NB Use of this **template is optional** – regulators may choose to agree an alternative approach with relevant business representatives. Please keep all entries **as brief as possible** consistent with allowing businesses to understand them.

Business Engagement Assessment

Title of Proposal	**Assessment of the options for revised river flow and water abstraction standards for run of river hydropower schemes**
Lead Regulator	Environment Agency
Contact for Enquiries	John Barraclough 07775 758472

Date of assessment	October 2013	Commencement date	April 2014
Net Cost to business (EANCB)	-£4.7m to +£5.4m	Stage of assessment	Final
Which area of the UK will be affected by the change(s)?	England	Price and present value base years	2013
Does this include implementation of Red Tape Challenge commitments?	No	Is this directly applicable EU or other international legislation?	No

Brief outline of proposed changes in regulatory action.

Hydropower schemes harness the energy from flowing water to generate electricity, using a turbine or other device. The volume of flowing water and the height it falls determines how much electricity can be generated.

The Environment Agency currently licenses hydropower in relation to water abstraction, impoundment, fish passage and flood risk management. It is our role to ensure that hydropower schemes include appropriate measures to protect the environment. We do this by ensuring good scheme design, by attaching conditions to the permits we issue and by monitoring compliance with those conditions. As part of the review of our Hydropower Good Practice Guidelines (GPG) we are making changes to the river flow and water abstraction standards for run of river hydropower schemes, following consultation on a number of options (see overleaf).

Why is the change proposed? Evidence of the current problem?

We are changing our river flow and abstraction standards for run of river hydropower schemes to avoid the risk of deterioration in the status of water bodies under the Water Framework Directive.

We have reviewed evidence across a wide range of research and information covering the environmental impacts of changes in flow regimes. In particular, we considered the results of a study by SNIFFER* which recommended that UK regulators review their hydropower guidance within a risk-based framework.

We have also modelled a range of hydropower flow scenarios which highlighted some risks from the loss of flow variability in depleted reaches. We also undertook a programme of engagement with the Hydropower Working Group (HWG) and its Technical Sub-Group. The HWG includes representatives of the industry and fisheries groups.

As a result of this review we decided that in our revised flow guidance we must be more explicit about the potential for adverse environmental impacts to certain species and ecosystems resulting from loss of flow variability in depleted reaches of river, from which water has been diverted into the hydropower installations.

*Scotland and Northern Ireland Forum For Environmental Research, WFD114 Phase 1 Literature review – Impact of run-of-river hydro-schemes on fish populations, April 2011

Which types of business will be affected? How many will be affected?

The main types of businesses that will be affected by any changes in river flow and water abstraction standards are owners of land and assets (e.g. weirs) suitable for hydropower developments, the hydropower development industry, and companies who manufacture hydropower equipment. Community schemes make up approximately one third of hydropower developments. With limited information available on the numbers of hydropower developers, and numbers of landowners with potentially viable projects, it has not been possible to forecast how many of these businesses will be affected.

How will the change impact these businesses?

Introduction
This quantitative and qualitative assessment has considered the impact that the options and our approach to revising river flow and water abstraction standards may have on the future viability of hydropower schemes compared to our existing hydropower GPG. The assessment has been completed in consultation with industry representatives from the British Hydropower Association (BHA) and Micro Hydro Association (MHA), with both of these organisations providing data and qualitative input to the process.

Our options
The options on which we consulted were as follows:

Option 1 – A direct development of and extension to the existing hydropower GPG standards. This option would be likely to provide good renewable energy generating potential for the hydropower industry.

Option 2 – Adopting an ecological sensitivity scoring approach. This option is designed for high head schemes and would not deliver well for low head schemes.

Option 3 – Applying our general abstraction licensing standards to hydropower using Catchment Abstraction Management Strategies Environmental Flow Indicators (CAMS/EFI). More stringent flow standards would come at a cost for the hydropower industry and reduce scheme viability considerably.

Option 4 – A variant of option 3 with limited discretion for higher levels of abstraction for certain schemes. As with option 3 this option would reduce scheme viability considerably.

Our recommended approach
Following consultation, we have developed a revised approach which is a hybrid between options 1 and 3. The starting point is the flow values in option 3 but with provision for departures up to the values in option 1 on the basis of a site specific environmental assessment. Exceptionally, depending on the site assessment, we may consider permitting flows beyond the levels in option 1 if the evidence is clear that there will be no unacceptable impacts. Exceptionally, we may also require lower flows than in option 1 to protect designated sites or species.

Quantitative assessment of the options
The valuation of impacts in the options assessment is based on a calculation of changes in the net present value (NPV) of cash flows arising from a set of schemes. Equivalent annual net cost to business figures are also given (EANCB). Only direct financial costs of schemes are included. No environmental or social costs are included. No overheads or ancillary costs for companies (e.g. to cover search or non-scheme related transaction costs) are included. A discount rate of 3.5% has been applied to the calculations as specified in the ARI guidance.

The assessment is sensitive to the choice of time period. Feed in tariffs are guaranteed for 20 years and individual hydropower schemes would be profitable if their costs are below expected revenues over the same time period. As capital costs are typically incurred in the two years before a scheme starts to operate (while the scheme is under design and construction) a period of 22 years would include scheme costs and guaranteed revenues and would be the basis for arranging borrowing from a financier. This period is used here as the basis for comparison of impacts on individual schemes.

