

# Hydroelectric-power schemes

## Pre-application form – Guidance notes



### About this form

These guidance notes give you information to help you fill in WR315. You need to read 'Guidance for run-of-river hydropower development'. You can get the guidance by calling us on 03708 506 506 (8am to 6pm Monday to Friday), or sending an email to [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk).

Hydropower schemes may need the following permissions from us:

- Water abstraction licence, for abstracting (removing) more than 20m<sup>3</sup> of water a day from a water source
- Impounding licence, for impounding (holding back) water in the water source
- Environmental permit for flood risk activities, if you plan to build any part of your scheme in, over or under a main river, or close to the bank of a main river
- Fish pass approval, if you need to build a structure to allow fish to migrate upstream.

You will also need planning permission from your local planning authority. We recommend that you apply for planning permission at the same time as your make your formal application for our permissions.

We strongly advise you to contact your local planning authority, as well as local organisations which could be affected by your proposal (for example, angling societies, recreational water users, archaeological and heritage trusts), early in the process of planning your proposal.

The form is split into two parts:

- part A for general information; and
- part B for technical information.

You must fill in part A. If you can provide more detailed technical information on your proposed scheme, also fill in part B.

When you fill in the form, if you need more space for any of your answers, please continue on a separate piece of paper. Make sure you label each sheet clearly and tell us which question it applies to.

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## Part A

### 1 Contact details

We need details of whom we should contact about this pre-application.

1.1 If you are an advisor or agent appointed by the applicant, give your contact details in question 1.2 and the applicant's details in question 1.3.

If you are the applicant, skip question 1.2 and give your details in question 1.3.

1.4 Give the name and phone number of any person in the Environment Agency whom you have spoken to about the proposal.

1.5 If you have spoken to any conservation agencies (for example, Natural England) about this proposal, give details in question 1.5.

### 2 Site details

With the form you need to include a scaled and labelled Ordnance Survey map or sketch plan of the proposed scheme showing the location of:

- the point where the water is abstracted, impounded (held back) and discharged;
- the turbine or turbines;
- any penstock pipeline or open channel;

- existing water-control structures;
- proposed water-control structures; and
- fish and eel pass facilities and fish and eel screens.

#### 2.1 Site name

Give the site a local or relevant name to help us distinguish between other sites.

#### 2.2 Name of the watercourse

Please give the name of the watercourse that you are proposing to abstract water from to generate electricity.

#### 2.3 Location details

Please provide 10-figure National Grid References (NGRs) for all the locations that are relevant to your scheme and any descriptions, in as much detail as you can. Continue on a separate piece of paper if you need to.

You need to give NGRs of the following:

- the abstraction point (the point where water is abstracted from the river or stream)
- the discharge point (the point where the water you have abstracted is returned to the river or stream)
- any proposed impoundment (structure for holding back water to increase the head); for example, a weir, sluice or hatch
- any existing impoundment

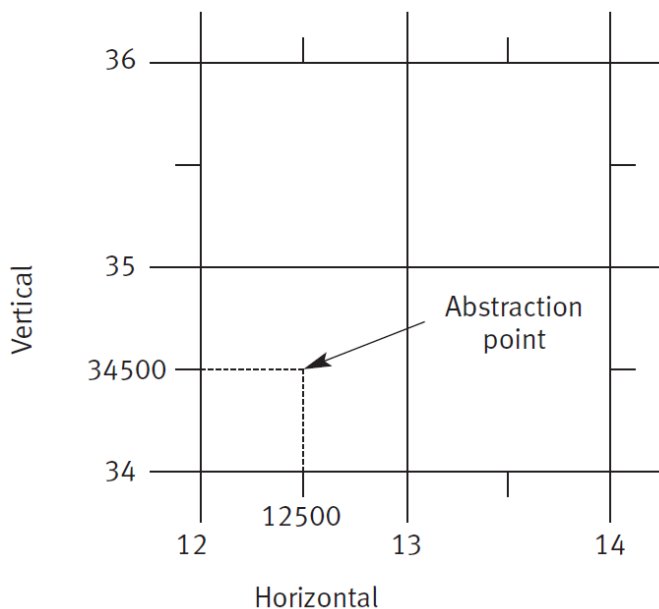
- any proposed or existing water-control structure (for example, lock, waterwheel, fish pass or canoe pass)
- any other proposed or existing features that are relevant (for example, turbine or flood alleviation channel).

An NGR is not the same as a field number.

You can find out the NGRs relating to your site using an Ordnance Survey map. In these maps, the boxes marked out in blue are equivalent to an area of 100,000m<sup>2</sup>.

Do the following to work out the NGR of your proposed abstraction point to the nearest 10m<sup>2</sup>. Looking at the example below will help.

