7 Nature Conservation: River and Marine Ecology

7.1 Introduction

7.1.1 Purpose of the assessment

The purpose of the assessment is to determine the effects of the proposed Allt Easach hydro-electric scheme on the river and marine environment.

7.1.2 Assessment structure

This chapter of the EIAR is based on surveys and technical reports made by Waterside Ecology and SAMS Research Services Ltd. The river survey report is attached to the EIA Report as Appendix 7.1, the seabed report as Appendix 7.2, the freshwater pearl mussel report as Confidential Appendix 7.3 and the EMF report as Appendix 7.4. This chapter provides an impact assessment and a summary report for the general reader; scientific and technical background is provided in the appendices.

7.1.3 Key aspects of the development which could affect river and marine ecology

Small hydro-electric schemes may affect river and marine ecology by:

- Alteration of flow and wetted area between intakes and outfall due to abstraction;
- Creation of barriers to fish migration at the intakes;
- Entrainment of fish in the pipeline;
- Construction effects on water quality;
- Engineering works on the sea floor.

Migratory fish may be affected by the electromagnetic field (EMF) emitted by submarine cables, although the effects of EMF on fish are relatively little studied and poorly understood. A technical report has been commissioned by GHR from Waterside Ecology and it is presented with this EIA Report as Appendix 7.4; a short summary is provided in this chapter at section 7.8.3.

The submarine cable may also cause physical impacts on the sea floor environment, particularly during the cable laying process.

7.1.4 The Nature of the Future Baseline

The forestry through which the Allt Easach flows, and in which the hydro scheme will be constructed, will be felled before hydro construction commences. Apart from possible negligible (and largely beneficial) changes to the water chemistry caused by removal of riparian exotic conifers, no changes to the river are expected. Therefore the future environmental baseline is equivalent to the current situation. The river is classed by SEPA as “High Status”.

No changes to the marine environment are expected.

7.2 Scoping and consultation

During pre-application discussions SNH requested that the EIA report should include information on likely effects on Atlantic salmon and brown trout, on freshwater pearl mussels, and on the possible effects of EMF on migratory fish. This report also considers some other species, and physical impacts of the cable laying process on the sea floor.

7.3 Legislative and policy context

The ***Atlantic salmon*** is listed on Annexes IIa and Va of the EU Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (known as the Habitats Directive). Atlantic salmon receive protection, particularly from over-exploitation, under the Bern Convention (Appendix 3). Salmon in Scotland receive further protection from Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003. This covers a number of regulatory areas, including legal methods of fishing and offences, close times and protection of juvenile and spawning salmon. The Atlantic salmon is listed as vulnerable on the IUCN red list.

Due to recent declines, ***eels*** are of increasing conservation interest and are protected by European (EC No 1100/2007) and Scottish (Freshwater Fish Conservation (Prohibition on Fishing for Eels) (Scotland) Regulations 2008) legislation. The latter makes it illegal to take eels without a license from the Scottish Government. European eels are listed as critically endangered on the IUCN Red List.

Brook, river and sea lamprey are listed on Annex IIa of the EU Habitats Directive. River lampreys also appear on Annex Va, which seeks to control their exploitation.

Atlantic salmon, brown trout (including sea trout), European eel, river lamprey and sea lamprey are all listed as priority species on the UK and Scottish Biodiversity Action Plan lists.

Under the Wildlife and Countryside Act (1981) of Great Britain as amended by the Nature Conservation Scotland Act (2004), it is an offence to intentionally or recklessly kill, injure take or disturb ***freshwater pearl mussels*** or to damage their habitat. The species is also listed on Annexes II and V of the EC Habitats Directive and Appendix III of the Bern Convention. The freshwater pearl mussel is a 'Priority Species' under the UK and Scottish Biodiversity Action Plans requiring the implementation of a Species Action Plan dedicated to its survival (Biodiversity Steering Group 1995).

Seabed habitats and species in Loch Etive are not within any designated protected area, but the "burrowed mud" habitat is a Priority Marine Feature in Scottish waters[2], and is of international importance[3]. The "burrowed mud" habitat is indicated by the presence of fireworks anemone *Pachycerianthus multiplicatus* and the tall seapen *Funiculina quadrangularis*. These are rare species and regarded by SNH as having international or global importance.

