Balliemeanoch Pumped Storage Hydro

Environmental Impact Assessment Report
Volume 5: Appendices
Appendix 11.2 WFD Assessment Tables

ILI (Borders PSH) Ltd

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Surface Water Body (name/ID/RBMP):	Loch Awe (ID: 100585)	**Current status or potential:**	Moderate
Water body length:		**Target status or potential (2027):**	
water body area:	38 square meter	**Protected Areas:**	None known
Heavily modified?	The water body has been designated as a heavily modified water body on account of physical alterations that cannot be addressed without a significant impact on water storage for hydroelectricity generation.		
Summary of scheme components:	Key scheme components considered include the risk of pollution during construction and the abstraction and discharge of water to and from Loch Awe during operation. Two potential operation scenarios: (1) Frequent operation with regular abstraction/discharge (i.e. Scenario 1); and (2) Abstraction and long term storage in the headpond - potentially for many weeks to months (i.e. Scenario 2). Minor watercourses draining to Loch Awe but not designated under the WFD in their own right are also considered. Principle impacts on them include the upgrade or new engineered crossing, construction site runoff and runoff from new areas of hardstanding and loss of catchment area during operation.		

WFD Parameter	Current Status (2022)	Description of other Protected Areas objectives	Brief description of impact		Brief description of mitigation measures		Residual impacts and WFD compliance	Adjacent water bodies
			Construction	Operation	Construction	Operation		
Overall status	**Moderate ecological potential**							
Overall ecology	**Poor**							
Physico-Chem	Good	None Applicable	Suspended sediments and chemical spillages from construction site runoff have the potential to affect ecological WFD elements in Loch Awe including those coming from the small watercourses draining to the Loch and during works within the loch itself.	**Loss of habitat** The construction of the inlet/outlet structures including concrete apron, rock armour, jetty and spillway outfall will result in the permanent loss of littoral habitat. **Risk of concrete residues** When first constructed there may be a concrete residue left on the basin forming the headpond that might slightly increase the pH of the water initially held in the basin. However, this water would be rapidly diluted and dispersed in Loch Awe. **Variation in water level** Operation of the Development may lead to water level changes of a maximum of approximately 1.4 m across Loch Awe. However, it is not anticipated that this will affect water quality. **Affect on thermal stratification** The operation of the Development has the potential to locally disrupt the thermal stratification of the loch, although the impact is uncertain and monitoring has been proposed. Although a natural process, from a water quality perspective it may not actually result in any particular deterioration in water quality. This is because thermal stratification (and subsequent overturn) tends to be associated with a reduction in water quality. Reduced stratification or maintaining a fully mixed water column reduces the potential for poorer water quality to form in bottom waters, particularly the release of bioavailable nutrients that can lead to algal blooms occurring under certain conditions. Indeed, preventing thermal stratification is one method that can be applied to control algal blooms where internal recycling of nutrients is a primary factor (Toffolon et al; 2013) by preventing the release of sediment-derived nutrients and increasing the mixing depth of nuisance blue-green algae (Dodds, 2002). However, it remains important that water quality conditions in Loch Awe are investigated before and during the operation of the Development and any changes in water quality aquatic ecology monitored. This data can then be used to optimise operation to minimise any significant adverse effects. **Increasing the risk of algal blooms** There may be an increased risk that discharges from the headpond could encourage an algal bloom to occur in Loch Awe if water in the headpond is not frequently renovated and its becomes nutrient enriched, although the catchment is unlikely to generate significant nutrient inputs. stagnation occurs, as well as by impacts on stratification process with continuous pumping/discharges. However, these are unlikely due to continuous maintenance of the headpond and the same reasons mentioned under "Water Stratification". Reduced water quality through algal development could affect the rest of the biological elements. As this is not expected to occur as mentioned above, no adverse impacts are predicted. **Spillage risk during operation** During operation there is a low risk that small quantities of oil or fuel may be spilt from service vehicles and routine maintenance of fixed plant, especially at the outlet / inlet structure. All maintenance operations would be carried out in accordance with the Operators Environmental Management System, which will include measures to avoid spillages of chemical substances.	