- Read the two letters identifying the box the abstraction point is in. In the example below we have used the letters ST.
- Identify the vertical line immediately left of your proposed abstraction point and read the numbers. In the example below it is 12.
- Identify the horizontal grid line immediately below the proposed abstraction point and read the numbers. In the example below it is 34.



If you imagine the square is split into 10 sections across and 10 down, the final grid reference is ST 12500 34500.

## 2.5 Length of any depleted reach of river created

If you take water from a river, the stretch between the abstraction point and the discharge point has a depleted (reduced) flow. That stretch of water is known as the ‘depleted reach’. In question 2.5, tell us the length (in metres) of each depleted reach associated with this scheme.

## 2.6 What type of turbine do you propose to use?

For example, Kaplan, Francis, Pelton or Archimedes screw. If you propose to use more than one turbine, please include details on a separate piece of paper attached to this form. If you are using an Archimedes screw, the extra information we ask for helps us assess the need for fish screening.

## 2.7 Number of turbines

In the space given, state how many turbines you propose to use.

## 2.8 Proposed turbine flows

In question 2.8, give the following details for each separate turbine.

- Maximum design flow (sometimes called the ‘instantaneous turbine flow’, which is the maximum flow capacity of the turbine), in litres per second, at any given moment.
- Maximum flows (in cubic metres) for the turbine in any hour, day and year. (In most cases, the maximum annual turbine flow will normally be 220 × the daily turbine flow).
- Minimum turbine start-up flow (the flow needed for the turbine to start), in litres per second.

## 2.9 Calculation of quantities

In question 2.9, explain how you worked out the flows given in question 2.8.

## 2.10 Raising the level of an existing impoundment?

An impoundment is a structure, such as a dam or weir, that impounds (holds back) or obstructs the flow in an inland watercourse. If you are planning to raise the level of an impoundment, you need to let us know by how much, in millimetres.

## 2.11 Right of access

You can only apply for a licence to abstract water if you have, or expect to have, a right of access to the land directly adjoining the river. That right of access must continue for at least one year or while the licence is in force.

If you do not have a right of access, you will need to make access arrangements before you make your formal application.

With the form include a scaled and labelled Ordnance Survey map or sketch plan of the proposed scheme. On the map, highlight the different ownerships or access rights to show:

- who owns or has rights to the left and right banks upstream and downstream of the site and within any depleted reach of the river;
- who owns the watercourse and to what extent (for example, the bank, middle of the watercourse and so on);
- who owns or has rights to operate any water-control structures; and
- any fishing or navigation rights that exist.

## 2.12 Planning permission

If you have already applied for planning permission from your local planning authority, tell us:

- which local planning authority you applied to;
- the reference number of your application; and
- the status of your application (pending, approved or refused).

## Part B

You may not yet have the information asked for in this part. However, if you do not provide it now we will need it before you make your formal application.

## 3 Scheme details

### 3.1 Gross head

The gross head is the maximum difference in height (in metres), from the upstream level (such as the water intake) to the downstream level where the water leaves the turbine.

### 3.2 Net head

Net head is the gross head, minus losses due to friction and turbulence, when transferring water into and away from the turbine.

### 3.3 Estimated generating potential

Provide the scheme's estimated generating potential (that is, the amount of electricity you expect the scheme to generate) in kilowatts (kW).

### 3.4 Annual generating potential

Provide the annual generating potential of the scheme in kilowatt-hours (kWhrs).

### 3.5 Control of the scheme

Please describe how you are going to control the hydroelectric-power scheme, including the turbine and any control structures used, such as hatches and penstocks. Say whether the scheme will be operated manually or automated (for example, by using head-level sensors, automated sluice gates, automated start-up and shut-off, automated screen cleaners and so on).

## 4 Water resource considerations

### Assessment of existing hydrology

This assessment will need to include analysis of how the proposed scheme will affect the volume of water flow, or water level, within all channels present or proposed. You'll also need to fully explain the effect the scheme will have on the flow and level of water over any structures in the river, such as weirs or fish passes.

The assessment will need to include the following.

- An overview of the catchment hydrology
- Hydrometric information (current meter gaugings, gauging station data, model data, rainfall data)
- An assessment of the change in flow within all channels affected
- Seasonal variation in flows
- Base flow/run-off comparison
- An assessment of high-flow events (management of structures, relief channels)
- The reduction in downstream levels and the raising of upstream levels
- The residual flows downstream of intake needed to protect the river and other interests.

We will always try to make our requests for hydrometric information appropriate to the site and the proposed scheme. However, if we need a more detailed assessment of the potential effects of your proposal (for example, because the scheme lies within a national or European conservation area or there are significant fishery or biodiversity issues) we may need you to provide more information and analysis. This can include a comprehensive flow survey of the site, including current meter gaugings over a range of flows. We will try to tell you what we need at an early stage.

