

Red John Pumped Storage Hydro Scheme

Volume 2, Chapter 7 Aquatic
Ecology

ILI (Highlands PSH) Ltd

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Quality Information

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7 Aquatic Ecology

7.1 Introduction

- 7.1.1 This chapter assesses the ecological impacts and effects of the Development on aquatic habitats, namely Loch Ness, smaller lochs and watercourses throughout the Development Site. Where appropriate it provides details of proportionate mitigation and / or enhancement measures. This chapter is related to aquatic ecology only. Chapter 6: Terrestrial Ecology of this EIA Report describes the assessment of impacts and effects on terrestrial ecology, including terrestrial invasive non-native species (INNS).
- 7.1.2 Chapter 2: Project and Site Description and Chapter 3: Alternatives and Design Evolution provide a detailed description of the Development and the works required to implement it, including the layout of the Development and the Development Site boundary.
- 7.1.3 This Chapter is supported by Appendix 7.1: Aquatic Ecology Survey Report, and Appendix 7.2: INNS Risk Assessment (Volume 5).
- 7.1.4 Throughout this Chapter, species are given their Latin names when first referred to and their common names only thereafter. All distances are cited as the shortest boundary to boundary distance 'as the crow flies' unless otherwise specified.

7.2 Legislation, Policy and Guidance

- 7.2.1 This assessment has been undertaken within the context of the following relevant legislative instruments, planning policies and guidance documents and legislative instruments.
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive');
 - Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the 'Water Framework Directive' (WFD));
 - Regulation 1143/2014 on invasive alien species;
 - Convention on Wetlands of International Importance ('Ramsar convention');
 - Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the 'Habitats Regulations');
 - Wildlife and Countryside Act 1981 (as amended) (the 'WCA');
 - Nature Conservation (Scotland) Act 2004 (as amended);
 - Wildlife and Natural Environment (Scotland) Act 2011 (as amended);
 - Scottish Planning Policy (SPP) 2014;
 - The Highland Wide Local Development Plan (HwLDP);
 - Inverness and Nairn Local Biodiversity Action Plan (LBAP);
 - Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd Edition (CIEEM, 2016);
 - Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR).
- 7.2.2 Further information on relevant planning policy can be found in the Planning Statement.

7.3 Methods

Assessment Scope

- 7.3.1 The scope of the assessment described in this Chapter was defined by AECOM following the completion of a Preliminary Ecological Appraisal (PEA) and based on the comments provided by consultees in response to the Scoping Report for the Development (AECOM's PEA Report can be found as an appendix to the Scoping Report for the Development which itself is provided in Appendix 4.2: Scoping Report). A summary of the key comments provided by those organisations is provided in Table 7.1.
- 7.3.2 Loch Ashie, Loch Duntelchaig, Lochan an Eoin Ruadha and Loch na Curra were scoped out of aquatic field surveys due to the lack of direct impacts on them following the design evolution of the Development, and following receipt of the Scoping Opinion. Sufficient background data was available to support the assessment of these waterbodies. In addition, embedded mitigation measures such as the incorporation of mitigation measures such as SuDs features and attenuation ponds provided additional justification as to why these receptors may not be adversely affected by the Development. Therefore, potential impacts in relation to these waterbodies have been assessed in this chapter. These waterbodies will also be assessed in the WFD assessment (Appendix 10.5, Volume 5), supported by WFD monitoring data which is contained within Chapter 10: Water Environment of this EIA Report.

