Application number: NPS/WR/029902
Licence number: NE/022/0003/014
EA Area: North East Area
Date of Application: 30/11/2018
Applicant details:

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Summary of the proposal:

This is an application for a full abstraction licence for a hydropower (HEP) scheme.

The hydropower scheme is proposed at a meander in the River Coquet at Guyzance, Northumberland. The applicant originally applied for both an impoundment licence and a full abstraction licence, but due to the specifics of their scheme they only need an abstraction licence. One Archimedean screw with a maximum flow rate of 2,900 litres per second has been chosen for this scheme. There is a fish easement at Guyzance Mill weir, which is approx. 500 metres downstream from the abstraction point. All the water will be returned to the river downstream, but it leaves a depleted reach of approx. 1750m along the meander.

The scheme is sized as 100kW which will generate up to 375,000 kWh of renewable electricity per year, equivalent to the consumption of 180 average homes, and prevents the emission of 161.25 tonnes of CO2 annually.

Source of Supply:

River Coquet at Guyzance, Northumberland.

Points of abstraction and quantities:

At National Grid Reference: NU 20983 03140.

10,440 cubic metres per hour,
250,560 cubic metres per day,
55,123,200 cubic metres per year.

At an instantaneous rate not exceeding 2,900 litres per second

Means of abstraction:

Gravity flow to a hydropower scheme via an intake channel (buried tunnel) controlled by a 2.6 metre diameter 4-blade Archimedes variable speed screw turbine with adjustable sluice gate and an intake fish screen.

Purpose of abstraction:

Hydro-electric Power generation.

Abstraction period:

All year.

Case history:

No pre-application was submitted for this proposal.

Formal application submitted on 07/11/2018.

Further information/clarification of water velocities, stage-discharge calculations and control regime etc. received on 19/12/2018.

Following an initial assessment of the proposal, it was confirmed that the scheme would need to be compliant with the Joint Nature Conservation Committee (JNCC) revised Common Standards Monitoring Guidance (rCSMG) flow targets for Sites of Special Scientific Interest (SSSI) rivers. Because of this, there has been some significant amendments to the original proposal.

Application made ‘valid’ on 30/11/2018.

Further information requested regarding the abstraction quantities, details of the bywash, fish passage, screening and geomorphology assessment on 21/01/2019 and received on the 28/01/2019.

Further information regarding fish pass improvements etc. received on the 15/02/2019.

Justification of quantities:

We assess HEP schemes against our 'Run-of-river' hydropower guidance.

Default design flows are set out in Table A of the relevant 'flow and abstraction management' section of the guidance.

Under the default Table A flow regime, the River Coquet would be a medium baseflow river and be assigned Abstraction Sensitivity Band (ASB) 3. This would allow an abstraction of 35% of the flow above Q95 Hands-off Flow (HoF), up to a maximum of 1.3 times the mean flow.

Table C allows for a deviation from the default Table A where there is a depleted reach as here, but only if sufficient supporting evidence is provided that demonstrates that the scheme;

- does not prevent the achievement of Water Framework Directive (WFD) objectives at waterbody level,
- maintains or improves fisheries and fish passage,
- does not have unacceptable impacts on protected sites or species, and,
- does not have unacceptable impacts on the rights of other water users, including anglers.

However, as the River Coquet is designated as a Site of Special Scientific Interest (SSSI), we have to use the revised Common Standards Monitoring Guidance (rCSMG) flow targets to calculate the abstraction quantity.

The Joint Nature Conservation Committee (JNCC) and the conservation agencies, including Natural England (NE), published rCSMG in January 2014 for setting and monitoring objectives for all SSSIs, including the Natura 2000 (N2K) Protected Areas. The rCSMG flow targets for rivers are considered a prerequisite for achieving conservation objectives. These flow targets are more stringent than the Environmental Flow Indictor (EFI), the flow which supports good ecological status under the Water Framework Directive (WFD), or as used under the 'Run-of-river' hydropower guidance.

This was explained to the applicant and they agreed and amended their proposed abstraction regime on 15/02/2019 to comply with the revised Common Standards Monitoring Guidance values.

The turbine's rated flow maximum of 2,900 litres per second has been scaled up to derive an hourly volume of 10,440m^3/hour and a daily volume of 250,560m^3/day. Our recommendations suggest annual rates should be limited to a multiple of 220 days, which the applicant has complied with (55,123,200m^3/year.)

In conclusion, the quantities applied for – as revised due to rCMSG - are acceptable and justified.

Resource assessment:

The abstraction point is within the GB103022076693 Coquet from Forest Burn to Tidal Limit in the Northumberland Rivers Abstraction Licensing Strategy (ALS.)

