Decision Statement

Statement of our decision made with respect to an application for a new full abstraction licence NW/076/0014/014 under the Water Resources Act 1991 (as amended) and the Environment Act 1995.

Executive Summary

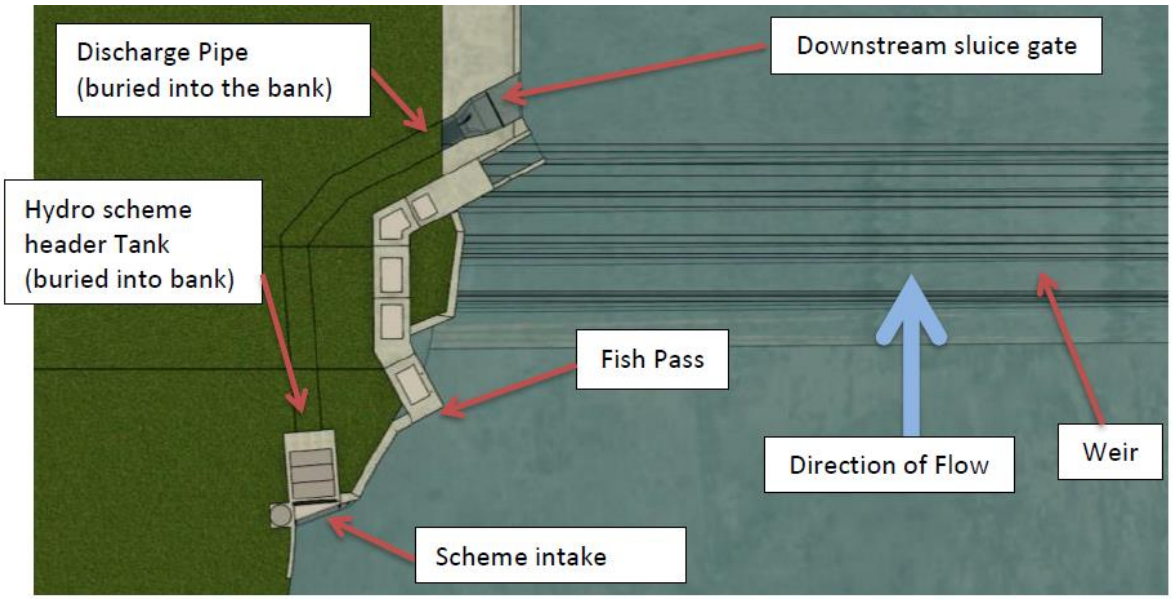
We have decided to refuse this application based on all information provided.

1. Summary of the proposal

Application for a new full abstraction licence for low-head hydropower electric power generation (~40kW) on the existing Buckabank weir. Buckabank Weir is a ca. 30 m wide curved stone weir located 1.5 km south of Dalston, Cumbria on the River Caldew. The weir was constructed in the 1920s after a large flood event to provide flows to a mill via a leat. The water no longer serves the mill for any practical reasons and is used only for visual amenity.

Figure 1: photograph of Buckabank weir

Figure 2: scheme layout



Water is to be abstracted from the River Caldew to a Venturi-Enhanced Turbine Technology (VETT) turbine – See figures 2 and 3 for scheme layout and turbine design. The primary flow through the hydropower scheme would feature a 50mm debris screen and the secondary flow through the turbine would be fitted with 2mm in-take screen. No screen would be installed on the outflow.

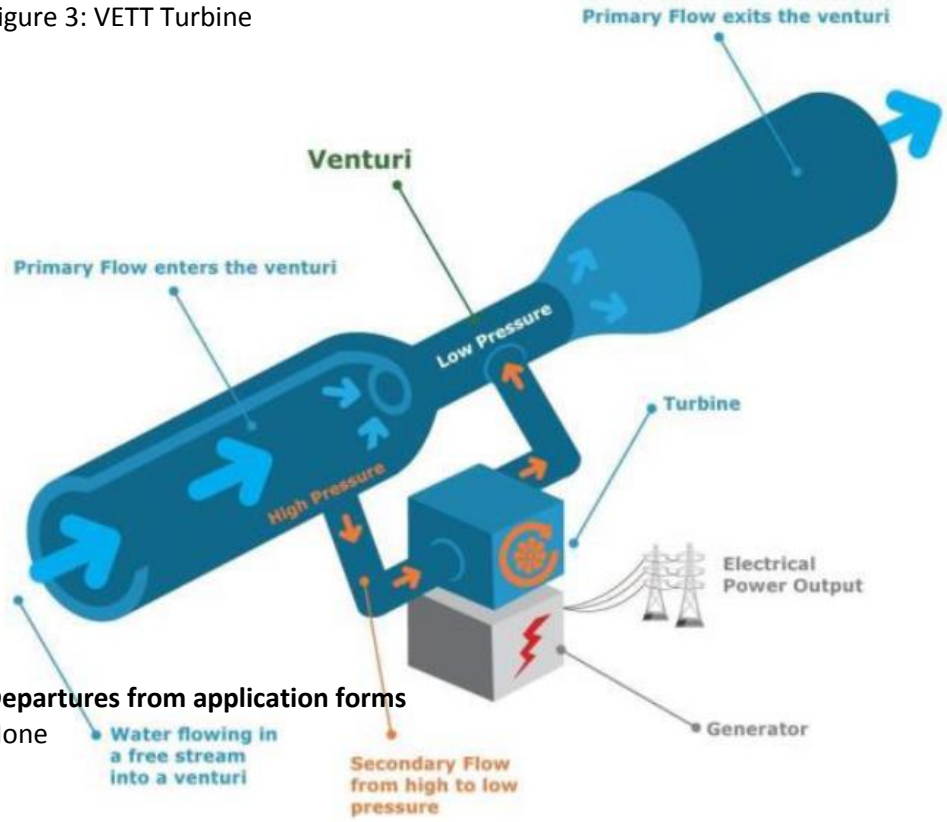
Water is taken out of the main body of the river, dropping into a stilling chamber before going through the VETT system. 20% of the water goes through the turbine, and this would be screened at 2mm. 80% of the water passes through the venturi tube which has no moving parts and is unscreened. The scheme has a maximum design flow of 3000 litres per second (l/s) and a minimum turbine start up flow of 1500 l/s.

The site already has a fish pass to allow upstream migration of adult salmonids; there is currently no specific lamprey or eel pass and no specific structure for downstream migration. The current fish pass was not designed to facilitate downstream fish passage, including smolts and salmonid kelts (post spawning adults).

The hydropower scheme would operate under a 1.31m3/s (Q85) hands off flow (HOF), meaning that at least this volume of water must be flowing via the weir, fish pass and mill leat before the turbine can begin to abstract water. The total HOF takes into account the weir amenity flow, the required fish pass flow and the mill leat amenity flow and is therefore calculated as: $QHOF = Qweir + Qfishpass + Qmill = 1.31\ m3/s$.

Venturi-Enhanced Turbine Technology (VETT) has been proposed for installation at this site. VETT is a hydropower technology developed by VerdErg Renewable Energy that produces electricity from low head sources of potential energy; typically over weirs or steep river courses. VETT is designed to amplify the low head source by as much as three times so a conventional small, high speed turbine and generating equipment can be installed economically. 80% of the flow is passed through a venturi, creating a region of low static pressure which draws the remaining flow via a turbine at an amplified head drop (Figure 2). The turbine, which takes 20% of the flow, will always be screened.

