Guidance for developers of run-of-river hydropower schemes

Contents

Introduction

This guidance is aimed at anyone planning to develop a run-of-river hydropower scheme i.e. a scheme with less than 24 hours' worth of storage. It is **essential** that developers assess their proposal against the criteria in the document to ensure it is capable of being consented by us. To assist with this process a pro-forma screening outcome document is attached to the end of this guidance document. All developers **must** fill in this document to demonstrate how their proposal complies with the guidance. Failure to do so may result in the application being refused and the developer carrying out unnecessary work. Developers are recommended to use this screening guidance at an early stage in the planning of a potential scheme and thereafter to contact us to verify its likely acceptability.

This guidance is divided into two parts.

Part A provides a set of simple checklists that can be used at a very early stage in the planning of a scheme to assess the likelihood that the scheme will be able to obtain a water use licence from us. It is particularly aimed at developers of schemes with an installed capacity of less than about 100 kilowatts.

Part B is intended to help developers planning any size of run-of-river scheme. It sets out the mitigation measures that we will require to be incorporated into hydropower developments for the purpose of protecting the water environment.

Those using this guidance may also be interested in our Guidance for applicants on supporting information requirements for hydropower applications which is available on our website.

Screening outcome recording form

The pro-forma screening outcome document is attached as Appendix 1 at the end of the guidance document and must be completed and submitted along with any application. The appropriate forms can be found on our website.

Background

Scottish Ministers set out their objectives with respect to striking the right balance between the protection of the water environment and renewable energy generation in a policy statement issued in January 2010.

Developers of hydropower schemes require a water use licence from us[1]. Before granting such a licence, we have to take account of a scheme's likely adverse impacts on the water environment as well as its potential benefits, including its contribution to renewable energy generation. This guidance has been produced in part to help developers understand how, in carrying out its licensing role, we will help deliver ministers' policy objectives.

Developers incur costs in planning a scheme and then preparing and making an application for a water use licence. This investment represents a business risk. Developers of small schemes have raised concerns with us that, in some cases, this risk may be a barrier to pursuing potential developments. One of our main aims in producing the guidance is to reduce this business uncertainty by enabling developers to assess the likelihood that a proposal will be able to obtain a water use licence.

[1] Under the Water Environment (Controlled Activities) (Scotland) Regulations 2005.

Part A: Screening process

This part of the guidance describes how we will secure appropriate protection for the water environment whilst optimising the contribution hydropower schemes can make to achieving Scotland's renewable energy targets. We will apply the tiered approach summarised in Table 1 below.

Table 1: Tiered approach to the regulation of proposed hydropower scheme developments

Row	**Average annual electricity output (gigawatt hours)**	**Screening criteria**
1	Any(i)	Proposal: (a) satisfies the criteria described in the checklists in Annex A; (b) incorporates the mitigation described in Part B; (c) does not cause significant adverse effects on the interests of other users of the water environment.
2	0.35 to 1.75, except where meeting the criteria in row 1 above(i)	Proposal: (a) incorporates the mitigation described in Part B; (b) does not result in sufficiently extensive adverse impacts on the water environment to cause deterioration of the status of a water body[2] (eg proposal adversely affects only a short length of river); (c) delivers benefits that outweigh the adverse environmental, social and economic impacts of any adverse effects on the water environment.
3	> 1.75, except where meeting the criteria in row 1 above	Proposal: (a) incorporates the mitigation described in Part B; (b) delivers benefits that outweigh the adverse environmental, social and economic impacts of any adverse effects on the water environment; (c) where it would cause deterioration of status, demonstrates that, for reasons of technical feasibility or disproportionate cost, there is no significantly better environmental option that could deliver equivalent benefits to those expected to result from the proposal.

[2] Information on the status of water bodies is available via an interactive map on the SEPA website at http://gis.sepa.org.uk/rbmp/. This information is updated from time to time and should be treated as indicative only. Developers may wish to contact us to check whether more recent assessments are available.

Note:

(i) We may apply the screening criteria in row 3 with respect to any proposed scheme:

a. not meeting the criteria in row 1;
b. expected to deliver significant social or environmental benefits in addition to the generation of renewable energy.

Overview of approach where annual output < 0.35 gigawatt hours

Scottish Ministers expect us to manage the individual and cumulative impacts of sub-100 kilowatt schemes:

"Small schemes with a generating capacity of less than 100 kW may provide local economic benefits and, where they can be shown to have no adverse impact on the water environment, such schemes will be welcomed. At this scale of development, particular attention will need to be given to managing both individual and cumulative impacts. Generally no deterioration will be permitted, unless the proposed scheme delivers particularly significant benefits."

A typical 100 kilowatt scheme would be expected to generate around 0.35 gigawatt hours of electricity per year. Some 100 kilowatt schemes could generate significantly more than this whilst others may generate significantly less. To ensure Scottish Ministers' policy intent is implemented consistently, we will apply the approach described below to proposals that would generate < 0.35 gigawatt hours per year of electricity.

To avoid individual and cumulative adverse impacts on the water environment, such schemes need to be sited and designed appropriately.

Annex A includes a series of checklists that can be used by developers to assess whether the proposed site and design of a potential scheme will ensure that significant adverse impacts on the water environment are avoided.

The checklists embody the criteria we will subsequently use in determining applications for such schemes. Proposals meeting the criteria will be able to obtain a water use licence, subject to consideration by us of any adverse impacts on the interests of other users of the water environment.

Likely acceptable schemes include those:

- situated in degraded parts of the water environment (other than those planned to be improved);
- situated in small, steep streams;
- delivering an overall improvement to the ecological quality of the water environment;
- using only that proportion of flow that can be abstracted from the river or stream without breaching river flow standards.

Proposals not satisfying the criteria in the checklists may still be able to obtain authorisation if they would deliver additional and significant social or environmental benefits. Where a developer believes this to be the case it is advised that they contact us before proceeding further.

Overview of approach where annual output ≥ 0.35 gigawatt hours

Scottish Ministers have also expressed their wish to optimise the potential for hydropower generation:

"In order to optimise the potential for hydropower generation emphasis will be placed on supporting hydropower developments which can make a significant contribution to Scotland's renewables targets whilst minimising any adverse impacts on the water environment."

Scottish Ministers also expect that if schemes with an output greater than 0.35 gigawatt hours per year are permitted to cause deterioration of the water environment, the deterioration must be justifiable in terms of costs and benefits.

"Ministers accept that in supporting such schemes some deterioration of the water environment may be necessary. However any deterioration must be justifiable in terms of costs and benefits, and therefore considerations such as wider social or economic benefits, or impacts on other users of the water environment, will continue to be important factors in the decision-making process."

We will continue to assess whether any adverse impacts caused by schemes of 0.35 gigawatt hours or more are justifiable in terms of costs and benefits. It will make these assessments on a case-by-case basis using the regulatory method[3] it has developed for such purposes.

Where the adverse impacts of a scheme would be sufficiently extensive to affect the status of a water body, we have to ensure compliance with strict tests set out in European law[4] before granting authorisation. We must then report cases that we have authorised to the European Commission, explaining why we believe the tests are met. The tests include demonstrating that the benefits of the scheme to sustainable development outweigh its adverse impacts and that the benefits cannot be provided using a significantly better environmental option[5]. The other options that we have to take into account include other sites and other relevant technologies for generating renewable energy[6]. Our view is that these tests will not be met if the proposed annual electricity output of the scheme is ≤ 1.75 gigawatt hours[7] unless the scheme also provides additional and significant social or environmental benefits.

