*
Compliance Level	0 mg/L*

****Note – Typically only total recirculation systems will be able to achieve this standard.***

B1. *Record the Design Target, Action Level and Compliance Level on the* ***Project Location Worksheet*** *(Appendix A).*

Once the effluent discharge standards are recorded on the ***Project Location Worksheet*** proceed to the next question.

Do you propose to build a Seasonal, Temporary or Permanent diversion channel?

NO – Proceed to Step C, Riparian Zones.

YES – Proceed to Step D, Diversion Channels.

C) Riparian Zones

The Riparian Zone is defined as the portion of the stream bank (either vegetated or not) immediately adjacent to the stream channel. Riparian Zones are measured from the high water mark on each bank of the watercourse and follow the shape of the channel.

The designated **Riparian Zone** in High suitability habitats is **30 metres.**

The Riparian Zone designation applies to all High suitability habitats. In the absence of a site-specific authorization from Fisheries and Oceans Canada, the only activity permitted within the Riparian Zone is the clearing of surface vegetation to create a corridor to provide access to the stream (typically for water acquisition purposes). The maximum width of the corridor is to be no more than **3 metres**. Riparian Zones must be staked out by the operator prior to development.

Do you propose to conduct surface or subsurface works in the Riparian Zone?

NO – Proceed to Step D, Diversion Channels.

YES – Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question.

Do you propose to construct a new stream crossing (ford)?

NO – Proceed to next question.

YES – Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question.

Do you propose to clear surface vegetation only?

YES – Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question.

NO – Proceed to next question.

D) Diversion Channels

It is unlikely that the construction of a diversion channel will be permitted in High suitability habitats. However, operators wishing to propose construction of a diversion channel in High suitability habitats must first prepare a detailed design of the diversion channel, with the structural design certified by a professional engineer, and a detailed fish habitat compensation plan and submit this detailed design to Fisheries and Oceans Canada for review. Each proposal will be reviewed on a case-by-case basis and it is likely that detailed dialogue will need to occur between the operator and Fisheries and Oceans Canada during the proposal review stage.

Ultimately, the proposal will need to clearly demonstrate how High suitability habitat will be compensated for (via the creation of replacement habitat) in a manner that poses little to no risk to the fisheries resource (typically adult salmon / spawning activities). Operators are encouraged to contact Fisheries and Oceans Canada for more information prior to proceeding with the development of a proposal that involves channel diversion in High suitability habitat.

Do you propose to use an Existing Ford?

NO – Proceed to next question.

YES – Proceed to Step E, Watercourse Crossings, then E1, Use of Existing Ford.

Do you propose to construct a New Ford?

NO – Proceed to Step F, Water Acquisition.

YES – Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question.

E. Watercourse Crossings (Fords)

Fording is defined as the crossing of creeks, streams and / or rivers at locations where a bridge, causeway or elevated embankment does not exist or is not utilized by a vehicle or equipment. Fording typically involves driving directly through a watercourse, across the banks and bed. In some instances, Fording locations (*Fords*) have been "improved" or constructed through watercourses by way of adding materials such as rocks or gravel, the modification of approaches, or the modification of the bed of a watercourse.

E1. Use of Existing Ford

Use of existing Fords is often the least preferred option for crossing watercourses however it is recognized that there are instances where it is the only viable option. Refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* for additional information on Fords. The following measures should be adhered to when utilizing existing Fords.

NOTE – Use of existing Fords in High suitability habitats is ONLY permitted between June 10 and July 1 of any given year. Please identify if you intend to use existing Fords on the Project Location Worksheet (Appendix A).

- Ensure water depth is sufficiently shallow to allow passage of vehicle / equipment.
- Plan your activities in advance to minimize the number of crossings required.
- Avoid crossing during extreme rain or flood events.
- Access approaches at 90° to the bank, when entering or exiting the ford.
- Maintain speed at a very slow and steady pace throughout the crossing.
- Avoid rapid acceleration while on approaches or while in the water.

Do you propose to withdraw water from a High habitat suitability watercourse?

NO – Proceed to Step G, In-stream Works.

YES – Proceed to Step F, Water Acquisition.

F. Water Acquisition

Acquisition of water is required for processing materials during placer mining. Effective water management is a key consideration at all placer mine sites. The following requirements must be achieved to meet compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

F1. Water Intake Screens

In order to meet the requirement of the *Fisheries Act*, all water intakes must be screened in accordance with requirements identified in the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines. A general summary of the guideline requirements are provided in the following table. For more information regarding fish screens, please refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* or for more specialized applications please refer to the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines (available online or through Fisheries and Oceans Canada).

General Guidelines for Intake Screens

Design Component (Fish Screens)	Requirement
Screen Openings (Imperial)	No less than 8 openings per lineal inch, with openings no greater than 1/8 inch along any given side of the screen. If a punch plate or similar material is used, openings no greater than 1/8 inches in length or width are permitted.
Screen Openings (Metric)	No less than 3.5 openings per lineal cm, with openings no greater than 3.2 mm along any given side of the screen. If a punch plate or similar material is used, openings no greater than 3.2 mm in length or width are permitted.
Screen Area (Imperial)	1 ft^2 of open screen area per 45 imperial / 55 US gallons per minute of water withdrawn is required.
Screen Area (Metric)	929 cm^2 of open screen area per 205 litres per minute of water withdrawn is required.

Note: the objective behind the installation of intake screens is to prevent the destruction of fish through the acquisition of water. If screens of the correct mesh size are deployed between a watercourse and the intake to a water reservoir or gravity feed ditch, it is not necessary to screen the pump intake that removes water from within these structures provided these structures do not already contain fish. In the case of total recirculation systems, the operator shall ensure that any areas where fish could enter the system have barriers to prevent the entry of fish (unless the pump intake is appropriately screened).

G. In-stream Works

In-stream works are defined as works that occur within the high water mark of a watercourse, but do not include diversion channels or fords. Some in-stream works can lead to effects on fish and fish habitat such as erosion/scouring, sediment inputs, loss of habitat area, changes in channel morphology, blockages to passage, and reduced productivity.

No physical works are permitted within a watercourse under the auspices of a watershed-based authorization in habitats of High suitability. Should in-stream works be contemplated in these areas, operators must apply to Fisheries and Oceans Canada for a site-specific review of proposed in-stream works prior to proceeding.

High Suitability Habitat (Chinook Salmon Production)

Fish Habitat Design, Operation and Reclamation Requirements for High Habitat Suitability Watercourses (Areas of Special Consideration)

Fish Habitat Design, Operation and Reclamation Requirements for High Habitat Suitability Watercourses (Areas of Special Consideration)

High suitability habitats (Areas of Special Consideration) are defined as watercourses that contain ecologically or culturally important fisheries or aquatic resources. Watercourses assigned this designation may include habitats for rare or locally significant species or areas which directly support subsistence, traditional, commercial or sport fisheries.

Areas of Special Consideration (ASC) may be established for either anadromous or non-anadromous species of fish.

In **all cases**, any placer mining activities (other than those listed in the following operational requirements) that are likely to result in the harmful alteration, disruption or destruction of High (ASC) suitability habitats require a site-specific review, and if the activity is deemed to be acceptable, a site-specific authorization issued by Fisheries and Oceans Canada. A full compensation and fish habitat restoration plan must be submitted to Fisheries and Oceans Canada with any proposal to conduct works in or around High (ASC) suitability habitats.

Summary of general restrictions on works or undertakings in High suitability habitats

Activity Type / Operation	Restriction in High (ASC) suitability habitats without site-specific authorization.
Effluent Discharge	Discharge of sediment concentrations above background levels not authorized
Riparian Zone	Work within 30 metres from the high water mark not authorized.
Fords	Construction of new fords not authorized.
Diversion Channels	Construction of diversion channels not authorized.
In-stream Works	In-stream works not authorized.

Please refer to the following information regarding works or undertakings in or around High (ASC) suitability habitats.

Do you propose to undertake placer mining activities in or near a watercourse? Activities may include discharging effluent, constructing stream crossings, clearing riparian vegetation, constructing channel diversions, or withdrawing water.

NO – No further review pursuant to the *Fisheries Act* is required.

YES – Proceed to Step A, Identification of Project Location

High Suitability Habitat (Areas of Special Consideration)

A) Identification of Project Location

The first step in compiling a project proposal that involves activities proposed to occur in or around fish habitat areas is the completion of the ***Project Location Worksheet*** (Appendix A).

A1. *On the* ***Project Location Worksheet*** *enter the stream name, the watershed name (as per* ***Yukon Placer Fish Habitat Suitability Maps),*** *identify the watershed sensitivity and habitat suitability classification for the reaches you proposed to work in, determine if any reaches are designated as "prior development", provide a short description of the location, describe the proposed duration of activities and include a copy of a map of the specific location of the site.*

Once the sections noted above are completed on the ***Project Location Worksheet***, proceed to the next question.

Do you propose to discharge effluent from your mine site?

NO – Proceed to Step C, Riparian Zones.

YES - Proceed to Step B, Settling Pond Discharge.

B) Settling Pond Discharge (effluent concentration)

Point source sediment discharges from gold recovery processes are typically managed through the use of settling facilities. The action level approach is a key element of the risk-based approach to sediment management for Yukon placer mining. For more information on the action level approach or settling pond design, operation, recirculation systems, and settling pond reclamation refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

Water quality objectives and sediment discharge standards for High (ASC) suitability habitats are identified in the *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* for the specific watershed you propose to work in. Please verify your specific discharge standard in the respective watershed you plan to work in prior to proceeding with your application.

Discharge Standard (High (ASC)Habitat Suitability)	Requirement
Design Target	See Watershed Authorization
Action Level	See Watershed Authorization
Compliance Level	See Watershed Authorization

B1. *Record the Design Target, Action Level and Compliance Level on the* ***Project Location Worksheet*** *(Appendix A).*

Once the effluent discharge standards are recorded on the ***Project Location Worksheet*** proceed to the next question.

High Suitability Habitat (Areas of Special Consideration)

Do you propose to build a Seasonal, Temporary or Permanent diversion channel?

NO – Proceed to Step C, Riparian Zones.

YES – Proceed to Step D, Diversion Channels.

C) Riparian Zones

The Riparian Zone is defined as the portion of the stream bank (either vegetated or not) immediately adjacent to the stream channel.

The designated **Riparian Zone** in High (ASC) suitability habitats is **30 metres,** measured from the ordinary high water mark on each bank of the watercourse and following the shape of the channel.

The Riparian Zone designation applies to all High (ASC) suitability habitats. In the absence of a site-specific authorization from Fisheries and Oceans Canada, the only activity permitted within the Riparian Zone is the clearing of surface vegetation to create a corridor to provide access to the stream (typically for water acquisition purposes). The maximum width of the corridor is to be no more than **3 metres**. Riparian Zones must be staked out by the operator prior to development.

Do you propose to conduct surface or subsurface works in the Riparian Zone?

NO – Proceed to Step D, Diversion Channels.

YES – Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question.

Do you propose to clear surface vegetation only?

YES – Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question.

NO – Proceed to next question.

D) Diversion Channels

Construction of a diversion channel will be considered in High (ASC) suitability habitats on a case-by-case basis and will require a site-specific authorization issued from Fisheries and Oceans Canada. It is likely that stringent operating restrictions will likely be required in these areas. However, operators wishing to propose construction of a diversion channel in High (ASC) suitability habitats must first prepare a detailed design of the diversion channel, and a detailed fish habitat compensation plan and submit this detailed design to Fisheries and Oceans Canada for review. Each proposal will be reviewed on a case-by-case basis and it is likely that detailed dialogue will need to occur between the operator and Fisheries and Oceans Canada during the proposal review stage.

Ultimately, the proposal will need to clearly demonstrate how High (ASC) suitability habitat will be compensated for (via the creation of replacement habitat) in a manner that poses little to no risk to the fisheries resource. Operators are encouraged to contact Fisheries and Oceans Canada for more information prior to proceeding with the development of a proposal that involves channel diversion in High (ASC) suitability habitat.

Do you propose to use an Existing Ford?

NO – Proceed to next question.

YES – Proceed to Step E, Watercourse Crossings, then E1, Use of Existing Ford.

Do you propose to construct a new stream crossing (Ford)?

NO – Proceed to Step F, Water Acquisition.

YES – Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question.

E. Watercourse Crossings (Fords)

Fording is defined as the crossing of creeks, streams and / or rivers at locations where a bridge, causeway or elevated embankment does not exist or is not utilized by a vehicle or equipment. Fording typically involves driving directly through a watercourse, across the banks and bed. In some instances, Fording locations (*Fords*) have been "improved" or constructed through watercourses by way of adding materials such as rocks or gravel, the modification of approaches, or the modification of the bed of a watercourse.

E1. Use of Existing Ford

Use of existing Fords is often the least preferred option for crossing watercourses however it is recognized that there are instances where it is the only viable option. Refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* for additional information on Fords. The following measures should be adhered to when utilizing existing Fords.

NOTE – Use of existing Fords in High (ASC) suitability habitats may be restricted to certain times of year. Please identify if you intend to use existing Fords on the Project Location Worksheet (Appendix A) and contact Fisheries and Oceans Canada for more information on timing restrictions for existing Fords for the specific High (ASC) suitability habitat you plan cross.

- Ensure water depth is sufficiently shallow to allow passage of vehicle / equipment.
- Plan your activities in advance to minimize the number of crossings required.
- Avoid crossing during extreme rain or flood events.
- Access approaches at 90° to the bank, when entering or exiting the ford.
- Maintain speed at a very slow and steady pace throughout the crossing.
- Avoid rapid acceleration while on approaches or while in the water.

High Suitability Habitat (Areas of Special Consideration)

Do you propose to withdraw water from a High (ASC) habitat suitability watercourse?

NO – Proceed to Step G, In-stream Works.

YES – Proceed to Step F, Water Acquisition.

F. Water Acquisition

Acquisition of water is required for processing materials during placer mining. Effective water management is a key consideration at all placer mine sites. The following requirements must be achieved to meet compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

F1. Water Intake Screens

In order to meet the requirement of the *Fisheries Act*, all water intakes must be screened in accordance with requirements identified in the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines. A general summary of the guideline requirements are provided in the following table. For more information regarding fish screens, please refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* or for more specialized applications please refer to the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines (available online or through Fisheries and Oceans Canada).

General Guidelines for Intake Screens

Design Component (Fish Screens)	Requirement
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Screen Openings (Metric)	No less than 3.5 openings per lineal cm, with openings no greater than 3.2 mm along any given side of the screen. If a punch plate or similar material is used, openings no greater than 3.2 mm in length or width are permitted.
Screen Area (Imperial)	1 ft^2 of open screen area per 45 imperial / 55 US gallons per minute of water withdrawn is required.
Screen Area (Metric)	929 cm^2 of open screen area per 205 litres per minute of water withdrawn is required.

High Suitability Habitat (Areas of Special Consideration)

Note: the objective behind the installation of intake screens is to prevent the destruction of fish through the acquisition of water. If screens of the correct mesh size are deployed between a watercourse and the intake to a water reservoir or gravity feed ditch, it is not necessary to screen the pump intake that removes water from within these structures provided these structures do not already contain fish. In the case of total recirculation systems, the operator shall ensure that any areas where fish could enter the system have barriers to prevent the entry of fish (unless the pump intake is appropriately screened).

G. In-stream Works

In-stream works are defined as works that occur within the high water mark of a watercourse, but do not include diversion channels or fords. Some in-stream works can lead to effects on fish and fish habitat such as erosion/scouring, sediment inputs, loss of habitat area, changes in channel morphology, blockages to passage, and reduced productivity.

No physical works are permitted within a watercourse under the auspices of a watershed-based authorization in habitats of High suitability. Should in-stream works be contemplated in these areas, operators must apply to Fisheries and Oceans Canada for a site-specific review of proposed in-stream works prior to proceeding.

Fish Habitat Design, Operation, Reclamation Requirements for Moderate–High Habitat Suitability Watercourses

Fish Habitat Design, Operation, Reclamation Requirements for Moderate – High Habitat Suitability Watercourses

Moderate-high suitability habitats are defined as watercourses that are highly suitable for rearing juvenile Chinook salmon. Typically these watercourses provide locally desirably conditions for feeding, growth and development. These watercourses also provide habitats that are highly suitable for a broad range of adult and juvenile resident fish species.

Please use the following instructions and information to complete the worksheets relevant to your proposal (located in Appendix A to G). The completed worksheets will be submitted as part of your project description to Yukon Environmental and Socio Economic Assessment Board (YESAB) and your application to the Yukon Water Board (YWB).

Do you propose to undertake placer mining activities in or near a watercourse? Activities may include discharging effluent, constructing stream crossings, clearing riparian vegetation, constructing channel diversions, or withdrawing water.

NO – No further review pursuant to the *Fisheries Act* is required.

YES – Proceed to Step A, Identification of Project Location

A) Identification of Project Location

The first step in compiling a project proposal that involves activities proposed to occur in or around fish habitat areas involves completing the ***Project Location Worksheet*** (Appendix A).

A1. *On the Project Location Worksheet enter the stream name, the watershed name (as per **Yukon Placer Fish Habitat Suitability Maps**), identify the watershed sensitivity, and habitat suitability classification for the reaches you proposed to work in, if any reaches are designated as "prior development" a short description of the location, the proposed duration of activities and a copy of a map of the specific location of the site.*

Does the Previous Development designation apply to your project?

NO – Proceed to the next question.

YES – See below.

Historical Development

If your project falls within a "Historical Development" zone, the requirements for settling pond discharge, riparian zones, seasonal or temporary diversions, watercourse crossings, water acquisition and in-stream works that normally apply to Moderate-moderate suitability habitats will apply to your operation. **Please note that permanent diversion channels and all reclamation work must conform to the requirements for Moderate-high suitability habitats**.

Current Development or Extensive Development

If your project falls within a "Current Development" or "Extensive Development" zone, the requirements for settling pond discharge, riparian zones, seasonal or temporary diversions, watercourse crossings, water acquisition and in-stream works that normally apply to Moderate-low suitability habitats will apply to your operation. **Please note that permanent diversion channels and all reclamation work must conform to the requirements for Moderate-high suitability habitats**.

Once the sections noted above are completed on the ***Project Location Worksheet***, proceed to the next question.

Do you propose to discharge effluent from your mine site?

NO – Proceed to Step C, Riparian Zones.

YES - Proceed to Step B, Settling Pond Discharge.

B) Settling Pond Discharge (effluent concentration)

Point source sediment discharges from gold recovery processes are typically managed through the use of settling facilities. The action level approach is a key element of the risk-based approach to sediment management for Yukon placer mining. For more information on the action level approach or settling pond design, operation, recirculation systems, and settling pond reclamation refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

Water quality objectives and sediment discharge standards for settling ponds in Moderate-high suitability habitats are identified in the *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* for the specific watershed you propose to work in (general requirements summarized below). Please ensure to verify your specific discharge standard in the respective watershed you plan to work in (specifically if any exemptions exist) prior to proceeding with your application.

Discharge Standard (Moderate-High Suitability)	**Requirement**
Design Target	< 200 mg/l
Action Level	< 200 mg/l
Compliance Level	< 200 mg/l

B1. *Record the Design Target, Action Level and Compliance Level on the* ***Project Location Worksheet*** *(Appendix A).*

Once the effluent discharge standards are recorded on the ***Project Location Worksheet*** proceed to the next question.

Do you propose to build a Seasonal, Temporary or Permanent diversion channel?

NO – Proceed to Step C, Riparian Zones.

YES – Proceed to Step D, Diversion Channels.

C) Riparian Zones

The Riparian Zone is defined as the portion of the stream bank (either vegetated or not) immediately adjacent to the stream channel.

The designated **Riparian Zone** in Moderate-high habitats is **20 metres,** measured from the ordinary high water mark on each bank of the watercourse and following the shape of the channel.

The Riparian Zone designation applies to original (un-modified) channels, previously reclaimed channels and Permanent Diversion Channels.

Activities proposed within the Riparian Zone must comply with the following provisions (requirements of the watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*), or a site-specific authorization issued by DFO. In absence of compliance with either authorization, the only activity permitted within the Riparian Zone is the clearing of surface vegetation within a corridor to provide access to the stream (typically for water acquisition purposes). The maximum width of the corridor is to be no more than **3 metres**. Riparian Zones must be staked out by the operator prior to development.

Do you propose to conduct surface or subsurface works in the Riparian Zone?

NO – Proceed to Step D, Diversion Channels.

YES – Proceed to next question.

Do you propose to construct a new stream crossing (ford)?

NO – Proceed to next question.

YES – Review Step E, Watercourse Crossings, prior to proceeding to next question.

Do you propose to clear surface vegetation only?

YES – Proceed to Step C1, Surface Vegetation Clearing.

NO – The proposal includes both clearing of surface vegetation and subsurface works - Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question

C1. Surface Vegetation Clearing

If works or undertakings are proposed to occur within the Riparian Zone, refer to the conditions identified in the tables below and use the information to fill out the ***Riparian Zone / Bank Modification Worksheet*** (Appendix B).

C1a – *On the Riparian Zone / Bank Modification Worksheet record the maximum duration the proposed Vegetation Clearing will be in place (see table below).*

C1b – *Record the habitat suitability type where Vegetation Clearing in the Riparian Zone is proposed.*

C1c – *Record the length (in metres) of proposed Vegetation Clearing in the Riparian Zone (see table below for restrictions).*

C1d – *Record the width (in metres) of proposed Vegetation Clearing in the Riparian Zone (see table below for restrictions).*

C1e – *Record the width (in metres) of Vegetation Setback in the Riparian Zone (see table below).*

C1f – *Draw a diagram of the proposed location where clearing of the Riparian Zone is proposed (include north arrow, flow direction) (use symbols identified on worksheet to compose your diagram).*

C1g – *Record a description of the required reclamation works (see table below).*

Conditions and reclamation required when proposing surface **Vegetation Clearing** in Riparian Zones in Moderate-high suitability habitats.

Design Component (Vegetation Clearing)	**Requirement**
Minimum Vegetated Setback from Stream	5.0 metres
Maximum Length of Clearing	100 metres
Minimum Space Between Cleared Areas	500 metres
Maximum Duration Prior to Reclamation	5 years
Reclamation Requirement (surface)	Full topsoil coverage
Reclamation Requirement (vegetation)	30% live staking

Do you propose a Seasonal, Temporary or Permanent relocation of a channel?

NO – Proceed to step E, Watercourse Crossings.

YES – Proceed to step D, Diversion Channels.

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D) Diversion Channels

Design and construction of a diversion channel is required if the proposal includes *Seasonal*, *Temporary* or *Permanent* relocation of a water course or channel. It is the responsibility of the applicant to ensure that when transferring water into a diversion channel, it is completed in such a manner as to avoid stranding of fish in the dewatered channel. If it is likely that stranding of fish will occur in a dewatered channel, the applicant should retain a qualified professional to conduct a fish salvage prior to dewatering the channel. More information on fish salvage requirements is available from Fisheries and Oceans Canada.

Provided the diversion channel design proposal meets the conditions identified in the following sections, the diversion channel may be constructed pursuant to the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat.* Specific criteria related to channel design and restoration requirements are described in the following sections while general information regarding design, construction and reclamation of diversion channels is provided in the *Guidebook of Mitigation Measures for Yukon Placer Mining.*If you are unable to achieve the requirements described in the following sections you are required to submit your proposal to DFO for site-specific review and authorization prior to proceeding.

D1. Original Channel and Site Parameters Worksheet

On the ***Original Channel and Site Parameters Worksheet*** *(Appendix C), record the information for the original channel (pre-diversion conditions). Refer to guidebook reference sections identified on the worksheet to assist you with the data collection and entry process.*

Note – The above worksheet must be completed prior to proceeding with the following steps.

Do you propose a Seasonal relocation of a channel? *(A Seasonal Channel is in place for a period of less than one year and is replaced before winter).*

YES – Not permitted in Moderate-high suitability habitat. Proceed to next question.