[2] https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/priority-marine-features-scotlands-seas, accessed 1st March 2018

[3] Tyler-Walters, H. *et al* (2016) Descriptions of Scottish Priority Marine Features (PMFs). Scottish Natural Heritage Commissioned Report No. 406

7.4 Assessment method

Fish

A walkover survey of salmonid and other fish habitats was carried out by Dr Jon Watt of Waterside Ecology on 31st May 2017. The water level was low to moderate and the river was clear, providing good conditions for assessment of instream habitats.

The primary target species for the walkover survey were salmon and trout. The survey method was based on the protocols described by Hendry and Cragg-Hine (1997), Summers et al. (1996) and SEPA (2010a). These characterise in-stream habitats according to depth, substrate, flow and thus suitability for different age classes of salmonid.

Obstacles to migration were recorded and photographed. Their likely passability for adult salmonids was assessed. Where possible, the height (lip to water surface at base/plunge pool) and length (upstream to downstream) of obstacles was measured using a tape and bob weight. The likelihood of obstacles being passable was assessed based on data provided by SEPA (2010a), SNIFFER (2010) and the surveyor's own wide experience of fish population survey.

Areas of suitable spawning substrate were recorded. Other variables recorded in each survey section were: (i) up and downstream grid reference, (ii) wet width, (iii), stability of substrate, (iv) compaction of substrate and (v) availability of cover for fish alongside banks. The surveyor also made a subjective assessment of typical habitat quality for juvenile salmon and trout in each section.

Fish populations were surveyed by electric fishing on 24th and 30th August 2017. The survey was conducted under Scottish Government License CSM-17-150. The distribution and location of electric fishing sites was guided by the results of the habitat survey, completed before electric fishing commenced. Sites were placed in areas where suitable habitats for salmonid fish, the species most likely to be encountered, were present.

Freshwater pearl mussel

Following standard SNH recommended survey method (http://www.snh.gov.uk/docs/A372955.pdf) the linear stream survey extended from the normal tidal limit (NTL) to 100 m upstream of each proposed intake. A general survey was made by wading in the water and walking the riverbanks. The aim was to identify those areas that might harbour mussels, based on their known habitat preferences and surveyor experience. Where apparently suitable habitat was found an intensive search for mussels was conducted. The survey was carried out on 9th September 2017 under Animal Licence No. 94487.

Seabed habitats and species

A seabed survey by autonomous underwater vehicle (AUV: an unmanned submarine) was commissioned by GHR from SAMS Research Services Ltd in Oban. The AUV passed over the seabed along the proposed line of the submarine cable, making a bathymetric survey by side-scanning sonar and taking photographs of the seabed habitats. The data were then analysed by specialist scientists at SAMS. Their report is attached to this EIA Report at Appendix 7.2.

7.4.1 Study area

The study area consisted of the channels of the Allt Easach and the Allt Lochan an Lair; and the route of the proposed submarine cable route from near the mouth of the Allt Easach to near Ardmaddy, on the south-east shore of Loch Etive, to 50m on either side.

7.4.2 Time frame

The report considers the possible effects of the construction and operational phases of the proposed scheme. Decommissioning is not considered in detail because it is so far into the future that environmental and legislative effects at that time are impossible to predict.

7.4.3 Impact identification

Impacts were identified through the professional judgement of Waterside Ecology, SAMS Research Services Ltd and Eden Environment, based on long experience of many similar hydro-electric development schemes in the Scottish Highlands.

7.4.4 Development of mitigation

Between them, Waterside Ecology and Eden Environment have been involved in more than 100 similar schemes. They, and GHR, therefore have a detailed understanding of the mitigation measures available in this sort of development. The primary method is simply to avoid any impact, and this has been done through a continuing conversation between GHR, their design engineers and the environmental team throughout the design phase. Several changes were made to the scheme in response to environmental impacts. For example, in the case of fish, the location of the outfall was altered to move it to an area of bedrock riverbed upstream of a small pocket of gravel substrate (therefore leaving it unaffected) which might have provided some sub-optimal habitat for spawning fish.

Other mitigation measures consist mainly of ensuring best practice in construction, specified in a detailed Construction Method Statement, backed up by contractual obligations on the contractors, and supervised and enforced by an Environmental Clerks of Works and a Landscape Clerk of Works. These measures help to protect against impacts such as sediment and pollution spillages into the river, which may affect fish and freshwater pearl mussel.