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[3] See WAT-RM-34: Derogation Determination - Adverse Impacts on the Water Environment at: www.sepa.org.uk/water/water_regulation/guidance/all_regimes.aspx

[4] The tests are specified in Article 4 of Directive 2000/60 EC ("the Water Framework Directive").

[5] For brevity, the tests SEPA is required to apply have been paraphrased.

[6] A scheme with an installed capacity of 500 kilowatts typically produces around one third (1.75 gigawatt hours per year) of the output of a modern on-shore wind turbine.

[7] For comparison, the German system of electricity tariffs does not support schemes of less than 500 kilowatts if they would adversely affect the water environment.

Annex A to Part A: Guidance on identifying provisionally acceptable hydropower schemes

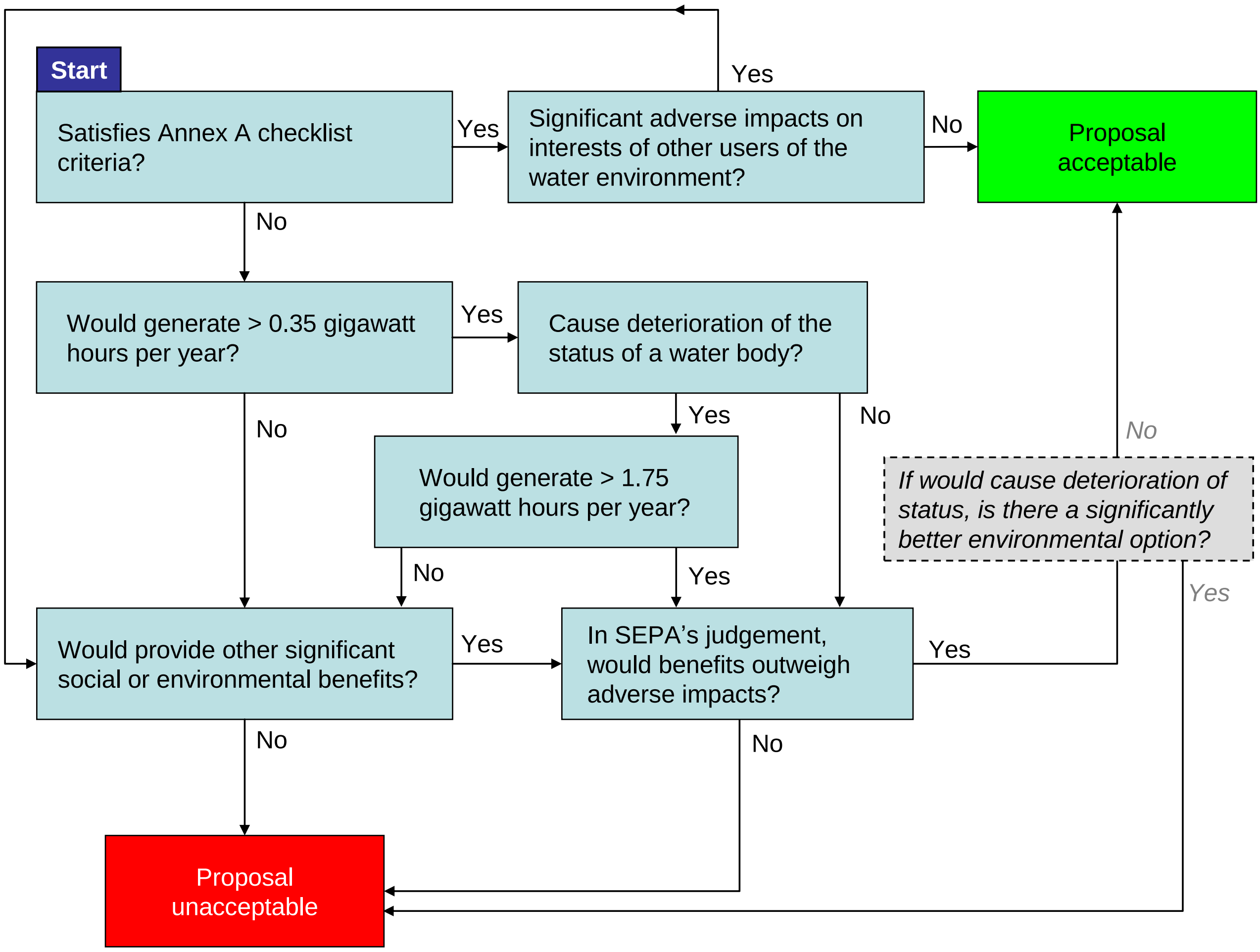
Proposals meeting the criteria described in the checklists set out below are not expected to cause deterioration in the ecological quality of the water environment. We will grant authorisation for such proposals provided they:

- include all relevant mitigation listed in Part B of this guidance;
- do not cause significant adverse impacts on the interests of other users of the water environment.

Proposals not meeting the checklist criteria will be refused authorisation unless they:

- deliver other significant social or environmental benefits;
- generate ≥ 0.35 gigawatt hours per year.

The figure below summarises the principal tests we will apply in determining a proposal, assuming the proposal includes the relevant mitigation set out in Part B of this guidance.



It may not always be clear whether the criteria described in the checklist are met. In such cases, we will reach a judgment taking into account the specifics of the case, including the potential risks to the water environment should the proposal cause deterioration.

The checklists are primarily intended to be used in assessing proposals for sub-0.35 gigawatt hours per year hydropower schemes. However, we will also use the criteria to help it streamline its determination of applications for schemes that will generate ≥ 0.35 gigawatt hours per year. If such a scheme meets the checklist criteria, no additional assessment will be required provided:

- the mitigation described in Part B is incorporated into the proposal;
- the proposal would not cause significant adverse impacts on the interests of other users of the water environment.

In some cases, part of a scheme that would generate ≥ 0.35 gigawatt hours per year overall may meet the criteria described in the checklists. For example, part of the scheme may be located on a small steep stream. With the mitigation referred to in Part B in place, this part of the scheme would not be expected to result in an adverse impact on the water environment. We will take this into account when weighing up the positive and negative impacts of the scheme (see requirements for authorisation in Table 1 in Part A).

Checklist A: Proposals sited in degraded parts of the water environment (note 1)			
1	Is the river or stream between the intake and the tailrace: • part of a heavily modified water body (information from SEPA – see note 2); • immediately surrounded by urbanised land (e.g. roads, pavements or buildings running along the bank top) or land used for commercial forestry or agriculture, other than rough grazing?	**If yes, go to 2**	**If no, go to checklist B**
2	Is the river or stream between the intake and the tailrace significantly adversely impacted? e.g. the condition of the bed and banks is poor or bad because of: (i) extensive stands of conifers or invasive non-native plant species on the banks; (ii) extensive engineering modifications, including channel straightening, bank revetment, dredging, culverting, etc?	**If yes, go to 3**	**If no, go to checklist B**
3	Is the stretch of river or stream planned to be improved (including by re-establishing access to migratory fish) to achieve the objectives of a river basin management plan (information available from SEPA)?	**If no, proposal provisionally acceptable (see note 3)**	**If yes, go to checklist B**

Note 1

Checklist A applies to stretches of river that:

(a) are in a poor or bad condition with respect to their morphological characteristics (i.e. structure and condition of their bed and banks) or water quality;
(b) are not planned to be improved.

In our judgment, a run-of-river hydropower scheme located in an area which complies with checklist A and which is operated in accordance with the mitigation listed in the guidance will: (i) be unlikely to result in further adverse ecological impacts on such stretches; (ii) not compromise the achievement of any improvement objective.

