Application for fish pass approval

Guidance notes

Introduction

Please read through these guidance notes and the application form carefully before you fill the form in.

If you are not sure about anything in the form, phone us on **08708 506 506 between 8am and 6pm, Monday to Friday**.

The form is designed to help you provide the information we need to understand and approve the design and dimensions of your proposed fish pass. However, designing fish passes is very specialised and technical, so you should read the Environment Agency Fish Pass Manual (or other similar publications) which is on our website at http://publications.environment-agency.gov.uk/pdf/GEHO0910BTBP-E-E.pdf. Because of the specialised nature of the information we need, we recommend that you use specialist consultants to make sure the design is appropriate and you provide enough details.

About the form

Fish passes are specialised structures designed to help fish swim upstream. If they are needed on rivers where there are salmon, sea trout and eels, the form and dimensions of the pass must be approved by us. This is so we can make sure that you provide an appropriate type and design of pass.

The design of fish passes for other species (such as coarse fish) must be compatible with approved status, so you must fill in this form for all fish passes, regardless of the species of fish they are for.

We cannot grant Fish Pass Approval if you do not provide engineering design drawings of the proposed pass. However, we will still assess applications without these documents to see whether any proposed fish pass forming part of a hydroelectric-power scheme is compatible with approved status. Your obligation to get Fish Pass Approval will apply until you provide the necessary documents that we can approve.

Contents

Documents you need to provide

Please send the following with this application.

- A map or location plans, at an appropriate scale, to indicate the proposed position of the fish pass and all related structures. Please also make sure that the inverts of the structure (that is, the concave lower surfaces) are shown.
- Three copies of the detailed engineering drawings of the fish pass.

Other documents you could provide to support your application

- A percentage exceedance hydrograph (a percentage exceedance of Q_{10} is a river flow, in cubic metres per second, that is exceeded only 10% of the time. Q_{95} is a river flow exceeded 95% of the time).

1 Site details

We need to be able to easily identify the location of the proposed fish pass. Please provide:

- the name of site, including any names local people call it (if any);
- the National Grid Reference (10 figures) for the site;
- the name of the watercourse; and
- a list, in order, of the rivers that the watercourse joins on its way to the sea.

2 Details of the obstruction

2.1 Type of obstruction

Give a description of the type of obstruction (for example, vertical weir, sloping weir, stepped weir, weir and control structures, control structures only (mixed), sluices, radial gates, dam, estuary barrage, tidal exclusion, bridge footings, ford, culvert, natural falls and so on) the pass needs to overcome.

2.2 Purpose of the obstruction

Give a description of the purpose of the obstruction (for example, navigation, abstraction (removing water), fish counter, fishing weir, flood defence, recreational, transport crossing and so on).

2.3 Description of the obstruction

Provide a description of the obstruction, including any relevant control structures and associated channels. If there is more than one channel at an obstruction, describe how the flows are currently distributed. With your application you must provide a plan, at a scale of 1:2500 or 1:10,000, showing the general layout of the site.

2.4 Length of the crest (top) of the structure the pass is beside

Provide the overall length of the existing structure, including separate details for fixed crests and other water-control structures that are set at different levels.

2.5 Maximum difference between upstream and downstream water levels at the structure

State the maximum difference (head drop) expected between upstream and downstream water levels at the structure. The maximum difference will normally occur at low flow (for example Q_{95}), but this may not always be the case. If the maximum does not occur at low flow, please explain why it occurs at a different flow.

2.6 Owner of the obstruction and riverbanks at the structure

Give the details of the person who owns the obstruction and the riverbanks at the site of the pass. If there is more than one owner, give the details of other owners on a separate piece of paper and attach it to the form.

3 Fish pass design and ownership details

In this section you need to give us details of:

- the person who has designed the fish pass; and
- who will own and operate the fish pass.

If the person who will own and operate the fish pass is the owner of the obstruction and riverbanks at the structure, as named in 2.6, tick the 'The person named in 2.6' box.

If someone else will own and operate the fish pass, tick the 'Another person' box and give that person's details.

3.3 Lead Environment Agency Officer

If your pass does not need to be approved by us, because it is not needed for salmon, sea trout or eels, give the name of any Environment Agency Officer you have consulted during the design process. If the pass needs to be approved by us, give details of the Environment Agency Officer leading the project.

4 Fish species and period of migration

4.1 Species

In the table:

- tick the relevant boxes to show which species of fish the pass is designed for and what other species are present in the watercourse; and
- the size range for each species.

