



Community Energy Scotland

Cumhachd Coimhearsnachd na h-Alba

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

29 April 2010

Dear Sir or Madam

SEPA Guidance for developers of run-of river hydropower schemes

Please find attached our response to the above consultation.

Community Energy Scotland is a registered charity dedicated to building confidence, resilience and wealth at community level in Scotland through sustainable energy development. We have supported hundreds of community-owned renewable energy projects across Scotland and are currently delivering funding to projects up to 10MW.

We believe that community owned and based renewable energy development has a vital role to play in a low carbon future and can be developed in a way which brings many benefits to the local community.

Our focus in responding to the consultation is, therefore, on its implication for renewable energy development by community groups. In our view, the proposals, if implemented, would disadvantage the development of community hydro schemes, for the reasons given in our detailed response. We would urge that the proposals are reconsidered with a view to ensuring that sufficient weight is given to the importance of community schemes in the guidance.

We are happy for this response to be made public.

Yours faithfully

Nicholas Gubbins
Chief Executive

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Community Energy Scotland response to SEPA consultation on Run of River Hydro

Comments on the overall consultation for: Guidance for developers of run-of-river hydro power schemes

In terms of the suite of renewable options that are utilised for community energy projects, hydro schemes are of significant importance for the community sector. Community renewable developments can happen in a range of scales varying from 2-3kW up to 1MW in scale. A sizeable number of these would lie within the sub-100kW range. Community Energy Scotland's objectives are to create confidence, wealth and resilience at community level and schemes of varying sizes and in these range, do result in these objectives being achieved. A number of the communities we deal with are well placed to harness hydro power for their own direct benefit. Given our aforementioned objectives, we would wish to have all the available options for development that can be accessed including sub-100kW hydro schemes available for community development. Income derived from such schemes can and are playing a significant role in the regeneration of communities both in rural and urban environments alike.

Community Energy Scotland is currently supporting 32 community owned hydro projects of which 20 are 100kW or under. We believe that these projects can potentially provide many significant benefits. These more local schemes provide local jobs, accountability, provide power to local community buildings, they establish an increased sense of ownership, increased sense of energy awareness, they build local capacity, decentralised energy production increases the resilience of an area, self sufficiency, reduction in the use of unsustainable fossil fuels and importantly the potential to provide a sustainable income for the community /area.

Alternative options: In terms of alternative development, Community Energy Scotland is concerned about the depth and level of information and advice that SEPA are able to offer in suggesting alternatives to hydro projects. Community Energy Scotland are unclear as to whether this 'alternative option analysis' information will require to be provided by the developer of such a scheme or whether it will be assessed by SEPA. If there is a cost burden on the developer this could potentially pose a barrier to development given that the increased cost could limit the schemes taken forward. Furthermore the choice of community projects will often be very restricted due to the availability of and access to land. Local benefits risk being lost in this way; larger national or multinational developers will often have the option of locating a scheme elsewhere geographically, but schemes developed by a local estate or community group only have the option of developing a scheme within their own locale. If the guidance from SEPA was for them to look elsewhere, this may



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prevent any scheme from being developed by them at all, which could have very negative consequences for local skills, employment, rural income and development. Indeed it is our belief that most sub-100kW schemes are more suited to and would be developed by local landowners or community groups anyway, rather than larger national developers, so the risk would be that no scheme is developed as an alternative. Sub 100kW schemes could and are also being developed to power community buildings such as schools, community halls, scout clubs, leisure centres etc where the resource was available providing a sustainable source of power. Alternative options for land would be limited in these cases and the alternative assessment could prove prohibitive to these valuable schemes and result in nothing happening at all.

The idea that there might be a local alternative such as wind power is also misleading; if a viable, locally-supported site for wind power exists, then it should be developed **as well as**, not instead of. As shown by several peer-reviewed studies, notably David MacKay's 'Sustainable Energy - Without the Hot Air', if we are to meet our climate change and emission reduction targets, we need every possible form of renewable generation to be utilised, in every viable site. The aim of avoiding dangerous climate change should not be forgotten when considering schemes like these, given that climate change could potentially cause much more serious harm to local environments and ecosystems in Scotland.

Basing decisions on purely capacity for power generation would be inadvisable in that there are many other additional benefits to such schemes. A balanced approach would be needed otherwise there will be a danger that the other benefits could be ignored.

We can also advise you that the nature of Community Energy Scotland's development assistance remit would on most occasions have appraised a specific site or available land area for its renewable potential. This is normally done before making a recommendation, or supporting a proposal for any community renewable development. Developing renewable projects (particularly wind) within a community setting can and does on occasion lead to friction and division within that community. Sometimes, the rationale for choosing a particular technology can depend on a number of factors, and one of importance is community consensus. On occasion we have found that because of their visible nature, wind projects have had the potential to divide opinion and consensus needed to enable a successful development can be threatened and at times derailed. It is our experience that hydro developments do not provoke the same levels of friction as wind projects.

Moreover, 'On assessing significantly better environmental options' Community Energy Scotland feels that the overall concept is too simplistic. E.g. If SEPA makes an assessment and recommendation/suggestion that a wind turbine would have a lower environmental and economic cost and should be favoured over a particular hydro scheme, then Community Energy Scotland would be concerned that in our experience and due to the bespoke nature of very individual projects, accurate comparison is not viable. Hydro per kW installed in most instances is more expensive than similarly sized wind projects. Furthermore assessing the full costs and overall



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viability of a wind scheme will incur considerable time, costs and potentially local opposition. Many such schemes might initially seem attractive as alternatives, however may be found to be unviable for one of any number of economic, environmental or logistical reasons only ascertained following months of expensive financial and time outlay. The 'Alternative options assessment' is a very site specific methodology which may not fit the majority of cases. Wind technology can also be very site specific and dependant on good wind speeds which is not a resource available to all. Hydro power can also prove more efficient than wind energy as it may operate at a higher capacity and therefore higher efficiency of rated power.

The document refers to 'low efficiency schemes' but this may not be a correct term for impact per length of river. Efficiency with regards to energy generation usually relates to the % operating capacity and it could be confusing to use the term in this way. Furthermore, in terms of the other options outlined by SEPA (using another river for the hydro, or upgrading the efficiency of existing hydro schemes), this is also too simplistic; whilst it may sometimes be viable to use a different river, often the choice available to a community group or estate will be very limited to their own locale. While it might be possible to upgrade other schemes nearby or elsewhere, they will almost never be owned by the same community group or small private developer; so whilst their owners could upgrade them and get the economical and environmental benefits, there would be no benefit to the community group or developer who wished to develop a new project. Development of other schemes also requires land ownership rights or rental agreements with landowners which may not always be possible.

Overall, we feel this approach is too simplistic and ignores the wider policy context of Scotland and the UK in terms of having to develop as much renewable energy as possible, in every different type of renewable resource/technology. The choice should not be one or the other – if a viable local scheme exists and is supported locally, economically viable and environmentally balanced, then it should be developed.

Community Energy Scotland feels this consultation seems to start with a presumption against development at smaller sites, introducing regulatory burdens that could make a scheme cost prohibitive at outset. Rather than starting from a negative viewpoint that these schemes will degrade water courses it could prove more acceptable to start from a more neutral assessment of sites. This legislative guidance could provide a barrier to the development of such small schemes given the information required. It is unclear whether the cost burden associated with the alternative energy options would be up held by SEPA or in our case an already cash strapped community groups.

Technical comment: Community Energy Scotland believes there needs to be more definition of 'deterioration' and more information provided on how the status of a river is actually assessed by SEPA. If deterioration is defined as (for instance) a river changing from 'high' to 'good' status, then the risk is run that a river which was just on the borderline between the two might drop to a lower status as a result of only



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relatively minor impacts from hydro. In contrast, a river well within the status bracket of 'high' or 'good' could maintain that status even with the impact of a hydro scheme taken into account. This methodology needs to be more clearly defined and explained in order to assess whether the SEPA proposals are reasonable and competent.

On page 5 of the consultation, the proposal suggests that outputs of schemes in question should exceed 1.75GWh per 500m of water bodies in high status, or per 1500m of water bodies at good status. Whilst we entirely agree that it is important for hydro schemes to be as efficient and productive as possible, we feel it is important to recognise that all hydro schemes are different and bespoke, and that some viable and reasonable schemes may not meet what seems to be a relatively arbitrary target like this. Community Energy Scotland would argue that it is fundamentally flawed to compare onshore wind generation to a length of river that hydro is developed on in this manner. This guidance seems to bias high head schemes which will produce more per m of abstraction and limit low head schemes where longer stretches of river are abstracted such as the Archimedes Screw generators schemes. Furthermore, a guideline like this reduces the potential for compromise, such as reducing the 'hands-off' flow to Q80 instead of Q95. That move would reduce the annual output of a scheme, but would also reduce greatly the impacts on the affected section of river. The net effect would be some new renewable generation, rather than none at all if the scheme was refused on the basis that it was not generating enough power per 500m of river. In addition, many rural areas may not start with degraded water sources. The guidance could bias already degraded rivers which in turn could eliminate rural communities or developments in favour of urban alternatives where rivers area may already have more chance of being in a degraded status, based on location of industry and high population.

We have concerns with the maximum abstraction rate detailed on page 9 of the consultation; having run the calculations on a number of schemes (both existing and planned) which we have supported, and which are both economically and environmentally sound, this limit is far exceeded by them (one uses a design flow which could theoretically abstract 2.3 times the average mean daily flow; reducing this to 1.3 would halve the installed capacity of the scheme, probably making it economically unviable as the capital costs would remain the same, but the energy production and resultant carbon reductions would be massively reduced).

Despite some of these projects being apparently economically and environmentally sound, they would not have been provisionally acceptable using the guidance outlined in Annex A of the consultation. However, although these projects may have failed using the proposed assessment criteria, both are providing invaluable benefit to their host communities and we would ask that due weight and attention is given to the local benefits referred to in the Ministers statement.

We notice that average daily flow would be calculated from the average of mean daily flows over several whole years; if that means small schemes like these would have to conduct flow monitoring over several years, that is also likely to impact



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severely on the number of schemes coming to fruition, due to the delays and costs this would entail. We feel instead that for small schemes like this, it would be fairer to calculate these figures using software like the Low Flows database.

Cumulative impacts: The nature and pattern of community renewable development are usually dispersed. However, that may not in fact mean that they are the only hydro developments in any given area. It may transpire that there instances where both community and private developments are occurring concurrently in the same relative locale or water catchments. This may then lead to issues of cumulative impact. Community Energy Scotland contends that where this may be the case that Community based projects should be given precedence This contention is due to the local nature and dispersal of the income derived from community based schemes that do in reality lead to the creation of social and environmental benefit.

The consultation refers to the need for the assessment of the cumulative impact of sub 100kW schemes. This mostly refers to any negative environmental impact however, there is also a case for the cumulative beneficial impacts, both social and economic, arising from small scale power generation to communities across Scotland that would not be apparent where by power generation is more based on larger and more disparate generating sites. The benefits of community generation can have positive effects on the health of communities in rural and urban areas. Where a scheme is delivered locally by a community non-profit distributing group, revenue generated through the scheme stays locally in contrast to schemes which are developed by large power generation companies.

Another positive benefit which should be taken account of is the cumulative power generation impact. Smaller schemes may be more deliverable and realistic and can be undertaken by small business, land owners and community groups whereas biasing larger schemes will limit the groups that are able to take this on due to the increased development costs, time and capacity.



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Consultation questions

Part A criteria – sub-100kW 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?

Community Energy Scotland would agree that those identified as acceptable under these criteria are unlikely to cause deterioration of the environment; however we also believe that the restrictions could be relaxed in some areas without causing deterioration, and allowing development of many schemes (which would otherwise be refused) which would have substantial local economic benefits, as well as contributing towards national energy security and carbon reduction targets.

Balancing Duty

It is suggested that there should be more of a balancing duty akin to that carried out by Scottish Natural Heritage to balance conservation objectives with the wider benefits of renewable energy, including carbon emissions reductions and importantly any local socio economic benefits.

Micro generation is also key to the future energy requirements of the country. Burdening sub 100kW schemes will not only affect community groups but also make domestic level schemes prohibitive. As mentioned above Sub 100kW schemes could and are also being developed to power community buildings such as schools, community halls, scout clubs, leisure centres etc where the resource was available providing a sustainable source of power. Alternative options for land would be limited in these cases and the alternative assessment could prove prohibitive to these valuable schemes.

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?

We feel that the guidance given in Annex A is generally so prescriptive and specific, that it will significantly reduce the number of opportunities for sub-100kW hydro schemes, to the detriment of their potential local social and environmental benefits. Whilst the guidance is thorough and detailed, we feel that there needs to be leeway for schemes which do not meet these criteria but which deliver very strong local benefits in employment and local community development and income.

In Annex A , page 21, there is a statement that it is expected to be rare that there are significant social or environmental benefits that would allow schemes to progress. It suggested that perhaps a more balanced approach is taken to incorporate these benefits, we would again draw reference to the Minister's Statement here and the importance of wider social and economic benefits which these community owned schemes would bring



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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.

Generally the information is clear; however more clarity is required on the use of existing weirs or impoundments which do not currently divert or abstract water from the river (but would be used to do so within the proposed development) – in checklist D this is unclear.

Part A criteria -100kilowatt + 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?

We do not feel this will optimise use of the resource as hoped by the Scottish Ministers, as the concept that schemes which cause a drop in status of a river could instead be replaced by a scheme in a different location, or by making other schemes more efficient, or by using a wind turbine or other form of generation instead, is a concept which Community Energy Scotland would argue is fundamentally flawed as explained previously. The minimum output of 1.75GWh per 500m is relatively arbitrary, due to the varied and bespoke nature of hydro schemes, and so should be reconsidered. It also removes the possibility to increase the 'hands-off' flow to reduce environmental impacts, whilst retaining the majority of energy production.

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?

The mitigation identified will certainly minimise adverse impacts on the local freshwater environments; however they are so stringent that they will greatly limit hydro development opportunity in Scotland, with negative consequences for the wider environmental benefits which could have arisen from them in terms of reducing carbon emissions. Whilst these might appear to be small benefits for each individual scheme, taken cumulatively they have the potential to be very significant indeed. A recent study for the Scottish Government by Nick Forrest Associates has been updated taking into account the feed-in tariff, and shows that there is the potential for 1204MW of further hydro capacity in Scotland, much of which will be on the scale of several hundred kilowatts. These have the potential to generate between 360 and 1400 jobs by 2020 according to the study, and would have a significant positive environmental impact in reducing carbon emissions. Getting even a small fraction of these schemes operational will require a more open regulatory environment.

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



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your reasons for this view.

Community Energy Scotland feels strongly that the mitigation to protect high flows as outlined in section 1.3 is not practical and is at a stroke likely to make a large percentage of schemes unviable. As outlined earlier in our response, many existing and proposed schemes are designed to abstract significantly more than 1.3 times the average daily flow – 2.3 times that rate in some cases. Designing them to limit abstraction would cut their installed capacity by half, vastly reducing the annual generation. Capital costs would remain almost as high however as the penstock, weir and turbine house would all remain the same size. This is likely to make many unviable; even if they stacked up economically, it might mean they then failed to meet the requirement to generate 1.75GWh per 500/1500m annually because of the reduced abstraction and subsequent generation. This means the two mitigation measures are at odds with each other, which will impact severely on the number of schemes coming to fruition.

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?

If it is deemed essential to maintain regular high flows, then rather than limiting the design so that it can abstract only 1.3 times the average flow in one day, then instead the abstraction rates could be monitored, and if a rate of (e.g.) 2 times the average daily flow was exceeded for more than a certain number of hours, then abstraction could be reduced down to the lower level of 1.3 for a set period. During this period the section of river in between the weir and tailrace would experience high flow conditions. The environmental affects could be monitored by SEPA and the developer to ensure this is having the correct effect, and the high flow periods adjusted consequently as required.

In addition to this we would hope (although not explicitly mentioned in the consultation document) that technical control solutions to abstraction rates can be used in mitigation? E.g. sub-level transducers might effect a technical fix in that the hydro generator could adjust intake levels ensuring that water levels downstream of the take-off point would not be compromised whilst at the same time making the most of the available if temporary resource from higher than required water levels i.e. surplus.



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RWE npower renewables

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30th April 2010

Consultation Response – Scottish Environment Protection Agency (SEPA) Guidance for developers of run-of-river hydropower schemes

Dear Sir/Madam,

RWE npower renewables is a leading developer and operator of run-of-river hydro electric schemes in Scotland. As such we are in a position to properly inform SEPA and the Scottish Ministers regarding the potential impacts of the proposed guidance.

In principal we support the provision of clearer guidance to developers of run-of-river hydro schemes. However, we have major concerns regarding the scope of the proposed guidance and consider that it will significantly reduce the development potential of hydro in Scotland.

The proposed guidance extensively departs from the Scottish Minister's hydro policy statement of January 2010 and is counter to its objectives. Further, the 'efficiency' criteria as proposed by SEPA is counter to the objectives of article 13 of the European Unions Renewable Energy Directive 2009.

We also have concerns regarding the phrasing of the consultation. The consultation suggests that the new guidance will only apply to the sub 100kW sector of the hydro industry.

We wish to **strongly object** to the approach taken by SEPA in this consultation and we would like to make clear both to SEPA and the Scottish Ministers that the proposed guidance will have considerable adverse impact on all capacities of hydro schemes.

We do not believe it is SEPA's intention to gratuitously frustrate the development of viable hydro schemes. However we are not assured that SEPA are aware of the real impact that their proposed guidance if affected would have on developing Scotland's hydro potential.

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The proposed guidance in Part A would effectively put a red light on any future hydro schemes being developed on 'High' status water bodies and substantially reduce the number of viable projects that could be developed of 'Good' status water bodies.

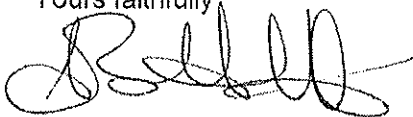
In Part B the proposed mitigation measures are extensively different from current industry practice and are being proposed without providing any evidence or justification for the changes. If the proposed mitigation measures are applied in practice then many good schemes will become impractical and unviable.

We are concerned that similar to previous consultations, SEPA are again intending to use this guidance in the face of significant objection from the Scottish hydro industry. This is the same position that was adopted for the RM34 consultation and in the view of the industry has contributed to many of the subsequent problems faced by developers and SEPA.

We appreciate the efforts that SEPA have gone to engage both individual developers and the industry through Scottish Renewables and the British Hydro Association. However, we see this consultation as a real test for SEPA to demonstrate their openness and willingness to properly inform and change the proposed guidance and not simply to view the consultation as a process to go through.

As such we would like to offer our continued support to SEPA and the Scottish Government to help properly inform the development and application of the proposed guidance.

Yours faithfully



Andy Billcliff
Head of UK Hydro

Cc: Jim Mather MSP – Minister for Enterprise, Energy & Tourism
Sue Kearns – Scottish Government Renewable Energy Policy Unit
Joyce Carr – Scottish Government Water Policy Unit

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?

Response

We feel the proposed mitigation measures significantly exceed current industry standards in screening to isolate migratory fish from intake structures and tailrace and compensation flow provisions. These present industry standards have been found to be effective and in the absence of supporting scientific evidence we object to the changes proposed.

Significant and substantial concerns are expressed regarding the appropriateness of the acceptable criteria defined in Part A of the guidance. This will be detailed further in our response to question 4.

Intake Screening

Section 2.1 – A Intake Design and Screening states that the required bar spacing for intake screens will be < 10 mm.

The optimum bar spacing for screens is scheme specific and is dependent on sediment load, bed width and other factors. The specification of bar spacing proposed will lead to unnecessarily large intake structures that will be no more effective than the more commonly used 12.5mm spacing.

A bar spacing of 12.5 mm is used on the majority of hydro schemes in Scotland and has been demonstrated to be effective through scientific study in preventing fish ingress while also allowing effective cleaning of the screens. These types of screens are often used on rivers where regular cleaning of screens is required to prevent blockages.