Note 2

Information on the status of water bodies is available via an interactive map on our website. This information is updated from time to time and should be treated as indicative only. Developers may wish to contact us to check whether more recent assessments are available. It is important to recognise that water bodies designated as heavily modified may contain stretches or tributaries which are currently in good condition. Consequently it is not safe to assume that just because the proposed development is within a HMWB catchment that it will be in poor condition.

Note 3

The provisional acceptability assumes that one or more of the following applies:

- The rivers or streams upstream of the intake do not contain any ecologically significant areas of good fish habitat.
- The tailrace is located above, or immediately downstream of, a natural barrier to the upstream movement of fish species, or a man-made barrier to such movement that is not planned to be removed to achieve the objectives of a river basin management plan.
- Risks to fish passage can be avoided through appropriate mitigation (developers should seek advice from SEPA).

Checklist B: Proposals sited in small, steep rivers and streams			
1	Is the area of the catchment upstream of the proposed tailrace < 10 km^2?	**If yes, go to 2**	**If no, go to checklist C**
2	Is the channel slope[8] between the intake and the tailrace ≥ 0.1?	**If yes, proposal provisionally acceptable**	**If no, go to 3**
3	Is the channel slope between the intake and the tailrace > 0.06?	**If yes, go to 4**	**If no, go to checklist C**
4	Is the affected stretch part of a waterbody as identified by SEPA, with a catchment area ≥10km^2?	**If yes, go to 5**	**If no, go to 6**
5	Is the distance between the intake and the tailrace together with any reaches impacted by other activities < 500 metres if the water body is at high status and < 1,500 metres in all other cases?	**If yes, go to 6**	**If no, go to checklist C**
6	Does the river or stream between the intake and the tailrace contain any ecologically significant area of good habitat for fish[9]?	**If no, proposal provisionally acceptable (note 1)**	**If yes, go to checklist C**

Note 1

The provisional acceptability assumes that for the majority of its length, the river or stream between the intake and the tailrace is an entrenched[10], confined and low sinuosity[11] (eg < 1.2) stream with cascading reaches and frequently spaced, deep pools in a step/pool bed morphology[12], and that one or more of the following applies:
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- the rivers and streams upstream of the intake do not contain any significant areas of good fish habitat;
- there is a natural barrier to the upstream movement of fish to fish habitat upstream of the intake;
- there is already a man-made barrier to the upstream movement of fish to fish habitat

[8] Channel slope is the drop in elevation between two points divided by the stream length between those two points. A gradient of 0.1 is equivalent to a 10 metre drop in 100 metres. As a guide, on Ordnance Survey 1:50,000 maps, this means that, where the 10 metre contours cross the river or stream, they are two millimetres apart as measured along the centre line of the river channel. A gradient of 0.06 is equivalent to a six metre drop in 100 metres. As a guide, on Ordnance Survey 1:50,000 maps, this means that, where the 10 metre contours cross the river or stream, they are 3.3 millimetres apart as measured along the centre line of the river channel.
[9]These are areas where there is a reduction in gradient, and the bed of the river channel is mainly formed from gravels, cobbles and boulders. Such areas are important if they are likely to provide spawning and nursery opportunities for fish, particularly if they are accessible from the sea or from lochs. These should be assessed by following the "productive habitat" or "lamprey habitat" definition given in Annex B of SEPA's Guidance for Applicants on Supporting Information Requirements for Hydropower applications. If there are one or more reaches of these types of habitat, advice should be sought from SEPA on whether the stream contains a significant area of good habitat for fish
[10] 'Entrenched' means that the river is incised into the valley floor making the flood-prone area very narrow such that in floods, river depth increases much faster than river width.
[11] Sinuosity is the ratio of channel length to valley length.
[12] Confined valley is a valley whose narrowness is such as to prevent all, or nearly all, lateral movement of the river channel.

upstream of the intake and this barrier is not planned to be removed to achieve the objectives of a river basin management plan; • risks to fish passage can be avoided through appropriate mitigation (developers should seek advice from SEPA).

Checklist C: Proposals delivering net benefits to the ecological quality of the water environment			
1	Will the proposal significantly improve fish passage at a man-made obstacle to upstream or downstream migration, such as a dam or weir?	**If yes, go to 2**	**If no, go to 3**
2	Is the length of fish habitat to which access would be improved significantly longer than the length of river or stream between the intake and the tailrace?	**If yes, go to 4**	**If no, go to 3**
3	Will the proposal provide other significant net benefits to the ecological quality of the water environment?	**If yes, go to 4**	**If no, go to checklist D**
4	Is the length of river or stream between the intake and the tailrace < 1,500 metres?	**If yes, proposal provisionally acceptable**	**If no, go to checklist D**

Checklist D: All other proposals			
1	Will the scheme be powered by the flow of water through an existing weir or dam (i.e. without removing water from the river channel)?	**If yes, proposal provisionally acceptable (see note 1)**	**If no, go to 2**
2	Will the scheme be powered by water flow from an existing outfall?	**If yes, proposal provisionally acceptable**	**If no, go to 3**
3	Will the scheme be powered by water that is abstracted from immediately above a drop (e.g. a waterfall, cascade or weir) and returned immediately[13] below that drop?	**If yes, proposal provisionally acceptable (see note 1)**	**If no, go to 4**
4	Is the proposal located on a minor tributary of a water body (i.e. a tributary with a catchment area of < 10 km^2) (information available from SEPA)?	**If yes, go to 7**	**If no, go to 5**
5	Is the water body at high status?	**If no, go to 7**	**If yes, go to 6**
6	Is the distance between the intake and the tailrace (excluding any part of that distance that is on a minor tributary) together with any reaches impacted by other activities < 500 metres?	**If yes, go to 7**	**If no, go to 8**

[13] i.e as close to the base of the falls as practicable and at most no further than 10 metres downstream.

7	Will the scheme use only the proportion of the flow in the river or stream at any one point in time that can be abstracted without causing a breach of the river flow standards for good (note 2)?	**If yes, proposal provisionally acceptable (see note 1)**	**If no, proposal provisionally unacceptable**
8	Will the scheme use only the proportion of the flow in the river or stream at any one point in time that can be abstracted without causing a breach of the river flow standards for high?	**If yes, proposal provisionally acceptable (see note 1)**	**If no, proposal provisionally unacceptable**

Note 1

The provisional acceptability assumes that one or more of the following applies:

- the rivers and streams upstream of the intake do not contain any important areas of good fish habitat;
- the tailrace is located above, or immediately downstream of, a natural barrier to the upstream movement of fish species, or a man-made barrier to such movement that is not planned to be removed to achieve the objectives of a river basin management plan;
- risks to fish passage can be avoided through appropriate mitigation (developers should seek advice from SEPA).

Note 2

The river flow standards for good typically allow abstraction of about 20% of average summer flows rising to about 30% of average winter flows and 40% of spate flows. However, as river flows vary throughout the year and the river flow standards differ slightly according to river type, it is worth contacting us for detailed advice on calculating the volumes of water that can be abstracted.

The river flow standards are set out in the Scotland River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) Directions 2009 and the Solway Tweed River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) (Scotland) Directions 2009. These are available on the Scottish Government's website.

Background rationale to criteria for proposals sited in small, steep streams

In our view, the balance of risk is that run-of-river hydropower schemes will not normally significantly adversely affect the ecological quality of small, steep streams, provided appropriate mitigation is incorporated into the design and operation of those schemes.