Flows' modelling using data from Environment Agency gauging stations has been undertaken to quantify the generating potential and impact of the changes. Typical hydropower project capital and operational costs have been taken from the Parsons Brinkerhoff Feed in Tariff report and data provided by the British Hydropower Association (BHA) and Micro-Hydro Association (MHA).

Impact of the options on net present value (NPV) of schemes developed by the hydropower industry
The value of the total hydropower resource in England is difficult to estimate as there are no reliable current assessments of the number of feasible schemes. The rate at which these schemes are developed each year is also subject to doubt. The total value and the rate of development will both be affected by changes to the feasibility of schemes under the options. This assessment has used two future scenarios for the annual rate of development of schemes derived from Environment Agency historical permitting data and British Hydropower Association/Micro-Hydro Association data. Meetings have also been held with hydropower industry representatives in June, July, and October 2013. There is broad agreement that even though it is difficult to project the future, the calculations represent the best available assessment of impact.

The following tables provide a forward projection of NPV of the whole life cash flow of hydropower projects beginning in the 10 year period 2014 to 2023, comparing the existing Hydropower GPG1 with consultation options 1-3. Option 4, which allowed for a more flexible application of Option 3, was not modelled because of a lack of specific flow parameters beyond those of Option 3.

TABLE 1: Future scenario of 40 schemes per year using the historical mix of Environment Agency scheme types along with Parsons Brinckerhoff and BHA/MHA scheme costs.

Scenario	Cost Data	GPG1	Option1	Option2	Option3
Future scenario '40 schemes per year',using the historical mix of Environment Agency licensed scheme types as observed in England 2009-2013.	Parsons Brinckerhoff	45.1	68.7	30.8	18.2
	BHA/MHA	71.8	94.6	56.7	44.2

Notes: NPV (FY13/14 to FY43/44) for the whole lives of the 40 schemes starting each year in the period FY13/14 to FY22/23 [£m, @3.5% discount rate, 2.5% Feed in Tariff degression]

Headline figures indicate that by using this historical mix of schemes applied to a future scenario, option 1 potentially gives an increase in estimated economic value against existing GPG of up to £23.6m (EANCB - £2.7m). However, this figure is likely to be overly optimistic as a developer may not get maximum abstraction levels set out in the table. This is because flow levels could be reduced after the application of criteria to meet local environmental standards. Results for options 2 and 3 potentially reduce the value of the industry by up to £27.6m (EANCB £3.2million) and reinforce the message that both of these options reduce the financial viability of some types of schemes (e.g. low head, depleted reach) compared with the existing GPG.

TABLE 2: Future scenario of 25 schemes per year using BHA/MHA data along with Parsons Brinckerhoff and BHA/MHA scheme costs.

Scenario	Cost Data	GPG1	Option1	Option2	Option3
Future scenario '25 schemes per year' using BHA and MHA mix of schemes.	Parsons Brinckerhoff	102.3	142.5	78.4	57.0
	BHA/MHA	168.3	207.6	143.6	122.2

Notes: NPV (FY13/14 to FY43/44) for the whole lives of the 25 schemes starting each year in the period FY13/14 to FY22/23 [£m, @3.5% discount rate, 2.5% Feed in Tariff degression]

Headline figures indicate that by using the BHA/MHA mix of schemes as a future scenario, the overall value of the hydropower industry increases compared to the EA mix of schemes future scenario. Option 1 potentially gives an increase in estimated economic value against existing GPG of up to £40.2m (EANBC -£4.67m). Again this figure is likely to be overly optimistic. Results for options 2 and 3 potentially reduce the value of the industry by up to £46.1m (EANCB £5.4million) and again reinforce the message that both of these options reduce the financial viability of some types of schemes (e.g. low head, depleted reach) compared with the existing GPG.

Under both the 40 scheme and 25 scheme future scenarios option 1 has the most potential to increase the net present value of the hydropower industry with option 3 having the biggest reduction.

Assessment of our revised approach

Whereas the options on which we consulted provide single flow values that can be used to model impacts on the industry, albeit with significant caveats, our revised approach is based on scheme-by-scheme assessment and provides a range of flow values for each type of scheme: on or around weir; low-head with a depleted reach; and high head. Hence it is more difficult to quantify the potential aggregate economic impact, which in effect falls in the range between options 1 and 3 (see text and tables above).

At individual scheme level, we are able to provide a qualitative assessment of the likely impact of our revised approach as follows:

Scheme on or around weir – schemes on existing weirs are likely to maintain the same, or in exceptional circumstances have a net gain in revenues, compared to the existing GPG standards.

Low head schemes with depleted reach – there are likely to be a mix of low head hydropower schemes that maintain the same and some that have a net loss in revenues compared to our existing GPG standards.

High head schemes – high head hydropower schemes are likely to maintain the same, or have a net gain in revenues compared to existing flow allocations.

Impact on small businesses?

As most scheme developers to date have been small and medium sized enterprises (SMEs), the impact on SMEs will be as for the sector as a whole. For certain schemes there may be additional costs in providing evidence that there will not be unacceptable impacts on the local environment but for most schemes the costs will be similar to those under existing guidance and while some schemes may see a lower return on investment others could see a greater return.