NO – Proceed to next question.

Do you propose a *Temporary* relocation of a channel? *(A Temporary Channel is in place for a period of less than five years).*

YES – Not permitted in Moderate-high suitability habitat. Proceed to next question.

NO – Proceed to next question.

Do you propose a *Permanent* relocation of a channel? *(A Permanent Channel is in place for a period of five years or more).*

YES – Proceed to Step D4, Permanent Diversion Channels.

NO – Proceed to next question.

D4. Permanent Diversion Channels

Permanent diversion channels are defined as a constructed channel that will convey stream flow for a period of over five years. All permanent diversion channels must include provisions for construction of fish habitat features. Refer to the channel design considerations in the guidebook for more information on permanent diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3), the ***Channel Design Method Worksheet*** (Appendix E) and the ***Fish Habitat Features Worksheet*** (Appendix F) for your Permanent Diversion Channel to YESAB and the YWB.

Note – Flood design interval for Permanent Diversion Channels in Moderate-high suitability habitat is 1:50.

D4a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

D4b. *On the* ***Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D4c. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

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D4d. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

The following tables identify design restrictions and fish habitat reclamation requirements for Permanent Diversion Channels which must be incorporated to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design Restrictions for Permanent Diversion Channels

Design Component (Permanent Diversion)	**Criteria**
Overall length of diversion channel*	< 500 m
Conveyance (flood design) capacity	1:50
Channel design	As per channel design worksheets
Fish Habitat Features	As per reclamation tables

Note – in the next step you will need to refer to the *Original Channel and Site Parameters Worksheet (Appendix C)* in order to select the appropriate category of the original channel type (Pool-riffle, Dune-riffle, Plane-bed, Step-pool or Cascade Channel). For more information on channel types see the *Guidebook of Mitigation Measures for Yukon Placer Mining*.

Construction and Reclamation Requirements for Permanent Diversion Channels

Pool-riffle / **Dune-riffle** and **Plane-bed** channel type.

Fish Habitat Features	**Spacing Requirements** (multiply the number in this column by the width of the channel in metres)
Rock Island (channel width < 5m)	5
Boulder Grouping (channel width > 5m)	3
Anchored or Buried trees	10
Top Soil Spreading	Continuous (both banks)
Willow staking	Continuous (both banks)
Transplanting	At sharp bends
Rip-rap	Based on channel design method

Note - Topsoil spreading is to occur for the full width of the Riparian Zone (20 metres), willow planting is to be completed to a width of 5 metres from the bank, Willow planting / Transplanting is not required for the floodplain design method.

Moderate–High Habitat Suitability

Construction and Reclamation Requirements for Permanent Diversion Channels.

Step-pool and **Cascade Channel** type

Fish Habitat Feature	Spacing Requirements (multiply the number in this column by the width of the channel in metres)
Rock Island (channel width < 5m)	4
Boulder Grouping (channel width > 5m)	3
Anchored or Buried trees	8
Top Soil Spreading	Continuous (both banks)
Willow Staking	Continuous (both banks)
Transplanting	At sharp bends only
Rip-rap	Based on channel design method

Note - Topsoil spreading is to occur for the full width of the Riparian Zone (20 metres), willow planting is to be completed to a width of 5 metres from the bank, Willow Staking / Transplanting is not required for the floodplain design method.

D4e. *Use the information above to complete the **Fish Habitat Feature Worksheet** (Appendix F) to identify the type, spacing and relative location of the fish habitat features. Draw a diagram of the diversion channel (include north arrow, flow direction and reclaimed Riparian Zone) (use symbols identified on worksheet to compose your diagram).*

Once the ***Fish Habitat Feature Worksheet*** is completed, proceed to the next question.

Do you propose to use an Existing Ford?

NO – Proceed to next question.

YES – Proceed to Step E, Watercourse Crossings, then E1, Use of Existing Ford.

Do you propose to construct a New Ford?

NO – Proceed to Step F, Water Acquisition.

YES – Not permitted without a site-specific authorization from Fisheries and Oceans Canada. Proceed to next question.

E. Watercourse Crossings (Fords)

Fording is defined as the crossing of creeks, streams and / or rivers at locations where a bridge, causeway or elevated embankment does not exist or is not utilized by a vehicle or equipment. Fording typically involves driving directly through a watercourse, across the banks and bed. In some instances, Fording locations (*Fords*) have been "improved" or constructed through watercourses by way of adding materials such as rocks or gravel, the modification of approaches, or the modification of the bed of a watercourse.

Moderate–High Habitat Suitability

E1. Use of Existing Ford

Use of existing Fords is often the least preferred option for crossing watercourses however it is recognized that there are instances where it is the only viable option. Refer to the guidebook for additional information on Fords. The following measures should be adhered to when utilizing existing Fords.

NOTE – Please identify if you intend to use Existing Fords on the Project Location Worksheet (Appendix A).

- Ensure water depth is sufficiently shallow to allow passage of vehicles / equipment.
- Plan your activities in advance to minimize the number of crossings required.
- Avoid crossing during extreme rain or flood events.
- Access approaches at 90° to the bank, when entering or exiting the ford.
- Maintain speed at a very slow and steady pace throughout the crossing.
- Avoid rapid acceleration while on approaches or while in the water.

Do you propose to withdraw water from a Moderate-high habitat suitability watercourse?

NO – Proceed to Step G, In-stream Works.

YES – Proceed to Step F, Water Acquisition.

F. Water Acquisition

Acquisition of water is required for processing materials during placer mining. Effective water management is a key consideration at all placer mine sites. The following requirements must be achieved to meet compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

F1. Water Intake Screens

In order to meet the requirements of the *Fisheries Act*, all water intakes must be screened in accordance with requirements identified in the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines. A general summary of the guideline requirements are provided in the following table. For more information regarding fish screens, please refer to the guidebook or for more specialized applications please refer to the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines (available online or through Fisheries and Oceans Canada).

General Guidelines for Intake Screens

Design Component (Fish Screens)	Requirement
Screen Openings (Imperial)	No less than 8 openings per lineal inch, with openings no greater than 1/8 inch along any given side of the screen. If a punch plate or similar material is used, openings no greater than 1/8 inches in length or width are permitted.
Screen Openings (Metric)	No less than 3.5 openings per lineal cm, with openings no greater than 3.2 mm along any given side of the screen. If a punch plate or similar material is used, openings no greater than 3.2 mm in length or width are permitted.
Screen Area (Imperial)	1 ft^2 of open screen area per 45 imperial / 55 US gallons per minute of water withdrawn is required.
Screen Area (Metric)	929 cm^2 of open screen area per 205 litres per minute of water withdrawn is required.

Note: the objective behind the installation of intake screens is to prevent the destruction of fish through the acquisition of water. If screens of the correct mesh size are deployed between a watercourse and the intake to a water reservoir or gravity feed ditch, it is not necessary to screen the pump intake that removes water from within these structures provided these structures do not already contain fish. In the case of total recirculation systems, the operator shall ensure that any areas where fish could enter the system have barriers to prevent the entry of fish (unless the pump intake is appropriately screened).

G. In-stream Works

In-stream works are defined as works that occur within the high water mark of a watercourse, but do not include diversion channels or fords. Some in-stream works can lead to effects on fish and fish habitat such as erosion/scouring, sediment inputs, loss of habitat area, changes in channel morphology, blockages to passage, and reduced productivity.

Do you propose to carry out in-stream works within a watercourse? In-stream works may include small dugouts or wing dams to facilitate water acquisition, in-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds.

NO – Review complete – proceed with submission of all completed worksheets along with your project description to YESAB and your application for water use license to YWB.

YES – Proceed to Step G1, Severity of Effects Assessment.

G1 - Severity of Effects Assessment and Risk Management Decisions for In-stream Works

Habitats of Moderate-High Suitability

In-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds are not authorized under the auspices of a watershed-based authorization in habitats of Moderate-high suitability.

Certain physical works that pose a low risk to fish and fish habitat are authorized under watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* in habitats of Moderate-high suitability provided that design conditions are met. In-stream works permitted are limited to the construction of small dugouts or wing dams to facilitate water acquisition.

The following table is to be used to evaluate the risk of proposed in-stream works in Moderate-high suitability habitats. The design elements of the proposed works must achieve a risk score of no higher than the maximum risk score identified to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

The maximum permitted score in this habitat suitability zone is twelve.

Design Component	Range	Risk Score
Channel Width Construction	>30% channel constriction 5% - 30% of the channel < 5%	N/A 2 1
Above and Below the Structure – Difference in Water Surface Level	>2.0 m 0.3 – 2.0 m < 0.3 m	N/A 2 1
Material Type	Fine (silt-sand) Compactable (fine gravel and sand) Metal/ riprap/ structure	N/A 2 1
Construction Method	Moderately compacted/ placement Compacted shallow lift (or rip-rap, gabions, or boulders)	2 1
Amount of In-water Work	Completely in water Partially in water (more than ½) In dry	3 2 1
Structure Height	Above bank full Between bank full and channel bed Below channel bed	3 2 1
MAXIMUM PERMITTED SCORE FOR IN-STREAM WORKS		**12**

G1. *Calculate your total score and maximum permitted score on the* ***Severity of Effects Assessment for In-stream Works Worksheet (****Appendix G1), and record details of proposed in-stream works on the* ***In-stream Works Worksheet*** *(Appendix G2). Proceed with submission of proposal.*

Moderate–High Habitat Suitability

Fish Habitat Design, Operation, Reclamation Requirements for Moderate–Moderate Habitat Suitability Watercourses (Includes Tributaries to Small Lakes)

Fish Habitat Design, Operation, Reclamation Requirements for Moderate – Moderate Habitat Suitability Watercourses (includes Tributaries to Small Lakes)

Moderate-moderate suitability habitats are defined as watercourses that are suitable for rearing juvenile Chinook salmon, although the habitat parameters and conditions are not as restricted as Moderate-high suitability habitats within the watershed. These watercourses are also highly suitable for a broad range of adult and juvenile resident fish species.

Please use the following instructions and information to complete the worksheets relevant to your proposal (located in Appendix A to G). The completed worksheets will be submitted as part of your project description to Yukon Environmental and Socio Economic Assessment Board (YESAB) and your application to the Yukon Water Board (YWB).

Do you propose to undertake placer mining activities in or near a watercourse? Activities may include discharging effluent, constructing stream crossings, clearing riparian vegetation, constructing channel diversions, or withdrawing water.

NO – No further review pursuant to the *Fisheries Act* is required.

YES – Proceed to Step A, Identification of Project Location

A) Identification of Project Location

The first step in compiling a project proposal that involves activities proposed to occur in or around fish habitat areas is the completion of the ***Project Location Worksheet*** (Appendix A).

A1. *On the Project Location Worksheet enter the stream name, the watershed name (as per* ***Yukon Placer Fish Habitat Suitability Maps),*** *identify the watershed sensitivity, and habitat suitability classification for the reaches you proposed to work in, if any reaches are designated as "prior development" a short description of the location, the proposed duration of activities and a copy of a map of the specific location of the site.*

Does the Previous Development designation apply to your project?

NO – Proceed to the next question.

YES – See below.

Historical Development

If your project falls within a "Historical Development" zone, the requirements for settling pond discharge, riparian zones, seasonal or temporary diversions, watercourse crossings, water acquisition and in-stream works that normally apply to Moderate-low suitability habitats will apply to your operation. **Please note that permanent diversion channels and all reclamation work must conform to the requirements for Moderate-moderate suitability habitats**.

Current Development or Extensive Development

If your project falls within a "Current Development" or "Extensive Development" zone, the requirements for settling pond discharge, riparian zones, seasonal or temporary diversions, watercourse crossings, water acquisition and in-stream works that normally apply to Low Habitat Suitability will apply to your operation. **Please note that permanent diversion channels and all reclamation work must conform to the requirements for Moderate-moderate suitability habitats**.

Once the sections noted above are complete in the ***Project Location Worksheet***, proceed to the next question.

Do you propose to discharge effluent from your mine site?

NO – Proceed to Step C, Riparian Zones.

YES - Proceed to Step B, Settling Pond Discharge.

B) Settling Pond Discharge (effluent concentration)

Point source sediment discharges from gold recovery processes are typically managed through the use of settling facilities. The action level approach is a key element of the risk-based approach to sediment management for Yukon placer mining. For more information on the action level approach or settling pond design, operation, recirculation systems, and settling pond reclamation refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

Water quality objectives and sediment discharge standards for settling ponds in Moderate-moderate suitability habitats are specified in the *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* for the specific watershed you propose to work in (general requirements summarized below). Please ensure to verify your specific discharge standard in the respective watershed you plan to work in (specifically if any exemptions exist) prior to proceeding with your application.

Discharge Standard (Category A, Moderate-Moderate and Tributaries to Small Lakes)	**Requirement**
Design Target	200 mg/L
Action Level	200 mg/L
Compliance Level	200 mg/L

Discharge Standard (Category B, Moderate-Moderate)	**Requirement**
Design Target	0.2 ml/L
Action Level	0.4 ml/L
Compliance Level	0.8 ml/L

B1. *Record the Design Target, Action Level and Compliance Level on the* ***Project Location Worksheet*** *(Appendix A).*

Once the effluent discharge standards are recorded on the ***Project Location Worksheet*** proceed to the next question.

Do you propose to build a Seasonal, Temporary or Permanent diversion channel?

NO – Proceed to Step C, Riparian Zones.

YES – Proceed to Step D, Diversion Channels.

C) Riparian Zones

The Riparian Zone is defined as the portion of the stream bank (either vegetated or not) immediately adjacent to the stream channel.

The designated **Riparian Zone** in Moderate-moderate habitats is **10 metres,** measured from the ordinary high water mark on each bank of the watercourse and following the shape of the channel.

The Riparian Zone designation applies to original (un-modified) channels, previously reclaimed channels and Permanent Diversion Channels. The Riparian Zone provisions set out below are not required for Seasonal or Temporary Diversion Channels.

Activities proposed within the Riparian Zone must comply with the following provisions (requirements of the watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*), or a site-specific authorization issued by DFO. In absence of compliance with either authorization, the only activity permitted within the Riparian Zone is the clearing of surface vegetation within a corridor to provide access to the stream (typically for water acquisition purposes). The maximum width of the corridor is to be no more than **5 metres**. Riparian Zones must be staked out by the operator prior to development.

Do you propose to conduct surface or subsurface works in the Riparian Zone?

NO – Proceed to Step D, Diversion Channels.

YES – Proceed to next question.

Do you propose to construct a new stream crossing (ford)?

NO – Proceed to next question.

YES – Review Step E, Watercourse Crossings, prior to proceeding to next question.

Do you propose to clear surface vegetation only?

YES – Proceed to Step C1, Surface Vegetation Clearing.

NO – The proposal includes both clearing of surface vegetation and subsurface works, proceed to Step C1, Surface Vegetation Clearing, followed by C2, Bank Modification.

C1. Surface Vegetation Clearing

If works or undertakings are proposed to occur within the Riparian Zone, refer to the conditions identified in the tables below and use the information to fill out the ***Riparian Zone / Bank Modification Worksheet*** (Appendix B).

C1a – *On the Riparian Zone / Bank Modification Worksheet record the maximum duration the proposed Vegetation Clearing will be in place (see table below).*

C1b – *Record the habitat suitability type where Vegetation Clearing in the Riparian Zone is proposed.*

C1c – *Record the length (in metres) of proposed Vegetation Clearing in the Riparian Zone (see table below for restrictions).*

C1d – *Record the width (in metres) of proposed Vegetation Clearing in the Riparian Zone (see table below for restrictions).*

C1e – *Record the width (in metres) of Vegetation Setback in the Riparian Zone (see table below).*

C1f – *Draw a diagram of the proposed location where clearing of the Riparian Zone is proposed (include north arrow, flow direction) (use symbols identified on worksheet to compose your diagram).*

C1g – *Record a description of the required reclamation works (see table below).*

Conditions and reclamation required when proposing surface **Vegetation Clearing** in Riparian Zones in Moderate-moderate suitability habitats.

Design Component (Vegetation Clearing)	**Requirement**
Minimum Vegetated Setback from Stream	3.0 metres
Maximum Length of Clearing	200 metres
Minimum Space Between Cleared Areas	300 metres
Maximum Duration Prior to Reclamation	5 years
Reclamation Requirement (surface)	Full topsoil coverage
Reclamation Requirement (vegetation)	30% live staking

If proposing bank modification activities, proceed to step C2.

Moderate–Moderate Habitat Suitability (Includes Tributaries to Small Lakes)

C2. Bank Modification

If works or undertakings are proposed to occur within the Riparian Zone, refer to the conditions identified in the tables below and use the information to further fill out the ***Riparian Zone / Bank Modification Worksheet*** (Appendix B).

Conditions related to subsurface **Bank Modification** in Riparian Zones authorized in Moderate-moderate habitats.

Note - If your proposal includes bank modification related to the construction of a ford, see step E for design conditions and requirements prior to proceeding to step C2a.

C2a – *On the **Riparian Zone / Bank Modification Worksheet** enter length (in metres) of the proposed Bank Modification in the Riparian Zone (see table below for restrictions).*

C2b – *Record the width (in metres) of proposed Bank Modification (see table below).*

C2c – *Record the width (in metres) of the Bank Setback (see table below).*

C2e – *Draw a diagram of the proposed location of the Bank Modification (use symbols identified on worksheet to compose your diagram).*

C2f – *Draw the location of any new fords proposed (see step E for restrictions)*

C2g – *Record a description of the required reclamation works (see table below).*

Conditions and reclamation requirements when proposing Bank Modification in Riparian Zones in Moderate-moderate Habitats

Design Component (Bank Modification)	**Requirement**
Minimum Bank Setback From Stream	5.0 metres
Maximum Width of Excavation	50 metres
Minimum Width Between Bank Modification Areas	300 metres
Maximum Duration Prior to Reclamation	5 years
Reclamation Requirement (grading)	To pre-excavation grade
Reclamation Requirement (surface)	Full topsoil coverage
Reclamation Requirement (vegetation)	30% live staking

Note – The "Minimum Bank Setback From Stream" provision identified above does <u>not</u> apply to the construction of watercourse crossings (fords). If your proposal includes the construction of a ford, please see step E.

Once the ***Riparian Zone / Bank Modification Worksheet*** is completed, proceed to the next question.

Moderate–Moderate Habitat Suitability (Includes Tributaries to Small Lakes)

Do you propose a Seasonal, Temporary or Permanent relocation of a channel?

NO – Proceed to step E, Watercourse Crossings.

YES – Proceed to step D, Diversion Channels.

D) Diversion Channels

Design and construction of a diversion channel is required if the proposal includes *Seasonal*, *Temporary* or *Permanent* relocation of a water course or channel. It is the responsibility of the applicant to ensure that when transferring water into a diversion channel, it is completed in such a manner as to avoid stranding of fish in the dewatered channel. If it is likely that stranding of fish will occur in a dewatered channel, the applicant should retain a qualified professional to conduct a fish salvage prior to dewatering the channel. More information on fish salvage requirements is available from Fisheries and Oceans Canada.

Provided the diversion channel design proposal meets the conditions identified in the following sections, the diversion channel may be constructed pursuant to the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat.* Specific criteria related to channel design and restoration requirements are described in the following sections while general information regarding design, construction and reclamation of diversion channels is provided in the *Guidebook of Mitigation Measures for Yukon Placer Mining*.

In order for a diversion channel to meet the requirements of the watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*, you must ensure that your proposed channel design achieves a total risk score of less than or equal to the maximum risk score threshold identified on the following Risk Scoring Tables. If your design exceeds this score you may wish to redesign your proposed channel in order to meet the maximum risk score, thus meeting the requirements of the authorization. If you are unable to meet the maximum risk score you are required to submit your proposal to Fisheries and Oceans Canada for site-specific review and authorization prior to proceeding.

D1. Original Channel and Site Parameters Worksheet

*On the **Original Channel and Site Parameters Worksheet** (Appendix C), record the information for the original channel (pre-diversion conditions). Refer to guidebook reference sections identified on the worksheet to assist you with the data collection and entry process.*

Note – The above worksheet must be completed prior to proceeding with the following steps.

***Do you propose a Seasonal relocation of a channel?** (A Seasonal Channel is in place for a period of less than one year and is replaced before winter).*

YES – Not permitted in Moderate-moderate suitability habitat. Proceed to next question.

NO – Proceed to next question.

Do you propose a *Temporary* relocation of a channel? *(A Temporary Channel is in place for a period of less than five years).*

YES – Proceed to Step D3, Temporary Diversion Channels.

NO – Proceed to next question.

Do you propose a *Permanent* relocation of a channel? *(A Permanent Channel is in place for a period of five years or more).*

NO – Proceed to next question.

YES – Proceed to Step D4, Permanent Diversion Channels.

D3. *Temporary Diversion Channels*

Temporary diversion channels are in Moderate-moderate suitability habitats are defined as a constructed channel that will convey stream flow for a period of less than five years. Although not required, construction of fish habitat features may be incorporated in the channel design to reduce the overall risk score. To achieve this condition the channel must incorporate the required fish habitat features (based on channel configuration). Refer to the channel design considerations in the guidebook for more information on temporary diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3) and the ***Channel Design Method Worksheet*** (Appendix E) for your Temporary Diversion Channel to YESAB and the YWB.

Note – The Riparian Zone provisions do not apply to Temporary Diversion Channels.

Note – Flood design interval for Temporary Diversion Channels in Moderate-moderate Habitat is 1:10.

D3a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

D3b. *On the* ***Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D3c. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

Moderate–Moderate Habitat Suitability (Includes Tributaries to Small Lakes)

D3d. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

The following table is to be used when designing Temporary Diversion Channels. The channel design proposed must achieve a risk score of no higher than the maximum risk score identified to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Severity of Effects Assessment for Temporary Diversion Channels

Design Component (Temporary Diversion)	Range	Risk Score
Channel Gradient	3.51% to 5.0%	N/A
	1.51% to 3.5%	2
	0 to 1.5%	1
Length of diversion channel	1000 m to 2000 m	3
	500m to 1000 m	2
	<500 m	1
Relative length of diversion channel	Shorter than original	1
	Equal or Longer than original	0
Permafrost in diversion channel	Present	N/A
	Absent	0
Primary material in diversion channel	Silt / Sand	2
	Gravel / Cobble / Bedrock	1
Location of diversion channel	Perched (valley wall)	N/A
	Confined (valley floor)	2
	Incised (valley floor)	1
Fish habitat features (rock islands / boulder groupings only)	50% of total required for permanent channel	-1
Maximum Permitted Score for Temporary Diversion Channels		**7**

D3e. *Calculate your total score and maximum permitted score on the* ***Severity of Effects Assessment for Temporary Diversion Channel Worksheet (****Appendix D2), and* record your total score on line 2 of the **Channel** ***Design Flood Estimate Worksheet*** *(Appendix D3).*

D3f. Fish Habitat Features

If you have included Fish Habitat Features in your proposed Temporary Diversion Channel you must select the appropriate spacing of features based on the Channel Type identified on the ***Original Channel and Site Parameters Worksheet***. Refer to the fish habitat feature considerations in the guidebook for more information. Use the following tables as a guide to fill out information requirements in the ***Fish Habitat Feature Worksheet*** (Appendix F).

Moderate–Moderate Habitat Suitability (Includes Tributaries to Small Lakes)

Fish Habitat Reclamation Requirements for Temporary Diversion Channels

Pool-riffle / Dune-riffle and **Plane-bed** channel type

Select Fish Habitat Feature Based on Diversion Channel Width	Spacing Requirements (place feature every X channel width)
Rock Island (channel width < 5m)	12
Boulder Grouping (channel width > 5m)	10
Rip-rap	Based on channel design method

Step-pool and **Cascade** channel type

Select Fish Habitat Feature Based on Diversion Channel Width	Spacing Requirements (place feature every X channel width)
Rock Island (channel width < 5m)	8
Boulder Grouping (channel width > 5m)	6
Rip-rap	Based on channel design method

D3g. *Enter the required information on the **Fish Habitat Feature Worksheet** (Appendix F) to identify the type, spacing and relative location of the fish habitat features. Draw a diagram of the diversion channel (include north arrow, flow direction) (use symbols identified on worksheet to compose your diagram).*

Note – If your Temporary Diversion Channel includes fish habitat features, and you propose to construct a crossing (new ford) be sure to identify the location of the ford on the *Fish Habitat Features Worksheet* (see step E2).