If there are lamprey, coarse fish or other species in the watercourse, specify the species (for example, sea lamprey, chub, minnow). Continue on separate sheets if you need to.

4.2 Period of operation

If the pass is expected to work all year, tick 'All year'. Otherwise, tick the 'Shorter periods' box and list the species (as shown in the table in 4.1) that will use the pass and during which months. If necessary, continue on a separate piece of paper and attach it to this application.

5 River discharge and water levels

5.1 Annual river discharge

River discharge is the volume of water which flows in a given time. It is usually measured in cubic metres per second (m^3/s).

ADF or Annual Daily Mean Flow is the average river discharge per day for the year.

You can get river discharge figures for different percentile exceedance levels from Environment Agency Hydrometric Officers (there may be a charge).

5.2 Range of river discharge

If you know specific migration periods, use these, recording them separately for each species (as in 4.1 above). If you do not know the migration periods for the site, then it is expected that the pass will operate over the following ranges.

Q_{90} to Q_{10} for salmon

Q_{95} to Q_{10} for sea trout

Q_{95} to Q_{20} for coarse fish

Q_{99} to Q_{70} for eels

5.3 River water levels

The levels you give here should be the levels above ordnance datum (a known position which heights are measured from). This can be obtained from professional survey grade Global Positioning Satellite (GPS) equipment. It is recommended that this is carried out by survey professionals.

In the third column, state whether the level was measured or estimated. In the final column, explain how the level was measured or estimated.

6 Description of fish pass, operating flows, and intended operating periods

The details you provide in this section must accurately describe the form and dimensions of the pass, and how the fish pass is intended to operate effectively over the range of river flows when the target species are expected to be migrating.

Include plans and sectional elevations of all relevant parts of the pass and neighbouring structures (see the guidance under 'Documents you need to provide' in the guidance notes). The levels of all relevant crests, channels of the pass, and the upstream and downstream water levels under the range of water levels should be marked on the drawing using Ordnance Survey datum.

6.1 Type of fish pass

State the type of fish pass (for example, Pool and Traverse, Pool and Orifice, pre-barrages, Vertical Slot, Deep Notch and Orifice, V Notch Weir, Plane Baffle Denil, Alaskan A Denil, Larinier (super-active baffle), Chevron Bottom Baffle, Chevron Side Baffle, Hurn Baffle, Bristle Pass (fish and canoe). If the pass is a combination of these types, list the types.

6.2 Description of the fish pass

Describe the general layout of the pass (for example, single flight of Pane Baffle Denil, two flights of Larinier with rest pool, ten pool Vertical Slot passes, eight pool Pool and Traverse passes, Alaskan A Denil with pre-barrages).

6.3 Location of the fish pass

Describe where the downstream entrance of the pass is in relation to the downstream edge of the weir structure and why it is located there. The location of the downstream entrance is usually critical for a pass for fish migrating upstream. For example, it may be the most upstream location, it may be where fish appear to collect, or somewhere else that tracking studies have identified as the place where fish approach the obstruction. If it is relevant, describe where the downstream entrance is in relation to the discharge from a hydropower station.

6.4 Pass location and operation design

The ability to attract fish into the entrance to the fish pass is absolutely critical for the fish pass to be effective. Fill in the table to show:

- the pass discharge (in m^3/s);
- the augmentation flow, if any (in m^3/s); and
- the total attraction flow, as a percentage of the river discharge;

for the percentile exceedance values and river discharges shown in the table at 5.1.

6.5 How other water-control structures may affect the operation of the pass

Spills of water (particularly varying ones) at or from nearby water-control structures can affect the performance of the pass by altering the water level, water flows in the pass and associated attraction flows of the pass. Describe how the operation of nearby water-control structures (for example, opening sluice gates, flood discharge channels and so on) can affect the fish pass.

6.7 Details of pool passes

This section should demonstrate how the pool pass is designed to meet the guidelines laid out for pool passes in the Environment Agency Fish Pass Manual. We recommend you provide drawings to support and expand upon the description.

The following details must be provided in the description, or in a detailed drawing(s) to support the description.