On rivers that carry high loads of trash material, screens with 10 mm bar spacing can be difficult to properly maintain and clean with automated screen cleaners as the bar spacing is too narrow for conventional screen cleaning equipment to operate effectively.

It has been found that the teeth of trash rakes bounce off the screen having the effect of compacting trash into the gaps of the screen leading to increased screen blockages.

Significant difficulties have been experienced on a recent scheme, Inverlael hydro, where 10mm bar spacing screens have been used on one of the two weirs of this site. The 10mm bar spacing has been found to be no more effective than a conventional 12.5 mm spaced screen but has been found to be more prone to blockage and less efficient at self cleaning.

The industry standard for screening on rivers with downstream fish migration (including salmon smolts) is 12.5mm (where it has not been possible to use a COANDA screen).

This has been proven through scientific study to be effective in preventing migratory fish from entering intake chambers (inc salmon smolts) and allows effective maintenance of the screens to be performed.

SEPA have not presented any scientific evidence to suggest that 12.5mm bar spacing is no longer effective nor has any evidence been presented to suggest that 10mm bar spacing is required.

Recommendation

We would therefore ask SEPA to consider revising criteria presented in section 2.1 to include a bar spacing of 12.5 mm where it is not practicable to use COANDA screens.

Tailrace Screening

Section 2.2 Tailrace design suggests a maximum bar spacing of 20mm.

Industry standards in recent years have been to use bar spacing of 40 mm. This has proven to be effective with current operational schemes.

Reducing the spacing to 20 mm for tailrace screening would lead to far larger screens that would be no more

effective than current designs. This would result in larger tailrace structures that would increase the environmental impacts on river banks and needlessly increase construction costs.

Recommendation

We would therefore ask SEPA to consider revising criteria presented in section 2.2 to include a bar spacing of 40 mm.

Compensation flow provisions

Section 1.2 Protection of low flow levels now proposes to introduce a new common standard for compensation flows that is not current industry standard and would be unnecessary precautionary on rivers of lower river status or that are absent of environmental sensitivities.

Currently hydro schemes located on rivers with environmental sensitivities operate a Q95-90 compensation flow that varies to Q80 at maximum turbine flow equivalent to Qn20 is applied.

It is now proposing that the level at which a maximum variability of Q80 should be dropped to Qn30. This in effect increases the level of compensation flow and level of variability.

SEPA have not presented any scientific justification for increasing the level of compensation flow and variability above that currently accepted by SEPA on existing operational schemes.

Equally, we have concern that the proposed mitigation measure for protection of flow variability will be applied on all rivers regardless of their environmental sensitivities.

Recommendation

We would therefore ask SEPA to revise section 1.2 to reflect that compensation flows must be determined specific to the proposed hydro scheme and the environmental constraints of the specific site.

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?

Response

If sub 100kW schemes adopt the mitigation measures set out by Part B of SEPA's proposed guidance then they should not pose a risk to the water environment.

Such mitigations if properly applied should not in many cases lead to a deterioration in water status.

Given this, there is no necessity to apply 'efficiency' criteria to sub 100 kW or sub 500 kW projects unless it is not possible for a proposed scheme to implement the mitigation measures described in Part B.

As highlighted in our response to Question 4, the 'efficiency' criteria requires further refinement in order to reflect projects that are technically and commercially viable.

Recommendation

If a proposal can meet the mitigation criteria set by Part B then it will not be required to apply the 'efficiency' criteria set out by Part A.

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.

Response

Response

The check list may be useful as it should aid developers to identify early in the process acceptable proposals. This should hopefully save cost for both the developer and SEPA.

The checklist presented in Annex A in a table format appears to be workable. It could help applicant's further understanding if the checklist was presented in summary by a process chart.

The checklist has potential to be adapted into an interactive online tool either in a spreadsheet format or GIS layer. This would aid correct interpretation of the process.

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*

Response

We **strongly disagree** and **object** to the inclusion of 100 kW or more projects being considered under the proposed guidance and the proposed 'efficiency' criteria.

The Ministers policy statement does not suggest there is an issue with this scale of project. In fact the Ministers statement clear states that SEPA guidance will be to ***facilitate the appropriate siting and authorisation of sub 100 kW schemes.***

We therefore contend that SEPA have gone beyond the terms of the minister's policy statement by proposing guidance for schemes greater than 100 kW.

SEPA's regulatory method RM34 already gives sufficient guidance to developers for this scale of project. The 'efficiency' criteria being proposed for this scale of scheme, goes far beyond the current regulatory method.

We **object** to the phrasing of question 4 as we consider it to be misleading and an incorrect interpretation of the Scottish minister's objectives as stated in their policy statement of January 2010.

The ministerial policy statement states the objective as:

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

We strongly disagree with the SEPA interpretation of this statement as phrased in question 4. The statement clearly refers to the ***potential for hydropower generation*** and not of the ***resource***.

As such, we contend that the Scottish Ministers objective is to maximise the potential for new hydro **schemes/sites** in Scotland whilst minimising any adverse impacts on the water environment.

SEPA interpretation of this is evident through their proposed 'efficiency' criteria is to optimise the use of the resource of a **specific site**. This a very different proposition.

We also **strongly disagree** that the Scottish Minister policy statement of January 2010 requires SEPA to develop further assessment criteria to assess significantly better environmental options.

Although there is a need under the Water Framework Directive to consider significantly better environmental options, the Scottish Ministers policy statement makes no reference to this.

SEPA should therefore reference in the guidance and any subsequent consultation where the requirement to assess significantly better environmental options is derived from. This context is important as it will help industry to scrutinise if SEPA are correctly deriving proposed assessment methods.

If the requirement to assess significantly better environmental options is indeed derived from the Water Framework Directive (WFD), then the proposed 'efficiency' criteria is **not appropriate**.

The WFD criteria includes a qualification that 'better options' must be technically feasible and not disproportionately expensive.

The proposed 'efficiency' criteria fails to take into account the technical feasibility and economic viability that would indicate if alternatives were disproportionately expensive.

The SEPA definition of an efficient hydro scheme as defined by Part A section 2 (i) & (ii), does not take into consideration other relevant factors that contribute to the efficiency of a hydro scheme.

The efficiency of a hydro scheme can not simply be equated by a basic generating capacity figure per metre as suggested by section 2 (ii).

This fails to take account of other factors that define the generating potential of a particular site. These 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 layout of a proposed hydro scheme is not determined on the maximum theoretical resource available from a particular water course.

Similar to other renewable technologies, the factors described to in the above would influence the final configuration of a scheme on a particular water course. Most hydro schemes do not fully utilise the potential hydrological resource for the above reasons.

The true efficiency of a hydro scheme should be measured against how the available hydrological resource is utilised in combination with the specific restrictions of the individual scheme.

Reduction in sites – optimisation of hydro generation

The proposed 'efficiency' criteria sets an impractical and unrealistic specification for energy yield per metre of affected river that will prevent the development of a wide range of otherwise viable schemes and severely affect the optimisation of hydro generation in Scotland.

It is not clear from the guidance under which circumstance the criteria be applied. For example, would it be applied to all applications or only if a proposed scheme would lead to a deterioration in status or adversely affecting a significant interest. We would request that SEPA provide clarification on this point.

Economically viable hydro schemes will lead to a deterioration in status, not due to demonstrable adverse impacts on the water environment but as a result of the environmental standards, set by SEPA, having being failed.

The industry has long believed that these standards are overly precautionary and unnecessarily high and have not been properly informed by study of the actual ecological and other environmental impacts of abstraction of hydro schemes from the water environment.

Effect of efficiency criteria

The proposed 'efficiency' criteria will:

- Eliminate development from the majority of High status rivers across the full range of run-of-river hydro schemes.
- Significantly reduce the development potential of Good status rivers.
- Eliminate the development of all sub 500kW schemes on rivers of High and Good status.

Existing schemes give a good indication of the type of projects that will be developed in the future. This is because existing schemes represent projects that are:

- Technically feasible
- Not disproportionately expensive
- Acceptable environmental impacts.

For a nominal run-of-river hydro scheme, as determined by analysis of our existing operational portfolio, the average capacity is 0.0023 GWh/y per metre of affect stretch regardless of the initial status of the water body.

If these projects where to be considered on rivers of High status, the average capacity would be 1.14 GWh/y per 500 metre of affected stretch.

SEPA proposed 'efficiency' criteria of 1.75 GWh/y per 500 m of affected stretch is much higher than that of current hydro schemes.

Rivers of High status that offer the characteristics of 1.75 GWh/y per 500m will be rivers of high flows and steep gradient.

Very few of these sites are available in Scotland and often such sites will have third party interests from recreation groups. Therefore, even if a proposed scheme does meet SEPA 'efficiency' criteria for high status

rivers, it is likely that such a project would not be acceptable on other grounds, such as its rarity value or impact on third party interests.

Equally, the proposed 'efficiency' criteria of 1.75 GWh/y per 1,500 m on rivers of Good status does not reflect current schemes that have been deemed to be technically and economically viable with acceptable environmental impacts, and as such again sets an unrealistic target for viable projects to achieve on rivers of Good status.

Recently consented hydro project illustrates clearly that the 'efficiency' criteria set for High and Good status rivers is not at an appropriate level.

An example of the inappropriateness of the **High** status criteria would be the 2.7 MW Cla Aig Hydro scheme, near Loch Arkaig, that has recently been granted a water licence by SEPA. This scheme will generate approximately 8 GWh/y and will affect approximately 3000 meters of **High** status water body.

The efficiency of this project, as defined under SEPA proposed 'efficiency' criteria, would be **1.33 GWh/y per 500m**. This is below the **1.75 GWh/y per 500m** for **High** status threshold proposed by SEPA.

An example of the inappropriateness of the **Good** status criteria would be for the a recently consented 1MW scheme in the Loch Lomond and Trossachs National Park that has received section 36 consent and a water licence.

The scheme will generate approximately 2.6 GWh/y and will affect approximately 2400 meters of a **Good** status water body.

The efficiency of this project, as defined under SEPA proposed 'efficiency' criteria, would be **1.63 GWh/y per 1,500m**. This is below the **1.75 GWh/y per 1,500m** for **Good** status threshold proposed by SEPA.

Through consent by the Scottish Ministers of the Section 36 planning application and the granting of a water licence by SEPA, it can be considered that this project has met the criteria for making a valuable contribution to Scotland's renewable targets while ensuring that the water environment is protected from significant adverse impacts.

This clearly demonstrates that the proposed 'efficiency' criteria for both **High** and **Good** status is not appropriate as it rules out the type of schemes that have very recently been deemed to be acceptable both by SEPA and the Scottish Ministers.

Technology Comparison

The 'efficiency' criteria has been based on the consideration of a wind turbine as a comparable alternative that would offer significantly better environmental alternative.

We **strongly object** to this principal as it:

- A wind turbine is not a fair comparison to hydro generating technology.
- Forces renewable technologies to compete with each other in an inappropriate manner.
- Provides an onerous and burden on the hydro developers to demonstrate that specific proposals

represent the best environmental option against other alternatives.

- Is counter to European Union Renewable Energy policy.

Hydropower generation offers very unique and different benefits to wind generation. It has a lower carbon footprint, lower visual and noise impact, and gives higher load factors with better 'fuel' to energy efficiency. SEPA insinuates that hydro has a lower load factor than wind by suggesting that a hydro scheme a quarter of the size of a 2MW turbine produces a third of the power, this is incorrect. Therefore the benefits are far wider than simply the electricity generated.

Also like hydro, wind generation can have impacts to the environment and to socio and economic issues. It does not make sense to reject a hydro scheme with a particular environmental, socio, or economic issues on the grounds of possible alternatives as an alternative renewable technology that will likely have a have far greater environmental, socio, or economic issues.

If a hydro scheme is not consented, the loss generating potential will result in conventional forms of generation not being offset with a loss of opportunity to contribute towards renewable energy targets. As such, the alternative to hydro would only be conventional forms of generation. Other renewable technologies could only be considered as an alternative once renewable energy targets have been met.

It is therefore not appropriate for SEPA to force a comparison between hydro and wind generating technologies. No renewable technology can be compared as an alternative to another renewable technology until all renewable technologies are equally developed.

Renewable Energy Policy

We believe that the 'efficiency' criteria approach undermines current European renewable energy policy.

Article 13 section 1 of the European Unions Renewable Energy Directive 2009 states that *Member States shall ensure rules concerning the authorisation, certification and licensing procedures that are applied to plants...for the production of electricity...from renewable energy sources...are proportionate and necessary.*

Article 13 Section 1(d) goes on to say that *rules governing authorisation, certification and licensing are objective, transparent, proportionate, do not discriminate between applicants and take full account the particularities of individual renewable energy technologies.*

Article 13 Section 1(f) also states *simplified and less burdensome authorisation procedures...are established for decentralised for producing energy from renewable sources.*

It would be impractical and burdensome for hydro developers to demonstrate that a specific proposal represents the best option against all other alternatives. Equally it is impractical for SEPA to demonstrate that other renewable technologies would provide significantly better environmental alternatives.

We consider therefore that hydro developers are being unfairly discriminated against relative to other renewable developers and the proposed 'efficiency' criteria introduces an assessment method that is not proportionate or necessary.

We therefore contend that the 'efficiency' criteria as proposed is counter to the objectives of article 13 of the European Unions Renewable Energy Directive 2009.

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?

Response

The mitigation measures identified in principal will minimise the impacts of hydropower schemes on the water environment. We have great concerns over the detail of the proposed mitigation measures as they go beyond current industry practice that has been found to be effective.

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

Protection of low flows

The proposed mandatory Q90 compensation flow for catchments greater than 10 km² is a significant change from current industry standard for river that contain no migratory fish. It would be impracticable and unnecessary for to operate a Q90 compensation flow for many type of schemes.

We understand that no ecological data or other evidence suggests that current industry standards of Q95 compensation flows on existing sites has lead to a significant environmental impact.

Protection of flow variability

Releasing increase volumes of water as outlined in section 1.1, 1.2 and 1.3 will have a major impact on the viability of hydro schemes and again would be impractical for many types of schemes to operate.

The proposed variability flow of Q80 at ADF as previously described in question 1, is over and above what is currently operated on existing sites.

Again we ask what evidence SEPA has to present that suggests the variability of compensation flows operated on current schemes is unsuitable.

Protection of high flows

Restricting the maximum abstraction to 1.3 – 1.5 (Q30) times ADF is a significant issue for the viable operation of hydro schemes.

The majority of RWE npower renewable schemes and viable projects in Scotland operate a maximum abstraction of approximately Q20 which is greater than 1.5 times ADF. Projects are sized at this level to maximise most efficient use of the water resource but also to achieve a commercially viable hydro electric scheme.

A reduction in maximum abstraction in combination with the proposed increase in compensation flows and compensation flow variability would effectively render most hydro schemes economically unviable.

Again, we are not aware of what ecological information has been used by SEPA to demonstrate that abstraction greater than 1.5 ADF will have a significantly increased environmental impact.

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?

Response

Current industry best practice and mitigation has been found to be effective with no evidence presented to suggest otherwise. Additional measures are not necessary.

Consultation Response

**Consultation Title: GUIDANCE FOR RUN-OF-RIVER HYDROPOWER
SCHEMES**

Date: 30.04.10

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SRPBA

SCOTTISH RURAL PROPERTY AND BUSINESS ASSOCIATION

Introduction

The Scottish Rural Property and Business Association (SRPBA) is a membership organisation that uniquely represents the interests of both land managers and land based businesses in rural Scotland. Our membership, which numbers around 3,000 in total and includes both those directly involved in active land management and professional members who advise clients, accounts for the majority of non-publicly owned land in Scotland. The SRPBA has members with run-of-river hydropower interests and also members with fishing interests. Therefore, we are well placed to give a balanced response to this consultation.

SRPBA General Comments on Run-of-River Hydropower Schemes

- The SRPBA believes it is important to consider the Scottish Government's targets relating to renewable energy and greenhouse gas emissions:
 - Renewable energy targets:* 20% of total Scottish energy use will be produced from renewable energy sources by 2020. 50% of the total demand for Scottish electricity will be supplied from renewable energy sources by 2020.
 - Greenhouse gas emissions reductions targets:* greenhouse gas emissions in Scotland will be reduced by 42% compared with 1990 levels by 2020 and by 80% by 2050.

It is in this context that we must consider this draft guidance for developers of run-of-river hydropower schemes. If the ambitious targets outlined above are to be achieved it is imperative that unnecessary restrictions and regulations are not placed on the renewable energy sector as a whole and on run-of-river hydropower schemes more specifically.

- However, the SRPBA does acknowledge that new run-of-river hydropower schemes must be developed in an appropriate manner to avoid an out of proportion deterioration of the water environment where they are to be established. The Scotland and the Solway Tweed River Basin Management Plans set ambitious targets for improving and maintaining the quality of rivers at good or better status between 2008 and 2027 (Table 1). Therefore, in order to meet these targets it is vital that run-of-river hydropower schemes are installed in a sustainable fashion.

| Scotland River Basin District | | | |
|--|------|------|------|
| Proportion of rivers in good or better condition (%) | | | |
| 2008 | 2015 | 2021 | 2027 |
| 56 | 63 | 71 | 97 |

| Solway Tweed River Basin District | | | |
|---|------|------|------|
| Number of rivers in good or better condition (rivers other than artificial and heavily modified rivers) | | | |
| 2008 | 2015 | 2021 | 2027 |
| 216 | 252 | 299 | 432 |

Table 1: Rivers in the Scotland and the Solway Tweed River Basin Districts at good or better status now and aspirations for the future.

- The SRPBA also has members with fishing interests and therefore we want to ensure that this guidance for run-of-river hydropower schemes adequately protects their interests. We believe that there are a number of ways in which run-of-river hydropower developments can exist alongside a healthy fish population. For example, intakes can be screened, fish-friendly Archimedean screws can be installed, plunge pools can be created below any drop over a weir



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and fish passes can be put into place. By implementing one or a combination of these measures it is possible for fish to move past a run-of-river hydropower scheme and for the two interests to successfully co-exist.

SRPBA Specific Comments on the Draft Guidance Document

- In its current format, the draft guidance is complicated to follow and very prescriptive. The tone of Part A suggests that this is a policy document rather than guidance and the title should reflect this.
- It is important that a positive 'can-do' approach is adopted with regards to run-of-river hydropower schemes in order to help achieve the renewable energy and greenhouse gas emissions targets outlined above. The SRPBA believes that the draft guidance takes a general presumption against run-of-river developments except where very strict criteria are met. This situation needs to be reversed and the guidance must actively promote run-of-river hydropower schemes while outlining that certain criteria should be met when developing a scheme.
- P5 footnote 3: *"A scheme with an installed capacity of 500 kilowatts typically produces around one third (1.75 gigawatt hours per year) of the output of a modern on-shore wind turbine"*. The SRPBA believes that this comparison of run-of-river hydropower with on-shore wind energy is inappropriate and suggests that SEPA is promoting wind energy over hydropower. Also, it fails to recognise the benefits of run-of-river hydropower compared with wind energy, such as run-of-river hydropower schemes are less visible than wind turbines.
- P5 (ii): *"SEPA will normally consider there to be a significantly better environmental option [if].....the output of the scheme compared to the length of river or stream it impacts is equivalent (pro rata) to less than 1.75 gigawatt hours per 500 metres in water bodies at high status"*. This is a very strict limit and very few existing schemes would pass this test. This proposal will create blanket no-go zones on high status rivers. It is particularly alarming that the 1.75 gigawatt hours appears to be an arbitrary value for a notional wind turbine.
- P5 (ii): *"SEPA will normally consider there to be a significantly better environmental option [if].....the output of the scheme compared to the length of river or stream it impacts is equivalent (pro rata) to less than 1.75 gigawatt hours per 1,500 metres in water bodies at good status"*. This test will not rule out all potential schemes but will significantly hinder Scotland from reaching its full run-of-river hydropower potential.
- P5: *"....deterioration of status is not permitted if there are significantly better environmental options for generating the equivalent amount of renewable energy"*. The SRPBA argues that no renewable technology can be compared as an alternative to another until all renewable technologies are equally developed. If a run-of-river scheme is not consented, the power that the scheme would have generated will be made up by the existing generation mix and not by another renewable technology. Therefore, the assertion that you could employ another renewable technology as a *"significantly better environmental option"* is not appropriate.
- The implementation of an arbitrary 100kW threshold is biased against farm-scale systems and discourages the development of run-of-river hydropower schemes which would help contribute towards meeting rural energy demands. The SRPBA realises that this threshold is based on the Ministerial Policy Statement on Hydropower and Water Environment Protection but we feel that it is inappropriate and should not be employed. The SRPBA believes that all schemes should be assessed on their own merits and SEPA's consent for a Controlled Activities (Scotland) Regulations 2005 (CAR) licence should be based on the benefits and impacts of that scheme on the water environment. Scottish Government Planning Policy states that *"Small schemes can provide a limited but valuable contribution to renewables output, local and national energy*



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requirements and towards tackling climate change. Planning authorities should not reject a proposal simply because the level of output is low" (Planning for Micro Renewables Annex to PAN 45 Renewable Energy Technologies, 2006). Therefore, it is inappropriate for SEPA to penalise schemes based on their size.