Implementation of a Construction Environmental Management Plan (CEMP) and the Outline Water Mangement Plan (oWMP). Measures to reduce the risk of chemical spillages such as bunded fuel tanks, spill kits, plant nappies on static plant, and the implementation of an Emergency Response Plan. Temporary and permanent works affecting watercourses will require a CAR Licence from SEPA. Installation of a temporary cofferdam and with an outer site-specific silt curtain to prevent spillages and runoff from the construction works in Loch Awe. Works in Loch Awe should be carried out under the supervision of an Aquatic Ecological Clerk of Works (ECoW). Please refer to Chapter 11 Water Environment and Chapter 7 Aquatic Ecology of the EIA for further details.	Water quality monitoring of the headpond and Loch Awe is proposed to understand actual changes and tooptimise the operation of the Development to minimise the changes and reduce any iincreased risk of an algal bloom occurring. The inlet/outlet structures will incorporate a screen with 2 mm apertures as an energy dissipation measure to reduce the velocity of the water discharging from the Development, and therefore reduce the risk of disrupting thermally stratified layers of water during the summer. The spillage outlet will contain energy dissipation components to reduce the force of the water entering the loch and causing scour of the bed. A concrete apron will be provided in front of the main outlet to prevent scour of the bed. All maintenance operations would be carried out in accordance with the Operators Environmental Management System, which will include measures to avoid spillages of chemical substances.	Negligible to minor adverse impacts are predicted only with mitigation. Therefore, the proposed Development would be compliant with all WFD objectives.	River Awe
Dissolved Oxygen	High							
Total Phosphorus	Good							
Salinity	High							
Acid Neutralising Capacity	High							
Biological elements	**Moderate**							
Alien species	Good	None Applicable	Potential for INNS to be spread through or introduced to the Site during construction - factors such as inter-species competition and displacement	No risk of introduction of INNS during operation as water will only be circulated between loch Awe and the headpond. However, prevention control measures should still be followed (See Chapter 7 Aquatic Ecology of the EIA Report).	Spoil management, ECoW supervision, and strict biosecurity measures to be implemented. Please refer to Chapter 7 Aquatic Ecology of the EIA Report for further details. Survey of the extent of the proposed cofferdam and temporary pier works in Loch Awe for the presence of INNS, will be required prior to any works and appropriate site specific remediation measures implemented in agreement with SEPA.	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. These will be set out in a Biosecurity Management Plan. Annual monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction are to be undertaken.	No significant residual adverse impacts are predicted. Therefore, the proposed Development would be compliant with all WFD objectives.	River Awe
Fish	Good		Potential impacts on salmon and other important species such as lamprey, Arctic char and brown trout include direct mortality or physical injury, disruption of their migratory pathway and avoidance reaction. Please refer to Chapter 07 Aquatic Ecology of the EIA for further details. Watercourse crossings for temporary access roads and temporary site compounds, including diversion and culverting of watercourses flowing to Loch Awe, can affect resident fish populations.	Inlet / outlet structure on Loch Awe shoreline could result in the abstraction or entrainment of fish. However, these adverse impacts will be minimised by the construction of a screen with suitable mesh size resulting in a negligible impact. Rheotactic (the tendency of fish to face into an oncoming current) distraction by attracting migratory fish such as salmon from their migration path could also occur but the impact would be negligible.	Spoil management, ECoW supervision, and strict biosecurity measures to be implemented. Please refer to Chapter 7 Aquatic Ecology of the EIA Report for further details. Survey of the extent of the proposed cofferdam will be required prior to any works and appropriate site specific remediation measures implemented in agreement with SEPA.	To avoid fish and debris entrainment, the inlet/outlet structures where the waterways terminate into Loch Awe, will incorporate a screen with 2 mm apertures.	Minor adverse impacts are predicted only. Therefore, the proposed Development would be compliant with all WFD objectives.	River Awe