In the case of marine impacts, GHR, Waterside and Eden discussed the likely impacts of the proposed cable laying with scientists at SAMS Research Services Ltd, and modified the proposals accordingly.

7.4.5 Residual impact assessment

Receptor sensitivity

For this assessment, river and marine species are considered to be sensitive, to the types of impacts likely to be caused by the scheme, in accordance with the following scale:

- ***High sensitivity:*** An internationally or nationally designated site or candidate site (SAC or cSAC, SSSI, NNR) designated in respect of the relevant species, or any regularly occurring population of an internationally or nationally important species, or a regularly occurring, nationally significant population of any internationally or nationally important species, or a feature identified as of critical importance in the UK BAP.

- ***Moderate sensitivity:*** Any regularly occurring, locally significant population of a species listed as being nationally scarce, or a regularly occurring, locally significant number of a regionally important species.

- ***Low sensitivity:*** Any other site or species.

Magnitude of change caused by the scheme

The magnitude of change, likely to be caused by the scheme, is assessed in accordance with the following scale. Note that changes may either be adverse or beneficial:

- ***Large change*** *(usually adverse)**:*** Total loss or very major alteration to key elements or features of the baseline conditions such that post development character, composition or attributes will be fundamentally changed and, in the case of adverse changes, may be lost from the site altogether. For example the destruction of a bed of freshwater pearl mussel, destruction of a Annex 1 priority habitat or a statutory designated site. Generally irreversible and permanent.

- ***Medium change:*** Alteration to one or more key elements or features of the baseline conditions such that post development character, composition or attributes of baseline will be changed. For example, loss or gain of optimal spawning habitat, death or injury or recruitment to a number of a locally rare species. Generally reversible with mitigation.

- ***Small change:*** Minor shift away from baseline conditions. Change arising from the loss or gain will be discernible but the underlying character, composition or attributes of the baseline condition will be similar to pre-development circumstances or patterns. For example, loss or gain of sub optimal foraging habitat, death or injury, or recruitment, of a very small number of common species. Generally reversible without mitigation in short timescale.

- ***Negligible change:*** A change that would be too small to be measurable by survey, for example a small behavioural change caused by disturbance, which would not impact on the survival or health of an individual animal.

The table below provides a matrix for impact assessment and significance judgement, where the sensitivity or value of a receptor is recorded on the vertical axis and the magnitude of change is recorded on the horizontal axis. The relationship between sensitivity or value and magnitude of change gives an impact 'score'. This table implies either positive or negative impacts. Results highlighted in yellow are considered *significant* in EIA terms, and may be either adverse or beneficial.

"*Significant"* in this report means an environmental effect which should be taken into account, and weighed against other adverse and beneficial factors, by planning officers in their decision making on the planning application.

Table 7.1: Impact significance

High sensitivity / highly sensitive	Not significant	Not significant	Significant	Significant	Significant
Medium sensitivity/ moderately sensitive	Not significant	Not significant	Not significant	Significant	Significant
Low sensitivity	Not significant	Not significant	Not significant	Not significant	Significant
	No change, no impact	**Negligible change**	**Small change**	**Medium change**	**Large change**

7.4.6 Difficulties and limitations of the assessment

Very small lengths of the rivers were not safely accessible by surveyors. Waterside Ecology considers it unlikely that these restrictions affected the validity of the survey work.

7.4.7 Assumptions

No particular assumptions had to be made in carrying out the assessment.

7.5 Baseline conditions

7.5.1 Obstacles to migration

The river was surveyed for falls, rapids and bedrock ramps which would present obstacles to upstream fish migration. The depleted reach of the river is about 2.1 km between the west intake and the outfall; nine obstacles or possible obstacles were identified on this stretch. The lowest of these is a rapid over sheet bedrock, including a series of rock ramps, about 70m upstream of the outfall. It was judged to be passable by eels, but passable by salmonids only in moderately elevated flows.

Further upstream, about 450 m upstream of the outfall, is a 10 m long rock ramp with a 0.5 m step at the upstream end, which is probably impassable. Just upstream of that, at the point where the forest road crosses over the river, is a 100 m reach of cascades and rock ramps which is impassable.