- The draft guidance ascribes no value to the potential for certain run-of-river hydropower schemes to assist remote and isolated communities and businesses to become less dependent on the grid and more self-sustaining by consuming the power that they produce. Instead it appears that SEPA has adopted the position that individual run-of-river hydropower schemes do not contribute a great deal towards the national renewable energy target and therefore should only be approved if they meet very strict criteria.
- The recently introduced Feed-in Tariffs (FITs) have made small scale renewable energy developments more attractive to potential developers. It is perverse that the UK Government is trying to encourage new renewable energy developments to take place through FITs while SEPA is trying to place extremely stringent criteria on such schemes. A positive approach must be adopted by SEPA to run-of-river hydropower schemes which enables land managers to benefit from the current incentives being offered by the UK Government in terms of FITs.
- The draft guidance only has one Annex which refers to sub-100kW schemes. Why has no Annex been produced for schemes greater than 100kW?

Conclusion

In summary, the SRPBA believes that it is imperative that a sensible balance is struck between protecting the water environment (in terms of biology, hydromorphology and physico-chemical quality) and renewable energy developments. Unnecessarily stringent regulations will hinder the development of run-of-river hydropower schemes and will be off-putting for potential developers. Therefore, guidance for new installations must be straightforward to follow and result in the delivery of healthy river systems which provide multiple benefits.

Ulster Angling Federation

Hydro-electric Power Generation

Comment on *"SEPA Guidance for developers of run of river hydropower schemes; Draft for public consultation"*

30-4-10

Summary

The standards proposed have clearly been drawn up to promote hydroelectricity at the expense of rivers; the proposals will provide insufficient protection, and degradation will result. It is very disappointing that the body charged with protection of the water environment should be so partial in its administration of the Guidance in favour of destructive forces. The proposals need to be changed to offer reasonable protection to the rivers. The document represents a significant failure on the part of SEPA.

1 Response to the Draft

1.1 Combined Answer to the following two questions;

PART A

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 ?

And

PART B

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?

Answer We do not agree.

The flows being left in the river are far too small. The proposed Hands Off Flows of Q90/Q95 are wholly inadequate and will not protect the rivers. The standards proposed have little or no scientific basis, and will condemn the rivers to long periods of low summer flows, for 65/75 % of the year. It does not say what is to happen when flows exceed Q30. The guidance on abstraction rates at 1.3 to 1.5 Qmean are destructive and represent a significant lowering of standards as compared to England and Wales - why should Scotland have such a markedly lower standard ?

In Table 2, fourth section, the reference to section 1.4 as ensuring “*Good status flows are maintained across the relevant flow range (ie flows up to Qn10) during periods of migration and spawning*” is calculated to mislead.

The relevant river flow standards are detailed in the Scotland River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) Directions 2009 and the Solway Tweed River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) (Scotland) Directions 2009.

These are very heavily qualified; there are so many “get-out clauses” that in effect they will provide no protection at all.

Generally the standards need to be changed to provide higher Hands Off Flows, certainly no lower than Q80; also the concept of the Proportional Take needs to be incorporated so that abstraction does not exceed 50 % at any time.

1.2 Page 6, note 8 (b)

“(b) stretches of rivers or stream that are locally not in a good condition but are part of a water body that is in high or good condition overall”

This is yet another “get-out clause” which allows permanent degradation of the river; it is calculated to give polluters/abstractors and SEPA an easy life, and consolidates degradation of the river.

1.3 Heading of PART B

The heading of PART B is particularly illuminating; “Draft mitigation SEPA considers likely to be practicable to include in run-of-river hydropower scheme developments”.

One might have expected this to be headed “Draft mitigation SEPA considers likely to be required for conservation in run-of-river hydropower scheme developments”.

However the actual wording clarifies that the purpose of this document is not to protect rivers, but to protect abstractors from the need to include effective mitigation. As a result, as stated above, the mitigation measures are wholly inadequate.

1.4 PART B clause 1.2

In PART B clause 1.2 the reference to “*not abstracting for six hours every Sunday from midday*” is most inept and is too short a time to make a significant difference.

1.5 Cumulative effects

The reference to assessment of the cumulative effects of multiple schemes again is misleading as this will only happen within “Water Bodies” as defined by the Water

Framework Directive - which means that certainly in excess of 90% of hydroelectric schemes will not be subject to any cumulative assessment at all.

2 General Comments

2.1 Best Practice on Salmon Migration

The following (in italics) is an extract from;

Cowx & Frasier 2003 Monitoring the Atlantic Salmon Conserving Natura 200 Rivers Monitoring Series No. 7

Cowx & Frasier (2003) note that river flow is one of the most important influences on upstream migrating salmon.

"There are three conceptual models to describe the influence of flow on upstream movement.

- *Adult salmon require certain minimum (threshold) flows to be exceeded before they will move upstream, and these flows are defined as percentages of the average flow. For salmon, 30–50% of the average flow is considered necessary in the lower and middle reaches of rivers (50–70% for large spring salmon) and >70% ADF in the headwater streams.*
- *Salmon tend to move only during certain parts of the hydrograph, usually the rising and falling limbs, or the falling limb only, rather than the spate peak.*
- *Two annual phases of movement occur with peaks in June to August and October to December"*
-

The present draft proposals will not allow sufficient flows to reach these recommended standards.

2.2 Protection of Natural Flows at Headwaters

Flowrates needed by fish to negotiate rivers and barriers to upstream migration have been examined by a number of researchers.

At the recent York Conference "Managing River Flows for Salmonids" (Jan 26th - 28th), it was a noticeable feature of the papers that the concept of increasing flows needed as fish move further up the system was quoted and supported by a number of speakers when presenting papers. The paper by Solomon et al supported earlier work by Solomon showing that flows in the region of Q50/Q65 were needed in headwaters to provide adequate flow for movement of fish through the system.

19 Single Minimum Flow and Proportional Take

The following is an extract from; Butterworth, Dr A. J. 2009 Hydropower; The Effect of Flows on Fish Populations and Continuity (personal paper)

"For any fish, but particularly for salmonids, flow reduction and flow variability may impact all life stages, from egg to adult, since each life stage has its own specific requirements. Some people think that the ecology of a stream can be protected provided there is a 95%ile flow (i.e. the flow which is exceeded for 95% of the time). This is a dangerous and unproven assumption.

Historically, flows have been protected by means of a single prescribed flow condition on a licence. However, it is now recognised that this approach may result in a severe impact upon the aquatic environment by prolonged periods of low flows, a particular risk with hydropower schemes involving diversion of flow from the main stream or river. Therefore, in addition to safeguarding a low flow, it is important to provide for adequate flow variability in the deprived reach of a watercourse.

The latest research work carried out on Hydro Electric Schemes demonstrates a clear understanding that there needs to be some means of ensuring that in the depleted stretch a flow regime remains which resembles the natural flow regime of the river.

It is not reasonable to set a hands off flow and then destroy the natural river flow regime for all flows in excess of the hands off flow until high flood levels are reached when surplus water is available for the depleted stretch. It is now understood and appreciated that the depleted stretch resulting from non-consumptive abstractions needs to retain a reasonable element of the natural flow regime;

It has been argued that as hydropower water take is non-consumptive, then it should be treated more favourably than consumptive abstractions. However, for reaches of rivers, including weirpools, that are subjected to a reduced flow regime, then from ecological and fish migration aspects, it is consumptive".

It is emphasized that the sole application of a Single Minimum Flow (HOF) on its own will not provide sufficient protection of the ecology of the dewatered stretch. This can only be achieved by a combination of the HOF and a Proportional Take, acting together. The abstraction from the river should be a "Proportional Take" of the available flow in the river.

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- Solomon, Milner, Smith January 2010 Migration into and Through Rivers
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- Various departments within the Irish Government; October 2007 Guidelines on the Planning, Design, Construction and Operation of Small Scale Hydro-electric Schemes and Fisheries

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Water Policy Unit,
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FK9 4TR

29th April 2010

Dear Water Policy team,

The Salmon & Trout Association (S&TA) is grateful for this opportunity to respond to SEPA's draft sub 100 kilowatt run of river hydropower schemes Guidelines.

S&TA was established in 1903 to address the damage done to our rivers by the polluting effects of the Industrial Revolution. For 107 years, the Association has worked to protect fisheries, fish stocks and the wider aquatic environment on behalf of game angling and fisheries. In 2008 it was granted charitable status. S&TA's charitable objectives empower it to address all issues affecting fish and the aquatic environment, supported by strong scientific evidence from its scientific network. Its charitable status enable it to take the widest possible remit in protecting salmonid fish stocks, and the aquatic environment upon which they depend.

We would like to make the following comments to specific questions:

- 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?*

S&TA has concerns over what constitutes a 'degraded part of the water environment'. Under the Water Framework Directive, there is a responsibility to achieve good ecological status or good ecological potential in all water bodies.

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Adverse impact on the environment from badly constructed or sited hydropower schemes could jeopardise this responsibility.

Small, steep streams could well be important locally for spawning salmonid species. In particular, one of the outcomes of the 1st International Sea Trout Symposium at Cardiff University in 2004 was the importance of small, sometimes tiny, streams for sea trout spawning.

Overall improvement of the aquatic environment would have to be significantly evidenced. For example, where a presently impassable obstruction could accommodate a hydropower scheme incorporating a new fish pass might constitute environmental improvement. However, so might total removal of the obstruction.

S&TA would recommend that, as well as prospective developers contacting SEPA at an early stage in the planning process, they should also contact other local stakeholders, especially fisheries interests.

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?*

S&TA would not support any other circumstances under which sub-100 kilowatt hydropower schemes would not pose a risk to the aquatic environment. On the contrary, we are particularly concerned that other EU countries are decommissioning hydropower schemes in the light of addressing WFD objectives, while the UK seems determined to encourage development, despite evidence that sub-100 kilowatt installations can have individual and cumulative impacts on the environment, particularly fish passage. S&TA would rather see a programme of removing redundant man-made obstructions wherever possible to improve the connectivity of river systems for all water-dependent biodiversity.

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.*

S&TA would be concerned if too much emphasis is placed on generic criteria. We believe that hydropower schemes should be assessed within an integrated catchment management plan with the objective of reaching good ecological status as defined by the WFD. Each hydropower scheme should therefore be assessed on an individual basis, however closely aligned its situation may be to the generic criteria.

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4. *Do you agree that the draft criteria on the efficiency of scheme of 100 kilowatts or more (in terms of energy output per length of river stream affected) will help; 1) deliver Scottish Ministers objective of optimising the use of the resource, 2) ensure deterioration of status is not caused where there are significantly better, 3) environmental options for generating the same quantity of renewable energy?*

Again, S&TA is concerned about the emphasis placed on generic criteria. In particular, we are unconvinced of the public benefit derived from present cost benefit analysis of hydropower schemes in terms of environmental impact. We believe that full valuation techniques of the benefits derived from ecosystem services should be established for all work associated with the aquatic environment, and that these should also be applied to the potential damage that developments, such as hydropower schemes, could cause.

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?*

S&TA has serious concerns over some of these generic criteria as follows:

- Evidence suggests that it is impossible to set generic flow criteria for all hydropower schemes. This is because migratory fish require greater flow to encourage migration over obstructions the higher up the river system they travel. The flow requirements for a fish in upland areas to encourage fish to reach spawning habitat is therefore greater than at the first obstructions they encounter in the lower river on their homeward migrations.
- We have grave concerns over the suggestion that because habitat upstream of a proposed hydropower development might not be suitable for fish, it should be written off as such. The WFD requires water bodies of less than good status to be raised to such, and therefore every effort should be made to abide by WFD objectives in water bodies which fish might normally reach (not obstructed by naturally impassable barriers).
- Fish held up at barriers on both outward and inward migrations have the potential for serious impact on fish stocks. Migrating smolts held up on downward migrations are susceptible to increased predation, and evidence suggests that the cumulative effect of multiple obstructions can lead to the loss of the fishes' ability to smoltify and successfully enter seawater. Low flow barriers to upwardly migrating adults can stop them reaching prime spawning habitat, so impacting on the overall productivity of the river system.
- We are unconvinced of the efficiency of many fish passes, many of which are designed only for the passage of salmonids, whereas the WFD requires management for all fish species likely to be present in a river system –

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particularly relevant to eels. Wherever practical, S&TA would like to see the adoption of rock ramp or natural channel passes, which allow more efficient migration routes for all relevant fish species and also aquatic invertebrates, so greatly improving the connectivity of river systems.

- S&TA is unconvinced that any hydropower turbine is entirely fish friendly, and therefore all turbines should be screened with appropriate sized mesh set at correct angles so that fish are not sucked against screens. This is particularly important for downward migrating smolts and eels.

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

Once again, S&TA believes that hydropower schemes must be assessed on an individual basis to ascertain whether or not mitigation is practical. Where mitigation is assessed as being impractical, the precautionary approach must be adopted and therefore there must be an assumption against allowing development. Indeed, we believe that the WFD and, where relevant, the Habitats Directive (under which Atlantic salmon and eels are designated Annex 1 protected species) demands this.

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.

We refer to answers already given. S&TA believes that to evaluate individual hydropower schemes in isolation to the requirements of the whole catchment – and all potential environmental stressors – is bad management practice. It will therefore be necessary to assess whether a particular hydropower scheme can fit into an overall catchment management strategy without impact. The amount of energy which can be generated by sub 100 kilowat run of river hydropower schemes is likely to be so low as to make any significant environmental impact totally unacceptable. Indeed, under the WFD, it is also likely to be illegal, especially if full ecosystem service valuations are undertaken.

Yours sincerely,



Paul Knight
Chief Executive

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Paterson, Kevin

From: Jennifer Dodd
Sent: 30 April 2010 11:56
To: Hydro Consultation
Subject: Comment on - Guidance for developers of run-of-river hydropower schemes
Follow Up Flag: Follow up
Flag Status: Completed
Attachments: Hydropower__Comms_JDodd.doc

Dear,

I am a PhD student at the university of Glasgow studying long-term trends in factors influencing macroinvertebrate distribution in river in west central Scotland. I have attached some comments regarding the consultation document "Guidance for developers of run-of-river hydropower schemes".

Regards,

Jennifer Dodd

Environmental impact of sub-100 kilowatt schemes in relation to invertebrates

Invertebrates form the corner stone of aquatic ecosystems, providing food for higher animals (fish, birds), processing of material within the river system and some are of a high conservation value. These animals also provide a simple and effective monitoring tool and for these reasons should play a greater role in the guidance so far detailed.

Specific concerns relating to the building of sub-100 kilowatt hydropower schemes:

Temperature:

The small size, reduced width and depth, of upland rivers and streams make them particularly sensitive to temperature change. Recent work (Durnace & Ormerod, 2007) has highlighted the impact small temperature shifts have on macroinvertebrate species composition and abundance in these systems. Temperature increases associated with hydropower generation have been shown to alter macroinvertebrate life history (Raddum, et al., 2008). Temperature shifts (even very small) associated with hydropower generation may exacerbate problems in headwater streams which are already under pressure from climate change. Losses associated with this are of major conservation concern, particularly if obligate, cold water species are lost from their limited high altitude range.

Flow:

LIFE (Lotic invertebrate Index for Flow Evaluation; Existence et al., 1999) provides an index for evaluating flow with specific regard to aquatic invertebrates. Using those species present to type a site's flow this index should be considered as a monitoring tool if a hydropower scheme is given the go ahead. The more sedentary nature of macroinvertebrates, compared with fish, almost certainly makes them more susceptible to flow alterations. This type of monitoring should be included in the site assessment process as, if there are particular species susceptible to flow alteration this must be considered.

Dispersal:

To what extent the hard structure of these hydropower systems would affect the dispersal of those groups with an adult flight stage, is not known well. There has been some work looking at the effects of fragmentation on caddisfly dispersal through road culverts (Blakely, et al., 2006) which were shown to negatively influence upstream recruitment. It is likely that the effects of hard structure are going to affect upstream movements of those species with poor flight capabilities.

Definitions within the consultation document:

Part A, Section 1 – Sub-100 kilowatt schemes (page 4)

01/01/2011

"Likely acceptable schemes include those:

- situated in degraded parts of the water environment"

This needs a much clearer definition. If falls into the WFD category of "heavily modified" then construction of a scheme is likely to be suitable. However, as many of these

- "small steep streams"

are usually not degraded as, are generally not found in urban localities this requires much clearer definition and consideration in light of the concerns raised above.

References:

Blakely TJ, Harding, JS, McIntosh, AR & Winterbourn MJ 2006 Barriers to the recovery of insect communities in urban streams. *Freshwater Biology* 51:1634-1645

Durance I & Ormerod SJ 2007 Climate change effects on upland stream macroinvertebrates over a 25-year period. *Global Change Biology* 13:942-957

Extence, CA, Balbi, DM & Chadd, RP 1999 River flow indexing using British benthic macroinvertebrates: A framework for setting hydroecological objectives. *Regulated Rivers: Research and Management* 15:543-574

Raddum, GG, Fjellheim, A & Velle G 2008 Increased growth and distribution of *Ephemerella aurivilli* (Ephemeroptera) after hydropower regulation of the Aurland catchment in Western Norway. *River Research and Applications* 24:688-697

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Jennifer Dodd

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The small size, reduced width and depth, of upland rivers and streams make them particularly sensitive to temperature change. Recent work (Durnace & Ormerod, 2007) has highlighted the impact small temperature shifts have on macroinvertebrate species composition and abundance in these systems. Temperature increases associated with hydropower generation have been shown to alter macroinvertebrate life history (Raddum, et al., 2008). Temperature shifts (even very small) associated with hydropower generation may exacerbate problems in headwater streams which are already under pressure from climate change. Losses associated with this are of major conservation concern, particularly if obligate, cold water species are lost from their limited high altitude range.

Flow:

There has been an index for flow evaluation created specifically for the assessment of macroinvertebrates; LIFE (Lotic invertebrate Index for Flow Evaluation; Existence et al., 1999). This uses those species present to type a sites flow and should at least be considered as a monitoring tool if a hydropower scheme is given the okay. The more sedentary nature of macroinvertebrates, compared with fish, almost certainly makes them more susceptible to flow alterations. This type of monitoring should be included in the site assessment process as, if there are particular species susceptible to flow alteration this must be considered.

Dispersal:

To what extent the hard structure of these hydropower systems would affect the dispersal of those groups with an adult flight stage, is not known well. There has been some work looking the effects of fragmentation on caddisfly dispersal through road culverts (Blakely, et al., 2006) which were shown to negatively influence upstream recruitment. It is likely that the effects of hard structure are going to affect upstream movements of those species with poor flight capabilities.