The characteristics of such streams - their steepness and the rapidity of the rise and fall of their flows in response to rainfall - naturally make them very high disturbance environments. They also tend to be incised into their valleys with low width to depth ratios. These characteristics mean that the wetted width typically changes little between low flows (which would be retained) and the mid-range flows that would be utilised by hydropower schemes. Hydropower schemes with the appropriate mitigation would not impact the high disturbance characteristics of these streams to which the stream's water plants and animals are adapted.

Some streams at the lower end of range of streams defined as ‘steep’ for the purposes of this guidance may include stretches containing river habitats that may be more sensitive to the effects of hydropower schemes on river flows. These may support trout that are important for the maintenance of the populations within the wider catchment or may even be used by migratory species. Sub-0.35 gigawatt hour per year schemes may cause deterioration of such important habitats and should therefore not be situated on stretches containing them.

Part B: Mitigation we consider likely to be practicable to include in run-of-river hydropower scheme developments.

This part of the consultation sets out the mitigation that we expect to be incorporated into all run-of-river hydropower scheme developments, except those where the developer or an interested third party provides evidence that:

- the mitigation measure is unnecessary because of the site characteristics;
- another measure will deliver equivalent mitigation;
- the mitigation measure would be impracticable to incorporate into the development[14] (i.e. for reasons of unusual technical constraints at the site);
- the presence of sensitive species or habitats require enhanced mitigation above and beyond that set out in this guidance.

The mitigation described represents our current view of what constitutes practicable mitigation to reduce the impacts on the water environment of run-of-river hydropower schemes. The list of mitigation measures will be reviewed and updated as scientific knowledge increases and more effective practicable mitigation is identified.

The mitigation is designed to minimise any adverse impacts of hydropower schemes on the water environment and will contribute to delivering the following objective of Scottish Ministers:

"In order to optimise the potential for hydropower generation emphasis will be placed on supporting hydropower developments which can make a significant contribution to Scotland's renewables targets whilst minimising any adverse impacts on the water environment."

[14] The absence of mitigation for such reasons will be taken into account in assessing significance of the impact of the proposed scheme.

Impact of proposal on river flows

Purpose	Mitigation (summarised)
Protection of low flows	• No abstraction of flows at or below a hands-off flow equivalent to Qn90 or Qn95, dependent on site-specific factors as detailed below.
Protection of flow variability	• No extended periods during which the flow downstream of intake is at, or below, the hands-off flow is either: – flow downstream increases in proportion to flow upstream rising to Qn80 when upstream flow would be at Qn30; – scheme shuts down for a fixed period at an agreed frequency designed to ensure flow higher than the hands-off flow occurs with equivalent frequency. • Full details can be found under the heading 'Protection of flow variability'
Protection of high flows	• Maximum abstraction not to exceed 1.3 to 1.5 times the average daily flow depending[15] on the particular characteristics of the scheme (as outlined under the section headed 'Protection of high flows').
Protection of flows for upstream fish migration and spawning	• Good status flows are maintained across the relevant flow range (ie flows up to Qn10) during periods of migration and spawning. • Full details can be found under the heading 'Protection of flows for upstream fish migration and spawning'

Protection of low flows

Purpose

Mitigation must be designed to avoid the development causing either:

- the channel to dry;
- the wetted width of the channel to be significantly reduced.

Requirements

When the scheme is operating, a minimum flow must pass over, or through, the weir to the river channel immediately downstream to sustain water-dependent plants and animals. This is known as a hands-off flow. When the flow upstream of the intake is less than the hands-off flow, no abstraction may take place.

Our strong preference is for flows to pass over the weir. Flow through the weir (e.g. via a pipe) is only appropriate for one of the following:

- fish passage upstream is not required (e.g. because fish are absent and will continue to be absent following achievement of the objectives of the river basin management

[15] Average daily flow is equivalent to around Qn30.

plan);
- alternative provisions for fish passage are included in the proposal.

When flow in the river upstream of the intake drops below the hands-off flow, all the flow in the river upstream of the intake structure must pass over, or through, the weir to the river channel downstream.

In the following circumstances, the hands-off flow must be equivalent to at least Qn90[16]:

- sites with populations of salmon or sea trout;
- sites designated for the conservation of aquatic plants or animals;
- sites with catchment areas upstream of the tailrace of < 10 km^2;
- sites where the wetted width is significantly reduced at flows below Qn90.

In other circumstances, the hands-off flow must be equivalent to at least Qn95[17].

Protection of flow variability

Purpose

Mitigation must be designed to avoid extended periods of low flow downstream of the intake.

Requirements

Periods where the flow exceeds the hands-off flow must be provided by meeting one of the points below:

- designing the intake structure such that as the flow upstream increases, the proportion of flow (additional to the hands-off flow) passing downstream also increases. When the natural flow upstream would be at Qn30, the flow downstream should be at least equivalent to Qn80: In other words, as flow upstream of the intake increases to Qn30[18], flow downstream should rise to at least Qn80[19];
- shutting the scheme down for a fixed period at an agreed frequency - for example not abstracting for six hours every Sunday from midday. The shut-down regime applied must have the effect of avoiding flow downstream of the intake being at or below the hands-off-flow for extended periods.

Providing variable flows through the weir (e.g. via pipes etc) is only appropriate for one of these reasons:

- fish passage upstream is not required (e.g. because fish are absent and will continue to be absent following achievement of the objectives of the river basin management plan);
- alternative provisions for fish passage are included in the proposal.

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[16] Qn90 is the natural low flow (ie the flow in the absence of abstractions) that would, on average, be exceeded for all but 36 days in a year.
[17] Qn95 is the natural low flow that would, on average, be exceeded for all but 18 days a year.
[18] Qn30 is to the natural flow that is, on average, exceeded for around 110 days in a year
[19] Qn80 is the flow that, on average, would normally be exceeded for all but 73 days a year.

Protection of high flows

Purpose

Mitigation must be designed to ensure that the river between the intake and the tailrace continues to experience high flows and associated high velocities and turbulence necessary to:

- create the disturbance regime that helps maintain the natural composition and abundance of water-dependent plants and animals; and
- maintain a range of river habitats dependent on natural sediment erosion, transport and deposition processes.

Requirements

The maximum abstraction rate must be designed to ensure that surplus water during spate flows will spill over the weir into the river downstream.

The maximum abstraction rate should be no more than either:

- 1.3 times the average daily flow[20] for schemes with an annual output of < 0.35 gigawatt hours;
- 1.5 times the average daily flow for schemes with an annual output of ≥ 0.35 gigawatt hours, depending on the characteristics of the site.

In steep, high rainfall, 'flashy' catchments, where the annual output of the scheme is >0.35 gigawatt hours, an abstraction of greater than 1.5 times the mean flow may be acceptable, subject to following conditions:

- The maximum abstraction must not exceed two times the mean flow.
- There should be no abstraction until the flow upstream of the intake is at or above the hands off flow plus 10% of the maximum abstraction. ,
- (Qn10 ÷ Qnmean)[21] ≥ 2.3 and the channel gradient is >10%.
- (Qn10 ÷ Qnmean) ≥ 2.3, the channel gradient is >6% and fish survey data indicates migratory fish are absent and there would be very low risk of impact on resident fish populations[22].

As high spate flows are infrequent but very large compared to lower flows, the average daily flow corresponds to Qn30.

Protection of flows for upstream fish migration and spawning

The mitigation in this section does not apply to either of the following:

- to schemes located on rivers upstream of natural barriers to upstream fish migration;

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[20] Average daily flow is the, average of the mean daily flows for a number of whole years taken to represent the long term condition.
[21] Qn10 ÷ Qnmean is a measure of the flashiness of a catchment, this is generally a function of the rainfall and gradient of the river stretch.
[22] In these cases, fish survey data should be provided by the applicant and fish abundance will be assessed by SEPA on a site-specific basis.

