

# Ebley Mill VEP Hydroelectric Project

## Water Framework Directive Assessment

## Renewables First – Company

Renewables First is one of the UK's leading hydro and wind power specialists and has been delivering hydro and wind projects for over ten years. We provide all of the services from in-house resources to take a project from initial feasibility stage, through all of the consenting and engineering design stages and on to construction and commissioning. We use our experience of the installation and operational phases to provide feedback into the design stages of the next projects, ensuring that our customers benefit from our whole-project exposure.

We are independent of hardware suppliers, so we only recommend the most appropriate hardware to maximise energy production and return on investment, and to ensure a long and reliable operational life. We only recommend the best quality hardware from established manufacturers, and design good quality systems that will be reliable in the long-term. Our designs focus on maximising renewable energy production whilst applying best practice in regard to ecological protection or enhancement.

## Document Control

Version	Date of Issue	Author(s)	Reviewed by
01	08/11/2018	Kelly Clutterbuck	Matt Lomax



Renewables First Ltd  
The Mill  
Brimscombe  
Stroud, Glos, GL5 2QG

Phone +44 (0)1453 88 77 44  
Fax +44 (0)1453 88 77 84  
Email [info@renewablesfirst.co.uk](mailto:info@renewablesfirst.co.uk)  
www. [renewablesfirst.co.uk](http://renewablesfirst.co.uk)

## Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
	Introduction to assessment .....	1
	Purpose of Assessment.....	2
	Site description .....	2
	Scheme Description & Status.....	2
	Current WFD status .....	3
<b>2</b>	<b>Expected impact arising from proposal on WFD Objectives .....</b>	<b>1</b>
	Impact on Current WFD Status .....	1
<b>3</b>	<b>Detailed review .....</b>	<b>3</b>
	<b>River basin and management catchment summary .....</b>	<b>3</b>
	<b>Operational catchment summary.....</b>	<b>3</b>
	<b>Frome – Ebley Mill to conf R Severn .....</b>	<b>4</b>
	Biodiversity and fish passage .....	5
<b>4</b>	<b>Conclusion .....</b>	<b>5</b>

## 1 Introduction

### Introduction to assessment

- 1.1 This document has been produced in connection with an impoundment licence application for a hydropower scheme at Ebley Mill on the River Frome.
- 1.2 The Environment Agency's *Guidance for run-of-river hydropower: the Water Framework Directive, nature conservation and heritage* dated December 2013 has been followed as part of this assessment.
- 1.3 The assessment will review the potential effects arising from the proposal in relation to:
  - flow patterns
  - sediment availability
- 1.4 The Water Framework Directive (2000/60/EC) (WFD) was passed by the European Union in 2000. It became part of UK law in 2003 with the issue of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.
- 1.5 The WFD is implemented regionally by river basins. Each river basin has a River Basin Management Plan (RBMP) which is updated every six years. The RBMP documents the current status of the water bodies and the pressures affecting them. It outlines the improvements that can be made within the current management period and the programme of investigations to be carried out.
- 1.6 The fundamental objectives of the WFD that apply to surface water bodies are:
  - Prevent deterioration of the status of water bodies
  - Achieve at least good ecological status and good surface water chemical status by a set date
  - Reduce pollution from priority substances and eliminate priority hazardous substances as defined by the European Commission
- 1.7 In addition to the objectives above there are further standards and measures to be met in areas defined as protected areas. These areas are listed in the RBMPs.
- 1.8 Artificial or Heavily Modified Water Bodies (AWB, HMWB) cannot achieve good ecological status as they are unable to get close enough to the required natural conditions. Instead the aim is to achieve good ecological potential.
- 1.9 The RBMPs detail the Environment Agency (EA) objectives specific to each water body that are designed to meet the WFD objectives. The proposed measures to meet the objectives are also given.

## Purpose of Assessment

- 1.10 This assessment has been undertaken to fulfil the requirements under the Water Framework Directive.
- 1.11 The EU Water Framework Directive requires environmental objectives be set for all surface and ground waters to enable them to achieve good status or potential for heavily modified water bodies by a defined date. One objective is to prevent further deterioration which can include changes to flow pattern, width and depth of channel, sediment availability/transport and ecology and biology.
- 1.12 This assessment looks at the current status of the water bodies that may be affected by the proposed hydropower system and discusses whether or not the proposal will deteriorate the ecological quality of the water bodies or prevent the water bodies from achieving good ecological status.
- 1.13 Any EA defined objectives and measures that are specific to the water body will be considered to determine if the proposed hydropower system will prevent these objectives and measures from being realised.
- 1.14 The assessment includes any cumulative or in-combination effects.
- 1.15 If this assessment finds that the proposal is likely to contravene the WFD, then further more detailed assessments will be recommended.

