

Paterson, Kevin

From: .. [
Sent: 09 March 2010 20:35
To: Hydro Consultation
Subject: Small hydro scheme consultation.
Follow Up Flag: Follow up
Flag Status: Completed
Attachments: 100305 Hydro scheme consultation.doc

Dear Sirs,

I refer to your consultation document 'Guidance for the developers of run-of-the-river Hydropower schemes'. The document contains detailed mitigation measures in order to protect the passage of fish, but makes no reference to the protection of non-angling interests, in particular those of canoeists. Hydropower schemes can make an important contribution to low-carbon energy sources but they also have the potential to harm the ecology and the recreational use of the river. Mitigation measures are therefore particularly important and indeed the Scottish Ministers have indicated their desire that schemes should not cause unacceptable impact on the water environment.

The Water Framework Directive requires that consideration be given to the users of the water environment. The Environment Act 1995 Section 32 (2)(a) places a duty upon SEPA to have regard to the desirability of preserving for the public any freedom of access, and whilst rivers and burns are not specifically listed, many are themselves places of natural beauty. Subsequent to the EA 95 Scottish Ministers passed access legislation that does include rivers and burns, and taking the two together I think the intention of ministers is clear.

I fully understand that the document is aimed at very small schemes, and if these are on burns that are too small/steep/inaccessible to be used then mitigation would be inappropriate. However some may be on larger burns which are used in high flow conditions, Ness Glen on the River Doon springs to mind.

I therefore request that the document is expanded to include mitigation measures for the protection of navigation, and that the mitigation measures for fish passage – especially the section regarding rock ramps – are reviewed to ensure that a freely navigable channel is always included. Rock ramps have the potential to change a natural fall or rapid into a boulder-choked boat-wrecker! Preferably a fish pass and canoe pass should be one and the same: there are plenty of suitable examples on existing weirs. The incorporation of baffles in chutes on weirs, such as that fitted on the weir at Craigie Park, Ayr, is a recent innovation that obstructs passage by canoes. They serve no significantly useful function; fish used the channel just as well before the baffles were installed and fish pass freely up the unobstructed chutes on the weirs on the River Doon.

I would also request that any general guidance and draft licences for engineering works such as dam and weir construction on larger rivers are also reviewed to ensure that new or modified structures are required to include a canoe chute.

I enclose a first draft of supplementary mitigation that may form the basis of appropriate measures.

David Wilbraham

Scottish Canoe Association River Advisor – River Doon

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3 Impact of proposal on downstream passage of canoes and kayaks.

Protection of downstream small boat passage.

Most rivers and large burns in Scotland are used by canoeists and such use is enshrined in recent access legislation. In smaller watercourses such use is usually associated with higher flows. For the purpose of this document, the word 'canoe' is used generically to mean either canoes or kayaks, as the requirements regarding passage are the same for both types of craft.

Section 3.1 Provision of downstream passage for canoes.

The mitigation in this section does not apply to schemes located in watercourses that are too small for passage by canoes in high flow conditions, or to those situated on natural waterfalls that are impassable due to their size or gradient. (Note: interested third party verification required).

A Weir design and canoe pass

Purpose

The purpose of the mitigation is to ensure that the scheme does not create an impassable barrier to downstream navigation by canoes under medium to high flow conditions. The design of the mitigation should take account of flow characteristics at variable water levels and should ensure that a canoe pass is provided that is free from obstruction either by boulders or a powerful hydraulic jump (the wave that forms at the foot of a weir or similar drop in water level).

Requirements

It is generally recommended that this mitigation measure is incorporated with any fish pass. Mitigation must be provided in the form of a channel, notch or chute (the 'canoe pass') leading into a plunge pool of adequate depth such that canoes do not impact on the river bed. The design of the plunge pool must not include hard engineering of the river bank or side walls so as to constrain the hydraulic jump between the side walls or banks. The canoe pass must include a clean channel not less than 1 metre wide unobstructed by rocks, boulders, baffles, or other obstacles.

The canoe pass shall not include vertical drops of greater than 1.5 metres, and where more than one such drop is included, there shall be not less than 10m of shallow gradient channel between each vertical drop.

The canoe pass shall not include 90° bends unless the channel is itself greater than 3 m wide.

The canoe pass shall be maintained as necessary to ensure it remains free of obstructions.

Paterson, Kevin

From: Michael Wigan
Sent: 26 March 2010 18:47
To: Hydro Consultation
Subject: hydro consultation, michael wigan.
Follow Up Flag: Follow up
Flag Status: Completed

Response to Consultation by SEPA, 'Guidance for developers of run-of-river hydropower schemes', Draft 3 March 2010.

From: Michael Wigan, Borrobol Estate, Kinbrace, Sutherland KW11 6UB.

It is impossible to respond to this paper the way it is presented in tick-box format.

The reason is that the premises of the consultation exhibit no understanding of hydropower in its history affecting this part of Scotland.

The development of sporting properties -- embracing the location for many potential hydro schemes -- was dependent on hydropower. My own house and other estate houses, built around 1900, were powered by hydro originally. These were run-of-river schemes. This was typical. I know of many more similar situations.

Many run-of-river schemes presently up for grant assistance under 'renewables options' should be seen as restoration schemes not new proposals.

The Draft logically should undertake some audit of hydro history. Is renewing a scheme capable of delivering better environmental benefits or not? This audit would inform the balance in decision-making, on the one hand potential damage to water-flow taken over its complete history, on the other the power benefits.

Secondly, comments are invited on 'adverse impacts'. This judgement is unexplained. No explanation is offered for what is considered adverse or the opposite. It appears, indeed, that 'bad' is change of any sort. 'Good' is no change.

Proper environmental value judgements are site-specific, the system in all other planning.

Informed decision-taking would embrace the beneficial impacts created by past schemes applying to be restored. The old hydropower systems often provided new water environment also, in some cases water gardens and stream features around houses. Many of these, if audited, would show positive environmental effects.

What are called natural flows are, in fact, seldom natural. Most trout fishing lochs in the north Highlands have low-level hatches and small impoundments.

A better study of the history of water-flows might have produced a consultation which reflected truthfully the realities on the ground. If SEPA starts from the imaginary premise of a pristine environment, sensible policies are impossible.

If regulations aimed to restore completely natural flows Waverley Station in Edinburgh will have to be relocated and the original marsh restored! Is that the purpose of the EU's Water Framework Directive?

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If, alternatively, it has been understood that potentially the number of small hydro schemes is so great that the grants are unaffordable, and a restrictive and arbitrary system about changed water-flows is needed to curb the number of successful applications, that is another thing and understandable.

Regrettably though entrepreneurs stimulated by renewables options will have been misled. They have wasted money and human resources futilely applying for ill-conceived schemes.

I am sorry not to be able to comment in a positive light on proposals for more benign power generation, an obviously desirable aim.

Michael Wigan.

26th March 2010.

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Paterson, Kevin

From: hebe carus [mcofs.accessandconservation@yahoo.co.uk]
Sent: 06 April 2010 14:48
To: Hydro Consultation
Subject: run of river guidance
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Hi

In response to the consultation document, all I really wanted to say is that it is vital to make it clear and cross-reference other guidance that is applicable to these schemes. Particularly the SNH document that is currently in the pipeline and expected in May (led by Kenny Taylor) which is going to cover non-water environment issues of the schemes such as landscape, public access, tracks, terrestrial ecology etc. With such compartmentalised guidance as has been appearing recently on hydro schemes it is important that no-one is left in any doubt about what is relevant through omission of cross-referencing.

Thanks

Hebe

Hebe Carus- Access and Conservation Officer

Please reply to- mcofs.accessandconservation@yahoo.co.uk
www.mcofs.org.uk

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Paterson, Kevin

From: John Craig
Sent: 15 April 2010 11:19
To: Hydro Consultation
Subject: Hydro consultation
Follow Up Flag: Follow up
Flag Status: Completed
Attachments: letter to SEPA.docx

Dear Sir

Please find an attached letter. I would be grateful if you could acknowledge its receipt.

Best wishes

John Craig

Dr John F Craig CBiol FSB FLS
Editor in Chief Journal of Fish Biology
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Whiteside
Dunscore
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01387820501

30 March 2010

Scottish Environment Protection Agency (SEPA)

Subject: Consultation on environment licensing for hydro schemes

Dear Sir

I wish to make some general comments regarding the above. I am writing as a professional fish ecologist.

Ecosystem development projects such as hydropower schemes can potentially have a damaging effect. This applies to sub-100 kW and 100 + kW schemes (see for example <http://intranet.iucn.org/webfiles/doc/archive/2001/IUCN850.PDF>). There is a need to protect and conserve all users and inhabitants of the freshwater resource including plants, invertebrates, fishes and other animal communities that utilise the water. Thus I appreciate the Guidelines that have been prepared by SEPA. I note that the Environment Agency has also produced *Good Practice Guidelines Annex to the Environment Agency Hydropower Handbook. The Environmental Assessment of Proposed Low Head Hydro Power Developments*. The latter outlines clear steps to be taken during development.

There is extensive literature and model development regarding regulated rivers and streams and fish stocks but there is widespread lack of ecological knowledge about aquatic species abundance, distribution and population dynamics and the factors constraining sustainability of the resources. How do you measure 'deterioration' on the water environment without carrying out intensive 'before' and 'after' surveys? In many cases, for example building large dams for hydropower, problems have arisen in assessing impacts because of a dearth of 'before' data. How are schemes considered 'acceptable' or 'unacceptable' without being able to quantify the impacts? Judgements are usually based on qualitative, subjective data. Without quantitative data it is not possible to determine if development of the schemes would or would not 'cause deterioration of the water environment'. There is a need for 'rule of thumb' management of the resources based on sharing experiences from more intensively studied systems. Unfortunately, however, there appears to be very limited quantitative data available. Data for small streams in particular are limited and suitable data may take years to accumulate.

Large schemes should proceed with extreme caution considering the impacts on the environment, which are already known for such developments. There is extensive literature around the world to show this. Quantitative data are required. Note that the resource is only useful if it is kept in a 'healthy' environmental state. Governments should not give way to power companies if developments are proven to be detrimental to the environment. This has happened too often in the past.

It is more difficult to apply rules to small schemes and probably a case by case analysis is required. It is probably also appropriate to consider the cumulative impact of several micro hydro schemes in a single catchment. Spot checks such as electrofishing surveys have limited value as they only indicate what is there at one particular time (species may be missed) and they do not provide abundance estimates. Relics above impassable upward barriers may have genetic significance but this can only be determined by DNA analysis. It may also be very difficult to determine the downstream contribution of these stocks.

The Guidelines indicate the exceptions to required mitigation i.e. conditions under which mitigations are not required. These are imprecise and judgemental (words such as 'good' should be avoided). If mitigation is quantitatively shown to be necessary then the measures suggested in the Guidelines are very detailed. Mitigation can be costly, however, and evidence must be produced of its effectiveness if applied. I suggest that before rigid rules are set, a comprehensive survey of available literature is made. This could then be used to develop a programme of research to quantify the contribution small streams make to fish abundance and how this could be affected by single and cumulative micro hydro power systems. In the meantime there should be a flexible approach to applications for micro hydro power systems.

Yours faithfully

Dr John F Craig CBiol FSB FLS

Paterson, Kevin

From: Joyce M. King [jmkking@burnett-reid.co.uk] on behalf of George Alpine [galpine@burnett-reid.co.uk]
Sent: 16 April 2010 11:54
To: Hydro Consultation
Subject: FW: SEPA consultation - Guidance for developers of run-of river hydropower schemes
Follow Up Flag: Follow up
Flag Status: Completed
Attachments: Hydro Mitigation Edits p1.jpg; Hydro Mitigation Edits p2.jpg; Hydro Mitigation Edits p3.jpg

Consultation response attached, as requested.

Joyce M. King

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1 Impact of proposal on river flows

Table 2: Summary of flow impact mitigation

Purpose	Detailed guidance	Mitigation (summarised)
Protection of low flows	Section 1.1	No abstraction of flows at or below a hands-off flow equivalent to Qn90 or Qn95, dependent on site-specific factors detailed in Section 1.1.
Protection of flow variability	Section 1.2	No extended periods during which the flow downstream of intake is at, or below, the hands-off flow: <ul style="list-style-type: none">– flow downstream increases in proportion to flow upstream rising to Qn80 when upstream flow would be at Qn30; or– scheme shuts down for a fixed period at an agreed frequency, designed to ensure flow higher than the hands-off flow occurs with

³ The absence of mitigation for such reasons will be taken into account in assessing significance of the impact of the proposed scheme.

-text missing

Page 7

1.4 Protection of flows for upstream migration and spawning of fish

The mitigation in this section does not apply:

- to schemes located on rivers upstream of natural barriers to upstream fish migration; or
- where the rivers and streams upstream of the tailrace do not provide suitable habitat for fish species that might otherwise migrate upstream to spawn.

Page 10

- suggest delete since installation of fish pass can open additional habitat

2 Impact of proposal on river continuity for fish

- suggest "a proven technical fish pass such as a pool & traverse or baffled fish pass".

Table 3: Summary of mitigation to minimise risk to fish movements

Purpose	Detailed guidance	Mitigation (summarised)
Protection of downstream fish passage	Section 2.1	Intakes must be appropriately screened unless the scheme uses a 'fish-friendly' Archimedean screw and has no screen on the tailrace. There must be a plunge pool for fish below any drop over the weir.
	Section 2.2A	A fish pass for salmon and trout. This may comprise: <ul style="list-style-type: none">• a natural design pass, such as a low-gradient by-pass channel or a rock ramp; or• a proven artificial design fish pass, such as a pool and traverse pass.

Page 11

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2.1 Provision for downstream passage of fish (all species)

The mitigation in this section does not apply to schemes located on rivers from which fish are absent, or where rehabilitation is not feasible.

A Intake design and screening

Suggest add

Purpose

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

Page 12

2.2 Provision for upstream passage of fish

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 natural¹⁵ 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;

Page 13

Suggest delete

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 SEPA are recommended.

A 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 (eg schemes located above the upstream limit to migratory fish in steeply sloping

Page 14

Suggest delete since very variable

Artificial design passes ← Suggest "Technical fish passes"

- **Pool and traverse passes:** These break-down the head-difference at the 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;

Page 15

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B 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 permanent man-made barriers to eel migration, such as large impoundments where there are no plans to improve the situation.

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 that eel would have to leap in order to ascend the river;
- provides a permanently wetted and non-smooth surface up which eels can move

Elvers cannot "leap". Suggest omit this point.

Page 17

- 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 6; and
 - the downstream face of the weir is vertical or close to vertical.

Table 5: Guide design characteristics for rock-ramp fish passes¹⁶

Page 16

Suggest delete. Not relevant, really a default to 1 traverse pool & traverse fish pass. Hence head difference of <45cm for salmon & <30cm for sea trout, and D/S pool to be effective up to Q10 flows.

Table 6: Maximum head difference across the weir

Fish species present	Salmon only	Trout only	Salmon and trout
Vertical height (centimetres)	80	50	50

Page 18

Suggest table not necessary; and figures should read 45 30 30

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Scottish Anglers National Association Ltd

**The National Game Angling Centre
The Pier, Loch Leven, Kinross KY13 8UF**

'Recognised by sportscotland as the Governing Body in Scotland for the sport of Game Angling'

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Guidance for developers of run-of-river hydropower schemes

19th April 2010

SANA's response to SEPA's consultation paper

The Scottish Anglers National Association Ltd (SANA) is recognised by Sportscotland and the Scottish Government as the governing body for game angling in Scotland. We are pleased to respond to this consultation paper as our principal interest is in the wellbeing of game fish stocks, especially wild salmon, sea trout, brown trout and grayling, so that sustainable stocks are available to anglers in the future. We also want to ensure access to fishings is not compromised by development, of which hydro schemes are a part.

We are not averse to green energy initiatives, but have fears that even if run-of-river schemes are well designed and operated, some may thwart Water Framework Directive aims and have undesirable impact on inland water systems. We also doubt if many will prove as productive in energy and cost efficiency as proponents expect. However, given that SEPA must comply with Ministerial hydropower policy objectives, we consider the proposed guidance is reasonably robust considering the limitations of those objectives, but we wonder what SEPA's interpretation is of the subjective terms 'significant benefits' and 'significant contribution' in the policy statements on p.4 and p.5? Ours is that they pose an issue particularly for larger schemes. As it is imperative for SEPA to operate consistently, relative to the requirements of the WFD, the examination of larger schemes should be subject to the same discipline as smaller ones.

We are pleased that sites will require individual sanction by SEPA, and pleased that SEPA will continue to review and update mitigation measures as knowledge progresses, but note there is no mention in the guidance of inspection and monitoring of built schemes. We hope that SEPA has sufficient resources to take on these roles, otherwise they should be done by an independent body and not left to self regulation by individual plant owners.

We also hope that local communities and others with interest in water bodies to be utilised, such as Rivers and Fisheries Trusts and Salmon Fisheries Boards as well as SANA, not forgetting local anglers who might otherwise find access to their fishing compromised, will be given the chance to air their views when a scheme is proposed.

The criteria for <500kw schemes in table 1 appear acceptable, but not for >500kw schemes (table1 p.6). We feel that the latter are potentially more hazardous to maintaining good ecological condition because of the larger volume of abstraction from the stretch of river affected. We believe that any deterioration of status caused would run counter to WFD aims and should not be tolerated. >500kw schemes should therefore be as tightly controlled as smaller units.

We are a little worried by the apparent implications in Part B 1.4 which states *The mitigation in this section does not apply to schemes located on rivers upstream of natural barriers to upstream fish migration*. It seems to us this could be taken as inferring freedom for developers to introduce schemes to substantial lengths of river to which upstream migration is barred. The Clyde for example has several miles of trout and grayling fishing above the Falls of Clyde.

We draw your attention to various places in the text where the word 'should' is used when 'must' would be better. For example on ps.22 to 24 in the notes to checklists A, B and D, amending 'should seek advice' to read 'must seek advice' would show developers that avoiding risk to fish passage is critical to the acceptance of a scheme. Similarly 'must' could usefully replace 'should' on p. 9 *The maximum abstraction rate should be designed*, p.10 *Mitigation should be designed to provide a flow regime capable of*, p.11 *SEPA should be contacted for detailed advice on calculating the volumes of water*, ps.12, 14, 17, 18, and 19 *Mitigation should be designed*.



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To conclude, we regard cost benefit arguments on larger schemes to be specious. All efforts must be made to ensure run-of-river energy schemes will not compromise the drive via the WFD to improve Scotland's water environment.

Sam Waddell, SANA President

Alan Ayre, Secretary Non-Migratory Fish Committee

Response to SEPA consultation on run of river hydro guidance from Gavin King-Smith

Page 1 of 7

Administrator of the [micro hydro association](http://www.microhydroassociation.co.uk) (<http://www.microhydroassociation.co.uk>), representing around 50 current and potential generators and 16 suppliers of resources for small hydro scheme development.

Proprietor of High Appin Hydro High Appin, Tynron, Thornhill, Dumfries & Galloway DG3 4LF 01848 200770 gkingsmith@gmail.com

22 April 2010

Question	Response
General	<p>I have been in touch with SEPA since December 2008 on the subject of guidance for small hydro schemes, specifically with David Sigsworth, David Ruczkowski of the Dumfries Office, Michael Wann in Dingwall and Pauline Silverman. I welcome the decision to consult more widely on the draft proposals that have now emerged.</p> <p>I have two main concerns:</p> <ol style="list-style-type: none"> 1 there is a problem in how the objective that “no deterioration will be permitted” has been interpreted; deterioration cannot at present be quantified given the absence of data on the impact of hydro schemes under 100kW: I consider it important that studies are commissioned and data collected over a reasonable number of years in order to assess impact before guidelines are applied rigorously 2 the guidelines lack proportionality in the requirements for assessing and mitigating the impact of the smaller scale schemes, particularly those involving very small amounts of power production (sub 50kW and sub 15kW), rather than focusing on larger schemes; this conflicts with SEPA’s obligations to protect the environment. <p>Should the guidelines be implemented as drafted I believe that fewer schemes would be implemented and the benefits of small-scale hydro technology lost. I therefore propose that the guidelines be revised and then offered as a provisional code of practice. SEPA should exercise their powers to refuse a licence for, or to impose special conditions on, a proposed scheme only where there is supportable evidence that it could cause significant environmental damage.</p> <p>Responses below amplify these concerns.</p> <p>Throughout I suggest that the term “developers” be replaced by “proprietors/developers” since many small schemes will be initiated and implemented by proprietors rather than by developers.</p>

Response to SEPA consultation on run of river hydro guidance from Gavin King-Smith

Page 2 of 7

Administrator of the [micro hydro association](http://www.microhydroassociation.co.uk) (<http://www.microhydroassociation.co.uk>), representing around 50 current and potential generators and 16 suppliers of resources for small hydro scheme development.

Proprietor of High Appin Hydro High Appin, Tynron, Thornhill, Dumfries & Galloway DG3 4LF 01848 200770 gkingsmith@gmail.com

22 April 2010

Question	Response
<p>Part A General</p> <p>"Likely acceptable schemes include those:</p> <ul style="list-style-type: none"> • situated in degraded parts of the water environment; • 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." 	<p>I agree with these criteria and that mitigation measures should be taken but only where found necessary (see answers to 1 & 2 below). I consider that the criteria will apply to the majority of small economically viable run-of-river schemes. I base this assertion on my surveys to date by map, and in many cases on the ground, of over sites mostly in Dumfries and Galloway each with the potential for a hydro scheme (76% of sites <15kW, 23% 15-50kW, 1% 50-100kW).</p> <p>For this reason I propose that for the present SEPA award licenses for such schemes by default, subject to proprietors/developers being required to commit to adherence to a provisional code of practice with measures similar to the draft guidance. As data on the impact of such schemes on the environment is collected and analysed, it may then become possible to develop quantified criteria on the basis of which licences can be awarded and conditions set on new schemes. If found necessary for environmental protection purposes, existing licences could be modified with additional conditions.</p>
<p>Part A criteria –sub-100 kilowatt schemes</p> <p>1. Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?</p>	<p>I agree that schemes under 100kW which put in the mitigation measures described in Part B are unlikely to cause any significant deterioration of the water environment. I also suggest that schemes with mitigation may in some cases improve it, for example where mitigation improves upstream migration past old dams or other impediments, as otherwise such stretches of river would not be assessed at all and hence no improvements identified.</p> <p>However, I do not agree that mitigation should always be a requirement (see response to question 2).</p>

Response to SEPA consultation on run of river hydro guidance from Gavin King-Smith

Page 3 of 7

Administrator of the [micro hydro association](http://www.microhydroassociation.co.uk) (<http://www.microhydroassociation.co.uk>), representing around 50 current and potential generators and 16 suppliers of resources for small hydro scheme development.