- where the rivers and streams upstream of the tailrace do not provide any significant extent of suitable habitat for fish species that might otherwise migrate upstream to spawn.

Fish migration in this context includes long-distance migrations undertaken by species such as Atlantic salmon as well as short distance migrations undertaken by resident species, such as brown trout.

Purpose

Mitigation must be designed to provide a flow regime capable of:

- triggering migration;
- enabling fish to pass natural and artificial obstacles in the river;
- providing sufficient time at suitable flows for fish to progress upstream.

Requirements

The scheme must be operated so as to provide suitable flows for fish migration and spawning activity during the periods of the year in which that activity would naturally occur. These periods will depend on:

- the fish species and fish populations;
- the location of the scheme.

In smaller upland tributaries, only a relatively short period in the autumn and winter months may be relevant depending on the species and stocks present. On major rivers in the lower reaches of catchments, fish migration may occur in all months.

During periods in which migration or spawning would be expected to occur, schemes will be expected to operate so that the rate of abstraction is no greater than that permitted by the river flow standards for good[23] across the range of flows providing the flow depths and velocities needed by fish for migration and spawning. In practice, this may be achieved by one of the following:

- reducing abstraction rates accordingly;
- ceasing generation during the relevant period of the year;
- operating a much greater hands-off flow.

The most appropriate option for providing the required flows and optimising the electricity output of the scheme will depend on the site-specific circumstances.

The river flow standards for good typically allow abstraction of about 20% of average summer flows rising to about 30% of average winter flows and 40% of spate flows. However, as river flows vary throughout the year and the river flow standards differ slightly according to river type, we should be contacted for detailed advice on calculating the volumes of water that can be abstracted during periods of migration and spawning.

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[23] The relevant river flow standards are detailed in the Scotland River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) Directions 2009 and the Solway Tweed River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) (Scotland) Directions 2009. These are available on the Scottish Government's website at:
www.scotland.gov.uk/Topics/Environment/Water/WFD/RBMPFramework

Impact of proposal on river continuity for fish

Purpose	Mitigation (summarised)
Protection for downstream fish passage	Intakes must be appropriately screened unless the scheme uses an Archimedean screw and has no screen on the tailrace. There must be a plunge pool for fish below any drop over the weir.
Protection for upstream fish passage	A fish pass for salmon and trout. This may comprise either: • a natural design pass, such as a low-gradient by-pass channel or a rock ramp; • a proven artificial design fish pass, such as a pool and traverse pass.
	An eel pass (suitable for upstream migration of elvers).
	A lamprey pass (suitable for upstream migration of lampreys).
	Tailrace: • designed and located so as not to attract migratory fish; • screened where necessary (gaps ≤ 20 mm).
Protection of flows for upstream fish migration and spawning	See previous section

Provision for downstream fish passage (all species)

The mitigation in this section applies if the rivers upstream of the intake support fish populations, or would be expected to do so following the achievement of the objectives of the relevant river basin management plan.

Intake design and screening

Purpose

Mitigation must be designed to avoid downstream-moving fish from entering the abstraction intake unless:

- the scheme uses an Archimedean screw incorporating appropriate protection of the leading edge[24] and with a blade pitch designed to provide sufficient room for the safe transit of the fish species present;
- the tailrace is unscreened.

[24] i.e. a compressible silicone extrusion.

Requirements

The intake must be appropriately designed and screened to avoid downstream-moving fish from entering the intake or becoming trapped against intake screens:

- Coanda screens should be used wherever site characteristics permit.
- Drop screens may be used instead of coanda screens if it is not reasonably possible to use coanda screens.
- Screens should have gaps of ≤ 10 mm.
- Where coanda screens are used, there must be sufficient flow to keep the entire face of the screen at least wet and allow debris and fish to be washed from the screen face.
- Screens must be sufficiently steeply angled from the horizontal to prevent debris accumulating on the screens and to ensure fish are safely washed downstream over the screens.

If, in exceptional circumstances, it is not reasonably possible to use coanda or drop screens, we will consider the case for deploying alternative types of screen. The following design criteria must be considered in such situations:

- Where vertical screens are used, the off-take should normally abstract water at 90° to the main flow so that the intake screens follow the existing bank line and fish are led along the face of the screens rather than being drawn onto them.
- To ensure that fish are not pinned against, or damaged by, the screen, flow velocities through the screen must be ≤ 0.3 metres per second.
- In exceptional cases where the only reasonably practicable option is to install the screen in a headrace, the screen should be angled diagonally across the flow, allowing a low approach velocity even when the axial channel velocity in the headrace is high. A screen by-wash must also be installed and the angling of the screen should guide fish towards the by-wash entrance.
- Screens should have gaps of ≤ 10 mm.
- In operation, the screen must be kept clear of debris to avoid flow through the screen becoming concentrated resulting in higher velocities. An allowance must be made for some blocking when sizing the screens, such that the target approach velocity is not exceeded when screen performance is reduced by the accumulation of debris. The inclusion of an automatic screen cleaner will improve performance so that the additional area of screen required can be less. If screens are to be cleared manually, the target approach velocity will need to be maintained with 50 per cent screen blockage. Where automatic screen cleaning is to be used, the target approach velocity will need to be maintained with 10 per cent screen blockage.

There are circumstances where different screen gap sizes may be acceptable. Larger screen gap sizes than 10 mm may be acceptable if:

- the proportion of salmon and sea trout smolts present that have a length of < 11.5 cm is insignificant;
- no ecologically significant downstream movement of salmon or trout fry, salmon or trout parr, or juvenile eel (elvers);
- juvenile lamprey (ammocetes) occurs in the part of the river or stream concerned.

Developers proposing to use larger screen gap sizes than 10mm must provide with a suitable risk assessment, taking account of the fish species present.

Weir design

Purpose

Mitigation must be designed to prevent injury to fish moving downstream after passing over the weir (i.e. by ensuring that fish do not fall directly onto rock or concrete).

Requirements

A plunge pool of adequate volume must be present on the downstream side of the weir. Where intakes have been built on natural waterfalls, a suitable plunge pool may already be present. Where such a natural feature is not present, a retaining structure must be provided to maintain a pool of sufficient depth.

No part of the weir or plunge pool retaining structure may be constructed of unconsolidated rip-rap or gabion baskets into which fish may be washed and become trapped or injured.

The plunge pool must extend over the entire width of the weir over which water could flow in very high river flows. Its depth must be at least 1/3 of the height of the vertical drop or one metre, whichever is the smaller.

The plunge pool must be connected with the main flow in the river channel at all times to minimise the risk of fish stranding and to prevent delays to migration.

The weir face and any notch or pipe used to provide downstream flow must be designed to ensure that fish passing over or through the weir are not injured (e.g. by colliding with protruding structures or sharp and/or abrasive surfaces, etc).

Provision for upstream fish passage

Fish Passes and Screens Guidance
The Water Environment (Controlled Activities)(Scotland) Regulations 2011 Regulations, gives power to SEPA to control the design and operation of abstractions and impoundments which includes the provision of fish passes and screens. In order to ensure compliance with the Water Framework Directive and other relevant legislation, SEPA is currently producing guidance on the design and operation of fish passes and screens. This guidance will be based on the Fish Pass Manual produced by the Environment Agency (EA) in England and Wales.