Definitions within the consultation document:

Part A, Section 1 – Sub-100 kilowatt schemes (page 4)

“Likely acceptable schemes include those:

- situated in degraded parts of the water environment”

This needs a much clearer definition. If falls into the WFD category of “heavily modified” then construction of a scheme is likely to be suitable. However, as many of these

- “small steep streams”

are usually not degraded as, are generally not found in urban localities this requires much clearer definition and consideration in light of the concerns raised above.

References:

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Contact:

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Response from the Wild Trout Trust to the SEPA draft Guidance for Developers of Run-of-the-River Hydropower Schemes, April 2010.

The aspiration for transparency and an avoidance of formulaic determination of applications for hydropower schemes expressed in the supporting document WAT-RM-34 is to be welcomed in that each application will be considered on a case-by-case basis. Implicit in this aspiration is an acceptance that the ecological status of all Scottish waterbodies is thoroughly understood by SEPA or other responsible bodies; where this is not the case, detailed and independent Environmental Impact Assessment by an applicant is essential – I believe that this draft guidance should place greater emphasis on this need.

I am concerned that the draft guidance implicitly accepts exploitation for hydropower of degraded parts of the water environment (e.g. pages 4 & 13 of main guidance and page 12 of WAT-RM-34). Surely the primary focus of SEPA in such circumstances should be to address the causes and effects of the degradation rather than consent a further (potential) stressor on such environments?

The comments under the questions below emphasise the need for a precautionary approach to protect valuable components of the biota potentially threatened by hydropower which in many situations fails to deliver viable, sustainable returns.

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?

Not in all situations. The need for individual and fully informed consideration of proposals is essential.

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.

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.

I have concerns over Q4 of Checklist B which supposes that SEPA (or other responsible authorities perhaps) are fully aware of all significant ecological components of coastal burns which may be very important spawning streams for sea trout but as yet not recognised by SEPA. Again, I think there is a need for caution.

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?

I retain strong reservations as these comments illustrate.

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?

There is comprehensive guidance on provisions for migratory fish but I believe there are questions to be answered in relation to flows. For example, periods of high, winter energy demand coincide with salmonid migration and spawning seasons and the mitigation measures proposed (such as the flow Qn90) may well not adequately protect either migration or spawning.

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

There is practical and practicable guidance in the document. However, page 7 recognises the document represents SEPA's current view which can be reviewed and updated as scientific knowledge increases. The document does not appear to address how consented hydropower schemes can be modified (perhaps to the point of non-viability) in the face of new scientific knowledge.

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 comment.

S.R. Leonard
Director, Wild Trout Trust, April 2010

Paterson, Kevin

From: Gary Houston
Sent: 30 April 2010 12:48
To: Hydro Consultation
Subject: Hydro consultation
Follow Up Flag: Follow up
Flag Status: Completed
Attachments: SEPAhydroresponse.doc

We support this submission by UAF,

Gary Houston
Hon. Secretary
Lveagh Angling Club

[Click here to report this email as spam.](#)

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Alvie & Dalraddy Estates

Our ref: Response hydro guide SEPA / JDAW

10 January, 2011

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Consultation on SEPA Guidance for Run-of-River Hydropower Schemes

Thank you for the opportunity to respond to your Guidance for developers of run-of-river hydropower schemes. Given the ambitious renewable energy targets set by the Scottish Government we regard your proposed guidance depressingly negative in content and emphasis. It appears to be all about prescriptive criteria for impeding and refusing hydroelectric generation proposals rather than enabling such proposals. If these impediments to future run-of-river hydro schemes are implemented as proposed we cannot see the Scottish Government's renewable energy targets being met.

Sub-100 kW schemes

Almost all hydro-electric schemes will have some adverse environmental consequences; however these should be balanced against the requirement for a viable economy and the consequences of continuing to generate electricity from fossil fuels, relying on imported fuels to generate a large proportion of the electricity that we consume and distributing the electricity generated relative long distances.

Supplying electricity to the nation requires generation of the electricity and distribution to the consumers. Distribution to consumers in remote locations can be relatively more expensive due to the length of the transmission lines per consumer. Scotland is fortunate in that many remote consumers are located in areas where there is adequate water and elevations to generate electricity locally from renewable resources. This should be encouraged and will be essential if the Scottish Government is to achieve its renewable energy targets.

Any perceived adverse impacts on water quality should be balanced against the alternative of generating electricity from non renewable resources plus the financial and environmental costs of distribution. If the renewable energy targets set by the Scottish Government are to be met there will need to be some compromises in regard to the ecological quality of the water environment.

100 kW + schemes

Some of these schemes have the opportunity to provide a vital economic stimulus in rural communities. Schemes should be supported where they can make a significant contribution to the economic viability and sustainability of local communities and reduce their reliance on electricity generated from non renewable resources.

Even relatively small hydro-electric generation schemes can play an important role in generating electricity at times when wind turbines are unable to operate at their design capacity or where wind turbines are considered inappropriate due to landscape or environmental impacts.

A larger proportion of Scotland's landmass is made up of sparsely populated areas with relatively remote communities in comparison with Germany. Just because Germany has currently decided not to financially support hydro-schemes of less than 500 kW if they compromise the water environment does not mean that they should not be supported in Scotland. Many communities in Scotland could be self sufficient in electricity if they installed a sub 500 kW scheme.

We don't believe there is any justification for imposing restrictions such as less than 1.75 gigawatt hours per 500 metres or per 1,500 metres. Every scheme should be judged on its contribution to the local economy, community and the government's renewable energy targets balanced against the perceived adverse environment impacts.

Q1 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 renewable energy targets set by the Scottish Government will require the proportion of Scotland's energy demand provided by renewable resources to increase to 50% by 2020; this will require a major expansion in hydro-electric schemes. This will include modifying water courses throughout Scotland, many of which will have not been modified previously. The Scottish Government's targets will only be achieved if government regulatory bodies such as SEPA take into account these targets and judge the possible adverse ecological impacts of individual hydro scheme proposals against the consequences to the nation's economy, society and environment by failing to reduce our dependence on non renewable and ecologically damaging energy production.

We consider many of the flow impact mitigation proposals in Part B to be too prescriptive and arbitrary. We envisage these proposed criteria creating unreasonable and unnecessary barriers to Scotland achieving the government's renewable energy targets.

Q2 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?

Almost any modification of water courses will have some adverse impact on its ecological status. However this should be considered against the greater need for our society to reduce its reliance on non renewable fossil fuels and reduce carbon emissions.

The environmental and economic impact of providing energy includes both the impact of energy generation and the impact of distribution. Hydropower provides the opportunity for electricity to be generated closer to its source of consumption and from renewable resources. We believe the net environmental and economic gain from a proliferation of sub 100 kW run-of-river hydro schemes far outweigh any adverse ecological consequences in most circumstances.

Q3 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 consider the checklist format as useful if used as a general guide but not as prescriptive criteria for all sub 100 kW schemes. We are concerned that the stated criteria will be used to unreasonably and unnecessarily restrict the production of renewable energy from hydro schemes.

Q4 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.

The Scottish Government's overall objective is to make our nation less reliant on non renewable energy sources while at the same time reducing our carbon emissions. When considering other options for generating electricity from other renewable technologies SEPA should take into account that hydro is likely to be producing electricity when there is insufficient wind for a wind turbine in that locality to operate. Hydro also tends to be more cost effective per kWh generated than electricity generated from wind, wave or biomass and produce less carbon emissions. SEPA should take economic and social considerations into account, not just environmental factors.

Q5 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?

Yes.

We believe the proposed criteria will minimise adverse impacts on the water environment by eliminating most of the opportunities available for generating renewable energy from run-of-river hydro schemes. It will not however achieve the Scottish Government's renewable energy or carbon emission targets. It does not consider, compare or judge adverse impacts on the water environment against environmental, social or economic gains that would be achieved if a hydro scheme proposal is implemented.

Q6 Do you agree that, in general, the mitigation identified is likely to be practicable? If not, please give your reasons for this view.

No.

The proposed criteria for restricting hydropower proposals do not take into account the relative value of generating electricity from renewable resources at that location compared with the likely adverse impact the hydro scheme might have on the ecology of the water course.

Q7 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?

We disagree with the approach taken by SEPA. We would prefer to see a more positive approach that will assess the environmental, economic and social gains that will be generated by the proposed hydro scheme against the possible adverse impacts on the ecological condition of the water course. SEPA should also consider adjustments to the proposed scheme that will mitigate these adverse impacts without compromising the overall economic viability or environmental gains achieved by the scheme being implemented.

Yours sincerely,

Jamie Williamson

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THE RIVER DON TRUST- *"River in harmony"*

River Don Trust, Old Estate Office, Cluny Castle, Sauchen, Inverurie, AB51 7RT

Tel 01330830080 Email biologist@riverdon.org.uk Web www.riverdon.org.uk

Hydro Consultation

Water Policy Unit

SEPA Corporate Office

Erskine Court

Castle Business Park

Stirling

FK9 4TR

Dear Sir/Madam

28th April 2010

Please find the following comments from the River Don Trust on SEPA's draft consultation document for the Guidance for developers of run of river hydropower schemes dated March 3rd 2010.

The River Don Trust is an independent charitable Trust briefed to contribute to river and fishery management for the benefit of all fish species living within the aquatic habitat of the River Don catchment. We are pleased to be able to comment on this draft document and wish to be informed of any further consultation documents.

The RDT has been dealing with several RoR macro and micro hydro schemes over the past year and has found the current guidance lacking considerably in terms of detail and content. This has resulted in some schemes being questionably granted abstraction and others nearing the later stages of the process without adequate guidance for developing and identifying their potential impacts. As a result a lot of time has been wasted by all parties involved, the developer, their hydro power consultants and both the time of the Don DSFB and the River Don Trust.

Overall we are very pleased with this completed version of the draft document and look forward to the final document in due course.

The River Don Trust is a charity registered in Scotland, No: SC036015.

Registered Office: Messrs. Burnett & Reid 15 Golden Square Aberdeen, AB10 1WF

The River Don Trust is a charity registered in Scotland, No: SC036015

Directors: I. Morrison, A.J.F.Wallace, Dr. S.A. M. Martin, R. Dey, R. Fyffe, D. Mckay

Web Site: www.riverdon.org.uk

The Rivers and Fisheries Trusts for Scotland and the Atlantic Salmon Fishery Board have also provided comments which we have reiterated along with our own additional comments.

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 water bodies 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 water bodies 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 water bodies very difficult.

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.

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.

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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.

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.

We would also welcome advice on the placement of Archimedes screw type turbines, as we have been made aware of the intention to run these types of turbines directly back into the flow of the water body without the need for a tailrace. Our concerns lie with the potential impacts on the hydro morphological status of the water body directly downstream of the scheme.

13) Page 13, 2.1 Provision for downstream passage of fish (all species) B Weir design Paragraph 3

"No part of the weir or plunge pool may be constructed of unconsolidatedbecome trapped or injured." We would also welcome the statement that the design of the structure itself not including the materials used must not potentially trap any fish and prevent any passage downstream.

14) Page 13, 2.1 Provision for upstream passage of fish, final paragraph

We would welcome the recognition that various requirements for different life stages of fish species should also be considered in the statement that the fish passages should only operate during periods of fish migration.

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The River Don Trust is a charity registered in Scotland, No: SC036015

Directors: I. Morrison, A.J.F.Wallace, Dr. S.A. M. Martin, R. Dey, R. Fyffe, D. Mckay

Web Site: www.riverdon.org.uk

15) Page 17 – B Fish pass design – Eels requirements paragraph 2

We would also welcome the suggestion that covers be fitted to the fish pass troughs to prevent any predation and light pollution as recommended by Solomon and Beach footnote 17.

16) 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.

17) Page 19, Management of sediment accumulating upstream of weir, Paragraph 3

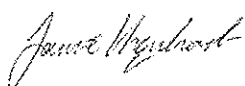
Where an existing weir is to be used and sediment loads have built up it should be consider that existing juvenile stages of lampreys may be present in the sediment.

18) 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.

We hope that you find these constructive comments helpful

Yours sincerely



Jamie Urquhart

River Don Trust Biologist

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Web Site: www.riverdon.org.uk

Paterson, Kevin

From: TOM
Sent: 30 April 2010 13:59
To: Hydro Consultation
Subject: SEPA Guidance Consultation
Follow Up Flag: Follow up
Flag Status: Completed

I write in support of the Ulster Angling Federation submission on this consultation.

Yours,

Tom Lavelle

UAF/Glens Angling Club

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Paterson, Kevin

From: Steven Turnbull [steven@jmt.org]
Sent: 30 April 2010 14:15
To: Hydro Consultation
Subject: Response: Guidance for developers of run-of-river hydropower schemes
Follow Up Flag: Follow up
Flag Status: Completed

John Muir Trust response to public consultation on "Guidance for developers of run-of-river hydropower schemes"

As a wild land conservation charity, the John Muir Trust is generally supportive of appropriately-sited renewable energy schemes, including small-scale hydropower schemes, provided that they do not cause negative impacts on wild land or other remote, sensitive locations.

This consultation document seeks to enable the widespread development of hydropower schemes across Scotland in order to help meet Scottish Government targets for both renewable energy (electricity) production and a reduction in carbon / greenhouse gas emissions, while at the same time preserving the *status quo* of river-based flora and fauna and potentially enhancing local ecosystems.

The Trust is satisfied that the approach identified in the consultation document will be beneficial to developers, planning authorities, regulators and others with a vested interest in the protection of river-based flora and fauna and, as a consequence, we will not be commenting directly on the questions raised on page three of the consultation document.

However, we are concerned that the focus of the guidance provided has been entirely towards the "in river" impacts, i.e. the protection of ecosystems within the banks of identified watercourses. Whilst these are likely to be the predominant issues relating to any future development proposal, we feel it is necessary to highlight the potential impact such schemes can have on flora and fauna on the periphery of watercourses, even if all of the best practice criteria identified in the guidance is applied correctly.

We cite the example of the proposed run-of-river scheme at the Falls of Moness, within the Birks of Aberfeldy SSSI, and the impact it would have on the small cow wheat plant (*Melampyrum sylvaticum*), a Category 1 protected species in the UK Biodiversity Plan.

The developer agreed abstraction rates with SEPA that would pass the criteria identified in the guidance document. However, as noted by the Royal Botanical Society (RBS), this plant requires high levels of humidity to survive, and this is usually provided by spray from an adjacent watercourse. The agreed rate of abstraction meant that spray may not occur to the same extent, causing potential desiccation of plants and loss of local populations.

This is a clear example whereby the developer (and SEPA) would have done everything correctly according to the guidance, but a failure to consider potential wider impacts of the proposal on the local ecosystem could have led to significant (but unintentional) negative impacts on biodiversity levels, culminating in the destruction of a protected species.

We request that further consideration be given to including some guidance on how the associated impacts from run-of-river hydropower schemes on land-based ecosystems can be identified, evaluated and mitigated against during development, so as to avoid the potential for unintended negative environmental impacts in future.

Kind regards,

Steven Turnbull
 Policy Officer

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30 April 2010

Dear Sirs

FISHERIES (ELECTRICITY) COMMITTEE RESPONSE TO SEPA AND NATURAL SCOTLAND GUIDANCE FOR DEVELOPERS OF RUN OF RIVER HYDROPOWER SCHEMES: DRAFT FOR PUBLIC CONSULTATION (3 MARCH 2010).

Thank you for the invitation to comment on the draft Guidance for developers of hydropower schemes. The Committee welcomes the opportunity to take part in the consultation and provide written comments. The document has been discussed at recent Committee business meetings and this letter constitutes the Committee's formal response.

1. Overview

The Committee supports the concept of Government and Regulators providing guidance to developers and operators of hydroelectric power (HEP) schemes.

The Committee recognizes the ongoing growth of new HEP schemes and, because of the sensitivity of the areas unexploited, regards the opportunity for further development of large scale-scale schemes as quite limited. In contrast, subject to careful planning and design, there may be significant opportunities for smaller scale, usually run-of-river (ROR), HEP development and, so, the publication of this guidance is relevant and timely. The Committee is pleased, too, that Scottish Ministers and SEPA acknowledge the importance of affording protection to wild fish stocks and fisheries.

The Committee also supports the principle of encouraging developers towards fewer and bigger ROR schemes that will provide significant energy benefits to balance against any associated environmental impacts. As the Committee has long argued, it is preferable to avoid, as much as is reasonably possible, a nationwide rash of very small hydros that, even together, make a fairly insignificant contribution to the Government's national renewable energy targets, while potentially risking local and/or cumulative damage to fish populations and their associated fisheries if badly located, designed or operated

In the Committee's experience, the smallest hydro schemes have tended to be promoted by interests working with limited resources who are not always able to engage adequate expert advice. This can lead to a poor understanding of both the potential impacts of their plans on fish and fisheries and the levels of mitigation that are likely to be required. The Committee, therefore, welcomes the development of a basic guidance framework that will underpin a rigorous process of regulatory scrutiny irrespective of scheme size.

Whilst noting the brief opening comments detailed on Page 2, the Committee is concerned that some developers may regard the guidance as constituting an outline specification.

Moreover, against the current background of limited regulatory resources, it is concerned that outline designs that are broadly consistent with the guidance may be deemed to be acceptable by the Regulator without individual scrutiny taking account of local circumstances. It is very important, therefore, that all users of the guidance fully understand that it refers to one part only of the larger and more detailed CAR determination process and that it is no more than a tool to facilitate an initial screening of new applications which, even if they meet the screening criteria, will still be subject to individual scrutiny. It must NOT represent a stepping-stone towards consenting and regulation via a check-list assessment approach only. Any subsequent revision of the guidance resulting from the ongoing consultation should include a new and highlighted section at the front of the document that details a clear and unambiguous statement about the purpose and limitations of the guidance and how it will be used.

The draft guidance and its associated consultation questions reflect a wide range of important and complex issues. Consequently, the Committee would have preferred that a document of this kind would have been peer-reviewed by an independent technical advisory group before being put out to public consultation.

In addition to publishing guidance, SEPA must take steps to ensure that new hydro schemes are inspected more rigorously especially during the construction phase and at (or about) the point of becoming operation. Despite much effort being spent on "getting things right" at the "front end" of the CAR authorization process, it is concerning that some recently constructed new schemes have been built without proper provision for the safe passage of fish and have had to be modified retrospectively. It would be advantageous to identify and correct defects while scheme are being built and all licences should include a requirement for new schemes to be certified for compliance with the licence conditions/approved design drawings etc within 3 months of becoming operational. The Committee firmly believes that all aspects of the authorization, implementation and monitoring of CAR schemes should be undertaken only by suitably qualified and experienced personnel.

The Committee strongly recommends that an annual technical audit of a selection of new schemes should be undertaken annually and the findings considered by FFAG to improve confidence that mitigation measures are being properly applied.

2. Responses to Consultation questions

Part A (Criteria – sub-100 kilowatt ROR schemes)

Q1. Response: Agree.

The Committee considers that the development of well designed ROR HEP units on small, high gradient systems that do not contain significant fish resources (and associated critical habitats) is unlikely to have a significant impact on Scotland's fish resources and fisheries. However, where applicable the Committee recommends the potential cumulative impact of a number of such schemes on fish and fisheries should always be rigorously assessed.

Q2. Response: No.

The Committee considers it is unlikely that there are any other circumstances whereby sub-100KW schemes could be developed that will not pose a risk to the freshwater environment. This is primarily because the draft guidance currently fails to recognize the potential risks posed to fish and fisheries by poorly sited and designed Archimedean screw HEP systems.

Note: It is possible that sub-100 KW schemes could possibly be developed on existing outfalls etc. within adequately screened facilities operated by other water users without posing a risk to the water environment.

Q3. Response: Qualified agreement.