Fish ecology	Good							
Fish barrier	High							
Aquatic plants	Moderate		Suspended sediments and chemical spillages from construction site runoff have the potential to affect ecological WFD elements in Loch Awe including those coming from the small watercourses draining to the Loch and during works within the loch itself.	Physicochemical quality elements around the outlet could be affected (potential increase in the risk of algal blooms which can alter local water quality, especially during summer and when the loch is stratified)as described above. In the longer term, it would be expected that inorganic and organic sediment derived from the water abstracted from Loch Awe, the immediate surrounds to the headpond, and windblown leaf matter, will accumulate within the headpond. However, it is not expected that the rate of accumulation would be rapid as the water from Loch Awe has a relatively low turbidity and productivity, there is limited direct runoff into the headpond, and although there are areas of dense woodland nearby, they do not overhang the headpond and would be downslope.	Implementation of a Construction Environmental Management Plan (CEMP) and oWMP. Measures to reduce the risk of chemical spillages such as bunded fuel tanks, spill kits, plant nappies on static plant, and the implementation of an Emergency Response Plan. Temporary and permanent works affecting watercourses will require a CAR Licence from SEPA. Control measures in Allt a Mhinisteir watercourse and Pond 4, both draining to Loch Awe. Installation of a temporary cofferdam and with an outer site specific silt curtain to prevent spillages and runoff from the construction works in Loch Awe. Works in Loch Awe should be carried out under the supervision of an Aquatic Ecological Clerk of Works (ECoW). Please refer to Chapter 10 Water Environment and Chapter 7 Aquatic Ecology of the EIA for further details.	The headpond water quality will be routinely monitored so that over time an understanding of how water quality may change with storage time and to ensure that operation of the Development only takes place when the headpond water quality is good (i.e. an algal bloom is not occurring or there has been significant deterioration in water quality). Sediment build up would also be monitored and when necessary sediment would be removed for appropriate disposal in accordance with waste legislation. A concrete apron will be provided to prevent scouring of the loch bed and the suspension of matter and release of nutrients etc. into the water column. All maintenance operations would be carried out in accordance with the Operators Environmental Management System, which will include measures to avoid spillages of chemical substances.	Minor adverse impacts are predicted only. Therefore, the proposed Development would be compliant with all WFD objectives.	River Awe
Phytoplankton	High							
Other aquatic plants	Moderate							
Macrophytes	Moderate							
Specific pollutants	**Pass**							
Ammonium	Pass							
Hydromorphology	**Poor**							
Morphology	Moderate		n/a	The permanent intake/outlet structure on the shore of Loch Awe will not alter the size, shape, morphology of the loch. However, there will be approximately 150m of bank modified from natural to reinforced, with local dredging required to deepen the loch shoreline in front of the outlet. There will be some loss of the marginal zone, with an area of deepener water close to the outlet. However, given the scale of Loch Awe it is unlikely to cause any change to the WFD Status	n/a	n/a	No significant residual adverse impacts are predicted. Therefore, the proposed Development would be compliant with all WFD objectives.	River Awe
Overall hydrology	Poor							

Groundwater Body (name/ID/RBMP):	Oban and Kintyre Groundwater Body (ID:150698)	**Current status or potential:**	Good
Groundwater area:	2663.1 square kilometres	**Target status or potential (2027):**	
Summary of scheme components:	Potential impacts from boring of tunnels and general construction activities. The underlying groundwater body is of a very large size and spatial extent. Potentially supports GWDTEs		