Proprietor of High Appin Hydro High Appin, Tynron, Thornhill, Dumfries & Galloway DG3 4LF 01848 200770 gkingsmith@gmail.com

22 April 2010

Question	Response
<p>2. Are there other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?</p>	<p>All human activity will carry the risk of damage to some feature of the environment, some activities considerably more so than others. With its inevitably limited resources, it will be important for SEPA to focus on developments that have the potential of causing significant and measurable damage (commercial and industrial building, roads, forestry, wind farms, large hydro schemes, large agricultural operations) rather than on small hydro schemes where very little knowledge exists to indicate whether there is any damage to the environment.</p> <p>The risk of cumulative damage could arise only after a period of development. This should allow time for SEPA to collect data on the impact of a statistically significant number of small schemes and on the effectiveness of mitigation measures.</p> <p>See also my response to "Part A General" above</p>
<p>3. Do you find the checklist format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.</p>	<p>The checklist approach is in my opinion workable in principle, but could be greatly simplified for the smallest hydro scheme proposals (under 15kW capacity); such proposals would be well served by a much shorter checklist with tick boxes to be confirmed by the proprietor/developer and reviewed by SEPA. This would also reduce the administrative load for SEPA.</p> <p>The following clarifications would be helpful:</p>

Response to SEPA consultation on run of river hydro guidance from Gavin King-Smith

Page 4 of 7

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22 April 2010

Question	Response
3. continued	<p>Checklist A</p> <p>Q1: give reference to website containing details of “heavily modified water bodies”</p> <p>Q2: add: (iii) subject to forestry operations upstream</p> <p>Q3: give reference to website containing details of river basin management plans</p> <p>All remaining checklists</p> <p>In order for proprietors/developers to assess whether (as described in part B):</p> <ul style="list-style-type: none"> • <i>the mitigation measure is unnecessary because of the site characteristics;</i> • <i>another measure will deliver equivalent mitigation;</i> • <i>the mitigation measure would be impracticable to incorporate into the development (ie for reasons of unusual technical constraints at the site)</i> <p>it would be helpful to give reasoning in accompanying notes for the chosen values of the parameters (e.g. catchment area, length of watercourse between intake and tailrace).</p> <p>Checklist B:</p> <p>Q5: give reference to website containing details of status of water bodies.</p> <p>Checklist C</p> <p>Q1 and Q2: propose remove the word “significantly” for small schemes below 50kW</p> <p>Q3: explain the example</p> <p>ANNEXE A PART A Guidance paragraph 3</p> <p>Last sentence appears to prevent sub 100kW schemes being installed on any stretch of water where there is a possibility, however remote, that trout, or even salmon, may at times find a suitable habitat – this would be a disproportionate measure since only a small proportion of the trout or salmon population in the country would be affected, at least in the first few years of development. This last sentence should be removed or expanded to explain how this item of guidance should be interpreted.</p>

Response to SEPA consultation on run of river hydro guidance from Gavin King-Smith

Page 5 of 7

Administrator of the [micro hydro association](http://www.microhydroassociation.co.uk) (<http://www.microhydroassociation.co.uk>), representing around 50 current and potential generators and 16 suppliers of resources for small hydro scheme development.

Proprietor of High Appin Hydro High Appin, Tynron, Thornhill, Dumfries & Galloway DG3 4LE 01848 200770 gkingsmith@gmail.com

22 April 2010

Question	Response
<p>Part A criteria – 100 kilowatt + schemes</p> <p>4. Do you agree that the draft criteria on the efficiency of schemes of 100 kilowatts or more (in terms of energy output per length of river or stream affected) will help:</p> <ul style="list-style-type: none"> • deliver Scottish Ministers' objective of optimising the use of the resource; • ensure deterioration of status is not caused where there are significantly better environmental options for generating the same quantity of renewable energy? 	<p>No comment on larger scale schemes other than to note that the potential damage from such schemes would dwarf that possibly arising from smaller schemes, at least for a considerable period of time.</p>
<p>Part B mitigation measures</p> <p>5. Do you agree that the mitigation identified will help achieve Scottish Ministers' objective of minimising the adverse impacts of hydropower scheme developments on the water environment?</p>	<p>Deterioration could occur through multiple other causes outside the scope of these guidelines (large-scale hydro schemes, forestry, large-scale agriculture, wind farms, natural events), so in my opinion the identified mitigation measures will have little effect. More importantly, too stringent regulation could discourage initiatives and stifle small scale hydro developments. This would cut off access to a resource with significant economic and social consequences (e.g. job creation – see recent report for the Scottish Executive: http://www.scotland.gov.uk/Publications/2010/01/19141527/2). It would also prevent reductions in CO₂ emissions in a significant way since, relative to other small-scale renewable energy technologies, hydro offers more reliable and efficient generation of “green” electricity.</p>

Response to SEPA consultation on run of river hydro guidance from Gavin King-Smith

Page 6 of 7

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22 April 2010

Question	Response
<p>6. Do you agree that, in general, the mitigation identified is likely to be practicable? If not, please give your reasons for this view.</p>	<p>The mitigation measures identified may be practicable but would not always be necessary and could in some cases lead to unnecessary costs or to delays (see above).</p> <p><i>Introductory paragraph exceptions:</i></p> <ul style="list-style-type: none"> 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 (ie for reasons of unusual technical constraints at the site). <p>See answer to question 3 "<u>All remaining checklists</u>"</p> <p><i>Paragraph 1.1</i></p> <p>"Sites:</p> <ul style="list-style-type: none"> with populations of salmon or sea trout; designated for the conservation of aquatic plants or animals; with catchment areas upstream of the tailrace of <10 km²; where the wetted width is significantly reduced at flows below Qn90." <p>It should be clarified whether these criteria are intended to be taken together or individually or in some combination thereof. For example requiring a hands off flow of Qn90 or more might represent a disproportionate constraint if the criterion of catchment upstream of the tailrace being <10km² were also to be applied.</p> <p>I suggest instead:</p> <p>"Sites</p> <ul style="list-style-type: none"> with populations of salmon or sea trout and/or designated for the conservation of aquatic plants or animals <p>AND</p> <ul style="list-style-type: none"> with catchment areas upstream of the tailrace of <10 km² or where the wetted width is significantly reduced at flows below Qn90."

Response to SEPA consultation on run of river hydro guidance from Gavin King-Smith

Page 7 of 7

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22 April 2010

Question	Response
<p>6. Continued</p>	<p><i>Paragraph 1.2</i></p> <p>This mitigation should be discretionary until such time as evidence is obtained of the impact of sustained hands-off flow. Because of the highly variable nature of flows that occur, I consider this requirement would be impractical to monitor and achieve in an effective manner on small schemes with design flows less than, say, 0.3m³/s.</p> <p>As an additional criterion, schemes where a significant impoundment is involved should be allowed to use full capacity abstractions to achieve optimum efficiency. This is effected by repeatedly depleting the impoundment to an acceptable level and then allowing it to be replenished.</p> <p><i>Paragraph 1.3</i></p> <p>This mitigation is likely to be redundant for many sub 100kW schemes. These are often designed with mean flow as the maximum abstraction rate.</p>
<p>7. Do you think that there other practicable measures that you think could be taken to achieve an equivalent or greater level of mitigation? If yes, please describe the mitigation and your reasons for believing that it would be practicable and effective in minimising adverse impacts on the water environment?</p>	<p>Other improvements may be appropriate when developing schemes, for instance measures to improve stability of watercourse banks, and to improve drainage in moorland in ways beneficial to species diversity and improved land use. However I consider that these could be achieved by providing good practice guidelines, not only to proprietors/developers, but also to landowners not seeking to install hydro schemes.</p>
<p>Until the guidance is finalised, SEPA will apply this draft when carrying out its regulatory functions</p>	<p>In view of the significant number of potential small-scale hydro schemes and the urgency to respond to CO₂ reduction initiatives, SEPA should aim to finalise these guidelines with the suggested improvements quickly, publishing them as a provisional code of practice. In this way, work can commence on schemes and the resources for implementing schemes can be expanded as soon as possible without fear of licence rejections, delays, or imposition of disproportionate conditions.</p>

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26 April 2010

Dear Sir or Madam,

Highland Eco-Design Ltd is a small, rural business specializing in the supply and installation of micro-hydro turbines on rural properties, farms and estates. Our client base is dominated by the local landholders themselves.

In 2009 I also co-authored a report for the Scottish Government that attempted to quantify the employment potential of the Scottish hydro industry. With the analysis tools used in that project – along with some additional information from Nick Forrest Associates - I have been able to do a semi-quantitative analysis on the effects of the proposed guidance on the feasible micro-hydro potential of Scotland.

Alongside this work I have looked at two representative catchments to assess the likelihood of the proposed guidance discriminating against any particular stakeholder group.

As a company we are very supportive of SEPA's recent efforts to clarify the regulations for smaller schemes and we generally agree with the mitigation outlined in Part B of the document. However, based upon the analysis described above, we must **strongly object** to the guidance as it is proposed.

We are a small organisation and have had our work cut out assessing the impact on the sub 100-kW sector. As a result we would like to voice our full support for the representations made by both Scottish Renewables and the British Hydropower Association as these address some important general issues not covered in our representation.

We look forward to continuing our dialogue with SEPA in taking this important rural industry forward.

Yours sincerely,

Jamie Wallace, Director: Highland Eco-Design Ltd

Table of Contents

1. Overview.....	2
2. Concerns regarding the implementation of an arbitrary 100 kW threshold.....	3
3. The socio-economic benefits associated with micro-hydro.....	3
3.1. National socio-economic impacts	4
3.2. Local socio-economic impacts.....	5
4. Environmental mitigation and the optimisation of Scotland's resource	7
4.1. Purpose of regulation.....	7
4.2. Water Framework Directive	7
4.3. Representative catchments	8
4.4. Testing the proposed guidance	8
5.1. One of many alternatives.....	11
5. Responses to specific items within the check-list	13
6. Responses to consultation questions	14
7. Data Sets.....	16

1. Overview

Scotland has an exceptional renewable energy resource. Our rugged landscape combined with prolific wind and rain make it one of the best locations in Europe for wind and hydro power. The benefits of locally owned renewable energy systems such as micro-hydro schemes go beyond renewable energy targets or national economic contributions.

As it stands the guidance should be an item of substantial concern to both the hydro community and rural stakeholders.

Essentially we believe the Ministerial Statement and the Guidance have the following flaws:

1. The implementation of an arbitrary 100 kW threshold appears bias against farm-scale systems and discourages the development of this clean, renewable resource close to energy demands.
2. No account appears to have been taken of the local, rural socio-economic benefits of the sub 100 kW sector.
3. The guidance generally, and the 100 kW threshold in particular, does not encourage the optimal utilisation of Scotland's hydropower resource within the constraints laid out in the Water Framework Directive (WFD) legislation. As it stands it could result in a gross under-utilisation of this valuable resource.

The implementation of the guidance as-is could deprive the rural economy of Scotland of up to £24 million p.a. This revenue stream would be more likely to be recycled through the local community by farmers and landholders than the revenues from larger hydro developments. As a result we would urge the Scottish ministers to reconsider the implications of the arbitrary 100 kW threshold and instead consider a program of ongoing research and review into the effects of micro-hydro schemes.

2. Concerns regarding the implementation of an arbitrary 100 kW threshold

The implementation of an arbitrary 100 kW threshold appears bias against farm-scale systems and discourages the development of this clean, renewable resource close to energy demands.

Generally speaking larger hydro systems are developed by commercial developers while micro-hydro (sub 100 kW) systems tend to be developed the landowners, rural businesses, individuals or communities themselves. There is a large degree of cross-over in the 100 – 500 kW range but it would be fair to say that the majority of sub-100 kW systems in the pipeline are landowner led developments.

There is a risk that the Scottish Government's statement, as currently interpreted by the Scottish Environment Protection Agency (SEPA), constitutes endorsement of development by large external investors where the profits will be distributed among remote shareholders. Meanwhile, the stringent restrictions placed on schemes below 100kW represents a suppression of farm-scale schemes where the profits are more likely to be recycled into the rural economy.

SEPA's checklist approach for sub-100kW schemes is useful in terms of guidance for appropriate siting and it is indeed intended as guidance for all hydro development. However the prescriptive nature in which it is applied to the sub-100kW sector is unjustified and of great concern.

The following statement appears on page 21 of the draft, immediately prior to the check-list:

"Proposals identified as provisionally unacceptable may be considered for authorisation if they provide other significant social or environmental benefits. Such cases are expected to be rare."

This statement essentially says that schemes with a capacity of <100 kW that fail the checklist will not go ahead unless there are exceptional circumstances. In discussions with senior SEPA officers the example of a scheme powering a remote island community was used – where the social benefits would far out-weigh the environmental impact. It is not these schemes we are concerned about, it is the ones where the local social benefits are in balance with the local environmental impact that are likely to be compromised.

3. The socio-economic benefits associated with micro-hydro

No account appears to have been taken of the local, rural socio-economic benefits of the sub 100 kW sector.

The Scottish Government and SEPA make regular reference to Scotland's renewable energy targets and the contribution that all hydro can make to Scotland's macro-economy. However what they have not taken full account of is the added-value associated with micro-hydro or the distribution of the resource compared to electrical demand. It is also useful to compare the opportunity-cost of SEPA's approach with that of the English Environment Agency (EA).

3.1. National socio-economic impacts

In order to assess the national impact of SEPA's approach Nick Forrest kindly agreed to pull some more numbers out of the Hydrobot model used in the recent addition to the Scottish Government's Hydro Resource study¹ that he and I authored. To approximate the likelihood of identified systems falling foul of SEPA's flow-chart the average gradient of the pipeline was used as a surrogate for the gradient of the watercourse. In reality the pipeline will almost always be steeper than the river (it does not twist and turn) and so the impact of SEPA's gradient hurdles will be underestimated. Unfortunately it was not possible to extract the catchment areas from the model so the opportunity costs outlined here may be under-estimates.

It is interesting to note that the <100kW sector only represents 31% of the sites (by number of potential installations) on rivers and burns with a gradient less than 6%.

The table below outlines the number of <100 kW schemes identified by Hydrobot that would potentially be severely affected by the guidance.

	0 to 100kW	
	Power (kW)	Count
6% - 10% (Gradient	32,182	779
<6% Gradient	12,304	216
Shallow weir (<25m depleted)	17,742	347
Total	49,924	1,126

Up to approximately 50 MW of micro-hydro capacity, distributed across over 1000 schemes could be severely restricted due to SEPA's interpretation of the ministerial statement. This is around 30% of Scotland's micro-hydro (<100 kW) resource as identified by the updated resource study and represents an income stream of up to £43m p.a. into the rural economy².

Applying the Good Status³ flow limitation to any of the systems above results in a 55% reduction in energy output. This means that the potential income lost to the rural economy through the implementation of SEPA's guidance will be between £6m and £24m p.a.

Put into context that's an opportunity cost of 1.5% to 6% of the Scottish Rural Development Budget every year.

As a comparison applying the English EA guidance for low-head schemes⁴ to any of the above systems would result in a 17% reduction in output, depriving the rural economy of only £2m to £7m p.a.

It should be noted that this analysis has not accounted for legislative constraints such as the spatial element of European Water Framework Directive (WFD) – put in place

¹ Forrest, N. and Wallace, J. "The Employment Potential of Scotland's Hydro Resource". Scottish Government, 2010

² This has been derived from a baseline "traditional" hydro development with a relatively conservative design flow equal to the Q30 (approx. equal to the mean flow) and a mitigation flow equal to the Q90.

³ Approximated as an abstraction of 30% of the available flow

⁴ Design flow equal to Q40 and mitigation flow equal to Q85

to mitigate against cumulative impacts – and Natura 2000 sites. The carrying capacity of watercourses will legitimately push the above figures down as, under the WFD, only a certain level of impact can be accommodated within a given catchment. WFD issues are covered in more depth in Section 3 of this document.

3.2. Local socio-economic impacts

When considering the local (water-body scale) economic impacts it is necessary to break the economic benefit down into three sectors:

- Direct benefits
- Indirect benefits
- Induced benefits

Direct benefits relate to the economic impact of a development on the resource owner. For hydro this relates to the profits from owning and operating the scheme. In the case of larger hydro these profits will tend to be split between the developer (often a private company not associated with the local community) and the landowner (usually in the form of a lease rental payment). For micro-hydro however the developer and landowner are often the same person or rural business.

Indirect economic benefits accrue from activities directly related to the development. For hydro schemes this is a measure of employment and material requirements for development, construction, maintenance and operation of the systems. The geographical distribution of indirect benefits will depend on many factors but developers tend to localise as much of the work/supply as possible.

Finally the induced economic benefits arise where a portion of both the direct and indirect cash-flows are cycled back through the local economy. For example the increased financial viability of an agricultural holding may enable them to invest in additional long-term investments such as tree-planting, this in turn will provide tree nurseries with more business and tree planters with work. There is evidence confirming that the level of local induced benefit is inversely proportional to the scale of development – i.e. the smaller the scheme the more of the money stays in the local economy. A good example of this effect looks at the Strathspey tourist industry⁵.

Additionally, the cost of grid-connection for micro-hydro schemes means they are more likely to be located close to an on-site demand. This is particularly important when considering schemes in the 0 – 50 kW capacity range. At this scale a significant proportion of the energy may be used by an adjacent rural business or property. Under the Feed in Tariff the guaranteed export value of renewable electricity is 3p/kWh while a ball-park cost for imported energy is 10 p/kWh. It is clear from this disparity that - even if the micro-hydro installation and adjacent rural business or property are unrelated - there is still a win-win situation to be had from supplying the adjacent business/property with cheaper renewable electricity when it is available. This can increase the revenue to the generator whilst simultaneously reducing the electricity bill of the rural business/property.

There are many good economic, environmental and social reasons to promote the use of hydro-power on farms and estates. Not least the improved rural business viability, improved agricultural business stability, induced local economic benefits and reduced transmission losses. The key point here is that the Scottish Ministers and SEPA do not seem to have taken the rural development arguments on-board when





⁵ SLEE, R W, FARR, H and SNOWDON, P, (1997), The Economic Impact of Alternative Types of Rural Tourism, Journal of Agricultural Economics 48 (2) 179-192.)

they considered the balance between hydro development and the environment. Indeed, when questioned at the last FREDS micro-hydro sub group meeting neither party would confirm that this had been taken into account at all.

In recent discussions SEPA highlighted the Scottish Governments decision on the River Braan Hydro appeal as a vindication of their approach. This approach was summarised as comparing the environmental impact of a scheme to the contribution that scheme would make to national targets.

This approach is only valid where the environmental impact of a scheme is of national importance: i.e. where it impacts a protected area or where it causes a *deterioration in status* of a water-body. Where a scheme only causes a local failure of standards the environmental impact is at a local scale and so the primary comparison for assessing the scheme should be to the local benefits.

The picture below highlights the imbalance of failing to account for local positive factors.

	Positive	Negative
Local	 Rural Economic Development Rural Business Viability	 Impact on Local Water Body Impact Within Local Water Body
National	 Renewable Energy Targets Scottish Economy	 Impact on Scotland's Water Environment

4. Environmental mitigation and the optimisation of Scotland's resource

The guidance generally, and the 100 kW threshold in particular, does not encourage the optimal utilisation of Scotland's hydropower resource within the constraints laid out in the Water Framework Directive legislation. As it stands it could result in a gross under-utilisation of this valuable resource.

Firstly let's be clear: there is a need for effective regulation of hydro development at all scales. However this regulation must be fit for purpose and proportionate to risk.

4.1. Purpose of regulation

In order to assess SEPA's proposed guidance we need to consider what the intended outcome is. Without being an expert on the guiding legislation I believe the target outcome of any regulations should be the regulatory method should:

1. Protect Scotland's water environment as directed by the European Water Framework Directive and other natural heritage legislation
2. Promote the maximum utilisation of the renewable energy resource as directed by the UK and Scottish Government renewable energy targets
3. Promote sustainable rural development

In the list above 1 takes precedence over 2, which in turn takes precedence over 3. Essentially this is saying:

- maximise the rural development benefits provided doing so does not preclude maximisation of the renewable energy resource or cause an unjustifiable environmental impact
- maximise the renewable energy resource provided doing so does not cause an unjustifiable environmental impact

With the above outcomes in mind we should ask two questions of both the Ministerial statement and the SEPA guidance derived from it:

- Does the guidance promote the maximum utilisation of the hydro resource within the legislative constraints?
- Does the guidance promote the maximum rural development potential within the legislative constraints?

4.2. Water Framework Directive (WFD)

Without getting bogged down in the detail the primary legislation governing the protection of the majority of Scotland's watercourses is the European Water Framework Directive. Under this legislation *waterbodies* (watercourses with a catchment of $>10 \text{ km}^2$) and their *tributaries* (watercourses with a catchment of $<10 \text{ km}^2$) are classified with a *status* of high, good, moderate, poor or bad. The status is derived from a number of factors including hydrology (flows), morphology (bed and banks), biology and chemistry.

The overall aim of the WFD is to maintain high status waterbodies at high status, to maintain good status waterbodies at good status and to improve most other waterbodies to good status too.

Hydro-electric power stations have an impact on the hydrology of a watercourse between their intake and their outflow, this is known as the depleted reach. While

every effort will be made to minimise the impact of the scheme within this reach, the level of flow abstractions will generally be so high as to cause the local designation of the water course to fall below "good" in hydrological terms – this is known as a failure of environmental standards.

However, in recognition that a local impact does not necessarily adversely affect the whole water body there is an allowance for a certain level of impact within a given area. For good status this is defined as:

- Less than the lesser of 10% or 1.5 km of the main stem of the waterbody is adversely affected.
- Tributaries draining less than 25% of the catchment area of the waterbody are adversely affected.
- Less than 1.5 km continuous length of any given tributary is affected⁶.

In addition to this there are non-geographic constraints such as maintaining access for migratory species but these are very site specific.

4.3. Representative catchments

To test whether the guidance meets the assumed objectives outlined in Section 3.1 two small waterbodies were modelled.

The first is a typical east-coast catchment with low gradients throughout and a relatively low rainfall. The tributaries and main stem all flow through arable farm-land. There are abundant opportunities for on-site utilisation and grid connection is not an issue. Although other pressures such as chemical pollution and irrigation abstractions would normally come into play they have been ignored for clarity of the argument in this case. It is also assumed that migration issues would be addressed separately and, although the waterbody has been straightened and is surrounded by farmland, the existing morphological alterations are not so severe as to classify the waterbody as poor or bad status.

The second is a typical west-coast catchment with relatively steep tributaries and high rainfall. The tributaries and main stem of the river are relatively isolated although there is a small hamlet, and thus a potential grid connection, at the foot of the main river stem. The waterbody is surrounded by heath land and there are no morphological alterations.

The watercourses within the catchments were split into 750 m lengths. Working upstream, hence the reverse arrows on the watercourse tracks, the upstream rainfall catchment area and elevation change were logged. The catchment area was used to scale an existing average flow prediction to the watercourse in each section. The elevation change across each section was used to calculate gradient and also combined with flow data to estimate power.

The data derived from this analysis is available in Section 7.

4.4. Testing the proposed guidance

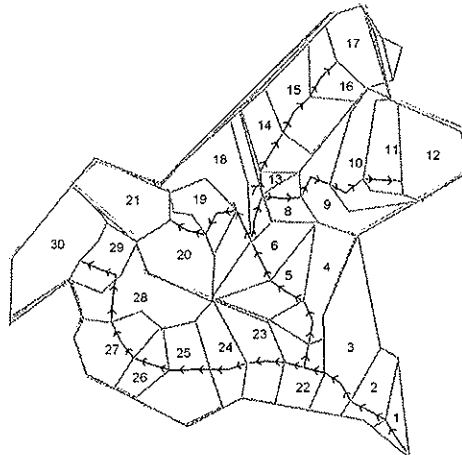
The flow-chart from the draft SEPA guidance was applied to each section of waterbody. However, since we do not know what barriers there are to fish etc only the critical elements of the flow-chart can be assessed. These are:

⁶ This particular constraint is not actually written into the legislation but is rather SEPA's interpretation of the legislation.

1. Is the catchment area above the scheme >10 km²? Yes = Unacceptable (white)
2. Is the gradient of watercourse section >10%? Yes = Definite site (blue)
3. Is the gradient of watercourse section >6% but <10%? Yes = Potential site (yellow)
4. Is the gradient of watercourse section <6%? Yes Unacceptable (white)
5. Is the scheme unacceptable but have a power greater than 100 kW? Yes = Potential site (yellow)

Figure 1 below shows the distribution of provisionally acceptable schemes in the lowland, east-coast catchment.