The water availability is as follows:

Q Percentile	Water Resources availability colour	Water resource status
Q30	Green	Available water
Q50	Green	Available water
Q70	Green	Available water
Q95	Green	Available water

Therefore water is available at least 95% of the time for consumptive abstraction.

As this application is for hydro-electric power which is non consumptive returning all water back to the river downstream of the turbine, abstraction quantities are assessed against our 'Run-of-river' hydropower guidance rather than the relevant ALS's 'water availability' table.

However, as the site lies within the Coquet SSSI and the depleted reach is more than 5% of the length of the river in the relevant waterbody unit (GB103022076693), it falls under Natural England's revised Common Standards Monitoring Guidance (rCSMG), which is more restrictive than our hydropower guidance. The rCSMG section applicable for this river only allows for the abstraction of 15% of the available flow between Q50-95, 20% of the available flow between Q10-50 and 10% of the available flow above Q10.

Impact assessment of proposal:

This is a surface water abstraction that is within surface waterbody GB103022076693 – Coquet from Forest Burn to Tidal Limit. It is not classed as an Artificial/Heavily Modified water body.

	Status		
Consideration	Baseline data (2015)	Cycle 2 current data (2016)	Objective
Overall WB status	Good	Good	Good by 2015
Ecological status	Good	Good	Good by 2015
Fish	-	-	-
Invertebrates	High	High	Good by 2015
Macrophytes/Phytobenthos	Good	High	Good by 2015
Hydrology regime	High	Good	Good by 2015
Hydromorphology	Supports Good	Supports Good	Good by 2015
Physico-chemical	High	High	Good by 2015
Chemical	High	Good	Good by 2015

Water Framework Directive (WFD) status information

This abstraction is not considered likely to cause deterioration to the WFD overall water body status subject to the conditions included in the licence. Overall Waterbody (WB) status is 'Good'. Both Ecological and Chemical status are also 'Good' with some elements of the Ecological status reaching 'High'.

Hydrology.

Abstraction quantities for hydro-electric power proposals are assessed against our 'Run-of-river' hydropower guidance, noting that these schemes are non-consumptive, returning all water back to the river downstream of the turbine.

However, as the site lies within the Coquet SSSI and the depleted reach is more than 5% of the length of the river in the relevant waterbody unit (GB103022076693), it falls under Natural England's revised Common Standards Monitoring Guidance (rCSMG), which is more restrictive than our hydropower guidance for quantities/flows. The rCSMG section applicable for this river only allows for the abstraction of 15% of the available flow between Q50-95, 20% of the available flow between Q10-50 and 10% of the available flow above Q10.

The Applicant applied for a Hands-off Flow (HoF) of Q75 before abstraction could start, which is much more restrictive than our guidance suggests (Q95.) The Applicant's maximum abstraction rate of 2.9 cubic metres per second is also much less than our guidance suggests, 1.3 x Qmean = 1.3 x 8.38 m3/s = 10.89 m3/s. (So, 2.9 m3/s is 27% of the potential maximum.)

Therefore, a high HoF, a maximum percentage take of the available flow of 20% and a low maximum abstraction rate (in comparison to Qmean) provides continued flow variability to the main river (depleted reach) for species, habitats and geomorphological processes etc.

We do not consider that the proposal, on this basis, will impact the current WFD hydrological status of Good.

Water Quality.

The reduction in flows within the depleted reach could have the potential to result in an increase in water temperature, which could affect the levels of dissolved oxygen. The depleted reach is limited in relation to the wider catchment and any changes in temperature and dissolved oxygen in this reach are likely to be minor given that abstraction will occur proportionally at higher flows when temperature and dissolved oxygen are likely to be within lower and higher limits, respectively.

There are two discharge permits approx. 500m upstream of the abstraction point and a discharge permit within the depleted reach and less water in the depleted reach may change the quality of water through less dilution.

Due to the nature of the scheme it is considered that the ammonia, acid neutralising capacity, pH and phosphate levels are unlikely to be affected other than by chemical means. The proposal will not increase the concentrations of pollutants within the waterbody as it will solely abstract water, run it through a turbine and then return it to the river – no chemicals or pollutants are added or taken away by the scheme. Therefore no changes to the quality of water are anticipated, especially with a high HoF, a maximum percentage take of the available flow of 20% and a low maximum abstraction rate (in comparison to Qmean) to provide continued flow variability to the main river (depleted reach.)

We do not consider that the proposal, on this basis, will impact the current WFD chemical status of Good.

Geomorphology.