The Committee's views on the inherent risks associated with check-list based assessments are well known and highlighted in Section 1 of this response. Nevertheless, it considers such an approach for the purposes of assisting developers and their advisors to consider their preliminary proposals critically via a tiered approach (based upon appropriate criteria) would probably be helpful. The addition of photographs illustrating key features of design and good practice may also probably prove useful.

The Committee strongly recommends that the development of the guidance must NOT represent a stepping-stone towards regulation via a check-list assessment approach only.

Part A Criteria – 100 kilowatt+ ROR schemes.

Q4. Response: Not currently able to agree or disagree.

The Committee welcomes the introduction of a system of scrutiny by the Regulator whereby new HEP applications will be reviewed in relation to other possible options for generating the same quantity of renewable energy. However, it is currently unclear how such a system of scrutiny is likely to operate and its vulnerability to challenge.

The Committee recommends that the Regulator acts at all times to ensure that any water that is abstracted for HEP purposes is used in the most efficient way possible.

The concept of scheme 'efficiency' measured in terms of energy generated in relation to the spatial scale of impacts on the aquatic environment is new and potentially controversial. The underpinning criteria must therefore be scientifically robust and open to independent scrutiny. Currently, there is insufficient information for us to be confident that the criteria outlined are appropriate. The Committee would therefore wish to see copies of the relevant technical papers that underpin the thresholds quoted (defined currently only in terms length of river that is presumed to be impacted) in order that it can be confident that the potential risks to fish and fisheries have been adequately taken into account.

Part B Mitigation measures

Q5. Response: Qualified agreement.

The Committee agrees that some of the examples of mitigation outlined in the draft guidance will help to REDUCE the impact of new HEP developments.

Whilst welcoming the clear acknowledgment that different levels of flow are important, the Committee considers the application of generalised 'off the shelf' flow standards without due regard to local circumstances (e.g., channel form and local biota requirements) as posing potentially serious and unnecessary risks to fish resources and the fisheries that depend upon them.

For the purposes of providing suitable mitigation the water requirements, design and operation of a scheme are usually more important than levels of power generation *per se*. The Committee is therefore disappointed that so many of the criteria outlined in section 1 (Part B) are defined via a series fixed flow thresholds. The Committee notes that the underlying basis and relevance of many of the figures quoted in relation to fish and fisheries is not detailed, and wishes to see the relevant supporting data and information attached as part of an Appendix.

The Committee's advice is that where fish are present any substantive licensing decisions made on the basis of generalised fixed-flow thresholds or generalised designs may pose significant risks to both wild fish resources and their associated fisheries. The Committee therefore strongly recommends that Scottish Ministers' objective of MINIMISING the adverse impacts of hydro scheme developments on the water environment should be achieved via a process of detailed scrutiny of proposals with site-specific design, flow and operational mitigation measures tailored to each individual scheme.

Q6. Response: Cautiously agree.

The Committee recommends that in all but exceptional cases, schemes that are for whatever reason unable to provide adequate levels of mitigation necessary to protect the water environment should not be licensed.

Q7. Response: Yes.

The Committee recommends that mitigation measures (design and operational) should be specifically tailored to each scheme on an individual basis, and all existing and new schemes should be subject to appropriate pre- and post installation monitoring to facilitate assessment of the effectiveness of mitigation measures.

3. Other observations:

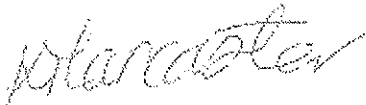
- Part A would probably benefit from the inclusion of a simple diagram that shows the relationship between hydraulic head, energy generation potential and the volume water required. The diagram should be annotated to illustrate the relative range of performance of the main HEP systems available.
- The distinction between the upper and lower reaches of rivers and the hydrological characteristics upland and lowland (particularly those dominated by either direct rainfall or groundwater inputs) watercourses should be emphasised. This is particularly important with regard to issuing guidance in terms of proportions or multiples of average daily flow on the basis of very limited data and information.
- Part B should include references to:
 1. Mitigation planning requirements in situations where native wild fish are likely to be ordinarily present but absent at the time of pre-development surveys (e.g. some West Coast Rivers).
 2. Situations where abstractions (hydro or otherwise) already exist.
- Part B. Table 2 should include a new sub-section headed 'protection of flows for maintaining fisheries'.

- Part B (Section 2) Subject to a thorough review of local circumstances, the Committee recommends that the intakes and outfalls of all HEP units should be fitted with suitably sited and designed screens. The current guidance regarding the screening requirements of Archimedean screw systems appears to be conflicting. The potential risks associated Archimedean screw HEP systems are likely to vary with the design and construction method of each unit together with site-specific factors. Regulators should not use any terminology which gives undue weighting to a particular HEP generating technology. The term 'fish friendly' should therefore be removed.
- Part B (Section 1.1) The Committee recommends that timing of shut-downs for the purposes of delivering variable flows should be prioritized towards maintaining the critical ecological requirements of aquatic biota.
- Part B (Section 1.4) adequate flows are necessary for both upstream and downstream migration. The relevant heading and associated text should therefore be amended.
- The basic concept of the need to maintain the wetted width of stream and river channels is pertinent. However, the Committee recommends that the existence and functioning of critical aquatic habitats (and processes that serve to generate and maintain them) should be considered to be more important. Furthermore, adequate flows should also be maintained for the purposes of protecting natural patterns of migration and fisheries operation. These important points should therefore be highlighted.
- The document contains some repetition of some sections of text (e.g. Pages 8 and 9) and typing errors which should be removed. Section 3 (Page 18 headed 'Provision for sediment transport' should have an introductory paragraph on the importance of sediments and the continuity of sediment supply.
- The Committee recommends that the potential impact of HEP development and operation on fisheries should be highlighted.
- Sub-section 1.3 (Page 9) should include reference to the importance of particularly sensitive times of the year (e.g., migration and spawning) when critical habitats should be maintained — particularly for high conservation status and high economic value species.
- Sub-section 1.4 (Page 10) should include a reference for the need to enable fish to disperse safely (up and downstream) and spawn. The protection of incubating eggs and emergence and dispersal (Salmonids) opportunities for the resulting fry should also be protected.
- Section 2.1 (Page 12) The Committee recommends that the suggested screen blockage contingency value (as a percentage of the average submerged screen area) should be increased. The terms of such criteria should be clearly defined. In particular, the level of blockage at which the maximum velocity specification should apply.

- The sub-section headed 'Artificial design passes' (Page 15) should include the recommendation that fish should not under any circumstances be forced to jump through orifices. Furthermore, pre-weir structures (including those associated with plunge pools) should also have at least one notch. Prefabricated baffled fish passes should be assembled and inserted according to manufacturer's instructions.
- The relevance of the contents of Table 6 (Page 17) should be explained.
- Section 2 D (Page 18 subsection headed 'requirements') should include the recommendation that outfall fish screening arrays should be aligned as close as possible with the foot of the existing bank line.
- Part B (Section 2.1 A) The quoted guide design 'characteristics' should be reviewed in the light of the physical capabilities of Scotland's native fish species and the thermal conditions pertaining in many of its upland fed rivers.

The Committee will be pleased to discuss any aspects of this response with SEPA if that would be helpful.

Yours faithfully



Kerry Lancaster
Secretary
Fisheries (Electricity) Committee

TAY DISTRICT SALMON FISHERIES BOARD

30 April 2010

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Water Policy Unit
SEPA Corporate office
Erskine Court
Castle Business Park
STIRLING
FK9 4TR

Dear Sir / Madam,

Draft Guidance for developers of run-of-river hydropower schemes

The Tay District Salmon Fisheries Board welcomes the opportunity to comment on the draft guidance on hydropower. As you will know, the Tay catchment has perhaps more hydropower development than any other river catchment in Scotland. Therefore this is an issue of great concern to the Board.

However, I should like to commence by saying that we support the position taken by the Scottish Government and SEPA and are pleased that this timely guidance is being issued. It establishes what, in the most part, are sensible rules which will allow expansion of hydro to continue but at the same time will ensure that the river environment and, fish in particular, will continue to receive the necessary level of protection. To have this set of clear rules is long overdue.

While we strongly welcome the overarching principles behind this document, we still have some concerns regarding some areas of detail which will be described through the answers to the Consultation Questions posed on page 3 of the guidance document.

Our answers are as follows.

- 1) Do you agree that sub 100KW schemes identified as provisionally acceptable according to Part A will not cause deterioration to the water environment?

Yes in the most part agree with this, but it will be essential that the mitigation (Part B) must be rigorously applied.

We accept that there should be no deterioration in waters of good or high condition (Table 1), but does "condition" refer to both "status" and "ecological potential"? If not, we consider it should relate to EP also. However, we take issue with the proposal that, because rivers have not been identified for restoration, they should be allowed to degrade further. Further clarification of what SEPA has in mind is required. We have concerns regarding the definition of "degraded" streams (Section 1, p. 4). This is rather a broad term although it is clearer from the checklist that only specific types of degradation might qualify. We are concerned that this may raise optimism on the part of developers as to the types of areas which might qualify (e.g. farmland).

- 2) Are there other circumstances where < 100KW schemes could be developed?

Perhaps the definition of steep streams is restrictive. Streams need not be continuously “steep” if they are upstream of natural barriers to migratory fish, e.g. where a stream flows over an upland plateau.

- 3) Do you find the checklist useful for identifying <100KW.

In general, under scenarios we have tried, they follow a logical order. However, we again draw attention to the degraded category. Just because there are conifers or invasive plants alongside streams does not necessarily preclude them from containing important fish populations.

- 4) Do the draft criteria for >100KW schemes help to optimise use of the resource or ensure deterioration of status is not caused where there are significantly better environmental options?

We agree that the consenting regime for hydro should encourage the “most efficient” use of water resources and welcome a “joined up” approach between SEPA and Scottish Government. This is particularly true when the financial incentives (e.g. banding of ROCs and banding of Feed in Tariffs – both of which appear to have been designed to encourage domestic micro-renewable generation such as solar PV or small wind turbines) are actually encouraging the installation of very low installed capacities in instances where higher installed capacities might be used with a lesser impact (for example by reducing the installed capacity there might be more of an incentive to abstract a higher proportion of the flow at low flows when a larger machine might not even operate). This is not logical as regards national energy production. By helping to create more of a balance this aspect of the guidance is particularly welcome.

We agree with the concept of using some notion of electricity generated per length of river (or similar) as one means of comparing “efficiencies” of schemes. We agree that it is preferable to consider this in terms of energy produced (i.e. GWh or MWh) rather than relating to the more misleading concept of installed capacity. However, rather than stating thresholds such as 1.75 GWh per 500m we would prefer to see this expressed as Wh per metre. Thus, in the examples given in 2(ii), the thresholds would be expressed as 3.5MWh per metre and 1.17 MWh per metre. We consider that for schemes which produce less than 1.75 GWh, the length of river which has to be impacted should be less than the 500m or the 1500m given in the example, on a pro rata basis. Using MWh per metre will achieve this aim.

However, we do question some of the actual thresholds proposed in 2(ii). Why should high status (and what about high ecological potential?) be treated more stringently than good status? In the Tay district almost all of the high status waterbodies are at high altitude and almost all do not contain migratory salmonids because of obstructions. Even if they did, they would not be the most productive rivers in the district owing to their poor nutrients status. Those water bodies which are only at good status are far more important in terms of salmon production. Furthermore many tributaries which are at less than good status also have very significant salmon populations. Indeed, some of the agricultural tributaries in the Forfar area are amongst the most productive salmon habitats in the Tay district, again probably on account of their enriched status. We think it preferable that a more appropriate figure would be a blanket 3.5MWh per metre (equivalent to 1.75GWh per 500m) in waterbodies which contain significant salmon habitat (or would do if other limiting factors are restored under WFD).

We consider that SEPA's identification of significantly better environmental options is fair and SEPA is correct to identify an intermediate category of hydro between <100KW and much bigger schemes. The exact bounds could be debated but the 100KW – 500KW range is a good start. The comparison with wind power is appropriate, but this could be strengthened by acknowledging that hydro is also a more expensive form of generation than wind turbines, as is clearly acknowledged by the recently introduced feed-in-tariffs (the commonest type of commercial wind turbine now being installed qualifies for 4.5p per unit, while a <2MW hydro receives 11p and <100KW receives 17.8p).

- 5) Do you agree that the mitigation will help achieve the objective of minimising adverse impacts of hydropower on the water environment?

Mitigation flows

We agree that hands off flows should, as a minimum, never be less than Q95 or Q90 where salmon are present. We understand that this is based on UKTAG guidance, but we are concerned that this may be based on relatively limited research and that some circumstances might require higher baseflows (we certainly would like to see HoFs maintained as high as possible). If this is found to be so we would like to see HoFs of > Q90 being insisted on if necessary. We encourage more research in this area and that these figures should be reviewed if the knowledge changes.

Regarding low flow definitions, we have concerns over the point where width becomes "significantly" reduced. We would like "significantly" to be defined. Furthermore, width is not necessarily the main determining factor of ecological quality. For example, in a rough substrate salmon stream, water velocity may vary at a greater rate than width as discharge varies. We suggest that the wording on page 8, 2nd bullet point should be changed to "a significant reduction in wetted width or water velocity", and whichever of the two factors is most affected should take precedence.

The appropriate level of HoF for juvenile salmon will also depend on other factors. The size of the watercourse must also be important. A greater HoF is likely to be necessary in a smaller stream as opposed to a larger river if fish are to survive over an extended period of low flow. The impact of prolonged low flows on egg incubation is another issue which requires consideration.

There should also be consideration of downstream hydrology, for example is a long length of river dependent on the HoF or are there significant tributaries which join just downstream?

We agree that the HoF should increase as natural river flows rise so that HoF levels will be rising prior to a spill event and should not return to base flow immediately after a spill ceases.

We also agree that there should be limits to the maximum abstraction level to protect spate flows and that the levels proposed seem reasonable. However, there may be circumstances where a higher proportion of spate flows may be abstracted without causing harm - e.g. if done at time of year when fish are not migrating (e.g. winter high flows).

We strongly agree that it is necessary to maintain good status flows during adult migration and spawning periods and agree that the periods of these vary in different parts of river systems. However, as stated earlier, there may be a need to consider egg incubation flows and this should be an area where research should be conducted (for example, if river flows are low it could lead to an excess of low D.O. groundwater invading redds, as has been demonstrated in the Girnock Burn by Marine Scotland Science). Consideration should also be given to the effect of abstraction on fish migration over partial natural barriers which may require higher flows or more extended high flows than in an unobstructed river. If reducing abstraction is not acceptable, then we ask that consideration be given to other forms of mitigation to assist fish to pass the partial natural

obstruction while still maintaining viable rates of abstraction (e.g. by artificially raising the tailwater level downstream of an obstruction).

Finally, as general points, we agree that there needs to be flexibility in the approach to flow setting and that individual cases should be considered on a site by site basis. The main issues have been covered, although the guidance should change if research requires it.

Downstream migration

We agree with the broad principles of screening described, as being of as good a standard as can be expected for such installations. However, we think that there should be reference to the lateral current velocity across the screen and that the screen / bywash arrangement should be so designed to ensure that the flow attracts fish towards the bywash, i.e. that velocities should increase towards the bywash. The bywash should be much more attractive than any part of the screen array.

However, we do question the approach velocity for salmon presented in Table 4. We understand from SEPA that the figure quoted (0.6m/s) is less than that given in the *Notes for Guidance on the Provision of fish passes and screens for the safe passage of salmon* (SOAFD 1995). We note that on p. 28 of that document it does refer to maximum figures of 0.75 m/s to 0.9 m/s. However, p. 4 of the same document also states that 13cm to 14.5 cm smolts were found to be unable to hold station at over 2 body lengths per second (i.e. 0.26 m/s for 13cm). It also states that the Scottish hydro stations built in the 1950s were designed for one foot per second, i.e. about 0.3 m/s. It went on to recommend that because smolts were between 10cm and 15cm it was safest to recommend lower levels of approach velocity, unless smolts had a very easy escape route and there was no danger of smolts lingering at the screens.

Fish Passes and Screens of Salmon (Salmon Advisory Committee 1997) p. 29 recommended that the approach velocity should not exceed 0.25 m/s, again except if smolts could move rapidly out of the intake zone.

Therefore, we consider that SEPA should reconsider the required approach velocity. We consider that it should not exceed 0.25 m/s, except in circumstances where a small proportion of the flow is being abstracted from a larger river with a powerful sweeping velocity to drive the smolts past. But the 0.25 m/s limit should certainly apply in situations where most of the flow is being abstracted, i.e. where the challenge is to divert smolts from the main flow concentration into a smaller one.

With regard to weir designs, we consider that unless weirs are particularly high, a plunge pool depth of only 1/3 of the weir height might seem low.

Upstream fish passage

This appears comprehensive. However, Table 6 should be qualified for water temperature / time of year - i.e. what may be suitable in a large river in summer when temperatures are high and salmon fresh may be completely unsuitable for a spawning stream in winter. Then, the height which salmon will clear may be much less than 80cms.

General points

There were several references that SEPA should only agree to mitigation which is "effective". It should be borne in mind that the Fish Passes and Screens Regs currently require mitigation to pass a test of effectiveness. Therefore the principle should always be that whatever is constructed must be effective and if proven not to be then modifications should be required. Therefore, in p. 14 para 4, SEPA should say they "will" require effectiveness of operation of a fish pass, not "is likely", as currently stated.

Several references were made to Archimedes screw turbines being “fish friendly”. We request that “fish friendly” should not be used.

In section A1 (p. 4), it might be useful to have a Table describing in broad terms what the flow standards are, as only those with a high degree of familiarity with the subject are likely to understand this on first reading.

In section 1.1, the first bullet point in “Requirements” should be “fish are naturally absent”. This should allow for situations where fish may have been obstructed by man made obstacles which should be removed.

6) Do you agree that the mitigation is likely to be practicable? If not, give reasons.

Yes we do. The types of mitigation described have been widely used in existing schemes. We appreciate that some interests may not agree with this opinion, but this is likely to largely be an issue of cost. However, given that this industry is being very heavily subsidised (with FiTs, some schemes could probably receive something like five times the income they would otherwise get by merely selling to the wholesale electricity market) for relatively little genuine output, it is only appropriate that robust mitigation is put in place. There is no justification for cutting corners.

7) Do you think there are other practicable measures which could be taken to achieve equal or greater mitigation? If yes, please describe the mitigation and reasons.

We think principles outlined are sound. If anything, some of the mitigations (e.g. hands off flows) are perhaps very much the minimum which may be tolerated. We do not wish to see the adoption of untested technologies or technologies whose effectiveness at a given time are difficult to assess (e.g. various types of behavioural fish screens). Physical screens are visible and are easy to monitor.

Yours sincerely

Dr David Summers
Fisheries Director

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Scottish Natural Heritage
All of nature for all of Scotland

Hydro consultation
Water Policy Unit,
SEPA Corporate Office,
Erskine Court,
Castle Business Park,
Stirling,
FK9 4TR.
FAO Peter Pollard

23/04/10

Dear Peter Pollard,

CONSULTATION: SEPA GUIDANCE FOR DEVELOPERS OF RUN-OF RIVER HYDROPOWER SCHEMES

Thank you for your e-mail of 8th March 2010 seeking our comments on the run-of river hydropower scheme guidance document.

We note that the purpose of the document is to provide guidance to developers of hydropower schemes that require a water use licence from SEPA. Before granting such a licence, SEPA has to take account of a scheme's likely adverse impacts on the water environment, as well as its potential benefits to renewable energy generation.

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

Having read the guidance we consider that this purpose has been broadly met, although there are areas where slight improvement could be made to ensure the information is understood and the purpose met. We have suggested improvements to the guidance in an annex to this letter.

If you have any queries in relation to this response please contact Kenny Taylor (Kenny.taylor@snh.gov.uk).