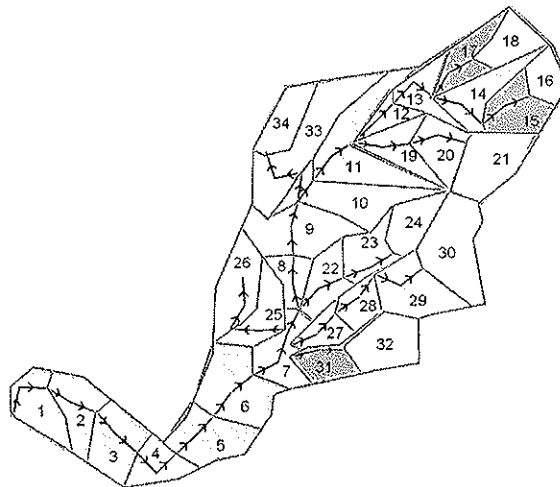
Figure 1: Potential sites in east-coast catchment under SEPA guidance



It is clear that by implementing these criteria there are no potentially acceptable systems in this catchment. The wording of the guidance would make it risky and difficult to develop any hydro schemes in this, predominantly agricultural, area.

Figure 2 below shows the distribution of provisionally acceptable systems in the highland, west-coast catchment.

Figure 2: Potential sites in west-coast catchment under SEPA guidance



In this case the main-stem potential has a capacity greater than 100 kW and so is exempt from immediate exclusion on the grounds of low gradient. However the 1.75GWh / 1500 m efficiency criteria rules out any reduction in status of this waterbody and so the maximum capacity available will be limited regardless of the actual environmental impact of a larger development. The upper reaches of the tributaries provide a limited number of opportunities for micro-hydro development when assessed using the sub 100kW checklist.

Lastly, if we imagine a catchment somewhere between the extremes outlined above. SEPA's criteria look likely to result in a very constrained development map. This will inevitably result in an under-utilisation of the resource. Other constraints (such as other environmental elements, landowner issues, grid access, terrain etc) will rule out some of the schemes that would otherwise appear acceptable under SEPA's simplistic criteria. In order to allow these other constraints to be worked around there must be some flexibility in the system.

Re-visiting our questions from Section 3.1:

Does the guidance promote the maximum rural development potential within the legislative constraints?

Clearly not. Even though there are abundant opportunities for powering farms or rural businesses within the east-coast catchment, SEPA's prescriptive thresholds immediately rule this out. In the West coast scenario there is potential for some smaller systems however the remoteness of the sites will make many of them unviable.

Does the guidance promote the maximum utilisation of the hydro resource within the legislative constraints?

Again clearly no. Even though the amount of renewable energy available in the east-coast catchment is small there is some potential that can be utilised without causing a drop in status of the waterbody. In these times of ambitious renewable energy targets and concerns about energy security every available kW of sustainable, distributed generation is required. In the west-coast, highland catchment the SEPA guidance probably allows enough flexibility to maximise the micro-hydro resource in this particular catchment. However the 1.75 GWh/1500m constraint would mean that the capacity on the main stem is limited to approximately 50% of the potential renewable energy on that stretch of river.

5.1. One of many alternatives

In order to assess the true efficiency and effectiveness of the 100kW flow-chart, and SEPA's other efficiency criteria, in terms of what can be accommodated under the WFD we need to look at an alternative assessment methodology.

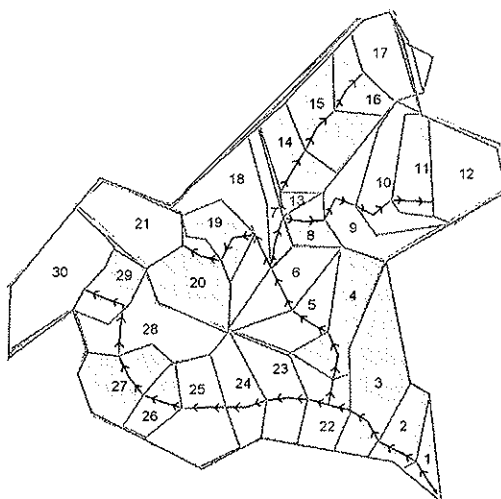
As an indicator of efficiency of resource use the power available in each section was divided by either the length (for the main stem) or up-stream catchment (for tributaries), termed the power-per-unit. The proportion of the waterbody carrying capacity "used up" by each section was also calculated by dividing the length of the section by 1.5 km (for main the stem) or dividing the up-stream catchment by 25% of the total catchment (for tributaries).

Separate power-per-unit hurdle rates were derived as half of the average value for both the main stem and tributaries. This hurdle rate was then applied to each watercourse section to assess whether it would be provisionally acceptable (coloured yellow).

In addition to this the % of the carrying capacity used by each section could be used to derive the optimum capacity that could be developed within the catchment while staying within the bounds set under the WFD (coloured green).

Figure 3 below shows the distribution of provisionally acceptable schemes in the east-coast catchment using this methodology.

Figure 3: Potential sites in east-coast catchment using alternative methodology

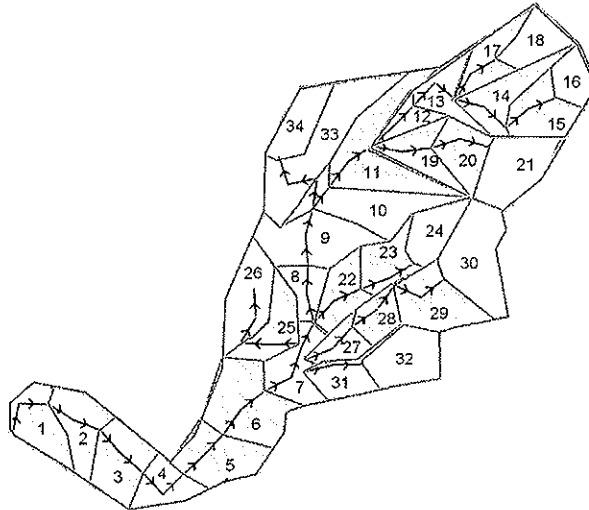


The optimum installed capacity for this catchment would total 54 kW across 4 schemes – much of which could be utilised on-site. Within this catchment alone this represents an injection of ~£47,000 p.a. into the local economy once the schemes have paid themselves off. It should be noted that the actual optimum capacity will be somewhat lower due to higher mitigation flow rates in the lower watercourses where migratory fish must be taken into account.

Under the WFD legislation it is entirely possible for this capacity to be installed without affecting the status of the water body.

Figure 4 below shows the distribution of provisionally acceptable schemes in the west-coast catchment using this methodology.

Figure 4: Potential sites in west-coast catchment using alternative methodology



The distribution is similar to the distribution resulting from SEPA's proposed guidance and the optimal schemes are in agreement. This indicates that this methodology is likely to provide a more equitable solution for lowland areas while not compromising the integrity of highland areas. The optimum installed capacity for this catchment would total 686 kW across 5 schemes – little of which could be utilised on-site. It should be noted that the actual optimum capacity could be higher if the ecology of the watercourse could accommodate a larger hydro scheme on the lower reaches – since this could cause a deterioration in status it would need to be subject to site-specific analysis.

This model represents a very simplified interpretation of some very complex environmental legislation. What it shows, however, is that use of an arbitrary power threshold in order to mitigate against the cumulative impact of micro-hydro is unscientific and will result in a gross under-utilisation of Scotland's resource. The guidance will predominantly adversely affect lowland agricultural areas and as such will have a disproportionately negative impact on the rural economy.

If some form of targeting is required for the sub 100kW is truly justified then the draft guidance does not provide the most effective system of targeting such development.

It should be noted that the industry has voiced concerns about the implementation of any sort of "traffic lighting" of Scotland's watercourse. Red-lighting of watercourses runs the risk of stifling development before looking at what actual impact it would have on a watercourse. If targeted development is explored then the system must have enough wriggle room to allow the free market to develop the available potential in an efficient manner.

5. Responses to specific items within the sub 100 kW check-list

In addition to the general response above there are some specific items within the guidance which we would like to draw attention to:

- Checklist A, question 2: more clarification is required on what constitutes a significantly impacted section of watercourse, particularly in terms of channel straightening etc.
- Checklist A, question 3 asks if the stretch of waterbody is "planned to be improved". If the answer is no then the user is directed to checklist C, bypassing checklist B. The majority of waterbodies that are below good status are planned to be improved, furthermore a significant proportion of these waterbodies are below good status because of chemical pollution. Checklist C then sets out the ways in which the scheme must improve the water body to be acceptable – since a hydro scheme cannot improve the chemical status of a water body this will cause a lot of schemes to be flagged as unacceptable. Instead users should be directed through Checklist B.
- Checklist C, question 3: how can a hydro scheme remedy low-flow impacts? Are SEPA advocating storage schemes with timed release? Will an open lade which is accessible to fish be classed as a benefit because of the additional habitat created?
- Checklist D, question 3, footnote: it is practically impossible to abstract immediately above a waterfall and return the flow immediately below it without destroying a significant length of riparian habitat for access tracks. If a maximum distance from the head/foot of a falls is to be stipulated a figure of at least 100m is, geologically speaking, much more realistic and would allow the riparian disruption to be minimised.

6. Responses to SEPA consultation questions

Consultation questions
Part A criteria – sub-100 kilowatt schemes
<p><i>1. Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?</i></p> <p>We agree that implementing the mitigation laid out in Part B will allow sub-100 kW schemes to be installed without posing a risk to the water environment.</p> <p>However we would stress that we fundamentally disagree with the setting of an arbitrary power threshold.</p>
<p><i>2. Are there any other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?</i></p> <p>If the mitigation measures in Part B are applied appropriately then individual schemes will not pose a risk to the water environment. The cumulative impact of small schemes can be easily managed using SEPA's existing GIS system and the criteria for managing this risk are embedded in the Water Framework Directive legislation. See Section 4 for more details.</p> <p>There are likely to be many other instances where an abstraction above the rate required for good status will not result in a degradation of the water environment. Since individuals cannot afford to undertake such a wide ranging research program it is the responsibility of the Scottish Government to ensure that this avenue is explored. It would make sense to tie such a research program into the abstraction regulatory role of SEPA. However we acknowledge that SEPA's resources are limited and so are keen to explore ways in which the economic value of the schemes themselves can be used to facilitate the research into minimising their impact.</p>
<p><i>3. Do you find the format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.</i></p> <p>The checklist is a useful and user friendly format for identifying provisionally acceptable sites.</p> <p>It would be helpful to move the footnotes, notes and some of the bracketed examples to a look-up table to make them easier to read and interpret.</p> <p>SEPA should make it clear (if they agree with the principles outlined in this document) that the provisionally acceptable/unacceptable verdict is only a guideline and will be subject to site specific analysis and spatial tests.</p>

Part A criteria – 100 kilowatt + schemes
<p>4. <i>So you agree that the draft criteria on the efficiency of schemes of 100 kilowatts or more (in terms of energy output per length of river or stream affected) will help:</i></p> <ul style="list-style-type: none"> - <i>Deliver Scottish Ministers' objective of optimising the use of the resource;</i> - <i>ensure deterioration of status is not caused where there are significantly better environmental options for generating the same quantity of renewable energy?</i>
<p>The criteria laid out in the guidance (both the 100 kW threshold and the 1.75 GWh/500 or 1500m) will not meet the Scottish Ministers' objective of optimising the use of the resource. As it stands it will almost certainly result in an under-utilisation of the resource and will also work against other Scottish Government policies on sustainable rural development.</p> <p>Comparing one renewable technology to another is not valid until all renewable energy targets have been met. If "environmentally better option" comparisons are to be made then, from a sustainable rural development point of view, a comparison also needs to be drawn between the environmental impact, income and benefits from a hydro scheme and those from all other potential farm and estate operations. Consideration must also be given to the reliability of those alternative resources and the stability of the markets they serve.</p>
<p>5. <i>Do you agree that the mitigation identified will help achieve Scottish Ministers' objective of minimising the adverse impacts of hydropower scheme developments on the water environment?</i></p>
<p>We generally agree that the mitigation identified is appropriate. However we agree with Scottish Renewables' concerns regarding the specifics of a number of measures.</p>
<p>6. <i>Do you agree that, in general the mitigation identified is likely to be practicable? If not, please give your reasons for this view.</i></p>
<p>We generally agree that the mitigation measures will be practicable.</p>
<p>7. <i>Do you think that there are other practicable mitigation measures that you think could be taken to achieve an equivalent or greater level of mitigation? If yes, please describe the mitigation and your reasons for believing that it would be practicable and effective in minimising adverse impacts on the water environment?</i></p>
<p>There may be more practicable, site-specific mitigation measures. However if these fall out-with the measures identified then they are likely to be very rare. As a result it is not possible to explore them in a general sense but merely to leave the door open to unconventional mitigation measures where they are likely to provide the best solution.</p> <p>As highlighted previously we also believe that there currently exists a golden opportunity to thoroughly and iteratively assess the true impact of micro-hydro schemes through a rolling research program. To ignore this opportunity and simply apply general criteria to all sub-100kW schemes will deny the rural economy of a significant income and will do little to protect the water environment.</p>

7. Data Sets

East-coast catchment derived data

Main Stem

Section	Catchment Area (km ²)	Mean flow (m ³ /s)	Head (m)	Gradient	P (kW)	P per m depleted	%carrying capacity
1	24.0	0.323	5	0.007	10	0.01	50%
2	23.7	0.319	9	0.012	17	0.02	50%
3	23.2	0.312	3	0.004	6	0.01	50%
4	13.9	0.187	21	0.028	24	0.03	50%
5	12.8	0.172	3	0.004	3	0.00	50%
6	12.0	0.161	2	0.003	2	0.00	50%
18	11.4	0.153	3	0.004	3	0.00	50%

Tributaries

Section	Catchment Area (km ²)	Mean flow (m ³ /s)	Head (m)	Gradient	P (kW)	P per km2 catchment	%carrying capacity
7	7.5	0.100	5	0.007	3	0.40	124%
8	3.9	0.053	28	0.037	9	2.26	65%
9	3.5	0.048	6	0.008	2	0.48	59%
10	2.6	0.035	8	0.011	2	0.65	44%
11	1.8	0.024	28	0.037	4	2.26	29%
12	1.1	0.015					
13							
14	3.1	0.041	31	0.041	8	2.50	51%
15	2.3	0.031	26	0.035	5	2.10	39%
16	1.3	0.018	43	0.057	5	3.47	22%
17	0.9	0.011					
19	2.6	0.035	12	0.016	3	0.97	44%
20	2.1	0.028	30	0.040	5	2.42	35%
21	1.1	0.014					
23	7.2	0.097	3	0.004	2	0.24	121%
24	6.5	0.087	2	0.003	1	0.16	108%
25	5.7	0.077	8	0.011	4	0.65	95%
26	4.6	0.062	22	0.029	8	1.77	77%
27	4.2	0.056	28	0.037	9	2.26	70%
28	3.3	0.044	2	0.003	1	0.16	55%
29	2.1	0.028	31	0.041	5	2.50	35%
30	1.5	0.020		0.025		0.74	

West-coast catchment derived data

Main Stem

Section	Catchment Area (km ²)	Mean flow (m ³ /s)	Head (m)	Gradient	P (kW)	P per m depleted	%carrying capacity
1	13.14	0.960	33	0.044	190	0.25	50%
2	12.77	0.933	57	0.076	319	0.43	50%
3	12.38	0.905	32	0.043	174	0.23	50%
4	11.94	0.872	12	0.016	63	0.08	50%
5	11.66	0.852	40	0.053	204	0.27	50%
6	11.18	0.817	54	0.072	265	0.35	50%
7							

Tributaries

Section	Catchment Area (km ²)	Mean flow (m ³ /s)	Head (m)	Gradient	P (kW)	P per km2 catchment	%carrying capacity
8	6.30	0.460	18	0.024	50	7.89	192%
9	6.09	0.445	0	0.000	0	0.00	185%
10							
11	3.89	0.284	42	0.056	72	18.41	118%
12	1.95	0.142	41	0.055	35	17.97	59%
13	1.84	0.134	19	0.025	15	8.33	56%
14	0.98	0.072	59	0.079	25	25.87	30%
15	0.59	0.043	103	0.137	27	45.16	18%
16							
17	0.58	0.042	78	0.104	20	34.20	18%
18	0.30	0.022					
19	1.12	0.082	42	0.056	21	18.41	34%
20	0.82	0.060	43	0.057	15	18.85	25%
21	0.49	0.036					
22	0.91	0.066	51	0.068	20	22.36	28%
23	0.61	0.045	60	0.080	16	26.30	19%
24	0.30	0.022					
25	0.80	0.058	39	0.052	14	17.10	24%
26	0.45	0.033					
27	1.53	0.112	51	0.068	34	22.36	47%
28	1.34	0.098	50	0.067	29	21.92	41%
29	1.12	0.082	47	0.063	23	20.61	34%
30	0.64	0.047					
31	0.69	0.050	88	0.117	27	38.58	21%
32	0.43	0.031					
33	1.04	0.076	13	0.017	6	5.70	32%
34	0.31	0.023					

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Paterson, Kevin

From: DONALD GRANT
Sent: 26 April 2010 09:38
To: Hydro Consultation
Subject: Fw: Proposed Micro Hydro Scheme
Follow Up Flag: Follow up
Flag Status: Completed

----- Original Message -----

From: DONALD GRANT
To: consultation@sepa.org.uk
Sent: Sunday, April 25, 2010 9:08 PM
Subject: Proposed Micro Hydro Scheme

Kingussie Community Development Company (K.C.D.C.)

We are a "NOT FOR PROFIT" Community Company who are in the process of planning to restore a 90 years old Micro Hydro Scheme on the River Gynack which flows through Kingussie on it's way to the River Spey

A recent Preliminary Design Report has shown that this is a viable Project that in future years could inject £15k p.a. into the Local Community to support Voluntary Groups who are working hard to achieve improvements like extending the Paths Network, The Purchase of Local Woodlands for Community use and other similar Projects

We are extremely concerned that proposed new guidelines from SEPA may jeopardize our Project which with its Historical background and accessibility will make it both an Educational and Visitor attraction as well as benefitting the Community

As we are located within the Cairngorms National Park it would be unlikely that a Wind Turbine with a similar output would ever be approved by National Park Planning

We are aware of many similar Community Hydro Projects below 100kw planned in the Highlands and Islands and feel any negative decision would be a devastating blow to Communities like ourselves

We trust you will reach a decision that will be seen to assist Hydro microgeneration projects that can both generate Renewable Energy and help other Community Projects

Regards

Donnie Grant

Director / Renewable Energy K.C.D.C

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Paterson, Kevin

From:
Sent: 26 April 2010 11:07
To: Hydro Consultation
Subject: SEPA consultation on Run of River Hydropower

Follow Up Flag: Follow up
Flag Status: Completed

Dear SEPA,

It is good that you have undertaken a consultation process regarding the approval of run-of-river hydro schemes. I have read the document and am also aware of some of the responses that have been sent to you. Like them I am particularly concerned of the one-size-fits-all approach you seem to have adopted and little concern / consideration seems to have been taken regarding the small scale schemes particularly those under 15 kw.

The consultation doesn't seem to differentiate between schemes below 100 kW and there is a vast difference between the cost / value / impact of a 3kw scheme compared to a 95 kw scheme. They shouldn't be lumped together. You have a separate category in your SEPA approval process regarding information requirements for schemes under 15 kW but this consultation doesn't pay such size of schemes enough attention. Far more should be done to think about how schemes of this size should be encouraged and supported (as it would appear is done by regulatory bodies in England and Wales who operate with the same EU water-related legislation).

I believe that you should be thinking about what you can do to encourage micro and pico-hydro schemes in Scotland which could have a big impact on small businesses and households and - together - make a significant contribution to carbon reduction targets for Scotland and the UK. Every little helps.

Also with the new FIT scheme more and more people will be looking to invest their capital in such technology. SEPA should be seen to support this process not as an almost insurmountable barrier. Can you not consider such small schemes separately to the 'small' 50-100 kw schemes.

I am hoping to install a 9 kW system for my business to generate renewable power and make it a bit greener and, hopefully, save some money. I expect that you would see such a scheme as a triflingly small project but it is a big investment for our tiny company (~£70,000) and is very very important to the image and economics of the business (as well as saving around 20 tonnes of CO2 per year).

I would also like to lend my support to the comments sent in by Jamie Wallace (Highland Eco) and the Micro-hydro Association's formal response by Gavin King-Smith.

PLEASE do everything in your power to support micro / pico hydro, don't just focus on larger schemes.

Yours sincerely,
Robert Dunn.
Ardnamushrooms
www.ardnamushrooms.co.uk

Click <https://www.mailcontrol.com/sr/MLL7YVV1qHXtndxI!oX7UvIIItv2OGGpT2y0!wRYqVDOfnjZ4NxV+NKWWDrE0RwvYu48tOIesbbKVy4oAFznL6w==> to report this email as spam.

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Paterson, Kevin

From: David Stirling [ds@braidwoodfarm.co.uk]
Sent: 26 April 2010 12:49
To: Hydro Consultation
Subject: Public Consultation Response
Follow Up Flag: Follow up
Flag Status: Completed

Dear Sirs,

Although the guidelines for run-of-river hydropower schemes is a welcome development, there are a number of concerns with the proposed guidance.

There are probably several thousand potential sites for sub-100kw projects in Scotland, and it is almost certain that no two of these will be alike.

Setting an arbitrary threshold and strictly following a flow chart will not allow for the inevitable variations which will be found at these sites and strict implementation could prove unnecessarily and unfairly restrictive.

It should be emphasised in the Guidance that these are only guidelines and each case should be decided on its particular merits and circumstances.

A degree of flexibility is required.

I would also like to endorse the response submission by Highland Eco Design and Scottish Renewables.

Yours sincerely,

David Stirling
Braidwood Farm
Penicuik
Midlothian
EH26 9LP

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CONSULTATION ON GUIDANCE FOR DEVELOPERS OF RUN-OF-RIVER HYDROPOWER SCHEMES

RSPB Scotland Response

RSPB Scotland¹ is part of the RSPB, which speaks out for birds and wildlife, tackling the problems that threaten our environment, and promotes the conservation of wild birds and their habitats. We are supported by more than 87,000 members in Scotland, with a strong membership base in rural areas as well as towns and cities. We have practical experience of managing land, aquatic and coastal habitats for conservation, farming, forestry and other enterprises, and of providing advice to land managers. RSPB Scotland manages 68,240 hectares of land, much in management agreements with local farmers/ crofters and graziers. Our land management interests cover a wide range of habitats and geographic areas within Scotland. We undertake biological and economic research to underpin our policy analysis and advocacy. We also have experience of environmental education and training for all ages. The RSPB is the BirdLife International partner in the UK.

Summary

RSPB Scotland welcomes the opportunity to respond to this public consultation on draft guidance for developers of run-of-river hydropower schemes. We welcomed the Climate Change (Scotland) Act 2009 obligations to reduce Scotland's greenhouse gas emissions and recognise that we must shift our energy supply towards renewable sources, such as hydropower, in order to meet those targets. However, we believe that renewables can be developed and sited so that they do not have significant impacts on biodiversity or compromise species' ability to adapt to climate change.

We congratulate SEPA on providing useful guidance for developers of run-of-river hydropower schemes but we feel that there is a weakness in the guidance in relation to where the "likely acceptable schemes" can be sited. The guidance states that likely acceptable schemes include those "situated in degraded parts of the water environment or in small, steep streams". While it seems sensible to site developments in already degraded habitats, we would be concerned that this could (i) cause deterioration of watercourses incorrectly classified as 'poor' or 'moderate' by SEPA's classification system or (ii) reduce the capacity to restore habitats to good or high ecological status. To overcome this, it will be crucial for SEPA to undertake their duty to manage the *individual* and *cumulative* impacts of proposed developments and to thoroughly assess those developments on a site-by-site basis. This should also help to avoid developments in small, steep streams within areas of high conservation value, where that development is likely to have a significant negative impact on biodiversity.