Proceed to following steps if: D4, constructing a *Permanent Diversion Channel.*
E, proposing to construct a new stream crossing.
F, proposing to acquire water.

D4. Permanent Diversion Channels

Permanent diversion channels are defined as a constructed channel that will convey stream flow for a period of over five years. All permanent diversion channels must include provisions for construction of fish habitat features. Refer to the channel design considerations in the *Guidebook of Mitigation Measures for Yukon Placer Mining* for more information on permanent diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3), the ***Channel Design Method Worksheet*** (Appendix E) and the ***Fish Habitat Features Worksheet*** (Appendix F) for your Permanent Diversion Channel to YESAB and the YWB.

Note – Flood design interval for Permanent Diversion Channels in Moderate-moderate Habitat is 1:20.

D4a. O*n the **Channel Design Flood Estimate Worksheet** (Appendix D3), enter the flood design interval (line 1).*

D4b. *On the **Design Flood Estimate Worksheet** (Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed **Design Flood Estimate Worksheet** with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D4c. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

D4d. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

The following tables identify design restrictions and fish habitat reclamation requirements for Permanent Diversion Channels which must be incorporated to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design Restrictions for Permanent Diversion Channels

Design Component (Permanent Diversion)	**Criteria**
Overall length of diversion channel	< 2000 m
Conveyance (flood design) capacity	1:20
Channel design	As per channel design worksheets
Fish Habitat Features	As per reclamation tables

Note – in the next step you will need to refer to the *Original Channel and Site Parameters Worksheet (Appendix C)* in order to select the appropriate category of the original channel type (Pool-riffle, Dune-riffle, Plane-bed, Step-pool or Cascade Channel). For more information on channel types see the *Guidebook of Mitigation Measures for Yukon Placer Mining*.

Construction and Reclamation Requirements for Permanent Diversion Channels

Pool-riffle / **Dune-riffle** and **Plane-bed** channel type.

Fish Habitat Features	**Spacing Requirements** (multiply the number in this column by the width of the channel in metres)
Rock Island (channel width < 5m)	5
Boulder Grouping (channel width > 5m)	4
Anchored or Buried trees	14
Top Soil Spreading	Continuous (both banks)
Willow Staking	Inside bank, all meander bends
Transplanting	At sharp bends
Rip-rap	Based on channel design method

Note - Topsoil spreading is to occur for the full width of the Riparian Zone (10 metres), willow staking is to be completed to a width of 3 metres from the bank, willow staking / Transplanting is not required for the floodplain design method.

Construction and Reclamation Requirements for Permanent Diversion Channels

Step-pool and **Cascade Channel** type

Fish Habitat Feature	**Spacing Requirements** (multiply the number in this column by the width of the channel in metres)
Rock Island (channel width < 5m)	5
Boulder Grouping (channel width > 5m)	3
Anchored or Buried trees	12
Top Soil Spreading	Continuous (both banks)
Willow staking	Inside bank, all meander bends
Transplanting	At sharp bends
Rip-rap	Based on channel design method

Note - Topsoil spreading is to occur for the full width of the Riparian Zone (10 metres), willow staking is to be completed to a width of 3 metres from the bank, willow staking / Transplanting is not required for the floodplain design method.

D4e. *Use the information above to complete the **Fish Habitat Feature Worksheet** (Appendix F) to identify the type, spacing and relative location of the fish habitat features. Draw a diagram of the diversion channel (include north arrow, flow direction and reclaimed Riparian Zone) (use symbols identified on worksheet to compose your diagram).*

Note – If you propose to construct a crossing (new ford) be sure to identify the location of the ford on the *Fish Habitat Feature Worksheet* (see section E2).

Once the ***Fish Habitat Feature Worksheet*** is completed, proceed to the next question.

Do you propose to use an Existing Ford?

NO – Proceed to next question.

YES – Proceed to Step E, Watercourse Crossings, then E1, Use of Existing Ford.

Do you propose to construct a New Ford?

NO – Proceed to Step F, Water Acquisition.

YES – Proceed to Step E, Watercourse Crossings.

E. Watercourse Crossings (Fords)

Fording is defined as the crossing of creeks, streams and / or rivers at locations where a bridge, causeway or elevated embankment does not exist or is not utilized by a vehicle or equipment. Fording typically involves driving directly through a watercourse, across the banks and bed. In some instances, Fording locations (*Fords*) have been "improved" or constructed through watercourses by way of adding materials such as rocks or gravel, the modification of approaches, or the modification of the bed of a watercourse.

E1. Use of Existing Ford

Use of existing Fords is often the least preferred option for crossing watercourses however it is recognized that there are instances where it is the only viable option. Refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* for additional information on Fords. The following measures should be adhered to when utilizing existing Fords.

NOTE – Please identify if you intend to use Existing Fords on the Project Location Worksheet (Appendix A).

- Ensure water depth is sufficiently shallow to allow passage of vehicle / equipment.
- Plan your activities in advance to minimize the number of crossings required.
- Avoid crossing during extreme rain or flood events.
- Access approaches at 90° to the bank, when entering or exiting the ford.
- Maintain speed at a very slow and steady pace throughout the crossing.
- Avoid rapid acceleration while on approaches or while in the water.

E2. Construction of New Fords

Construction of new Fords should be limited to locations or applications where deemed to be absolutely necessary. More permanent or high use locations should employ the construction and use of a bridge as the primary crossing structure where possible. For more information on construction of stream crossings refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining*.

The location of new Fords must be identified when proposed for original channels, Temporary Channels (with Fish Habitat Features), and Permanent Diversion Channels. The new ford proposed must achieve the design, construction and reclamation requirements identified in the table below to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design and Construction Restrictions and Reclamation Requirements for New Fords

Design Component (Construction of new Ford)	**Requirement**
Approach angle	90° to bank
Maximum width of approach zone clearing (surface)	7 metres
Minimum watercourse distance between Ford sites or Not to exceed more than	2000 metres 2 fords every 4000 metres
Site Selection (Watercourse)	Shallow Water Depth

Site Selection (Approach / Bank Composition)	Gravel / Cobble
Construction	Equipment to Work from Bank
Maximum width of bank grading (subsurface)	7 metres
Approach surface ground coverage	Gravel / Cobble
Construction timing	Low Water Period
Reclamation	Full Topsoil Coverage and Willow staking

E2a. *If the construction of a new ford is proposed for an original channel or previously restored channel, identify the location of the new ford(s) on the* ***Riparian Zone / Bank Modification Worksheet*** *(see step C, Riparian Zones and Appendix B).*

E2b. *If the construction of a new ford is proposed for a Temporary Diversion Channel (with fish habitat features) or a Permanent Diversion Channel, identify the location of the new ford(s) on the* ***Fish Habitat Feature Worksheet*** *(see step D3d or D4b and Appendix F).*

Once the location and specification of the new ford is identified on either the completed ***Riparian Zone / Bank Modification Worksheet*** *or the* ***Fish Habitat Feature Worksheet*** proceed to the next question.

Do you propose to withdraw water from a Moderate-moderate habitat suitability watercourse?

NO – Proceed to Step G, In-stream Works.

YES – Proceed to Step F, Water Acquisition.

F. Water Acquisition

Acquisition of water is required for processing materials during placer mining. Effective water management is a key consideration at all placer mine sites. The following requirements must be achieved to meet compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

F1. Water Intake Screens

In order to meet the requirement of the *Fisheries Act*, all water intakes must be screened in accordance with requirements identified in the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines. A general summary of the guideline requirements are provided in the following table. For more information regarding fish screens, please refer to the guidebook or for more specialized applications please refer to the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines (available online or through Fisheries and Oceans Canada).

General Guidelines for Intake Screens

Design Component (Fish Screens)	Requirement
Screen Openings (Imperial)	No less than 8 openings per lineal inch, with openings no greater than 1/8 inch along any given side of the screen. If a punch plate or similar material is used, openings no greater than 1/8 inch in length or width are permitted.
Screen Openings (Metric)	No less than 3.5 openings per lineal cm, with openings no greater than 3.2 mm along any given side of the screen. If a punch plate or similar material is used, openings no greater than 3.2 mm in length or width are permitted.
Screen Area (Imperial)	1 ft^2 of open screen area per 45 imperial / 55 US gallons per minute of water withdrawn is required.
Screen Area (Metric)	929 cm^2 of open screen area per 205 litres per minute of water withdrawn is required.

Note: the objective behind the installation of intake screens is to prevent the destruction of fish through the acquisition of water. If screens of the correct mesh size are deployed between a watercourse and the intake to a water reservoir or gravity feed ditch, it is not necessary to screen the pump intake that removes water from within these structures provided these structures do not already contain fish. In the case of total recirculation systems, the operator shall ensure that any areas where fish could enter the system have barriers to prevent the entry of fish (unless the pump intake is appropriately screened).

Do you propose to carry out in-stream works within a watercourse? In-stream works may include small dugouts or wing dams to facilitate water acquisition, in-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds.

NO – Proceed to next question.

YES – Proceed to Step G, In-stream Works.

G. In-stream Works

In-stream works are defined as works that occur within the high water mark of a watercourse, but do not include diversion channels or fords. Some in-stream works can lead to effects on fish and fish habitat such as erosion/scouring, sediment inputs, loss of habitat area, changes in channel morphology, blockages to passage, and reduced productivity.

Do you propose to carry out in-stream works within a watercourse? In-stream works may include small dugouts or wing dams to facilitate water acquisition, in-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds.

NO – Review complete – proceed with submission of all completed worksheets along with your project description to YESAB and your application for water use license to YWB.

YES – Proceed to Step G1, Severity of Effects Assessment.

G1 - Severity of Effects Assessment and Risk Management Decisions for In-stream Works

Habitats of Moderate-Moderate Suitability

In-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds are not authorized under the auspices of a watershed-based authorization in habitats of Moderate-moderate suitability.

Certain physical works that pose a low risk to fish and fish habitat are authorized under watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* in habitats of Moderate-moderate suitability provided that design conditions are met. Physical works authorized are limited to the construction of a small dugouts or wing dams to facilitate water acquisition.

The following table is to be used to evaluate the risk of proposed in-stream works in Moderate-moderate suitability habitats. The design elements of the proposed works must achieve a risk score of no higher than the maximum risk score identified to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design Component	Range	Risk Score
Channel Width Construction	>30% channel constriction 5% - 30% of the channel < 5%	3 2 1
Above and Below the Structure – Difference in Water Surface	>2.0 m 0.3 – 2.0 m < 0.3 m	3 2 1
Material Type	Fine (silt-sand) Compactable (fine gravel and sand) Metal/ riprap/ structure	N/A 2 1
Construction Method	Non-compaction/ dumped Moderately compacted/ placement Compacted shallow lift	3 2 1
Amount of In-water Work	Completely in water Partially in water (more than ½) In dry	3 2 1
Structure Height	Above bank full Between bank full and channel bed Below channel bed	3 2 1
MAXIMUM PERMITTED SCORE FOR IN-STREAM WORKS		**12**

G1. Calculate your total score and maximum permitted score on the **Severity of Effects Assessment for In-stream Works Worksheet (**Appendix G1), and record details of proposed in-stream works on the **In-stream Works Worksheet** (Appendix G2). Proceed with submission of proposal.

Fish Habitat Design, Operation, Reclamation Requirements for Moderate–Low Habitat Suitability Watercourses (Includes Tributaries to Large Lakes)

Fish Habitat Design, Operation, Reclamation Requirements for Moderate – Low Habitat Suitability Watercourses (includes Tributaries to Large Lakes)

Moderate-low suitability habitats are defined as watercourses suitable for rearing juvenile Chinook salmon, although utilization may be limited at times due to environmental factors or conditions. These watercourses are typically highly suitable for non-anadromous resident fish species such as Arctic grayling.

Please use the following instructions and information to complete the worksheets relevant to your proposal (located in Appendix A to G). The completed worksheets will be submitted as part of your project description to Yukon Environmental and Socio Economic Assessment Board (YESAB) and your application to the Yukon Water Board (YWB).

Do you propose to undertake placer mining activities in or near a watercourse? Activities may include discharging effluent, constructing stream crossings, clearing riparian vegetation, constructing channel diversions, or withdrawing water.

NO – No further review pursuant to the *Fisheries Act* is required.

YES – Proceed to Step A, Identification of Project Location

A) Identification of Project Location

The first step in compiling a project proposal that involves activities proposed to occur in or around fish habitat areas involves completing the ***Project Location Worksheet*** (Appendix A).

A1. *On the **Project Location Worksheet** enter the stream name, the watershed name (as per **Yukon Placer Fish Habitat Suitability Maps),** identify the watershed sensitivity, and habitat suitability classification for the reaches you proposed to work in, if any reaches are designated as "prior development" a short description of the location, the proposed duration of activities and a copy of a map of the specific location of the site.*

Does the Previous Development designation apply to your project?

NO – Proceed to the next question.

YES – See below.

Historical Development, Current Development or Extensive Development
If your project falls within a "Historical Development", "Current Development" or "Extensive Development" zone, the requirements for settling pond discharge, riparian zones, seasonal or temporary diversions, watercourse crossings, water acquisition and in-stream works that normally apply to Low Habitat Suitability will apply to your operation. **Please note that permanent diversion channels and all reclamation work must conform to the requirements for Moderate-low suitability habitats**.

Once the sections noted above are complete in the ***Project Location Worksheet***, proceed to the next question.

Do you propose to discharge effluent from your mine site?

NO – Proceed to Step C, Riparian Zones.

YES - Proceed to Step B, Settling Pond Discharge.

B) Settling Pond Discharge (effluent concentration)

Point source sediment discharges from gold recovery processes are typically managed through the use of settling facilities. The action level approach is a key element of the risk-based approach to sediment management for Yukon placer mining. For more information on the action level approach or settling pond design, operation, recirculation systems, and settling pond reclamation refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining*

Water quality objectives and sediment discharge standards for settling ponds in Moderate-low habitats are specified in the *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* for the specific watershed you propose to work in (general requirements summarized below). Please ensure to verify your specific discharge standard in the respective watershed you plan to work in (specifically if any exemptions exist) prior to proceeding with your application.

Discharge Standard (Category A, Moderate-Low and Tributaries to Large Lakes)	**Requirement**
Design Target	0.2 ml/L
Action Level	0.8 ml/L
Compliance Level	1.2 ml/L

Discharge Standard (Category B, Moderate-Low)	**Requirement**
Design Target	0.2 ml/L
Action Level	1.0 ml/L
Compliance Level	2.0 ml/L

B1. *Record the Design Target, Action Level and Compliance Level on the* ***Project Location Worksheet*** *(Appendix A).*

Once the effluent discharge standards are recorded on the ***Project Location Worksheet*** proceed to the next question.

Do you propose to build a Seasonal, Temporary or Permanent diversion channel?

NO – Proceed to Step C, Riparian Zones.

YES – Proceed to Step D, Diversion Channels.

C) Riparian Zones

The Riparian Zone is defined as the portion of the stream bank (either vegetated or not) immediately adjacent to the stream channel.

The designated **Riparian Zone** in Moderate-low habitats is **5 metres,** measured from the ordinary high water mark of the watercourse and following the shape of the channel.

The Riparian Zone designation applies to original (un-modified) channels, previously reclaimed channels and Permanent Diversion Channels. The Riparian Zone provisions set out below are not required for Seasonal or Temporary Diversion Channels.

Activities proposed within the Riparian Zone must comply with the following provisions (requirements of the watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*), or a site-specific authorization issued by DFO. In absence of compliance with either authorization, the only activity authorized within the Riparian Zone is the clearing of surface vegetation within a corridor to provide access to the stream (typically for water acquisition purposes). The maximum width of the corridor is to be no more than 7 **metres**. Riparian Zones must be staked out by the operator prior to development.

Do you propose to conduct surface or subsurface works in the Riparian Zone?

NO – Proceed to Step D, Diversion Channels.

YES – Proceed to next question.

Do you propose to construct a new stream crossing (ford)?

NO – Proceed to next question.

YES – Review Step E, Watercourse Crossings, prior to proceeding to next question.

Do you propose to clear surface vegetation only?

YES – Proceed to Step C1, Surface Vegetation Clearing.

NO – The proposal includes both clearing of surface vegetation and subsurface works, proceed to Step C1, Surface Vegetation Clearing, followed by C2, Bank Modification.

C1. Surface Vegetation Clearing

If works or undertakings are proposed to occur within the Riparian Zone, refer to the conditions identified in the tables below and use the information to fill out the ***Riparian Zone / Bank Modification Worksheet*** (Appendix B).

C1a – *On the **Riparian Zone / Bank Modification Worksheet** record the maximum duration the proposed Vegetation Clearing will be in place (see table below).*

C1b – *Record the habitat suitability type where Vegetation Clearing in the Riparian Zone is proposed.*

C1c – *Record the length (in metres) of proposed Vegetation Clearing in the Riparian Zone (see table below for restrictions).*

C1d – *Record the width (in metres) of proposed Vegetation Clearing in the Riparian Zone (see table below for restrictions).*

C1e – *Record the width (in metres) of Vegetation Setback in the Riparian Zone (see table below).*

C1f – *Draw a diagram of the proposed location where clearing of the Riparian Zone is proposed (include north arrow, flow direction) (use symbols identified on worksheet to compose your diagram).*

C1g – *Record a description of the required reclamation works (see table below).*

Conditions and reclamation required when proposing surface Vegetation Clearing in Riparian Zones in Moderate-low suitability habitats

Design Component (Vegetation Clearing)	**Requirement**
Minimum Vegetated Setback from Stream	1.0 metre
Maximum Length of Clearing	300 metres
Minimum Space Between Cleared Areas	100 metres
Maximum Duration Prior to Reclamation	5 years
Reclamation Requirement (surface)	Full topsoil coverage
Reclamation Requirement (vegetation)	30% live staking

If proposing bank modification activities, proceed to step C2.

C2. Bank Modification

If works or undertakings are proposed to occur within the Riparian Zone, refer to the conditions identified in the tables below and use the information to further fill out the ***Riparian Zone / Bank Modification Worksheet*** (Appendix B).

Conditions related to subsurface **Bank Modification** in Riparian Zones authorized in Moderate-low habitats.

Note - If your proposal includes bank modification related to the construction of a ford, see step E for design conditions and requirements prior to proceeding to step C2a.

C2a – *On the **Riparian Zone / Bank Modification Worksheet** enter length (in metres) of the proposed Bank Modification in the Riparian Zone (see table below for restrictions).*

C2b – *Record the width (in metres) of proposed Bank Modification (see table below).*

C2c – *Record the width (in metres) of the Bank Setback (see table below).*

C2e – *Draw a diagram of the proposed location of the Bank Modification (use symbols identified on worksheet to compose your diagram).*

C2f – *Draw the location of any new fords proposed (see step E for restrictions)*

C2g – *Record a description of the required reclamation works (see table below).*

Conditions and reclamation requirements when proposing Bank Modification in Riparian Zones in Moderate-low Habitats

Design Component (Bank Modification)	**Requirement**
Minimum Bank Setback From Stream	3.0 metres
Maximum Width of Excavation	100 metres
Minimum Width Between Bank Modification Areas	300 metres
Maximum Duration Prior to Reclamation	5 years
Reclamation Requirement (grading)	To pre-excavation grade
Reclamation Requirement (surface)	Full topsoil coverage
Reclamation Requirement (vegetation)	30% live staking

Note – The "Minimum Bank Setback From Stream" provision identified above does <u>not</u> apply to the construction of watercourse crossings (fords). If your proposal includes the construction of a ford, please see step E.

Once the ***Riparian Zone / Bank Modification Worksheet*** is completed, proceed to the next question.

Do you propose a Seasonal, Temporary or Permanent relocation of a channel?

NO – Proceed to step E, Watercourse Crossings.
YES – Proceed to step D, Diversion Channels.

<u>D) Diversion Channels</u>

Design and construction of a diversion channel is required if the proposal includes *Seasonal*, *Temporary* or *Permanent* relocation of a water course or channel. It is the responsibility of the applicant to ensure that when transferring water into a diversion channel, it is completed in such a manner as to avoid stranding of fish in the dewatered channel. If it is likely that stranding of fish will occur in a dewatered channel, the applicant should retain a qualified professional to conduct fish salvage prior to dewatering the channel. More information on fish salvage requirements is available from Fisheries and Oceans Canada.

Moderate–Low Habitat Suitability (Includes Tributaries to Large Lakes)

Provided the diversion channel design proposal meets the conditions identified in the following sections, the diversion channel may be constructed pursuant to the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat.* Specific criteria related to channel design and restoration requirements are described in the following sections while general information regarding design, construction and reclamation of diversion channels is provided in the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

In order for a diversion channel to meet the requirements of the watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*, you must ensure that your proposed channel design achieves a total risk score of less than or equal to the maximum risk score threshold identified on the following Risk Scoring Tables. If your design exceeds this score you may wish to redesign your proposed channel in order to meet the maximum risk score, thus meeting the requirements of the authorization. If you are unable to meet the maximum risk score you are required to submit your proposal to Fisheries and Oceans Canada for site-specific review and authorization prior to proceeding.

D1. Original Channel and Site Parameters Worksheet

On the ***Original Channel and Site Parameters Worksheet*** *(Appendix C), record the information for the original channel (pre-diversion conditions). Refer to* the *Guidebook of Mitigation Measures for Yukon Placer Mining reference sections identified on the worksheet to assist you with the data collection and entry process.*

Note – The above worksheet must be completed prior to proceeding with the following steps.

Do you propose a Seasonal relocation of a channel? *(A Seasonal Channel is in place for a period of less than one year and is replaced before winter).*

YES – Proceed to Step D2, Seasonal Diversion Channels.

NO – Proceed to next question.

Do you propose a *Temporary* relocation of a channel? *(A Temporary Channel is in place for a period of less than five years).*

YES – Proceed to Step D3, Temporary Diversion Channels.

NO – Proceed to next question.

Do you propose a *Permanent* relocation of a channel? *(A Permanent Channel is in place for a period of five years or more).*

NO – Proceed to next question.

YES – Proceed to Step D4, Permanent Diversion Channels.

D2. Seasonal Diversion Channels

Seasonal diversion channels are defined as a constructed channel that will convey stream flow for no more than one operating season. This diversion channel type may not be used to convey stream flow between late fall and the following spring of any given year. Refer to the channel design considerations in the guidebook for more information on seasonal diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3) and the ***Channel Design Method Worksheet*** (Appendix E) for your Seasonal Diversion Channel to YESAB and the YWB.

Note – Riparian Zone provisions do not apply to Seasonal Diversion Channels.

Note – Flood design interval for Seasonal Diversion Channels in Moderate-low is 1:1.

D2a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*
The following table is to be used to asses the total risk when designing a seasonal diversion channel. The channel design proposed must achieve a risk score of no higher than the maximum risk score identified.