WFD Parameter	Current Status/Potential (2022)	Description of other Protected Areas objectives	Brief description of impact		Brief description of mitigation measures		Residual impacts and WFD compliance	Consideration of impact to adjacent water bodies
			Construction	Operation	Construction	Operation		
Overall status	**Good**							
Quantitative Status	**Good**							
Saline Intrusion	Good	Within a Drinking Water Protected Area (Groundwater)	The headpond construction will require excavations down to bedrock, with the potential to interact with shallow groundwater and also surface watercourses. Bedrock aquifer is essentially unproductive so no impacts	The ongoing presence and operation of the tunnels is anticipated to have a negligible impact on groundwater levels as the tunnel design prevents migration of groundwater between the tunnels and the surrounding bedrock. The headpond will be a 'closed' system and will not affect groundwater resources.	Tunnel construction methodology - the tunnel will be progressively lined as boring progresses, minimising the impacts to surrounding groundwater. A monitoring programme is to be implemented, including groundwater level and quality monitoring, linked to a predefined Action Plan. The steming of water ingress at the power cavern will minimise any qualitative changes. At the headpond, monitoring in observaton boreholes of groundwater quality around the headpond may be required.	Some monitoring of water ingress to power cavern may also be required during the operation phase. Possible continued monitoring of observation boreholes for water levels around the headpond.	No significant residual adverse impacts are predicted. Therefore, the proposed development would be compliant with all WFD objectives.	Due to the size of the groundwater body and the size and position of this scheme within it, impacts to adjacent groundwater bodies are considered to be extremely unlikely.
SW Interaction	Good							
Water quality	**Good**							
Chemical status	**Good**							
Chem - SW Interaction	Good	Within a Drinking Water Protected Area (Groundwater)	The headpond construction will require excavations down to bedrock, with the potential to interact with shallow groundwater and also surface watercourses. Bedrock aquifer is essentially unproductive so no impacts	The headpond and power tunnels will be a 'closed' system and will not affect groundwater quality.	Tunnel construction methodology - the tunnel will be progressively lined as boring progresses, minimising the impacts to surrounding groundwater. A monitoring programme is to be implemented, including groundwater level and quality monitoring, linked to a predefined Action Plan. The steming of water ingress at the power cavern will minimise any qualitative changes. At the headpond, monitoring in observaton boreholes of groundwater quality around the headpond may be required.	Possible continued monitoring of observation boreholes for water quality around the headpond.	No significant residual adverse impacts are predicted. Therefore, the proposed development would be compliant with all WFD objectives.	Due to the size of the groundwater body and the size and position of this scheme within it, impacts to adjacent groundwater bodies are considered to be extremely unlikely.
SWI - Specific pollutants	Good							
SWI - Chromium	Good							
SWI - Zinc	Good							
SWI - Manganese	Good							
SWI - Other Substances	Good							
SWI - Nitrate	Good							
SWI - Priority substances	Good							
SWI - Cadmium	Good							
SWI - Lead	Good							
Drinking Water Protected Area	**Good**							
DWPA - Priority substances	Good							
DWPA - Atrazine	Good							
DWPA - Simazine	Good							
DWPA - Other Substances	Good							
DWPA - Epoxyconazole	Good							
DWPA - Nitrate	Good							
Chemical - General tests	Good							
CGT - Priority substances	Good							
CGT - Atrazine	Good							
CGT - Simazine	Good							
CGT - Trichloroethene	Good							
CGT - Benzene	Good							
CGT - Specific pollutants	Good							
CGT - Chromium	Good							
CGT - Other Substances	Good							
CGT - Electrical Conductivity	Good							
CGT - Epoxyconazole	Good							
CGT - Nitrate	Good							
CGT - Free Product	Good							
CGT - Vinyl Chloride	Good							

Surface Water Body (name/ID/RBMP):	Allt Beochlich (ID: 10275)	**Current status or potential:**	Moderate
Water body length:	7.7	**Target status or potential (2027):**	
water body area:		**Protected Areas:**	None known
Heavily modified?			

Summary of scheme components: The development will involve the excavation of headpond and earth embankment across the watercourse resulting in the loss of the channel and reducing the catchment in relation to downstream flows.