¹ The Royal Society for the Protection of Birds (RSPB) is a registered charity: England and Wales no. 207076, Scotland no. SC037654

In addition, the guidance should state that efforts should be made to locate developments away from particularly sensitive locations where such development may have an adverse impact, for example at sites designated for nature conservation such as Special Protections Areas (SPAs) and Special Areas of Conservation (SACs). Deterioration of the water environment which may lead to significant adverse impacts on such designated sites should be avoided where possible, even where there are "*wider social or economic benefits*" (para 5, page 5). Further to this, proposals situated within designated sites may also require an Appropriate Assessment and the guidance should highlight this requirement.

Consultation questions

Part A criteria – sub-100 kilowatt schemes

1. Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?

We agree, in general, with the identification of provisionally acceptable sub-100kW schemes. However, we have concerns about the presumption for those schemes to be sited in degraded parts of the water environment or in small, steep streams.

Deterioration of the water environment could occur in water bodies incorrectly classified as poor or moderate under SEPA's classification system, or in small, steep streams of high conservation value. To avoid this, SEPA must ensure that developments are considered on a site-by-site basis so that they can fully assess the individual and cumulative impacts of any proposed developments.

2. Are there other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?

No, we do not suggest other circumstances at this stage.

3. Do you find the checklist format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.

We believe that the checklist format will be a helpful tool for developers. However, the guidance should make clear that provisionally acceptable proposals will undergo thorough assessments of their individual and cumulative impacts.

Part A criteria – 100 kilowatt + schemes

4. Do you agree that the draft criteria on the efficiency of schemes of 100 kilowatts or more (in terms of energy output per length of river or stream affected) will help deliver Scottish Ministers' objective of optimising the use of the resource, and ensure deterioration of status is not caused where there are significantly better environmental options for generating the same quantity of renewable energy?

Yes, we agree that the criteria will help to deliver Scottish Ministers' objectives and are pleased that they highlight that the emphasis will be on developments that make a significant contribution to Scotland's renewable targets while minimising adverse effects on the water environment. The guidance should also make clear that efforts should be made to locate developments away from particularly sensitive locations where development may have an adverse impact, for example at sites designated for nature conservation such as Special Protections Areas (SPAs) and Special Areas of Conservation (SACs). Deterioration of the water environment which could cause significant adverse impacts on these sites should be avoided where possible, even where there are "*wider social or economic benefits*". Further to this, proposals situated within designated sites may require an Appropriate Assessment and the guidance should highlight this requirement.

Part B mitigation measures

5. Do you agree that the mitigation identified will help achieve Scottish Ministers' objective of minimising the adverse impacts of hydropower scheme developments on the water environment?

We agree that the mitigation measures regarding flow protection, fish passage and sediment transport should all help to minimise adverse impacts. However, it should be stressed in the guidance that mitigation measures must be properly implemented, and will be subsequently checked by SEPA, to ensure their efficacy.

6. Do you agree that, in general, the mitigation identified is likely to be practicable? If not, please give your reasons for this view.

Yes, the identified mitigation is likely to be practicable. The feasibility of mitigation measures will vary between developments and sites, hence why they should be designed and implemented well.

7. Do you think that there other practicable measures that you think could be taken to achieve an equivalent or greater level of mitigation? If yes, please describe the mitigation and your reasons for believing that it would be practicable and effective in minimising adverse impacts on the water environment?

The list of draft mitigation measures seems comprehensive and we do not suggest further additions at this stage.

For any enquiries regarding this response, contact:

Lisa Webb, Land Use Policy Officer (Water)

RSPB Scotland, 25 Ravelston Terrace, Edinburgh EH4 3TP Tel: 0131 311 6500

Email: lisa.webb@rspb.org.uk

Registered Charity England and Wales Number 207076, Scotland Number SC037654

RSPB Scotland is part of the Royal Society for the Protection of Birds, the UK-wide charity which speaks out for birds and wildlife, tackling the problems that threaten our environment.

Nature is amazing - help us keep it that way

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Ayrshire Rivers Trust

A Scottish Registered Charity No. 030426

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Ayr
KA6 5HW
Tel: 01292 525142
Fax: 0700 6036870

Hydro consultation
Water Policy Unit
SEPA Corporate Office
Erskine Court
Castle Business Park
Stirling
FK9 4TR

26/04/10

Dear Sir/Madam,

Consultation SEPA, March 2010: Guidance for developers of run-of-river hydropower schemes

On behalf of Ayrshire Rivers Trust (ART) I would like to make the following comments regarding the above consultation.

Part A

1. The opening remarks and context set out in Part A are generally well balanced, and we welcome the useful comparison between hydro and on-shore wind turbine energy production.
2. The risk based assessment of hydro production in relation to length of stream bed affected (**page 5, i - iii**) is understandable but the emphasis on the current status of the affected waterbody highlights the requirement for the waterbody status to be accurate. For example ART have been in discussion with developers of a potential run-of-river scheme in the middle reaches of the River Ayr for the last two years. The proposed location for this hydro scheme lies within the section of the Ayr defined by SEPA as River Ayr (d/s Greenock Water). SEPA have the current status of this part of the River Ayr as "bad" (<http://apps.sepa.org.uk/rbmp/pdf/10420.pdf>). ART do not agree with this classification and we are currently seeking more detailed information on the specific causes of the "bad" status. The consultation outlines the SEPA view on the level of hydro production which may be acceptable for waters with "high" or "good" status but not for those with lower status. This may lead developers to the conclusion that anything goes on a waterbody classified as lower than "good" status. This would appear to contradict the overarching aims of the WFD for watercourse restoration to "good" status at least.
3. The contrast between the consultation position on proposed schemes < 500kw and the German system highlighted in Note 4, page 5, is interesting. ART question why it would be considered acceptable to have lesser environmental protection in Scotland than applied in other EU countries.

Email: info@ayrshireriverstrust.org
Website: www.ayrshireriverstrust.org

Part B

4. **1.1 Protection of low flow level.** The typical flow duration curve is very flat towards the lower flows. This means that in reality the actual difference in flows between Q95 and Q90 are relatively small. ART welcomes the requirement for Q90 for sensitive catchments but for the reason given above this may not be sufficient to provide adequate protection, e.g. to protect wetted width. ART consider that some flexibility should be built into CAR licences associated with approved hydro schemes to ensure that changes to flow regimes can be made post approval if required in light of post development monitoring.
5. **1.2 Protection of flow variability.** The requirement for designed variable hands-off flow mechanisms is welcome although ART consider that the first option given (intake design) is far more preferable than the shut-down option. Switching on and off flows rapidly is one of the most damaging aspects of hydro operations. Fish or invertebrates are unable to cope with rapid changes in water level and we fail to see how shutting down an operation for six hours at the weekend could possibly help protect downstream ecology.
6. **1.3 Protection of high flows.** ART considers that the levels of maximum abstraction given are appropriate.
7. **1.4 Protection of flows for upstream migration and spawning of fish.** ART welcomes the recognition for protection of migratory flows as this is an aspect that is often overlooked by developers. We welcome the linkage of abstraction rates with the river flow standards defined in The Scotland River Basin District Direction 2009. However, in an attempt to find out if all Scottish rivers have actually been classified through the typology process several senior staff members of SEPA were contacted but it was impossible to get a definitive answer. It would appear that the typology exercise for river flows has not yet been completed and therefore it is difficult to establish what the permitted river flow standards are for any particular river.
8. **2.1 Intake design and screening.** This section contains a great deal of very good, detailed advice which should be implemented at all run-of-river schemes. It is good to note the requirement for 10mm screening on smolt screens. Screening of this size is essential to exclude smaller smolts and parr. Downstream migration of small salmon parr in the spring is a feature noted by ART during smolt trapping exercises. We would question whether it is necessary to label Archimedean screws as “fish friendly”. ART have seen reports which show damage to fish caused by Archimedean screws. They may well be a better option than more traditional turbines but they do not justify the label “fish friendly”.
9. **2.2 Provision for upstream passage of fish. Section A.** Again this section summarises the risk to fish migration posed by run-of-river schemes in a very detailed and comprehensive manner. ART would like to add that the local fishery or rivers trust, or local district salmon fishery board are likely to have in-depth knowledge of fish species, run timing etc on rivers within their area and should be consulted by SEPA and/or developers at an early stage in the application process.
10. **2.2 Section B.** The provision for eel passes is timely. The impact of barriers on eel migration has been neglected in Scotland. In England and Wales there are already statutory powers enabling the Environment Agency to require responsible persons to fit eel passes to weirs (http://www.opsi.gov.uk/si/si2009/ukSI_20093344_en_3). Provision for the same powers in Scotland should be prioritised.
11. **2.2 Section C.** The mitigation listed in this section is vague and does not differentiate between the three species of lamprey found in Scotland. ART have found that juvenile brook lampreys (*Lampetra planeri*) are present throughout much of Ayrshire, including upland areas, above impassable waterfalls, whereas juvenile and adult sea lampreys

(*Petromyzon marinus*) are largely restricted to the lower reaches of the larger rivers. A key factor limiting the range of sea lampreys is thought to be the presence of weirs.

12. **2.2 Section D.** ART agree with the comments in this section, although the requirement for 20mm screening on the tailrace is much closer spacing than previously defined in fish screening documents. This will increase the requirement for frequent cleaning of screens and the risk of over topping should screens become blocked.

13. **Annex A.2.** The checklist was tested with a known proposed micro hydro scheme in Ayrshire. The proposal is to use an existing weir and lade, in a small stream in an agricultural area. The checklist led to the apparent provisional approval of the proposed scheme at point D:2. (see below). It is the opinion of ART that this proposed scheme should not receive provisional acceptance as there are no proposed mitigation measures to remove a complete barrier to fish passage which has existed for 200 years. It appears that Checklist D would permit the proposed scheme just because it uses an existing outfall. This contradicts with the overarching aims of the WFD for the restoration of watercourses.

The decision cascade for the proposed scheme is as follows:

Checklist A	Issue	Answer	
1	Surrounded by agricultural land	Yes	Go to A2
2	Extensive engineering modification present between intake and tailrace	Yes	Go to A3
3	Site is located on a tributary of a watercourse planned for improvement	Yes	Go to Checklist C
Checklist C			
1	No fish passage improvements planned	No	Go to C3
3	Any other significant net benefits to ecology?	No	Go to Checklist D
Checklist D			
1	Abstracted water will be removed for several hundred metres	No	Go to D2
2	The scheme will be powered by water flow from an existing outfall	Yes	Provisionally acceptable

In this case the deciding factor appears to be that the scheme is proposed for an existing outfall and would receive provisional approval despite there being no associated environmental benefit. It would still be subject to the provisions in Note 1 but some of them have already been ruled out by the decision process e.g. no fish passage benefits.

Man-made barriers planned for removal to achieve the objectives of a river basin management plan are mentioned in Note 1. In the case of the actual scenario given above, the weir does not exist in the Clyde RBMP as it was not registered by the owner, despite it being 12' high, and was not known to ART as that burn had never been surveyed in detail. The point being is that just because a barrier has existed below the regulatory radar its impact and influence on the decision tree should be no different to weirs which are properly registered in compliance with existing legislation.

The main outstanding issues influencing the development of the guidance are:

a) the accuracy of information used by SEPA to classify watercourses. The classification scheme is still work in progress e.g. there are still many issues unrecorded, and this should be borne in mind when applying the guidance,

b) the full development of tools such as river flows typology as it proved impossible to reach any SEPA staff who could provide answers to related questions.

In summary ART approves of much of the content of the consultation document. It provides for the first time a very detailed and comprehensive list of mitigation measures which should be applied at all proposed run-of-river hydro schemes. The consultation document is well balanced and will help to ensure that the hydro resource in Scotland is developed where appropriate and with effective mitigation where required.

If you require any clarification regarding any of the points raised in this response please do not hesitate to get back in touch.

Yours sincerely,

Brian Shaw
Senior biologist

Paterson, Kevin

From: Miff Tuck
Sent: 27 April 2010 18:45
To: Hydro Consultation
Subject: Consultation on RoR Hydropower
Follow Up Flag: Follow up
Flag Status: Completed

Dear Sirs,

manage a small West Aberdeenshire estate which has principally grouse moor with some hill farming and some forestry, together with diversification into various tourism related projects. The estate borders the upper reaches of the River Don and has five tributary streams.

My interest in micro hydro is that we finally , after two years application and negotiation, received planning permission and CAR licence for a RoR scheme of 11 kW on one of those streams.

was greatly handicapped during that time by the lack of Government and SEPA policy and am delighted that guidance is now appearing.

This estate, like many others of its kind, performs an important public service in employment, injection of cash, and maintenance of the rural community. The owner has continually over the years paid money into the estate to balance its running costs as well as investing considerable capital. The investment into a hydro electric scheme is designed to increase the income flow and thereby benefit the estate and the community. It involves a considerable investment of capital for a return to profit in about 7 years time. At the same time the owner is contributing usefully to the government policy for renewable energy.

have read the consultation paper and also the comment submitted by my agent "Highland Eco-Design Ltd". I entirely support Jamie Wallace's views. The implementation of the 100kW threshold would prevent any scheme similar to mine. As I found in my application, environmental issues are given far too much weight compared with the all important renewable energy issue. Ridiculous precautionary measures were implemented (adding to the cost considerably) without any research or evidence of potential damage to the environment. The guidance allows no weight to local or community benefit, nor even of the contribution to national renewable targets to weigh against the WFD regulations. My information is that although each scheme is small , there is in total a considerable wattage available from a multitude of schemes, and these operate in widely dispersed areas so benefiting power distribution.

strongly recommend that policy should lean towards approval of schemes unless they would have serious environmental impacts , rather than the other way round (as proposed). At the very least a more flexible interpretation of the guidance should be implemented to take account of the socio-economic impacts and the over-riding need to increase renewable energy sources

Yours faithfully,

Mitchell Tuck

Col F.M.K.Tuck
 Allargue, Corgarff,
 Strathdon,
 Aberdeenshire AB36 8YP

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Paterson, Kevin

From: Miles Wenner [mileswenner@developingforestry.freemove.co.uk]
Sent: 27 April 2010 22:31
To: Hydro Consultation
Subject: Consultation on environment licensing for hydro schemes - Comment
Follow Up Flag: Follow up
Flag Status: Completed

I do not agree that the ecological basis of these guidelines is correctly founded for small upland streams and upland catchments:

Large 100KW+ schemes or even 30KW schemes are likely to pose major problems for the aquatic environment which cannot be compared to small hydro schemes, cumulatively or otherwise. Large schemes can alter the character of a whole catchments ecological interest, whereas small schemes might affect at worst a short distance of a trivial part of a catchment. The character of upland catchments are very flash flows – from very low flows and even dry in the driest periods to severe flash torrents metres deep, causing widespread damage to vulnerable banks and riparian habitat, where stock has not been excluded from the riparian area, whether or not rough grazing, or where shade bearing trees have been planted densely too close to the water habitat, whether conifer or broadleaved. In practice in these areas schemes will not operate properly in very low flows, and will only use a small fraction of the high flow volume, so flow guidance seems unlikely to be problematic. Whereas in large waters, flows will be more even and the ecology is permanently adapted to plentiful water along its length.

In small, upland streams, the damage caused to riparian habitat in flash flows arises from intensive stock grazing of catchments keeping vegetation short, drainage schemes both from agriculture and forestry (forestry only c25% of land area in D&G, c15% in Scottish Borders, and c12% Scotland wide), and stock poaching through unrestricted stock access to riparian habitat. Poorly designed small scale hydro will be at worst a very small drop in this ecological bucket, and where design safeguards are incorporated, will have no meaningful impact whatever, whether or not restricted to steep sections. It is theoretically possible that very long lengths of an upland catchment could be used for small scale hydro, but the cost benefit of installing such in remote, unpopulated areas far from the grid, is not likely to make this viable. If exceptionally this were to happen one might then weigh up the cumulative benefit of multiple energy generation versus the likely impact on a likely degraded, upland habitat, and any unique wildlife values that might be affected.

If we come to the aquatic species protection which the guidelines require to protect, in practice there appear to be no adverse impacts for correctly designed small scale hydro schemes. Migratory fish move in high flows, eels can move over wet ground, plants to be protected need to be specified – aquatic plants will be adapted to the existing severe water variation and most of the bank plants degraded by stock trampling and grazing, on top of which the lengths we are talking about are tiny, within a whole catchment. That said if the mitigation measures are effectively to allow a base flow thru a low flow pipe, and allow for high flow water movement over a weir, where deemed to be sensitive for migratory fish, then this would not appear very onerous, and practical. But on that basis a lengthy document and procedure appears unnecessary. Mitigation measures beyond good design appear wholly unnecessary in the broader context of small upland waters. If the aquatic

environment is to be positively helped it would be to remove catchment areas from grazing to reduce run off, stop up drains, create wetland most of which silted up from bad land management, and fence out stock from riparian areas. Another positive measure might be to create more standing water to help mitigate the significantly man made or enhanced flashy nature of upland catchments, which would also help to recreate the post glacial water habitat on which many endangered waders and wildfowl depend. Such standing waters might also in many cases be combined with small hydro, as a financial benefit will make such waters more attractive to create and recreate when silted up, and maintain.

I do not agree that the efficiencies of larger scale energy generation pre-empt small hydro:

I do not consider as above, that there is a meaningful ecological impact with small hydro, and that it can be compared with large hydro impact, on a per KW, or any other basis. Hydro renewables are generally significantly more cost effective per KW than other land based renewables. It is cheap to install and maintain. Wind is only 30% efficient because of periods in the year when there is either no wind, too little, or too much. Often in cold high pressure winter weather, there is no wind. Solar is restricted to the 6-7 months of the year when sun's radiant energy is effective, not in winter, when energy is most needed. Heat exchangers work best with energy on demand. Small hydro can be very cost effective on a rural household basis, requiring no alteration to the grid, and providing proper insulation and hot water storage, with possibility of full self sufficiency. Where small hydro includes water storage it can provide continuity of supply or energy on demand, whilst at the same time helping to mitigate flashiness of upland run off. The long standing government policy of supporting rural life should encourage household energy self sufficiency to help offset higher costs and lack of facilities that remoter living entails.

I hope these comments are useful, and can be acknowledged.

Sincerely

Miles Wenner

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Paterson, Kevin

From: Gordon Black [gordonblack@babyhydro.co.uk]
Sent: 28 April 2010 07:55
To: Hydro Consultation
Subject: Guidance for developers of run-of-river hydropower schemes - Consultation response
Follow Up Flag: Follow up
Flag Status: Completed
Attachments: HED response to SEPA guidance[1].pdf

Water Policy Unit
 SEPA

Response to the draft consultation document – Guidance for developers of run-of-river hydropower schemes

The successful and productive growth of hydropower as a source of zero carbon energy requires clarity for landowners and developers alike. The absence of structured information on what will and will not be permitted in the development of smaller schemes is the major barrier now that the Feed-in Tariffs have been announced and provide some financial certainty. Hence we welcome 'guidance' as this will enable landowners and developers to make decisions with improved confidence and thus lead to hydropower flourishing.

We also understand and appreciate the need for river quality to be protected. However, we believe the current draft guidance to be heavily biased towards regulatory compliance with EU rules (often where scientific evidence is not available) at the expense of consideration of the local economic impact.

We wholeheartedly endorse the response submitted by Highland Eco Design. We find their document to be a considered and balanced view. We agree with their interpretation, opinion and emphasis.

A significant economic opportunity is being squandered; generation of rural income, reduction in costs of consumed electricity, and earning potential through jobs. Additionally, an opportunity for Scotland to become an international exemplar in the development of significant numbers of run-of-river hydro schemes under a high quality environmental regime is being lost. This of course being a contribution to the Scottish Government's ambition for Scotland to become a centre of excellence on renewables.

Like Highland Eco-Design we argue this case not from a parochial business standpoint looking after our own interests; there is enough business above 100kW, and in the refurbishment of derelict schemes, and in the expansion of Hydrobot overseas, for us to thrive.

In summary, our primary observation is that the envisaged environmental impact of run-of-river schemes, particularly below 100kW, is not adequately balanced with the potential socio-economic gain.

We remain committed to the quality development of micro-hydropower in Scotland and will continue to engage sensitively with SEPA.

Regards,

Gordon

Gordon Black
Director
babyHydro Ltd
Mob: 07736 554276

www.babyhydro.co.uk

Registered office: Gateside Farm, Kilncadzow, Carluke, ML8 4QN
 Registered in Scotland No. SC350026

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Paterson, Kevin

From: John Lithgow [johnlithgow@lithgows.co.uk]
Sent: 28 April 2010 14:41
To: Hydro Consultation
Cc: Fyfe, Richard; Frame, Jim; James Lithgow; Montague, Michael
Subject: Response to Guidance for Developers of Run-of-River Hydropower Schemes
Follow Up Flag: Follow up
Flag Status: Completed

Dear Sir / Madam,

We are responding to the consultation on the Guidance for Developers of Run-of-River Hydropower Schemes published on 3rd March 2010. We have extensive small scale hydro experience having built and operated more than six schemes over many years, albeit storage rather than purely run-of-river. We presently have a further four schemes at various stages of development / consultation.

We broadly welcome the publication of this Guidance as it gives a great deal more assistance to developers on what is regarded as "best practice". However, we have a number of concerns, primarily the degree of assumed knowledge of SEPA terminology and regulation that this document is based on. With the advent of the Feed in Tariff there will be a number of farmers, landowners and developers looking at small scale hydro with little or no experience. This document should be aimed squarely at them but with sufficient detail and substance to guide experienced developers too.

Part A

Our suggestion is that right at the start of this document there is clear instruction on how someone can determine what SEPA definition is applied to the river/burn in question. For example, nowhere is there a clear definition of the difference between a "water body" (catchment >10km²), a "watercourse" (visible on the OS 1:50k map but with catchment <10km²) and a non-defined river. Neither is there any mention of the use of the RBMP Interactive Map to understand SEPA's existing grading or "status" of particular rivers. The document assumes that developers somehow have a choice of rivers on which to develop hydro but this often isn't the case – if a landowner has a river on their land, they want to clearly understand how it is classed and whether or not it is appropriate to develop hydro on it.

Without this clear guidance right at the start, this document can be very misleading. If we understand it correctly SEPA is actively discouraging sub-100kW schemes on water bodies i.e. bigger rivers with a SEPA "status" on which it should be feasible to develop much larger schemes with little or no detriment to the status and certainly if sub-100kW schemes are the only option then they should be feasible with no deterioration in status. We believe the Guidance document isn't trying to discourage sub-100kW schemes on other rivers which don't have a SEPA "status", but to a layman (and to us when we first read it), the overwhelming impression is of "anti sub-100kW" because the term "water body" could, to the uninformed, refer to any type or size of river. We believe it is vital that SEPA is seen to encourage responsible hydro power, albeit in line with best practice, and this simple miscommunication completely undermines the intention and spirit of the Guidance.

Page 5 of the Guidance talks about efficiency of schemes based on length of river or stream "impacted". What does this mean? Is it the length between abstraction and tailrace return or is it the distance between abstraction and the point where sufficient tributary feeds return the river's "status" to the same level as upstream of the abstraction? Based on our experience the energy densities stated appear very high. Also, if a scheme is based on a number of abstractions, is this energy density based on the cumulative generation or pro-rata generation? I'm not sure that the comparison with Germany is fair as the topography and hydrology of Scotland is completely different. Again the comparison with on-shore wind isn't helpful; the capacity factor of on-shore wind is often below that of R-o-R hydro so a 500kW wind turbine is unlikely to produce more GWh per year than a 500kW R-o-R hydro. We felt this whole section on "efficiency" and "better options" was very unclear and could lead developers to believe their schemes are inefficient when they may not be and appears to be based on inappropriate comparisons.