Figure 3: VETT Turbine



1.1 Departures from application forms

None

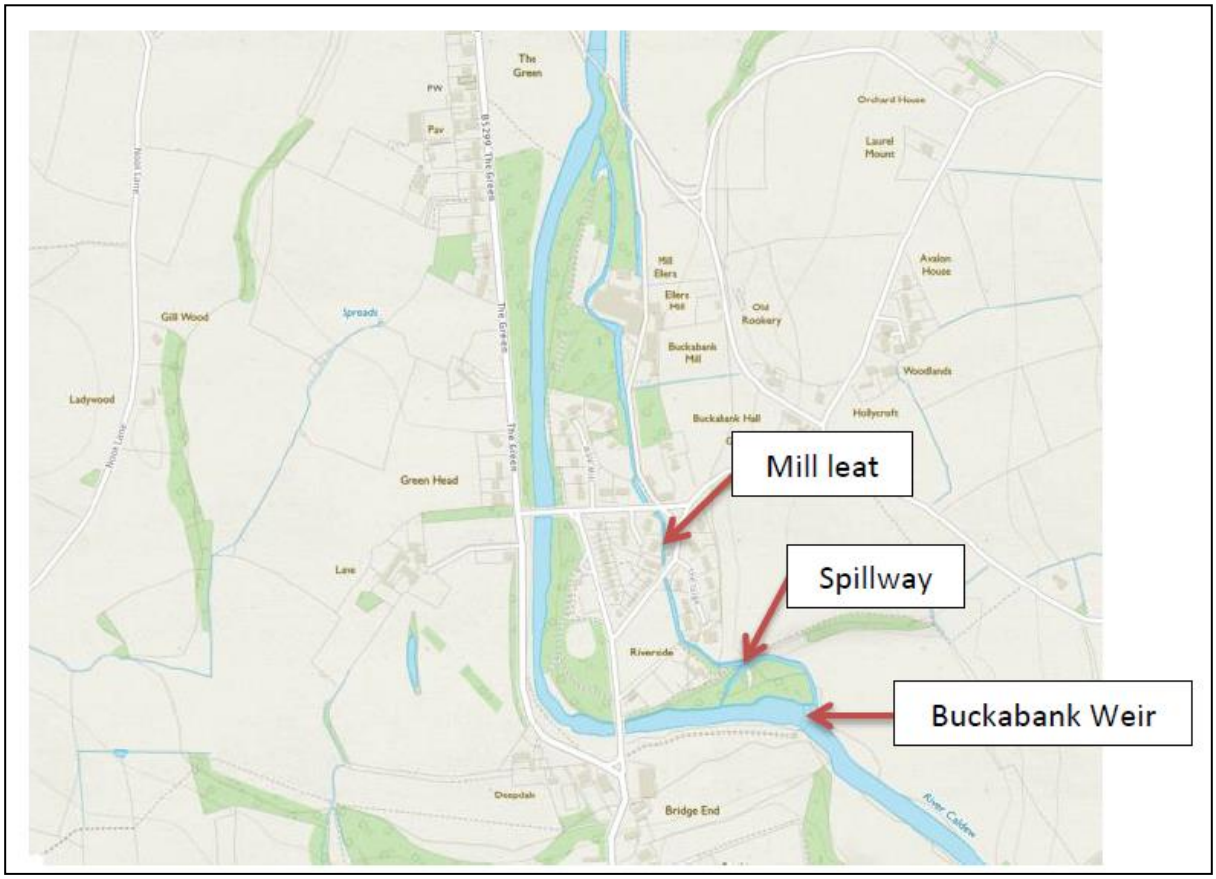
1.2 Details of proposal

Administrative details	
New licence number	NW/076/0014/014
Application reference number	NPS/WR/024601
Applicant name and address	[redacted]
Application contact details	[redacted]
Catchment	Eden and Esk ALS Caldew d/s Caldbeck (GB102076073880)
Agency Area	North West
Administratively complete date	26/09/2016
Relevant date	17/10/2016
Determination date	16/02/2017
Agreed extended determination date	01/12/2017
Applicant entitled to apply	Yes
Supplementary reports	The following supplementary reports were submitted: VRE202-RPT-006 Scheme Design with Supporting Evidence VRE202-RA-001-r0_Env Risk Assessment VRE202-SK-004-r4_Intake Layout VRE202-SK-035-r0_Fish Pass Modifications VRE202-TN-009-r0_Analysis of Upstrm Migrtn VETT EA Approval Letter (plain) VRE202-TN-010-r0 WFD Assessment HRA Report Appendix 2 – Target Notes & Photographic Plates Appendix 3 – Protected Species Legislation control schematic EXTENDED PHASE 1 HABITAT SURVEY REPORT Geomorphology Assessment Intake layout - Drawing Main Priority Habitat Inventory VRE202 /MS/001 Method Statement RIVER HABITAT SUITABILITY SURVEY REPORT Site Access Plan VRE202/RPT/002 Supporting Information VRE202-MEMO-010_Dalston Hydropower - Profiled Discharge Velocity at the Outfall VRE202/SK/010 X section schematic 171013_P00001962 APEM Habitat Regulations Assessment - Dalston Hydropower Updated Sketch VRE202-SK-035_r2 proposed fish pass modifications VRE202-Memo-015_r0_Proposed amendments to

	Dalston Fish Pass 170105_Monitoring Proposal Dalston VRE202-MEMO 10-07

Abstraction details	
Location of abstraction	Buckabank Weir
Source of supply	River Caldew
Point of abstraction	NY 37349 48777
Outfall	NY 37320 48798
Purpose of abstraction	Power generation
Period(s) of abstraction	All year
Quantities and rates	10,800 m^3/hr 259,200 m^3/d 57,024,000 m^3/yr 3m^3/s
Aggregate conditions	none
Means of abstraction	Gravity by means of an existing weir and an intake structure to a VETT system.
Measurement of abstraction	By reference to the amount of KWhrs generated

1.3 Maps



Map 1: Buckabank weir, Spillway and Mill Leat

2. Case history

Date	Event
11/06/2015	Pre-app received
18/08/2015	Formal application NW/076/0014/013 received
12/04/2016	Formal application NW/076/0014/013 withdrawn
26/08/2016	Formal application NW/076/0014/014 received

3. Water Resources (Environmental Impact Assessment Regulations) 2003 as amended by the Water Resources (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2006

We have confirmed that the proposal is not a "relevant project", as defined by the Regulations. No environmental statement is therefore required to be submitted in respect of this application and project proposal.

4. Justification of requirements & water efficiency

The applicant has applied for the following volumes on an all year basis:

- 10,800 cubic metres an hour
- 259,200 cubic metres a day
- 57,024,000 cubic metres a year
- 3 cubic metres per second

Parameter	Calculated Flows
Maximum design flow	3000 l/s
Gross head	3.2 m
Net head	3.1 m
Estimated generating potential	40 kW
Annual generating potential	160,000 kWh

Table 1: Scheme design basics

The applicant has applied to abstract at an annual rate which is equivalent to 220 days abstraction at the maximum daily rate. The applicant has stated that the scheme has a gross head of 3.2m and a design flow of 3000 l/s. All the water abstracted will be passed through the VETT system to generate electricity. The scheme has an annual generating potential of 160,000 kWhrs.

The applicant has applied for higher levels of abstraction than those shown in Table A in the Flow and Abstraction Management section of our 'Guidance for run-of-river hydropower'

In order to deviate from Table A the applicant is required to provide supporting evidence that the scheme will pass the following four tests:

- not prevent the achievement of Water Framework Directive objectives at water body level;
- maintain or improve fisheries and fish passage;
- not have unacceptable impacts on protected sites or species;
- not have unacceptable impacts on the rights of other water users, including anglers.

Further explanation and assessment of the information provided for these four tests is detailed in Section 7.1, 7.3-7.6 of this report.

Q95 has been modelled as 0.93m^3/s (79.9Ml/d) and Qmean 5.84m^3/s (504.6Ml/d) with a medium/low baseflow index. The applicant has applied to depart from our Run of river guidance for hydropower developers "Table A" scenario and has applied for flows within "Table B" of our guidance. The scheme has a maximum design flow of 3m^3/s (~51% of Qmean) and a minimum turbine start up flow of 1500 l/s.

The hydropower scheme would be sited alongside an existing weir with no significant flow depletion within natural watercourse as water discharged back into weir pool as per scenario B, see table below.

Table B: Taken from our Guidance for run of river hydropower

TABLE B HYDROPOWER SCHEMES AT AN EXISTING WEIR Indicative departures from Table A	
Hands off flow (HOF)	Q95 (or Q97 for very high base flow rivers)
Maximum abstraction	1.3 x Qmean
% take above HOF	100%

The applicant has calculated the Hands off flow for the weir in line with Table B in our Flow and Abstraction Management which states Q_{95} must be available for the weir. Q_{95} has been calculated at 0.930m^3/s. The water level over the weir at Q95 has been calculated using the methods described in BS ISO 3846:2008. For a broad crested weir:

$$Q_{weir} = (23)_{(32)} . \sqrt{g} . b . h_{(32)} . C_d$$

Where
b = Width of weir crest (m)
C_d = Coefficient of discharge (-)
g = Gravitational acceleration (9.807 m/s_2)
h = Depth of water over weir crest (m)
Q_{weir} = Flow over weir crest (m_3/s)

The width of the weir is 38 m. Cd is equal to 0.85 based on the weir geometry. The water level over the weir at Q95 is therefore 66 mm which will provide the required visual amenity flow over the weir. The abstractions for the fish pass and mill leat are upstream of the weir and therefore were not considered in this calculation.

The HOF for the mill leat is required for amenity only as the water no longer serves the mill for any practical reasons. The mill leat flow is controlled by a manual sluice gate on the river. The HOF for the mill leat has been set at 0.100 m^3/s.