The proposed scheme will cause flow changes at Q75 and above. This may affect the geomorphology of the depleted reach within mid to higher flows. The consequence of the changes of geomorphology will not only will affect how the river flows through the depleted reach but also how sediments move, affecting potential spawning areas for salmonids and lamprey.

However, the risk of significant change to sedimentation and spanwing habitat etc. is unlikely, given the abstraction regime under rCSMG, with a high Hands-off Flow. High mobilising and flushing flows will still occur, retaining the ability to move coarse sediment downstream. And the high HoF (Q75) and percentage take means the impact on slow depositional flow conditions and fine sediment movement downstream is also expected to be minor.

Further (and following Natural England's advice), to ensure that there is no negative effect upon the fluvial dynamics in the depleted reach of the SSSI designated River Coquet under the flow regime proposed, the Applicant will be required to devise and undertake a geomorphology monitoring plan, as approved by the Agency. If the findings of the monitoring plan records a significant impact to geomorphology, the Applicant will have to agree and implement an appropriate action plan, including any mitigation, with the Agency.

We do not consider that the proposal, on this basis, will impact the current WFD hydromorphology status of Supporting Good, or prevent the achievement of future hydromorphology WFD objectives.

Ecology (including fish).

The River Coquet is a nationally important salmonid river with significant runs of both salmon and sea trout. Insuring that migratory cues are not impacted is crucial as the Agency now consider salmon stocks in the River Coquet to be 'probably at risk' (based on the 2017 stock assessment.) It is vitally important that salmonid migration is not impeded/delayed through the depleted reach either by a reduction in migratory cues or by attraction to the outflow point.

The River Coquet is also a migratory route for European eel and Brook and Sea lamprey at the point of abstraction.

The intake will be on the right hand bank on the outside of a bend meaning a greater 'pull' towards the intake when abstraction is occurring. To prevent adult fish, eels and lamprey entering the intake and the pipe to the turbine, a 12.5mm aperture screen will be used. (This is significantly more restrictive than our guidance where Archimedes screws are typically not screened at all.) The average velocity through the intake screen is 0.3m/s, which will allow adult species to be able to swim away.

The outfall screen will have a 25mm aperture to prevent access to adult species. Prior to the outfall screen will be the turbine's discharge pool to slow the velocity of water returning to the river, making the main river the attractant flow.

There is a risk that any juvenile fish, eels and lamprey that pass the intake screen could become entrained in the 110 metre intake pipe to the turbine, especially if the turbine is not operating. During operation, juvenile fish, eels and lamprey should pass down the pipe, through the turbine and back into the river unharmed. When the turbine is not operating, a sluice prior to the 12.5mm screen will close preventing access to the forebay. A 400mm depth of water will be maintained in the intake forebay which will be connected to an eel/lamprey pass with it's exit by the abstraction point back into the river. A sweetening flow will be provided down the eel/lamprey pass allowing these species to escape. In addition, utilising the sweetening flow, a bypass chute from the intake forebay to the river alongside the discharge point will allow fish to escape the system.

The turbine itself will be fitted with fish protection measures (rubber bumpers etc.) to reduce the risk to any juvenile fish, eels and lamprey that come into contact with the leading edge of the turbine blades.

There is a weir at Guyzance Mill approx. 500m downstream of the abstraction point. An assessment concluded that the weir currently does not present a significant barrier to the upstream migration of adult salmonids or juvenile eel at most flows, but is a barrier to juvenile salmonids and adult lamprey at flows of Q75 and above. The scheme will alter the flow regime at the weir and may make passage more difficult, or alter the cues that drive fish migration. The Applicant has stated in their application that they have had positive discussions with the weir owner about improving fish, eel and lamprey passage at the weir. Licence conditions (and drawings) will ensure that no abstraction shall take place unless an Agency approved fish pass and an eel/lamprey pass is installed at Guyzance Mill weir. (Removal of the weir would also be seen as an acceptable option.) If, in the opinion of the Agency, fish migration cues are significantly impacted the licence will be conditioned that an action plan, including any mitigation measures will need to be agreed with the Agency and implemented.

Otter and signal crayfish are present in the River Coquet. The screened off and enclosed nature of the majority of the scheme will ensure any impact to these species is minimal during operation.

There will be a loss of riparian habitat at the intake, which is designated as 'ancient woodland.' The habitat loss will be minimal in the context of the relevant WFD waterbody assessment unit - River Coquet (Forest Burn to Tidal Limit) – which is 31km in length, and the section of riparian habitat to be lost is significantly less than 1% the total length of this section of the river. The impact of the loss of this habitat has been assessed in the context of the SSSI and wider areas of ancient woodland and we conclude that the effect on these habitats will not be significant.