Part B

0/01/2011

No issue with Protection of Low Flows

The issue of protecting flow variability and high flows is so site specific that guidance of this nature can be frustrating. The most obvious item is tributary feed: if HOF becomes dwarfed in comparison to tributary feed just downstream of an abstraction then the guidance envelope for maximum abstraction becomes largely academic. We're concerned that Case Officers will seek to enforce the letter of the requirements with all pragmatism removed. At least in the protection of high flows (1.3) leeway is given for abstractions larger than $1.5 Q_{\text{mean}}$ after discussion with SEPA but this is notable by its absence in section 1.2, protection of variable flows. By all means provide clear guidance but we feel it is critical to ensure this is qualified with the ability of individual case officers to amend as appropriate as the environment over which these regulations are being applied is so varied.

Annex A

Our comments about clear definitions as detailed in Part A above are also applicable to Annex A. Do these various checklists refer to watercourses or just to water bodies? If you are proposing a scheme on a watercourse (i.e. small stream), with a $<10\text{km}^2$ catchment and a slope of less than 0.06, then you are reliant on there being net benefits to the ecology of the water environment (meeting Checklist C – unlikely) or on having a modified watercourse already (Checklist D – unlikely) for the scheme to be approved. Why should this be? Plenty of watercourses could be utilised effectively for sub-100kW schemes which don't necessarily have a 0.06 slope.

For example: 55m static head over a 1km pipeline from a 4km^2 catchment and 1750mm annual rainfall adhering to all the other best practices as defined in Part B (HOF, variable flow etc.), would yield approximately 50kW. A bigger catchment (but still $<10\text{km}^2$) could be closer to 100kW and very cost effective. Should they be discouraged or downsized to ensure they don't breach river flow standards as defined in Checklist D? We don't think so as they are exactly the size of scheme that is realistic on the West coast of Scotland (if they can be made financially viable) and shouldn't be discouraged as a result.

The fact that this basic worked example of a mini-hydro scheme appears to essentially fail your criteria but would, in our opinion, have a negligible impact on the water environment SEPA is tasked with protecting is a major concern and highlights that the various Checklists are not sufficiently robust as yet. If, however, these various Checklists are aimed at water bodies only then obviously this is a red herring but that does not appear to be the case.

We have always advocated empowering local SEPA officers to make case by case judgements based on experience and universal guidance, which this document represents. We applaud SEPA's engagement with this issue but feel there is still some improvement to make to the Guidance for it to be general acceptable, and therefore more easily enforceable, within the small scale hydro power community.

If you would like further detail on any of the points raised in this submission please feel free to call or email me using the details listed below.

Kind regards,

John Lithgow

Ormsary & Inver Farmers
Office: 01475-540-692
Mobile: 07786-213-022

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0/01/2011

Paterson, Kevin

From: Richard Haldane [rwh@cloanden.co.uk]
Sent: 28 April 2010 16:10
To: Hydro Consultation
Cc: Wallace, Clare; Castle, Gail
Subject: Guidance for run-of-river hydropower schemes
Follow Up Flag: Follow up
Flag Status: Completed

Dear Sir,

would begin with 2 general comments: -

1. It is clear from the draft paper that there is a presumption by Scottish Ministers against small (sub 100kW) hydro schemes. This appears to be totally at odds with the DECC Feed-in Tariff scheme, published 1st February, 2010. In this scheme the Generation tariff for 0-15kW generation is 19.9 p/kWh; 15-100kW, 17.8p; 100+ kW 11p, reducing to 4.5p above 2000kW. This is quite clearly designed to encourage small generation units. Who is going to pay the Generation tariff - the Scottish Government or the DECC?

2. The presumption against small hydro schemes has serious implications for small farms and estates, where maintaining profitability and viability are becoming increasingly difficult. For such businesses, where 15kW of generation would generate c.£10,000 per annum of cash flow, in addition to providing 15kW of 'free' electricity worth a further £10,000, the £20,000 per annum positive difference is a significant figure which could well secure the long-term viability of such farms and estates,. It is such agricultural units - and not the huge commercial acreages of farm land - which are the guardians of our biodiversity and ecology. In consequence the Scottish Ministers' presumption against small hydro schemes may well over a period of time result in small businesses becoming non-viable units, resulting in their absorption by neighbouring 'big' farmers. This would not be good for the ecology.

Consultation Questions

Part A criteria - sub 100kW schemes -Q1 - It is relatively easy to agree with this question as it is akin to asking 'if you do nothing except in waters where the environment is already of a low quality, do you agree that (further) deterioration is unlikely to take place?'

Part A criteria-Q2 - There are other circumstances (see also my point 2 above). Small hydro units will almost certainly be situated on small rivers or burns, both of which are likely to have hugely variable water flows, depending on rainfall at different times of the year. It is perfectly feasible to design a scheme in which generation only takes place when there is excess water. Furthermore, except during very severe frost, river flows tend to be higher during late autumn, winter and early spring, which also are the times when electricity usage is at its peak.

Part A criteria-Q3 - Helpful

Part B mitigation measures - Qs 5 & 6 - If the objective of these measures is to ensure that a minimal level of hydro electric schemes (particularly small ones) are approved, then the answer to both questions is 'yes'. It is perhaps worth reflecting on the subsidiary question - 'if all these mitigation measures had been put in place prior to 1952, would Scotland's highly successful development of its hydro power ever have taken place?'

Pendulums tend to swing from one extreme to the other and it appears to me that SEPA, driven by the EC's WFD and in an effort to put right past wrongs, are 'swinging' a very long way. We either want renewable energy or we don't - and if we do we cannot afford to be too extreme.

Yours faithfully,

Richard Haldane, MBE,
Cloan

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RTPI

mediation of space · making of place

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Hydro consultation
Water Policy Unit
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Erskine Court
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FK9 4TR

28th April 2010

Email to: hydro.consultation@sepa.org.uk

Dear Sir / Madam

Response by the Royal Town Planning Institute in Scotland to the Consultation on Scottish Environmental Protection Agency Guidance for Developers of Run-of-River Hydropower Schemes

Thank you for the opportunity to respond to the above consultation. The RTPI is the UK body chartered to represent the planning profession and offers these comments from the point of view of a diverse and politically-neutral professional body committed to supporting devolved government in Scotland. The Institute has approximately 2100 members in Scotland, working across all sectors of central government, local government, government agencies, the voluntary sector, private consultancy, the development industry and academia.

Since devolution, the Institute has empowered its RTPI in Scotland Office, together with its Scottish Executive Committee, with the responsibility for working with government and public bodies generally for the improvement of the planning system in Scotland. This is in accordance with its charter obligation to work for the public interest.

Our response has been discussed with members of the RTPI in Scotland's Policy Sub-committee and I am particularly grateful to Hilary MacBean who has led our work on this response.

Our responses to the questions set out in your consultation document are given in full in Annex 1 attached to this letter whilst our general points are set out below.

The Royal Town Planning Institute in Scotland has elected to respond to this consultation as part of its commitment to supporting a planning system that is responsive to Government objectives to meet the challenge of climate change, deliver sustainable development, improve the contribution from renewable energy resources and provide an efficient planning system in this field.

This response is geared towards the interface between SEPA and Local Planning Authority responsibilities for regulating micro-hydro power generating developments. It aims to ensure that the responsibilities of each regime overlap as little as possible, in the interests of clarity, efficiency and certainty for developers and public officials in both organisations. It also aims to ensure that the criteria and material considerations of both systems are clear and fully understood.

The response includes suggestions for cross referencing with the planning system, clarification of the criteria applying to different scales of development and a clearer definition of the meaning and scope of terms used in the guidance. One or two technical points are made in relation to fish and other species.

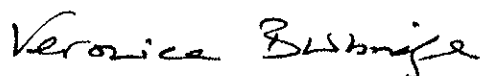
The scope for overlap between planning control and licensing under CAR, particularly on river and stream systems subject to special designations such as Ramsar sites, Special Areas of Conservation, Special Protection Areas, National Scenic Areas, SSSIs, and National Parks, indicates the need for early and joint consultation between developers, SEPA, SNH and the Planning Authority. The guidance should specifically recommend an early approach by developers, to all agencies concerned.

Subject to appropriate pre-application consultation, it can even be argued that developers should be advised to seek a CAR licence for a scheme, dealing with specific and more technical issues, before subjecting it to the wider considerations of a planning application. The specific and technical issues considered by CAR are not excluded as material planning considerations, particularly if they have not already been considered by CAR, so a sequential rather than parallel approach to the consents avoids the risk of double regulation, abortive effort and confusion to applicants. The draft SEPA guidance should make a clear cross-reference to other SEPA guidance such as Guidance for Applicants on Supporting Information Requirements for Hydropower Applications (2009), where the matter is covered.

The above guidance, published in conjunction with SNH, deals with biodiversity, protected species, landscape, amenity and the interests of other water users (although these are not defined and do not appear to include water supply). These matters are highly material to the grant of a license and planning permission but are not covered in the micro-hydro guidance, out for consultation. SNH is also publishing further detailed guidance largely intended for its own field officers but of relevance to the regulatory officials in planning and SEPA. The availability of all related guidance should be set out, as without it, the picture is incomplete and confusing.

The Institute trusts that these comments are of assistance and has no objection to them being made available to the public in the usual way. If you wish any clarification or further assistance, please do not hesitate to contact me at our Edinburgh office: 57 Melville Street Edinburgh, EH3 7HL phone: 0131 226 1959, or email: scotland@rtpi.org.uk

Yours sincerely



National Director, RTPI in Scotland

Response by the Royal Town Planning Institute in Scotland to the specific questions raised in the SEPA consultation paper

Consultation questions

Part A criteria – sub-100 kilowatt schemes

Question 1. Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?

1. Disagree. The hands off flow and flow management criteria require on-going monitoring to ensure that, as specified in the criteria, they are sufficient to prevent any deterioration of the water course or habitat, particularly when they depend on active management by the operator and there is a risk of sub-optimal practices.
2. The criteria deal at length with the passage of adult fish for spawning but appear to overlook the vital function of tributaries as year round nurseries for young fry, parr and smolts spawned down stream and then moving into the tributary for their early development.

Question 2. Are there other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?

3. No, the criteria appear to be proportionate as long as biodiversity, amenity of other users, landscape and water supply protection are also considered.

Question 3. Do you find the checklist format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.

4. The criteria set out in Part A are variably contained within the text, in list form and in tabular form. This is confusing and a consolidation into one clear reference list and a check list would assist. The check list itself is quite useable. (There also seems to be some contradiction between the text and tables e.g. are >100kW and >500kW schemes both subject to impacts relative to the length of the river involved? It is unclear whether >500kW schemes are dealt with differently to >100kW schemes and perhaps these criteria should be combined).

Part A criteria – 100 kilowatt + schemes

Question 4. Do you agree that the draft criteria on the efficiency of schemes of 100 kilowatts or more (in terms of energy output per length of river or stream affected) will help:

- deliver Scottish Ministers' objective of optimising the use of the resource;
- ensure deterioration of status is not caused where there are significantly better environmental options for generating the same quantity of renewable energy?

5. It is unclear by whom and how significantly better options will be identified. Are they existing, potential or planned schemes and do they include schemes on land outwith the applicants control? The SEPA Guidance on this subject (WAT-SG-68) is identified as a link but is not particularly helpful in its current form. Some type of sequential test of the available alternative options and their assessment for feasibility and viability could be submitted as part of the application proposal. An awareness, by regulators, of over-inflated or understated claims for the energy productivity of proposals is essential – the figures require challenge.

Part B mitigation measures

Question 5. Do you agree that the mitigation identified will help achieve Scottish Ministers' objective of minimising the adverse impacts of hydropower scheme developments on the water environment?

6. Disagree. The hands off flow and flow management criteria require on-going monitoring to ensure that, as specified in the criteria, they are sufficient to prevent any deterioration of the water course or habitat, particularly when they depend on active management by the operator and there is a risk of sub-optimal practices.

Question 6. Do you agree that, in general, the mitigation identified is likely to be practicable? If not, please give your reasons for this view.

7. No comment

Question 7. Do you think that there other practicable measures that you think could be taken to achieve an equivalent or greater level of mitigation? If yes, please describe the mitigation and your reasons for believing that it would be practicable and effective in minimising adverse impacts on the water environment?

8. No comment



29 April 2010

Hydro Consultation
Water Policy Unit
SEPA Corporate Office
Erskine Court
Castle Business Park
Stirling
FK9 4RT

Dear Sir/Madam

Officer's Response To Draft SEPA Guidance For Run-Of-River Hydropower Schemes

Thank you for the opportunity to comment on the draft guidance. The National Park Authority is supportive of the guidance as it will inform planning decision-making on the increasing number of renewable energy schemes in the Park. Our response is attached in Annex 1. We are also developing supplementary planning guidance on renewable energy to assist planning decision-making and ensure that the broad range of issues is taken into account for each scheme. The draft SEPA guidance will complement the Park's planning guidance.

Yours sincerely

Carmel Rowlands
Water Environment Advisor

LOCH LOMOND & THE TROSSACHS NATIONAL PARK AUTHORITY

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Annex 1: Loch Lomond and The Trossachs National Park Authority Response to SEPA Guidance for Developers of Run-of-River Hydropower Schemes

Part A criteria – sub-100 kilowatt schemes

1. Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?

The National Park Authority has developed draft Supplementary Planning Guidance on Renewable Energy to assist the implementation of policies on Renewable Energy in the finalised draft local plan. The SPG provides locational guidance for run-of-river hydro schemes between 50kw and 3MW. While this threshold is different to the thresholds of schemes below 100kw and greater than 100kw contained in the SEPA guidance, the two sets of guidance should complement each other. The SEPA guidance should ensure that impacts on the water environment through abstraction, engineering and discharging are appropriately managed through the Controlled Activities Regulations licensing regime.

The SEPA guidance provides for environmental considerations such as flows, fish and habitat, and hydrology while the draft SPG provides guidance on broader issues such as landscape, cultural and historic heritage and amenity. The SEPA guidance should complement the draft SPG by ensuring more specific consideration of impacts on the water environment at the planning stage. Given that renewable energy projects in the National Park will need to adhere to the SPG as well as the SEPA guidance, schemes should not cause deterioration of the water environment.

2. Are there other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?

No comment.

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3. Do you find the checklist format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.

A checklist approach is useful however, in its current form the list of requirements is technical and may be difficult for license applicants to interpret, particularly regarding applications for small-scale schemes by individual land owners. Reference to the planning process should also be included in the SEPA guidance, and the role of local authorities and the Scottish Government in approving hydro energy schemes.

Consideration of the cumulative impacts of more than one project on water bodies is also mentioned in the SEPA guidance. This is consistent with the NPA's draft SPG which incorporates the need to identify the cumulative impacts on fish hydrology, and other biodiversity and landscape values at all stages of the planning process. More detail in the SEPA guidance on the following would be useful:

- Whether minimum/low flows have been identified for specific rivers
- Information on how the cumulative impacts are determined
- Whether allocation limits have been set for specific water bodies

Part A criteria – 100 kilowatt + schemes

4. Do you agree that the draft criteria on the efficiency of schemes of 100 kilowatts or more (in terms of energy output per length of river or stream affected) will help:
- deliver Scottish Ministers' objective of optimising the use of the resource
 - ensure deterioration of status is not caused where there are significantly better environmental options for generating the same quantity of renewable energy?

The NPA would expect that schemes above 100kw would also need to comply with the Park's SPG on Renewable Energy when seeking planning permission. Our comments regarding the need for further information in the guidance about how to identify, assess and consider the cumulative impacts of hydro schemes under question 3 also apply to schemes above 100 kilowatts.

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Part B mitigation measures

5. Do you agree that the mitigation identified will help achieve Scottish Ministers' objective of minimising the adverse impacts of hydro power scheme developments on the water environment?

The mitigation should help to minimise adverse impacts, however more detail is required on how to identify and consider the cumulative impacts of more than one scheme. In the context of considering the cumulative impacts, more information on how to access the following would be useful:

- Whether minimum/low flows have been identified for specific rivers.
- Whether allocation limits have been set for specific water bodies.

6. Do you agree that, in general, the mitigation identified is likely to be practicable? If not, please give your reasons for this view.

No comment.

7. Do you think that there are other practicable measures that you think could be taken to achieve an equivalent or great level of mitigation? If yes, please describe the mitigation and your reasons for believing that it would be practicable and effective in minimising adverse impacts on the water environment?

No comment.

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RIVERS & FISHERIES TRUSTS OF SCOTLAND
Safeguarding Scotland's Rivers & Lochs



Association of Salmon Fishery Boards

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Tel: 0131 272 2797 www.rafts.org.uk / www.asfb.org.uk

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29 April 2010

Dear Sir/Madam,

Guidance for developers of run-of-river hydropower schemes – consultation on draft guidance

ASFB and RAFTS welcome the opportunity to respond to the above consultation.

ASFB represents the network of 41 Scottish District Salmon Fishery Boards (DSFBs) including the River Tweed Commission (RTC), who have a statutory responsibility to protect and improve salmon and sea trout fisheries. RAFTS represents the 24 fishery trusts who work across over 90% of Scotland's freshwaters to protect and develop our native fish stocks and populations by undertaking a range of activities including freshwater, river habitat restoration, fish and fisheries monitoring, research and education programmes.

In summary ASFB and RAFTS welcome the proposed guidance. The consultation draft is of high quality and provides comprehensive guidance for developers to direct them to appropriate mitigation measures which should be capable of being applied to all proposed run-of-river hydro schemes. We believe that the guidance will help to ensure that the hydro resource in Scotland is developed where appropriate and with effective mitigation for fish where required. The opening remarks and context set out in Part A are generally well balanced, and we welcome the useful comparison between hydro and on-shore wind turbine energy production.

As a key message for developers of hydro power schemes, we would like the guidance to underpin the principle that developers promoting, planning and implementing schemes should demonstrate no adverse impacts in fish or fisheries. The guidance should make clear that the onus lies clearly on developers to demonstrate no negative effect. Whilst this may be implicit in the detailed guidance,

it would be helpful to express this in the preamble to the guidance. It would also be helpful if DSFBs and Fishery Trusts were identified in the guidance as competent agencies to whom a developer would be directed to obtain information on fish and fisheries for any development within their respective areas.

We have a few specific queries relating to specific parts of the guidance:

1) Page 4 - paragraph in italics - *"and, where they can be shown to have no adverse impact on the water environment"*. We believe that there should be some statement demonstrating that the onus lies with the developer to show that no adverse impact will occur.

2) Page 4, first bullet *"Likely acceptable schemes include those: situated in degraded parts of the environment"*

By encouraging the development of schemes in degraded areas, how will this be reconciled with the objective to improve the status of degraded waterbodies in line with the water framework directive target of 'good' ecological status? May the promotion of development in these areas further hinder work to restore these waterbodies to 'good' status? We believe that there is a risk here that this sends a negative message and potentially sets a worrying precedent that could make progress in rehabilitating degraded waterbodies very difficult.

3) Page 4, last bullet *"using only that.....without breaching river flow standards"*
Are these standards contained in the regulations referred to in footnote 12 ? If so, it may be useful to state this.

4) Page 5 Ministerial statement – we would reiterate our point made at 1. above. We believe that there should be no acceptance that schemes may in some cases be justifiable, even if they do result in deterioration of the water environment. We strongly believe that the key principle in hydro development should be, at worst, no deterioration in the condition of the water environment.

5) Page 5, i – iii. We support the response of Ayrshire Rivers Trust to the consultation in respect of the risk based assessment of hydro production in relation to length of stream bed affected and status of that waterbody. This can only work effectively if the classification of the waterbody in question is correct and based on accurate information.

The consultation outlines the SEPA view on the level of production which may be acceptable for waters with "high" or "good" status but not for those with lower status. Again, to reiterate our earlier point, this may encourage development on waterbodies whose classification is lower than "good" status. Again, this would appear to be in contrast to the overarching aims of the WFD for watercourse restoration to "good" ecological status at least.

6) Page 6, Table 1 and footnote 8 – Whilst we support the tiered approach, we do not agree that waters not requiring restoration should be provisionally accepted

for proposed new hydro schemes. In our view this conflicts with the general aim of the WFD to restore waters to 'good' ecological status as we have referred to in point 2. We believe that at worst, the aim should be no deterioration.

7) Page 8, 1.1, bullet 2 It would be useful if the guidance could be more specific about what the term 'significantly reduced' means in relation to wetted area. It is also possible that, depending on the depth of the watercourse and the morphological features, that the wetted width of a channel could still be maintained, yet pose a risk to fish present.

8) Page 8, 1.1, bullet 3 & 4 'Fish passage upstream is not required'. It is important that the guidance takes account of potential removal of a downstream barrier thereby potentially creating fish passage issues in the future.

9) Page 9, 1.2 Protection of flow variability, Bullet 1 - The requirement to design variable hands-off flow mechanisms is good, and we would support this approach. In terms of bullet 2, we do feel that a fixed frequency regime for regulating abstraction is not necessarily the best for ecological considerations. Fish or invertebrates are unable to cope with rapid falls in water level and this is unlikely to have a positive effect on downstream ecology.

10) Page 10, 1.4 Protection of flows for upstream migration and spawning of fish. We welcome the provision to ensure mitigation provides attractive flow regimes for migrating fish. Whilst it is a laudable aim, we believe that migration triggers for fish can be complex, and flow volume may only be one element.

11) Page 11, line 6 – 'The river flow standards for good.... Insert – 'status' after 'good'

12) Page 11, 2. Impact of proposal on river continuity for fish Archimedes screw type turbines are not necessarily fish friendly, rather they are generally less damaging than other mechanisms. There may be some value in suggesting alternative designs, we are aware that there is an alternative design Archimedes screw which, due to the lack of a gap between the screw and the outer casing, does not trap fish.

13) Page 17/18 - lampreys there is the suggestion that lampreys will not be found upstream of waterfalls or large impoundments. This is certainly not the case locally as populations of lampreys have, for example, been detected upstream of Scottish & Southern Energy reservoirs. Based on the entry in the current draft, there is the risk that a developer/EIA provider looking at the advice may wrongly assume that lampreys are not present simply because they intend to develop upstream of a reservoir. Similarly, on page 17 the section on eels could be read to suggest that large impoundments are of themselves barriers to migration for eels whereas it is the case that eels do migrate through impoundments that incorporate fish passes.

14) Barriers – general It would be useful if the guidance could provide explanation as to what may or may not constitute a natural barrier to fish, and if so, how it can be demonstrated if it is. It is possible that the guidance as drafted could lead to the assertion by a landowner, developer or someone with a vested interest in a scheme that an obstacle is a complete barrier to migration.

I hope that you find these comments helpful.

Yours faithfully

Brian Davidson
ASFB/RAFTS



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29 April 2010

Dear Sirs

This is an Officer response to the consultation which has not yet been formally approved by the Council.

Officers broadly agree with and support the Scottish Renewables response to the consultation.

We welcome SEPA's offer of help for developers at the early stage in the planning of potential schemes and in assessing likely acceptability. We believe that SEPA officers should take a more active role in the process and be trained in the technical aspects of hydro schemes to provide a more informed view.

We would however like to make these additional observations.

There appears to us to be no logical reason for the arbitrary nature of the 100KW demarcation which discriminates against smaller schemes. Larger schemes by their very nature abstract larger volumes of water (given the same head) and should on that basis be subject to greater scrutiny. The feed-in-tariff introduced by the UK Government was designed to encourage micro-hydro generation below 100KW so why should the Scottish Government take a different view?

To suggest that alternative forms of renewable generation such as wind may be used as a comparison or as a substitute is not realistic

Scotland requires all forms of renewable generation if it is to meet its climate change targets, particularly given the intermittent nature of wind generation. This is exacerbated in winter when electricity demand is high.