The flow over the fish pass has also been considered in the HOF. To allow the minimum flow of 0.134 m^3/s, the water level over the crest of the pass is required to be 0.183 m. The crest of the fish pass is 0.22 m below the crest of the weir, so providing the required water level over the weir is maintained the fish pass will have adequate flow and the conditions specified in the fish pass abstraction licence NW/076/0014/008 will be maintained.

At Q95 the water level over the weir is 66 mm which equates to 306 mm above the fish pass notch crest. At this water level the flow rate through the fish pass will be 0.284m^3/s; this will be set as the HOF for the fish pass.

The total HOF takes into account the weir amenity flow, the required fish pass flow and the mill leat amenity flow and is therefore calculated as

$$Q_{HOF} = Q_{weir} + Q_{fishpass} + Q_{mill} = 1.314\ m_3/s$$

The scheme does not have a consumptive element and would return all abstracted water to the River Caldew approximately 13m downstream of intake over the weir.

We consider the quantities of water applied for as justified and reasonable.

5. Advertising

Application was advertised	
Date when advertised	16/12/2016
Name of newspaper	Cumberland News
5 representations were received and these are addressed in section 5.1. 1 representation was received out of time, as an addendum of supporting evidence to one of the previous representations therefore will still be taken into consideration as part of the determination process for this application.	

As the application was advertised, Statutory Notification was served to:

Statutory Bodies	**Date**
Statutory Water Undertaker (SWU)	01/12/2016
United Utilities – No comment on the application was made.	

5.1. Representations and decision document

Five representations were received raising various points of concern and objections summarised below.

Point raised in representation	**Response**
Meeting WFD objectives at a water body level.	WFD has been assessed in section 7 of this report, we have considered: hydrology, water quality, geomorphology, ecology including fisheries and protected sites and species.
Maintain and improve fisheries and fish passage	As a principle of WFD this aspect has been assessed as part of the determination of this application. To see how we have considered these points in full please refer to section 7.5 of this report. Any impact upon amenity interests have been considered in section 7.9.
Unacceptable pressures on protected sites and species from this application. Negative wildlife and conservation impacts from the scheme.	We have assessed the impacts of this proposal on the River Eden SSSI and SAC, we have consulted with Natural England. We have assessed the impact of this proposal on the populations of migratory species in the area. To see how we have considered these points in full please refer to section 7.6 of this report.
Impact on angling interests reducing fish stock numbers.	The impacts of this proposals have been assessed with regard to lawful users in accordance with our statutory duty. The specific fisheries concerns are addressed in sections 7.5 and 7.9 of this report.

As a result of refusing this application a decision statement has been placed on Gov.uk website on the 4th December 2017.

6. External consultation

In accordance with our obligations, we have consulted the following bodies about the proposal:

Statutory Consultee	Date
Natural England (NE)	Various
NE have been consulted via an Appendix 4/11/12. To see how NE responded to our consultations please refer to section 7.6 of this report.	

7. Technical assessment of the proposal

Licensing Strategy:

The abstraction point is within the 16 River Caldew ptc at Eden in the Eden and Esk abstraction licensing strategy.

The water availability is as follows:

Q Percentile	Water Resources availability colour	Water resource status
Q30	Green	Water available for licensing
Q50	Green	Water available for licensing
Q70	Green	Water available for licensing
Q95	Green	Water available for licensing

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

Any restrictions that might apply at specific flows would only become relevant for a consumptive use of water where there was a net loss of water to the catchment. Here all of the water abstracted to the new VETT system is entirely non-consumptive. All of the water directed to the turbine is returned to the river downstream of the weir.

Water Framework Directive (WFD) status information

This is a surface water abstraction that is within surface waterbody Caldew d/s Caldbeck (GB102076073880). It is not classed as an Artificial/Heavily Modified waterbody.

Consideration	Status	
	Baseline data (2015)	Cycle 2 current data (2016)
Overall WB status	Poor	Poor
Ecological status	Poor	Poor
Fish	Poor	Poor
Invertebrates	High	High
Macrophytes	Good	Good
Phytobenthos	Good	Good
Hydropowerlogy regime	Supports Good	Supports Good
Morphology	Supports Good	Supports Good
Physico-chemical	Not Assessed	High

Chemical	Good	Good

Reasons For Not Achieving Good (RFNAG)

The failures in this water body are due to sediment pressure from diffuse sources, reducing fish numbers. This is probably due to poor agricultural land and livestock management. There is currently a stage 3 investigation in place to assess what feasible measures can be taken to address this issue. Any projects that are likely to have a negative impact on restoring fish numbers in the catchment will prevent WFD status from improving. Currently the catchment is predicated to still be in "poor" status for the fish element until at least 2021. There are other water bodies further upstream that are also at less than good for fish. So, the current proposal has the potential to reduce the likelihood of additional water bodies failing to reach GES (or result in deterioration).

WFD Objectives

Surface water body

Consideration	**Cycle 2 Objective**
Overall WB status	Good by 2027
Ecological status	Good by 2027
Hydrology regime	Supports good by 2015
Morphology	Not set

The proposal will be assessed against the WFD status throughout sections 7.2-7.7.

7.1 Designated and protected conservation sites and species

Nearest conservation sites within immediate vicinity of proposed scheme.		
Designation types	Name of site	Distance and direction
Special Areas of Conservation (SACs)	River Eden SAC Refer to sections 7.5 and 7.6	Proposed scheme is within the protected site
Ramsar sites	N/A	N/A
Special Protection Areas (SPAs)	N/A	N/A
Sites of Special Scientific Interest (SSSIs)	River Eden & Tributaries SSSI Refer to sections 7.5 and 7.6	Proposed scheme is within the protected site
Groundwater Dependent Terrestrial Ecosystems (GWDTEs) that are not designated as SSSIs – GW only	N/A	N/A
National Nature Reserves (NNRs)	N/A	N/A
Local Nature Reserves (LNRs)	N/A	N/A
Ancient Woodland	N/A	N/A
Scheduled Ancient	N/A	N/A

Monuments (SAMs)		
Local Wildlife Sites (LWSs)	N/A	N/A
National Parks	N/A	N/A
Areas of Outstanding Natural Beauty (AONBs)	N/A	N/A
Heritage Coast	N/A	N/A
Restoring Sustainable Abstraction (RSA) Programmes	N/A	N/A
Protected Species	European Eel migratory route, Atlantic Salmon migratory route. Various mammal, plant and insect protected species. Refer to sections 7.5 and 7.6	Immediately at intake and outfall.
Protected Habitats	Deciduous woodland	Adjacent to weir

The distance searched downstream is within the immediate vicinity of the scheme, the scheme is non-consumptive and will not impact any non-migratory species that are not in the immediate area. For hydropower we also screen upstream for designations that include species that may migrate through the proposed hydropower site to, for example, access upstream spawning habitat.

The impact of this proposal on the sites and species listed in the table above will be assessed in sections 7.2-7.7.

7.2 Hydrology and impact on flows

Pre 1928 the original course of the river ran through what is now the spillway over the weir which is still located there, however, after a large flood event the river changed course and Buckabank weir was constructed. The weir ensures water levels are sufficient to feed the mill leat connecting to Ellers Mill and preserve its visual amenity. The river originates in the Lake District and flows for approximately 11 km in a north east direction towards Carlisle from the weir and discharges into the River Eden.

The site is within the 244 km^2 Cummersdale rural catchment area, Solway Tweed River Basin District, Eden and Esk management catchment and Caldew operational catchment. The headwaters are situated in Carboniferous Limestone of Pennines to the east and imperious Lower Palaeozoics of the Lake District Massif to the west. The Vale of Eden is composed of Permo-Triassic sandstone covered in extensive boulder clay. A review of the BGS bedrock and superficial surface geology data indicates that a fluvial deposition of sand and gravel detrital material forming river terrace deposits has taken place at the site and makes up the St Bees Sandstone Formation bedrock. Superficial deposits are composed of clay, silt, sand and gravel alluvium.

We operate a gauging station 6 km upstream at Cummersdale (Station Number 76809, grid reference NY394527) with data available from 1997 to 2012. The Cummersdale gauging station preforms well and has an excellent rating.

Cummersdale gauging station catchment is the most appropriate station to reference against the site. The station has a reasonably long (1997 onwards), reliable and robust record with a near-to-natural catchment. It has very similar hydrological characteristics to

the hydropower site we have no further concerns with the validity of the data and the assessment of the site.