Until such time as the guidance is produced, developers are recommended to follow the design guidance in the EA Manual and to seek advice from SEPA in the early stages of the design process. The EA manual is designed to be used by engineers and developers and is available online from the EA website at www.publications.environment-agency.gov.uk/pdf/GEHO0910BTBP-E-E.pdf. It should be noted that the design guidance in the EA manual is tailored to ensuring upstream fish passage. Protection of downstream fish movement, mainly through the use of appropriate screening, is also essential.

Disruption or delay to fish migration can have significant adverse impacts on the distribution and/or abundance of fish populations. Run-of-river hydropower schemes can pose significant risks to fish migration and the impacts can extend far beyond the site of the hydropower scheme. Unless such risks can be avoided, authorisation will generally be refused.

Developers are advised to consider:

- sites that are upstream of natural[25] barriers to fish migration;
- sites where fish habitat upstream is only very poor quality, or very limited, and not important for maintaining the distribution or abundance of fish populations;
- utilising existing weirs that are currently acting as a significant barrier to fish migration. The development of such sites must aim to improve fish passage.

We will only consider applications to develop other sites where the developer provides evidence that the fish passage provisions proposed (including the accompanying management regime) will be effective in safeguarding fish migration.

Most fish passes are likely to cause some delay or increase fish stress or energy use. It is not possible to predict the efficiency of any design with 100% confidence. We will take account of this uncertainty in deciding whether or not the benefits of the scheme justify the risk. Even with a well designed fish pass, a development may be unacceptable if located on an important fish migration route or if it would contribute (together with existing obstacles) to a significant cumulative risk to fish migration.

Where there is a significant extent of good fish habitat upstream of a proposed scheme, we are likely to require effective operation of the fish pass to be demonstrated as a condition of continued authorisation. This may involve electric fishing, redd counts or fish pass surveillance using TV or automatic fish counters. For this purpose, camera systems, light boxes and counter housings may need to be incorporated into the initial design of the fish pass.

The most appropriate fish pass design to use will depend on a range of factors including:

- the fish species present (e.g. Atlantic salmon, sea trout/brown trout; eel; lamprey, etc);
- the characteristics of the intake structure, including the head difference;
- the characteristics of the river or stream;
- the type of management regime it is feasible to put in place to ensure the fish pass is maintained in working order.

The fish pass need only operate during the period of the year used for migration by the fish species and populations that are present. Early discussions with us are recommended.

[25] Rivers and streams upstream of man-made barriers to upstream migration may support local brown trout populations that could be adversely affected by new obstacles to fish movement in those rivers and streams.

Fish pass design - salmon and trout

The mitigation in this section does not apply to schemes located on rivers lacking populations of salmon and trout (e.g. schemes located above the upstream limit to migratory fish in steeply sloping channels through which upstream movement of brown trout is unlikely).

Purpose
Mitigation must be designed to ensure that salmon and trout are provided with a means of ascending passed the weir at times during which they would naturally move upstream.

Requirements

Passage must be provided by one of the following fish passes outlined below. In all cases, there must be an appropriate flow attracting fish to the pass entrance. To achieve this, the fish pass discharge must be able to out-compete other flows in its attraction to fish. Where a turbine is on a weir, the turbine outflow should be adjacent to the fish pass so that it augments attraction rather than competing with it.

All passes must be maintained free of any debris that could impair their effective operation. This will require suitable design characteristics (e.g. incorporation of an upstream debris boom) and a maintenance programme.

Natural design passes

- **Low-gradient, by-pass channels**. These can accommodate all fish species and also provide additional fish habitat.

- **Rock-ramps.** These are built into the river channel and lead up to the weir crest. They must be engineered with strategically placed rocks (boulders) designed to provide natural refuge pools and reduced water velocities. They must also be able to withstand flood flows. The appropriate gradients and boulders for a rock ramp depend on the fish species that are present. Table A2 provides indicative design criteria for ramps suitable for salmon and trout. Adjustments may need to be made (e.g. to boulder placements etc) to optimise the performance of the rock-ramp.

Artificial design passes

- **Pool and traverse passes**. These break-down the head-difference at main weir into a series of small steps that can be ascended by fish. The pass should be designed to ensure that:

  - the drop in water levels between adjacent pools does not exceed 30 centimetres if trout are present or 45 centimetres if only salmon are present;

  - the pools have minimum dimensions of 3 metres long, 2 metres wide and 1.2 metres deep;

  - the downstream edge of the notch and traverse is curved so as to reduce turbulence and ensure water flows down the face of the wall (ie has an adherent nappe) rather than forming a free-spurting jet;

  - the majority of the baseline flow regime passes through the fish pass;

- the pass is positioned at the most upstream section below the weir where fish naturally accumulate;

- the pass is still effective when flow in the river upstream of the intake structure rises to Qn10.

- **Pool and traverse passes using pre-weirs** (sometimes called easements). These operate on similar principles to the conventional pool and traverse pass but have the effect of raising tailwater levels. The pre-weirs span the width of the river about 10 metres downstream of the main weir. The same traverse design criteria as for pool and traverse passes apply. The principal difference is that pre-weirs take the full flow of the water passing over the main weir.

- **Baffled fish passes**. These consist of rectangular channels/troughs containing various shaped, closely-spaced baffles set at an angle to the axis of the channel. The baffles form secondary channels whilst leaving a proportion of the channel/trough to take the main flow. The gradient and length (between resting pools) of baffled fish passes must be designed to suit the swim speeds and endurance of the fish present. Baffled passes can be constructed off-site and bolted together *in situ*, or the baffles inserted into a pre-formed channel. Examples of baffled passes include:

    - the Alaskan 'A' baffled pass. This can operate at steeper gradients than other baffled passes. A maximum slope of 25% and maximum length of 12 metres (i.e. a 3 metre head difference) can be used for salmon. A less steep gradient and shorter length is required for smaller fish. These passes operate with relatively low flows, give the most lift before requiring a resting pool, and accommodate about a 1 metre change in upstream water level. Their complicated baffle geometry and narrow free gap makes them very prone to blockage by debris. An effective means of preventing blockage by debris (e.g. an upstream debris boom) must be incorporated into the design and operation of the pass;

    - the plane baffle or Denil fish pass. This uses a less complicated baffle design than the Alaskan A and can operate up to a maximum slope of 20% and maximum length of 12 metres (i.e. a 2.4 metre head difference) before a resting pool is required. An effective means of preventing blockage by debris (e.g. an upstream debris boom) must be incorporated into the design and operation of the pass;

    - Larinier Superactive baffled pass. This consists of 10 to 15 cm high chevron baffles that span the bottom of the fish pass channel and (unlike in the Alaskan A and Denil) do not extend up the sides. Channel widths can be very wide to accommodate large flows provided longitudinal webs are used to separate each set of chevron baffles. The design can achieve very low water velocities and so enable passage of small salmonids and large coarse fish. They are not as prone to blockage by debris as other baffled passes and so require less maintenance. The Larinier pass operates at a maximum gradient of 15% and a maximum length is 12 metres for large salmonids before a resting pool is required (ie a 1.8 metre head difference). This type of pass is less tolerant than other designs of large upstream head fluctuations. The maximum head over the top baffle is limited to about 0.7 metres.

- **One or more notches in the crest and apron of the weir** with associated take-off pools beneath them. The depth of a take-off pool must be 1.25 times the height of the drop. This type of fish pass may only be used where:

- the maximum head difference across the weir (at the fish pass notch) is less than the relevant head difference in Table A3;
- the downstream face of the weir is vertical or close to vertical.