Yours sincerely

Brendan Turvey



Silvan House, 3rd Floor East, 231 Corstorphine Road, Edinburgh, EH12 7AT
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Annex

General comments on the guidance:

SNH would welcome the guidance adding further detail on how SEPA think they can deliver on the Scottish Minister's policy statement on balancing the benefits of renewable energy production and protecting the water environment. SNH support the broad thrust that small schemes make less of a contribution to energy production, while still adversely affecting the environment and natural heritage, and therefore it should be more challenging for such schemes to go ahead.

It was very unclear how this document relates to the other SEPA guidance SNH have contributed to on the environmental information requirements for hydro scheme applications. We assume it applies at the same time but this guidance would benefit from making the link explicit (or more obvious).

Generally, SNH note that there is insufficient reference to the need to protect designated sites throughout the document. For example, if the proposal is on a Site of Special Scientific Interest (SSSI), then SEPA should automatically consult us. But it would be worth highlighting such an issue in the checklists. There are areas on the coast that are designated as SSSIs in small catchments where one could imagine a hydro scheme being proposed, that conforms to all the criteria in Checklist B, and would be provisionally acceptable. But it may well be totally unacceptable because of the SSSI interests. This sort of situation should be highlighted in the guidance. Further to this, the guidance does not include any consideration of European Protected Species or other protected species, specifically in stream fresh water pearl mussel, otter, water voles and river jelly lichen.

Overall SNH found the document focuses predominantly on fish and very little else ecologically, as far as mitigation goes. Given the narrow focus of the document SNH would suggest that reading this guidance alongside the current SEPA hydropower guidance and the forthcoming SNH Hydro-electric guidance, would benefit the overall message that is being conveyed to developers and consenting authorities on the need to cover many other aspects of the water and terrestrial environment that are important to conservation. Links should be made in the future. SNH will be consulting on our guidance in the near future.

The guidance does not explicitly encourage developers to consult the District Salmon Fishery Boards and relevant Salmon Fishery Trusts. The boards and trusts could provide developers with site specific information which is unlikely to be held elsewhere. It is also important that the developers get in touch with the boards and trusts sooner rather than later. The general view is that the guidance should encourage early consultation with SNH, and fisheries boards etc. If SNH does not become aware until an application is made to SEPA, then issues like EPS, freshwater pearl mussels and potentially designated sites etc. may not have been drawn to developer's attention and could result in additional delays.

The guidance is not clear on the process involved when an existing weir structure is proposed for a hydro scheme. SNH are aware of an example where man made obstacles downstream of the weir meant that fish could not access the habitat up stream. It was hoped that in the future more of the existing down stream obstacles could be made passable. There was some debate over whether existing weirs being re-used for a hydro scheme should be made passable to migratory fish to improve the situation for the future.

SNH would be interested to know how SEPA view this guidance working with regard to the Environmental Liability (Scotland) Regulations 2009 i.e. if a developer followed this guidance to the letter and found post-construction to have deviated from a particular piece of environmental

legislation or from the guidelines to the extent of potentially impacting on the environment, what the consequences would be?

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?

There is still some ambiguity existing surrounding the way the checklist is worked through, please see below. SNH do not feel that sufficient information exists within this Section to point developers etc. in the direction of further SNH or SEPA guidance.

SNH, in reading the document, felt that there was the apparent presumption that small schemes will be provisionally acceptable if they don't reduce flows below the GES flow standards. This is specifically shown in checklist D, the final section makes clear that a scheme is acceptable if GES flow standards will not be breached. This seems to contravene part of the aim of the Water Framework Directive, which is to prevent deterioration in the status of waterbodies. Shouldn't the checklist be seeking to maintain the flow at High status (if it is already at high status), unless the proposal is judged to be sufficient benefit to allow a derogation to good? Assuming the flow was previously at high, these systems that are at high status could represent relatively pristine conditions according to the criteria in the checklists. The conservation of those remaining near pristine areas should be encouraged, and their associated species/habitats, rather than presuming they can be degraded by development that the wider policy says is of limited value in mitigating the extent of climate change. This important step, in maintaining those parts of Scotland's water environment that are near pristine, appears to be missing from Checklist D. Surely the objective is to prevent deterioration from High? Our response to this apparent omission is that we would seek to see <100kW schemes provisionally acceptable only if they don't breach flow standards for the waterbody they are within, in order to prevent them adversely affecting the water environment.

In Annex A, part 2 of checklist A, one of the questions asks if a waterbody is at poor or bad status because of extensive invasive species. If it is, then it is acceptable to put a small hydro scheme there if there are no plans to restore the waterbody. SNH would query this. SNH notes that, through the river basin planning process to date, measures are not included in draft Area Management Plans to improve the condition of waterbodies that have been downgraded because of invasive species. This is despite there being tools available to tackle some invasive species (e.g. riparian plant species), and therefore those waterbodies have the potential to be restored, given the will. SNH would question whether having alien species present, but no measures in place, is really an acceptable situation in which to accept further damage to the river/burn from a hydro scheme when the current pressure could be addressed by the application of measures.

SNH would query the checklist on page 21 (Checklist A) of the guidance and ask, do all of the criteria have to be met?

Checklist B tries to define small, steep watercourses. It says that in small catchments, with a >0.1 slope, a proposal is acceptable. Such areas could conceivably cover, for example, streams in enclosed ravines with important bryophyte communities. Such areas would be considered relatively important for conservation and should be flagged up in some way. SNH are also aware of some reaches in pearl mussel rivers where the slope would be between 0.06 and 0.1 (and potentially greater still). SNH questions whether these would be picked up in the appraisal process for schemes, as they will have had information on bryophytes, pearl mussels collected? SNH raises its concerns when, with the declaration of schemes being identified as provisionally acceptable in this document, they will not be subject to such scrutiny.

SNH further notes that the footnote number 19 doesn't make much sense. I think footnote 19 is trying to suggest that an area is only "significant" for fish if >2 areas of 50m spawning habitat are present. Given that the abstracted reach could be 500m long, that seems like quite a high threshold in reaches - especially when such small streams could often be at the upstream end of fish passage and therefore be host to important head water fish populations. As well as being important for particular invertebrate assemblages etc.

In checklist C, the first question is "Will the proposal significantly improve fish access to upstream or downstream fish habitat" and there is then an example of improving passage over a man-made obstacle. SNH feels that this matter should be better defined. We have publicly stated that natural barriers to fish migration should remain in place and not be breached, in order to protect potentially isolated and important relic upstream fish populations. The first part of checklist C could be misinterpreted. SNH are aware of cases where proposals for hydro schemes on waterfalls have included, as a benefit, the possibility of fish passage over the waterfall. This is something SNH would not normally condone. SNH suggest a changing the text in the first cell of checklist C to "Will the proposal significantly improve fish access **beyond a man-made obstacle** to upstream or downstream fish habitat".

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?

SNH believe that there may be further areas to consider here, for example areas where there will be little by way of habitat loss (such as on areas of bedrock or very high gradient and other features, such as bryophytes are absent).

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.

SNH have the following general comments to make about the checklists. We find Checklists B-D arrangement slightly confusing. The issue of 'significance' raises itself as an issue here. It suggests a level of quantitative assessment that isn't fully explained elsewhere.

Question 4 in Checklist C seems to suggest that if the length of stream affected is < 1.5 km then it is provisionally acceptable.

With regard to fish habitat (Checklist B and C) spawning habitat may be in short supply in such areas, making even small areas important. Using Checklist C as an example, there are several Questions here that need to be better defined to make them useful.

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?*

On page 5 of the guidance, the paragraph beginning 'SEPA will normally consider...' is difficult to read. Further on page 5, bullet point i SNH do not understand the relevance of the comparison with another country.

SNH do not agree with the draft criteria because, again, they make no mention of the importance some watercourses have for biodiversity and nature conservation. While it is noted that bullet iii of Section 2 may address many of the issues, the document that is linked to that bullet doesn't appear to make any mention of designated sites or wider biodiversity either. SNH feels that this is an omission from this document.

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?

SNH does consider the mitigation to go a long way to minimising adverse effects on fish populations. But there is very little in the document about the wider water environment (e.g. plants, invertebrates), and no mitigation aimed at those components of our biodiversity.

In Part B, Sections 2.1 and 2.2 both mention Archimedes screws as being "fish-friendly". SNH are not aware that there is sufficient evidence to say that such turbines are necessarily fish-friendly and will allow the safe transit of fish species. Therefore the guidance should either point to the evidence or, if that is not available, amend the mitigation to reflect this.

There is also no mention of Arctic charr. While most populations in Scotland were thought to be resident only in lochs, recent evidence has shown they use inflow burns and rivers in a number of locations. The guidance would benefit from acknowledging this point, principally in section 2.2 of Part B, and providing information on provision of mitigation for the species.

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, SNH does think the mitigation will be practicable.

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?*

In several places the guidance mentions plants and animals (e.g. section 1.1) but nowhere is there any mitigation mentioned for plants, or for animals other than fish, or invertebrates. We presume the assumption is that if mitigation is provided for fish, then it is sufficient to account for the rest of the biota in burns and rivers. If so, the guidance should say so. However we do not consider this to be the case. There are practicable mitigation measures that could be applied to improve the level of mitigation. For otters, any mitigation is likely to be from the construction phase and possible mitigation measures are listed on our website <http://www.snh.org.uk/publications/online/wildlife/otters/mitigation.asp>. The same principal would apply to water voles where, practical mitigation can be readily and easily applied to small scale hydro which SNH could contribute. We could also suggest that hydro schemes within the boundary of fish Specials Area's of Conservation (SAC's) are likely to be unacceptable, or within the boundary of pearl mussel SACs (or in any pearl mussel river).

On page 17 of the guidance the statement reads 'Lampreys are unlikely to be present in steep streams and reaches upstream of waterfalls or large impoundments.' This (the 'reaches upstream of waterfalls ...' element) is incorrect. Both river and sea lamprey are anadromous; their upstream (and perhaps downstream) migration may be hampered or stopped by obstacles such as waterfalls. However brook lamprey populations may exist upstream of barriers that are impassable to migratory species.

Page 18 mentions that "lamprey can negotiate relatively steep gradients, even vertical, if sufficiently smooth to employ a sucker, swim, and re-engagement technique". That is not true. SNH would suggest that this point is made clearly and use, as evidence, Reinhardt *et al.* (2009) who state "we found no evidence, in either a laboratory or field setting, that sea lampreys can climb up wetted surfaces using an attach-twitch-attach strategy. Instead, when they detach, the either fell back or struggle to hold their position....it thus appears that attachment to a barrier serves sea lampreys solely for the purpose of resting and preventing loss of gained ground in rapid water and is not an integral part of the technique by which this species passes over barriers". The reference should be:

Reinhardt, U.G., Binder, T., and Gordon McDonald, D. 2009. Ability of adult sea lampreys to climb inclined surfaces. Pages 125-138 in Brown, L.R., Chase, S.D., Mesa, M.G., Beamish, R.J. and Moyle, P.B, editors. Biology, management and conservation of lampreys in North America. American Fisheries Society, Symposium 72, Bethesda, Maryland.

On page 19 of the guidance reads 'the natural erosion and downstream migration of sediments ~~are~~ is essential for the creation and maintenance of natural river habitats' but SNH note that sediment does not 'migrate'.

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

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

30 April 2010

Dear Sir or Madam

Scottish Renewables response to the SEPA guidance for developers of run of river schemes consultation.

Scottish Renewables is Scotland's leading renewables trade body. We represent over 290 organisations involved in renewable energy in Scotland. Further information on our work and membership can be found on our website www.scottishrenewables.com.

Firstly, many thanks for the opportunity to respond on what is an important change for hydro developers in Scotland. This response has been formulated by Scottish Renewables following internal discussion within our membership. Although we are largely supportive of the mitigation outlined in part B of the document we must **strongly object** to the guidance as it stands due to our concerns about part A of the document.

I trust that you find Scottish Renewables' comments helpful in this consultation process.

If you have any further work arising from this consultation or would like clarification on any of the detail in this correspondence please do not hesitate to contact Scottish Renewables.

Yours faithfully

Johanna Yates
Hydro Policy Manager

cc Sue Kearns, Head of Onshore Renewables and Policy, Scottish Government
Joyce Carr, Water Environment team leader, Scottish Government

1. General Comments

1.1 Scottish Renewables welcomes the guidance paper for run-of-river schemes, the information on mitigation requirements and the check list for sub-100 kilowatt schemes are welcomed especially as they will help reduce development risk.

1.2 The tone of the document, especially in part A, suggests that this is a policy document rather than guidance and therefore the title should reflect this.

1.3 Scottish Renewables however, has some concern over the Part A of the consultation, these are addressed in the question responses and in the comments below.

2. Alternatives

2.1 SEPA's use of alternatives is of great concern. Scottish Renewables strongly believes that no renewable technology can be compared as an alternative to another renewable technology. If a hydro scheme is not consented, and therefore not built, the power that that scheme would have generated will be made up by the existing generation mix, not another renewable technology. Scottish Renewables therefore consider that the comparison to another renewable energy does not qualify as a *significantly better environmental option*, as outlined in the Water Framework Directive (WFD) Article 4 subsection 7(d).¹

2.3 The footnote on page 5 refers to a "modern on-shore wind turbine" as a comparison to hydro generation. Not only do we not agree with this analogy due to the reasons above, but this also suggests that SEPA are promoting wind over hydro which we do not feel is appropriate or productive.

2.4 All generating technologies possess different characteristics which mean that the type used in an area will be suited to the local resource and sensitivities. Hydro has many benefits, such as low visual impact and the lowest net carbon output per kilowatt hour generation of all technologies. A major driver for renewable energy is maximising the diversity of our energy supply to ensure its security. Hydro, and especially micro-hydro at a local level, is an important tool for this. It is therefore inappropriate to promote other renewables over hydro, as is suggested in the consultation document.

2.5 The use of alternatives in such a way is analogous to the sequential approach that has been rejected from Scottish Planning Policy for renewables. This is a further example of why the use of the comparison to other generating technologies, is inappropriate.

*"Spatial frameworks should not be used to put in place a sequential approach to determining applications which requires applicants proposing development outwith an area of search to show that there is no capacity within areas of search."*²

¹ European Water Framework Directive, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:327:0001:0072:EN:PDF>

² Scottish Planning Policy, <http://openscotland.net/Resource/Doc/300760/0093908.pdf>

3. Efficiency

3.1 Scottish Renewables would welcome clarification on whether the three criteria stated on page 5 are inclusive or exclusive of each other.

3.2 Scottish Renewables has great concern with SEPA's use of an efficiency calculation based solely on generation versus affected reach.

3.3 Commonly, efficiency is taken to mean the highest output given technical, environmental, social and economic considerations. SEPA's "environmental efficiency" based on output per affected reach, does not consider the size, percentage of water extracted nor any technical or economic constraints.

3.4 Scottish Renewables insists that there is no simple calculation or 'one size fits all' measure for determining whether a hydro scheme is a good scheme in terms of benefits versus impacts. Scottish renewables therefore considers it inappropriate for SEPA to try to do this. Scottish Renewables recommends that SEPA revisits the WAT-RM-34 methodology to ensure that this provides the suitable means for a robust, objective decision to be made for a scheme, and schemes should not be determined using the "environmental efficiency" criteria.

3.5 On the specific limits, there is concern over the 1.75 GWh per annum per 500 m threshold on high status rivers as this is a very strict limit. Considering schemes that are currently operating very few would pass this high status river test. If existing schemes are used as an indication of schemes that will be proposed in the future, this limit would result in very little or more likely no development on high status rivers. This will therefore create blanket no-go zones for development on rivers of high status, based on a calculation that only considers two points of a complex system. This is even more concerning given that the generation threshold is based on an unreferenced, notional wind turbine

3.6 Using the same procedure to look at the effect on good status rivers, the 1.75 GWh per 1500 m per annum does not rule out all schemes, but will have a significant impact on the industry's ability to realise the Scottish potential.

3.7 For example, using a recently consented scheme. This 2.7 MW project fails the criteria as it has an annual output of approximately 8 GWh/y on a 3 km stretch of river meaning an "efficiency" of around 1.33 GWh/y per 500 m on the high status river.

4. 100 kilowatt limit

4.1 Although it is appreciated that the 100 kW limit is based on the Ministerial Policy Statement published in January, Scottish Renewables feels that it is inappropriate to have such a limit. Scottish Renewables believe that all

schemes should be based on their own merits and SEPAs consent for a Controlled Activities (Scotland) Regulations 2005 (CAR) licence should be based on the benefits and impacts of that scheme on the water environment.

4.2 Using the planning system as a comparison, Scottish Government Planning Policy states that:

"Development plans should support the wider application of medium and smaller scale renewable technologies such as decentralised energy supply systems, community and household projects. Development plans should also encourage microgeneration projects including those associated with or fitted to existing buildings.

*"Planning authorities should ensure that the development plan or supplementary guidance clearly explain the factors that will be taken into account in decision making on all renewable energy generation developments."*³

And the planning guidance states:

*"Small schemes can provide a limited but valuable contribution to renewables output, local and national energy requirements and towards tackling climate change. Planning authorities should not reject a proposal simply because the level of output is low."*⁴

4.2 Scottish Renewables therefore feels that it is unjustified for SEPA to penalise schemes based on their size.

5. 500 kilowatt limit

5.1 Scottish Renewables is concerned at the addition of the 500 kW threshold in the guidance document, especially given that this is not directed by Ministerial Policy.

5.2 Although the guidance document references other European Union countries approach to these thresholds there is no reference to whether this is a fair representation of the EU27 positions or how this relates to other considerations within the countries such as, renewables targets, available resource, saturation of the market at both a small and large scale, WFD compliance, and other socio-economic and technical considerations.

6. UKTAG standards

6.1 Scottish Renewables main concern is that the UKTAG standards used to assign deterioration of a water body set unnecessarily strict criteria. Many of the concerns that SEPA have about causing the deterioration of a standard would be addressed with scientific evidence showing that hydropower

³ Scottish Planning Policy, <http://openscotland.net/Resource/Doc/300760/0093908.pdf>

⁴ Planning for Micro Renewables Annex to PAN 45 Renewable Energy Technologies, <http://www.scotland.gov.uk/Resource/Doc/150324/0040009.pdf>

schemes, when constructed with the appropriate hands-off flow, are unlikely to cause a deterioration of the water bodies' ecological potential.

6.2 If SEPA were to address this issue, with the support of industry, SEPA will be able to determine consents for hydro schemes on based solely on their environmental merits, both positive and negative, rather than through time consuming and costly derogation tests, where the starting assumption is that the hydro scheme is bad.

6.3 This is a subject we have already had initial discussion with SEPA about and look forward to continuing to work towards more appropriate standards given the UKTAG review timeline.

Consultation Questions

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| <p>Part A criteria – sub 100 kilowatt schemes</p> <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>If the points laid out in question 5 are taken into consideration then Scottish Renewables is content that, given the mitigation laid out in part B, sub 100 kW schemes will not cause deterioration of the water environment.</p> <p>However, Scottish Renewables continues to stress our objection to the efficiency calculation in part A of the document, explained in detail in section 3 above.</p> <p><i>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?</i></p> <p>If the mitigation measures in Part B are applied appropriately then no deterioration should occur. This will result in the “efficiency” criteria being redundant.</p> <p>SEPA should also consider in what other circumstances would environmental impacts be allowed, given that there are other circumstances such as remote, off grid locations or where a scheme will lead directly to a secure supply or a reduction in fuel poverty, for example.</p> <p><i>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.</i></p> <p>The checklist format is an ideal way of identifying provisionally acceptable sub-100 kW schemes. Its effectiveness will be shown through how widely advertised, and therefore how broadly used it is.</p> <p>The criteria however must remain a checklist and not become policy as SEPA themselves know hydro schemes are heavily site dependant and therefore a degree of flexibility must be kept, for example where there is an over-riding social or economic benefit to the scheme.</p> <p>Part A criteria – 100 kilowatt + schemes</p> <p><i>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</i></p> |
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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?