During periods of high pressure in winter when wind generation is reduced hydro generation is generally stable and strong.

There are estimated to be over one thousand mill sites in Aberdeenshire, with over six hundred recorded on Aberdeenshire's archaeology database. These are sites where water power has been used in the past and where there is potential to generate in the future, especially where infrastructure is in place.

Generation below 100kW and below 50kW in particular will provide income for farms, estates and local communities. This provides local economic benefit, particularly to remote rural areas, helping them to become more sustainable communities, a factor which is increasingly important as Government funding to Local Authorities is reduced.

Larger schemes are generally managed by corporate organisations, with profits retained outwith the local area and in some cases abroad.

Mill lades can form an important habitat for flora and fauna. If these lades are allowed to become depleted and derelict, an important habitat can be lost. The length of lade should not be restricted arbitrarily if it has no adverse affect on the main water body, either singly or cumulatively.

A good example of a water body produced by a hydro scheme that enhances the local environment is the Loch of Skene in Aberdeenshire. This loch was created from a much smaller body of water when the Garlogie hydro scheme was built in 1923. This is now a designated RAMSAR site, a SSSI/ASSI and an SPA.

Yours sincerely

A handwritten signature in cursive script that reads "Eric Wells". The signature is written in dark ink and is positioned above a horizontal line.

Eric Wells
Renewable Energy Development Co-ordinator

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23rd April 2010

Dear Sir/Madam

Guidance for developers of run-of-river hydropower schemes

It should be stressed that the following comments do not necessarily reflect the views of all members of the Forum.

Tweed Forum welcomes this much needed guidance and congratulates SEPA on doing a very thorough job. One of the major threats posed by hydropower is to fish populations and it is quite clear that SEPA have sought and incorporated expert advice that understands the appropriate mitigation measures that developers can use, particularly for important migratory species.

However, we feel the main weakness concerns the presumption that developments are more acceptable in degraded parts of the water environment. Whilst on the face of it this is an entirely logical principle, we urge extreme caution in using the SEPA classification system to judge what is and what isn't degraded. Tweed Forum members have spent some time examining the status of water bodies on Tweed and it is clear that the classification may often be highly inaccurate, particularly with regards to morphological pressures.

We feel significant stretches of excellent, and extremely important, river habitat have been classified as poor or moderate for reasons that are either unclear, or erroneous. Even some of those bodies classified as heavily modified are questionable and could perhaps attain better status than just 'good ecological potential'.

Whilst we fully understand that the classification is work in progress and will be refined in time, we strongly urge consultation with bodies (particularly the likes of the local fisheries trusts, who generally have unsurpassed knowledge of the river system) in order to groundtruth and verify any degraded stretches that are subject to a hydro power proposal. This way we can avoid potential WFD 'own goals' i.e. the risk of inadvertently consenting a scheme on a water body that is actually of good ecological status and downgrading it. We accept that this factor is beyond the scope of this particular consultation per se, but feel it is worth mentioning if the guidance is to work effectively.

We would also urge SEPA and any other competent authority to ensure that the likely proliferation of run-of-river hydropower schemes is accompanied by an effective monitoring programme to ensure that any unforeseen adverse affects are detected quickly and addressed.

We trust these comments are useful and would like to emphasise that our overriding opinion is that the guidelines are extremely comprehensive and will be of great benefit.

Yours sincerely



Luke Comins
Director

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Bryan S. Chalmers *B.Sc. (Agric)*

Member of the Association of Independent Crop Consultants

Steven A. Mackison *B.Sc. (Agric)*

Member of the British Institute of Agricultural Consultants

James Begg *BLE (Hons.), Dip FRCM*

Member of the British Institute of Agricultural Consultants

advising agriculture



SEPA
Hydro Consultation
Water Policy Unit
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Erskine Court,
Castle Business Park,
Stirling,
FK9 4TR

29th April 2010

Dear Sir/Madam,

Response to the Guidance of Developers of Run-of-River Hydropower Schemes Consultation

Our firm is a small, rural based business which specialises in the provision of farm and estate management and consultancy advice to farmers, landowners, government bodies and institutions.

The firm has recently been heavily involved in appraising and advising on the potential for various renewable energy schemes, including micro and small scale hydro schemes, given the vast level of interest shown by landowners here in the north east of Scotland, but also throughout the rest of the country.

We have studied the consultation document, and whilst we generally agree with mitigation measures in part B of the document, we have some concerns with Part A, as described in the attached pages. As our business is primarily involved with sub 100kW schemes, we have restricted our detailed response to Part A of the consultation.

In summary, we support the stance of the responses of Highland Eco-Design Ltd in their response, and our key points are as follows:-

1. The implementation of an arbitrary 100 kW threshold appears biased against farm-scale systems and discourages the development of this clean, renewable resource close to energy demands.
2. No account appears to have been taken of the local, rural socio-economic benefits of the sub 100 kW sector.

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3. The guidance generally, and the 100 kW threshold in particular, does not encourage the optimal utilisation of Scotland's hydropower resource within the constraints laid out in the Water Framework Directive (WFD) legislation. As it stands it could result in a gross under-utilisation of this valuable resource.

The implementation of the guidance as-is could deprive the rural economy of Scotland of up to £24 million p.a. This revenue stream would be more likely to be recycled through the local community by farmers and landholders than the revenues from larger hydro developments. As a result we would urge the Scottish ministers to reconsider the implications of the arbitrary 100 kW threshold and instead consider a program of ongoing research and review into the effects of micro-hydro schemes.

The sub 100kW sector has considerable potential in rural Scotland to help the Scottish Government reach its Climate Change targets, and trust that this can be taken into account when considering the future potential of this sector and the rural economy in addition to the wider environment.

Yours faithfully,

A handwritten signature in cursive script, reading 'James Begg'.

James Begg

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m 07825 741991

Responses to SEPA consultation questions

Consultation questions

Part A criteria – sub-100 kilowatt schemes only

1. Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?

We agree that implementing the mitigation laid out in Part B will allow sub-100 kW schemes to be installed without posing a risk to the water environment.

However we would stress that we fundamentally disagree with the setting of an arbitrary power threshold.

2. Are there any other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?

If the mitigation measures in Part B are applied appropriately then individual schemes will not pose a risk to the water environment. The cumulative impact of small schemes can be easily managed using SEPA's existing GIS system and the criteria for managing this risk are embedded in the Water Framework Directive legislation.

There are likely to be many other instances where an abstraction above the rate required for good status will **not** result in a degradation of the water environment. Since individuals cannot afford to undertake such a wide ranging research program it is the responsibility of the Scottish Government to ensure that this avenue is explored. It would make sense to tie such a research program into the abstraction regulatory role of SEPA. However we acknowledge that SEPA's resources are limited and so are keen to explore ways in which the economic value of the schemes themselves can be used to facilitate the research into minimising their impact.

3. Do you find the format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.

The checklist is a useful and user friendly format for identifying provisionally acceptable sites.

It would be helpful to move the footnotes, notes and some of the bracketed examples to a look-up table to make them easier to read and interpret. SEPA should make it clear that the provisionally acceptable/unacceptable verdict is only a guideline and will be subject to site specific analysis and spatial tests.

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29th April 2010

GUIDANCE FOR DEVELOPERS OF RUN-OF-RIVER HYDROPOWER SCHEMES – CONSULTATION RESPONSE

Dear SEPA,

I am writing to provide a response to your consultation on the draft guidance for developers of run- of-river hydro schemes.

TLS Hydro Power are developers and operators of small hydropower schemes. We believe that hydropower can make an important contribution to meeting the country's targets for renewable energy generation without significant negative impacts on the environment.

We currently operate 5 schemes in Scotland (ranging between 100kW and 700kW) and we have several more at varying stages of development including a 900kW project which has just received its CAR licence. Therefore the proposals in this document have the potential to very greatly affect our core business. Due to the short timescale of the consultation we have not had a chance to review our entire portfolio of projects or to fully understand the extent that this will affect the small hydropower industry. However, in consultation with SEPA we have identified at least one project in our portfolio (Dalmigavie – for Further details refer to Richard Fyfe) which does not appear to be consentable under these new regulations.

The main point we wish to make in this consultation response is that we believe the flow standards used to assess hydro schemes should be urgently reviewed. This would achieve appropriate and environmentally sustainable use of Scotland's small hydropower resource without causing deteriorations in waterbody status which may have political implications in Europe.

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Secondary and important points we have are:

1. The document goes far further than ministerial statement

For projects of less than 100kW the statement acknowledges the value of small projects but says that the value is not significant enough to warrant a deterioration in the water environment. Although not specific, it appears that this refers to preventing deteriorations in water body status. The guidance goes further than this and does not allow a deterioration or any environmental impact. For projects greater than 100kW the implication of the statement (albeit very subjective) is that these projects are valuable enough to allow some deterioration. The SEPA guidance is far more stringent than the implications of the statement.

2. Policy rather than guidance

Although titled as guidance, the document is effectively a new policy on how SEPA will regulate new hydro. We believe that as such there should be a more in depth legislative process to bring in such an important change rather than implementing the new restrictions out of the blue.

3. No impact assessment

It does not appear that any impact assessment on these new policies has been done. We not yet fully understand the impact in terms of numbers or types of schemes affected however it appears that small schemes are likely to be at a significant disadvantage and that a large number of schemes may be affected. Policies which have the potential to make large impacts should be properly assessed prior to implementation.

4. The guidance appears to be driven by European politics than actual environmental protection

The document is designed around preventing reporting to Europe downgradings in water body status in order to prevent embarrassment. This is not a good reason to significantly impact a valuable industry which has an important role to play in reducing Scotland's actual environmental impact. We welcome the mitigation measures which we feel will help protect Scotland's actual aquatic environments.

5. Use of other environmental option is not appropriate

For various reasons it is not appropriate to use other renewable technologies as an alternative solution to an individual project: until we have met our targets for renewable generation all projects of all technologies are needed; other technologies also have environmental impacts; other technologies are not available options for individual landowners or developers.

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This is analogous to the 'sequential approach' which has been rejected from Scottish Planning Policy.

6. Definition of efficiency is not appropriate

We disagree with the definition of 'efficiency' as energy generated per unit length as this does not take into account the size of the watercourse or indeed the environmental value of the watercourse. More appropriate would be energy generated per unit of mean flow in the watercourse per unit length; or per square metre of aquatic habitat affected by the scheme.

7. The values set are very high

If SEPA is intent on using this definition of efficiency, there is very little rationale behind the 1.75GWh limit set. For a high status waterbody the limit is so high as to be very rarely achieved. For good status waterbodies it is likely to be more achievable however it appears that smaller schemes would be penalised and we have an example in our current portfolio of projects under development which would fail the test.

8. There is no need to set the 500kW limit

The 1.75GWh limit set, already discriminates against small schemes. If a scheme of <500kW did meet that limit for its annual output it would seem illogical to exclude it on the grounds of its rated capacity. Furthermore, the use of one European country as an anecdotal example does not appear to be sufficient grounds to exclude smaller schemes.

9. Inbuilt protection against inefficient schemes

There is inherent protection against less 'efficient' schemes because schemes which are built on less steep watercourses (and indeed schemes with lower rated outputs) are more expensive to build per unit of energy produced. Thus there is a large amount of self regulation against a proliferation of 'inefficient schemes'.

We therefore oppose the application of acceptability criteria to schemes above 100kW.

10. We welcome the publication of the mitigation guidelines

We hope these will ensure that the environment is suitably protected when new hydropower schemes are implemented and ensure that a consistent approach is applied across the country.

Further to these we have provided a more detailed response to the document as a whole.

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We trust that you will take these comments into account and would be very happy to provide further feedback on any detailed issues. If you have any comments please get in touch.

Yours faithfully,

Nick Bard
Development Manager

Cc: Sue Kearns – Scottish Government
Joyce Carr – Scottish Government

Flow Standards

Neither the ministerial statement nor the draft guidance makes any differentiation between deterioration of actual aquatic habitats and deterioration of water body status. It appears that the ministerial statement and Part A of the guidance are aimed at preventing deteriorations in water body status in order to reduce the number of derogations which require to be reported to Europe. Conversely Part B of the guidance is aimed at actually protecting the aquatic habitats of Scotland from damage by small hydropower schemes.

We therefore strongly support the principles of and the vast majority of the detail in Part B. However we support neither the principle, nor the proposed details of limiting the development of hydropower schemes according to their output. We believe that each scheme should be judged on its merits and actual impacts on the environment – not on artificially set limits which cause political discomfort in Europe.

The main reason why there is such a large discrepancy between waterbody status and actual environmental protection is the flow standards set by UKTAG. These have been arbitrarily set at a level which means that all hydro schemes, regardless of the mitigation measures they propose, will fail the test. This often causes a deterioration in water body status, resulting in the need for a time consuming, complicated and costly derogation to allow a licence to be issued. The differing flow standards may be a reason why different European countries have different policies on supporting small hydropower.

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We therefore suggest that a more appropriate solution to the problem of potentially large numbers of water bodies suffering deteriorations in status would be to **REVIEW THE FLOW STANDARDS SET BY UKTAG**. We suggest that this should be done urgently and preferably backed up by research from existing hydro schemes. We suggest that broadly, the acceptable flows outlined in Part B of the guidance do prevent actual deterioration of aquatic habitats when hydro schemes are constructed and thus may offer a basis on which to build new standards.

Part A – Sub 100kW

Q1. We do agree that with the mitigation of Part B the majority of schemes should be consentable regardless of their rating

Q2. If the flow standards were changed, many more schemes could be implemented without causing downgrading of water body status.

Q3. When trialled on two different projects, the checklist was found to be very user friendly and gave a clear answer. However it does seem rather complicated and it is difficult to clearly understand what the criteria for eligibility actually are.

Part A – 100kW+

Furthermore guidance to help identify which schemes would cause a deterioration in environmental status would be useful.

Clarification is needed on two points:

- Talking to Richard Fyfe, it appears that the efficiency value is to be calculated per length of classified waterbody affected rather than per length of deprived reach. This needs to be more clearly stated.
- The three criteria on page need to have an 'or' between each one

Q4. We disagree with the definition of 'efficiency' as energy generated per unit length as this does not take into account the size of the watercourse or indeed the environmental value of the watercourse. More appropriate would be energy generated per mean flow per length; or per square metre of aquatic habitat affected by the scheme.

With the definition of 'efficiency' as used we feel that the value of 1.75 GWh is far too high and would prevent good schemes, which genuinely make a significant contribution whilst having a minimal impact, from going ahead.

Part B – Mitigation

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TLS Hydro Power Ltd

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Edinburgh EH3 9HP

General - The guidance is explicitly aimed at run-of-river schemes and no mention of storage schemes is made. Some clarification of where storage schemes fit in would be useful.

Q5. We agree that these measures will minimise adverse impacts of schemes on the water environment

Q6. In general, yes. Some comments on the detail are given below

Q7. We do not have suggestions at this point for other measures however we would like to point out that in line with the minister's aim of optimising use of the resource, SEPA should aim to encourage schemes which generate the maximum amount of energy from a given site whilst protecting the aquatic environment. The complicated system proposed would not necessarily do this. For example, at our Dalmigavie site (just over 500kW) we do not meet the 1.75GWh criteria, therefore we are considering the use of a smaller scheme with a deprived reach of less than 1,500m and much lower capacity in order to fit in with the guidelines. It appears nonsensical not to develop the site to its full potential.

We support the majority of the mitigation measures. We do however have comments on the following points:

1.1

- Through Pipes - This section appears to be addressing the actual flow only. The comment on delivery method would be better off placed in the section on weir design
- The reason behind having an increased HOF for catchments $<10\text{km}^2$ is not clear. This appears to be a severe measure that would significantly negatively impact energy generation from some of the most environmentally benign projects (small and steep watercourses). For example increasing the HOF from Q95 to Q90 results in a drop in annual output of 6% for a scheme with a catchment of approx 10km^2 using LowFlows2000 FDC

1.2

Scheduled Shutdowns - The document is unclear as to what requirements might be. A scheduled shut down of 6 hours per week would reduce the annual output of a scheme by 3.5%. This is a significant loss of generation for unclear benefit. During dry spells the turbines do not abstract water at all. It appears that the method of increasing hands off flow with increasing total flow would be much more effective.

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1.3 We welcome these proposals although it is unclear why there are different limits for sub 100kW projects and how the site characteristics would affect the 1.3 - 1.5 value. Use of 1.5 times the mean flow corresponds (generally) with our design methodology.

1.4 We agree with the principle of these proposals. It is difficult to be prescriptive given the site specific nature of this issue and it may be best to deal with this on a case by case basis.

2.1A

- It may not always be possible to abstract at 90 degrees to the flow direction although this is preferred
- The way Coanda screens function, they cannot keep the entire face wetted at all times.

2.1D

Due to the high exit velocities (with reaction turbines – i.e Francis turbines) and vertical drops (impulse turbines) it is very rare that fish can enter any turbine from downstream. Therefore screening provisions should be dependent on issues of upstream migration and fish stranding in the tailrace only. Furthermore the bar spacings specified (10mm and 25mm) are more arduous than standard spacings that have been proven to be effective in the past (12.5mm and 40mm).

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29th April 2010

e-mail: hydro.consultation@sepa.org.uk

Dear Water Policy Unit,

CONSULTATION ON THE SEPA GUIDANCE FOR DEVELOPERS OF RUN-OF-RIVER HYDROPOWER SCHEMES

I am responding on behalf of the British Hydropower Association (BHA) to the consultation on the SEPA guidance for developers of run-of-river hydropower schemes.

The BHA is the trade association for the UK hydropower industry. With around 150 members, the Association represents a wide range of interests: consulting engineering, design, manufacture, investment and operation, and specialist service providers. The BHA represents generators from small owner-operators to large UK and international companies.

The BHA believes that charging is generally a good thing as it demonstrates the seriousness of potential developers. However, it is unlikely that SEPA and general legislation would be changed to exclude advertising - If anything the need to advertise will increase. It is important that abstraction and impoundment are both considered. Perhaps SEPA would consider more generally impoundment as "effective impoundment" i.e. even where the weir is greater than 1m, it is effectively less than 1m when considering the burn as a whole. Fees should be reduced where multiple intakes in close proximity to the main burn do not add a significant additional burden to SEPA resources. The subsistence charging regime should not be changed; subsistence charges can be changed much more easily in the future than introducing charges.

We believe that real impact of SEPA's proposed efficiency criteria would be to limit hydro development potential of Scotland and the impact of the efficiency measures they propose is to unfairly discriminated against hydro development when compared to other renewable developers.

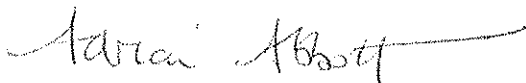
The BHA is concerned that by taking the line that until the guidance is finalised, the draft will be applied when it is carrying out its regulatory functions under the Water Environment (Controlled Activities)(Scotland) Regulations 2005, it could be construed that SEPA was not taking the consultation seriously. The Association's responses to the consultation questions are attached.

The Association believes that the 1.75 GWh per annum per 500 m threshold on high status rivers is a strict limit that very few of the schemes currently operating would pass. We believe that the limit, based on a calculation that only considers two points of a complex system based on an arbitrary number for a notional wind turbine, would effectively create no-go zones on high status rivers because very little or more likely no development would take place.

Proposal on sub-100 kilowatt schemes

The BHA proposes a short pilot study on two representative water bodies (as per the examples set out below in the response to question 1) is undertaken to assess SEPA's proposed methodology to ensure that it effectively encourages the efficient use of the water resource – a requirement under the WFD - and if necessary to point the way to a better, fairer and more robust methodology. Our reasoning for the short pilot study is in our response to the consultation questions.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Adrian Abbott', with a long horizontal flourish extending to the right.

Adrian Abbott
Policy & Consultations Manager

British Hydropower Association's responses to the Consultation Questions

Part A criteria - sub-100 kilwatt schemes

1. Taking account of the mitigation described in Part B, do you agree that sub-100KW schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?

By the use of Q90 or Q95, depending on site-specific factors, hands off flow is acceptable. Varying the flow downstream of the point of abstraction such that the depleted reach flow increases to Qn80 when the flow upstream of the point of abstraction reaches Qn30 would appear sensible but it may be difficult to achieve in practice however and would be very difficult to verify.

Shutting a scheme down for an agreed period, to provide freshets to the depleted reach, would be easier to manage and would be beyond dispute. A variation might be added such that if Qn exceeds Qn20 at the agreed time/date then the river can be considered to be seeing a freshet naturally and as such no shut down would be required.

Setting maximum abstraction at 1.3 to 1.5 times the average daily flow is acceptable.

The BHA questions whether increasing flows to Qn10 will actually enable fish to ascend the watercourse. We fully accept that the increased flows will trigger the impulse to migrate but would suggest that that trigger will occur regardless of whether the flows are delivered via the watercourse or a combination of the watercourse and hydro facility. It is reported that fish can often not make progress against high flows and need to wait for the receding limb of a spate before progress can be made.

SEPA's proposed approach raises two questions:

- Will the 100kW threshold result in the optimum use of Scotland's water resources?

- What mechanism will be implemented for schemes of capacity 100kW to 500kW to ensure the optimum use of Scotland's water resources?

As set forward, SEPA's guidance will **not** promote the most efficient use of Scotland's water bodies and could lead to the under utilisation of the resource in lowland agricultural areas (the areas where it would have a proportionately larger benefit on the local economy). Under the Water Framework Directive a waterbody with "good" status can have up to 15% of its length failing the "good" standard and tributaries draining up to 25% of its catchment can be "significantly impacted" (i.e. also fail the "good" standard) but still retain its status. The following examples of two hypothetical water bodies, both with "good" environmental status illustrate this:

Example A: a small river draining a small, mountainous area of the west-coast

There water body has a good grid-line, a road running right down the middle of the main valley and the tributaries are relatively steep. Only the main stem of the river is on a shallow gradient. Assume every part of this river is suitable for a hydro scheme. Applying SEPA's 100kW threshold and gradient rules would probably knock out a few schemes on the main stem of the river and on some of the shallower tributaries. In this respect the guidance works: by disallowing development on the shallower sections the threshold encourages extra capacity on the steeper sections and tributaries.

However, if the schemes that "pass" SEPA's guidance total more than 25% of the catchment and/or 15% of the main stem length, the threshold does nothing to ensure that the maximum capacity is extracted from the water body while maintaining "good" status. In fact it is conceivable that a few 105kW schemes, if they went in first, could prevent a similar number of 490kW schemes from being developed, reducing the overall generation benefit.

Example B: a small river draining a larger, lowland area of the east coast.

This water body also has grid and road access but has a low gradient, a number of old weirs and its tributaries are also fairly low-gradient. Only some parts of this river system will be suitable for hydro schemes. At a couple of the weirs on the main stem of the river there are >100kW sites but the majority of potential sites are <100kW. In this case applying SEPA's threshold and criteria could easily rule out 80-90% of the schemes in the area. The cumulative impact would be that the few schemes >100kW are unlikely to be approaching the carrying capacity of the river (15% length and 25% catchment).

There is a bias against the local economy if the larger schemes are developed because they tend to be developed by larger developers with the result that much of the financial benefit associated with the resource is siphoned off to remote shareholders. Smaller schemes tend to be developed by the landowners themselves and the profits are directly recycled into the local economy through improved business viability, etc.

Proposal

The BHA proposes a short pilot study on two representative water bodies (as per the examples above) is undertaken to assess SEPA's proposed methodology to ensure that it effectively encourages the efficient use of the water resource – a requirement under the WFD and if necessary to point the way to a better, fairer and more robust methodology.

2. Are there other circumstances under which you think sub-100kW schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?

Sub-100kW schemes developed on weir installations should pose no risk to the water environment. However, in general the Part B provisions on intake and tail race design, orientation and intake and tail race screening, the provisions on fish passage and on sediment seem very onerous. Many schemes already operate without applying all of these recommendations and without any sign of damage to the water environment.