Severity of Effect Assessment for Seasonal Diversion Channels

Design Component (Seasonal Diversion)	Range	Risk Score
Channel Gradient	3.51% to 5.0%	3
	1.51% to 3.5%	2
	0 to 1.5%	1
Length of diversion channel	1000 m to 2000 m	2
	<1000 m	1
Relative length of diversion channel	Shorter than original	1
	Equal or Longer than original	0
Permafrost in diversion channel	Present	3
	Absent	0
Primary material in diversion channel	Silt / Sand	2
	Gravel / Cobble / Bedrock	1
Location of diversion channel	Perched (valley wall)	4
	Confined (valley floor)	2
	Incised (valley floor)	1
Total Maximum Permitted Score for Seasonal Diversion Channels		**11**

D2b. *Calculate your total score and maximum permitted score on the* ***Severity of Effects Assessment for Seasonal Diversion Channel Worksheet (****Appendix D1), and* record your total score on line 2 of the **Channel** ***Design Flood Estimate Worksheet*** *(Appendix D3).*

D2c. *On the **Design Flood Estimate Worksheet** (Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed **Design Flood Estimate Worksheet** with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D2d. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

Moderate–Low Habitat Suitability (Includes Tributaries to Large Lakes)

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

D2e. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

Note – A plan for a Seasonal Diversion Channel must be accompanied by plans for a Temporary and / or Permanent Diversion Channel (See sections D3 and / or D4).

Once the ***Channel Design Method Worksheet*** is completed, proceed to Step D3, Temporary Diversion Channels or D4, Permanent Diversion Channels.

D3. ***Temporary Diversion Channels***

Temporary diversion channels are defined as a constructed channel that will convey stream flow for a period of one to five years. Although not required, construction of fish habitat features may be incorporated in the channel design to reduce the overall risk score. To achieve this condition the channel must incorporate the required fish habitat features (based on channel configuration). Refer to the channel design considerations in the guidebook for more information on temporary diversion channels.

You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3) and the ***Channel Design Method Worksheet*** (Appendix E) for your Temporary Diversion Channel to YESAB and the YWB.

Note – The Riparian Zone provisions do not apply to Temporary Diversion Channels.

Note – Flood design interval for Temporary Diversion Channels in Moderate Low is 1:5.

D3a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

The following table is to be used when designing Temporary Diversion Channels. The channel design proposed must achieve a risk score of no higher than the maximum risk score identified to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Severity of Effects Assessment for Temporary Diversion Channels

Design Component (Temporary Diversion)	Range	Risk Score
Channel Gradient	3.51% to 5.0%	3
	1.51% to 3.5%	2
	0 to 1.5%	1
Length of diversion channel	2000 m to 5000 m	3
	500m to 2000 m	2
	<500 m	1
Relative length of diversion channel	Shorter than original	1
	Equal or Longer than original	0
Permafrost in diversion channel	Present	2
	Absent	0
Primary material in diversion channel	Silt / Sand	2
	Gravel / Cobble / Bedrock	1
Location of diversion channel	Perched (valley wall)	4
	Confined (valley floor)	2
	Incised (valley floor)	1
Fish habitat features (rock islands / boulder groupings only)	30% of total required for permanent channel	-1
Maximum Permitted Score for Temporary Diversion Channels		**10**

D3b. *Calculate your total score and maximum permitted score on the* ***Severity of Effects Assessment for Temporary Diversion Channel Worksheet (****Appendix D2), and* record your total score on line 2 of the **Channel** ***Design Flood Estimate Worksheet*** *(Appendix D3).*

D3c. *On the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB or YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

Have you selected Fish Habitat Features to generate the total risk score for your proposed Temporary Diversion Channel (in step D3b)?

NO – Proceed to Step E, Watercourse Crossings.

YES – Proceed to Step D3d, Selecting a Channel Design Method.

D3d. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

D3e. Fish Habitat Features

If you have included Fish Habitat Features in your proposed Temporary Diversion Channel you must select the appropriate spacing of features based on the Channel Type identified on the ***Original Channel and Site Parameters Worksheet***. Refer to the fish habitat feature considerations in the guidebook for more information. Use the following tables as a guide to fill out information requirements in the ***Fish Habitat Feature Worksheet*** (Appendix F).

Fish Habitat Reclamation Requirements for Temporary Diversion Channels

Pool-riffle / Dune-riffle and **Plane-bed** channel type

Select Fish Habitat Feature Based on Diversion Channel Width	Spacing Requirements (place feature every X channel width)
Rock Island (channel width < 5m)	18
Boulder Grouping (channel width > 5m)	16
Rip-rap	Based on channel design method

Step-pool and **Cascade** channel type

Select Fish Habitat Feature Based on Diversion Channel Width	Spacing Requirements (place feature every X channel width)
Rock Island (channel width < 5m)	15
Boulder Grouping (channel width > 5m)	9
Rip-rap	Based on channel design method

D3f. *Enter the required information on the **Fish Habitat Feature Worksheet** (Appendix F) to identify the type, spacing and relative location of the fish habitat features. Draw a diagram of the diversion channel (include north arrow, flow direction) (use symbols identified on worksheet to compose your diagram).*

Note – If your Temporary Diversion Channel includes fish habitat features, and you propose to construct a crossing (new ford) be sure to identify the location of the ford on the *Fish Habitat Features Worksheet* (see step E2).

Proceed to following steps if: D4, constructing a Permanent Diversion Channel.
E, proposing to construct a new stream crossing.
F, proposing to acquire water.

D4. Permanent Diversion Channels

Permanent diversion channels are defined as a constructed channel that will convey stream flow for a period of over five years. All permanent diversion channels must include provisions for construction of fish habitat features. Refer to the channel design considerations in the guidebook for more information on permanent diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3), the ***Channel Design Method Worksheet*** (Appendix E) and the ***Fish Habitat Features Worksheet*** (Appendix F) for your Permanent Diversion Channel to YESAB and the YWB.

Note – Flood design interval for Permanent Diversion Channels in Moderate Low Habitat is 1:10.

D4a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

D4b. *On the* ***Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D4c. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
	Channel Duration	Seasonal or Temporary or Permanent

	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
Regime Channel	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

D4d. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

The following tables identify design restrictions and fish habitat reclamation requirements for Permanent Diversion Channels which must be incorporated to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design Restrictions for Permanent Diversion Channels

Design Component (Permanent Diversion)	**Criteria**
Overall length of diversion channel	< 5000 m
Conveyance (flood design) capacity	1:10
Channel design	As per channel design worksheets
Fish Habitat Features	As per reclamation tables

Note – in the next step you will need to refer to the *Original Channel and Site Parameters Worksheet (Appendix C)* in order to select the appropriate category of the original channel type (Pool-riffle, Dune-riffle, Plane-bed, Step-pool or Cascade Channel). For more information on channel types see the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

Construction and Reclamation Requirements for Permanent Diversion Channels
Pool-riffle / **Dune-riffle** and **Plane-bed** channel type.

Fish Habitat Features	Spacing Requirements (multiply the number in this column by the width of the channel in metres)
Rock Island (channel width < 5m)	6
Boulder Grouping (channel width > 5m)	4
Anchored or Buried trees	20
Top Soil Spreading	Continuous (both banks)
Willow staking	Inside bank, alternating meander bends
Transplanting	At sharp bends
Rip-rap	Based on channel design method

Step-pool and **Cascade Channel** type

Fish Habitat Feature	Spacing Requirements (multiply the number in this column by the width of the channel in metres)
Rock Island (channel width < 5m)	5
Boulder Grouping (channel width > 5m)	3
Anchored or Buried trees	14
Top Soil Spreading	Continuous (both banks)
Willow staking	Inside bank, alternating meander bends
Transplanting	At sharp bends only
Rip-rap	Based on channel design method

Note - Topsoil spreading is to occur for the full width of the Riparian Zone (5 metres), willow planting is to be completed to a width of 3 metres from the bank, Willow staking / Transplanting is not required for the floodplain design method.

D4e. *Use the information above to complete the **Fish Habitat Feature Worksheet** (Appendix G) to identify the type, spacing and relative location of the fish habitat features. Draw a diagram of the diversion channel (include north arrow, flow direction and reclaimed Riparian Zone) (use symbols identified on worksheet to compose your diagram).*

Note – If you propose to construct a crossing (new ford) be sure to identify the location of the ford on the *Fish Habitat Feature Worksheet* (see section E2).

Once the ***Fish Habitat Feature Worksheet*** is completed, proceed to the next question.

Do you propose to use an Existing Ford?

NO – Proceed to next question.

YES – Proceed to Step E, Watercourse Crossings, then E1, Use of Existing Ford.

Moderate–Low Habitat Suitability (Includes Tributaries to Large Lakes)

Do you propose to construct a New Ford?

NO – Proceed to Step F, Water Acquisition.

YES – Proceed to Step E, Watercourse Crossings.

E. Watercourse Crossings (Fords)

Fording is defined as the crossing of creeks, streams and / or rivers at locations where a bridge, causeway or elevated embankment does not exist or is not utilized by a vehicle or equipment. Fording typically involves driving directly through a watercourse, across the banks and bed. In some instances, Fording locations (*Fords*) have been "improved" or constructed through watercourses by way of adding materials such as rocks or gravel, the modification of approaches, or the modification of the bed of a watercourse.

E1. Use of Existing Ford

Use of existing Fords is often the least preferred option for crossing watercourses however it is recognized that there are instances where it is the only viable option. Refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* for additional information on Fords. The following measures should be adhered to when utilizing existing Fords.

NOTE – Please identify if you intend to use Existing Fords on the Project Location Worksheet (Appendix A).

- Ensure water depth is sufficiently shallow to allow passage of vehicle / equipment.
- Plan your activities in advance to minimize the number of crossings required.
- Avoid crossing during extreme rain or flood events.
- Access approaches at 90° to the bank, when entering or exiting the ford.
- Maintain speed at a very slow and steady pace throughout the crossing.
- Avoid rapid acceleration while on approaches or while in the water.

E2. Construction of New Fords

Construction of new Fords should be limited to locations or applications where deemed to be absolutely necessary. More permanent or high use locations should employ the construction and use of a bridge as the primary crossing structure where possible. For more information on construction of stream crossings refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

The location of new Fords must be identified when proposed for original channels, Temporary Channels (with Fish Habitat Features), and Permanent Diversion Channels. The new ford proposed must achieve the design, construction and reclamation requirements identified in the table below to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design and Construction Restrictions and Reclamation Requirements for New Fords

Design Component (Construction of new Ford)	Requirement
Approach angle	90° to bank
Maximum width of approach zone clearing (surface)	10 metres
Minimum watercourse distance between Ford sites or Not to exceed more than	800 metres 3 fords / 2000 metres
Site Selection (Watercourse)	Shallow Water Depth
Site Selection (Approach / Bank Composition)	Gravel / Cobble
Construction	Equipment to Work from Bank
Maximum width of bank grading (subsurface)	10 metres
Approach surface ground coverage	Gravel / Cobble
Construction timing	Low Water Period
Reclamation	Full Topsoil Coverage

Note – The above design considerations are not required for Construction of Fords in Seasonal Diversion Channels.

E2a. *If the construction of a new ford is proposed for an original channel or previously restored channel, identify the location of the new ford(s) on the* ***Riparian Zone / Bank Modification Worksheet*** *(see step C, Riparian Zones and Appendix B).*

E2b. *If the construction of a new ford is proposed for a Temporary Diversion Channel (with fish habitat features) or a Permanent Diversion Channel, identify the location of the new ford(s) on the* ***Fish Habitat Feature Worksheet*** *(see step D3d or D4b and Appendix F).*

Once the location and specification of the new ford is identified on either the completed ***Riparian Zone / Bank Modification Worksheet*** *or the* ***Fish Habitat Feature Worksheet*** proceed to the next question.

Do you propose to withdraw water from a Moderate-low habitat suitability watercourse?

NO – Proceed to Step G, In-stream Works.

YES – Proceed to Step F, Water Acquisition.

F. Water Acquisition

Acquisition of water is required for processing materials during placer mining. Effective water management is a key consideration at all placer mine sites. The following requirements must be achieved to meet compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Moderate–Low Habitat Suitability (Includes Tributaries to Large Lakes)

F1. Water Intake Screens

In order to meet the requirement of the *Fisheries Act*, all water intakes must be screened in accordance with requirements identified in the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines. A general summary of the guideline requirements are provided in the following table. For more information regarding fish screens, please refer to the guidebook or for more specialized applications please refer to the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines (available online or through Fisheries and Oceans Canada).

General Guidelines for Intake Screens

Design Component (Fish Screens)	Requirement
Screen Openings (Imperial)	No less than 8 openings per lineal inch, with openings no greater than 1/8 inch along any given side of the screen. If a punch plate or similar material is used, openings no greater than 1/8 inches in length or width are permitted.
Screen Openings (Metric)	No less than 3.5 openings per lineal cm, with openings no greater than 3.2 mm along any given side of the screen. If a punch plate or similar material is used, openings no greater than 3.2 mm in length or width are permitted.
Screen Area (Imperial)	1 ft^2 of open screen area per 45 imperial / 55 US gallons per minute of water withdrawn is required.
Screen Area (Metric)	929 cm^2 of open screen area per 205 litres per minute of water withdrawn is required.

Note: the objective behind the installation of intake screens is to prevent the destruction of fish through the acquisition of water. If screens of the correct mesh size are deployed between a watercourse and the intake to a water reservoir or gravity feed ditch, it is not necessary to screen the pump intake that removes water from within these structures provided these structures do not already contain fish. In the case of total recirculation systems, the operator shall ensure that any areas where fish could enter the system have barriers to prevent the entry of fish (unless the pump intake is appropriately screened).

Do you propose to carry out in-stream works within a watercourse? In-stream works may include small dugouts or wing dams to facilitate water acquisition, in-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds.

NO – Proceed to next question.

YES – Proceed to Step G, In-stream Works.

G. In-stream Works

In-stream works are defined as works that occur within the high water mark of a watercourse, but do not include diversion channels or fords. Some in-stream works can lead to effects on fish and fish habitat such as erosion/scouring, sediment inputs, loss of habitat area, changes in channel morphology, blockages to passage, and reduced productivity.

Do you propose to carry out in-stream works within a watercourse? In-stream works may include small dugouts or wing dams to facilitate water acquisition, in-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds.

NO – Review complete – proceed with submission of all completed worksheets along with your project description to YESAB and your application for water use license to YWB.

YES – Proceed to Step G1, Severity of Effects Assessment.

Habitats of Moderate-Low Suitability

In-stream settling facilities and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds may be authorized under the auspices of a watershed-based authorization in habitats of Moderate-low suitability under strictly specified conditions. In order to determine whether your site qualifies, please complete the worksheet found in Section I.

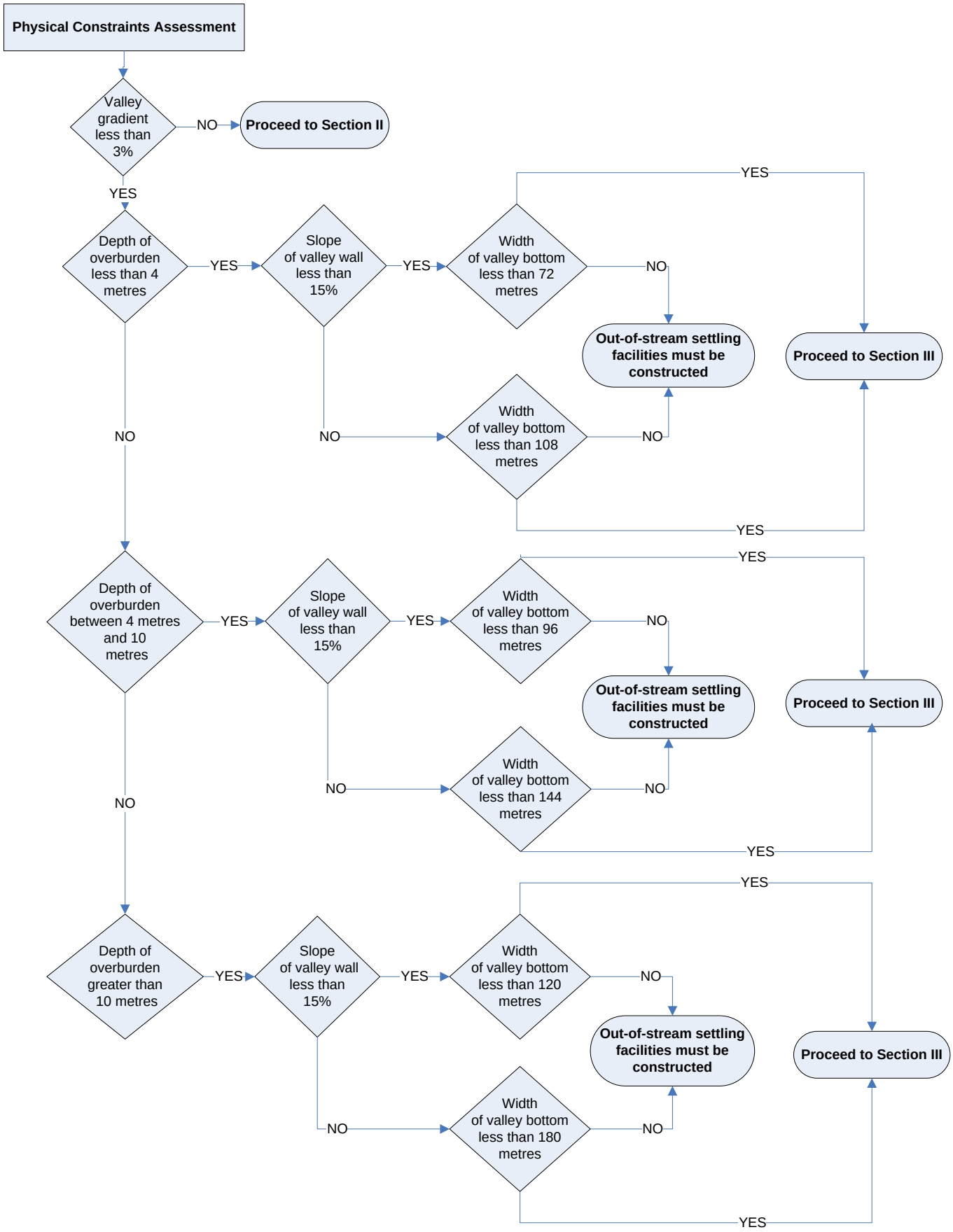
In-stream reservoirs constructed with cross-channel dams are not authorized under watershed-based authorizations in habitats of Moderate-low suitability, unless a previously authorized in-stream settling pond is used for this purpose prior to stream channel restoration. Operators may apply to Fisheries and Oceans Canada for a site-specific review of plans to construct in-stream reservoirs using cross-channel dams.

Section I

Use the following flowchart to evaluate whether your site is suitable for construction of in-stream settling facilities or the use of a stream channel as a conduit.

Please note that authorization to construct in-stream settling facilities or to use a stream channel as a conduit is conditional and that these works may not be permitted. Depending upon the scale of operation or size of earth-moving equipment out-of-stream settling facilities may be required in proximity to working areas.

Worksheet for Instream Settling Ponds and Use of Stream Channel as Conduit



Section II

The valley bottom you intend to mine is not ideal for the construction of settling ponds, due to its steep gradient. Use of the stream channel as a conduit for transporting process water to the nearest suitable site for out-of-stream settling ponds may be permitted.

Do you have the right to construct settling facilities on placer claims immediately below your working area where the valley gradient is less than or equal to 3%, and the habitat classification remains Moderate-low?

YES - Use the flowchart above to evaluate whether your site is suitable for construction of out-of stream settling facilities.
NO – Prior to proceeding with this proposal you must apply to Fisheries and Oceans Canada for a site-specific review of your project.

Section III

The valley bottom you intend to mine can not accommodate an out-of-stream settling facility, due to its narrow width. If you have the right to construct out-of stream settling facilities on placer claims immediately below your working area, and the habitat classification remains Moderate-low, use of the stream as a conduit for transporting process water to this downstream location may be permitted. If not, construction of in-stream settling ponds may be permitted. The following conditions apply to construction of these in-stream works:

- Construction and maintenance of a pre-settling pond is mandatory;
- If it is likely that stranding of fish will occur in a dewatered channel, the applicant should retain a qualified professional to conduct a fish salvage prior to dewatering the channel. More information on fish salvage requirements is available from Fisheries and Oceans Canada;
- Only compactable material (fine gravel and sand) may be used as core material in dam construction, while coarse material should be used on the surfaces to prevent erosion;
- Material must be placed in shallow (< 0.3 metre) lifts and compacted when dams are constructed;
- Sluicing must be terminated if stream flows increase to bank-full width in response to rainfall events;
- Settling ponds must be mechanically cleaned and equipped with well–armoured spillways in order to maintain stability during spring freshet; or
- A stable bypass channel must be constructed to protect the settling pond cells from high flows during spring freshet; and
- Stream channel restoration must commence once these in-stream works are no longer required for current mining activities.

The following table is to be used to evaluate the risk of proposed in-stream works in Moderate-low suitability habitats. The design elements of the proposed works must achieve a risk score of no higher than the maximum risk score identified to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Please note that in-stream settling ponds must be constructed from compactable material that is placed and compacted in shallow lifts.

Design Component	Range	Risk Score
Channel Width Construction	>30% channel constriction 5% - 30% of the channel < 5%	3 2 1
Above and Below the Structure – Difference in Water Surface	>2.0 m 0.3 – 2.0 m < 0.3 m	3 2 1
Material Type	Fine (silt-sand) Coarse (fine gravel and sand) Metal/ riprap/ structure	N/A 2 1
Construction Method	Non-compaction/ dumped Moderately compacted/ placement Compacted shallow lift	3 2 1
Amount of In-water Work	Completely in water Partially in water (more than ½) In dry	3 2 1
Structure Height	Above bank full Between bank full and channel bed Below channel bed	3 2 1
MAXIMUM PERMITTED SCORE FOR IN-STREAM WORKS		**14**

G1. *Calculate your total score and maximum permitted score on the* ***Severity of Effects Assessment for In-stream Works Worksheet (****Appendix G1), and record details of proposed in-stream works on the* ***In-stream Works Worksheet*** *(Appendix G2). Proceed with submission of proposal.*

Fish Habitat Design, Operation, Reclamation Requirements for Low Habitat Suitability Watercourses (including Tributaries to Lake Trout Lakes)

Fish Habitat Design, Operation, Reclamation Requirements for Low Habitat Suitability Watercourses (including Tributaries to Lake Trout Lakes)

Low Habitat Suitability Watercourses (formally Freshwater Fisheries Production Zone) are areas within watercourses that are utilized by a variety of fish species and are typically relatively abundant within a watershed. As a function of gradient and distance from Chinook salmon production areas these streams are likely not utilized by rearing juvenile Chinook salmon, but may be highly suitable for and used by non-anadromous resident fish species. The requirements and operational restrictions defined for Low Habitat Suitability Watercourses also apply to watercourses designated as Tributaries to Lake Trout Lakes.

Please use the following instructions and information to complete the worksheets relevant to your proposal (located in Appendix A to G). The completed worksheets will be submitted as part of your project description to Yukon Environmental and Socio Economic Assessment Board (YESAB) and your application to the Yukon Water Board (YWB).

Do you propose to undertake placer mining activities in or near a watercourse? Activities may include discharging effluent, constructing stream crossings, clearing riparian vegetation, constructing channel diversions, or withdrawing water.

NO – No further review pursuant to the *Fisheries Act* is required.

YES – Proceed to Step A, Identification of Project Location

A) Identification of Project Location

The first step in compiling a project proposal that involves activities proposed to occur in or around fish habitat areas involves completing the ***Project Location Worksheet*** (Appendix A).

A1. *On the* ***Project Location Worksheet*** *enter the stream name, the watershed name (as per* ***Yukon Placer Fish Habitat Suitability Maps),*** *identify the watershed sensitivity, and habitat suitability classification for the reaches you proposed to work in, if any reaches are designated as "prior development" a short description of the location, the proposed duration of activities and a copy of a map of the specific location of the site.*

Once the sections noted above are complete in the ***Project Location Worksheet***, proceed to the next question.

Do you propose to discharge effluent from your mine site?

NO – Proceed to Step C, Riparian Zones.

YES - Proceed to Step B, Settling Pond Discharge.