WFD Parameter	Current Status (2020)	Description of other Protected Areas objectives	Brief description of impact		Brief description of mitigation measures		Residual impacts and WFD compliance	Adjacent water bodies
			Construction	Operation	Construction	Operation		
Overall status	**Moderate**							
Overall ecology	**Moderate**							
Physico-Chem	**Good**		Excavation of headpond will increase the potential for sediment-laden run off from spoil heaps and exposed earth. There may also be contaminated run off from spillages of oils, fuels, solvents and other construction materials which could then enter All Beochlich. This could also be sourced from the access tracks and nearby construction compounds including TC15 and TC08 which are within the Allt Beochlich catchment. The consultrctuon of the embankment and headpond will include the excvation of a section of the Allt Beochlich catchment. This could also impact the downstream flow regime.	During the operation of the Proposed Development, the loss of a large proportion of the catchment could result in significant changes in hydrology and the flow regime downstream of the headpond impoundment. Without a compensation flow the remaining downstream reach would be depleted with reduced flows when compared to the current baseline. Depending on the morphology of the channel at any given location, reduced flows may correspond to a drying up of parts of the bed with the reduced wetted permitter corresponding with reduced aquatic habitat along the river corridor. Reduced flows may mean less dilution of chemical contaminants or flushing of excess fine sediment. During prolonged warm weather there may be longer periods of lower flows and periods of lower oxygen levels, when compared to the baseline situation.	The oWMP will be developed and implemented by the Construction Contractor and would support the CEMP by describing the measures to protect the water environment during the construction works in greater detail, with reference to specific construction activities and programme e.g. for earthworks or works affecting specific water bodies.	To ensure that significant impacts on the downstream flow regime for Allt Beochlich are avoided, it is proposed to ensure that a suitable compensation flow is maintained at all times. It is proposed that the compensation flow will be determined at a later stage as part of the CAR Licence application. In advance of this, a programme of water level and flow monitoring will be undertaken on the Buinne Dubh and the Allt Beachlich (and tributaries) as well as potentially level monitoring in the Beochlich Lochan (if such data is not already recorded for the local HEP scheme). This data will inform determination of a suitable compensation flow regime that maintains as close to as practical the current flow regime.	Orange - Adverse Impact on class of WFD element. Mitigation such as compensation flow will be used but the entire catchment is still permanatly altered.	Loch Awe, Lochan Airigh, Lochan Beochlich
Temperature	High							
Reactive phosphorus	High							
Dissolved Oxygen	High							
Acidity	Good							
pH	Good							
Biological elements	**Good**							
Invertebrate animals	Good							
Macroinvertebrates (RiCT/WHPT)	Good							
Macroinvertebrates (ASPT)	Good							
Macroinvertebrates (NTAXA)	High							
Fish	High							
Fish barrier	High	None Applicable						
Hydromorphology	**Moderate**		TC08, TC10, TC11, TC16 componds are all situated near tributaries to Allt Beochlich. This increased areas of hardstanding has the potentiall to increase runoff to Allt Beochlich causing erosion downstream. However, the area of hardstanding is small and so unlikely cause any major impact. New crossings could impede movement of corase sediment, leading to excess accumulation upstream and starvation downstream. Due to the typology of watercourses, this impact is very minor. Overpumping or diversioin of the Allt Beochlich could result in increased deposition of sediment upstream and starvation downstream.	The dam crossing Allt Beochlich will completely block its natural course.This is likely to result in changes to the flow regime and the associated capacity of the watercourse to transport coarse sediment. The channel of the watercourse in this location is dominated by bedrock and therefore it is very stable and has a low sensitivity to physical modifications. Cobble and gravel-sized material is transported at high flows and is deposited at bedrock steps and on meander bends. It is likely that the proposed loss of catchment would significantly reduce the transport capacity of the watercourse, resulting in increased deposition upstream of the dam, and starvation of the channel downstream. Reduced flows in downstream reaches may also prevent transport of existing sediment. Significant geomorphological change events normally occur in watercourses around a 50% Annual Exceedance Probability Event (AEP), but it is likely that diverting flow through the dam will result in changes to the natural flow regime and reduce the occurrence of these events during operation. There are also several permanent compounds uncluding PC06, PC09, PC17, PC18 and PC21 nearby which could increase surface runoff. However, the hardstanding area is small and so therefore the effects are likely to be neglibile.					