3. Do you find the checklist format for setting out the criteria for identifying provisionally acceptable sub-100kW schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.

The BHA agrees that checklists are useful. The number of elements makes it complex.

Part A criteria - 100 kilowatt + schemes

4. Do you agree that the draft criteria on the efficiency of schemes of 100kW or more (in terms of energy output per length of river or stream affected) will help:

- deliver Scottish Ministers' objective of optimising the use of the resource;*
- ensure deterioration of status is not caused where there are significantly better environmental options for generating the same quantity of renewable energy?*

The BHA believes that Scottish Ministers' statement should not be interpreted in this way. The Ministers statement says that SEPA guidance will be *to facilitate the appropriate siting and authorisation of sub 100 kW schemes*. It refers to *optimising the potential for hydropower generation whilst minimising any adverse impacts on the water environment* not, the resource as interpreted by SEPA and reflected through their proposed 'efficiency' criteria to optimise the use of the resource of a specific site.

There is no reference to the Water Framework Directive (WFD). The WFD criteria requires 'better options' to be technically feasible and not disproportionately expensive. SEPA's proposed 'efficiency' criteria does not take into account the technical feasibility and economic viability of alternatives

SEPA, and ministers, need to consider all the potential impacts of all technologies. We concede that an argument can be made about the smallest schemes, we believe that the threshold is too high, 50kW or less would seem to be more appropriate. The guidance cites a 500kW wind farm as being a 'significantly better alternative' this is not a valid comparator, technologies should not be compared in this way; a 500kW wind turbine, of current design, will deliver 1,095MWh a year and will have an operational life of about 20 years delivering about 21,900 MWh. A 500kW run-of-river small hydro will deliver 1,883.4MWh and have an operational life of 50 years. Over the course of its operational lifetime the hydro project will typically deliver 94,170MWh. Data issued by the Department of Energy and Climate Change show that the energy return over investment in a small hydro project is far in excess of the energy return from a wind farm.

In addition to the energy output SEPA and ministers' should consider the carbon input required to replace the wind farm after its operational life in the total carbon footprint of that scheme. Hydropower is one of best options for generating energy; it is one of the most efficient and benign method available.

The SEPA definition of an efficient hydro does not take into consideration other relevant factors that contribute to the efficiency of a scheme. It cannot simply be equated by a basic generating capacity figure per metre. Other factors include:

- Landownership and water rights;
- Environmental constraints;
- Available grid capacity;
- Technical feasibility;
- Load factors
- Topography and ground conditions of pipe route, intake & powerhouse locations;
- Supply chain; and
- Other water users.

The efficiency of a hydro scheme should be measured against how the available hydrological resource combined with the specific restrictions of the individual scheme.

Part B mitigation measures

5. Do you agree that the mitigation identified will help achieve Scottish Ministers' objective of minimising the adverse impacts of hydropower scheme developments on the water environment?

The BHA believes that in general the mitigation identified has the potential to help achieve Scottish Ministers' objective of minimising the adverse impacts of hydropower scheme developments on the water environment. The requirement on bar spacing for screening is too stringent. A bar spacing of 12.5mm is used on the majority of hydro schemes in Scotland and has been found to be effective where it is not practicable to use COANDA screens.

6. Do you agree that, in general, the mitigation identified is likely to be practicable? If not, please give your reasons for this view.

The BHA believes that the mitigation proposed is not practicable. The cost of employing all of these measures would often be disproportionate and physical space constraints would make it impractical to apply. This especially applies to provisions on the orientation of intakes. In particular:

- Flow variability is very expensive and difficult to engineer for low head sites.
- 10mm intake screening is extremely impractical where abstraction rates for low head schemes.

- There will be a significant number of old mill sites with existing barriers but no practical opportunity (due to space restrictions for example) to install upstream fish passage.
- Physical site restrictions will often make it impossible or impractical to comply with the requirements on intake and tail race orientation etc.
- Only the largest and most profitable schemes could contemplate compliance with the very onerous sediment provisions.

7. Do you think that there other practicable measures that you think could be taken to achieve an equivalent or greater level of mitigation? If yes, please describe the mitigation and your reasons for believing that it would be practicable and effective in minimising adverse impacts on the water environment?

No.

T.C. Findlay & Son

SEPA
Hydro Consultation
Water Policy Unit
SEPA Corporate Office,
Erskine Court,
Castle Business Park,
Stirling,
FK9 4TR

29 April 2010

Dear Sir/Madam,

Response to the Guidance of Developers of Run-of-River Hydropower Schemes Consultation

We have studied the consultation document, and whilst we generally agree with mitigation measures in part B of the document, we have some concerns with Part A, as described in the below. As our business is primarily involved in agriculture, with potential future interest in sub 100kW schemes, we have restricted our detailed response to Part A of the consultation.

In summary, we support the stance of the responses of Allathan Associates and Highland Eco-Design Ltd in their response, and our key points are as follows:-

1. The implementation of an arbitrary 100 kW threshold appears biased against farm-scale systems and discourages the development of this clean, renewable resource close to energy demands.
2. No account appears to have been taken of the local, rural socio-economic benefits of the sub 100 kW sector.
3. The guidance generally, and the 100 kW threshold in particular, does not encourage the optimal utilisation of Scotland's hydropower resource within the constraints laid out in the Water Framework Directive (WFD) legislation. As it stands it could result in a gross under-utilisation of this valuable resource.

The implementation of the guidance as-is could deprive the rural economy of Scotland of up to £24 million p.a. This revenue stream would be more likely to be recycled through the local community by farmers and landholders than the revenues from larger hydro developments.

As a result we would urge the Scottish ministers to reconsider the implications of the arbitrary 100 kW threshold and instead consider a program of ongoing research and review into the effects of micro-hydro schemes.

The sub 100kW sector has considerable potential in rural Scotland to help the Scottish Government reach its Climate Change targets, and trust that this can be taken into account when considering the future potential of this sector and the rural economy in addition to the wider environment.

Yours faithfully,

A handwritten signature in cursive script, appearing to read 'James Bezz'.

as authorised agent
for T.C. Findlay & Son

Responses to SEPA consultation questions

Consultation questions

Part A criteria – sub-100 kilowatt schemes only

1. Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?

We agree that implementing the mitigation laid out in Part B will allow sub-100 kW schemes to be installed without posing a risk to the water environment.

However we would stress that we fundamentally disagree with the setting of an arbitrary power threshold.

2. Are there any other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?

If the mitigation measures in Part B are applied appropriately then individual schemes will not pose a risk to the water environment. The cumulative impact of small schemes can be easily managed using SEPA's existing GIS system and the criteria for managing this risk are embedded in the Water Framework Directive legislation.

There are likely to be many other instances where an abstraction above the rate required for good status will **not** result in a degradation of the water environment. Since individuals cannot afford to undertake such a wide ranging research program it is the responsibility of the Scottish Government to ensure that this avenue is explored. It would make sense to tie such a research program into the abstraction regulatory role of SEPA. However we acknowledge that SEPA's resources are limited and so are keen to explore ways in which the economic value of the schemes themselves can be used to facilitate the research into minimising their impact.

3. Do you find the format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.

The checklist is a useful and user friendly format for identifying provisionally acceptable sites.

It would be helpful to move the footnotes, notes and some of the bracketed examples to a look-up table to make them easier to read and interpret. SEPA should make it clear that the provisionally acceptable/unacceptable verdict is only a guideline and will be subject to site specific analysis and spatial tests.

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29 April 2010

Dear Sir or Madam,

Guidance for developers or run-of-river hydropower schemes – public consultation

With reference to your "*Guidance for developers or run-of-river hydropower schemes – public consultation – Draft for public consultation*" document dated 3 March 2010, we will refer to this henceforth as the "Draft Guidance", in respect of which we would make the following response.

We commend the efforts of SEPA to consult with industry and facilitate discussion and welcome the opportunity to take part in this consultation.

In respect of the Draft Guidance, however, GreenPower strongly objects to the document as it stands. In the remainder of this letter, we highlight our key concerns.

General comments

In the Draft Guidance, it was expected that SEPA would try to provide a framework by which the acceptability of run-of-river schemes may be assessed. The Draft Guidance also seeks to set out the mitigation SEPA expects to be incorporated into any run-of-river hydropower scheme development. However, we consider that the approach taken is flawed in the following respects.

- Whilst the industry was expecting the Draft Guidance to provide a framework by which the acceptability of run-of-river schemes, from the SEPA standpoint, may be assessed, it instead appears that SEPA has sought to draft a template for decision making.
- On Page 2 the pre-amble describing Part B of the document talks of "*. . . all hydropower schemes likely to have an adverse impact on the water environment*" – it could be argued that all hydropower schemes (indeed all renewable generation schemes) inevitably entail some adverse environmental impact. We should not, in any form of renewable energy development, be seeking that there are no adverse impacts nor even that there are no significant adverse impacts. A more pertinent criterion would be whether, following such mitigation as may be appropriate, there is any residual significant adverse impact that is deemed unacceptable. This would be an approach consistent with the EIA regulations¹.

¹ The Environmental Impact Assessment (Scotland) Regulations 1999;
<http://www.scotland.gov.uk/library2/doc04/eia-00.htm>

- Many of the criteria that SEPA seek to apply in the Draft Guidance are subjective and in some cases appear quite arbitrary. For example:
 - On Page 6 the “*Tiered approach*” suggests certain generation capacity thresholds at 100 kW and 500kW. From the point of view of assessing the acceptability of a proposed hydropower scheme, such capacity thresholds are arbitrary and unhelpful. SEPA’s approach should assess the impacts on the water environment on a case-by-case basis and should not penalise smaller schemes on the basis of generation capacity.
 - The mitigation section suggests the adoption of a number of arbitrary physical criteria, for example, in relation to slope, catchment area and distance between intake and tailrace.
 - SEPA will “. . . assess whether any adverse impacts caused by schemes . . . are justifiable in terms of costs and benefits” and cites the SEPA “*regulatory method*”. In the corresponding “WAT-SG-67: *Assessing the Significance of Impacts - Social, Economic, Environmental*” document, SEPA appears to adopt the position of arbiter in respect of economic/social criteria in which it is clearly not expert. The reference to a suite of other SEPA documents clouds the issue and begs a question as to what the purpose of the Draft Guidance is, in the context of existing “*regulatory method*”.

In respect of assessment of impacts, we would expect that, in line with EIA regulations¹, SEPA would develop a set of scientific criteria against which impacts can be assessed. The “decision tree” approach that is suggested in the Draft Guidance appears (i.e. the checklists in the mitigation section) to offer a simplistic approach but one which fails to assess impacts against objective criteria. Hydropower projects are specifically designed for a particular water environment and are not generalised “off the peg” products. Each must be assessed on its own merits and ought to be supported except where there is any residual significant adverse impact that is deemed unacceptable.

In addition, the line of questioning in the check list for sub-100kW schemes presented suggests a negative attitude towards hydropower in general. This is implied by the priority of questions, which seems to suggest that SEPA would like these schemes firstly only on degraded parts of the water environment, if not possible, then only in small, steep rivers and streams, if not possible, then only if net benefits are delivered to the ecological quality of the water environment. This is subjective and in direct contrast with the policies of the Scottish Government to encourage hydropower.

Alternatives

On Page 6 the “*Tiered approach*” suggests that other options for producing energy should be taken into account.

This seems to set SEPA in a role in which it attempts to arbitrate among different renewable energy sources, whereas it ought instead to be pragmatically assessing water resource impacts, mindful of the objective of the Scottish Ministers’ Policy Statement:

*"In order to optimise the potential for hydropower generation emphasis will be placed on supporting hydropower developments . . ."*²

Indeed, even a consenting authority, such as a local planning authority or the Scottish Government, would not arbitrate in this way. It would seem to run contrary to all current energy and climate change directives that a hydropower project, for example, were to be refused consent because there happened to be an adjacent wind farm. This might be a healthy and helpful discrimination between a renewable generation scheme and a fossil-fired alternative, but not if it were applied between two renewable energy schemes.

Low flow

On Page 8 mitigation is suggested:

- Mitigation is suggested which should avoid the development causing "*the wetted width of the channel to be significantly reduced*".

The reduction of the wetted area downstream of a hydropower scheme intake will no doubt be a factor in the assessment of its impacts. However, the Draft Guidance does not define how the impact is assessed so that any residual significant adverse impact, that may be deemed unacceptable, can be identified.

Conclusions

Thank you for the opportunity to express our view in respect of your Draft Guidance.

SEPA has failed, in its Draft Guidance, to demonstrate an approach that is supportive of hydropower development in line with the objective of the Scottish Ministers' Policy Statement. The hydropower industry, we consider, should be able to rely on that support being given after objective assessment of impacts, except in cases where there is shown to be residual significant adverse impact that is unacceptable.

SEPA appears to be adopting a wide ranging role, in providing a licence under the Controlled Activities (Scotland) Regulations 2005 (CAR), akin to the role of a planning authority. We consider that this approach is misguided and strays far beyond what is appropriate for SEPA in its role under the direction of the Scottish Government. For other renewable generation technologies the wider impacts of a proposed scheme (eg socio-economics, interests of stakeholder groups etc) are satisfactorily addressed by the planning authority (local authority or Scottish Ministers) in the appropriate consenting process. SEPA appears to be seeking to establish de facto consenting powers and is assessing issues that are more appropriately dealt with in the proper planning process. SEPA seems intent on applying an additional and unnecessary layer of regulation in matters beyond its core area of expertise.

Yours sincerely

John Morgan

For and on behalf of GreenPower (Developments) Ltd

² Balancing the benefits of renewables generation and protection of the water environment
<http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Energy-sources/19185/17851-1/HydroPolicy>

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Response to SEPA Consultation on Guidance for Developers of Run of River Hydropower Schemes.

From Mary Turner, Kintyre Energy Trust (A Community Group which Promotes and Develops Renewable Energy). 29th April 2010

Part A criteria – sub-100kW schemes

General:

Particular concerns regarding the current proposals are:

1. There is an assumption that all hydro schemes will cause deterioration – this has never as far as we are aware been quantified as there are very few sub 100kw schemes in Scotland. No data has been collected to support this stance.
2. The guidelines for very small schemes such as 5-10kw schemes, are identical to those for 50-100kw schemes. This appears to be very disproportionate and will greatly disadvantage very small schemes for which the pre-development costs due to over regulation will be uneconomic.

The guidance states “Likely acceptable schemes include those:

- situated in degraded parts of the water environment;
- 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.”

These schemes should be consented through a simplified application process which should be a formality provided applicants agree to adhere to best practice. Small schemes should not have to go through the massively expensive, time consuming and prohibitive process that is currently in place.

There is currently a window of opportunity for SEPA to promote and encourage micro-hydro schemes. The benefits of more micro-hydro schemes would be many.

Local micro hydro schemes promoted by farmers and landowners raise the profile of renewable energy and climate change in the community, create employment in rural areas during the construction phase, then during subsequent maintenance, and provide reliable renewable energy for rural businesses thereby helping rural businesses to be sustainable. An advantage for the government is that private money will be invested into renewable energy for the benefit of climate change, renewable energy targets, and the local economy. All this can be provided for very little environmental impact and in some cases the environmental impact could be positive.

There are many examples of small businesses that would be more sustainable with small hydro power. For example those who produce local vegetables and herbs could do so all year round if they could use hydro- power. The UK's biggest herb producer currently imports herbs in winter but could produce herbs all year if the glass houses could be heated with hydro- power in winter – wind power and solar energy would not be reliable enough but a sub 100kw hydro scheme would be ideal. Community groups could benefit enormously from micro hydro schemes because grant funding is accessible to communities for viable schemes. The benefits are enormous. These include community cohesion, community capacity building, funding injected into rural communities for sustainable renewable energy projects, which in turn provide revitalizing economic benefits and a reliable source of funding for local voluntary groups.

The expenditure of so much time, effort and money envisaged by these proposals in order to be sure of mitigating against the possibility of the very small amount of degradation that a very small hydro scheme might cause is disproportionate and not good use of SEPA's time. Lack of resources will ensure that few hydro schemes are ever consented.

Unless the current license application process is much more streamlined and made less of an obstacle course very few hydro schemes will get off the ground and opportunities will be lost, perhaps forever. It will be a sad reflection on SEPA if in 20 years time we look back and say that if only they had promoted rather than stifled hydro schemes, we would all have been so much better able to withstand the impacts of climate change!

1. Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?

I agree that those identified as acceptable under these criteria are unlikely to cause deterioration of the environment. I also believe that the criteria are too stringent for all sub-100kw schemes, would be disproportionate for most schemes and could be

relaxed in many cases without causing deterioration. The socio economic benefits in most cases would outweigh a very small risk of deterioration. Small community and rural schemes have been shown to provide many benefits such as allowing local reduction of non renewable energy use, local food production, heating of village halls, helping to fund community groups. There should therefore be more of a balance between slight risks to the environment and the considerable benefits that can accrue from small hydro schemes. The scale of the problems and the magnitude of the threat of climate change facing us all make the proposed very prescriptive regulation of small hydro schemes seem excessive and inappropriate!

2. Are there other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?

The guidance in Annex A is far too prescriptive and specific, and if implemented will make most sub-100kW hydro schemes impossible to achieve. The statement in Annex A p21 that it is expected to be rare that significant social or environmental benefits would allow schemes to progress is simply not true and is based on speculation and not based on fact. There are many examples in England and Wales, (where the Environment Agency has a more positive approach to economic development and a less prescriptive approach to small hydro-power than is currently the case in Scotland), where the significant benefits of small hydro schemes are proven. Micro hydro schemes in Scotland are currently few and far between because they are extremely difficult to achieve due to over regulation and a hugely difficult license application process, which deters most would-be micro hydro scheme developers.

3. Do you find the checklist format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.

The Environment Agency's check list is better, more straightforward and clearer. Why not copy it rather than embellish it? More practical information regarding existing weirs and impoundments would be helpful.

Part A criteria -100 kilowatt + schemes

General:

The environmental impacts are obviously likely to be greater but technology and

sophisticated design has done much to increase the range of engineering solutions that can be used for larger hydro schemes. There should therefore be a more flexible attitude on the part of the regulator so that developers can work round the environmental impacts rather than have to pass a series of rigid tests and risk having spent money on development in order for the project to fail at one of the stages in the questionnaire.

4. Do you agree that the draft criteria on the efficiency of schemes of 100 kilowatts or more (in terms of energy output per length of river or stream affected) will help:

- **deliver Scottish Ministers' objective of optimising the use of the resource;**
- **ensure deterioration of status is not caused where there are significantly better environmental options for generating the same quantity of renewable energy?**

No, this will not optimise use of the resource as hoped by the Scottish Ministers, as the concept is basically totally flawed. It is too simplistic. Other measures could be used to make a specific location work such as technical solutions and increasing hands-off flow. It is not really relevant to consider whether other forms of renewable energy would be better in terms of generating the same quantity of renewable energy – all forms of renewable energy generation should be encouraged and in any case they tend to be complementary not substitutional.

Part B Mitigation Measures

5. Do you agree that the mitigation identified will help achieve Scottish Ministers' objectives on minimising the adverse impacts of hydropower scheme developments on the freshwater environment?

Yes, but at the expense of most of the potential hydro schemes in Scotland! This would severely limit the ability of hydro schemes to contribute to economic development and the renewable energy targets set by Scottish Ministers. A generation of renewable energy opportunities will be lost due to over zealous and draconian regulation! Decisions as to whether alternative technologies might be more appropriate should not form part of the hydropower licensing decision making process. These technologies are not a substitute for hydro -power as they have different characteristics whereby power is optimized in different weather conditions. Therefore these technologies should be additional and complimentary to hydro- power.

6. Do you agree that, in general the mitigation is likely to be practicable? If not please give your reasons for this view.

No, this cannot work! If this is implemented it will make most schemes financially

unviable. If schemes are unviable, funding is not available from the banks and therefore no community schemes and very few private schemes will go ahead. There will be a generation of lost opportunity due to over-regulation.

7. Do you think that there are other practicable measures that you think could be taken to achieve an equivalent or greater level of mitigation? If yes, please describe the mitigation and your reasons for believing that it would be practicable and effective in minimising adverse impacts on the water environment?

Yes, modern technology provides for flow monitoring and control. There are a number of well tried and tested methods available. This technology is reliable and not expensive and could be used to maximize power when flows are higher whilst providing increased and reliable mitigation when flows are lower.

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Paterson, Kevin

From: Lochaber Fisheries Trust [lochaberfisheriestrust@gmail.com]
Sent: 30 April 2010 08:35
To: Hydro Consultation
Subject: SEPA guidance for developers of run of river hydropower schemes
Follow Up Flag: Follow up
Flag Status: Completed

Thank you for the opportunity to comment on SEPAs guidance for developers run of river hydropower schemes. In general we welcome the production of this guidance as there is a clear need to provide clarity for developers on acceptable schemes and the mitigation measures necessary. We are also pleased that the cumulative impact of hydro schemes is repeatedly mentioned as we feel this has been neglected to date.

WFD classifications of waterbodies are repeatedly referred to in the guidance in relation to which schemes are acceptable and the mitigation required. There are some anomalies in the current classification and certainly the assessment of fish populations could be improved in some areas. We hope that in applying the guidance SEPA will be willing to re-examine classifications if there is justification for this.

We are concerned that schemes in degraded parts of the water environment and small steep schemes would be deemed acceptable. Under the WFD there is a duty to improve degraded habitats and this could be undermined if these areas are seen as open to developments. The lower reaches of small steep streams can provide important spawning habitat for sea trout and although the area in each burn may be small, cumulatively they can be locally significant. There should be some discretion to require that developers cause no adverse impact on degraded waterbodies or small, coastal burns where these could affect species of conservation importance.

It would be useful if SEPA produced guidance on how to assess whether natural barriers are passable to fish species. The acceptability of many schemes depends on such barriers and it is currently difficult to assess fish access objectively.

I hope you find these comments helpful.

Kind regards,

Diane

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Date: 28/04/10

Ref:

Dear Sir / Madam,

Response to Consultation on "Guidance for developers of run-of-river hydropower schemes"

SSE welcome the opportunity to comment on the draft guidance for run of river hydropower schemes.

Scottish and Southern Energy is the largest energy utility based in Scotland and is Scotland's second biggest company. SSE is involved in the generation, transmission, distribution and supply of electricity; energy trading; the storage, distribution and supply of gas; electrical and utility contracting; and telecoms.

SSE's core purpose is to provide the energy people need in a reliable and sustainable way and has set out an investment plan to 2013 of over £3 billion in renewables. We expect a significant proportion of this to be invested in Scotland. By 2013 SSE intends to have doubled its operating renewable energy portfolio to 4,000MW, maintaining and extending its current lead as the largest renewable energy generator in Scotland, and has set a sector leading target of reducing the carbon intensity of its overall power generating portfolio by 50% by 2020.

Hydropower has a significant role to play in achieving these plans and meeting Government targets for renewable energy generation and CO₂ emission reductions. SSE sees hydro contributing in two ways, the first of this is in displacement of carbon emissions through embedded run of river and small scale storage hydro schemes, such as the Chaorach, Chonais and Kildermorie hydro schemes.

The second way is through the addition of high flexibility conventional and pumped storage power stations such as Glendoe, Sloy pumping station and the Great Glen pumped storage projects, which will also act as facilitators, helping the grid to cope with larger scale implementation of less flexible renewable generation such as wind and tidal power.

Key Points

- SSE do not believe that SEPA have correctly interpreted the Scottish Ministers policy statement from January 2010 in Part A of their guidance.
- The 'efficiency' tests in Part A would not "optimise the potential for hydropower generation" as required by Ministers but would significantly restrict future development of all sizes of hydropower schemes.
- Many recent developments, including four schemes publically welcomed by Ministers since the January policy statement as "perfect examples of how we can make best use of our natural resources", would fail meet the 'efficiency' standards in Part A.
- The values and thresholds contained throughout the guidance are given without offering any ecological evidence to explain why they have been chosen.