B) Settling Pond Discharge (effluent concentration)

Point source sediment discharges from gold recovery processes are typically managed through the use of settling facilities. The action level approach is a key element of the risk-based approach to sediment management for Yukon placer mining. For more information on the action level approach or settling pond design, operation, recirculation systems, and settling pond reclamation refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

Water quality objectives and sediment discharge standards for settling ponds in Low Habitat Suitability Watercourses are specified in the *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* for the specific watershed you propose to work in (general requirements summarized below). Please ensure to verify your specific discharge standard in the respective watershed you plan to work in (specifically if any exemptions exist) prior to proceeding with your application.

Discharge Standard (Category A, Low Habitat Suitability Watercourses and Tributaries to Lake Trout Lakes)	**Requirement**
Design Target	0.2 ml/L
Action Level	1.0 ml/L
Compliance Level	1.5 ml/L

Discharge Standard (Category B, Low Habitat Suitability Watercourses)	**Requirement**
Design Target	0.2 ml/L
Action Level	1.0 ml/L
Compliance Level	2.5 ml/L

**** 2.5 ml/L is an interim standard with transition to 2.0 ml/L within three to five years subject to monitoring and adaptive management. The compliance level of 2.0 ml/L will apply in the 60 Mile and Mayo River watersheds.**

B1. *Record the Design Target, Action Level and Compliance Level on the* ***Project Location Worksheet*** *(Appendix A).*

Once the effluent discharge standards are recorded on the ***Project Location Worksheet*** proceed to the next question.

Do you propose to build a Seasonal, Temporary or Permanent diversion channel?

NO – Proceed to Step C, Riparian Zones.

YES – Proceed to Step D, Diversion Channels.

C) Riparian Zones

The Riparian Zone is defined as the portion of the stream bank (either vegetated or not) immediately adjacent to the stream channel.

The designated **Riparian Zone** in Low Habitat Suitability Watercourses is **1 meter,** measured from the ordinary high water mark on each bank of the watercourse and following the shape of the channel.

The Riparian Zone designation applies to original (un-modified) channels, previously reclaimed channels and Permanent Diversion Channels. The Riparian Zone provisions set out below are not required for Seasonal or Temporary Diversion Channels.

Activities proposed within the Riparian Zone must comply with the following provisions (requirements of the watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*), or a site-specific authorization issued by DFO. In absence of compliance with either authorization, the only activity permitted within the Riparian Zone is the clearing of surface vegetation within a corridor to provide access to the stream (typically for water acquisition purposes). The maximum width of the corridor is to be no more than **7 metres**. Riparian Zones must be staked out by the operator prior to development.

Do you propose to conduct surface or subsurface works in the Riparian Zone?

NO – Proceed to Step D, Diversion Channels.

YES – Proceed to next question.

Do you propose to construct a new stream crossing (Ford)?

NO – Proceed to next question.

YES – Review Step E, Watercourse Crossings, prior to proceeding to next question.

Do you propose to clear surface vegetation only?

YES – Proceed to Step C1, Surface Vegetation Clearing.

NO – The proposal includes both clearing of surface vegetation and subsurface works, proceed to Step C1, Surface Vegetation Clearing, followed by C2, Bank Modification.

C1. Surface Vegetation Clearing

If works or undertakings are proposed to occur within the Riparian Zone, refer to the conditions identified in the tables below and use the information to fill out the ***Riparian Zone / Bank Modification Worksheet*** (Appendix B).

C1a – *On the **Riparian Zone / Bank Modification Worksheet** record the maximum duration the proposed Vegetation Clearing will be in place (see table below).*

C1b – *Record the habitat suitability type where Vegetation Clearing in the Riparian Zone is proposed.*

C1c – *Record the length (in metres) of proposed Vegetation Clearing in the Riparian Zone (see table below for restrictions).*

C1d – *Record the width (in metres) of proposed Vegetation Clearing in the Riparian Zone (see table below for restrictions).*
C1e – *Record the width (in metres) of Vegetation Setback in the Riparian Zone (see table below).*

C1f – *Draw a diagram of the proposed location where clearing of the Riparian Zone is proposed (include north arrow, flow direction) (use symbols identified on worksheet to compose your diagram).*

C1g – *Record a description of the required reclamation works (see table below).*

Conditions and reclamation required when proposing surface Vegetation Clearing in Riparian Zones in Low Habitat Suitability Watercourses

Design Component (Vegetation Clearing)	**Requirement**
Minimum Vegetated Setback from Stream	To stream bank
Maximum Length of Clearing	400 metres
Minimum Space Between Cleared Areas	100 metres
Maximum Duration Prior to Reclamation	5 years
Reclamation Requirement (surface)	Full topsoil coverage

If proposing bank modification activities, proceed to step C2.

C2. Bank Modification

If works or undertakings are proposed to occur within the Riparian Zone, refer to the conditions identified in the tables below and use the information to further fill out the ***Riparian Zone / Bank Modification Worksheet*** (Appendix B).

Conditions related to subsurface **Bank Modification** in Riparian Zones authorized in Low Habitat Suitability Watercourses.

Note - If your proposal includes bank modification related to the construction of a ford, see step E for design conditions and requirements prior to proceeding to step C2a.

C2a – *On the **Riparian Zone / Bank Modification Worksheet** enter length (in metres) of the proposed Bank Modification in the Riparian Zone (see table below for restrictions).*

C2b – *Record the width (in metres) of proposed Bank Modification (see table below).*

C2c – *Record the width (in metres) of the Bank Setback (see table below).*

Low Habitat Suitability (including Tributaries to Lake Trout Lakes)

C2e – *Draw a diagram of the proposed location of the Bank Modification (use symbols identified on worksheet to compose your diagram).*

C2f – *Draw the location of any new fords proposed (see step E for restrictions)*

C2g – *Record a description of the required reclamation works (see table below).*

Conditions and reclamation requirements when proposing Bank Modification in Riparian Zones in Low Habitat Suitability Watercourses

Design Component (Bank Modification)	**Requirement**
Minimum Bank Setback From Stream	To stream bank
Maximum Width of Excavation	300 metres
Minimum Width Between Bank Modification Areas	300 metres
Maximum Duration Prior to Reclamation	5 years
Reclamation Requirement (grading)	To pre-excavation grade
Reclamation Requirement (surface)	Full topsoil coverage
Reclamation Requirement (vegetation)	10% live staking

Note – The "Minimum Bank Setback From Stream" provision identified above does not apply to the construction of watercourse crossings (fords). If your proposal includes the construction of a ford, please see step E.

Once the ***Riparian Zone / Bank Modification Worksheet*** is completed, proceed to the next question.

Do you propose a Seasonal, Temporary or Permanent relocation of a channel?

NO – Proceed to step E, Watercourse Crossings.

YES – Proceed to step D, Diversion Channels.

D) Diversion Channels

Design and construction of a diversion channel is required if the proposal includes *Seasonal*, *Temporary* or *Permanent* relocation of a water course or channel. It is the responsibility of the applicant to ensure that when transferring water into a diversion channel, it is completed in such a manner as to avoid stranding of fish in the dewatered channel. If it is likely that stranding of fish will occur in a dewatered channel, the applicant should retain a qualified professional to conduct a fish salvage prior to dewatering the channel. More information on fish salvage requirements is available from Fisheries and Oceans Canada.

Provided the diversion channel design proposal meets the conditions identified in the following sections, the diversion channel may be constructed pursuant to the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat.* Specific criteria related to channel design and restoration requirements are described in the following sections while general information regarding design, construction and reclamation of diversion channels is provided in the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

In order for a diversion channel to meet the requirements of the watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*, you must ensure that your proposed channel design achieves a total risk score of less than or equal to the maximum risk score threshold identified on the following Risk Scoring Tables. If your design exceeds this score you may wish to redesign your proposed channel in order to meet the maximum risk score, thus meeting the requirements of the authorization. If you are unable to meet the maximum risk score you are required to submit your proposal to Fisheries and Oceans Canada for site-specific review and authorization prior to proceeding.

D1. Original Channel and Site Parameters Worksheet

*On the **Original Channel and Site Parameters Worksheet** (Appendix C), record the information for the original channel (pre-diversion conditions). Refer to guidebook reference sections identified on the worksheet to assist you with the data collection and entry process.*

Note – The above worksheet must be completed prior to proceeding with the following steps.

***Do you propose a Seasonal relocation of a channel**? (A Seasonal Channel is in place for a period of less than one year and is replaced before winter).*

YES – Proceed to Step D2, Seasonal Diversion Channels.

NO – Proceed to next question.

Do you propose a *Temporary* relocation of a channel? *(A Temporary Channel is in place for a period of less than five years).*

YES – Proceed to Step D3, Temporary Diversion Channels.

NO – Proceed to next question.

Do you propose a *Permanent* relocation of a channel? *(A Permanent Channel is in place for a period of five years or more).*

NO – Proceed to next question.

YES – Proceed to Step D4, Permanent Diversion Channels.

D2. Seasonal Diversion Channels

Seasonal diversion channels are defined as a constructed channel that will convey stream flow for no more than one operating season. This diversion channel type may not be used to convey stream flow between late fall and the following spring of any given year. Refer to the channel design considerations in the guidebook for more information on seasonal diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3) and the ***Channel Design Method Worksheet*** (Appendix E) for your Seasonal Diversion Channel to YESAB and the YWB.

Note – Riparian Zone provisions do not apply to Seasonal Diversion Channels.

Note – Flood design interval for Seasonal Diversion Channels in Fresh Water Fisheries Production Zones is 1:1.

D2a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

The following table is to be used to asses the total risk when designing a seasonal diversion channel. The channel design proposed must achieve a risk score of no higher than the maximum risk score identified.

Severity of Effects Assessment for Seasonal Diversion Channels

Design Component (Seasonal Diversion)	Range	Risk Score
Channel Gradient	3.51% to 5.0%	3
	1.51% to 3.5%	2
	0 to 1.5%	1
Length of diversion channel	1000 m to 2000 m	2
	<1000 m	1
Relative length of diversion channel	Shorter than original	1
	Equal or Longer than original	0
Permafrost in diversion channel	Present	3
	Absent	0
Primary material in diversion channel	Silt / Sand	2
	Gravel / Cobble / Bedrock	1
Location of diversion channel	Perched (valley wall)	4
	Confined (valley floor)	2
	Incised (valley floor)	1
Total Maximum Permitted Score for Seasonal Diversion Channels		**13**

D2b. *Calculate your total score and maximum permitted score on the* ***Severity of Effects Assessment for Seasonal Diversion Channel Worksheet (****Appendix D1), and* record your total score on line 2 of the **Channel** ***Design Flood Estimate Worksheet*** *(Appendix D3).*

D2c. *On the* ***Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D2d. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

D2e. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

Note – A plan for a Seasonal Diversion Channel must be accompanied by plans for a Temporary and / or Permanent Diversion Channel (See sections D3 and / or D4).

Once the ***Channel Design Method Worksheet*** is completed, proceed to Step D3, Temporary Diversion Channels or D4, Permanent Diversion Channels.

D3. ***Temporary Diversion Channels***

Temporary diversion channels are defined as a constructed channel that will convey stream flow for a period of one to five years. Although not required, construction of fish habitat features may be incorporated in the channel design to reduce the overall risk score. To achieve this condition the channel must incorporate the required fish habitat features (based on channel configuration). Refer to the channel design considerations in the guidebook for more information on temporary diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3) and the ***Channel Design Method Worksheet*** (Appendix E) for your Temporary Diversion Channel to YESAB and the YWB.

Note – The Riparian Zone provisions do not apply to Temporary Diversion Channels.

Note – Flood design interval for Temporary Diversion Channels in Fresh Water Fisheries Production Zones is 1:2.

D3a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

The following table is to be used when designing Temporary Diversion Channels. The channel design proposed must achieve a risk score of no higher than the maximum risk score identified to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Severity of Effects Assessment for Temporary Diversion Channels

Design Component (Temporary Diversion)	Range	Risk Score
Channel Gradient	3.51% to 5.0%	3
	1.51% to 3.5%	2
	0 to 1.5%	1
Length of diversion channel	2000 m to 5000 m	3
	500m to 2000 m	2
	<500 m	1
Relative length of diversion channel	Shorter than original	1
	Equal or Longer than original	0
Permafrost in diversion channel	Present	2
	Absent	0
Primary material in diversion channel	Silt / Sand	2
	Gravel / Cobble / Bedrock	1
Location of diversion channel	Perched (valley wall)	4
	Confined (valley floor)	2
	Incised (valley floor)	1
Fish habitat features (rock islands / boulder groupings only)	30% of total required for permanent channel	-1
Maximum Permitted Score for Temporary Diversion Channels		**12**

D3b. *Calculate your total score and maximum permitted score on the* ***Severity of Effects Assessment for Temporary Diversion Channel Worksheet (****Appendix D2), and* record your total score on line 2 of the **Channel** ***Design Flood Estimate Worksheet*** *(Appendix D3).*

D3c. *On the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB or YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

Have you selected Fish Habitat Features to generate the total risk score for your proposed Temporary Diversion Channel (in step D3b)?

NO – Proceed to Step E, Watercourse Crossings.

YES – Proceed to Step D3d, Selecting a Channel Design Method.

D3d. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

Low Habitat Suitability (including Tributaries to Lake Trout Lakes)

D3e. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

D3f. Fish Habitat Features

If you have included Fish Habitat Features in your proposed Temporary Diversion Channel you must select the appropriate spacing of features based on the Channel Type identified on the ***Original Channel and Site Parameters Worksheet***. Refer to the fish habitat feature considerations in the guidebook for more information. Use the following tables as a guide to fill out information requirements in the ***Fish Habitat Feature Worksheet*** (Appendix F).

Fish Habitat Reclamation Requirements for Temporary Diversion Channels

Pool-riffle / Dune-riffle and **Plane-bed** channel type

Select Fish Habitat Feature Based on Diversion Channel Width	**Spacing Requirements (place feature every X channel width)**
Rock Island (channel width < 5m)	20
Boulder Grouping (channel width > 5m)	16
Rip-rap	Based on channel design method

Step-pool and **Cascade** channel type

Select Fish Habitat Feature Based on Diversion Channel Width	**Spacing Requirements (place feature every X channel width)**
Rock Island (channel width < 5m)	18
Boulder Grouping (channel width > 5m)	12
Rip-rap	Based on channel design method

D3g. Enter the required information on the **Fish Habitat Feature Worksheet** (Appendix F) to identify the type, spacing and relative location of the fish habitat features. Draw a diagram of the diversion channel (include north arrow, flow direction) (use symbols identified on worksheet to compose your diagram).

Note – If your Temporary Diversion Channel includes fish habitat features, and you propose to construct a crossing (new ford) be sure to identify the location of the ford on the *Fish Habitat Features Worksheet* (see step E2).

Proceed to following steps if : D4 - constructing a Permanent Diversion Channel.

E - proposing to construct a new stream crossing.

F - proposing to acquire water.

D4. Permanent Diversion Channels

Permanent diversion channels are defined as a constructed channel that will convey stream flow for a period of over five years. All permanent diversion channels must include provisions for construction of fish habitat features. Refer to the channel design considerations in the guidebook for more information on permanent diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3), the ***Channel Design Method Worksheet*** (Appendix E) and the ***Fish Habitat Features Worksheet*** (Appendix F) for your Permanent Diversion Channel to YESAB and the YWB.

Note – Flood design interval for Permanent Diversion Channels in Low Habitat Sensitivity Water Production Zones is 1 : 5.

D4a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

D4b. *On the* ***Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D4c. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	**Parameter**	**Condition**
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
	Channel Duration	Permanent
	Channel Gradient	< 2%

	Channel Material in Diversion	All
Floodplain Design	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
Regime Channel	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above. In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

D4d. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

The following tables identify design restrictions and fish habitat reclamation requirements for Permanent Diversion Channels which must be incorporated to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design Restrictions for Permanent Diversion Channels

Design Component (Permanent Diversion)	**Criteria**
Overall length of diversion channel	< 5000 m
Conveyance (flood design) capacity	1:5
Channel design	As per channel design worksheets
Fish Habitat Features	As per reclamation tables

Note – in the next step you will need to refer to the *Original Channel and Site Parameters Worksheet (Appendix C)* in order to select the appropriate category of the original channel type (Pool-riffle, Dune-riffle, Plane-bed, Step-pool or Cascade Channel). For more information on channel types see the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

Construction and Reclamation Requirements for Permanent Diversion Channels

Pool-riffle / **Dune-riffle** and **Plane-bed** channel type.

Fish Habitat Features	**Spacing Requirements** (multiply the number in this column by the width of the channel in metres)
Rock Island (channel width < 5m)	10
Boulder Grouping (channel width > 5m)	6
Anchored or Buried trees	Not Required
Top Soil Spreading	Continuous (both banks)
Willow staking	At sharp bends
Transplanting	Not Required
Rip-rap	Based on channel design method

Note - Willow staking is to be completed to a width of 1 metre from the bank but is not required for the floodplain design method.

Construction and Reclamation Requirements for Permanent Diversion Channels

Step-pool and **Cascade Channel** type

Fish Habitat Feature	**Spacing Requirements** (multiply the number in this column by the width of the channel in metres)
Rock Island (channel width < 5m)	8
Boulder Grouping (channel width > 5m)	5
Anchored or Buried trees	Not Required
Top Soil Spreading	Continuous (both banks)
Willow staking	At sharp bends
Transplanting	Not Required
Rip-rap	Based on channel design method

Note - Willow staking is to be completed to a width of 1 metre from the bank but is not required for the floodplain design method.

D4e. *Use the information above to complete the* ***Fish Habitat Feature Worksheet*** *(Appendix F) to identify the type, spacing and relative location of the fish habitat features. Draw a diagram of the diversion channel (include north arrow, flow direction and reclaimed Riparian Zone) (use symbols identified on worksheet to compose your diagram).*

Note – If you propose to construct a crossing (new ford) be sure to identify the location of the ford on the *Fish Habitat Feature Worksheet* (see section E2).

Once the ***Fish Habitat Feature Worksheet*** is completed, proceed to the next question.
Do you propose to use an Existing Ford?

NO – Proceed to next question.
YES – Proceed to Step E, Watercourse Crossings, then E1, Use of Existing Ford.

Do you propose to construct a New Ford?

NO – Proceed to Step F, Water Acquisition.

YES – Proceed to Step E, Watercourse Crossings.

E. Watercourse Crossings (Fords)
Fording is defined as the crossing of creeks, streams and / or rivers at locations where a bridge, causeway or elevated embankment does not exist or is not utilized by a vehicle or equipment. Fording typically involves driving directly through a watercourse, across the banks and bed. In some instances, Fording locations (*Fords*) have been "improved" or constructed through watercourses by way of adding materials such as rocks or gravel, the modification of approaches, or the modification of the bed of a watercourse.

E1. Use of Existing Ford

Use of existing Fords is often the least preferred option for crossing watercourses however it is recognized that there are instances where it is the only viable option. Refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* for additional information on Fords. The following measures should be adhered to when utilizing existing Fords.

NOTE – Please identify if you intend to use Existing Fords on the Project Location Worksheet (Appendix A).

- Ensure water depth is sufficiently shallow to allow passage of vehicle / equipment.
- Plan your activities in advance to minimize the number of crossings required.
- Avoid crossing during extreme rain or flood events.
- Access approaches at 90° to the bank, when entering or exiting the ford.
- Maintain speed at a very slow and steady pace throughout the crossing.
- Avoid rapid acceleration while on approaches or while in the water.

E2. Construction of New Fords

Construction of new Fords should be limited to locations or applications where deemed to be absolutely necessary. More permanent or high use locations should employ the construction and use of a bridge as the primary crossing structure where possible. For more information on construction of stream crossings refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

The location of new Fords must be identified when proposed for original channels, Temporary Channels (with Fish Habitat Features), and Permanent Diversion Channels. The new ford proposed must achieve the design, construction and reclamation requirements identified in the table below to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design and Construction Restrictions and Reclamation Requirements for New Fords

Design Component (Construction of new Ford)	**Requirement**
Approach angle	90° to bank
Maximum width of approach zone clearing (surface)	10 metres
Minimum watercourse distance between Ford sites or Not to exceed more than	300 metres 4 fords / 1000 metres
Site Selection (Watercourse)	Shallow Water Depth
Site Selection (Approach / Bank Composition)	Gravel / Cobble
Construction	Equipment to Work from Bank
Maximum width of bank grading (subsurface)	10 metres
Approach surface ground coverage	Gravel / Cobble
Construction timing	Low Water Period
Reclamation	Full Topsoil Coverage

Note – The above design considerations are not required for Construction of Fords in Seasonal Diversion Channels.

E2a. *If the construction of a new ford is proposed for an original channel or previously restored channel, identify the location of the new ford(s) on the* ***Riparian Zone / Bank Modification Worksheet*** *(see step C, Riparian Zones and Appendix B).*

E2b. *If the construction of a new ford is proposed for a Temporary Diversion Channel (with fish habitat features) or a Permanent Diversion Channel, identify the location of the new ford(s) on the* ***Fish Habitat Feature Worksheet*** *(see step D3d or D4b and Appendix F).*

Once the location and specification of the new ford is identified on either the completed ***Riparian Zone / Bank Modification Worksheet*** *or the* ***Fish Habitat Feature Worksheet*** proceed to the next question.

Do you propose to withdraw water from a Low Habitat Suitability***?***

NO – Proceed to Step G, In-stream Works.
YES – Proceed to Step F, Water Acquisition.

F. Water Acquisition

Acquisition of water is required for processing materials during placer mining. Effective water management is a key consideration at all placer mine sites. The following requirements must be achieved to meet compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

F1. Water Intake Screens

In order to meet the requirement of the *Fisheries Act*, all water intakes must be screened in accordance with requirements identified in the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines. A general summary of the guideline requirements are provided in the following table. For more information regarding fish screens, please refer to the guidebook or for more specialized applications please refer to the Fisheries and Oceans Canada Intake End-of-Pipe Fish Screen Guidelines (available online or through Fisheries and Oceans Canada).

General Guidelines for Intake Screens

Design Component (Fish Screens)	Requirement
Screen Openings (Imperial)	No less than 8 openings per lineal inch, with openings no greater than 1/8 inch along any given side of the screen. If a punch plate or similar material is used, openings no greater than 1/8 inch in length or width are permitted.
Screen Openings (Metric)	No less than 3.5 openings per lineal cm, with openings no greater than 3.2 mm along any given side of the screen. If a punch plate or similar material is used, openings no greater than 3.2 mm in length or width are permitted.
Screen Area (Imperial)	1 ft^2 of open screen area per 45 imperial / 55 US gallons per minute of water withdrawn is required.
Screen Area (Metric)	929 cm^2 of open screen area per 205 litres per minute of water withdrawn is required.

Note: the objective behind the installation of intake screens is to prevent the destruction of fish through the acquisition of water. If screens of the correct mesh size are deployed between a watercourse and the intake to a water reservoir or gravity feed ditch, it is not necessary to screen the pump intake that removes water from within these structures provided these structures do not already contain fish. In the case of total recirculation systems, the operator shall ensure that any areas where fish could enter the system have barriers to prevent the entry of fish (unless the pump intake is appropriately screened).

F2. Water Withdrawals

Do you propose to withdraw the total stream flow all or some of the time you are using water for mining purposes?

NO – Proceed to the next question.

YES – It is the responsibility of the applicant to ensure that when withdrawing water for mining purposes, it is completed in such a manner as to avoid stranding of fish in the dewatered channel. If it is likely that stranding of fish will occur in a dewatered channel, the applicant should retain a qualified professional to conduct a fish salvage prior to dewatering the channel. More information on fish salvage requirements is available from Fisheries and Oceans Canada.

Do you propose to carry out in-stream works within a watercourse? In-stream works may include small dugouts or wing dams to facilitate water acquisition, in-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds.

YES – Proceed to Step G, In-stream Works.

G. In-stream Works

In-stream works are defined as works that occur within the high water mark of a watercourse, but do not include diversion channels or fords. Some in-stream works can lead to effects on fish and fish habitat such as erosion/scouring, sediment inputs, loss of habitat area, changes in channel morphology, blockages to passage, and reduced productivity.