Morphology	High							
Overall hydrology	Moderate							
Modelled hydrology	Poor							
Hydrology (medium/high flows)	Poor							
Hydrology (low flows)	High							
Ecological indicators	Pass							

Surface Water Body (name/ID/RBMP):	Allt Blarghour (ID: 10224)	**Current status or potential:**	Moderate
Water body length:	13.4		
water body area:	n/a	**Protected Areas:**	None known
Heavily modified?	No		
Summary of scheme components:	An Inverary bypass will be created to reduce traffic going through Inverary. The bypass will cross the watercourse at NN 08894 09731, NN 09165 09860 and NN 09273 09887.		

WFD Parameter	Current Status (2022)	Description of other Protected Areas	Brief description of impact		Brief description of mitigation measures		Residual impacts and WFD compliance	Adjacent water bodies
			Construction	Operation	Construction	Operation		
Overall status	**Moderate**							
Pre-HMWB status	**Moderate**							
Overall ecology	Moderate		Excessive levels of fine sediment and spillages of chemicals could enter River Array from the construction of the Inverary Access Track. This could affect the physicochemical status of the River Array. To avoid significant impacts and the potential for non-compliance with WFD objectives, mitigation will be required.	Road runoff can include a range of substances that can be harmful to the water environment resulting in poor water quality, smothering habitats with fine sediment, and adversely impacting aquatic ecosystems. The quality and effects of road runoff is influenced by many parameters and is difficult to predict accurately. Common roadway pollutants include sediment/grit, dissolved and particulate heavy metals, hydrocarbons, pesticides and other organic-compounds, nutrients, de-icing salt, and litter. However, during operation the road would likely only be used to access the Proposed Development by employees/maintenance workers. Therefore, the amount of contaminated runoff would be minimal and unlikely to change the overall water Qality.	Measures to manage the formation of excessive sediment in runoff, its interception and treatment is expected to be described in a oWMP and CEMP. Measures to reduce the risk of chemical spillages such as bunded fuel tanks, spill kits, plant nappies on static plant, and the implementation of an Emergency Response Plan should also be implemented. A oWMP should include details of what permits and consents are required for works to water bodies.	Not reqired	No significant residual adverse impacts are predicted. Therefore, the proposed development would be compliant with all WFD objectives.	Loch Fyne, Unamed drainage ditches
Physico-Chem	Good							
Temperature	High							
Reactive phosphorus	High							
Dissolved Oxygen	High							
Acidity	Good							
pH	Good							
Biological elements	**Moderate**	None Applicable	During the construction of the access tracks, works may result in a reduction in water quality to River Array, due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site run-off. Any reduction in water quality could impact invertebrate and fish communities through toxic effects, reductions in dissolved oxygen, smothering of habitat, and direct physical impacts. Fine sediments may also smoother macrophytes and diatoms and reduce the potential for photosynthesis. Impacts would occur from the upgrading of the bridge crossing the stream.	Road runoff can include a range of substances that can be harmful to the water environment resulting in poor water quality, smothering habitats with fine sediment, and adversely impacting aquatic ecosystems. The quality and effects of road runoff is influenced by many parameters and is difficult to predict accurately. Common roadway pollutants include sediment/grit, dissolved and particulate heavy metals, hydrocarbons, pesticides and other organic-compounds, nutrients, de-icing salt, and litter. Any reduction in water quality could potentially adversely impact invertebrate and fish communities through chronic or acute toxic effects, reductions in dissolved oxygen, smothering of habitat, and direct physical impacts. Fine sediments may also smother macrophytes and diatoms and reduce the potential for photosynthesis. However, during operation the road would likely only be used to access the Proposed Development by employees/maintenance workers. Therefore, the amount of contaminated runoff would be minimal and unlikely to change the overall Water Quality.	