We may be able to provide the hydrometric information you need to help with the hydrology assessment. We manage a national network of river flow, river level and rainfall monitoring stations. The information from these is available to the public. We may charge for the information, depending on how much you need, how long it will take us to provide it, and what you will use it for.

To find out what information we have available for your location, phone the National Customer Contact Centre on 03708 506 506 (8am to 6pm Monday to Friday), or send an email to [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk).

The Centre for Ecology & Hydrology has hydrometric information on the National River Flow Archive, which you can view on the website at [www.ceh.ac.uk/data/nrfa](http://www.ceh.ac.uk/data/nrfa).

### 4.1 Flow duration statistics

The flow duration curve (FDC) represents the statistical availability of any given flow, based on best available information. The FDC and associated information can indicate the volume of flow which is available for any percentage of the time.

Please provide both the FDC, flow duration statistics (if they have been produced) and the available flow in megalitres per day (ML/d) that is exceeded at least:

- 95% of the time ( $Q_{95}$ );
- 80% of the time ( $Q_{80}$ );
- 50% of the time ( $Q_{50}$ );
- 40% of the time ( $Q_{40}$ ); and
- 10% of the time ( $Q_{10}$ ).

Also provide:

- the average of all flow measurements taken over a period of time ( $Q_{\text{mean}}$ ); and
- a pre-scheme assessment (flow survey) of all channels included within the scheme.

### 4.2 Base-flow indicator value (BFIV)

Your BFIV is your  $Q_{95}$  divided by your  $Q_{\text{mean}}$  value.

We use BFIV figures to classify rivers as having low, medium or high base flows (this is how much of the river water comes from groundwater). Rivers with a low base flow are sometimes described as 'flashy' rivers.

Use the 'Flow and abstraction management' section of 'Guidance for run-of-river hydropower development' to understand more about the BFIV.

You need to calculate your BFIV for use later on when working out your indicative design flows.

### 4.3 Abstraction sensitivity band (ASB)

ASBs are used to describe a watercourse's sensitivity to abstraction pressures. We give all watercourses an ASB of either 3 for 'high sensitivity', 2 for 'medium sensitivity' or 1 for 'low sensitivity'.

You need the ASB to work out your indicative design flows at question 4.4. Contact your Account Manager to get the ASB for the proposed location of your hydropower scheme.

### 4.4 Indicative design flows

You must read the 'Flow and abstraction management' section of 'Guidance for run-of-river hydropower development' when working out your indicative design flows. Table A gives the basic indicative design flows that should be suitable for most hydropower schemes.

Using your BFIV from question 4.2 and your ASB from question 4.3, choose the appropriate 'hands-off flow' (HOF), 'maximum abstraction' and 'percentage take above HOF' values from table A.

## 4.5 Applying for higher levels of abstraction

If you think that the design flows from question 4.4 are not sufficient for your hydropower scheme and you would like to apply for higher levels of abstraction, you need to fill in this section.

See tables B, C and D in 'Flow and abstraction management' section of 'Guidance for run-of-river hydropower development'. Those tables set out indicative departures (possible additional flow) that we may consider for different types of scheme (for example, low head or high head).

You will need to provide supporting evidence, in an environmental report, to demonstrate that your scheme will:

- not prevent Water Framework Directive objectives from being achieved (see the Water Framework Directive, 'Nature conservation and heritage' section of 'Guidance for run-of-river hydropower development');
- maintain or improve fisheries, fish passage and fish migration (see the 'Fish passage and screening' section of 'Guidance for run-of-river hydropower development');
- not have unacceptable impacts (effects) on protected sites or species (see the Water Framework Directive, 'Nature conservation and heritage' section of 'Guidance for run-of-river hydropower development'); and
- not have unacceptable impacts on the rights of other water users, including anglers.

Send us a copy of your report with this form.

The amount of additional flow we may allow above the design flows in table A will depend on:

- the potential risk to the environment; and
- the measures you propose to avoid environmental damage or keep it to a minimum.

You may also need to know if your river has fish-migration issues. Your Account Manager will be able to provide you with this information.

If you are applying for a high head hydropower scheme, you will also need to provide the flow value for  $Q_{80}$  (the flow we expect to see for 80% of the time).

In this section, enter your proposed hands-off flow (HOF), maximum abstraction and percentage take above HOF (or, if using table D, percentage flow for protecting flow variability) on the form.

## 5 Fisheries considerations

### 5.1 Fish and eel screening at intake and outfall

There is a wide variety of fish and eel screening systems available to suit the species and size of fish and eel to be protected, environmental conditions and budgets.

In the table, give details of screening proposals for both water intakes and outfalls for your proposed hydroelectric-power scheme. Please include the following information.