Do you propose to carry out in-stream works within a watercourse? In-stream works may include small dugouts or wing dams to facilitate water acquisition, in-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds.

NO – Review complete – proceed with submission of all completed worksheets along with your project description to YESAB and your application for water use license to YWB.

YES – Proceed to Step G1, Severity of Effects Assessment.

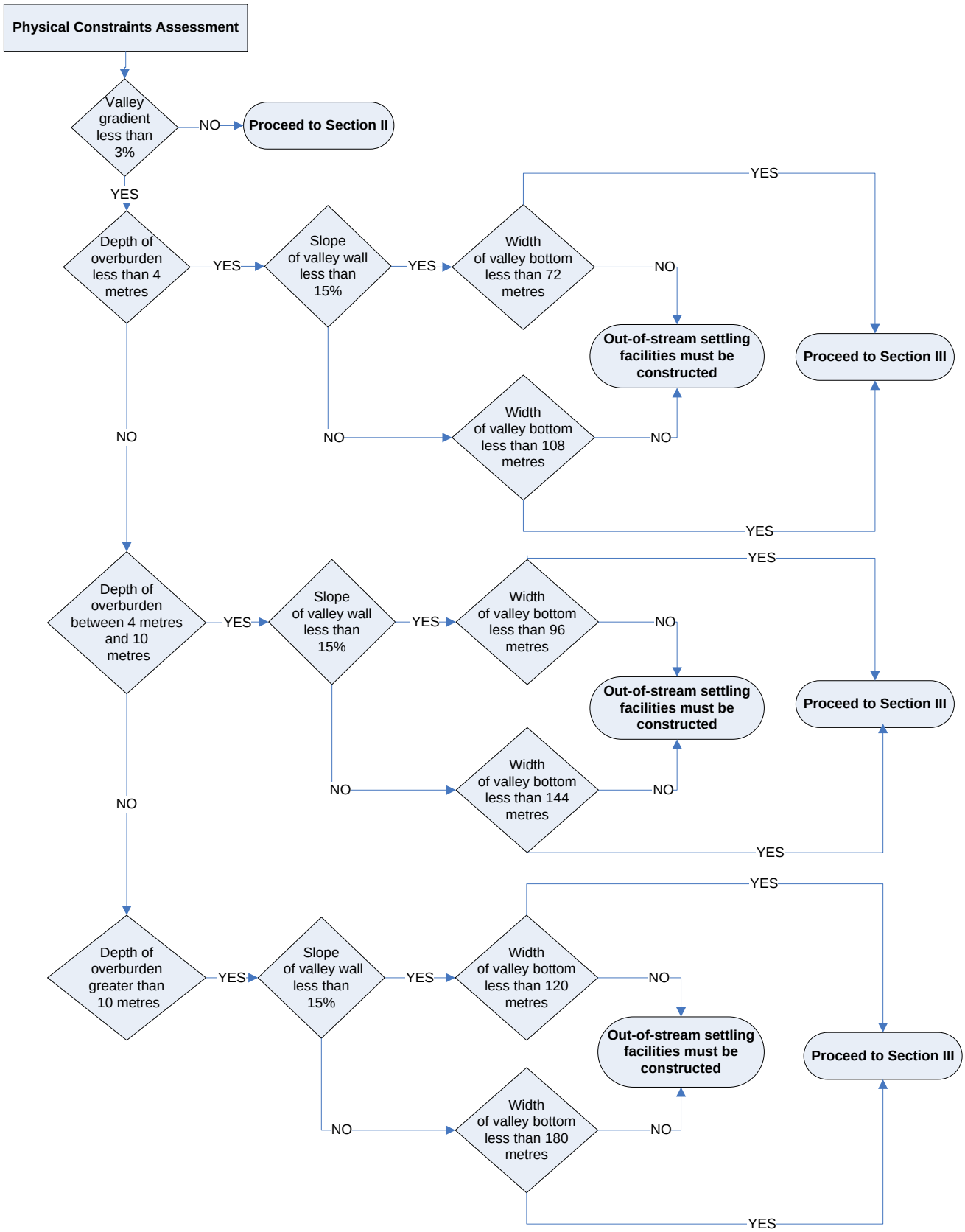
Low Habitat Suitability Watercourses

In-stream settling facilities and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds may be authorized under the auspices of a watershed-based authorization in Low Habitat Suitability Watercourses under strictly specified conditions. In order to determine whether your site qualifies, please complete the worksheet found in Section I. In-stream reservoirs constructed with cross-channel dams are authorized under watershed-based authorizations in Low Habitat Suitability Watercourses.

Section I

Use the following flowchart to evaluate whether your site is suitable for construction of in-stream settling facilities or the use of a stream channel as a conduit. **Please note that authorization to construct in-stream settling facilities or to use a stream channel as a conduit is conditional and that these works may not be permitted.** Depending upon the scale of operation or size of earth-moving equipment out-of-stream settling facilities may be required in proximity to working
area

Worksheet for Instream Settling Ponds and Use of Stream Channel as Conduit



Low Habitat Suitability (including Tributaries to Lake Trout Lakes)

Section II

The valley bottom you intend to mine is not ideal for the construction of settling ponds, due to its steep gradient. Use of the stream channel as a conduit for transporting process water to the nearest suitable site for out-of-stream settling ponds may be permitted.

Do you have the right to construct settling facilities on placer claims immediately below your working area where the valley gradient is less than or equal to 3%, and the habitat classification remains either a Low Habitat Suitability Watercourses or Moderate-low?

YES - Use the flowchart above to evaluate whether your site is suitable for construction of out-of stream settling facilities.

NO – Prior to proceeding with this proposal you must apply to Fisheries and Oceans Canada for a site-specific review of your project.

Section III

The valley bottom you intend to mine can not accommodate an out-of-stream settling facility, due to its narrow width. If you have the right to construct out-of stream settling facilities on placer claims immediately below your working area, and the habitat classification remains either a Low Habitat Suitability Watercourses or Moderate-low, use of the stream as a conduit for transporting process water to this downstream location may be permitted. If not, construction of in-stream settling ponds may be permitted. The following conditions apply to construction of these in-stream works:

- Construction and maintenance of a pre-settling pond is mandatory;
- If it is likely that stranding of fish will occur in a dewatered channel, the applicant should retain a qualified professional to conduct a fish salvage prior to dewatering the channel. More information on fish salvage requirements is available from Fisheries and Oceans Canada;
- Only compactable material (fine gravel and sand) may be used as core material in dam construction, while coarse material should be used on the surfaces to prevent erosion;
- Material must be placed in shallow (< 0.3 metre) lifts and compacted when dams are constructed;
- Sluicing must be terminated if stream flows increase to bank-full width in response to rainfall events;
- Settling ponds must be mechanically cleaned and equipped with well–armoured spillways in order to maintain stability during spring freshet; or

- A stable bypass channel must be constructed to protect the settling pond cells from high flows during spring freshet; and

- Stream channel restoration must commence once these in-stream works are no longer required for current mining activities.

The following table is to be used to evaluate the risk of proposed in-stream works in Moderate-low suitability habitats. The design elements of the proposed works must achieve a risk score of no higher than the maximum risk score identified to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Please note that in-stream settling ponds must be constructed from compactable material that is placed and compacted in shallow lifts.

Design Component	Range	Risk Score
Channel Width Construction	>30% channel constriction 5% - 30% of the channel < 5%	3 2 1
Above and Below the Structure – Difference in Water Surface	>2.0 m 0.3 – 2.0 m < 0.3 m	3 2 1
Material Type	Fine (silt-sand) Compactable (fine gravel and sand) Metal/ riprap/ structure	3 2 1
Construction Method	Non-compaction/ dumped Moderately compacted/ placement Compacted shallow lift	3 2 1
Amount of In-water Work	Completely in water Partially in water (more than ½) In dry	3 2 1
Structure Height	Above bank full Between bank full and channel bed Below channel bed	3 2 1
MAXIMUM PERMITTED SCORE FOR IN-STREAM WORKS		**16**

G1. *Calculate your total score and maximum permitted score on the* ***Severity of Effects Assessment for In-stream Works Worksheet (****Appendix G1), and record details of proposed in-stream works on the* ***In-stream Works Worksheet*** *(Appendix G2). Proceed with submission of proposal.*

Fish Habitat Design, Operation, Reclamation Requirements for Water Quality Zone Watercourses

Fish Habitat Design, Operation, Reclamation Requirements for Water Quality Zone Watercourses

Water quality zones are those areas within watercourses that are inaccessible to fish but provide water flow and contribute nutrients to downstream habitats. Water Quality zones are identified on an individual basis based on confirmed permanent barriers to fish passage. Permanent barriers include creeks that flow underground, waterfalls, and significant velocity barriers, but do not include temporary structures such as culverts, beaver dams or log jams.

Please use the following instructions and information to complete the worksheets relevant to your proposal (located in Appendix A to E). The completed worksheets will be submitted as part of your project description to Yukon Environmental and Socio Economic Assessment Board (YESAB) and your application to the Yukon Water Board (YWB).

Do you propose to undertake placer mining activities in or near a watercourse? Activities may include discharging effluent, constructing stream crossings, clearing riparian vegetation, constructing channel diversions, or withdrawing water.

NO – No further review pursuant to the *Fisheries Act* is required.

YES – Proceed to Step A, Identification of Project Location

A) Identification of Project Location

The first step in compiling a project proposal that involves activities proposed to occur in or around fish habitat areas involves completing the ***Project Location Worksheet*** (Appendix A).

A1. *On the* ***Project Location Worksheet*** *enter the stream name, the watershed name (as per* ***Yukon Placer Fish Habitat Suitability Maps),*** *identify the watershed sensitivity, and habitat suitability classification for the reaches you proposed to work in, if any reaches are designated as "prior development" a short description of the location, the proposed duration of activities and a copy of a map of the specific location of the site.*

Once the sections noted above are complete in the ***Project Location Worksheet***, proceed to the next question.

Do you propose to discharge effluent from your mine site?

NO – Proceed to Step C, Riparian Zones.

YES - Proceed to Step B, Settling Pond Discharge.

B) Settling Pond Discharge (effluent concentration)

Point source sediment discharges from gold recovery processes are typically managed through the use of settling facilities. The action level approach is a key element of the risk-based approach to sediment management for Yukon placer mining. For more information on the action level approach or settling pond design, operation, recirculation systems, and settling pond reclamation refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining*

Water quality objectives and sediment discharge standards for settling ponds in Water Quality Zones are specified in the *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat* for the specific watershed you propose to work in (general requirements summarized below). Please ensure to verify your specific discharge standard in the respective watershed you plan to work in (specifically if any exemptions exist) prior to proceeding with your application. In Water Quality Zones the discharge standard is set to maintain acceptable water quality in downstream habitats of greater sensitivity. Standards are specific to each watershed and are therefore defined in each individual Watershed Authorization.

B1. *Record the Design Target, Action Level and Compliance Level on the* ***Project Location Worksheet*** *(Appendix A).*

Once the effluent discharge standards are recorded on the ***Project Location Worksheet*** proceed to the next question.

Do you propose to build a Seasonal, Temporary or Permanent diversion channel?

NO – Proceed to Step C, Riparian Zones.

YES – Proceed to Step D, Diversion Channels.

C) Riparian Zones

The Riparian Zone is defined as the portion of the stream bank (either vegetated or not) immediately adjacent to the stream channel. Riparian Zones are measured from the high water mark on each bank of the watercourse and follow the shape of the channel.

No setback is required in Water Quality Zones; however a berm that is sufficient to prevent surface runoff and associated sediment from entering the watercourse must be constructed between the mine site and the watercourse.

Do you propose to conduct surface or subsurface works in the Riparian Zone?

NO – Proceed to Step D, Diversion Channels.

YES – Proceed to next question.

Do you propose to construct a new stream crossing (Ford)?

NO – Proceed to next question.

YES – Review Step D, Watercourse Crossings, prior to proceeding to next question.

Do you propose to clear surface vegetation only?

YES – Proceed to Step C1, Surface Vegetation Clearing.

NO – The proposal includes both clearing of surface vegetation and subsurface works, proceed to Step C1, Surface Vegetation Clearing, followed by C2, Bank Modification.

C1. Surface Vegetation Clearing

There are no restrictions on vegetation clearing in Water quality zones. Works or undertakings are authorized to occur up to the berm on the stream bank.

D) Diversion Channels

Design and construction of a diversion channel is required if the proposal includes *Seasonal*, *Temporary* or *Permanent* relocation of a water course or channel.

Provided the diversion channel design proposal meets the conditions identified in the following sections, the diversion channel may be constructed pursuant to the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat.* Specific criteria related to channel design and restoration requirements are described in the following sections while general information regarding design, construction and reclamation of diversion channels is provided in the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

D1. Original Channel and Site Parameters Worksheet

*On the **Original Channel and Site Parameters Worksheet** (Appendix C), record the information for the original channel (pre-diversion conditions). Refer to guidebook reference sections identified on the worksheet to assist you with the data collection and entry process.*

Note – The above worksheet must be completed prior to proceeding with the following steps.

***Do you propose a Seasonal relocation of a channel?** (A Seasonal Channel is in place for a period of less than one year and is replaced before winter).*

YES – Proceed to Step D2, Seasonal Diversion Channels.

NO – Proceed to next question.

Do you propose a *Temporary* relocation of a channel? *(A Temporary Channel is in place for a period of less than five years).*

YES – Proceed to Step D3, Temporary Diversion Channels.

NO – Proceed to next question.

Do you propose a *Permanent* relocation of a channel? *(A Permanent Channel is in place for a period of five years or more).*

NO – Proceed to next question.

YES – Proceed to Step D4, Permanent Diversion Channels.

D2. Seasonal Diversion Channels

Seasonal diversion channels are defined as a constructed channel that will convey stream flow for no more than one operating season. This diversion channel type may not be used to convey stream flow between late fall and the following spring of any given year. Refer to the channel design considerations in the guidebook for more information on seasonal diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3) and the ***Channel Design Method Worksheet*** (Appendix E) for your Seasonal Diversion Channel to YESAB and the YWB.

Note – Riparian Zone provisions do not apply to Seasonal Diversion Channels.

Note – Flood design interval for Seasonal Diversion Channels in Water Quality Zones is 1:1.

D2a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

Seasonal Diversion Channels must be less than 2000 metres in length.

D2b. *On the* ***Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D2c. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

D2d. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

Note – A plan for a Seasonal Diversion Channel must be accompanied by plans for a Temporary and / or Permanent Diversion Channel (See sections D3 and / or D4).

Once the ***Channel Design Method Worksheet*** is completed, proceed to Step D3, Temporary Diversion Channels or D4, Permanent Diversion Channels.

D3. ***Temporary Diversion Channels***

Temporary diversion channels are defined as a constructed channel that will convey stream flow for a period of one to five years. Refer to the channel design considerations in the guidebook for more information on temporary diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3) and the ***Channel Design Method Worksheet*** (Appendix E) for your Temporary Diversion Channel to YESAB and the YWB.

Note – The Riparian Zone provisions do not apply to Temporary Diversion Channels.

Note – Flood design interval for Temporary Diversion Channels in Water Quality is 1:2.

D3a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

D3b. *On the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed Design Flood Estimate Worksheet with your submission to the YESAB or YWB.*

D3c. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

D3d. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process.*

Please ensure to include the completed ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

D4. Permanent Diversion Channels

Permanent diversion channels are defined as a constructed channel that will convey stream flow for a period of over five years. All permanent diversion channels must include provisions for construction of fish habitat features. Refer to the channel design considerations in the guidebook for more information on permanent diversion channels. You will need to complete and submit the ***Channel Design Flood Estimate Worksheet*** (Appendix D3) and the ***Channel Design Method Worksheet*** (Appendix E) for your Permanent Diversion Channel to YESAB and the YWB.

Note – Flood design interval for Permanent Diversion Channels in Water quality Habitat is 1:5.

D4a. O*n the* ***Channel Design Flood Estimate Worksheet*** *(Appendix D3), enter the flood design interval (line 1).*

D4b. *On the* ***Design Flood Estimate Worksheet*** *(Appendix D3), enter the information required and complete the calculations. Refer to the guidebook reference sections identified on the worksheet to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Design Flood Estimate Worksheet*** *with your submission to the YESAB and the YWB.*

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following steps.

D4c. Selecting a Channel Design Method

The selection of a channel design method for channel construction is dependent upon the site geography, channel conditions and channel type. The design method selected is used to define the diversion channel dimensions and drop structure requirements.

The Channel Design Method table provides a list of recommendations to guide the selection of a suitable channel design method.

Design Method	Parameter	Condition
Channel Replication	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	> 2%
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Limited to none
	Valley Type	Incised or entrenched
	Channel Stability	Stable (if original channel is diversion it must have been in place for >10 Years)
	Notes	*Optional when channel gradient is < 2%*
Floodplain Design	Channel Duration	Permanent
	Channel Gradient	< 2%
	Channel Material in Diversion	All
	Diversion Channel Length	At least 2/3 length of original channel
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Can be used in areas with no floodplain when relocation site has space to support floodplain*
Regime Channel	Channel Duration	Seasonal or Temporary or Permanent
	Channel Gradient	All
	Channel Material in Diversion	Similar or Coarser than Original (not in seasonal channel)
	Diversion Channel Length	Any
	Floodplain	Narrow to Wide
	Valley Type	Narrow to Wide
	Channel Stability	Any
	Notes	*Use when site data is insufficient to use other methods*

Select a Channel Design Method based on the criteria listed in the table above.

In the following steps you will need to use a specific worksheet for the Channel Design Method you have selected (Channel Replication Worksheet (Appendix E1), Floodplain Design Worksheet (Appendix E2) or Regime Channel Worksheet (Appendix E3)). Do not proceed until you have selected a Channel Design Method.

Note – The Design Flood Estimate Worksheet must be completed prior to proceeding with the following sections.

D4c. On the ***Channel Design Method Worksheet*** you have selected, e*nter the information required and complete the design calculations. Refer to the guidebook reference sections identified on the worksheets to assist with the data collection, entry and calculation process. Please ensure to include the completed* ***Channel Design Method Worksheet*** *with your submission to the YESAB and the YWB.*

The following tables identify design restrictions for Permanent Diversion Channels which must be incorporated to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design Restrictions for Permanent Diversion Channels

Design Component (Permanent Diversion)	**Criteria**
Overall length of diversion channel	< 5000 m
Conveyance (flood design) capacity	1:5
Channel design	As per channel design worksheets
Fish Habitat Features	None Required

Note – in the next step you will need to refer to the *Original Channel and Site Parameters Worksheet (Appendix C)* in order to select the appropriate category of the original channel type (Pool-riffle, Dune-riffle, Plane-bed, Step-pool or Cascade Channel). For more information on channel types see the *Guidebook of Mitigation Measures for Yukon Placer Mining.*

Construction and Reclamation Requirements for Permanent Diversion Channels

Pool-riffle / **Dune-riffle** and **Plane-bed** channel type.

Reclamation Feature	**Spacing Requirements** (multiply the number in this column by the width of the channel in metres)
Top Soil Spreading	Continuous (both banks)
Rip-rap	Based on channel design method

Step-pool and **Cascade Channel** type

Reclamation Feature	**Spacing Requirements** (multiply the number in this column by the width of the channel in metres)
Top Soil Spreading	Continuous (both banks)
Rip-rap	Based on channel design method

D4d. *Use the information provided to complete the* ***Fish Habitat Feature Worksheet*** *(Appendix F) to identify the type, spacing and relative location of reclamation features. Draw a diagram of the diversion channel (include north arrow, flow direction and reclaimed Riparian Zone) (use symbols identified on worksheet to compose your diagram).*

Note – If you propose to construct a crossing (new Ford) be sure to identify the location of the ford on the *Fish Habitat Feature Worksheet* (see section E2).

Once the ***Fish Habitat Feature Worksheet*** is completed, proceed to the next question.

Do you propose to use an Existing Ford?

NO – Proceed to next question.
YES – Proceed to Step E, Watercourse Crossings, then E1, Use of Existing Ford.

Do you propose to construct a New Ford?

NO – Proceed to Step F, Water Acquisition.
YES – Proceed to Step E, Watercourse Crossings.

E. Watercourse Crossings (Fords)

Fording is defined as the crossing of creeks, streams and / or rivers at locations where a bridge, causeway or elevated embankment does not exist or is not utilized by a vehicle or equipment. Fording typically involves driving directly through a watercourse, across the banks and bed. In some instances, Fording locations (*Fords*) have been "improved" or constructed through watercourses by way of adding materials such as rocks or gravel, the modification of approaches, or the modification of the bed of a watercourse.

E1. Use of Existing Ford

Use of existing Fords may be used in Water Quality Zones. Refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* for additional information on Fords. The following measures should be adhered to when utilizing existing Fords.

NOTE – Please identify if you intend to use Existing Fords on the Project Location Worksheet (Appendix A).

Refer to the *Guidebook of Mitigation Measures for Yukon Placer Mining* for additional information on fords. The following measures should be adhered to when utilizing existing fords.

- Ensure water depth is sufficiently shallow to allow passage of vehicle / equipment.
- Plan your activities in advance to minimize the number of crossings required.
- Avoid crossing during extreme rain or flood events.
- Access approaches at 90° to the bank, when entering or exiting the ford.
- Maintain speed at a very slow and steady pace throughout the crossing.
- Avoid rapid acceleration while on approaches or while in the water.

E2. Construction of New Fords

The construction of new Fords is authorized in Water Quality Zones.

The location of new Fords must be identified when proposed for original channels, Temporary Channels (with Fish Habitat Features), and Permanent Diversion Channels. The new ford proposed must achieve the design, construction and reclamation requirements identified in the table below to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Design and Construction Restrictions and Reclamation Requirements for New Fords

Design Component (Construction of new Ford)	**Requirement**
Approach angle	90° to bank
Maximum width of approach zone clearing (surface)	No Restrictions
Minimum watercourse distance between Ford sites	No Restrictions
Site Selection (Watercourse)	Shallow Water Depth
Site Selection (Approach / Bank Composition)	Gravel / Cobble
Construction	Equipment to Work from Bank
Maximum width of bank grading (subsurface)	No Restrictions
Approach surface ground coverage	Gravel / Cobble
Construction timing	Low Water Period
Reclamation	Full Topsoil Coverage

Note – The above design considerations are not required for Construction of Fords in Seasonal or Temporary Diversion Channels.

E2a. *If the construction of a new ford is proposed for an original channel or previously restored channel, identify the location of the new ford(s) on the* ***Riparian Zone / Bank Modification Worksheet*** *(see step C, Riparian Zones and Appendix B).*

E2b. *If the construction of a new ford is proposed for a Permanent Diversion Channel,* identify the location on the ***Riparian Zone / Bank Modification Worksheet***. Proceed to the next question. ***Do you propose to withdraw water from a Water Quality Zone?***

NO – Proceed to Step G, In-stream Works.

YES – Proceed to Step F, Water Acquisition.

F. Water Acquisition

Acquisition of water is required for processing materials during placer mining. Effective water management is a key consideration at all placer mine sites. The following requirements must be achieved to meet compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

F1. Water Intake Screens

Intake pipes do **not** require screens.

G. In-stream Works

In-stream works are defined as works that occur within the high water mark of a watercourse, but do not include diversion channels or fords. Some in-stream works can lead to effects on fish and fish habitat such as erosion/scouring, sediment inputs, loss of habitat area, changes in channel morphology, blockages to passage, and reduced productivity.

Do you propose to carry out in-stream works within a watercourse? In-stream works may include small dugouts or wing dams to facilitate water acquisition, in-stream settling facilities, in-stream reservoirs, and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds.

NO – Review complete – proceed with submission of all completed worksheets along with your project description to YESAB and your application for water use license to YWB.

YES – Proceed to Step G1, Severity of Effects Assessment.