- Elevations and dimensions of all relevant inlet or outlet channels and water-control structures at the site that are likely to affect the operation of the pass (for example, the crest of a nearby weir, invert of water-control structures and so on)
- Elevations of side walls and the bases of pools
- Elevations and dimensions of all overfalls, notches, orifices and sills
- Thickness of traverses in notches or on overfalls
- Length and width of all pools
- Expected water levels in pools at the minimum and maximum range of river flows the pass is intended to operate at
- The shape and angular arrangement of any vertical slots
- Dimensions and elevations of arrangements to shield the pass from debris, including the gaps between bars if any are fitted
- Power density values in the pools at the minimum and maximum discharge the pass is intended to operate at
- Details of any associated structures, such as traps or counters, that may affect the pass's characteristics or operation
- Details of any coverings or lighting arrangements

6.8 Operating conditions for pool passes

This section summarises the hydraulic conditions of river flows expected in the fish pass at the river discharge limits it is intended to operate at.

We require power densities for each pool of a different size. If there are more than three different sized pools, please include additional power densities on additional sheets attached to this application.

The term nn is there to indicate the pool number. A pool pass has a number of pools. In most cases they will be equally sized pools but others may have several different sizes.

Tailwater refers to the section of the river into which water from the final pool spills into the river. Head difference is the difference in height between the pools.

Power density is a measure of turbulence in the pools. It can be worked out as follows.

Weight of 1 cubic metre of water in grams × acceleration due to gravity × pass discharge in cubic metres per second × difference in head between pools in metres divided by Length of pool × width of pool × average depth of pool.

Which is the following formula:

P/V (watts per cubic metre) $= (9810 \times Q \times DH)/(L \times W \times Dm)$

Where: Q = flow (metres cubed per second), DH = difference in head between pools in metres, L = length of pool in metres, W = width of pool in metres and Dm = mean depth of pool in metres.

6.9 Details of baffle passes

If the fish pass includes a baffle pass, tick the 'yes' box and give details in 6.10. If there is no baffle pass, tick the 'no' box and go to 6.10.

6.10 Details of baffle passes

This section should demonstrate how the baffle pass is designed to meet the guidelines laid out for baffle passes in the Environment Agency Fish Pass Manual. We recommend you provide drawings to support and expand upon the description.

The following details must be provided in the description or in a detailed drawing(s) to support the description.

- Elevations and dimensions of all relevant inlet or outlet channels and water-control structures at the site that are likely to affect the operation of the pass (for example, crest of a nearby weir, invert of water-control structures and so on)
- Elevations of side walls of flights
- Elevations of upstream and downstream ends of the slopes of each flight
- Elevations of the baffle inverts at the upstream and downstream ends of each flight
- Elevations of inlet and outlet channels
- The length of each flight (in metres)
- The slope of each flight (as a percentage gradient)
- Baffle height, thickness and design arrangement including spacing
- Expected water levels at the upstream and downstream ends of each flight at the minimum and maximum range of flows of intended operation
- Elevation of side walls and bases of any resting pools
- Length and width of any resting pools
- Power density values in any resting pools at minimum and maximum range of pass discharge the baffle pass is intended to operate at
- Dimensions and elevations arrangements to shield the baffle pass from debris, including the gaps between bars if any are fitted
- Details of any associated structures, such as traps or counters in so far as they may affect a baffle pass's characteristics or operation
- Details of any coverings or lighting arrangements

6.11 Operating conditions for baffle passes

In the table, give the following.

Upstream pass slope invert elevation – the level above ordnance datum of the upstream point (the top) of the pass slope.

Upstream pass hydraulic invert elevation – the level above ordnance datum of the point on the most upstream baffle that controls water discharge.

Downstream pass slope invert elevation – the level above ordnance datum of the downstream point (the bottom) of the pass slope.

Downstream pass hydraulic invert elevation – the level above ordnance datum of the top of the last baffle downstream.

Head difference of slope – the vertical distance between downstream pass invert elevation and upstream pass slope invert elevation.

Length of the slope in metres.

Slope as a percentage gradient.

Minimum hydraulic head on top baffle – minimum expected water depth over furthest upstream baffle.

Minimum hydraulic head on tail baffle – minimum expected water depth over furthest downstream baffle.

Maximum hydraulic head on top baffle – maximum expected water depth over furthest upstream baffle.

Maximum hydraulic head on tail baffle – maximum expected water depth over furthest downstream baffle.

Mean velocity at minimum pass flow – average water velocity at minimum expected flow.

Mean velocity at maximum pass flow – average water velocity at maximum expected flow.

6.12 Resting pools for baffle passes

This section describes the calculation that needs to be carried out to produce a rest pool of adequate size. Guidelines for the maximum values are given in the Environment Agency Fish Pass Manual.

The term nn is there to indicate the pool number. A pool pass has a number of pools. In most cases they will be equally sized pools but others may have several different sizes.