Table A2: Guide design characteristics for rock-ramp fish passes[26]		
Fish species present	Salmon	Trout
Average water velocity on ramp during periods of upstream migration	< 2 m/s	< 2 m/s
Depth of flow on ramp	> 15 cm	> 10 cm
Slope of ramp	< 15 %	< 15 %
Length (diagonal slope) of ramp between resting pools	< 10 metres	< 10 metres

Table A3: Maximum head difference across the weir		
Fish species present	Salmon	Trout
Vertical height (centimetres)	80	50

Fish pass design – eels

The mitigation in this section does not apply to schemes located on rivers upstream of natural barriers to upstream eel (elver) migration or upstream of known man-made barriers to eel migration in relation to which there are no plans to provide for eel passage.

Purpose

Mitigation should be designed to ensure that eel are provided with a means of ascending the river.

Requirements

An eel pass must be provided that:

- does not involve vertical drops (i.e. eels cannot leap in order to ascend the river);
- provides a permanently wetted and non-smooth surface up which eels can move.

Weirs devoid of a suitable climbing substrate (i.e. wetted surfaces covered in algae, moss or other growth) will require an eel pass. This must consist of a trough containing a suitable bristle substrate with an irrigation and attraction flow. Staged holding/release tanks must be included for weirs with high head differences.

[26] Adapted from SNIFFER research project (in progress), WFD111 Development of a screening tool for assessing the porosity of barriers to fish passage: Phase 2a: Draft project report; January 2010; SNIFFER, Edinburgh. The table will be updated, where necessary, to take account of any revisions made in the finalised project report.

A proportion of the eel population may attempt to ascend the turbine channel. This may require both the turbine channel and the depleted river channel to have an eel pass.

Fish pass design - lampreys

The mitigation in this section does not apply to schemes located on rivers or streams from which lampreys are absent. Lampreys are unlikely to be present in steep streams. Schemes using existing weirs and dams are unlikely to further compromise lamprey migration.

Purpose

Mitigation should be designed to ensure that lampreys are provided with a means of ascending the river.

Requirements

Lampreys have a very poor swimming ability and could not negotiate the artificial-type fish passes discussed above. A natural-type fish pass (such as a low-gradient, by-pass channel) may be used if the pass can be designed to provide sufficiently low flow velocities (eg < 0.5 metres per second).

Some authors (e.g. Armstrong *et al.*, 2004) have suggested that Denil type passes can be adapted for lamprey passage, although this has not been tested extensively in Scotland. Applicants are advised to contact us and SNH at an early stage if lamprey passage is likely to be an issue.

Tailrace design

Purpose

Mitigation should be designed to ensure that migrating fish are not diverted from upstream migration by the presence of competing tailrace flows.

Migrating fish are attracted to areas of high flow. They can therefore be attracted to high tailrace flows, particularly when turbines are operating at high capacity, and flows in the depleted reach are low.

Requirements

The tailrace must be designed so as not to attract upstream migrants. This may be achieved by:

- designing the tailrace so that the exit velocity of water from the tailrace is significantly lower at all flows than the main flow leading upstream;
- locating the tailrace so that it does not compete with the main river flow leading upstream to the fish pass (e.g. co-locating the tailrace in line with the main flow).

Tailraces must normally be screened using screens with a 20 mm mesh size. Larger mesh sizes may be used if:

- the tailrace flows will not attract upstream moving fish (e.g. because the tailrace has been designed to reduce exit flow velocity sufficiently for this flow not compete with flows in the river channel in terms of attraction to fish);

- evidence is provided that adult brown trout do not move upstream passed the proposed site of the tailrace to spawn.

The screens may be constructed from wedge wire, square or oblong metal bars. Round or oval bars should not be used.

Provision for sediment transport

Purpose	**Mitigation (summarised)**
Protection of downstream transport of sediment	Removal and return downstream (at appropriate times and locations) of sediment accumulation upstream of intake structure
Protection of river banks and bed from erosion	Appropriate design of engineering structures and tailrace to ensure that erosion rates of the bed and banks is not increased

Management of sediment accumulating upstream of weir

Purpose

Mitigation should be designed to aim to avoid significant disruption of sediment supply to river reaches downstream of the weir by re-supplying those reaches with sediment that accumulates upstream of the intake structure.

Requirements

The natural erosion and downstream migration of sediments are essential for the creation and maintenance of natural river habitats. Therefore, natural sediments should be reintroduced to a suitable location that is as close downstream of the intake as possible.

Accumulations of sediment in the ponded reach upstream of the intake structure must normally be returned to the river by:

- designing the intake structure such that high flows move sediments over it and into the river downstream;
- operating scour valves;
- excavating, transporting and reintroducing the sediments.

Picture 1: Scoop intake showing 'scoop' shaped central channel with side intakes. In high flow conditions the water continues over the crest of the intake and effectively scours the intake on every spill (photograph courtesy of Scottish & Southern Energy).

Sediment should be returned to the river:

(a) within 10 metres downstream of the intake structure if suitable sites are available and it is practicable to use them or as close to this downstream as possible;
(b) during periods of high flow conditions;
(c) at locations that will not create an accumulation of sediment likely to impede the free passage of migratory fish;
(d) during periods other than those during which fish are likely to be spawning and the period between spawning and emergence of the juvenile fish.

Where the proposal is to use a pre-existing weir and the sediment in the ponded reach may include sediment that has accumulated behind the weir over many years, steps should be agreed with us that will avoid potentially contaminated sediments from being excavated and returned to the downstream reach.

These requirements apply on the assumption that the scheme is designed to ensure the river downstream of the intake structure continues to experience high spate flows.

Management of erosion risks

Purpose

Mitigation should be designed to avoid the scheme increasing bed and bank erosion rates.

Requirements

The tailrace should be designed and located such that the water exiting the tailrace does not cause erosion of the bed and banks.

Engineering structures must be designed so as not to concentrate high flows onto parts of the bed or banks that are vulnerable to erosion.

References

Armstrong, G., Aprahamian, M., Fewings, A., Gough, P., Reader, N. & Varallo, P. (2004); *Environment Agency Fish Pass Manual: Guidance notes on the Legislation, Selection and Approval of Fish Passes in England and Wales*. Version 1.1

Beach, M.H.; (2010) *Review of mitigation measures for the protection of fish;* unpublished report to SEPA.

Dunbar, M.J. & Mould, D.J. (2009*) Distinguishing the Relative Importance of Environmental Data Underpinning Flow Pressure assessment 2 (DRIED-UP 2)* Environment Agency, Rio House Waterside Drive, Aztec West Almondsbury, Bristol BS32 4UD. Bristol.

Environment Agency (2009) *Good practice guidelines to the environment agency hydropower handbook: The environmental assessment of proposed low head hydropower developments*; Environment Agency, Rio House Waterside Drive, Aztec West Almondsbury, Bristol BS32 4UD.

Environment Agency Fish Pass Manual www.publications.environment-agency.gov.uk/pdf/GEHO0910BTBP-E-E.pdf

Solomon, D.J. & Beach, M. H. (2004) *Fish Pass Design for Eel and Elver (Anguilla anguilla);* Environment Agency, Rio House Waterside Drive, Aztec West Almondsbury, Bristol BS32 4UD; ISBN: 1 84432 267 X.

Scottish Office (1995) *Notes for guidance on the provision of fish passes and screens for the safe passage of salmon*; Scottish Office Agriculture and Fisheries Department, Pentland House, 47 Robb's Loan, Edinburgh EH14 1TW; ISBN: 0 7480 3105 Y.