G1 - Severity of Effects Assessment and Risk Management Decisions for In-stream Works

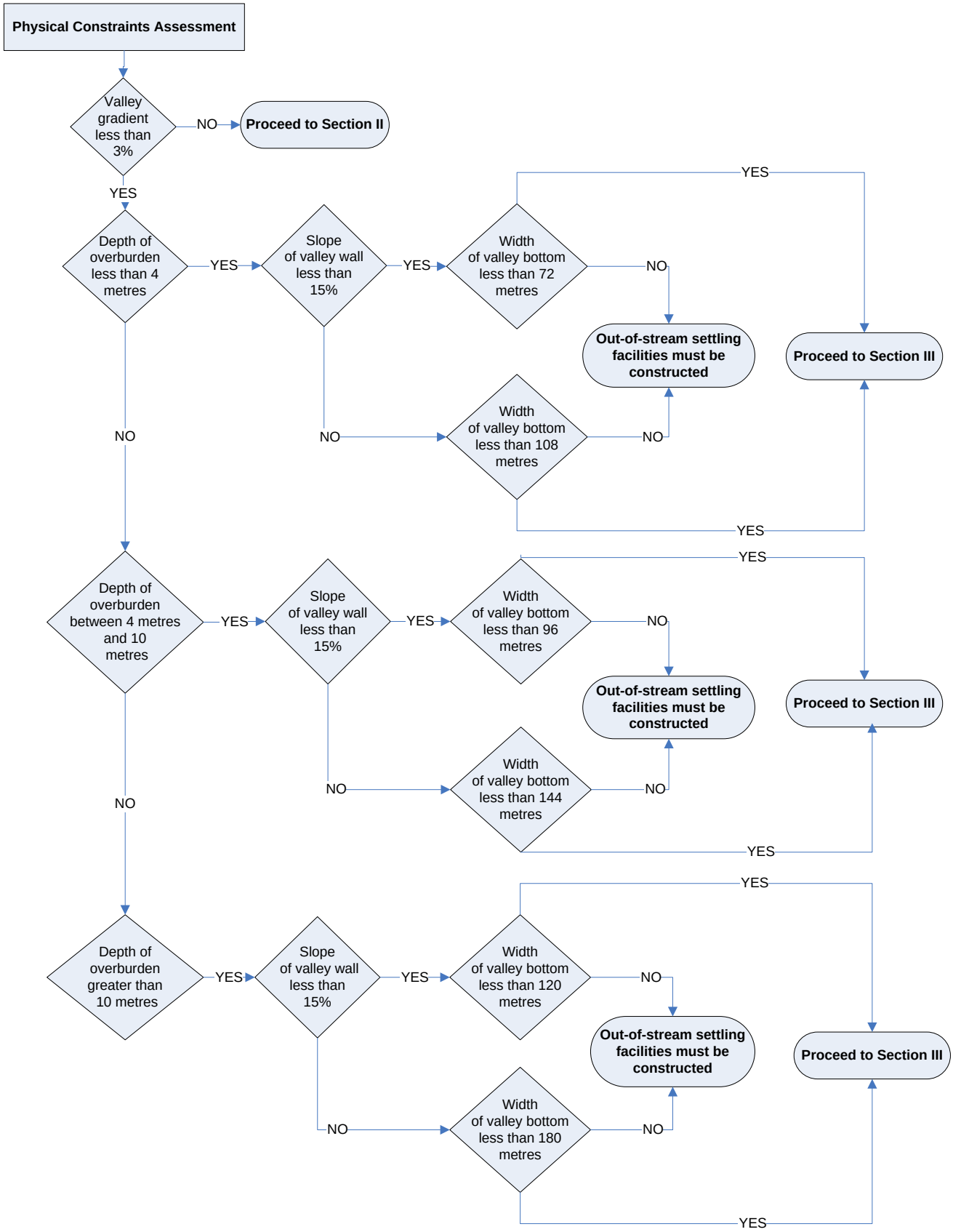
Water Quality Zones

In-stream settling facilities and use of a stream channel as a conduit to transport process water to out-of-stream settling ponds are authorized under the auspices of a watershed-based authorization in Water Quality Zones under certain conditions. In order to determine whether your site qualifies, please complete the worksheet found in Section I. In-stream reservoirs constructed with cross-channel dams are authorized under watershed-based authorizations in Low Habitat Suitability.

Section I

Use the following flowchart to evaluate whether your site is suitable for construction of in-stream settling facilities or the use of a stream channel as a conduit. **Please note that authorization to construct in-stream settling facilities or to use a stream channel as a conduit is conditional and that these works may not be permitted.** Depending upon the scale of operation or size of earth-moving equipment out-of-stream settling facilities may be required in proximity to working areas.

Worksheet for Instream Settling Ponds and Use of Stream Channel as Conduit



Section II

The valley bottom you intend to mine is not ideal for the construction of settling ponds, due to its steep gradient. Use of the stream channel as a conduit for transporting process water to the nearest suitable site for out-of-stream settling ponds may be permitted.

Do you have the right to construct settling facilities on placer claims immediately below your working area where the valley gradient is less than or equal to 3%, and the habitat classification remains either a Water Quality Zone, Low Habitat Suitability **or Moderate-low?**

YES - Use the flowchart above to evaluate whether your site is suitable for construction of out-of stream settling facilities.

NO – Prior to proceeding with this proposal you must apply to Fisheries and Oceans Canada for a site-specific review of your project.

Section III

The valley bottom you intend to mine can not accommodate an out-of-stream settling facility, due to its narrow width. If you have the right to construct out-of stream settling facilities on placer claims immediately below your working area, and the habitat classification remains either a Water Quality Zone, Low Habitat Suitability or Moderate-low, use of the stream as a conduit for transporting process water to this downstream location may be permitted. If not, construction of in-stream settling ponds may be permitted. The following conditions apply to construction of these in-stream works:

- Construction and maintenance of a pre-settling pond is mandatory;
- If it is likely that stranding of fish will occur in a dewatered channel, the applicant should retain a qualified professional to conduct a fish salvage prior to dewatering the channel. More information on fish salvage requirements is available from Fisheries and Oceans Canada;
- Only compactable material (fine gravel and sand) may be used as core material in dam construction, while coarse material should be used on the surfaces to prevent erosion;
- Material must be placed in shallow (< 0.3 metre) lifts and compacted when dams are constructed;
- Sluicing must be terminated if stream flows increase to bank-full width in response to rainfall events;
- Settling ponds must be mechanically cleaned and equipped with well–armoured spillways in order to maintain stability during spring freshet; or
- A stable bypass channel must be constructed to protect the settling pond cells from high flows during spring freshet; and

- Stream channel restoration must commence once these in-stream works are no longer required for current mining activities.

The following table is to be used to evaluate the risk of proposed in-stream works in Water Quality zones. The design elements of the proposed works must achieve a risk score of no higher than the maximum risk score identified to be in compliance with the respective watershed *Authorization for Placer Mining Works or Undertakings Affecting Fish Habitat*.

Please note that in-stream settling ponds must be constructed from compactable material that is placed and compacted in shallow lifts.

Design Component	Range	Risk Score
Channel Width Construction	> 30% channel constriction 5% - 30% of the channel < 5%	3 2 1
Above and Below the Structure – Difference in Water Surface	> 2.0 m 0.3 – 2.0 m < 0.3 m	3 2 1
Material Type	Fine (silt-sand) Compactable (fine gravel and sand) Metal/ riprap/ structure	3 2 1
Construction Method	Non-compaction/ dumped Moderately compacted/ placement Compacted shallow lift	3 2 1
Amount of In-water Work	Completely in water Partially in water (more than ½) In dry	3 2 1
Structure Height	Above bank full Between bank full and channel bed Below channel bed	3 2 1
MAXIMUM PERMITTED SCORE FOR IN-STREAM WORKS		**17**

G1. *Calculate your total score and maximum permitted score on* ***Severity of Effects Assessment for In-stream Works Worksheet*** *(Appendix G1), and record details of proposed in-stream works on the* ***In-stream Works Worksheet*** *(Appendix G2). Proceed with submission of proposal.*

List of Appendixes

Appendix A **Project Location Worksheet**

Applicant Name:				
Stream Name:		Watershed Name:		
Fish Habitat Suitability Classification(check appropriate box(s):	Operation Standard	☐ Water Quality Zone ☐ Low ☐ Lake Tributary ☐Moderate-Low ☐ Lake Tributary ☐Moderate-Moderate ☐ Lake Tributary	☐ Moderate-High ☐ High (Chinook Production) ☐ High (Areas of Special Consideration)	
	Restoration Standard	☐ Water Quality Zone ☐ Low ☐ Lake Tributary ☐Moderate-Low ☐ Lake Tributary ☐Moderate-Moderate ☐ Lake Tributary	☐ Moderate-High ☐ High (Chinook Production) ☐ High (Areas of Special Consideration)	
Watershed Sensitivity Classification:	☐ Category A	☐ Category B		
Prior Development Designation	☐ Yes ☐ No	Duration of proposed works:	(years)	
Discharge Standard (mg/L, ml/L):	Design: (mg/L, ml/L)	Action: (mg/L, ml/L)	Compliance: (mg/L, ml/L)	
Propose to Withdraw Water:	☐ Yes ☐ No			
All intakes will incorporate intake screens as per workbook:	☐ Yes ☐ No			
Propose to Use Existing Ford:	☐ Yes ☐ No			
Description of project location:				
Insert or attach map below showing proposed location of placer mine				
			North Arrow	

Appendix B **Riparian Zone / Bank Modification Design Worksheet**

Applicant Name:			
Stream Name:			
Riparian Zone			
Duration of Proposed Vegetation Clearing:	(years)	Total Length of Proposed Vegetation Clearing:	(m)
Habitat Suitability Type:		Width of proposed Works:	(m)
Designated Setback Distance:	(m)	Actual Setback Distance:	(m)
Bank Modification			
Duration of Proposed Bank Modification:	(years)	Total Length of Proposed Bank Modification:	(m)
Habitat Suitability Type:		Width of proposed Works:	(m)
Minimum Setback Distance:	(m)	Actual Setback Distance:	(m)

Do You Propose to Construct a New Ford: ☐ Yes ☐ No

Are Existing Fords Present: ☐ Yes ☐ No

Natural Channel Start

← Site Length (m) →

Natural Channel End

North Arrow

Diversion Channel

Flow Direction

Use the following symbols to indicate proposed works on map.

Riparian Clearing:	▮▮▮▮	Riparian Boundary:	- - - - - -
Bank Modification and Clearing:	**xxxxxxxx**	Stream Bank:	———
Previously Reclaimed Area:	‖‖‖‖	Undisturbed Vegetation:	▭
New Fords:	N	Existing Fords:	E

Required Reclamation Works (from workbook tables)

	Vegetation Clearing Requirement	Bank Modification Requirement
Grading:		
Surface:		
Vegetation:		

Appendix C **Original Channel and Site Parameters Worksheet**

Applicant Name:						**Guidebook Reference Section**
Channel Morphology:	Straight	☐	Meandering	☐	Braided ☐	**2.2.2**
Channel Floodplain Type:	None	☐	Narrow	☐	Wide ☐	**2.2.3**
Valley Length:	(metres)					**2.2.4**

Floodplain Width: **Note all measurements must be in metres.** **2.2.5**

Site	Width	
1		m
2		
3		
4		
5		
6		
Total of 1 to 6 above:		
Average width (total divided by 6):		

Change in Streambed Elevation:		m	**2.2.6**
Natural Channel Grade:		**%**	**2.2.7**
Flow Velocity Estimate:		Metres/second	**2.2.8**
Original Channel Length :		(metres)	**2.2.9**

Channel Width and Depth: **2.2.10**

Site	**Width**		**Site**	**Depth**	
1		(metres)	1		(metres)
2			2		
3			3		
4			4		
5			5		
6			6		
Total 1 to 6 Above:			Total 1 to 6 Above:		
Average (Total / 6)			Average (Total / 6)		

Channel Type (circle)	Dune-Ripple / Pool-Riffle / Plane-Bed / Step-pool / Cascade	**2.2.11**

Channel Bed Material: **2.2.12**

Record the most abundant size class		mm, in (circle)
Record the second most abundant size class		
Record the third most abundant size class		

Appendix D1

Severity of Effects Assessment for Seasonal Diversion Channel Worksheet

(Not applicable to High, Moderate-high and Moderate-moderate suitability habitat)

Applicant Name:	**Stream Name:**		
Design Component	**Range**	**Range Score**	**Project Score**
Channel gradient	**3.51% to 5.0%**	**3**	
	1.51% to 3.5%	**2**	
	0 to 1.5%	**1**	
Length of diversion channel	**1000 to 2000 metres**	**2**	
	<1000 metres	**1**	
Relative length of diversion channel	**Shorter than original**	**1**	
	Equal or Longer than original	**0**	
Permafrost in diversion channel	**Present**	**3**	
	Absent	**0**	
Primary material in diversion channel	**Silt / Sand**	**2**	
	Gravel / Cobble / Bedrock	**1**	
Location of diversion channel	**Perched (valley wall)**	**4**	
	Confined (valley floor)	**2**	
	Incised (valley floor)	**1**	
Project Score for Seasonal Diversion Channels			

Maximum permitted score for Seasonal diversion in Moderate-low suitability habitat: **11**
Maximum permitted score for Seasonal diversion in Freshwater Fisheries Production zones: **13**

Appendix D2

Severity of Effects Assessment for Temporary Diversion Channel Worksheet (Not applicable to High and Moderate-high suitability habitat)				
Applicant Name:		**Stream Name:**		
Design Component	**Range**		**Range Score**	**Project Score**
Channel gradient	**3.51% to 5.0%** (Not applicable to Moderate-moderate suitability habitat)		**3**	
	1.51% to 3.5%		**2**	
	0 to 1.5%		**1**	
	2000 to 5000 metres (Not applicable to Moderate-moderate suitability habitat)		**3**	
Length of diversion channel	**1000 to 2000 metres**	Moderate-moderate	**3**	
		Moderate-low	**2**	
		Freshwater Fisheries Production	**2**	
	500 to 1000 metres		**2**	
	<500 metres		**1**	
Relative length of diversion channel	**Shorter than original**		**1**	
	Equal or Longer than original		**0**	
Permafrost in diversion channel	**Present** (Not applicable to Moderate-moderate suitability habitat)		**2**	
	Absent		**0**	
Primary material in diversion channel	**Silt / Sand**		**2**	
	Gravel / Cobble / Bedrock		**1**	
	Perched (valley wall) (Not applicable to Moderate-moderate suitability habitat)		**4**	
Location of diversion channel	**Confined (valley floor)**		**2**	
	Incised (valley floor)		**1**	
Fish habitat features (rock islands / boulder groupings only)	**Moderate-moderate** (50% of total amount required for permanent channel)		**-1**	
	Moderate-low and Freshwater Fisheries Production zones (30% of total amount required for permanent channel)			
Project Score for Temporary Diversion Channels				

Maximum permitted score for Temporary diversion in Moderate-moderate suitability habitat: **7**
Maximum permitted score for Temporary diversion in Moderate-low suitability habitat: **10**
Maximum permitted score for Temporary diversion in Freshwater Fisheries Production zones: **12**

Appendix D3 Channel Design Flood Estimate Worksheet

(NOTE*: a separate Appendix D3 is required for each Habitat Suitability type*)

Applicant Name:

Guidebook Reference Section

Stream Name:

1. Required Flood Design Interval:										**2.3.3**
	Permanent Restoration Channel	:	Temporary Diversion	:	Seasonal Diversion	:				**2.3.4**
	(Refer to guidelines for applicable Habitat Suitability type and list it here:									
2. Calculated Severity of Effects Assessment Score for diversions:										
3. Upstream Drainage Area Calculation:										
	A. Topographic Map Scale (circle):	(1:50,000 or 1:250, 000)								
	B. Number of large (solid line) squares (1cm x 1cm):									
	C. Number of small (solid line) squares (0.5cm x 0.5cm):									
	D. Area within large (solid line) squares	=	Number of large squares	x	Area Factor					
		=		x	**1.5625**					
		=		Km^2						
	E. Area within small (dashed line) squares	=	Number of small squares	x	Area Factor					
		=		x	**0.0625**					
		=		Km^2						
			Area within small solid squares							
	F. Total drainage area = Area within large solid squares	+								
	=	+								
	=	km^2								
4. Determine Hydrologic Zone										
A. Upstream streambed elevation =		ft / m (circle one)								**2.3.5**
	B. Downstream streambed elevation =		ft / m (circle one)							
	C. Channel length between up and downstream elevations =		(m)							
	D. Average upstream Channel Slope =	Upstream elevation – Downstream elevation / Channel length							x 100%	
	=	–							x 100%	
	=	%								

	Mountain / Interior (circle)	Mountain (slope greater than or equal to 4.5%)
		Interior (slope less than 4.5%)

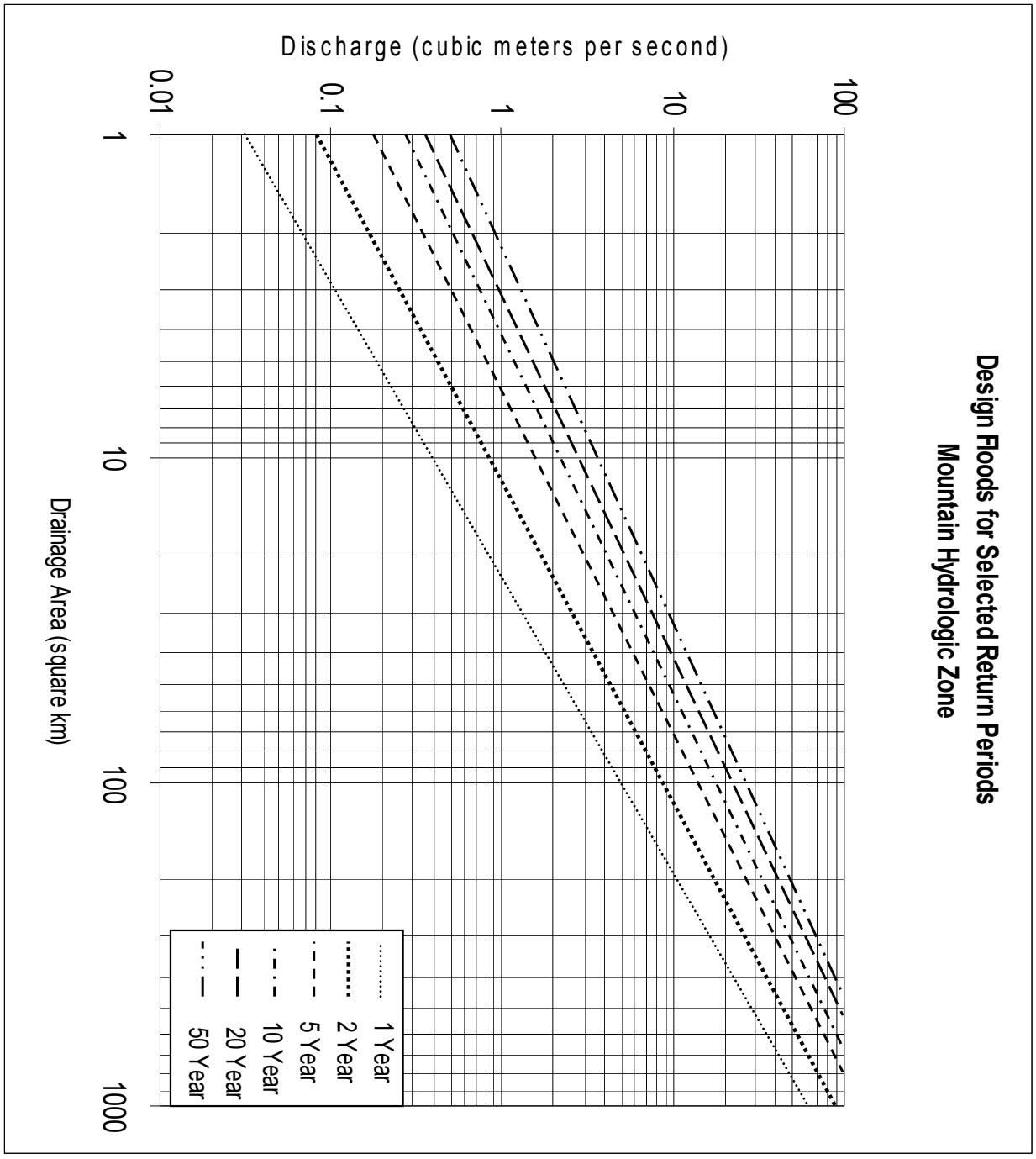
Appendix D3 (continued) **Applicant Name:**
Stream Name:

5. Design Flood Estimate:

A. Use the information from above (Steps 1 to 4) combined with the following graphs to determine the discharge (m^3 / sec) required for your proposed diversion channel.

A1. If the proposed site is located in the Mountain Hydrologic Zone use the following graph.

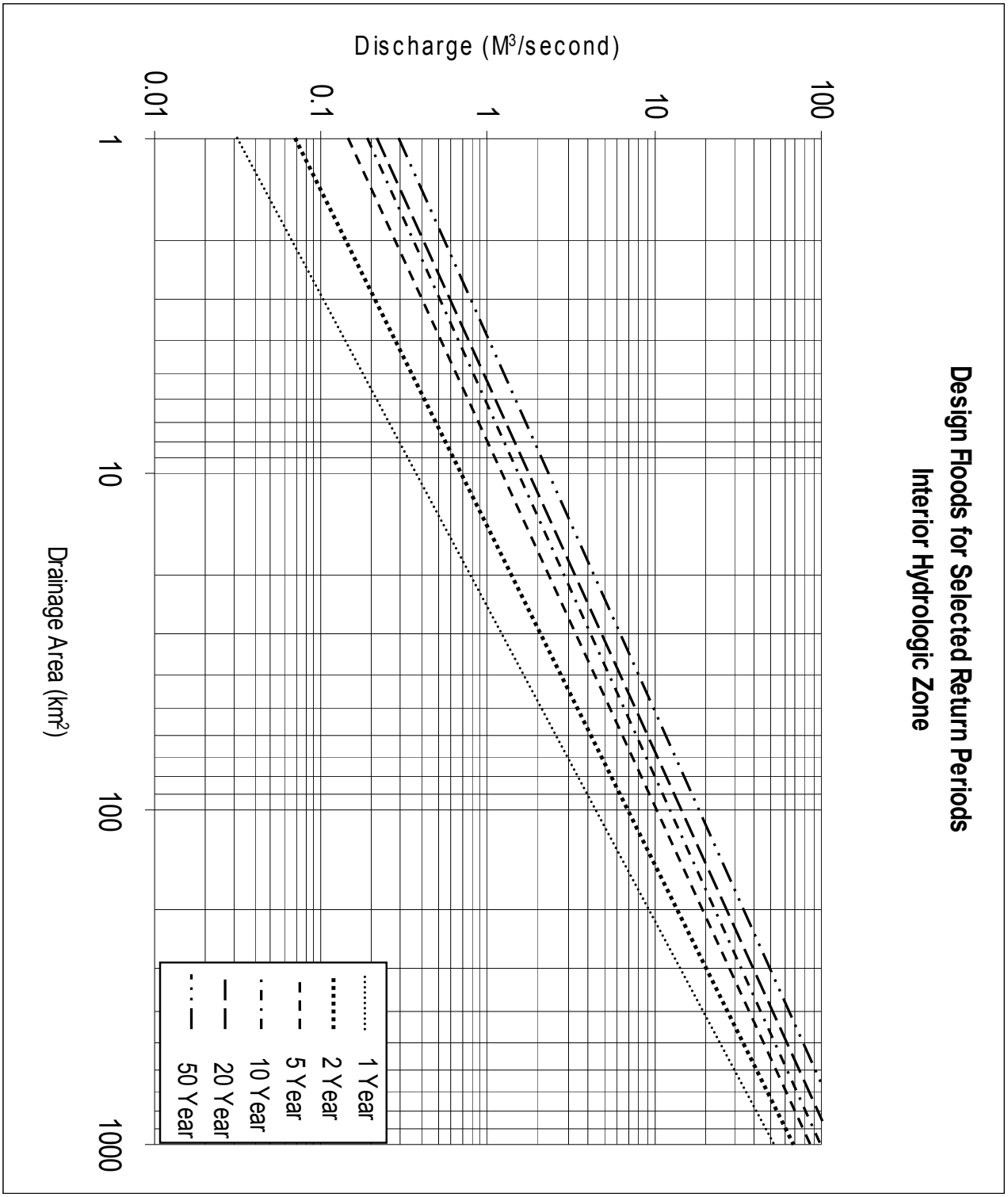
Enter the chart on the horizontal axis (Drainage Area). Draw a vertical straight line up through the appropriate return interval line on the graph. Draw a horizontal straight line to the left axis (left side of chart) from the intersection point with the vertical line. Read the Discharge on the left axis.