Power density is a measure of turbulence in the pools. It can be worked out as follows.

Weight of 1 cubic metre of water in grams × acceleration due to gravity × pass discharge in cubic metres per second × difference in head between pools in metres divided by Length of pool × width of pool × average depth of pool.

This is based on the following equation:

P/V (watts per cubic metre) = (9810 × Q × DHequiv)/ (L × W × Dm)

Where: Q = flow (metres cubed per second), DHequiv = equivalent difference in head between pools in metres, L = length of pool in metres, W = width of pool in metres and Dm = mean depth of pool in metres.

You can work out the equivalent difference in head (DHequic) for baffle passes using the following equation:

DHequiv = average velocity of water in the pass in metres per second × average water velocity in the pass in metres per second, divided by 2 × acceleration due to gravity.

6.13 Other fish passes

This section should demonstrate how any form of pass other than a pool pass or baffle pass is designed to meet the guidelines laid out for that type of pass in the Environment Agency Fish Pass Manual. We recommend you provide drawings to support and expand upon the description.

Provide all details relevant to describing the operation of the pass, using similar principles to those outlined in 6.7 to 6.12 where appropriate, and including the following.

- Elevations and dimensions of all relevant inlet or outlet channels and water-control structures that are likely to affect the operation of the pass.
- Relevant hydraulic conditions in the pass including flows, velocities, head drops, pool sizes, and power density across the range of river discharge the pass is expected to operate at.

7 Eel passes

7.1 Type of eel pass

Please tell us the type of eel pass by specifying which of the following apply.

- Open or enclosed
- Gravity fed or pump fed
- Bristle ramp, boss ramp, other ramp (specify the material used)
- With lateral slope or without lateral slope
- Fabricated channel (for example, aluminium, steel and so on) or in-situ channel (for example, cast in concrete)
- Bristle media on sidewall
- Tidal flap modification
- Eel lift
- With monitoring facility or without monitoring facility

7.2 Description of eel pass

Please provide a description of the pass, including the manufacturer and model number, the type and spacing of the climbing medium substrate, the number of flights and rest areas, and what trapping or other monitoring facilities (if any). You should provide a photograph or drawings to support the description.

7.3 Pump-fed passes

If the eel pass is pump fed, provide the details asked for and drawings showing the pump in relation to the channel and the eel pass, any screening or protection from debris, and the facilities for cleaning and maintenance.

7.4 Location details

Describe how the pass has been located for eel to be able to find it.

7.5 How nearby water-control structures may affect the eel pass

Spills of water (particularly varying ones) at or from nearby water-control structures can affect the performance of the eel pass by altering the water level, flows in the pass, or the areas that eel may congregate in. Describe how the operation of nearby water-control structures (for example, opening sluice gates, flood discharge channels and so on) can affect the eel pass.

7.6 Operating conditions

In the table, give the following.

Upstream pass invert elevation (metres above ordnance datum) – the lowest level above ordnance datum of the upstream point (the top) of the pass slope.

Downstream pass invert elevation (metres above ordnance datum) – the lowest level above ordnance datum of the downstream point (the bottom) of the pass slope.

Head difference (in metres) – the vertical distance between inverts at the top of the pass slope compared to the bottom of the pass slope.

Length of the slope in metres.

Slope as a percentage gradient.

8 Monitoring and maintenance

8.1 Hydraulic and biological performance

In this part, explain the monitoring programme you have in place to make sure that the fish pass is working as expected, both hydraulically and biologically. We recommend that you use gauge boards upstream and downstream of the pass to check that the pass is working within the expected range of head levels.

Biological monitoring should check that the target fish species use the pass effectively and efficiently across the range of rivers flows for which the pass was designed.

8.2 Structural and mechanical maintenance

It is an offence not to maintain the pass in an effective and efficient state. In this section, explain:

- how often the structure of the pass will be inspected, and who will inspect it; and
- how often the pass will be inspected to make sure that it is working properly and that debris is not preventing it from working properly, and who will carry out that inspection.
- details of any biological monitoring programmes associated with this pass.

9 Supporting documents

Tick the relevant boxes to show which documents you are enclosing with your application.

Give the reference numbers of all drawings you are enclosing including revision numbers and dates.

Also list any other documents you are providing to support your application.

If you are enclosing any separate sheets you have used to provide extra information to answer questions, say how many.

We can only grant Fish Pass Approval if you provide all the documents we need. If this is not possible, but the rest of the form is filled in properly, we will decide whether this proposal is compatible with approved status. You can then give us the relevant documents when you have them.