We do not consider that the proposal, on this basis, will impact the current WFD Ecological status of Good.

Statutory Consultation:

Statutory Notification was served to the Statutory Water Undertaker on the 03/12/2018. They returned no comments.

Natural England were consulted twice. First, they advised that the original proposal was not compatible with furthering and enhancing the conservation of the interest features of the SSSI for the reasons set out below:

- The proposed abstraction regime does not comply with the Joint Nature Conservation Committees revised CSMG flow targets for SSSI rivers in the UK over a significant length (1.75km or 7.7% by length) of unit 5 of the SSSI.
- Potential adverse impact of the proposed abstraction regime in the mid-high flow band (Qn10-Qn50) on upstream migration cues for salmon.
- Lack of adequate screening at the intake and outfall to prevent both entrainment of fish in the pipe and potential damage to fish coming into contact with the Archimedes screw turbine.
- Proposed minor alterations to the fish pass on the Guyzance Mill weir are unlikely to have an impact on sediment transport over the weir under the proposed abstraction regime.

Further to this advice, the Agency requested the Applicant revised their application and the following amendments were made:

- The proposed flow regime updated to comply fully with rCSMG and no abstraction below Q75;
- Screening at the intake (12.5mm) and the outfall (25mm) and calculations on discharge attraction velocities in relation to river velocities;
- Escape routes provided from the abstraction pipe - both downstream and upstream - for small fish, eels and lampreys that enter via the intake screen.
- Improvement of the fish passage and passability of the weir;
- Additional geomorphological assessment;

Natural England were re-consulted with the new information and in accordance with Section 28I of the Wildlife and Countryside Act 1981, they concluded that the proposal was unlikely to cause significant damage to the River Coquet and Coquet Valley Woodlands SSSI, subject to any licence incorporating conditions related to revised Common Standards Monitoring Guidance flow regimes and a geomorphological monitoring programme, including mitigation plans.

The Agency agree with and have incorporated Natural England's advice within the licence.

External Representations:

A total of 47 representations were received during the December 2018 advertisement period; 8 from angling clubs/groups, and 39 from individuals.

The representations received have been grouped into a number of common themes, as follows:

- Fisheries – the direct impact on fish and eels from interaction with the turbine; the weir in the depleted reach and fish pass; impact on the local fish habitat; the scheme design; the location of intake and outfall; screening; operation of the scheme; turbine type.
- Ecology, biodiversity – the direct impact of the scheme upon a SSSI river.
- Protected rights – access to the weir.
- Geomorphology - Sediment transportation and velocity analysis.
- Water availability – Common Standard Monitoring Guidance; Hands off Level.
- Water quality.

The assessment, consideration and any protection/mitigation required from these themes is detailed in the preceding sections of this Decision Statement.

The Agency has given full and due consideration to any comments or representations made, and due regard has been taken of protected rights and other lawful uses.

Protected Rights:

This proposal is a non-consumptive abstraction, all water abstracted will be returned to the river downstream.

No protected rights or lawful users have been identified within the depleted reach affected by this proposal.

Conservation Issues:

The River Coquet is a SSSI site which supports the following features:

- Atlantic salmon,
- Brook lamprey,
- Sea lamprey,
- European eel,
- Otter.

The assessment, consideration and protection/mitigation of these species etc. is detailed in the preceding sections of this Decision Statement.

We consider that the scheme is not likely to damage any of the flora, fauna or geological or physiological features which are of special interest because of the conditions and mitigations proposed in the licence and Natural England agreed with this conclusion.

Conclusion and recommendation:

Full and due consideration has been given to any comments or representations made, and due regard has been taken of protected rights and other lawful uses.

It has been concluded that this application is justified and, with appropriate conditions, does not pose any risk to the environment or protected users.

It is therefore recommended that the application is approved, as modified, and licence number NE/022/0003/014 should be issued with the conditions as drafted.

- HEP scheme to be built as per attached drawings.
- The abstraction licence be limited to conditions set out in the revised Common Standards Monitoring Guidance.
- A high Hands off Flow of Q75.
- Fish pass and eel pass to be approved prior to construction.
- Appropriate screens to be installed at the intake and outfall.
- Fish, eel and lamprey escape methods (eel pass and bywash) from the intake chamber.
- Level monitoring sensors to be installed to ensure prescribed flows (rCSMG and HoF) are met before abstraction is authorised.
- Geomorphology Monitoring plan is required

Contact the Environment Agency team responsible for this decision: PSC-WaterResources@environment-agency.gov.uk