As the Cummersdale station is 6 km upstream of the site a correction factor has been applied to the data to account for the increased catchment area at Buckabank. The factor has been calculated by dividing the modelled mean flow attained from the LowFlows package at Buckabank by that recorded at Cummersdale gauging station.

$$Correction\ Factor = Q\_Mean_{Buckabank}(Low\ Flows) / Q\_Mean_{Cummersdale}(Gauging\ Station)$$

Summary of key scheme details:	
Agreed Qmean of river	5.84 m^3/s
Agreed Q95 of river	0.93 m^3/s
Base Flow Index (BFI) of river	0.16
Hands off Flow (HOF) proposed Q95 plus fish pass?	1.31 m^3/s.
Start-up Flow	1500l/s (approx. Q80)
Gross Head of scheme	3.2m

QValue	m3/s
Q95	0.93
Q50	3.15
Q40	4.08
Q10	13.65
QMean	5.84
Q95 : QMean	0.16

The start-up flow is 1.500m^3/s + HOF of 1.314m^3/s equals 2.810m^3/s. This gives an approximate value of Q50 below that figure no abstraction will take place and therefore there will be no change. Above Q50 the flows will reduce across the weir to the HOF level to the point which the turbine is operating at maximum capacity. Beyond this point all additional water will be allowed to flow over the weir and fish pass However, the proposal will have a minimal impact on flows during high flow events due to the maximum abstraction being is 51% of Qmean; so a relatively small scheme for the site. Below Q50 flow events and less, the turbine flow will not operate and the weir and fish pass will experience a natural flow hydrograph.

Hydrology over the weir

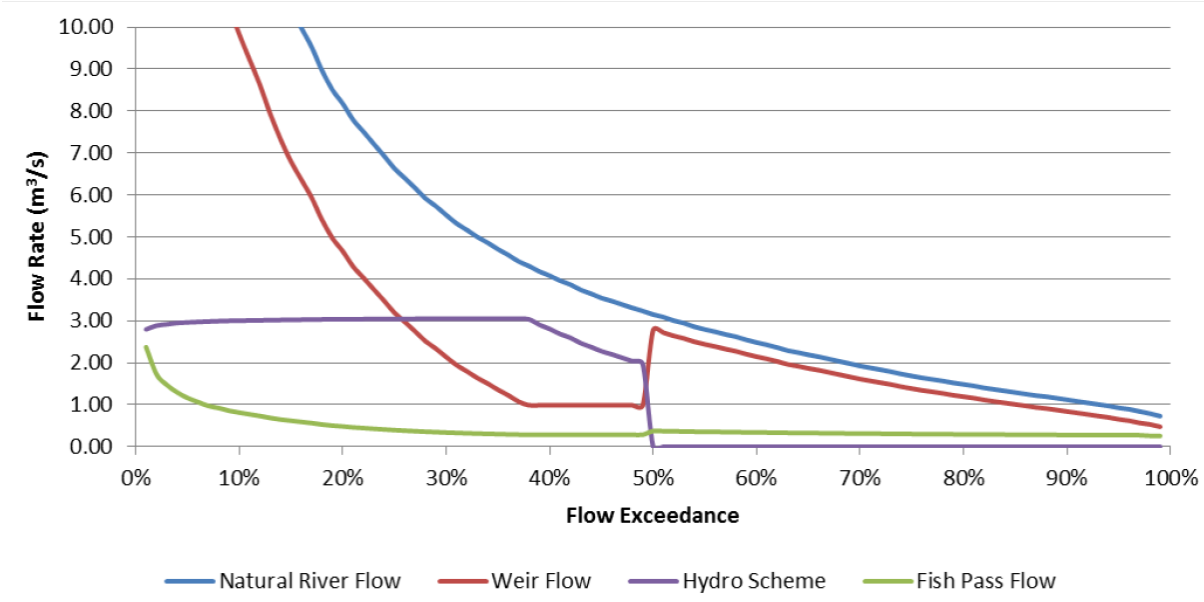


Figure 4: Post Scheme Assessment of the Flows at Buckabank Weir

The applicant has provided a post scheme assessment flow duration curve for the flows at the weir. There will be no increase in the risk of sections of the weir crest becoming dry as

the hands-off flow of 1.314m^3/s will always be in place, ensuring a suitable minimum flow across the whole of the weir as well as protecting fish pass flow and the mill leat.

The graph shows that the hydropower scheme would start operating (T_{MIN} + HOF) at river flows ~Q51. The turbine would reach capacity (T_{MAX}) when the river flow is at ~Q38.

The turbine will only operate when the HOF conditions in the river are satisfied. During times where there is excess water above the HOF in the river but this is below the turbine maximum, the downstream sluice gate will be partially opened to allow a fraction of the rated flow into the header tank. This has the benefit of producing more power over the year but will also prevent any rapid change in water levels that would occur for a simple on/off machine.