The outline Water Management Plan (oWMP) and CEMP will provide details on the following key areas of concern: - managing the risk of pollution to surface waters and the groundwater environment from all works (including construction of foundations and dewatering of excavations); - measures to control the storage, handling and disposal of substances during construction; - emergency procedure for how to respond to a serious pollution incident; - the management of activities in, over, under and near watercourses and their floodplains and other ponds and lakes; - the scope of any pre-, during-, and post-construction water quality or other relevant environmental monitoring; and - Details of what permits and consents are required for works to water bodies.	Not reqired	No significant residual adverse impacts are predicted. Therefore, the proposed development would be compliant with all WFD objectives.	Loch Fyne, Unamed drainage ditches
Invertebrate animals	High							
Macroinvertebrates (RiCT/WHPT)	High							
Macroinvertebrates (ASPT)	High							
Macroinvertebrates (NTAXA)	High							
Fish	Moderate							
Fish ecology	Moderate							
Fish barrier	High							
Hydromorphology	**Good**		Watercourse crossings have the potential to prevent movement of coarse sediment, which could lead to excess accumulation upstream and starvation of supply downstream that could trigger localised erosion. There are three crossings over River Array and tributaures. However, there is already an access track and crossing at these points and so unlikely to cause any major impact.	Watercourse crossings have the potential to prevent movement of coarse sediment, which could lead to excess accumulation upstream and starvation of supply downstream that could trigger localised erosion. There are three crossings over River Array and tributaures. However, there is already an access track and crossing at these points and so unlikely to cause any major impact.	Where there are existing crossings, it is proposed to widen the track, using a pipe culvert. There is not anticipated to be any adverse impact from access track upgrades, as the watercourses are already impacted by the existing constrictions. No significant deposition or erosion was noted upstream or downstream, indicating that the existing crossings are not currently causing major geomorphological impacts.	There is not anticipated to be any adverse impact from access track upgrades, as the watercourses are already impacted by the existing constrictions and crossing types will be replicated. No significant deposition or erosion was noted upstream or downstream, indicating that the existing crossings are not currently causing major geomorphological impacts.	No significant residual adverse impacts are predicted. Therefore, the proposed development would be compliant with all WFD objectives.	Loch Fyne, Unamed drainage ditches
Morphology	Good							
Overall hydrology	Good							
Modelled hydrology	Good							
Hydrology (medium/high flows)	High							
Hydrology (low flows)	Good							
Water quality	Good							

Surface Water Body (name/ID/RBMP):	Cladich River//Allt an Stacain (ID: 10281)	**Current status or potential:**	Moderate
Water body length:	13.1		
water body area:	n/a	**Protected Areas:**	None known
Heavily modified?	Yes - physical alterations that cannot be addressed without a significant impact on water storage for hydroelectricity generation.		