- SSE have over 50 years of operational experience in hydropower but we do not recognise where many of the thresholds and values for the specific mitigation measures in Part B come from. Several are far more restrictive than standards that have been shown to be effective in Scotland while others appear to us as being inadequate to protect ecology.
- The draft guidance works counter to EU, UK and Scottish Government Energy Policy by favouring one renewable energy technology over another. Proposals for all new renewable generation schemes should rightly be recognised as offsetting CO₂ emissions from existing fossil fuel generation and not compared to notional renewable alternatives that will never be built.
- SEPA now have over four years of regulatory experience and have been funded through charge payers to collect ecological data on the actual impacts of hydropower schemes. Despite this we see a purely theoretical approach in Part A without any supporting evidence.
- The draft guidance is an extra test that is applied in addition to the already overly complex and unnecessary methods being used by SEPA to determine applications for new schemes (RM34). Another significant opportunity to deliver better regulation has been missed.

While we can see some good points in the proposed guidance we believe the approach is too narrow and the conditions too onerous. We do not believe it is proportionate or risk based and there are some very serious issues that need to be addressed.

As it stands, we believe that the guidance in Part A would bring an effective halt to most small scale development and to development of all scales on 'high' status waterbodies. It also has the potential to skew development away from optimising the use of the available resource by incentivising some types of scheme over other, often less damaging, types of scheme.

In Part B some of the specific mitigation measures are significantly different from previous practice without providing any evidence or justification for the changes. If these changes are applied in practice then many good schemes will become unviable while some aspects of the ecology may not be adequately protected.

We are concerned that, as stated at the bottom of page 3, SEPA is once again intending to use this guidance before any consultation has taken place and before there has been any opportunity to review the responses of stakeholders. This is not good regulatory practice. This is the same position that was adopted for RM34 and which in our view contributed to the many of the subsequent problems faced by industry and SEPA.

We recognise that SEPA has made a real effort to engage with the industry at an individual company level and through industry trade associations but using methods and guidance before there has been any effective consultation weakens these efforts. It contributes to the widely held view that there is little openness or willingness to change and that consultations on this topic are simply a stage SEPA feel they have to go through.

SEPA have now been regulating hydropower schemes under CAR for four years and have determined 47 applications during this period (according to the Spring 2010 edition of 'SEPA View'). Over the same period SEPA have also been funded through the new charging scheme to collect environmental field data to assess the ecological impacts of abstraction and impoundment activities including hydropower. Despite this we still do not see any sign that ecology data or practical regulatory experience is being harnessed to deliver the more effective and streamlined regulation that SEPA is striving for under their 'Better Regulation' programme.

Once again we see highly theoretical approaches being developed which are not supported by any evidence of impacts on aquatic ecology or the wider environment. This guidance is also to be applied on top of the already overly complex and unnecessary methods (RM34)

being used by SEPA to determine hydropower applications. Another significant opportunity to deliver better regulation has been missed.

It appears to us that SEPA is concerned about the potential number of very small schemes that may be developed based on numbers which have arisen from the two recent FREDs reports. It is also notable that the recently implemented DEC Feed in Tariffs are solely there to encourage the type and scale of scheme which would be excluded by this guidance. By trying to limit the number of small schemes to something it considers to be acceptable, and by creating guidance expressly aimed at constraining these, SEPA is, perhaps inadvertently, also putting in jeopardy the larger schemes that Scottish Ministers expressly recognised in their policy statement as making an important contribution to meeting renewable energy targets, reducing CO₂ emissions and protecting electricity security of supply.

Such a major regulatory impact cannot be accepted without the case being demonstrated that such restrictions are genuinely necessary to protect the environment and are proportionate. If industry and other stakeholders are to have any confidence in the proposed guidance SEPA needs to:

- Publish the evidence, ecology data and any analysis they have used to set the 'efficiency' thresholds in Part A.
- Publish the evidence, ecology data and any analysis they have used to determine the thresholds and values used for the mitigation measures contained in Part B.
- Test the impact of their proposed 'efficiency' thresholds and mitigation guidance on the 47 schemes they have considered since 2006 and state clearly how many of these schemes would now fail to get consent or be made unviable.

Without publishing any justification for the changes being proposed it is not possible to hold a meaningful consultation and we urge SEPA to put this information into the public domain so that it can be properly scrutinised by all parties before they are implemented.

As they stand we believe these proposals are not robust. The consequences for the environment, renewable targets, emissions and electricity security of supply have not been thought through and are not justified. We believe they are disproportionate and will have a detrimental impact on government policies and targets. We believe more account needs to be taken of such factors in developing the final version of the guidance.

Yours Sincerely,

Peter Donaldson
Head of Renewable Generation

Consultation Questions	
Part A criteria – sub-100 kilowatt schemes	
Question 1	<i>Taking account of the mitigation described in Part B, do you agree that sub-100 kilowatt schemes identified as provisionally acceptable according to the criteria described in Part A will not cause deterioration of the water environment?</i>
	Yes in principle. In practice it depends on a credible and robust mechanism being developed for determining when ecological deterioration would be likely to occur. At present the hydrology based environmental standards developed by UKTAG and being used by SEPA is not fit for this purpose.
	We believe that these inappropriate standards grossly exaggerate the potential for ecological impact which will lead to the rejection of many small schemes where the impact will be minimal. For larger schemes these standards cause unnecessary reporting as derogations to Europe. Installed capacity is not in our view the correct measure of size or benefit for a run of river hydro scheme. The correct measure is the long term average annual energy output in MWh. This is the true contribution of a hydro scheme to renewable energy and carbon emissions reduction targets.
Question 2	<i>Are there other circumstances under which you think sub-100 kilowatt schemes could be developed that will not (cumulatively or individually) pose a risk to the water environment?</i>
	In exceptional circumstances such as isolated, off-grid, locations.
Question 3	<i>Do you find the checklist format for setting out the criteria for identifying provisionally acceptable sub-100 kilowatt schemes helpful? Please make any suggestions you may have for how SEPA could make the information clearer to users.</i>
	SSE has no direct involvement in developing schemes of this scale and so other developers may be better placed to provide comment on the proposed checklist.
	In principle we would support any moves to simplify and streamline the application and assessment process for both operators and SEPA. Avoiding unnecessary complexity should bring efficiency and cost savings to all parties. SSE would also urge SEPA to look again at its existing methodology (RM34) for assessing larger schemes with the aim of reducing the unnecessary scope and complexity.
Part A criteria – 100 kilowatt + schemes	
Question 4	<i>Do you agree that the draft criteria on the efficiency of schemes of 100 kilowatts or more (in terms of energy output per length of river or stream affected) will help:</i> <ul style="list-style-type: none"> <i>• deliver Scottish Ministers' objective of optimising the use of the resource;</i> <i>• ensure deterioration of status is not caused where there are significantly better environmental options for generating the same quantity of renewable energy?</i>
	We do not agree that the draft criteria on efficiency will deliver Scottish Ministers' objectives. The Scottish Ministers' stated policy is "to optimise the potential for hydropower generation" so it appears that SEPA have

misinterpreted the policy intent. This may explain why Part A of the guidance runs so counter to the Scottish Ministers' policy and why it appears to be aimed at limiting the available resource and restricting the number of sites of all sizes that can be developed.

We also disagree with the approach that SEPA have adopted of playing off renewable technologies against each other and which also goes against Government policy of promoting all renewable technologies over fossil fuel generation. Even if this approach were accepted the proposal gives no credible data or explanation as to why the proposed criteria demonstrates that "there are significantly better environmental options".

It is also unclear where the 500 kW threshold has come from as it is not mentioned anywhere in the Ministerial guidance. Although SSE is not directly involved in developing schemes of this size it is an example of thresholds and values appearing throughout the draft guidance without any reason or justification being provided. Reference to tariff structures in Germany in the footnotes cannot be accepted as a justification for environmental regulations in Scotland. No doubt there are various tariff thresholds in many different EU Member States which reflect local political, economic, environmental and industry factors. If SEPA believe that 500 kW is a necessary threshold to protect ecology in Scotland then they should provide the evidence and explain their reasoning.

Resource 'Efficiency'

SSE have long stated our view that SEPA need some way of differentiating 'good' schemes from 'bad' schemes. By 'good' we mean a scheme where the benefits are significant relative to the potential impacts. This is not a scale issue and schemes of any size can be good or bad. Many experienced developers, and increasingly a few individuals within SEPA, can recognise subjectively a 'good' scheme when they see one but it is not easy to define objective measures for capturing this. We would suggest that it is not possible to define one single measure for assessing schemes as seems to be the intention in Part A of this guidance. Indeed we see no need or benefit in trying to do so.

The concept of scheme 'efficiency' as proposed in the draft consultation has some merit from an environmental assessment perspective but it is not in our view a measure of efficiency (see below) and it is only a very partial and incomplete measure of environmental impact. To give just three brief examples of why it is not comprehensive: it treats all watercourses as being of equivalent value, sees length as the only important environmental factor, and takes no account of volumes or the flow regime.

This would not be a problem if this were being proposed as part of a review to simplify the existing RM34 methodology and was replacing or supporting other ways of measuring impacts and benefits. The problem arises because SEPA is proposing to use this as a single measure for rejecting schemes.

The proposed 'efficiency' standards for 'good' and 'high' status waterbodies set an exceptionally high bar for an initial screening stage. The two schemes which SSE has had approved since the introduction of CAR are, in our view, straightforward and un-contentious run of river schemes. Both are in very steep river sections at or above the natural upstream limit of salmon migration with minimal environmental impact. Both would appear to pass the efficiency test for good status waterbodies but would fail the threshold for high status by some

margin. If schemes such as these can't even pass the initial screening test then we can see very few commercial schemes ever being developed on high status waterbodies in future. Is this the intention? If SEPA want to place an effective moratorium on developing schemes on high status waters they should state this clearly and consult openly on this position.

The test could also have some interesting consequences that SEPA may not intend. For example, this measure would seem to favour low head barrage schemes, where the length affected is very short, over higher head upland schemes. It could also favour storage schemes as this would increase the amount of generation for the same affected length. Is this the intention?

SEPA need to be aware that any 'hard and fast' thresholds they apply will incentivise certain types of scheme at the expense of others and may work against optimising the scheme design to minimise the environmental impact. By setting thresholds based on one third of the output from a notional wind turbine it has moved from an interesting and potentially useful indicator of relative impact to a barrier that developers will need to design schemes around.

For example, increasing the Hands Off flow or setting a 'shut down' period will reduce the amount of generation without changing the length affected thereby reducing the 'efficiency' as measured by SEPA. In other words by reducing the impact on the flow regime the scheme becomes less 'efficient' and so less likely to be approved. Is this the incentive SEPA wish to give to developers?

On balance, SSE can see the potential usefulness of the proposed measure as one measure of relative impact but we cannot support the way SEPA is intending to apply it. We would urge SEPA not to add an additional barrier to good development but to look again at its existing RM34 methodology and see how this measure could be incorporated into a simpler and more effective assessment.

Measuring Scheme Efficiency

SEPA should be able to satisfy themselves that a proposed hydro scheme makes the best use of the available natural resource and it is absolutely correct that this should be included in the process of determining CAR applications.

There is a great deal of scope for confusion in the way SEPA use the terms 'efficiency' and 'optimisation'. SEPA is defining these in the context of GWh/km of watercourse which is at odds with the generally accepted terminology applied by developers and operators. To propose a method for assessing the environmental impact of hydro schemes is one thing, but to use the word 'efficiency' in this way will be very misleading to much of the intended audience of this consultation.

Energy / length is not a measure of scheme efficiency but promotes minimising the length affected above everything else including making the best use of the available natural hydropower resource. It will encourage multiple smaller schemes on the highest energy concentrations on watercourses in place of larger genuinely more 'efficient' and productive developments. Converse to what the consultation claims on page 5 (2nd paragraph) we believe that small schemes with high GWh/km are far more likely to preclude the development of larger schemes with lower GWh/km than the other way round.

Many schemes which have been consented in recent years utilise a small fraction of the available energy on a site and preclude the development of

larger, often less technically obvious, schemes around the same resource. A good example is Glendoe which is, in our view, a prime example of an efficient scheme with minimal environmental impacts relative to the scale of the benefit. We believe that one scheme of this type and scale will have far less environmental impact than a hundred smaller schemes which produce the same amount of electricity.

How could a scheme such as Glendoe, which relies on diverted catchments, be assessed using this method? Several run of river schemes on each of the diverted burns may appear more 'efficient' using the proposed measure but would produce far less electricity while having greater environmental impacts overall due to the construction of more roads, grid connections, construction of separate power stations, etc.

If SEPA want to measure efficiency then the figure they could use is the proportion of the available gravitational potential energy of the catchment's runoff which the scheme will convert into electrical energy. Ultimately however the governing factors of a scheme are often dictated by external factors such as land ownership and so any attempt to ensure the optimal use of the country's resource will probably be thwarted by events beyond both SEPA' and the developers control.

SSE believe that the single measure proposed in Part A is not appropriate and will not be able to assess the merits of all the different types of scheme. A simpler and more effective RM34 method is what is needed but it appears SEPA is looking for a way to screen out a large number of applications before they have to apply RM34 rather than face up to the fact the RM34 needs to be radically overhauled.

Comparison with Wind

SSE do not accept that different renewable technologies should be made to compete against each other. Government energy policy at a EU, UK and Scotland level are promoting all renewable technologies as an alternative to burning fossil fuels so why are SEPA working against this policy? This is governments role and we need a mix of all technologies to be able to meet demand at all times in a reliable and sustainable way

All forms of power generation have their own specific impacts. Just because wind turbines do not directly affect the water environment, and because SEPA is the agency primarily responsible for the protection of the water environment, doesn't mean wind power's impacts can be conveniently ignored. Windfarms vary considerably in their efficiency and environmental impact depending on the location so it is not clear exactly what measure of 'efficiency' is being compared here.

SSE, along with many other developers, is working hard to develop windfarm sites that are sustainable and progress can often be difficult and slow. Comparing hydro to wind is a false comparison as no developer is free to simply construct additional wind turbines instead. Any potential new renewable capacity that is foregone will mean continued days running at existing coal and gas stations with the associated CO₂ emissions this brings. Even on the most optimistic forecasts of renewable development this isn't going to change before 2050 at the earliest and SEPA's assessment method needs to face this honestly.

This in no way argues that every proposed hydropower scheme should be

	<p>allowed but that each should be viewed on its own energy and environmental merits. It would not be right to refuse permission for an otherwise acceptable scheme because SEPA believe that 1/3 of an imaginary wind turbine is in theory somehow more efficient. The proposed efficiency tests are completely arbitrary and unjustified and if SEPA persist then many good schemes will be lost.</p> <p>If this has not already been done, we would suggest that experienced staff within SEPA look through the schemes which they have been consulted on, or which have been applied for since CAR came into force. SEPA have consented 46 out of 47 schemes between 2006 and 2009. Experienced SEPA staff should assess these subjectively into those they now consider to be 'good' and 'bad' schemes. These could then be ranked using the proposed efficiency measure and any patterns or obvious thresholds identified. Are there any 'good' schemes that don't score well on this measure? Are there any 'bad' schemes that do score well? What does this indicate about other factors that need to be taken into account?</p> <p>In short, start from a practical perspective based on experience not a theoretical one and base any thresholds on an appraisal of hydropower schemes and their impact on ecology not on some abstract and idealised view of windfarms.</p>
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Part B mitigation measures

Question 5	<p><i>Do you agree that the mitigation identified will help achieve Scottish Ministers' objective of minimising the adverse impacts of hydropower scheme developments on the water environment?</i></p>
	<p>We agree that clear guidance on the required mitigation is needed and that appropriate guidance would help achieve the Scottish Ministers' objectives of protecting the water environment and promoting sustainable renewable energy developments.</p> <p>Overall the scope of the guidance and the issues it covers look to be about right. We do however have some comments on the specific mitigation measures and these are set out in answer to question 6 below.</p>
Question 6	<p><i>Do you agree that, in general, the mitigation identified is likely to be practicable? If not, please give your reasons for this view.</i></p>
	<p><u>Protection of low flow level</u> Virtually all the schemes SSE look at will have a catchment of >10km² at the tailrace so it appears we would be required to provide a HOF of Q90 on all intakes. This is a significant change as at Glendoe, Chonais and Chaorach we have had consent for HOF of Q95 as there are no migratory fish present at either site.</p> <p>Is there any ecology data or other evidence that suggests Q95 HOFs are having a significant environmental impact at existing sites? We are not aware of any data or research that suggests this is the case and no supporting evidence or justification is presented in the consultation document. If there isn't any evidence then why has the position changed?</p> <p><u>Protection of flow variability</u> Releasing the increased volumes of water as outlined in sections 1.1, 1.2 and 1.3 will have a major impact on the viability of hydro schemes. For example, releasing a Q80 flow under ADF inflow conditions is high relative to what we have done in the past and shut down periods have never been applied at any of</p>

	<p>our sites.</p> <p>Again we ask is there any ecology data or other evidence that suggests the existing mitigation measures are inadequate? We are not aware of any data or research that suggests this is the case. If there is not any evidence then why has the position changed?</p> <p>In the purpose section it says that mitigation should avoid extended periods of low flow. How can this to be achieved without storage? Presumably this only means periods when the flow would not naturally be low.</p> <p><u>Protection of high flows</u></p> <p>Restricting the maximum abstraction to 1.3 – 1.5 times ADF is a significant change. Practically all the schemes we consider will exceed 1.5 ADF abstraction and this is a must for a commercial hydro scheme. This would be even more the case if were required to release as much water as dictated by section 1.2.</p> <p>What ecological information has been used to demonstrate that abstraction greater than 1.5 ADF will have a significantly increased environmental impact? We are not aware of any data or research that suggests this is the case and it does not fit with our experience.</p> <p>The consultation appears to leave the door open to abstraction of more than 1.5 ADF where it provides 'clear benefits in terms of optimising the performance of the scheme' but what does this mean? As a developer of larger schemes we need to abstract more than 1.5 ADF if we are to achieve the maximum energy benefit for an acceptable environmental impact and this is what 'optimising the performance' should mean. Is this what SEPA mean and if so how will this be judged?</p> <p>We need clarity on what is meant by "...option for providing required flows and <i>optimising the electricity output of the scheme</i>". To a developer optimising means maximising the output for the amount of water available. Is this also what SEPA mean? If not then what is meant needs to be made clear.</p> <p>The requirement to increase the HoF as inflow increases is the opposite of a number of existing schemes where it was recognised that flow accretion downstream adequately supplements the flow, and thus more water could be taken as the inflow increases. At these sites there is good evidence of stable fish populations over many decades. At times of moderate to high runoff the intake facilities will be spilling anyway and this is when the fish are most likely to be migrating.</p> <p><u>Smolt Screen Bar Size</u></p> <p>The draft guidance requires smolt screens to be 10mm or less – where has this come from and what is the justification? The first smolt bar screens SSE installed to replace the old mesh screens was about 10 years ago. At most locations 12mm screens have been used and experience has shown them to be effective. In certain places at the upper sections of high altitude rivers, where smolts tend to be smaller, 10mm screens have been used but we have never needed to install screens below this size.</p> <p>At locations where sea trout are present without salmon then these can be twice the size of salmon smolts. Although limited in number, at such locations bar screens of 15mm would probably be more than adequate.</p>
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Bar screens are also likely to be more effective if they are angled to the direction of flow.

Flow Velocity at Smolt Screens

We do not understand where the figures for flow velocity in Table 4 come from. There is no differentiation between the requirements for adults and juveniles. The inclusion of shad seems unnecessary in Scotland.

For salmon smolts the best practice for screening is an approach velocity of 0.3m/s and the figure in the table is double this at 0.6 m/s. We believe that using this figure would lead to a high risk of fish becoming impinged on the screen.

Where have the 50% and 10% additional area of screens come from? Where significant debris builds up on un-cleaned screens then the risk of fish kills will still be high irrespective of the size of the screen as local velocity 'hot spots' will be created. Building oversized screens will cause additional environmental impacts due to construction without reducing the risks arising from poor maintenance.

Provision for upstream passage of fish

The document talks about upstream passage for migratory fish. Historically in legislation and practice this has meant salmon and sea trout. The guidance increases the scope to cover other fish and this may be justified in specific cases but the circumstances where this will be applied need to be made much clearer.

For example, brown trout are also migratory in a limited sense moving within river reaches. Brown trout are endemic in Scottish upland rivers but are often limited in their local movements by much smaller natural barriers than would be a problem for salmon and sea trout. What criteria will SEPA use to determine if a fish pass is required where salmon and sea trout are not present?

SSE believe it would not be necessary or proportionate to require brown trout passes at all sites so what amount of accessible habitat upstream and downstream of the intake would trigger the requirement to construct a pass?

Fish pass design

Shad and Sparling have a very limited natural range in Scotland so unless a tidal barrage scheme is being proposed for the Cree or Tay estuaries their inclusion seems surprising.

There needs to be a more concise and understandable phrase for the appropriate location of the fish pass than "*the pass is positioned at the most upstream section below the weir where fish naturally accumulate*".

In some cases this may not be the best place for the entrance to the fish pass as many fish will be attracted to the location of the highest flow which may well be the tailrace. If so, positioning the fish pass entrance adjacent to the location of the most attractive flow would be the better environmental option.

The guidance requires that "*the pass is still effective at Qn10 flows*". Why is this the case? Migratory fish may not be seeking passage at a Qn10 flow and many intakes will be spilling so any fish are likely to holdup below the intake and only attempt to go through the fish pass as the flow drops off.

	<p><u>Tailrace design</u></p> <p>The important aspect is to make sure that any fish passage facilities are located adjacent to the tailrace so that the fish can easily locate the entrance. There are many locations that SSE operate where the tailrace flows are very high compared to the flow through the pass but because of appropriate design the fish find no difficulty in locating the fish pass entrance.</p> <p>The guidance states that the screen spacing at the tailrace needs to be 20mm or smaller. What is the evidence or justification for this? SSE has operated many schemes for the past 50 years where 40mm flat bar tailrace screens have been in place and there have been no fish entrainment problems. So where salmon are the key species present then we can see no justification for anything less than 40 mm screens.</p> <p>For sea trout smaller screens may be necessary. On east coast rivers 30 mm screens may be appropriate while on some smaller west coast burns the sea trout also tend to be smaller and so 20 mm screens may be justified.</p> <p><u>Weir Design</u></p> <p>The required plunge pool depth of 1/3 height of impoundment seems ok for smaller intakes but at larger intakes this may be too great and actually cause problems when fish exit the plunge pool. Excessively deep pools will require more concrete and the intakes will have a larger footprint which also increases the environmental impact of construction.</p> <p>We suggest that a requirement for 1/3 of the height of the impoundment or 60 cms whichever is the lesser would be adequate to protect fish.</p>
Question 7	<p><i>Do you think that there other practicable measures that you think could be taken to achieve an equivalent or greater level of mitigation? If yes, please describe the mitigation and your reasons for believing that it would be practicable and effective in minimising adverse impacts on the water environment?</i></p> <p>Larger scour gates would help with sediment management by facilitating the passage of sediment downstream under high flow conditions without needing to get large plant and vehicles into the watercourse. It's not clear that this can be specified numerically due to the varied scale and sites conditions experienced at different locations but developers could be encouraged to consider this as part of their design.</p> <p>The guidance makes no mention of Borland fish lifts which have been shown to be very effective and efficient over a period of more than 50 years. Although they have typically been used at larger sites they can work equally well at smaller scales too and should not be excluded as a viable option.</p>

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