Flow Variation

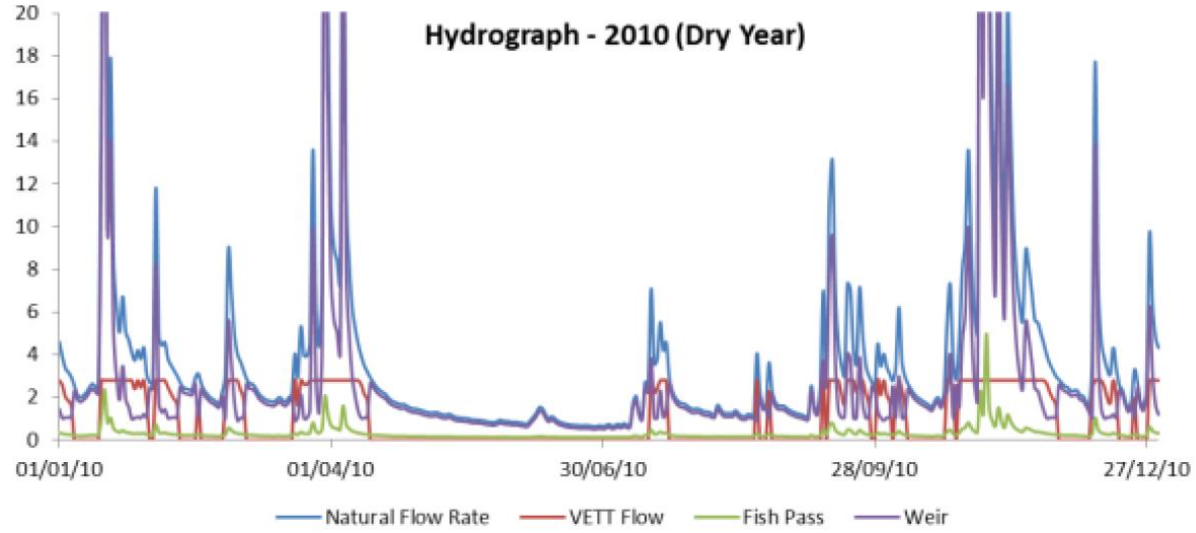


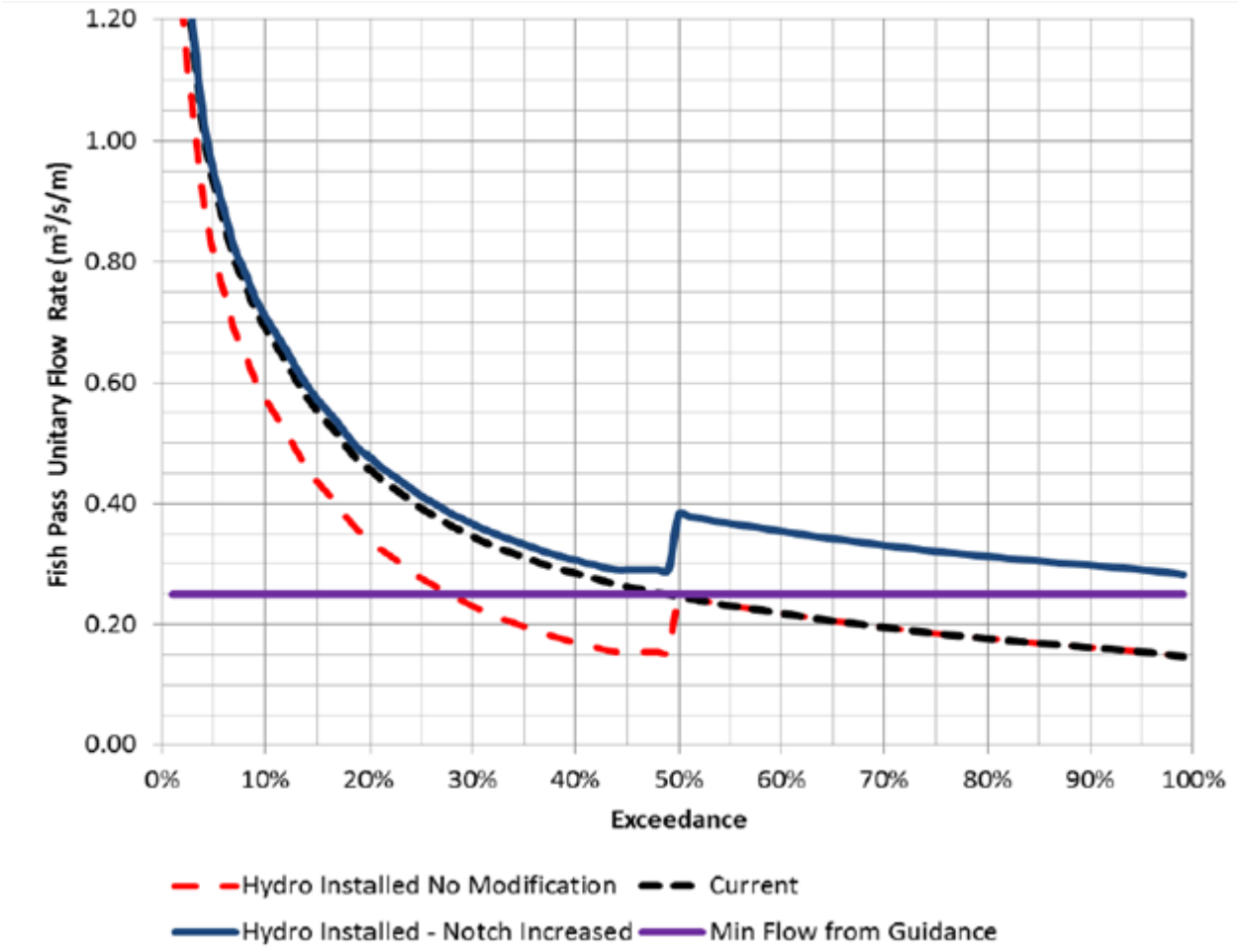
Figure 5: Dry indicator year (2010) hydrograph

The hydrograph illustrates the changes to the natural flow, pre and post installation and the impact of operating scheme over a range of flows. In dry years when the flows do not reach above the HoF there will be limited abstraction periods. Corresponding to rainfall events and mainly limited to the wetter winter season. As the Caldew is a responsive watercourse this pattern of higher abstraction rates following wetter periods and rainfall events would be expected in most years. Due to the flashy nature of the river the periods of time when the weir and fish pass would be experiencing consecutive days of HOF conditions would be limited.

A reserve flow equating to a depth of 66 mm across the width of the weir will ensure that the sites remain wetted at all times and the visual amenity preserved. The scheme does not behave as an impounding structure and therefore there will be no impact to upstream water levels. During operation of the hydropower scheme the water levels between the intake and outfall will be depleted but will remain within the HOF levels.

Hydrology over the fish pass

Figure 6: Assessment of fish pass flows with and without modifications.



Without any modifications the performance of the fish pass would be reduced by the proposed development because discharge through the fish pass would decrease when the hydropower scheme is abstracting water – i.e. at flows above Q50. The minimum flow has been obtained from our fish pass guidance. The applicant therefore proposed to improve the fish pass by widening the notch of each flight in the pool and traverse section to 1.90 m and retain both sections of the downstream Larinier pass.

Following the proposed modifications the flow rate would exceed the minimum recommended level of 0.250m^3/s at all times. By comparison, under the current condition this is only achieved at flows above Q50.

7.3 Impact on water quality

WFD Supporting Element	WFD Cycle 2 (2015) status	WFD Objective
Physico-chemical	Not Assessed	Good by 2027
Chemical	Good	Good by 2027

There are no consented water discharges within the short depleted reach. Dissolved oxygen has not been raised as a concern in regards to this scheme.

We are satisfied that the hydropower scheme will not cause any deterioration in the physico-chemical and chemical status of the water body.

7.4 Impact on geomorphology

WFD Supporting Element	WFD Cycle 2 (2015) status	WFD Objective
Morphology	Supports Good	Not Set

Upstream of the weir there is an impounded section of river at present. Immediately downstream of the weir is a weir pool, which spans most of the width of the weir and extends up to a couple of metres downstream of the weir with an approximately semi-circular shape. A series of shallow riffles extend approximately 30m – 70m downstream.

According to the BGS Geological Map, the bedrock geology in the area is part of the St Bees Sandstone formation with superficial deposits of alluvium consisting of clay, silt, sand and gravel.

The site visit carried out in June 2015, during Q79 flows, showed material of size approximately 60mm upstream and mainly bedrock slabs and boulders downstream, with very little silt evident.

A high level assessment of existing sediment deposits reveals that the River Caldew at Dalston has entered a mature low-land stage. Here, the energy density is low and only small grain silts and sands are transported during average flows.

Sediment is deposited by slow moving water upstream of the weir. Water passing over the weir and the subsequent riffles some 30m+ downstream has enough energy to move sediment, and only the largest bed load will be deposited here during flood flows.

<u>At the Weir</u>
There will be no increase in the risk of sections of the weir crest becoming dry due to the operation of the hydropower scheme as the hands-off flow of 1.2m^3/s will always be in place, ensuring a suitable minimum flow across the weir.

<u>Weir Pool</u>
The substrate of the weir pool is not considered suitable for fish spawning. The existing weir pool should be unaffected as the discharge is sufficient distance away. Also given the bed rock composition of the area downstream from the weir and weir pool there should be minimal changes in features elsewhere.

During low flows the scheme will not be operational (the scheme has a start-up flow of ~Q80) so the weir and fish pass will operate in a natural manner. Some sedimentation of fine particles may occur in the inlet and outlet channels but these areas will be flushed clean as soon as moderate flows resume.

During moderate flow conditions, there will be some additional sedimentation behind the weir and in the weir pool as a result of the proposal, but this is expected to be flushed out effectively during high flow events. The channel design is expected to avoid any significant sedimentation within the proposed channel, avoiding the need for regular removal of material.

During high flow conditions, the effects of the proposal will be minimal due to its maximum capacity which is equal to $3m^3/s$ (equivalent to Q50). Any additional sedimentation built up behind the weir or within the weir pool will be flushed downstream with only marginally reduced effectiveness.

Sediment transport rates will remain stable, allowing the production and sustenance of habitats associated with morphological features, both within and downstream of the depleted reach; in terms of geomorphology this scheme is WFD compliant and is not expected to be detrimental to WFD objectives.

7.5 Impact on ecology (including fish)

WFD Supporting Element	WFD Cycle 2 (2015) status	WFD Objective
Fish	Poor	Ecological status Good by 2027
Invertebrates	High	
Macrophytes & Phytobenthos	Good	

As the primary concerns associated with the proposed scheme are with regards to effect on the SAC, please see Section 7.6 below. However, it should be noted that the fisheries issues outlined in Section 7.6 are also relevant to WFD and the potential for the proposal to reduce the ability of a number of waterbodies to reach GES and / or to increase the risk of deterioration.

The developer has conducted detailed studies to investigate the survival of fish, including salmon smolts and lamprey, passed through an experimental VETT structure and these investigations found that fish survival was good over the duration of the post-impact monitoring period. As such, this specific aspect (direct mortalities associated with rapid pressure fluctuations) can be considered low risk to salmon smolts and lamprey. However this is just one factor affecting the downstream migration of fish at hydropower schemes, every site has unique attributes that can influence overall fish survival and passage.

The salmon population in the Eden catchment (and in particular the Caldew sub-catchment) has declined significantly in recent years and is now classed as being “Probably At Risk” (meaning without mitigation there is between a 5% and less than 50% prediction of the salmon stocks of meeting the Management Objective) the same status predicted for 2021 due to the current declining population trend. The Eden SAC is currently in Unfavourable – Declining (meaning without mitigation the feature is currently predicted to continue declining) condition for salmon and will remain so until 2019 at the very earliest

Sea, river and brook lamprey are not believed to be present at or upstream of Buckabank weir. Their upstream limit on the River Caldew is currently likely to be Holmehead weir approximately 10km downstream – this is a weir similar in size to Buckabank and which currently has no specific lamprey pass present to facilitate upstream migration. However a multi-agency project is currently underway to remove or bypass this weir to improve the migration of all lamprey species therefore they have been assessed as “in combination” this proposal will prevent the targets being achieved through reasons listed below.

We are concerned that whilst losses incurred as a direct result of passage through the VETT structure are likely to be minimal and that the scheme results in a new downstream migration route, existing downstream migration routes could be rendered less effective. This could result in a negative impact overall on downstream migration of lamprey.