A2. Record the Required Diversion Channel Design Discharge : _____ m^3 / sec

Appendix D3 (continued) **Applicant Name:**
Stream Name:

B1. If the proposed site is located in the Interior Hydrologic Zone use the following graph.



B2. Record the Required Diversion Channel Design Discharge: _____ m^3 / sec

Appendix E1 **Channel Replication Worksheet**

Applicant Name:

Guidebook Reference Section

Stream Name:

A. Required Diversion Channel Width:

Diversion Channel Width = Average Original channel width (m) x 1.2

= _____ metres

Diversion Channel Depth = Average original channel depth (m) x 1.5

= _____ metres

2.3.7

B. Original Channel Grade: _____ %

C. Proposed Channel Length: _____ metres

D. Is the diversion channel length less than the natural channel length?

☐ If Yes drop structures are required

☐ If No drop structures are not required

E. Required Number of Drop Structures

$$\text{Diversion Channel Bed Elevation Change} = \text{Proposed Channel Length} \times \frac{\text{Channel Grade}}{100}$$

$$= \_\_\_\_ \times \frac{\_\_\_\_}{100}$$

= _____ metres

F. Total Height of Drop Structures required:

$$= \text{Natural channel bed elevation change} - \text{Diversion channel bed elevation change}$$

$$= \_\_\_\_ - \_\_\_\_$$

= _____ metres

G. Number of Drop Structures Required:

Proposed Individual Drop Structure Height = _____ metres

$$\text{Number of Drop Structures Required} = \frac{\text{Total Height of Drop Structures}}{\text{Individual Drop Structure Height}}$$

$$= \frac{\quad}{\quad}$$

= _____ metres

Appendix E2 **Floodplain Design Worksheet**

Applicant Name:				**Guidebook Reference Section**
Stream Name:				
A. Floodplain Width:				**2.3.8**
Originally a Non-floodplain System	=	Average original channel width	x 3.0	
	=		x 3.0	
	=		metres	
Originally a Narrow or Wide Floodplain System	=	Average original channel width	x 6.0	
	=		x 6.0	
	=		metres	
B. Restoration Channel Width	=	Average Original channel width	x 1.2	
	=		x 1.2	
	=		metres	
C. Restoration Channel Depth	=	Average original channel depth	x 1.2	
	=		x 1.2	
	=		metres	
D. Restoration Channel Length:	=	Original channel length		
	=		metres	

Appendix E3 **Regime Channel Worksheet**

(Use Design Charts 1-4)

Applicant Name: **Guidebook Reference Section**

Stream Name:

A. Bed Material: Sand / Gravel / Small Cobbles / Large Cobbles / Rocks / Boulders (circle) **2.3.9**

B. Diversion Channel Discharge (m^3/sec): _____ (from section 5 Design Flood Estimate Worksheet)

C. Diversion Channel Width:

C1. Use Design Chart 1 based on Discharge and bed Material: _____ metres

D. Diversion Channel Depth:

D1. Use Design Chart 2 based on Discharge and Bed Material: _____ metres

D2. Add additional freeboard based on the following table:

Diversion Channel Width	Freeboard
< 5 metres	Add 0.5 metres
5 – 10 metres	Add1.0 metre
> 10 metres	Add 1.5 metres

D3. Total Channel Depth

Channel Depth	+	Freeboard
	+	
	=	metres

C. Channel Grade:

C1. Use Design Chart 3 based on Discharge and Bed Material: _____ %

D. Velocity of Flow:

D1. Use Design Chart 4 based on Discharge and Bed Material: _____ m /sec

E. Required Channel Length:

$$\text{Required Length (m)} = \frac{\text{Change in natural channel bed elevation}}{\text{Required Channel Grade (\%)}} \times 100\%$$

$$= \frac{\quad}{\quad} \times 100\%$$

$$= \quad \text{metres}$$

F. Proposed Diversion Channel Length = _____ metres

G. Diversion Channel Bed Elevation Change:

$$\text{Diversion Channel Bed Elevation Change} = \frac{\text{Required Channel Grade (\%)}}{100} \times \text{Diversion channel length (m)}$$

$$= \frac{\quad}{100} \times \quad$$

$$= \quad \text{metres}$$

Appendix E3 (continued) **Applicant Name:**
Stream Name:

H. Total Height Drop Structures Required:

Total Height Drop Structures = Natural channel bed elevation change - Diversion channel bed elevation change

[ ] - [ ]

= [ ] metres

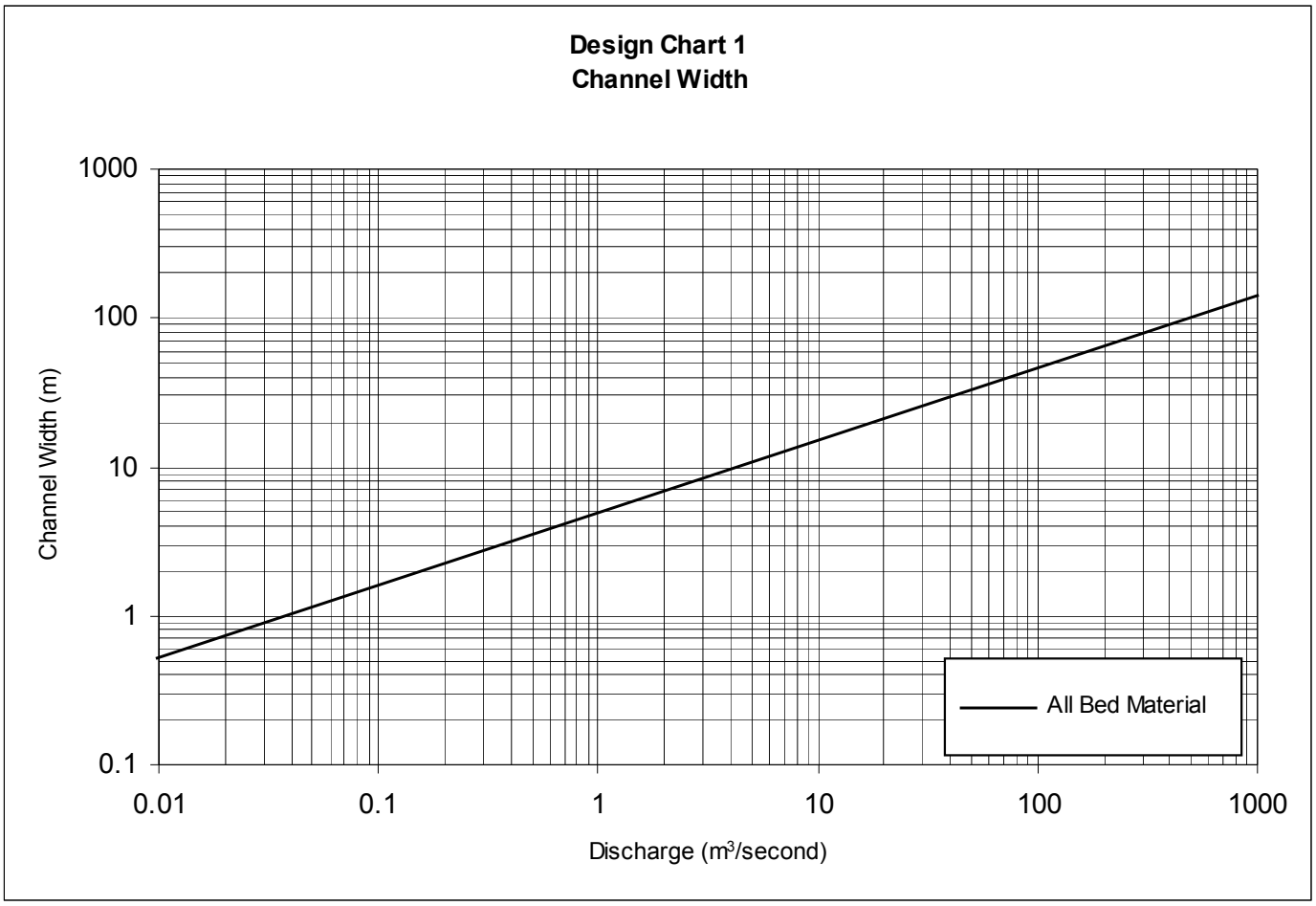
I. Number of Drop Structures Required:

Individual Drop Structure Height = [ ] metres

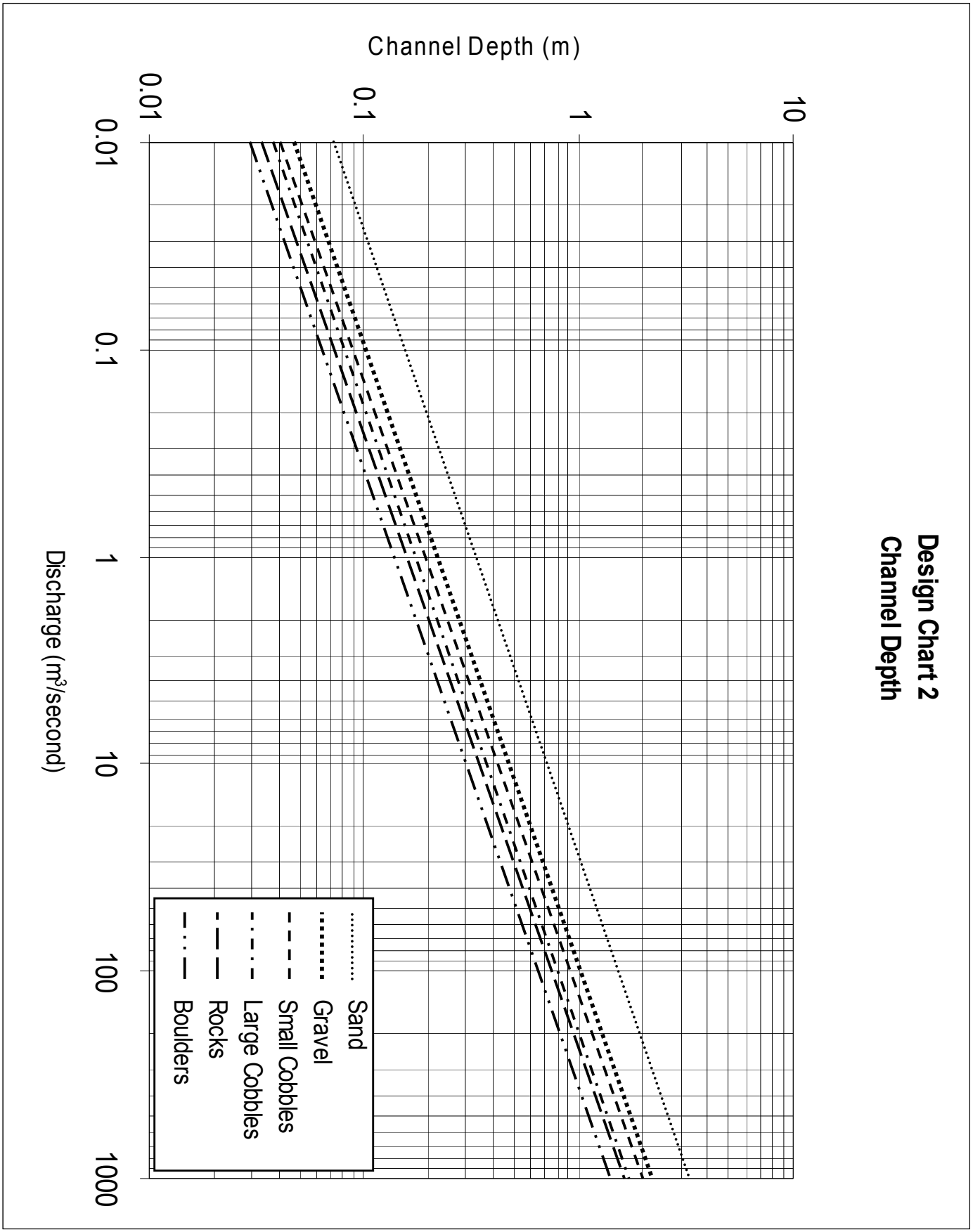
Number Required = Total Height of Drop Structures (m) / Individual Drop Structure Height (m)

= [ ] (m) / [ ] (m)

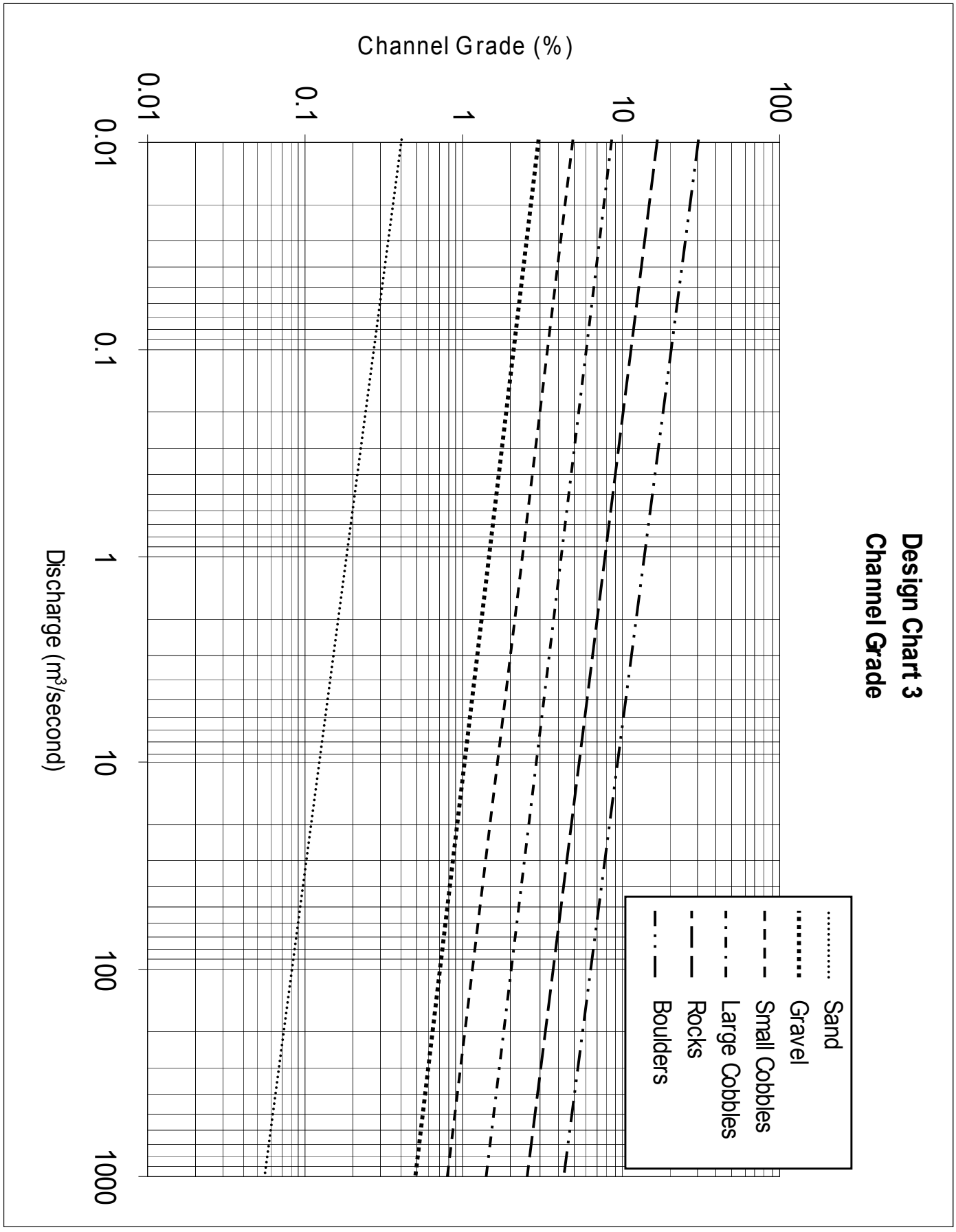
= [ ] Number



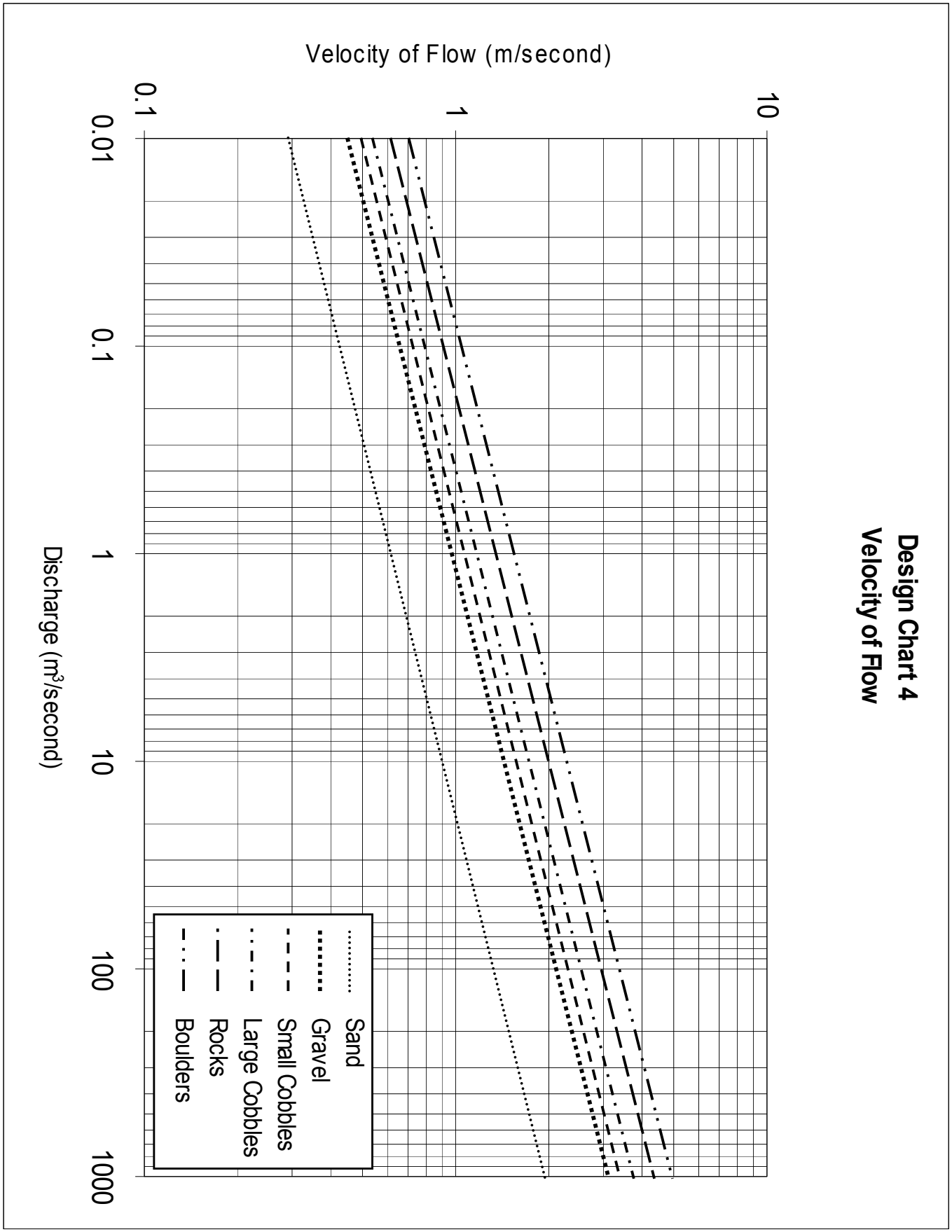
Appendix E3 (continued) **Applicant Name:**
Stream Name:



Appendix E3 (continued) **Applicant Name:**
Stream Name:



Appendix E3 (continued) **Applicant Name:**
Stream Name:



Appendix F **Fish Habitat Feature Design Worksheet**

(Temporary or Permanent Restoration Channel)

Applicant Name:

Stream Name:

Use the template below to draw a schematic of the proposed fish habitat features that will be constructed

Natural Channel Start		**North Arrow**
↑ Site Length (m) ↓		Diversion Channel
Natural Channel End		**Flow Direction**

Use the following symbols to indicate habitat feature locations.

Stream Bank	———	Anchored or buried tree	—<
Topsoil	- - - -	Willow staking	vv
Rock Island / Boulder Group		Transplant	
Ford		Drop Structure	**xxxx**

Fish Habitat Feature Description	**Spacing Requirement** (*X channel width*)	**Spacing Proposed (m)** (*Channel Width x Spacing Requirement*)

Appendix G1

Severity of Effects Assessment for In-stream Works Worksheet			
Applicant Name:			
Stream Name:			
Design Component	**Range**	**Risk Score**	**Project Score**
Channel Width Construction	**>30% channel constriction** (Not applicable for Moderate-high suitability habitat)	**3**	
	5% - 30% of the channel	**2**	
	< 5%	**1**	
Above and Below the Structure – Difference in Water Surface Level	**>2.0 m** (Not applicable for Moderate-high suitability habitat)	**3**	
	0.3 – 2.0 m	**2**	
	< 0.3 m	**1**	
Material Type	**Fine (silt-sand)** (Not applicable for Moderate-high, Moderate-moderate, or Moderate-low suitability habitat)	**3**	
	Compactable (fine gravel and sand)	**2**	
	Metal/ riprap/ structure	**1**	
Construction Method	**Non-compaction/ dumped** **Moderately compacted/ placement** **Compacted shallow lift (or rip-rap, gabions, or boulders)**	**3** **2** **1**	
Amount of In-water Work	**Completely in water**	**3**	
	Partially in water (more than ½)	**2**	
	In dry	**1**	
Structure Height	**Above bank full**	**3**	
	Between bank full and channel bed	**2**	
	Below channel bed	**1**	
PROJECT SCORE FOR IN-STREAM WORKS			

Note – some ranges are not permissible in specific habitat suitability classes.

Note – in-stream settling ponds must be constructed from compactable material that is placed and compacted in shallow lifts.

Maximum permitted score for in-stream works in Moderate-high suitability habitat:	**12**
Maximum permitted score for in-stream works in Moderate-moderate suitability habitat:	**12**
Maximum permitted score for in-stream works in Moderate-low suitability habitat:	**14**
Maximum permitted score for in-stream works in Freshwater Fisheries Production zones:	**16**
Maximum permitted score for in-stream works in Water Quality zones:	**17**

Appendix G2 **In-stream Works Worksheet**

Applicant Name:	**Stream Name:**

Do you Propose: Excavation of Dugout ☐ Stream Channel As Conduit ☐ Wing Dam ☐

In-stream Dam ☐ In-stream Settling ☐ In-stream Reservoir ☐

Description of the proposed in-stream works.

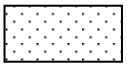
Calculated total score from Severity of Effects Assessment table :

Maximum permitted score for in-stream works :

Use the template below to draw a schematic of the proposed in-stream works.

		North Arrow
↓ Site Length (m) ↑		
		Flow Direction

Use the following symbols to indicate feature locations.

Stream Bank	——	In-stream Dam	
In-stream Settling Area		Point of Discharge	X
Dugout		Wing Dam