## Site description

- 1.16 The proposed development is located adjacent to Ebley weir on the River Frome.
- 1.17 At this point the river Frome runs alongside Ebley Mill which is a listed building dating back to the 18th Century. Originally Ebley Mill was a Woollen mill, it has since been converted into offices by Stroud District Council. The scheme is located approximately 265m downstream of the confluence weir.
- 1.18 Generally the ground onsite is relatively flat, laid to patio and sited alongside the council office mill structure.

## Other Schemes

- 1.19 There are no known hydropower schemes within 5km of the proposed development.

## Scheme Description & Status

- 1.20 This proposal involves the installation a single Aquazoom vortex turbine and associated equipment within the right bank of the River Frome. The intake of the proposal will be located at OS grid reference SO 82965 04555 and the outfall will be located at OS grid reference SO 82965 04542.
- 1.21 The overall classification for the waterbody during the 2016 cycle at this location is **moderate**.

## Current WFD status

Site Name	Ebley Mill
Location	River Frome
OS Grid Reference (Intake)	SO 82965 04555
OS Grid Reference (Outfall)	SO 82965 04542
Water body name	Frome – Ebley Mill to conf R Severn
Water body ID	GB109054032450
Catchment Area	29.462 km2
Management Catchment	Severn Vale
River Basin District	Severn
Hydromorphological Designation	Not designated artificial or heavily modified
<b>Overall 2016 Classification</b>	<b>Moderate</b>

## 2 Expected impact arising from proposal on WFD Objectives

### Impact on Current WFD Status

2.1 The following table reviews the RBMP plan and specifically for the Frome – Ebley Mill to conf R Severn waterbody.

Receptor	Current status (2016 C2)	Objectives	Potential impact	Assessment	WFD compliance	Further assessment
<b>Element – Biological Quality</b>						
Fish	Moderate	Good 2027	No impact	The scheme will not change any of these parameters significantly. No change – neutral impact on delivery of WFD. The development provides an alternative downstream fish passage route through the turbine.	Yes	No
<b>Element – Hydromorphological Supporting Elements</b>						
Hydrological Regime	Supports Good	Supports Good 2015	No impact	The scheme will not change any of these parameters significantly. No change – neutral impact on delivery of WFD.	Yes	No
<b>Element – Physico-chemical quality elements</b>						
Overall	Good	Good 2015	No impact	The scheme will not change any of these parameters significantly. No change – neutral impact on delivery of WFD.	Yes	No
Dissolved Oxygen	High	Good 2015	No impact	The scheme will not change any of these parameters significantly. No change – neutral impact on delivery of WFD.	Yes	No

Receptor	Current status (2016 C2)	Objectives	Potential impact	Assessment	WFD compliance	Further assessment
Phosphate	Poor	Good 2015	No impact	The scheme will not change any of these parameters.	Yes	No
<b>Element – Specific Pollutants - NOT ASSESSED</b>						
<b>Element – Chemical – Overall</b>						
Overall	Good	Good 2015	No impact	No change – neutral impact on delivery of WFD.	Yes	No
<b>Element – Chemical – Other Pollutants - DOES NOT REQUIRE ASSESSMENT</b>						
<b>Element – Chemical – Priority hazardous substances - DOES NOT REQUIRE ASSESSMENT</b>						
<b>Element – Chemical – Priority substances - DOES NOT REQUIRE ASSESSMENT</b>						

2.2 All conditions summarised above provide no impact on each of the WFD elements assessed.

### 3 Detailed review

#### River basin and management catchment summary

- 3.1 The Severn River basin district covers 21,500km<sup>2</sup>. The proposed development is located within the Severn Vale catchment.
- 3.2 Land use within the Severn Vale catchment is mainly agricultural with a mixture of farming. Watercourses within the catchment are used for a variety of activities including recreation, public water supply, fisheries and conservation.
- 3.3 The significant issues within this catchment are phosphates from sewage treatment works; diffuse pollution from both agriculture and urban areas; physical modifications; and old metal mines also contribute.

#### Operational catchment summary

- 3.4 The proposed development is located within the Frome and Cam Operational Catchment. The river Frome flows from its source in the Cotswolds towards the town of Stroud. Along its length the Frome bifurcates and is intertwined with the Stroud water canal. At Whetenhurst it splits into 2 with the majority being directed to the Gloucester/Sharpness canal and remainder to the river Severn.
- 3.5 The Frome and Cam operational catchment comprises 11 waterbodies, only one waterbody currently has a poor ecological water status.