Little is known about the downstream migration of lamprey, including how they respond to weirs, whether or not they migrate along the river margins, whether or not they, like salmon smolts, are likely to congregate towards the downstream end of a structure, and whether or not they are likely to move into structures such as a modified fish pass or the intake structure of their own volition. All of these unknown factors create a high degree of uncertainty as to whether or not downstream migrating lamprey will be adversely impacted by the proposed scheme relative to the existing weir structure. In the absence of any lamprey specific information we assume that they will behave in a similar way to descending salmon smolts.

To minimise the risk of further declines in salmon stocks in the River Caldew, we consider it essential that numbers of spawning adult salmon are maximised across the entire River Caldew catchment. In doing so, the spatial extent of juveniles and the densities of the salmon population at this life stage will be protected as far as possible. And, to ensure that subsequent adult returns are maximised, there must be no additional impacts on smolt survival. Opportunities to move the River Caldew salmon stock into recovery and ultimately Favourable Condition should be identified.

Due to the current poor status of salmon stocks in the catchment, we are required to reduce the exploitation (killing) of salmon in the Eden (and Caldew) and to increase the numbers of fish successfully spawning. This process is currently underway locally and any new measures will require approval from Natural England to ensure that they are compliant with the Habitats Regulations. A fundamental part of this is that we must demonstrate that the measures will show a clear, unambiguous reduction in exploitation.

Note that, due to the widespread and significant decline in salmon across England, a similar process is also underway nationally and an equivalent process is underway in Wales, underlining the significant concerns with salmon at the time being. The hydropower scheme at Buckabank weir has the potential to reduce or completely remove the effectiveness of this review, this would result in a failure to meet future objectives for improvement in status at this site for both SSSI and SAC designations.

The current Dalston fish pass comprises of five pool and transverse passes upstream and a twin-channel Larinier pass. The current fish pass is believed to have too little water passing over the Larinier baffles during flows of less than Q50 and therefore does not satisfy the current fish pass approval design criteria. Installing the hydropower without modification reduces the effectiveness of the fish pass for all flows <Q30.

In addition to the original application the applicant has also proposed changes to the current fish pass, this will have to be compliant with current fish pass guidelines and that this is highly likely to require more modifications than currently proposed. This would need to be presented to our National Fish Pass Approval Panel as a fish pass application. More information will be required before modifications to the fish pass can be fully considered.

The applicant has proposed to increase the notch width into each of the five pools (including at the very top of the fish pass) from 900mm to 1900mm. This would increase the water flow entering the fish pass and increase water levels whilst keeping the area of pass that the fish have to negotiate / travel through for the fish pass the same without reducing the entrance width of the structure. It is not proposed to modify the depth of the notches. These would remain at 250mm deep.

The water abstracted by the hydropower scheme would return to the River Caldew broadly parallel with the flow from the fish pass and approximately three metres downstream. The tailrace structure has been designed to dissipate water velocities to just under half that of the fish pass and therefore minimise the attraction of this water volume to upstream migrating salmon. However, due to the volume of water being discharged through the tailrace relative to the fish pass (approximately 7.5 times greater) and the unscreened nature of the tailrace channel, a proportion of adult salmon are likely to locate the discharge from the hydropower scheme and attempt to enter the un-screened tailrace structure rather than the fish pass. Entry of adult salmon into the tailrace has the potential to delay upstream migration, resulting in additional energy expenditure, arrival at spawning grounds during a sub-optimal period (i.e. too late) or potentially spawning in areas of sub-optimal habitat downstream of the weir if a route of upstream passage cannot be located. There is additionally the potential for increased mortality if a number of salmon remain in the outfall pipe for any extended period resulting in crowding. This could result in increased disease through cross contamination. There is no evidence at this time to suggest there will be any extended residence of individuals in the outfall pipe or crowding of several individuals at any one time.

Due to the unscreened state of the tailrace channel it is likely that a proportion of adult salmon would be attracted into the tailrace channel and, depending upon the length of fish and therefore individual swimming capabilities, a proportion of fish may be able to remain within the tailrace channel for a prolonged period, incurring migration delay.

Based on the water velocity in the tailrace pipe (1.7 m/s), the following three salmon size ranges have been established based on the ability to remain within the tailrace pipe:

1. <20cm – salmonids with a length <20 cm would be capable of achieving a burst swimming speed of approximately 1.8 m/s. The majority of fish under this size would therefore not, be able to ascend the HYDROPOWER discharge pipe.
2. 20-30cm – salmonids within a length range of ~20-30 cm would be capable of undertaking swimming bursts within the HYDROPOWER discharge pipe but would not be able to sustain swimming at this speed.
3. >30cm – salmonids with a length >30 cm would be capable of sustaining a swimming speed greater than the velocity of the HYDROPOWER discharge pipe.

Based on the downstream fish trap data, all adult salmon on the Caldew fall into category 3 (> 30 cm) and would therefore be capable of sustained residence within the tailrace pipe. There is therefore the potential that delay to upstream migration of adult salmon may be increased relative to the current situation at the weir.

The applicant has assessed the likely impact associated with returning salmon being distracted by and into the turbine outfall and concluded that this will not significantly impact on salmon populations. However, this assessment highlights the high levels of uncertainty around this impact, such that the actual impact could be much higher. We therefore cannot conclude beyond reasonable scientific doubt that the proposed scheme will not have an adverse impact on site integrity.

The hydropower scheme tailrace outfall is likely to act as a distracting flow from the existing fish pass. Whilst the relative close proximity of the outfall to the fish pass entrance will help attract fish into the general area of the fish pass, an unknown proportion of fish will be attracted into the larger outfall rather than the fish pass, notwithstanding proposed increases in flow within the fish pass. Of those fish entering the outfall, an unknown proportion will eventually leave and pass upstream via the fish pass to spawn, while the remainder may spawn downstream (and thus not contribute to stocks upstream) or be lost

as result of, for example, predation or disease resulting from exhaustion and / or stress. Proposed modifications to the fish pass may improve its effectiveness at attracting fish into it but it will not remove this risk.

Specific issues were identified with regards to reduced water levels over the weir during scheme operation, and considerable uncertainty that descending salmon smolts would find and use the intake and VETT device as a bypass structure. In their Habitats Risk Assessment, the applicant screened out any potential negative impacts on smolt migration at Stage 1 but provided no additional information to support this conclusion.

The existing weir and fish pass configuration at Buckabank is highly likely to delay smolt passage to some degree. The orientation of the weir crest is such that smolts moving downstream are likely to congregate towards the true right corner of the weir (looking downstream), the most downstream point of the structure, and to rely on elevated water flows over the weir to continue downstream via this route. This is the opposite side of the weir to that which the existing fish and proposed intake are located. No additional bypass structure to facilitate downstream migration, for example towards the right-hand edge of the weir, has been proposed by the applicant. Although a mill race is present in this right corner of the weir, this route is not considered an appropriate route for smolt migration due to it's long, shallow, partially culverted nature.

In order to conclude that the proposed HYDROPOWER scheme will have no adverse effect on site integrity we must be certain beyond reasonable scientific doubt that there will be no significant additional delay and mortality to emigrating salmon smolts. Studies undertaken elsewhere (e.g. Aarestrup & Koed, 2003; Gauld et al, 2013; Nyqvist et al, 2017) demonstrated delays in downstream smolt passage at dams and weirs with and without bypass features, with successful passage strongly associated with higher flows. Thus, it is reasonable to assume that reducing flow over Buckabank weir will exacerbate likely existing issues with smolt passage at this structure.

Specific concerns that have not been mitigated sufficiently by the applicant are listed below:

<u>Atlantic salmon:</u>

- Potential for delay in upstream migration of adult salmon due to the competing attraction flow of the turbine tailrace.
- Potential increase in mortality, loss of fitness, reduced spawning upstream, delayed arrival at spawning grounds, use of sub-optimal habitat downstream, and increased density dependent mortality of juveniles downstream.
- Potential for delay in downstream migration of salmon smolts and kelts due to reduced flow to and over the weir and considerable uncertainty that descending fish will find and enter the modified fish pass and / or intake.
- A net reduction in egg deposition in the River Caldew

<u>River, sea and brook lamprey:</u>

- Potential for future delay in downstream migration of river and sea lamprey transformers due to reduced flow to and over the weir and considerable uncertainty that descending fish will find and enter the modified fish pass and / or intake.
- Additional potential impacts as above with salmon.

Significantly, the modelling results presented do not address the likely cumulative impacts over successive generations of returning adults during the lifetime of the proposed scheme. Similarly, because no assessment of potential smolt losses has been carried out, no compounding effects on future runs are considered.