Summary of scheme components:	There is no physical works to the river. However, contamination from Keppochan River and the Archan River could have the potential to wash into the Cladich River		

WFD Parameter	Current Status (2022)	Description of other Protected Areas	Brief description of impact		Brief description of mitigation measures		Residual impacts and WFD compliance	Adjacent water bodies
			Construction	Operation	Construction	Operation		
Overall status	**Moderate**							
Pre-HMWB status	**Moderate**							
Overall ecology	Moderate		Excessive levels of fine sediment and spillages of chemicals could enter Cladich River from the Keppochan River and Archan River. This could affect the physicochemical status of the River Array. To avoid significant impacts and the potential for non-compliance with WFD objectives, mitigation will be required.	Road runoff can include a range of substances that can be harmful to the water environment resulting in poor water quality, smothering habitats with fine sediment, and adversely impacting aquatic ecosystems. The quality and effects of road runoff is influenced by many parameters and is difficult to predict accurately. Common roadway pollutants include sediment/grit, dissolved and particulate heavy metals, hydrocarbons, pesticides and other organic-compounds, nutrients, de-icing salt, and litter. However, during operation the road would likely only be used to access the Proposed Development by employees/maintenance workers. Therefore, the amount of contaminated runoff would be minimal and unlikely to change the overall water quality.	Measures to manage the formation of excessive sediment in runoff, its interception and treatment is expected to be described in a oWMP and CEMP. Measures to reduce the risk of chemical spillages such as bunded fuel tanks, spill kits, plant nappies on static plant, and the implementation of an Emergency Response Plan should also be implemented. A oWMP should include details of what permits and consents are required for works to water bodies.	Not required	No significant residual adverse impacts are predicted. Therefore, the proposed development would be compliant with all WFD objectives.	Loch Awe
Physico-Chem	Good							
Temperature	High							
Reactive phosphorus	High							
Dissolved Oxygen	High							
Acidity	Good							
pH	Good							
Biological elements	**Moderate**		During the construction of the access tracks, works may result in a reduction in water quality to Claddich River, due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site run-off. Any reduction in water quality could impact invertebrate and fish communities through toxic effects, reductions in dissolved oxygen, smothering of habitat, and direct physical impacts. Fine sediments may also smoother macrophytes and diatoms and reduce the potential for photosynthesis. Impacts would occur from the upgrading of the bridge crossing the stream.	Road runoff can include a range of substances that can be harmful to the water environment resulting in poor water quality, smothering habitats with fine sediment, and adversely impacting aquatic ecosystems. The quality and effects of road runoff is influenced by many parameters and is difficult to predict accurately. Common roadway pollutants include sediment/grit, dissolved and particulate heavy metals, hydrocarbons, pesticides and other organic-compounds, nutrients, de-icing salt, and litter. Any reduction in water quality could potentially adversely impact invertebrate and fish communities through chronic or acute toxic effects, reductions in dissolved oxygen, smothering of habitat, and direct physical impacts. Fine sediments may also smother macrophytes and diatoms and reduce the potential for photosynthesis. However, during operation the road would likely only be used to access the Proposed Development by employees/maintenance workers. Therefore, the amount of contaminated runoff would be minimal and unlikely to change the overall Water Quality.	The outline Water Management Plan (oWMP) and CEMP will provide details on the following key areas of concern: - managing the risk of pollution to surface waters and the groundwater environment from all works (including construction of foundations and dewatering of excavations); - measures to control the storage, handling and disposal of substances during construction; - emergency procedure for how to respond to a serious pollution incident; - the management of activities in, over, under and near watercourses and their floodplains and other ponds and lakes; - the scope of any pre-, during-, and post-construction water quality or other relevant environmental monitoring; and - Details of what permits and consents are required for works to water bodies.	Not required	No significant residual adverse impacts are predicted. Therefore, the proposed development would be compliant with all WFD objectives.	Loch Awe
Invertebrate animals	High	None Applicable						
Macroinvertebrates (RiCT/WHPT)	High							
Macroinvertebrates (ASPT)	High							
Macroinvertebrates (NTAXA)	High							
Fish	Moderate							
Fish ecology	Moderate							
Fish barrier	High							
Hydromorphology	**Good**		No changes to hydromorphology and hydrology predicted	No changes to hydromorphology and hydrology predicted	Not required	Not required	No significant residual adverse impacts are predicted. Therefore, the proposed development would be compliant with all WFD objectives.	Loch Awe
Morphology	Good							
Overall hydrology	Good							
Modelled hydrology	Good							
Hydrology (medium/high flows)	High							
Hydrology (low flows)	Good							
Water quality	Good							

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