Table 7.1 Consultee Responses to Scoping Report

Consultee	Consultee Response	Approach Taken in EclA
Scottish Natural Heritage (SNH)	There are a number of invasive non-native species present in Loch Ness and we would expect the applicant to provide mitigation measures in any application to ensure the movement of these species exacerbated by this proposal.	Aquatic INNS are dealt with in this chapter, and the INNS Risk Assessment (Appendix 7.2, Volume 5).
	Advise that an assessment of the current / existing fisheries interests should be undertaken. Should any salmonids be present in the watercourses then a further survey of the salmonid population will be required to establish the exact limit to migration within the catchment and assess the impact that the proposal will have upon nursery habitat for salmonids.	Surveys to include a fish habitat assessment to inform the impact assessment, including a catchment-wide desk study to establish fish populations. Any relevant mitigation measures are identified in this EIA Report.
Scottish Environment Protection Agency (SEPA)	Aware of the following invasive non-native species in the Ness catchment: Flatworm (<i>Phagocata woodworthi</i>), Freshwater shrimp (<i>Crangonyx pseudogracilis</i>) and Nuttall's Waterweed (<i>Elodea Nuttallii</i>).	Concern over the potential presence of these species, as detailed for Scottish Water below has been considered in the INNS Risk Assessment (Appendix 7.2, Volume 5).
Scottish Water	Raised concern over the following INNS: <i>Phagocata woodworthi</i> (a flatworm), <i>Elodea nuttallii</i> (a type of waterweed) and <i>Crangonyx pseudogracilis</i> (a non-native shrimp). These are species which SW has experienced concern from SEPA regarding potential cross-catchment spread.	Aquatic INNS are dealt with in this chapter, and the INNS Risk Assessment (Appendix 7.2, Volume 5).
	Scope for INNS in Loch Ness to be pumped up into the Headpond. Locating the Headpond partly within small areas of the Loch Duntelchaig and Loch Ashie catchments, will impact on water quality in both lochs. This will be affected during construction and then operation of the proposal.	EIA to consider potential impacts on water quality in all catchments as a result of the proposed works, both during construction and operation. This is also covered in Chapter 10: Water Environment.
The Highland Council	Policy 58 of the Highland-wide Local Development Plan (HwLDP) safeguards European protected species and only supports development where an adverse effect is likely if there are other overriding interests.	Impacts upon European, national and local protected aquatic species are assessed in this chapter.
Ness District Salmon Fishery Board	Impingement and / or impingement of salmon and sea trout smolts at the Tailpond Inlet / Outlet, in particular those originating from the River Moriston SAC. Concern over the cumulative effects of the Development on smolt escapement in combination with other existing or proposed projects.	The spatial extent of the studies to inform the EIA covers the entire area of the catchment accessible to salmon, rather than be limited to the Development Site. Catchment-wide desk study carried out to adequately inform the assessment of likely impacts, and inform the requirement for further survey work of fish populations.

Consultee	Consultee Response	Approach Taken in EclA
	Reduction of water levels in Loch Ness resulting from the inlet of water for the Development (particularly during low flow conditions). This has the potential to affect water levels in the River Ness and the ability of fish to negotiate the fish pass at Ness Weir.	Assessment of proposed impacts upon water levels in Loch Ness as a result of operation of the Development. The EIA will however also include an assessment of the likely effects on other key fish species including brown trout, Arctic char, European eel and lamprey species.
	Disruption of the migratory behaviour of salmon and sea trout resulting from the discharge of water from the Outlet of the Development. This has the potential to leave them more vulnerable to illegal exploitation and predation.	Assessment of migratory routes of salmon and sea trout, and potential disruption of migratory behaviour as a result of operation of the Development.
Marine Science Scotland (MSS)	There will be a need to prevent impacts from identified and currently unidentified invasive non-native species.	Terrestrial INNS are dealt with in Chapter 6: Terrestrial Ecology of this EIA Report. Impacts from aquatic INNS are dealt with in this chapter. Mitigation proposals should be extended to cover all invasive non-native species, whether they have been identified or not.
	Impacts in relation to fish should not be scoped out. Loch Ness has an important fish community of high conservation and fisheries importance, which includes salmon, brown trout, Arctic char, eel and pike.	Potential impacts on fish and fish habitat, including spawning habitat, are assessed in this chapter.
	Although Loch Ness is large, areas important to particular fish species may be localised, for example for spawning in the case of loch spawning fish.	Potential impacts on fish and fish habitat, including spawning habitat, are assessed in this chapter.
	Effective non-injurious screening to prevent fish from being drawn into the system will not be a simple matter and will require careful attention as many of the fish may be very small. There should be consideration of what action will be taken and / or additional measures needed should fish become regularly present or established in the system and header loch.	Appropriate design of the Screen at the Tailpond Inlet / Outlet has been considered within the design evolution of the Development (as outlined in Chapter 3: Evolution of Design and Alternatives), and has been assessed in this chapter.
	Need to consider salmon species in the Moriston SAC; this salmon population passes through Loch Ness at both smolt and adult life stages.	Potential impacts on fish and fish habitat, including spawning habitat, are assessed in this chapter.
	Consideration should be given to fish populations in the smaller burns which may be impacted.	Potential impacts on fish and fish habitat, including spawning habitat, are assessed in this chapter.