In order for the proposed scheme to be considered acceptable, it must be demonstrated beyond reasonable scientific doubt that it will not have an adverse impact on site integrity. In other words, it must not result in harm to salmon stocks across in the River Caldew (as a component of the wider Eden SAC) and must not result in failure to meet future protected site objectives for improvement in status.

Whilst the applicant has provided modelling for egg deposition, fish migration and suggested modifications to the fish pass as part of their supporting information overall, the modelling presented highlights the high level of uncertainty surrounding the impact of the proposed scheme. Assessment by the Environment Agency of this modelling work suggests that likely net reductions in egg deposition upstream of Buckabank Weir (the majority of available habitat) are worse than reported because the assessment presented is based on parts of the Caldew both upstream and downstream of the weir.

The modelling results presented do not address the likely cumulative impacts over successive generations of returning adults during the lifetime of the proposed scheme. Similarly, because no assessment of potential smolt losses was included in APEM's report, no compounding effects on future runs are considered. Given the poor numbers of adults recorded there in recent years. We therefore believe that any net reduction in egg deposition in the River Caldew, particularly upstream of Buckabank Weir, will result in a proportionate reduction in future juvenile densities and their distribution.

The WFD condition for this site for fish is currently at "Poor" status in order to achieve "good" status (2027 target) the fish stocks, specifically salmon populations would need to improve. As applied for the scheme could potentially lead to a decrease in fish stocks in the water body, with reduced spawning and condition as a factor this could be compounded year on year with reduced egg deposition, and therefore less juveniles. Unchecked over the length of the scheme (at least 20 years) the fish status of the river could fail to reach the "good" target and remain as poor or in a worst case scenario further deteriorate to "bad" status. The scheme as applied for is not currently compliant with WFD.

There are no further concerns this scheme would impact on the other various plant, mammal and insect species that have been identified in our screening process.

As fish species are a designated feature of the protected sites that the scheme is proposed to be built within, any negative impact on the fish species will therefore have a negative impact on protected site condition. This is further discussed in section 7.6.

7.6 Habitats Directive Regulations and Countryside and Rights of Way Act

The River Eden is designated as an SAC under the EU Habitats Directive, this is legally underpinned and assessed with River Eden & Tributaries SSSI. The designations cover areas of 2449ha over 42 individual assessment units. The scheme is to be located in unit 235 which was last assessed in 2010 as 'Unfavourable recovering'. There are a further two units upstream of the unit that the proposed scheme will be sited in, units 233 (Caldew - Carrock Fell to Cald Beck) and 234 (River Caldew - Cald Beck to Gaitsgill). The general condition assessment of unit 233 is "Unfavourable – No change" and that of unit 234 is "Unfavourable – Recovering".

A salmon specific condition assessment for the River Eden SAC was completed in September 2017 by Natural England. This assessment placed the majority of SAC units, including all three units in the River Caldew, in "Unfavourable - Declining" condition for salmon.

As applied for, we cannot conclude beyond reasonable scientific doubt that the proposed scheme will not have adverse impacts on several key features of the River Eden SAC (see table below) and the River Eden SSSI and its component populations. We therefore cannot conclude beyond reasonable scientific doubt that, overall, the proposed scheme will not have an adverse effect on site integrity of the River Eden SAC or not cause damage to River Eden SSSI.

EA habitat/species group	**Risk**	**Likely significant effect alone**	**Likely significant effect in combination**
River Eden SAC (UK0012643)^			
Migratory Fish Species *Salmo salar*; Atlantic salmon *Petromyzon marinus*; Sea lamprey *Lampetra fluviatilis*; River lamprey	Change in flow or velocity regime	Yes	Yes
Non-migratory fish and invertebrates of rivers *Cottus gobio*; Bullhead *Austropotamobius pallipes*; White-clawed (or Atlantic stream) crayfish *Lampetra planeri*; Brook lamprey	Change in flow or velocity regime	Yes	Yes
Mammals of riverine habitats *Lutra lutra*; Otter	Change in flow or velocity regime	Yes	Yes

^ Protected area under the Water Framework Directive

The table sets out the protected features, and specific species within those features of the River Eden SAC that would be placed at risk were this scheme to be licenced. The risk of "Change in flows or velocity regime" is specifically a reduction in flows over the weir, a reduction in flows through the fish pass and a distracting flow coming from the hydropower outfall. The alone effect is the impact of the installation of the hydropower without other factors. The in combination effect takes into consideration several other projects currently ongoing in catchment that the scheme may impact upon.

We must consider the implications of the proposal in view of the site's conservation objectives. The conservation objectives for the site requiring appropriate assessment are below:

With regard to the SAC and the natural habitats and/or species for which the site has been designated and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring;

For Qualifying Habitats:
- the extent and distribution of qualifying habitats
- the structure and function (including typical species) of qualifying habitats, and
- the supporting processes on which qualifying habitats rely.

For Qualifying Species:

- the extent and distribution of habitats of qualifying species
- the structure and function of habitats of qualifying species
- the supporting processes on which habitats of qualifying species rely
- the populations of qualifying species, and
- the distribution of qualifying species within the site.

Generic conservation objectives are based on 'Natural England (2014) Conservation Objectives for European Sites in England Strategic Standard 01/02/2014 V1.0'

Natural England's detailed Conservation Objectives for the River Eden include the following relevant site-specific targets for the Atlantic salmon population:

a. Spatial extent: Juvenile salmon distribution should reflect near-natural conditions.
b. Population density (juveniles): Juvenile salmon densities should not differ significantly from those expected for the river type / reach under conditions of high physical and chemical quality.
c. Population density (adult run size): Egg deposition estimates exceed the Conservation Limit in four years out of five.

The precautionary principle is applicable in this case and should be applied to all individual sectors of the designated site, including the Caldew in its own right as a protected site cannot be assessed as being in "favourable" condition if any units are in an "unfavourable" condition. Therefore it is appropriate that more precautionary, worst case scenario data is used to determine the effect on the integrity of the salmon population for the River Caldew uses mean data values and is therefore not appropriate to use to assess the impact of the hydropower scheme upon protected species.

It is also appropriate to consider the cumulative effect on the salmon population over the number of years that the hydropower scheme would be in operation, specifically reduction in egg deposition and therefor a reduction in the population size of next generation of fish year on year. The in-combination effects of multiple barriers across a catchment also needs to be considered in terms of the delays and additional energy expenditure required to navigate man-made barriers and the effect on health and fecundity of salmon, even when most fish eventually successfully navigate the structures.

Feasibility studies are currently underway for a collaborative project with a view to either weir removal or weir bypassing further downstream on the outskirts of Carlisle (Holmehead Weir, NY 39695 54415). Once removed or bypassed, river and sea lamprey would be able to reach Buckabank weir. The scheme may impact on these species but their behaviour around hydropower schemes and in-river structures is poorly understood. These concerns are principally with regards to river and sea lamprey and have been addressed in the relevant sections above. However, weir removal or bypassing is also likely to improve salmon passage upstream and downstream. The hydropower at Buckabank weir has the potential to reduce or completely remove the effectiveness of these plans. As such, this proposal has the potential to have adverse effects on the notified features by increasing the difficulty of returning the populations to favourable status.

The developers considered the effect of the scheme on the integrity of salmon population of the whole SAC – the River Eden, concluding that there was no likely significant effect. It is appropriate to consider the effect of the proposals on integrity of the salmon population of the Caldew given that it is likely that the stock are genetically different due to the different spawning locations and gene pool. A precedent for this has already been set in the

appropriate assessments completed by us for the Carlisle Northern relief road in 2006, and the river protection works at Eden Brow where the effect on the integrity of the site was considered at the unit/tributary reach level, rather than the whole site.

When considered at the tributary / Caldew level the assessments (using the precautionary values) show that there is a possible 3.75% reduction on the spawning ability and egg production. Case law has shown that even very small impacts on the feature of a site can adversely affect the sites integrity.

Defra and European Commission guidance has defined the integrity of a site as:

"The integrity of a site is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified."

In other words, a site's integrity is not only concerned with its qualifying features themselves but also the ongoing ability of a site to support and sustain its designated habitat and species features. In practical terms, for this proposal in this location, this means migration of salmon both upstream and downstream of the scheme, and all species of lamprey upstream, need to be maximised in order to meet conservation objectives. If the scheme prevents upstream migration of salmon it will compromise meeting the Conservation objectives.

The importance of maintaining / restoring natural geomorphological processes (weir removal/by passage) within the protected site resource is acknowledged in both Natural England's draft Supplementary Advice Document for Salmon guidance, the current Freshwater Fauna and Rivers Common Standards Monitoring guidance. Any development which may affect current site integrity or compromise the future attainment of natural function within a protected freshwater site must be considered unsuitable for such an area.