7.5.2 Fish habitat

Detailed descriptions of the potential habitat in each reach of the river are provided in Appendix 7.1. Estimates were made of the area of habitat for fry, juvenile, adult and spawning salmonids, and unsuitable bedrock.

The total area of accessible habitat (i.e. habitat between the normal tidal limit of Loch Etive and the first definitely impassable barrier) is 6,890 m^2, of which 6,030 m^2 is upstream of the outfall and would be subject to water abstraction by the proposed scheme.

Within the accessible abstracted area, some 57% of the river was classified as productive juvenile habitat, 38% as bedrock and 5% as deep pool. Habitat quality in the accessible abstracted area was mainly classified as poor to moderate and spawning habitat is extremely scarce. Upstream of the first clearly impassable obstacles a further 17,380 m^2 would be abstracted, of which 85% is in Allt Easach

and 15% in Allt Lochan an Lair. Of this, 45.6% was classified as productive juvenile salmonid habitat, 5% as deep pool and 49.3% as bedrock.

Generally, river channel morphology is such that water abstraction within standard hands-off flows is unlikely to affect wetted area or habitat availability. One reach of shallow braided habitat that might be susceptible to abstraction impacts was recorded, about 400m downstream of the confluence of the Allt Easach and the Allt Lochan an Lair, well above the impassable obstructions.

7.5.3 Fish populations

Salmon

A single salmon parr (aged 2+) was caught in section E3, about 230 m upstream of the outfall. No other salmon were found in any other part of the river.

Waterside Ecology and GHR discussed the results of the surveys, including the salmon populations, with specialists in the Argyll and Awe Fisheries Trusts, and they considered it most likely that salmon parr are not native to the Allt Easach but probably move there from other rivers and streams around Loch Etive, the journey being made possible by the low salinity of the surface layers of the loch. A sustainable salmon population is not thought likely to exist in the Allt Easach system.

Trout

Trout fry were caught in "poor" or "very poor" densities except in Section E3, about 200 m upstream of the outfall, where the population density was "fair".

Trout parr were caught in "very poor" densities at all sites except upstream of the east intake, on the Allt Lochan an Lair, where parr density was classified as "fair". The latter site is outside the scheme area and not in the depleted reach.

Waterside Ecology considers it likely that occasional sea trout may enter Allt Easach, as far as the impassable obstacles, and that low trout fry densities in this accessible reach probably reflect the lack of spawning opportunities in the watercourse.

Other species

Four ***eels*** were caught, three of them below the outfall, and one about 480 m upstream of the forest road bridge.

Spot checks were made for ***larval lampreys***, but none was found. It is highly unlikely that lampreys are present in Allt Easach, and they are not considered further in this report.

7.5.4 Freshwater Pearl Mussel

No freshwater pearl mussels or empty shells were found. Habitat in most survey sections was classified as poor or unsuitable due to lack of stable sand and gravel, substrate instability or dominance of sheet bedrock. Two survey sections were classified as providing moderate habitat quality. Details are provided in Confidential Appendix 7.3.

Obstacles to migratory host fish movements restrict the habitat available to freshwater pearl mussels, as described in 7.5.1 above.

Freshwater pearl mussels are therefore not considered further in this report.

7.5.5 Seabed habitats and species

The "burrowed mud" habitat is indicated by the presence of the tall seapen *Funiculina quadrangularis* and the (probable) presence of the fireworks anemone *Pachycerianthus multiplicatus*. These are rare species and regarded by SNH as having international or global importance. Both are particularly susceptible to damage by mobile fishing gear, for example trawling for *Nephrops norvegicus* (langoustine).

The survey area was chiefly composed of soft sediment, with large numbers of infaunal burrows and seapens present throughout. The burrows were typical of *Nephrops norvegicus*, with some individual Nephrops also seen in the images taken by the AUV. The majority of the seapens appeared to be *Virgularia mirabilis*, although several larger specimens were also seen that resembled the tall seapen *Funiculina quadrangularis*. In addition to the seapens, other notable epifauna included *Ophiuroidea* brittlestars (likely *Ophiura* spp.), and anemones. Several of the anemones seen in the images resembled the fireworks anemone, *Pachycerianthus multiplicatus*, although certain identification without colour imagery was difficult to make. The faunal community present was diagnostic of the biotope "Seapens and burrowing megafauna in circalittoral fine mud" (SS.SMu.CFiMu.SpnMeg). There was some possibility of sections being "Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud" (SS.SMu.CFiMu.SpnMeg.Fun), dependent on whether the identity of *Funiculina quadrangularis* could be confirmed.

