Hydro and Wind Consultancy, Design & Installation

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Church Farm VEP Hydroelectric Project

Water Framework Directive Assessment

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Renewables First – Company

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1 Introduction

Introduction to assessment

1.1 This document has been produced in connection with an abstraction licence application for a hydropower scheme at Church Farm on the River Wheelock.

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 additional 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.

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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 at Church Farm on the River Wheelock, adjacent to a small weir in the village of Warmingham.

1.17 At this point the river is non-navigable. Currently, flow spills over the weir with some water being partially diverted around the weir along a disused mill race.

1.18 The River Wheelock is a small river with steep banking combined with occasional berms and areas of floating aquatic vegetation. Habitat within the impact zone's vicinity primarily comprises cattle grazed pasture. The river's embankments are edged with semi-improved grassland, occasional mature trees and mixed vegetation.

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 of an Aquazoom vortex electric plant and associated equipment within a new channel on the south bank. The area of land on which the proposed development would occupy sits alongside the weir, at north of the farm.

1.21 The proposal will be located between OS grid reference SJ 70969 61160 and SJ 70968 61150 as per the attached drawing.

1.22 The overall classification for the waterbody during the 2016 cycle at this location is **poor.**

Current WFD status

Site Name	Church Farm
Location	Warmingham, River Wheelock
OS Grid Reference (Intake)	SJ 70969 61160
OS Grid Reference (Outfall)	SJ 70968 61150
Water body name	Wheelock (Fowle Brook to Dane)
Water body ID	GB112068055380
Management Catchment	Weaver Gowy
River Basin District	North West
Hydromorphological Designation	Not Designated artificial or heavily modified
Current Ecological Quality	Poor
Current Chemical Quality	Good
Overall 2016 Classification	**Poor**

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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 relevant Wheelock (Fowle Brook to Dane) waterbody.

Receptor	Current status (2016 C2)	Objectives	Potential impact	Assessment	WFD compliance	Further assessment
Element – Biological Quality						
Fish	Moderate	Good 2027	No impact	The scheme will provide an alternative downstream route when in operation. It will not change the background condition of the River Wheelock	Yes	No
Macrophytes and Phytobenthos Combined	Poor	Good 2027	No impact	Target to achieve good status is 2027 due to Disproportionate burdens. The scheme will not change any of these parameters. No change – neutral impact on delivery of WFD.	Yes	No
Element – Hydromorphological Supporting Elements						
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
Element – Physico-chemical quality elements						
Overall	Moderate	Good 2027	No impact	The scheme will not change any of these parameters significantly. No change – neutral impact on delivery of WFD. Moderate status due to disproportionate burdens	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

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Receptor	Current status (2016 C2)	Objectives	Potential impact	Assessment	WFD compliance	Further assessment
Element – Specific pollutants – EA not assessed						
Element – Supporting Elements – EA not assessed						
Element - Phosphate						
Overall	Poor	Good 2027	No impact	Target to achieve good status is 2027 due to Disproportionate burdens. The scheme will not change any of these parameters. No change – neutral impact on delivery of WFD.	Yes	No
Element – Chemical – Overall						
Overall	Good	Good 2015	No impact	No change – neutral impact on delivery of WFD.	Yes	No
Element – Chemical – Other Pollutants – Does not require assessment						
Element – Chemical – Priority hazardous substances – Does not require assessment						
Element – Chemical – Priority substances – Does not require assessment						

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

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3 Detailed review

3.1 The Environment Agency Catchment Data Explorer for water monitoring and classification shows the Wheelock (Fowle Brook to Dane) section within the Dane Operational Catchment Area.

River basin and management catchment summary

3.2 Within the Weaver Gowy Management Catchment the two main rivers are the Weaver and the Gowy. Their major tributaries include the River Dane and the River Wheelock.

3.3 The water environment within the Weaver Gowy Management Catchment is important for agriculture, the predominant economic activity in the low-lying countryside, but is also important for 10 providing historical and cultural identities to local settlements and urban areas.[1]

3.4 The Weaver Gowy catchment comprises 78 waterbodies. Below is a summary of the ecological and chemical status of the waterbodies:

Ecological and chemical classification for surface waters | 2016 Cycle 2

2016 Cycle 2

	Ecological status or potential					Chemical status	
Number of water bodies	Bad	Poor	Moderate	Good	High	Fail	Good
78	7	32	36	3	0	2	76

3.5 Approximately a third of the water bodies in the Weaver Gowy Management Catchment have been affected by some form of physical modification, often impacting on the ecology and the ability of water bodies to achieve 'good' ecological potential

3.6 Within this catchment the main reasons for not achieving good status (RNAGS) fall within the agriculture and rural land management sector followed by the water industry.

Operational catchment summary

3.7 The River Dane Operational Catchment covers east Cheshire. The land use of the catchment is predominantly agricultural. Current EA analysis suggests that 77% of the water bodies in the Dane Operational Catchment should have a long term objective of achieving 'good' status.

3.8 There are 17 waterbodies within this operational catchment. Below is a summary of the ecological and chemical status of the waterbodies:

1 https://circabc.europa.eu/webdav/CircaBC/env/wfd/Library/framework_directive/implementation_documents_1/2012-2014%20WFD%20public%20information%20and%20consultation%20documents/UK/UK12%20North%20West/Weaver%20Gowy.pdf

Ecological and chemical classification for surface waters | 2016 Cycle 2

2016 Cycle 2

	Ecological status or potential					Chemical status	
Number of water bodies	Bad	Poor	Moderate	Good	High	Fail	Good
17	3	8	4	2	0	1	16

3.9 The main RNAGs in this catchment is primarily within the agriculture and rural land management sector. Other RNAGs sectors include; the water Industry, the urban and transport sector and sector under investigation. At present, there are no measures within this catchment which the predicted improvements in the status of water bodies by 2021 are based upon. Other measures may be taking place, but there is not enough confidence (in location or scale of improvement) to predict specific outcomes based upon them.

Wheelock (Fowle Brook to Dane)

3.10 The 2016 cycle 2 classification is poor. The waterbody is working towards a 2027 objective of good status.

Cycle 2 classifications

Download as CSV

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

3.11 The EA catchment planning website cites the Reasons for Not Achieving Good Status (RNAGS) classification elements as phosphate, fish, invertebrates and macrophytes and Phytobenthos Combined. These transpire from both physical modification (agriculture and rural land management and industry sectors), point source due to sewage discharge (water industry sector) and unknown activity.

3.12 Appropriate pollution prevention measures will be implemented to protect the River 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 of fuels onsite.

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

3.14 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. In addition the development will not contribute towards further Phosphate, Macrophytes and Phytobenthos intrusion.

Biodiversity and fish passage

3.15 The immediate area is not subject to any environmental designations.

3.16 Currently there are no fish pass provisions at the weir. The development does allow safe downstream passage and it will be screened in line with EA guidance.

3.17 Overall the hydropower scheme does not create any additional barrier to fish passage.

Hydromorphology

3.18 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.

3.19 In summary, the proposed development is deemed highly unlikely to result any significant hydromorphological changes.

3.20 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.

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.