There are design and operational aspects of the proposed scheme as described in section 7.5 (reduced flows over the weir, distraction from outfall flows and the unscreened nature of the VETT), that are likely to have significant impacts on one or more life stages of migratory fish (salmon, and river and brook lamprey) that that are designated features of the protected site. While delay issues are present without the scheme in place, due to the nature of the weir, they are likely to be exacerbated once it has been completed.

We have assessed the supporting documents submitted by the developer and concluded there is high degree of uncertainty surrounding the potential adverse impacts of the proposed scheme on Atlantic salmon in particular (see section7.5 for further detail). Impacts are likely to be compounded across life stages as smolts and adults must both pass the site, and accumulate across successive generations of fish resulting in potentially large reductions in salmon across the lifetime of the scheme. Passage through the hydropower scheme is a small part of the proposal but the only one we have been provided with information on regarding smolts. We acknowledge that passage through the hydropower is low risk but there are other issues as listed in section 7.5.

Although Natural England do not currently use juvenile salmon distribution and juvenile salmon densities to carry out condition assessment of the SAC, any negative impact on salmon that the proposed scheme may result in will have a negative impact on juvenile salmon densities and / or distribution. Given the very poor adult returns to the River Caldew in recent years (and probably since trapping ceased), we do not believe that density dependent mortality is currently a significant factor in the River Caldew. Therefore, any reduction in numbers of spawning fish and / or numbers of smolts reaching the estuary will

have a negative impact on future juvenile fish densities, smolt runs and ultimately adult returns. Furthermore, if adult runs and smolt runs past the site are both impacted as a result of the proposed scheme, any impacts will be compounded. And, because the scheme is designed to operate for at least 20 years, there will be cumulative impacts on successive generations of salmon in the River Caldew. A number of these issues have not been addressed by the developer.

It is likely that downstream passage of lamprey will also be impacted by the proposed development in the future due to reduced flow to and over the weir and considerable uncertainty that descending fish will find and enter the modified fish pass and / or intake. Once multi agency projects such as the removal/bypassing of downstream weirs have been completed. The mitigation options (fish pass alterations) that have been suggested will not address these issues as there will still be a distracting flow from the unscreened VETT.

Further mitigation (screening/closed abstraction periods) was not a viable option for the developer due to the nature of the VETT turbine and it's specific low risk passage aspects to salmon smolts and lamprey (discussed in section 7.5) they did not agree screening was necessary. Closed abstraction periods would not have allowed the scheme to be financially viable as the closed period (outside of salmon runs) would have been a too small proportion of the year as well as possibly being variable and not protecting individuals migrating outside of runs. We have considered issuing with a monitoring schedule however due to the precautionary principle that surrounds EU designated sites this would not have been acceptable as if monitoring did show that the scheme was having an adverse effect we would have licenced something against our statutory duty.

Natural England were consulted with regarding this proposal and confirmed on the 24/11/2017 that the scheme as proposed, cannot be shown to have no adverse effect on the integrity of the site. The imposition of conditions or restrictions on the way the plan or project is to be carried out has been considered and it is ascertained that conditions or restrictions cannot/may not overcome the adverse effects on the integrity of the site. Natural England have advised against the issuing of the proposal.

For a full technical assessment of the protected sites please see Appendix 4, 11 and 12.

The application is therefore refused on these grounds.

7.7 WFD summary impact statement

The assessment of the application indicates there would be an unacceptable risk of deterioration in protected site status and failure to meet future objectives for improvement in status if the licence was granted, specifically ecology including fish and protected sites and habitats.

As a Natura 2000 site The River Eden SAC is a WFD protected area, in order to consent any application in this area the minimum acceptable Ecological Status the proposal must allow it to achieve "Good". As the site is currently at "Poor" Ecological Status proposals can only be licensed if they will not prevent the site from reaching "good" status by the target year (2027 in this case).

Any projects that are likely to have a negative impact on restoring fish numbers in the catchment will prevent WFD status from improving and reaching "Good" status. We have assessed the data provided by the applicant and the modelling results presented do not

address the likely cumulative impacts over successive generations of returning adult Salmon during the lifetime of the proposed scheme.

Documents submitted by the developer highlight potential adverse impacts of the proposed scheme specifically on Atlantic salmon however they are unable to state with any certainty to what scale this impact is likely to be, acknowledging there will be year on year variations and differences between individuals.

We are unable to assess this scheme as WFD compliant due to the uncertainty surrounding what level of impact the scheme will have on salmon condition, and therefore spawning, egg deposition and future populations.

7.8 Protected rights and lawful users

The fish pass flow and mill leat will be protected by the HOF.

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

7.9 Other considerations

Consideration	Comments
Flooding	No concerns
Archaeology	No concerns
Recreation/amenity	Several recreational fisheries groups have raised significant concerns that the scheme will reduce fish numbers and impact on the sport in the river. The concerns raised did not highlight any new information but have been taken into consideration. In section 7.5 and 7.6 the issues raised have been discussed further. See section 5.1 for details of representations made.
Subsidence and desiccation	No concerns

7.10 Other permits that might be required or related to the proposal

Permits	Yes/No	Comments
Discharge permit	No	N/A
Flood defence permit	Yes	It should be noted that we have not formally considered the construction phase associated with the proposed scheme. However, it should be noted that the normal working window for in-river works in Cumbria is 15th June to 30th September. It is also stated that piling would be required to install a coffer dam to enable civil works to be carried out in the dry. Further information would be required on the approach used for this as some forms of piling (i.e. impact piling) can be damaging to fish. It is likely that other aspects of construction would require further information too, the comments herein should not be considered as a complete list of

		potential issues.
Other	No	N/A

8. Assessment of likely Costs & Benefits of proposed approach

Water Resources/ The environment	By refusing the licence we are protecting the water environment, protected species and their designated features.
The applicant	By refusing this licence application the applicant will be unable to develop their hydropower site at Buckabank weir and generate renewable energy.
The Agency	In refusing the licence in accordance with the local and national policy, we are fulfilling our duties as a regulator. We have a statutory duty to ensure that sites designated under the Habitats Regulations are not exposed to permissions that may have an adverse impact on site integrity.
The economic and social wellbeing of the rural community	There is a potential negative impact upon the local community as no scheme will be built – no local developers or trades will be employed.

Alternative approaches considered

(1) Refuse.
(2) Grant as applied for by applicant.
(3) Grant with different terms than applied for by applicant.

Reason for choosing preferred approach over alternative approaches

(1) Refuse.

We cannot conclude beyond reasonable scientific doubt that the scheme will not have an adverse impact on The River Eden SAC site integrity.

The application is therefore refused on this ground.

Additionally there is a risk of failure to meet future objectives for improvement in WFD and therefore protected site status.

We have considered issuing with screening conditions or closed abstraction periods but these were not acceptable to the developer.

We have considered issuing with a monitoring schedule however due to the precautionary principle that surrounds EU designated sites this would not have been acceptable as if monitoring did show that the scheme was having an adverse effect we would have licenced something against our statutory duty.

9. Biodiversity and sustainable development

We do not consider this proposal to be sustainable, therefore we are not able to grant a licence. The biodiversity of the site will be protected by this decision.

10. Conclusion and recommendation

Conclusion

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

Recommendations

It is recommended that the application is refused for the following reasons:-

Due to the unscreened state of the tailrace channel of the scheme it is likely that a proportion of adult salmon would be attracted into the tailrace channel. This is likely to result in delayed migration, failure to pass upstream successfully and / or loss through, for example, disease or predation. The net effect of this would be to reduce numbers of spawning fish, particularly upstream of the weir. It is also likely that the proposed scheme will have an adverse impact on the downstream migration of salmon smolts, compounding any impacts on adult losses. Finally, any losses of fish at either life stage will have a cumulative impact through the lifespan of the proposed scheme.

In order for the proposed scheme to be considered sustainable, it must be demonstrated beyond reasonable scientific doubt that it will not have an adverse impact on fish stocks. In other words, it must not result in harm to salmon stocks across the River Caldew and must not result in failure to meet future protected site objectives for improvement in status.

As applied for, we cannot conclude beyond reasonable scientific doubt that the proposed scheme will not have adverse impacts on several key features of the River Eden SAC and the River Eden SSSI and its component populations. We therefore cannot conclude beyond reasonable scientific doubt that, overall, the proposed scheme will not have an adverse effect on site integrity of the River Eden SAC or not cause damage to River Eden SSSI.

The risk of deterioration in the protected site status if the licence was granted would be unacceptable. Additionally there is a risk of failure to meet future objectives for improvement in WFD and protected site status. The application is therefore refused.