Other fauna identified from the images included the siphons of large bivalves and a catshark.

A very small section of the seabed to the south east was characterised by cobbles on soft sediment, and was assigned the biotope 'Circalittoral mixed sediment' (SS.SMx.CMx). The faunal community in these areas was not substantially different from that of the surrounding burrowed mud, except for the presence of some smaller indistinguishable fauna on the cobbles themselves.

On the southern slope of the Loch Etive sea floor occur a series of six channels, presumably the result of downslope density flows from the nearby River Kinglass discharge. These channels average 9 m wide but are only 0.5 m deep, located in seabed at 52-82 m water depth.

SAMS Research Services Ltd considers it likely that no substantially different habitats from those detailed above are present within the proposed cable route. In discussions, SAMS staff indicated that the burrowed mud habitat is likely to be widespread in Loch Etive.

7.6 Impact identification

7.6.1 Potential construction impacts

Salmon and trout

Construction impacts of small hydro schemes on river ecology are typically due to the danger of siltation (which can smother salmonid spawning or juvenile habitat, and freshwater pearl mussel beds) and pollution by cement, fuel oils and lubricants, which can kill and injure river species. Salmonid densities, and the availability of suitable spawning habitat, in the accessible reaches were low, but those that are there are susceptible to damage.

Eels

Eels do not breed in the river, but may spend up to several years growing in fresh water before returning to the ocean to spawn. Construction activity may interrupt their upstream and downstream migration, and individual animals may be harmed by chemical pollution in the water.

Sea floor habitats

The burrowed mud habitat of the sea floor is vulnerable to engineering works, in particular excavation or ploughing to install a buried cable, or rock dumping to protect the cable on the surface of the sea floor. Recent research has highlighted the importance of Scottish sea loch floors as carbon sinks.

7.6.2 Potential operational impacts

Potential operational impacts on the river may be caused mainly by changes in river flow due to abstraction, and reduction in spate flows. The scheme would never, in itself, cause the river to dry out, because of abstraction restrictions put in place by the conditions of the CAR Licence.

Salmon and trout

Salmonid densities in the accessible reaches were low and, according to Waterside Ecology, it is improbable that wetted area is a limiting factor for juvenile salmonids. Wetted area is, in any case, unlikely to be affected by the proposed scheme due to the channel morphology. Most probably, impassable obstacles and lack of spawning habitat is the limiting factor for salmonid production in the accessible reaches.

Trout were recorded upstream of both intakes and therefore adequate screening is required to avoid entrainment in the intakes. This is dealt with by the use of Coanda intake screens, which prevent the ingress of anything larger than a couple of millimetres in size, and the incorporation of a plunge pool on the downstream side of the weir to facilitate downstream movement.

Eels

Eels were present at low density downstream of the intakes. Waterside Ecology considers that abstraction is unlikely to affect eels in Allt Easach. Eel density may be limited by poor access, as climbing substrate over or round waterfalls and rock ramps is scarce.

Sea floor habitats

The submarine cable would be static and is designed to be maintenance-free over the lifetime of the scheme. It should have no effect on the sea floor habitat after installation is complete.

The effects of EMF on migratory fish are discussed separately below.

7.6.3 Potential decommissioning impacts

Decommissioning would return the river to its natural state. Any demolitions in or near the river may cause sedimentation or pollution if not correctly managed.

The submarine cable is likely to be left in place after the scheme is decommissioned.

7.7 Mitigation development

The scheme has been designed in accordance with standard best practice, including the following measures which are designed to reduce adverse effects on river ecology. Full details are given in Chapter 3, Development Description.

7.7.1 Agreed construction mitigation

Impacts on the river environment and river species are unlikely to be significant, due to the river morphology and the consequent poor species density in the affected area. Nevertheless, construction would be subject to a range of controls designed to protect the river environment, including:

- Controls on refuelling operations and limits on distances from open water
- Specific requirements for surface water management and silt control
- Management of coffer dams and working in the river channel.

Details of these measures are provided in Chapter 3 and its associated appendices.