Scottish Renewables considers that SEPA's interpretation of the Scottish Ministers' objectives is not in line with the Ministerial Policy Statement published in January 2010. The ministerial Policy Statement states the objective as:

"In order to optimise the potential for hydropower generation emphasis will be placed on supporting hydropower developments..."⁵

Scottish Renewables believes this statement considers the optimisation of the **potential**, as laid out in the recent Scottish Government studies, not of the **resource**, as is suggested in question 4.

Scottish Renewables remains concerned with the use of the term efficiency especially in relation to optimising the use of Scotland's hydro resource, as discussed in section 3 above.

Scottish Renewables does not believe that the efficiency calculation will lead to effective use of the Water Framework Directive's "significantly better environmental option" as it fails to take into consideration any criteria other than generation per affected metre. The WFD's criteria includes a caveat that the *better option* must be technically feasible and not disproportionately expensive, which the efficiency calculation does not consider.

Scottish Renewables' concerns with SEPAs interpretation of significantly better environmental options are laid out in paragraph 2.1 above.

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?

If due consideration is given to the concerns outlined below then Scottish Renewables agrees that the mitigation identified in part B of the guidance document will help minimise adverse impacts.

Scottish Renewables would recommend the addition of a statement that clarified the use of mitigation measures where appropriate / required. For example, where a water body is known to have no migratory fish due to a

⁵ 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>

natural impassable feature downstream that no fish pass or other associated mitigation is required.

Section 1.1: Protection of low flow level

Through pipe flows - This section may be better placed in the section on weir design as it appears to be addressing the actual flow only.

Scottish Renewables would like clarification on the increased hands-off flow for catchments <10km². The effect of this is likely to be most applicable to small steep watercourses, which through SEPAs own criteria have a lower environmental impact. For example increasing the hands-off flow from Q95 to Q90 results in a drop in annual output of 6% for a scheme with a catchment of approx 10km² using LowFlows2000 flow duration curve.

Section 1.2: Protection of flow variability

Scottish Renewables considers that increasing a hands-off flow with increasing total flow may be a more appropriate method than scheduled shutdowns, as during dry spells there is no abstraction anyway.

Section 1.3: Protection of high flows

Scottish Renewables would welcome clarification on why there are different limits for sub 100kW projects and how the site characteristics affect the 1.3 - 1.5 value.

Section 1.4: Protection of flows for upstream migration and spawning of fish

The proposals in this section are welcomed, although Scottish Renewables would request that a degree of flexibility remains in this area as this is a highly site specific issue.

Section 2.1, A: Intake Design and Screening

Scottish Renewables believes that the proposed requirement for bar spacing for intake screens to be < 10 mm, is too narrow.

The industry standard historically for screening on rivers with downstream fish migration (including salmon smolts) is 12.5mm (where it has not been possible to use a COANDA screen).

This has been found to be effective in preventing migratory fish from entering intake chambers (inc salmon smolts) and allows effective maintenance of the screens to be performed.

Although the < 10mm specification of screens has been used on some recent projects, this specification of bar spacing will lead to unnecessary large intake structures that will be no more effective than the more commonly used 12.5mm spacing.

As a bar spacing of 12.5 mm is used on the majority of hydro schemes in

Scotland and has been found to be effective in preventing fish ingress while also allowing effective cleaning of the screens **Scottish Renewables recommends that SEPA consider revising criteria presented in section 2.1 to include a range of bar spacing between 12.5 mm – 10 mm where it is not practicable to use COANDA screens.**

The coanda requirement to keep the screen wetted at all times is too strict as these screens are not designed to keep the entire face wetted at all times

There needs to remain a level of flexibility in the abstraction angle as it may not always be possible to abstract at 90 degrees to the flow direction although this is preferred.

Section 2.2, D: Tailrace design

Due to the high exit velocities (with reaction turbines) and vertical drops (impulse turbines) it is very rare that fish can enter any turbine from downstream. Scottish Renewables recommends that screening provisions should be dependent on issues of upstream migration and fish stranding in the tailrace only.

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

Scottish Renewables does not believe the mitigation identified will be practicable unless due consideration is given to the comments outlined in our answer to question 5.

If these comments are addressed then Scottish Renewables agrees that the mitigation identified will be practicable.

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?

Scottish Renewables have no other suggestions other than the comments outlined in our response to question 5.

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Response of Mann Power Consulting Ltd to SEPA consultation, April 2010:

“Guidance for developers of run-of-river hydropower schemes”

Consultation questions

Question 1. *[Will sub-100kW schemes which are deemed “provisionally acceptable” because of their context cause no deterioration?]*

While all human developments involve change, inevitably involving some level of deviation from the status quo, SEPA's role lies in balancing socioeconomic uses of water with protection of the environment. SEPA's responsibility is therefore to control deterioration via the licensing process. In this consultation, it is therefore necessary to infer how SEPA interprets the government's stated commitment to “no deterioration”. Ministers explicitly accept that deterioration may arise from >100kW schemes and that this will be managed via SEPA's licensing process. For sub-100kW schemes, SEPA clearly does not intend that absolutely “no deterioration” will be permitted, for this would mean that no schemes below 100kW could proceed, conflicting with government's reassurance that “such schemes will be welcomed”.

Certainly, sub-100kW schemes deemed “provisionally acceptable” subject to mitigations would seem unlikely to risk deterioration from one WFD status to an inferior status. The same would apply to all schemes subject to SEPA's mitigation requirements at licensing, regardless of scheme size. For schemes of all sizes, localised “deterioration” is inevitable - e.g. in flows within the depleted reach – but it is precisely SEPA's mitigation requirements which determine how much deterioration is tolerable in the circumstances. Therefore any scheme which proposes to meet SEPA's mitigation requirements (as must all schemes) will satisfy SEPA's regulatory assessment of tolerable deterioration and is by definition acceptable to SEPA. Any judgement of whether deterioration will be acceptably controlled must therefore be based upon the detailed definition of the proposed mitigation measures and their application in determining licences.

Question 2. *[Other circumstances wherein sub-100kW schemes would “not pose a risk”?]*

Again, all developments may “pose a risk”, but the question’s intent in this consultation is whether there are “other circumstances” not already itemised which should allow a sub-100kW scheme to be considered “provisionally acceptable” by SEPA. The response must be that the Checklist criteria on degradation, HMWB, and engineering, must be phrased and applied in a way which adequately recognises sites with inherently low environmental cost - e.g. in-weir sites and water industry facilities where there is little or no depleted reach of river. As such sites are numerous it is particularly undesirable that the Checklist process might act to deprecate them and complicate their licensing disproportionately.

Also helpful in identifying “other circumstances” would be an explanation of SEPA’s understanding of those “particularly significant benefits” which the government statement foresees might make even sub-100kW schemes more acceptable. The 100kW threshold implies that power production might not be acknowledged as a benefit here, but “other circumstances” might include benefits beyond those in guidance Checklist C.

Question 3. *[Is the checklist helpful and how could it be made clearer?]*

Checklists are helpful where the decision-making sequence is linear, which seems to be SEPA’s intention in this case. The checklists could be improved as follows.

Checklist A: It would be more logical to begin by assessing the actual condition of the depleted reach (currently in criterion 2, dependent on criterion 1) along with any HWMB designation (correctly in criterion 1), and only then proceed to assess the land use context (currently in criterion 1). Otherwise, the sequence as proposed potentially reduces a site’s acceptability on the grounds of adjacent land uses, even where water condition is unimprovable. This does not seem to be an intention described in SEPA’s approach.

Checklists A, B & C: These checklists all feature a Note 1, which in fact is not an informational note but contains conditions material to the decision-making sequence. Transparent interpretation of each checklist could be made quicker and easier if the criteria in Note 1 were instead appended to the checklist itself. (Note 2, by contrast, is informational.)

All checklists: Subject to the above, a decision should be made to standardise on either footnotes or endnotes. As all other notes are of a purely informational nature, these would be best removed to footnotes to prevent interrupting sequential flow of the decision tree.

Question 4. *[Will efficiency criteria for >100kW help optimise resource use? Will deterioration be prevented by promoting "significantly better" renewable alternatives?]*

It is important to maximise efficiency, and extracting the maximum energy from water is the preserve of hydropower designers. However, any regulatory minimum standards for efficiency must be closely scrutinized to ensure that they do not create perverse outcomes by conflicting with other regulatory requirements, in schemes where efficiency is attenuated in favour of desirable mitigations (turbine choice, screening, permitted flow regime). Moreover, optimising use of the national resource relies on promptly enabling an uncontested development to proceed, by positive regulation when that opportunity arises, more often than on comparing competing projects for a given reach.

Displacing development to "significantly better" non-hydropower alternatives is a difficult proposition. Developing renewables to meet their share of national energy demand is a challenge which hardly favours allowing a margin for substitutability between technologies. Developing distributed generation involves the initiative of individual site owners, often unable to influence substitution of sites/technologies. Therefore, while an efficiency standard might seem to help in this, care must be taken not to define or apply it in a simplistic manner which prejudices hydropower development which would otherwise be making a net contribution to carbon reduction.

It appears that SEPA's principle concern in assessing substitutability is to be able to obtain a positive valuation outcome from Cost-Benefit Analysis when faced with potential deterioration from one WFD status to an inferior status. While formal CBA may be applied only in a minority of cases, it is desirable to have full transparency on CBA exercises conducted by SEPA in order to validate or challenge the assumptions made in pursuit of its public regulatory role.

Criteria for assuming "significantly better" alternatives exist are that a hydropower proposal with a capacity of 100kW to 500kW has an efficiency below 783kWh to 2350kWh annual output per metre of river impacted, and has adverse effects of "reasonably high significance" as defined in SEPA guidance WAT-SG-68. The origins or calculation of these assumed kWh efficiency values should be published so that they may be validated against true outputs. The multiplier of 300% for high status waters should be justified, e.g. by CBA.

WAT-SG-68 states that alternatives must not be technically unfeasible or disproportionately costly, but that cost to the applicant is not in itself a decisive consideration. However, SEPA should clarify what if any role in the decision is played by the applicant having no access to sites where efficient alternatives might be pursued.

Table 1 in the Consultation document ('Tiered Approach') does not represent the criteria in the body of the Consultation document. If it is to be used elsewhere, this table should be thoroughly revised to reflect SEPA's intended criteria in each capacity range.

Question 5. *[Will the proposed mitigations help minimise adverse impacts?]*

Yes, though their application may result in disbenefits to the development of hydropower. It must therefore be monitored that the measures remain proportionate.

Question 6. *[Will these mitigations "in general" be practicable?]*

There are some specific points of contention:

1.1 Reserving an enhanced hands-off flow irrespective of abstraction and site characteristics. It is proposed to apply a Q90 HOF in the presence of all salmonids and in all <10km² catchments without consideration of site conditions. This is not proportionate and is not based on evidence. Such decisions are properly made by officers' recommendations at the site level based on real-life considerations.

1.2 Flow variability, Again, generic ecosystem requirements are not established in this area. Evidence would need to be provided to justify a particular proposal, e.g. relating Qn30 to a residual Qn80. This would be far better articulated as an evidence-based decision at the site level based on the requirements of the river and its species. On the other hand, the proposal for an entirely artificial regime of fixed weekly freshets would seem the antithesis of nature-like management of variability in the depleted reach.

1.4 Applying "flow standards for good" during migration windows may be unnecessarily conservative in those schemes with minimal or no depleted reach (e.g. within weirs), and which incorporate effective continuous fish passage even when their abstraction exceeds "flow standards for good". If this exception is accepted it should be acknowledged in any generic guidance.

Question 5. *[Other practicable mitigation measures?]*

None proposed.

General observations

A significant aspect of SEPA's proposed approach is the intention to differentiate in licensing matters around a threshold value of 100kW scheme capacity. While this follows the Scottish Government policy statement of January 2010, clearly the ministers had taken regulators' advice in this matter; and it is inferred that the 100kW recommendation came to them via SEPA economists (cf. Badger 2010).

Identification of 100kW as a lower threshold for environmental-economic sustainability seems to have originated in studies based on 1990s German data and assumptions (Bunge et al, 2003). It need hardly be noted that the UK context in 2010 presents a very different milieu to pre-Euro Germany, in terms of:

- Types of hydropower in consideration (retreat from peaking/pulsing/large dams to run-of-river)
- Status of national hydropower development
- Governmental commitment to timetabled climate-change mitigation
- National renewable energy policy
- Monetary values and the economic investment climate
- Changed economics of mitigation (2010 UK Feed-In Tariff designed to internalise the costs of due environmental mitigation, with emphasis in favour of smaller schemes)
- Experience of WFD requirements and planning, and confidence in achieving compliance
- Experience among environmental regulators of licensing small hydropower
- Evidence of the actual impacts of run-of-river hydropower
- Legal challenge to unsubstantiated regulatory decisions

For contemporary UK developments, it appears questionable to proceed from dated and incongruent assumptions, derived from economic feasibility arguments under a long-superseded non-UK subsidy tariff.

SEPA's work in this area has reviewed evidence for monetising the utility of watercourses using techniques of contingent valuation (CV), revealing the wide divergence in some initial attempts to place monetary values on surface waters (Badger 2010). CV is a notoriously tendentious methodology, and that study acknowledges (in citing Hanley & Black 2006) that such valuation may be more reliably applied as a deliberative exercise than as a mechanism to quantify meaningful economic prices. However, the speculative valuation derived from one such attempt - £25,000/km - is subsequently employed as a mathematical constant to assess the cost of hydropower impacts on any Scottish river (Badger 2010). (This figure in fact originates not in CV research, but is drawn informally from "Ministers' willingness to pay" revealed in the bills for general enhancement works by Scottish Water.) Upon this foundation is built a model of hydropower's environmental costs and benefits, with a hypothetical 100kW scheme imputed to produce environmental benefits of £213K±50% (40-year NPV of 350MWh/a displacing carbon at tradable prices).

The model calculates high environmental costs by assuming >300m depleted reach, when in real low-head schemes it is frequently far shorter (in accordance with sound regulatory argument). Modelled impacts are price-banded according to degradation to a lower WFD status - but in reality such an outcome is entirely site-specific and is in no way predicted by the 100kW or any other capacity designation. By the same token, the actual output of real 100kW schemes could vary widely from that assumed above (even before $\pm 50\%$ variation is applied for future carbon prices).

Although that SEPA economic paper predicts that "100kW hydro schemes are not cost beneficial" in some circumstances, its matrix of scenarios in fact shows the converse to be true in 27 of the 36 scenarios modelled (Badger 2010). Most striking is the study's omission to note that the decisive variable here is depleted reach. All negative scenarios are those with unusually long (>760m) depleted reaches - while all scenarios with a shorter, more realistic, depleted reach show 100kW schemes to return positive net benefit.

It is all the more remarkable that regulatory attention is focussed on a capacity threshold when the impact costing for that threshold places the greatest significance on depleted reach and site-specific WFD status – neither of which are determined by capacity.

Using capacity itself to measure impacts is fundamentally illogical. Scotland abounds in sites where a smaller-capacity scheme could abstract less water, achieve greater efficiency for the flow regime, and generate more kWh per year than a larger-capacity scheme. In these cases, inserting a capacity threshold incentivises the uprating of schemes to enhance their regulatory acceptability. This outcome is clearly perverse.

An example noted recently by the present author is a low-head scheme proposal likely to develop 91kW from a design flow of 1.3cumecs leaving a Q90 residual flow. If the developer were to uprate to 101kW, designing for 1.44cumecs and leaving a lower residual flow, this site is predicted to yield around 20% less output. But the 100kW threshold acts to promote this less-efficient use of the water resource.

Nor is it credible to assert that this example represents an isolated case. The 100kW limit curve potentially represents widely divergent environmental impacts, even within low head – anything between, say:

0.6cumecs falling 20m at 85% peak efficiency, and
26cumecs falling 1m at 40% peak efficiency

All observations here re 100kW apply similarly to any capacity rating – the flaw is in applying a synchronous measure to a diachronous cost/benefit. There is no defence that all will be fair on balance, as the noted heterogeneity of the sector means that no “typical scheme” exists. The potential result is that schemes rated below 100kW will be licensed in no proportion to evidence-based assessment of their impacts, and will often be inequitably penalised. This both contravenes SEPA’s commitment to proportionate regulation and discriminates especially against smaller applicants wishing to make a legitimate social use of water.

An evaluatory tool developed via SEPA’s research above was not released for use, as further analysis was awaited to legitimate its methodology and numerous assumptions (Badger 2010). Nonetheless, the same research appears to form the basis for the (interim?) regulatory approach which is the subject of this consultation, and with which SEPA will shortly be assessing applications for hydropower CAR licences. If this is the case, the limitations described above cast grave doubt on the fitness of the approach intended to discriminate around 100kW.

A final pertinent concern is the wider implication for the role of the environmental regulator. SEPA’s purpose is to protect the environment and to advise government on so doing. There appears to be an increasing trend for SEPA to assume the evaluation of wider socioeconomic benefits beyond its advisory and regulatory remit. In introducing the SEPA paper discussed above, DEFRA’s Chief Economist recently cautioned that “sloppy pseudo-economics risks bringing us all into disrepute” (Price 2010). Nor does SEPA’s role seem to encompass the authority or expertise to prescribe the operational efficiencies of engineering infrastructure, particularly by imposing questionable generic assumptions which may artificially distort technical and economic choices. Especially in straitened times, and with the prospect of political reductions in public expenditure, it is important for a regulator to focus on its strengths in merit-based decision-making. Simplifying procedures to reduce costs should not introduce disproportionate and perverse outcomes which treat socioenvironmental stewardship as secondary to administrative process.

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SEPA's Guidance for developers of run-of river hydropower schemes

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Date of Submission: **29th April 2010**

Consulting Organisation:

SEPA

| | | |
|---|--|--|
| 1. | Are you responding: (please tick one box) | |
| a) | as an individual? | go to Q2a/b and then Q4 |
| b) | on behalf of a group/organisation? | <input checked="" type="checkbox"/> go to Q3 and then Q4 |
| Individuals | | |
| 2a. | Do you agree to your response being made available to the public | |
| | YES (go to 2b below) | |
| | NO, not at all | <i>We will treat your response as confidential</i> |
| 2b. | Where confidentiality is not requested, we will make your response available to the public on the following basis (please tick one of the following boxes) | |
| | YES, make my response, name and address all available | |
| | YES, make my response available, but not my name or address | |
| | YES, make my response and name available, but not my address | |
| On Behalf of Groups or Organisations | | |
| 3. | The name and address of your organisation <i>will</i> be made available to the public. Are you also content for your response to be made available? | |
| | <input checked="" type="checkbox"/> YES | |

Introduction

The Macaulay Institute is a main research provider to the Scottish Government's Rural and Environment Research and Analysis Directorate. Its mission is to conduct interdisciplinary research across the environmental and social sciences to support the protection of natural resources, the creation of integrated land use systems, and the development of sustainable rural communities. Much of our work is interdisciplinary linking social sciences and bio-physical sciences and we seek to take a joined up approach to the conduct of policy-relevant research.

In collaboration with the Catchment Management Group, the Socio-Economics Research Group has been working on micro-hydro power development in association with Aberdeenshire Council and others. Our provisional estimates are that there were historically around 1000 water power sites in Aberdeenshire alone and that at least a third of these have good technical and economic potential to deliver to green energy and rural development outcomes under new technologies. This suggests that over Scotland as a whole there are tens of thousands of sites and a very significant proportion of these are capable of producing low-cost renewable energy to support the greening of the Scottish economy and the maintenance of vibrant rural communities.

Our wider suite of work includes environmental economic assessment and the valuation of market and non-market benefits from rural land use. Such problems as the economic appraisal of water power sites, including non-market cost and benefit estimation, are typical examples of the type of work that we undertake.