Ecological and chemical classification for surface waters | 2016 Cycle 2

2016 Cycle 2 ▾

Number of water bodies	Ecological status or potential					Chemical status	
	Bad	Poor	Moderate	Good	High	Fail	Good
11	0	1	8	2	0	0	11

Summary of ecological status or potential and chemical status and objectives for surface water bodies (number of water bodies) including those with less stringent objectives and extended deadlines (blue shaded cells)

	Ecological status or potential						Chemical status		
	Bad	Poor	Moderate	Good	High	Total	Fail	Good	Total
By 2015	0	0	5	4	0	9	0	11	11
By 2021	0	0	0	0	0	0	0	0	0
By 2027	0	0	1	1	0	2	0	0	0
Beyond 2027	0	0	0	0	0	0	0	0	0
Total	0	0	6	5	0	11	0	11	11
	Less Stringent						Less Stringent		

Figure 1: EA summary of operational catchment status and status objectives.

- 3.6 The main RNAGs in this catchment is primarily pollution form rural areas and physical modifications within the agriculture and rural land management sector, pollution from waste water within the water industry sector and negative effects of non-native species.
- 3.7 At present, there are no measures within this catchment which the predicted improvements in the status of water bodies by 2021 are based upon.

**Frome – Ebley Mill to conf R Severn**

3.8 The 2016 cycle 2 classification is **moderate**. The waterbody is working towards a 2027 objective of good status overall. The relevant receptors impact on the Water Framework Directive have been assessed earlier in the report.

**Cycle 2 classifications** <sup>i</sup>

[Download as CSV](#)

Classification Item	2013	2014	2015	2016
▼ Overall Water Body	Moderate	Moderate	Moderate	Moderate
▼ Ecological	Moderate	Moderate	Moderate	Moderate
▼ Biological quality elements	Moderate	Moderate	Moderate	Moderate
Macrophytes and Phytobenthos Combined	-	Good	Good	Good
Fish	Moderate	Moderate	Moderate	Moderate
Invertebrates	-	High	High	High
▶ Hydromorphological Supporting Elements	Supports Good	Supports Good	Supports Good	Supports Good
▼ Physico-chemical quality elements	Moderate	Moderate	Good	Good
Ammonia (Phys-Chem)	High	High	High	High
Biochemical Oxygen Demand (BOD)	High	High	High	High
Dissolved oxygen	High	High	High	High
pH	High	High	High	High
Phosphate	Moderate	Moderate	Good	Good
Temperature	High	High	High	High
▼ Chemical	Good	Good	Good	Good
▶ Priority substances	Does not require assessment			
▶ Other Pollutants	Does not require assessment			
▶ Priority hazardous substances	Does not require assessment	Does not require assessment	Good	Does not require assessment

Figure 2: EA summary of the waterbody cycle 2 status

3.9 The EA catchment planning website cites the Reasons for Not Achieving Good Status (RNAGS) classification elements as fish due to Barriers – ecological discontinuity and reservoir / impoundment – non flow related. Currently disproportionate burdens are the reason for the 2027 objective.

3.10 Appropriate pollution prevention measures will be implemented to protect the River Ouzel from leakages of fuels or lubricants from vehicles and equipment and from siltation and run off during the construction period. The Environment Agency’s Pollution Prevention Guidance series is currently under review and at this time is not classed as ‘good practice’. In lieu of any other interim advice or guidance, however, these documents are still considered to provide useful advice on avoiding or minimising the risk of pollution events. There is no requirement to store chemicals, oils or fuels onsite.

3.11 Provided the pollution prevention measures are implemented, the water quality will not be significantly adversely affected by the proposal.

3.12 The proposed development will not introduce any chemicals or pollutants into the waterbody and therefore will not have a negative impact on the waterbodies chemical status.

## Biodiversity and fish passage

- 3.13 The immediate area is not subject to any environmental designations.
- 3.14 Currently there are no fish pass provisions at the weir. The development will provide an alternative route for safe downstream fish passage and will not impede fish passage at this location or within the catchment.
- 3.15 The development does allow safe downstream passage and it will be screened in line with EA guidance.
- 3.16 Overall the hydropower scheme does not create any additional barrier to fish passage.

## Hydromorphology

- 3.17 Due to the location of the hydropower scheme, the flow will only be slightly diverted away from the main watercourse to pass through the HEP scheme before re-joining the river. The flow will be as-existing during flood events. In major flood events the HEP will shut down, so during the periods of greatest geomorphological change, the site will be as-existing.
- 3.18 There will be no significant impacts to the hydrology during construction. The construction will take place predominantly within the existing bank, and flows will be unaltered until the turbines are commissioned.
- 3.19 In summary, the proposed development is deemed highly unlikely to result any significant hydromorphological changes.

## 4 Conclusion

- 4.1 The project and its construction will not release, generate or disturb any elements or substances not currently present in the river body. We see no impact on the current Good chemical status of the river.
- 4.2 Overall, this proposal is not expected to impact negatively on the current status of the water body and will not have an adverse impact on meeting future WFD objectives.