The results of the sea floor survey have caused some changes to the proposed installation method for the submarine cable, as follows:

- Proposals to bury the submarine cable in the sea floor, to protect it from anchors and trawling gear, have been definitely abandoned due to the potential for damage to the burrowed mud habitat and its associated species, and the likely disturbance to carbon-bearing sediments. Ploughing, excavating or dredging a trench had, in any case, been a tentative suggestion due to the cost and time which it would take, but the environmental concerns have now ruled it out completely. Instead, the cable would simply be laid across the sea floor by spooling it from a moving barge, as described in Chapter 3.

7.7.2 Agreed operational mitigation

During operation, the main effect of the scheme on the river would be to deplete the water flow between the intakes and the outfall. Abstraction would be controlled in accordance with the terms of the CAR licence, and would never cause the river to dry out. Waterside Ecology considers that abstraction is unlikely to reduce significantly the wetted area of the river in the reaches that are accessible to migratory fish.

No impacts are expected to be caused by the submarine cable during operation. The cable would be buried in a trench where it crosses dry land at both ends, and this trench would be extended into the water below the mean low water springs line, to protect the cable and for visual amenity reasons. The cable would emerge onto the surface of the sea floor well before it descends as far as the burrowed mud habitat: burrowed mud exists in deeper water and is unlikely to exist closer to the shore than about 10 to 20 m depth. The cable would also be fitted with cast steel cable protectors in this transitional zone. Burying the cable, and fitting the protectors, would remove any lingering doubt about the possibility of emitted EMF affecting migratory fish in the surface layers of the water body.

7.7.3 Agreed decommissioning mitigation

No specific mitigation measures have been proposed for decommissioning, because the environmental and regulatory conditions so far in the future cannot be predicted with any confidence.

7.8 Residual impacts

"Residual impacts" are those which are likely to occur after mitigation measures are taken into account.

7.8.1 Construction impacts

Fish and eels

Considering the low populations and small amount of suitable habitat, and the management controls placed on construction activities, the magnitude of change caused to these ***highly or moderately sensitive species*** would be ***negligible***. This would ***not be significant***.

Sea floor habitats

Considering the very narrow impact corridor, the very short construction period (a single day for laying the cable) and the extensive nature of the relevant burrowed mud habitat, the magnitude of change caused to these ***highly or moderately sensitive species and habitats*** would be ***negligible***. This would ***not be significant***.

7.8.2 Operational impacts

Fish and eels

Considering the river morphology and the abstraction controls imposed by CAR, the magnitude of change caused to these ***highly or moderately sensitive species*** would be ***negligible***. This would ***not be significant***.

Sea floor habitats

Considering the static nature of the submarine cable there would be ***no effect*** on sea floor habitats during operation of the scheme.

7.8.3 EMF and migratory fish

Some migratory fish in Loch Etive and its tributary rivers, in particular the River Kinglass and the River Etive, would cross the submarine power cable on their way to and from the sea. Some fish are known to make use of magnetic fields in navigation, and there is some evidence that anthropogenic electromagnetic fields may, in some circumstances, affect the behaviour of nearby fish. Accordingly, a study was commissioned to determine the likelihood of significant effects occurring due to the submarine cable across Loch Etive.

This author will not attempt to summarise the technical report, and the reader is referred to Appendix 7.4. Its main finding is that fish are unlikely to be affected by EMF caused by the Allt Easach cable, according to current understanding of the issue.

7.8.4 Decommissioning impacts

Decommissioning is likely to return the river to its natural condition. Compared with the environmental baseline prior to construction, there would be ***no effect***.

The submarine cable is likely to be left in place after the lifetime of the scheme is over. The cable is environmentally neutral when not in use and would cause ***no effect***.

7.9 Summary and conclusions

Table 7.2 Schedule of Effects

Receptor	Potential Effects before mitigation	Proposed Mitigation	Notes
River and Marine Ecology (Chapter 7)			
Migratory salmonids and eels	Insignificant, due to low populations and lack of suitable habitat.	Controls on construction methods, controls on abstraction.	Insignificant residual effect.
Resident trout	Insignificant, due to low populations in the depleted reach.	As above.	As above.
Larval lampreys	No effect.	None.	
Freshwater Pearl Mussels	No effect.	None.	
Migrating fish	Almost certainly no effect.	Burial of the cable in the intertidal and near-shore zone, and protection with cast steel cable protectors.	