Under the new research programme for 2011-2016 currently being commissioned by the Scottish Government's Rural and Environment Research and Analysis Directorate (*RERAD*), renewable energy assumes a much more important position than previously. We see the effective appraisal of renewable energies as a central research concern and, in collaboration with SEARS bodies, including SEPA, are willing to address some of the environmental concerns in our research effort. This effort will create the evidence base for future policy.

Consultation Response from the Macaulay Land Use Research Institute

We recognise that there are some important choices to make with regard to selection of renewable energy technologies and that a significant number of technically and financially feasible schemes should not go ahead for good environmental reasons. This is to be expected. However, in operationalising regulatory structures, it is vital that there is a level playing field of regulation across different renewable energies.

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?

Yes, we agree that if the strict environmental criteria are applied, this will result in minimal damage to the natural environment. However, we believe that the application of stricter criteria to the sub-100 kilowatt schemes than to larger schemes where the balance of evidence of costs and benefits will be considered is economically irrational. The criterion used of 'no adverse impacts on the water environment' is unreasonably strict and cannot be deemed proportionate. Our understanding of proportionality is based on the balance of costs and benefits, whereas there appears to be no application of any proportionality principle in the proposed regulatory structure. Indeed, the proposed treatment of below and above 100 kilowatt schemes disproportionately discriminates against smaller schemes.

If the same principle were applied to food and fibre production, almost no food production would take place in Scotland and almost no commercial forestry would take place, because both would interfere with the naturalness of the water cycle and with water quality and quantity to some degree. The singling out of small low-head run-of river hydropower for such treatment is profoundly unbalanced. Energy production is as legitimate an activity as food or fibre production, yet it is being subjected to regulation with respect to its impact on water quality which, in the case of sub-100 kilowatt schemes, is completely disproportionate.

Consultation Response from the Macaulay Land Use Research Institute

If Scottish ministers wish to optimise the use of the hydropower resource, as is intimated in this discussion document, then this optimisation should be based on formal and widely-used, Treasury-approved, Green Book economic principles, based on the assessment of the balance of benefits and costs. These principles include approved approaches to estimate the value of non-market costs and benefits, so should factor in all the environmental concerns cited by SEPA. The procedures established in this consultation document cannot and will not optimise the use of the resource. The failure to apply economic principles is likely to lead to poor decisions that are not based on the balance of benefits vs costs.

There are already numerous opportunities to assess the impact of low head schemes because of existing weirs used for traditional water power production and a limited number of sites which have been developed for low-head hydropower production. There appears to be little interest in SEPA for undertaking research on the environmental impacts of already developed sites, which could be undertaken to indicate any ecological stress caused by the small-scale low head systems. Outwith Scotland, a number of these sites are in national parks and several are on rivers where migratory salmonids are important, so there are substantial investigative possibilities.

In the search for evidence based policy, we would see scope for longitudinal biophysical studies of upstream effects and impacts on the depleted flow reach between weir and turbine. Such work over a range of sites could provide conclusive evidence of the impact of run-of-river hydropower developments on the quality of a watercourse.

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?

Yes, we consider that the standard applied is unreasonably onerous and economically irrational. The issue should not be whether the development poses any risk to water, but the balance of cost vs benefit, taking into account risk. It is clear from recent work by Forrest and Wallace (2009) that the scale of opportunity for small-scale hydropower has been massively underestimated in earlier work. This means that the opportunity cost of not developing technically feasible sites needs to be considered, taking into account the known

Consultation Response from the Macaulay Land Use Research Institute

cost of continuing fossil fuel emissions from other power sources (c £25 tonne of CO₂ according to DEFRA and the Treasury and rising).

The Scottish Government prides itself on being joined up across directorates. Its whole approach to the organisation of its mission of Sustainable Economic Growth through the National Performance Framework, National Outcomes and indicators is integrative. Rural development is a key theme of the Rural Affairs and Environment Directorate and the support of green growth is a fundamental tenet of Scottish Government policy. The government has asserted widely its green credentials and pinpointed the scope for renewable energy as a central platform in its green growth strategy. This set of values is not evidence in the approach to green energy of its agencies.

Typically a kilowatt of hydropower output translates into about £1000 (£600-1200- depending on site) of gross output of energy per year at current prices. Given that there are literally thousands of potential small low head (run-of-river) hydropower sites that could be technically and economically feasible, the potential injection of income into the rural economy is very considerable indeed.

Over recent years the incomes of many hill and upland farmers has been negative (see official Scottish Government data) and there is a strong desire to enhance the sustainable development of rural Scotland. The Scottish Rural Development plan from 2007-2013 has put in place measures to increase uptake of renewable energy projects and the recent CAP health check has argued that the role of European supported measures to mitigate climate change needs to increase. Unlike large-scale energy developments which produce an all-too-brief construction multiplier and then reward shareholders scattered throughout the world for subsequent sales of electricity, small-scale hydropower injects resource into the rural economy throughout the project's life, as most owners of small hydropower plant will be local residents whose presence in rural Scotland helps to maintain shops and other services through the multiplier effect.

In designing their regulatory measures in this consultation document, SEPA appear oblivious to the very real rural development benefits of small-scale hydropower which are almost certainly much greater in terms of their positive impact on rural areas than large-scale renewable energy schemes. Such benefits are part of the lifeblood of a low-carbon future

and can help to sustain rural incomes where they have long been compromised by economically adverse conditions.

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.

No, the approach is not acceptable because it is based on a regulatory system completely disconnected from the principle of assessing the value of damage compared with the value of benefits arising from the development. Typically, except for the rather special situation of natural obstacles such as waterfalls, low-head run-of-river hydropower developments require the construction of a weir and necessarily deplete the main body of water for an average of 400 meters or so. The open lades associated with such low-head hydropower developments are valued habitats in their own right and the standard extraction models used to date, which allow greater extraction from the main stream to that proposed in these new rules, do not appear to have impeded migratory salmonids to any significant degree or adversely affected protected species. It is to be noted that the depletion is for a short stretch of water only, although in some rivers a number of depleted stretches could occur along the watercourse.

Any scheme should be based on the balance of benefits over costs. It is clear that where water quality is highly degraded, and environmental consequences minimal, this will lead to technically and financially feasible proposals going ahead. But this will mean only a minority of technically and economically feasible sites will be developed. Where water quality is higher, exactly the same criterion should apply –the balance of benefit over all costs including environmental costs. The extremely detailed specification of ground rules to be followed misses the key point about the need to balance costs vs benefits.

The situations specified where approval might be given include:
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;

Consultation Response from the Macaulay Land Use Research Institute

- using only that proportion of flow that can be abstracted from the river or stream without breaching river flow standards.

This is unreasonably restrictive for the reasons mentioned above. It fundamentally breaches the principle of balancing costs and benefits and is neither acceptable nor proportionate.

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?**

As intimated earlier, there is no reason why the same criterion should not be used in the appraisal of large and small schemes. The minister's criterion for large schemes is:

'if schemes of larger than 100 kilowatts are permitted to cause deterioration of the water environment, the deterioration must be justifiable in terms of costs and benefits.'

Consultation document page 5.

We endorse that principle on schemes both above and below 100 kilowatts; and given the unambiguously greater benefits of smaller schemes on sustainable rural development find it incomprehensible that the same principle is not applied at all scales. In effect, the proposed rules will lead to highly effective (in terms of total benefits less environmental and other costs) schemes below 100 kilowatts being shelved when schemes with more adverse impacts go ahead. This is seriously flawed logic in pursuance of sustainable economic growth, the government's overarching aim.

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?

Consultation Response from the Macaulay Land Use Research Institute

No, the measures as specified will lead to an economically irrational outcome. The measures will effectively sterilise a significant renewable power resource that could be developed at minimal environmental costs, foregoing the opportunity of that same resource contributing to sustainable economic development.

Of course there will be some sites that should not be developed. On Natura 2000 sites and where the nature conservation interest and value is higher than the value of benefits derived no development should occur. Pearl mussel habitats on rivers such as the Dee and its tributaries, the Tay and its tributaries and the South Esk should be rigorously protected. There is also a need for any installations to be migratory salmonid, water vole and otter-friendly.

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

It is not clear what is meant by the term practicable. If it means are the measures technically feasible, then in most cases yes, they are. However, the mitigation measures proposed will dramatically reduce the number of sites where economically feasible run-of-river schemes can be introduced. In some cases, the measures will be practicable, insofar as they can be carried out without destroying the economic case for the development. But in terms of reasonableness and proportionality, the proposals are only reasonable and proportionate if they ensure that balanced decision making occurs. This is patently not the case for sub-100 kilowatt schemes.

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?

It is not possible to generalise, because of specific attributes of different sites, but the mitigation measures proposed are extremely thorough and wide-ranging. Indeed, they may already be excessive as environmental constraints.

Summary

In summary, we consider it economically irrational to create major regulatory obstructions to the development of micro-hydropower on installations below 100 kilowatts and implement alongside this a perfectly reasonable rationale for schemes above that threshold size based on the balance of financial and environmental costs and benefits. It is our contention that the balance of benefits vs costs is the only reasonable criterion to use in appraising hydropower sites. We recognise that some of the non-market economic values may be hard to measure and ask that further research be undertaken in this field.

We recognise that there will be a proportion of run-of river sites which will (and should be) rejected on the basis of their important environmental values, where these social costs exceed the private benefits. But invoking the Water Framework Directive and ignoring the proportionality principle makes this policy proposal discriminatory against both rural land managers and economic justice.

We would welcome the opportunity to work collaboratively with SEPA, SNH and others on developing procedures for the independent monitoring of operational sites, part funded by monies set aside by RERAD for such purposes under theme 2 of the new research programme for 2011-2016. We believe that methods such as multi-criteria analysis (MCA) can offer objective appraisal methods for screening potential sites, where detailed non-market benefits estimates are available.

We would wish to support SEPA and the Scottish Government in improving the evidence base and setting out a research agenda to better appraise the costs and benefits associated with such developments.

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Paterson, Kevin

From: Keith Williams [nbft@btconnect.com]
Sent: 30 April 2010 18:50
To: Hydro Consultation
Subject: Hydropower Consultation
Follow Up Flag: Follow up
Flag Status: Completed

Dear Sir/Madam

On behalf of the Ness & Beauly Fisheries Trust, I wish to endorse the response to this consultation that has been submitted by the Association of District Salmon Fishery Boards and Rivers and Fisheries Trusts Scotland.

Yours Faithfully

Keith Williams

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

30 April 2010

Your Ref:
Our Ref:

Dear Sirs

Hydroplan response to the SEPA guidance for developers of run of river schemes consultation

We would like to congratulate SEPA for producing a draft guidance document which we believe will be both useful and necessary for facilitating the appropriate development of run of river hydroelectric schemes in Scotland. We recognise that the production of such documents are always difficult and so would offer the following suggestions:-

Briefing and Workshops

We think that the Hydro Industry has not adequately prepared itself for the significance of the proposed guidance and so there has been a lot of mis-information being discussed (even with experienced developers) about the proposal. Similarly, we do not believe that SEPA has adequately briefed the Industry and it would be helpful if SEPA / BHA could organise a couple of workshops to explain the implications of the proposals.

Effective date for implementation

In this respect, whereas we welcome the guidance, we must insist that it's "rules" are not applied retrospectively i.e. there are many schemes "in process" or "in preparation" which have used current best practise in the their assessment and so might be affected by the proposals. We would suggest that a date in the Autumn of 2010 might be appropriate for the implementation of the guidance such that the Workshops mentioned above could take place and all feedback received.

Guidance in addition to local knowledge

Our experience of SEPA is generally very positive and the Case Officers and Specialists hold a wealth of useful local and specific knowledge and so it would be a shame to loose this resource. Moreover, although general guidance is useful, in the wrong hands (e.g an inexperienced officer), the guidelines could be applied rigidly. Hence we would encourage site-by-site analysis by SEPA as opposed to blanket measures.

Energy Density and Gradient

We agree with the goal of promoting effective and efficient hydro schemes which make best use of the hydro resource. Moreover, we support the idea of a minimum energy production per unit length of waterbody i.e energy density.

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In general, it is possible to build a pipeline on a slope of 1:4 or 1:5 and so this is steepest gradient of any burn that can be developed without tunnelling. On the other end of the spectrum, current economic drivers suggest that schemes with a gradient of 1:40 or more can be viable. Clearly, it is undesirable to have a long depleted stretch on a sensitive river but we would suggest that the energy density currently suggested in the guidance is too onerous.

The guidance suggests an energy density of 1167MWh/km for burns of good status and 3500MWh/km for high status. On a typical West Highland waterbody, this would equate to a maximum gradient of 1:20 for a good status burn and 1:5 for a high status burn. Both of these figures would preclude a significant number of schemes from development.

Reviewing the many schemes which we have recently consented, under construction, in process or in preparation, we would recommend that the energy density figures be relaxed to 583MWh/km for a good status burn and 1750MWh/km for a high status burn. This would allow construction of schemes up to 1:40 and 1:20 gradients respectively.

Protection of low flow level

Current Best Practise suggest that, in the main stem of the burn where fish are present a hands-off flow equal to Q90 with some variability would be appropriate. For smaller tributaries and burns where fish are not present a Q95 flow (sometimes fixed) would be generally adequate. Hence, we would therefore question on what basis SEPA are suggesting that it is necessary to pass Q90 for all watercourses with a catchment area upstream of the tailrace of <10km² .as is suggested in the guidance.

We believe that the hands-off flow should be dictated by the ecological status of the river and not just based on the size of its catchment. Moreover we believe that the establishment of a suitable hands-off flow should be decided on a site-by-site basis and should take into account a number of factors including the presence/absence of fish, the visual impact of the abstraction and the status of the river.

In Conclusion

The appropriate and sympathetic development of hydro should be in everybody's interests and a guidance document will promote and facilitate this aim. Therefore Hydroplan supports the guidance document and would like to praise SEPA on a far-reaching and comprehensive piece of work. With the help of the Hydro Industry, the right content and focus can be developed and the guidance will be an effective and useful tool.

We look forward to the outcome of this consultation and further discussion at Workshops.

Yours faithfully

The Hydroplan Team
30th April 2010

Paterson, Kevin

From: John Wood [John.Wood@strathmore-estates.co.uk]
Sent: 03 May 2010 09:36
To: Hydro Consultation
Subject: hydro power schemes
Follow Up Flag: Follow up
Flag Status: Completed

Dear sirs

wish to object most strongly to the proposals.

They unfairly mitigate against small [sub 100kw]rural schemes where the power will be used on the local estate.

It is the large schemes which are the real danger to fish and environment- eg Stanley, just a smolt mincing machine.eg river garry etc, eg all SSE dams where the smolts either cant find their way to the ladder to descend . or they get minced going through the turbine.

But sepa turns a blind eye !

There should be no 100kw threshold at all – it is unnecessary.

Your proposals on flow to be left in the burn are too stringent – ridiculously so.

Yours sincerely

John m wood

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Paterson, Kevin

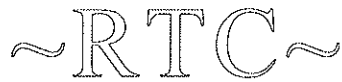
From: TERRY SMITHSON
Sent: 03 May 2010 09:40
To: Hydro Consultation
Subject: Submission by Ulster Angling Federation
Follow Up Flag: Follow up
Flag Status: Completed

Omagh Anglers association would like it noted that we support the submission made by Ulster Angling Federation on the SEPA guidance for developers of run of river hydro power schemes.
We would like it shown that we fully support their stance on this Issue

Terry Smithson
Secretary Omagh Anglers Association

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RIVER TWEED COMMISSION THE NORTH COURT DRYGRANGE STEADING MELROSE ROXBURGHSHIRE TD6 9DJ
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Established by Act of Parliament to protect the fish stocks in the Tweed river system
Clerk: N P Yonge Treasurer: Miss J J Lovett Superintendent: A P Coleman

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4th May 2010

Dear Sir/Madam

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

The River Tweed Commission (RTC) welcomes the opportunity to respond to the above consultation. I must apologise that you did not receive this response by the deadline of April 30th and I do hope that this late response is still acceptable.

The RTC is the regulatory authority for fisheries on the River Tweed. We are particularly interested in the subject of hydro-power as we have a number of parties who are interested in establishing turbines on the Tweed system. In some locations we consider these to be without issue but in others there is clearly a conflict of interests and to that extent we welcome these guidelines which we consider to be very good and well balanced. As you know, we were not content with the first draft but we think that this draft is very helpful, well considered and positive in an area that has the potential for much conflict.

There are, however, a number of areas which we think should be amended and we have contributed to a fisheries working party to determine these points. I believe that they have also been made to you by ASFB and RAFTS and with which we completely associate ourselves with.

These are the points we would like to contribute to the guidance draft:

Introduction: Developers of hydro schemes must demonstrate no adverse impacts for fish or fisheries and the guidance should make it clear that the onus lies clearly on developers to demonstrate no negative effects. It would be helpful if this could be stated in the introduction of the guidance.

1. Page 4 - paragraph in italics – We would like the point above to be made specifically on this page where it says "*and, where they can be shown to have no adverse impact on the water environment*".
2. Page 4, first bullet "*Likely acceptable schemes include those: situated in degraded parts of the environment*". We do not think that the development of schemes in degraded areas can be reconciled with the objective to improve the status of degraded waterbodies in line with the Water Framework Directive target of 'good' ecological status. The promotion of development in these areas further hinders work to restore these waterbodies to 'good' status. There is a risk that a negative message is sent by this concept and may set 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*". It would be useful to state that these standards are contained in the regulations referred to in footnote 12.
4. Page 5, Ministerial statement – we reiterate our point made at 1. above, 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 the 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, 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 not the case. 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

N P YONGE
CLERK TO THE COMMISSION

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**Scottish
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Always serving Scotland

30 April 2010

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Dear Sir/Madam

Guidance for developers of run-of-river hydropower schemes

Thank you for the opportunity to comment on the above document.

Scottish Water supports the concept of small scale hydro power. In the current investment period (2010-2015), we are funding the development of 25GWh of energy production capacity from hydro power.

Scottish Water would make three broad comments:

1. Scottish Water supports SEPA's current guidance for small scale hydropower developments. We note that, for example, the SEPA CAR charging scheme offers incentives for smaller scale hydropower schemes, with a reduced application fee and an exemption from the annual subsistence fees.

However, Scottish Water is concerned that the Guidance for developers of run-of-river hydropower schemes appears to be inconsistent with SEPA's existing guidance.

Scottish Water understands that the guidance for developers of run-of-river hydropower schemes was produced to facilitate the objectives set out by Scottish Ministers in January 2010 regarding balancing the benefits of renewables generation and protection of the water environment.

The Scottish Minister's document states that emphasis should be placed on supporting hydropower developments which can make a significant contribution to Scotland's renewables targets, accepting there may be environmental impacts. The document further states that it is larger schemes (100kW or more) that are considered to make an important contribution, whilst smaller schemes (less than 100kW) may provide only local economic benefits.

However SEPA have recently highlighted the contribution that smaller scale hydro schemes can make to Scotland's renewables target: the Spring 2010 edition of SEPA View (issue 46) carries an article on hydropower, emphasising the benefits of such micro-hydro schemes and encouraging those considering small scale schemes to submit their proposals.



2. There are already a number of SEPA documents related to hydropower and assessing impact on the environment. For example, Guidance for applicants on supporting information requirements for hydropower applications and regulatory method 'WAT-RM-34: assessing applications likely to result in significant adverse impacts on the water environment'.

Scottish Water suggests that these documents already provide adequate guidance to developers and perhaps SEPA may want to incorporate the guidance for developers contained in the run-of-river consultation document into one of these documents.

3. Annex A, Part A, Section 1 states it is important that 'the interests of other users of the water environment are taken into account'. Scottish Water welcomes this statement and considers that table 1, should, in addition to mentioning the tiered approach, reiterate that the interests of other users of the water environment need to be taken into account. It would also be of assistance to recommend that applicants consider the needs of other users as part of the pre assessment process.

I trust the above is useful in your deliberations. Do not hesitate to contact me if you require more information.

Yours faithfully

Dr Mark Williams
Environmental Regulation & Climate Change Manager