SNIFFER (2010) WFD111 research project (in progress); *Development of a screening tool for assessing the porosity of barriers to fish passage: Phase 2a: Draft project report;* January 2010; SNIFFER, First Floor, Greenside House, 25 Greenside Place, Edinburgh.

SNIFFER (2008), *Development of Standards for Compensation Flows and Freshets*; Project WFD 82, SNIFFER, First Floor, Greenside House, 25 Greenside Place, Edinburgh EH1 3AA.

Turnpenny, A.W.H. & O'Keefe, N. (2005) *Screening for Intakes and Outfalls: a best practice guide* (2005); Environment Agency, Rio House Waterside Drive, Aztec West Almondsbury, Bristol BS32 4UD; ISBN: 1 84432 361 7.

CAR screening document to be completed by applicants for all run of river hydro schemes

Part A – Checklists

Hydro schemes which meet the criteria set out in Part A of the SEPA 'Guidance for developers of run-of-river hydropower schemes' are unlikely to have a significant adverse impact on the water environment. This form is intended to record the reason(s) why you believe this to be the case.

Part B – Mitigation measures

All hydro schemes are required to incorporate all practicable mitigation measures, as set out in Part B of the guidance, to reduce the impact on the water environment.

Where proposals meet the requirements of both Parts A and B they are likely to be acceptable without further need for assessment.

N.B. - When you reach a decision which indicates that the proposal is either provisionally acceptable or provisionally unacceptable it is not necessary to proceed any further with the checklists. If the proposal is provisionally acceptable you must also record how the scheme incorporates the mitigation detailed in Part B of the guidance.

Scheme details
CAR licence number (if known) **CAR/L/**
NGR of intake(s) and return point **Intake(s)** **.. …. ….**
(8 figures please) **Return** **.. …. ….**
Location description **……………………………………………**

Part A - Checklists

Please tick relevant boxes and follow the instruction in the coloured box.

Checklist A: Proposals sited in degraded parts of the water environment		**Yes**	**No**
1	Is the impacted stretch: • Part of a HMWB? • Surrounded by urbanised land, intensive agriculture or commercial forestry?		
		Go to 2	Go to Checklist B
2	Is the river already impacted?		
		Go to 3	Go to Checklist B
3	Is the impacted stretch planned to be improved?		
		Go to Checklist B	Provisionally acceptable go to Part B

Reason for decision: The proposal is situated in an area of the water environment which is currently significantly adversely impacted and is not planned to be improved to achieve the objectives of a river basin management plan. Consequently the proposal will not result in an adverse impact on the water environment.			

Checklist B: Proposals sited in small, steep rivers and streams		**Yes**	**No**
1	Is the area of the catchment upstream of the proposed tailrace < 10 km^2?	Go to 2	Go to Checklist C
2	Is the channel slope between the intake and the tailrace ≥ 0.1?	Provisionally acceptable go to Part B	Go to 3
3	Is the channel slope between the intake and the tailrace > 0.06?	Go to 4	Go to Checklist C
4	Is the affected stretch part of a waterbody as identified by SEPA, with a catchment area ≥10km^2?	Go to 6	Go to 5
5	Is the distance between the intake and the tailrace together with any reaches impacted by other activities < 500 metres if the water body is at high status and < 1,500 metres in all other cases?	Go to 6	Go to Checklist C
6	Does the river or stream between the intake and the tailrace contain any ecologically significant area of good habitat for fish?	Go to Checklist C	Provisionally acceptable. Go to Part B
Reason for decision: The proposal is situated in a small (<10km^2) catchment which does not contain extensive areas of good fish habitat and the impact is of limited spatial extent. Consequently the proposal will not result in an adverse impact on the water environment.			

Checklist C: Proposals delivering net benefits to the ecological quality of the water environment		**Yes**	**No**
1	Will the proposal significantly improve fish passage at a man-made obstacle to upstream or downstream migration, such as a dam or weir?	Go to 2	Go to 3
2	Is the length of fish habitat to which access would be improved significantly longer than the length of river or stream between the intake and the tailrace?	Go to 4	Go to 3
3	Will the proposal provide other significant net benefits to the ecological quality of the water environment?	Go to 4	Go to Checklist D

4	Is the length of river or stream between the intake and the tailrace < 1,500 metres?	Provisionally acceptable. Go to Part B	Go to Checklist D
Reason for decision: The proposal will result in a net benefit to the water environment by improving fish passage at a man made obstacle or by providing other significant benefits to the ecological quality of the water environment. Consequently the proposal will not result in an adverse impact on the water environment.			

Checklist D: All other proposals		**Yes**	**No**
1	Will the scheme be powered by the flow of water through an existing weir or dam (i.e. without removing water from the river channel)?	Provisionally acceptable go to Part B	Go to 2
2	Will the scheme be powered by water flow from an existing outfall?	Provisionally acceptable go to Part B	Go to 3
3	Will the scheme be powered by water that is abstracted from immediately above a drop (eg a waterfall, cascade or weir) and returned immediately below that drop?	Provisionally acceptable go to Part B	Go to 4
4	Is the proposal located on a minor tributary of a water body (i.e. a tributary with a catchment area of < 10 km^2) (information available from SEPA)?	Go to 7	Go to 5
5	Is the water body at high status?	Go to 6	Go to 7
6	Is the distance between the intake and the tailrace (excluding any part of that distance that is on a minor tributary) together with any reaches impacted by other activities < 500 metres?	Go to 7	Go to 8
7	Will the scheme use only the proportion of the flow in the river or stream at any one point in time that can be abstracted without causing a breach of the river flow standards for good (note 2)?	Provisionally acceptable go to Part B	Provisionally unacceptable if <0.35GWh[27]
8	Will the scheme use only the proportion of the flow in the river or stream at any one point in time that can be abstracted without causing a breach of the river flow standards for high?	Provisionally acceptable go to Part B	Provisionally unacceptable if <0.35GWh[1]
Reason for decision: The proposal will be:			Tick relevant box

[27] For schemes producing <0.35GWh reference should be made to Table 1 in Part A of the Guidance and to the flowchart on page 6.

Powered by the flow of water through an existing dam.	
Powered by water flow from an existing outfall.	
Powered by water abstracted immediately above a drop and returned immediately below that drop.	
Operated such that it would not result in a breach of the relevant river flow standard.	
Consequently the proposal will not result in an adverse impact on the water environment.	

Part B - Mitigation measures

Summary of flow impact mitigation – please tick relevant boxes or mark as 'n/a'

Purpose of mitigation	Summary of mitigation provided			
Protection of low flows	Q_n95	Q_n90	Other	
Protection of flow variability	Q_n80 provided at u/s flow of Q_n30			
Protection of high flows	Max abs as a proportion of mean flow			
Protection of flows for upstream movement and spawning of fish	Scheme will be operated to comply with good status flow standards at relevant time of year			

Summary of mitigation to minimise risk to fish movements – please tick relevant boxes or mark as 'n/a'

Purpose of mitigation	Summary of mitigation provided	
Protection of downstream fish passage	Intake screened to 10mm	
	Coanda screen	
	Plunge pool fitted	
Protection of upstream passage of fish	Fish pass fitted	
	Fish pass type	
	Eel pass	
	Lamprey pass	
Tailrace design	Screened to 20mm	
	Not attractive to fish	

Reason for deviation from mitigation (if applicable)

For proposals which meet the criteria in the Part A checklists and incorporate the mitigation in Part B, no further assessment is required and this document will serve as our decision document.

Assessment made by …………………………… (print) ……………………………… (sign)

Date ……………………………………