- Type of screen – such as mesh screens, vertical or inclined bar racks, coanda screens (wedge-wire spillway screens).
- Size of the intake screen, in millimetres (mm).
- Dimensions (width × height) of the screen in millimetres (mm).
- Angle of the intake screen (in degrees) in relation to the main flow path (This should be adequate to effectively guide fish to the bypass channel).

- The approach velocity, for the intake screen only, in metres per second (m/s). Say how you worked this out (the approach velocity for screen-design purposes is defined as the velocity 10cm upstream of the screen, perpendicular to the screen face). Say how you worked this out.
- The 10-figure National Grid Reference of the intake screen.

### 5.2 Fish and eel screening

State whether the fish and eel screening is in line with the 'Screening guidance' section in 'Guidance for run-of-river hydropower development', which you can get by calling us on 03708 506 506 (8am to 6pm Monday to Friday), or sending an email to [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk).

### 5.3 Bywash channel

The design of a bywash channel is critical to the performance of any fish screen placed within a channel. The entrance to a bywash should be where the fish have the best chance of finding it. Please say whether the bywash is a separate channel, if the fish pass forms part of the bywash channel, and the dimensions. Please also include the units.

### 5.4 Other screening methods proposed

Other screening methods, such as behavioural fish barriers, can be used where physical screens are not practical. Behavioural fish barriers include louvre bar, acoustic, BAFF and strobe lighting.

Please provide details of any alternative screening methods you are proposing to use at the site.

### 5.5 Fish and eel passes

If you tick 'Yes'

If you are providing a new fish and eel pass (or passes) or existing passes are being refurbished, we will need to be sure that your plans are suitable for the location and intended range of species.

If there are already any upstream passes on the impoundment, we will have to consider the effect your proposed scheme could have on their performance. Details you provide on existing passes will help us.

If you tick 'No'

We will need to decide whether including a fish and eel pass will be a condition for your scheme to get permission. If there will be no upstream fish passes, explain why not.

## 6 Flood risk considerations

### 6.1 Flood risk assessment and flood consequence assessment

If you have already completed a flood risk assessment or flood consequence assessment, send a copy with this form.

### 6.2 Proposed in-river constructions or modifications that could change the flood risk

If you have not yet carried out a flood risk assessment or flood consequence assessment, provide details of the proposed in river construction or modifications which could change flood risk (for example, alterations to the width or height of the weir crest or obstructions to the flow on floodplains).

## **7 Planning considerations**

### **7.1 Contact with your local planning authority**

If you have already discussed your proposal with your local planning authority, please send us a copy of their advice.

If you have not discussed your proposal with your local planning authority we recommend that you contact them as soon as possible.

### **7.2 Environmental impact assessment**

You will need an environmental impact assessment if your scheme will have a significant effect on the environment. You can ask your local planning authority for a screening opinion to help you find out if you need an environmental impact assessment. If significant effects are expected, you will need to provide an environmental statement as part of your planning application.

You will need an environmental statement if:

- your scheme will produce 0.5 MW or more of power; or
- your scheme is in a sensitive area (for example, a site of special scientific interest or a nature reserve).

### **7.5 Screening opinion**

If you have a screening opinion from your local planning authority, send us a copy with your form.

### **7.6 Land contamination**

Identifying the existing and previous uses of the site will give an indication of the possibility of contamination. If land contamination poses a risk of pollution to water, we will give the local planning authority advice when they are considering your planning application.

### **7.7 Preliminary risk assessment**

If you do not provide at least a preliminary risk assessment with this form, we may object to your planning application. So we strongly advise you to send us a preliminary risk assessment with this form.

Providing a preliminary risk assessment will also help us decide whether a site investigation and more detailed risk assessment would be needed as part of your planning application. If you have any of this extra information already, send it with this form.

The preliminary risk assessment should identify possible pollutants for the site. It should also assess the previous uses of the site, their potential for contamination and potential risks to waters. For more information on contaminated land, see [www.gov.uk/government/collections/land-contamination-technical-guidance](http://www.gov.uk/government/collections/land-contamination-technical-guidance).

Please note that we cannot give advice on the risks to human health arising from development on contaminated land. If necessary, you should get this advice from your local authority's environmental health department.

## **8 Checklist**

Please read through the checklist and tick all the items you have enclosed. If you do not enclose all the items we need, we may return your application.

If you have design drawings or further details ensure that you provide document reference(s) for these.

## **9 The Data Protection Act 1998**

This section provides details of how we will use the information you provide.

## **10 Where to send the forms**

Check this form thoroughly and complete the checklist before sending them to the address shown.

We'll get in touch with you shortly, either to give you our decision and tell you the likely timescale, or to ask for more information.