- 7.3.3 The Ness and Beaully Fisheries Trust (NBFT) advised that consideration should be given to potential for impacts upon the River Moriston Special Area of Conservation (SAC), which flows into the west side of Loch Ness, to the south-west of the Development Site. Potential impacts to the SAC are assessed in the Habitats Regulations Assessment (HRA) for the Development.
- 7.3.4 Based on the results of the PEA and the feedback provided on the Scoping Report, the scope of the aquatic ecology assessment for the Development included the following ecological features:
- Statutory and non-statutory designated nature conservation sites;
 - Catchment-wide and cross-catchment desk study to establish records of protected / notable species and INNS in the study area;
 - Aquatic and riparian habitats;
 - Aquatic macroinvertebrate survey;
 - Aquatic macrophyte survey;
 - Fish habitat assessment survey;
 - Aquatic INNS survey.
- 7.3.5 Note that terrestrial ecology, including terrestrial INNS, is the subject of Chapter 6: Terrestrial Ecology of this EIA Report.
- 7.3.6 For the purposes of desk study and field survey, protected and notable habitats and species were as follows:
- Qualifying features of European designated sites within 10 km (or further where connectivity exists) of the Development;
 - All species listed on Schedules 2 and 4 of the Habitats Regulations;
 - All species listed on Schedules 1, 5 and 8 of the WCA;
 - Species and habitats listed on the Scottish Biodiversity List (SBL);
 - All species and habitats on the Inverness and Nairn LBAP;
 - Species that are Nationally Rare, Nationally Scarce or listed in Red Data Lists;
 - Invasive non-native species of plants and animals listed on Schedule 9 of the WCA (although this no longer legally applies in Scotland) and in particular the 29 high impact species identified by Invasive Species Scotland and those considered to be species of EU concern under the EU Invasive Alien Species Regulation.

Ecological Impact Assessment

- 7.3.7 The assessment of ecological impacts described in this chapter was conducted in accordance with the guidelines published by the (CIEEM, 2016). The principal steps involved in the CIEEM approach can be summarised as:
- Ecological features that are both present and might be affected by the Development are identified (both those likely to be present at the time works begin, and for the sake of comparison, those predicted to be present at a set time in the future) through a combination of targeted desk-based study and field survey work to determine the relevant baseline conditions;
 - The importance of the identified ecological features is evaluated to place their relative biodiversity and nature conservation value into geographic context, and this is used to

define the relevant ecological features that need to be considered further within the impact assessment process;

- The changes or perturbations predicted to result as a consequence of the Development (i.e. the potential impacts) that have the potential to affect relevant ecological features are identified and their nature described. Established best-practice, legislative requirements or other incorporated design measures to minimise or avoid impacts are also described and are taken into account;
- The likely effects (beneficial or adverse) on relevant ecological features are then assessed, and where possible quantified;
- Measures to avoid or reduce any predicted significant effects, if possible, are then developed in conjunction with other elements of the design (including mitigation for other environmental disciplines). If necessary, measures to compensate for effects on features of nature conservation importance are also included;
- Any residual effects of the Development are reported; and
- Scope for ecological enhancement is considered.

7.3.8 Further details on the ecological impact assessment method are provided in Appendix 6.7: Method for Assessment of Ecological Impacts (Volume 5).

7.3.9 CIEEM impacts have been translated in this assessment into more widely-used terms, following the approach and definitions set out in Chapter 4: Approach to EIA. Taking account of professional judgement and the full range of impact assessment parameters (as described in Appendix 6.7, Volume 5), impact magnitude has been translated as 'very high', 'high', 'medium' and 'low', while significance of effect has been defined as 'major', 'moderate', 'minor' or 'negligible'. Significance of effect can either be adverse or beneficial. Full descriptions of the definitions of impact magnitude and significance of effect can be found in Tables 4.6 and 4.7, respectively, in Chapter 4: Approach to EIA.

Desk Study

7.3.10 A desk study was carried out to identify nature conservation designations, protected and notable habitats and species, and INNS potentially relevant to the Development. A stratified approach was taken when defining the desk study area, based on the likely zone of influence of the Development on different ecological receptors and an understanding of the maximum distances typically considered by statutory consultees. Accordingly, the desk study identified any international nature conservation designations within 10 km of the Development Site boundary and other national statutory and local non-statutory nature conservations designations and notable habitats within 2 km of the Development Site boundary.

7.3.11 Results of the desk study pertaining to statutory and non-statutory designated sites and terrestrial habitats and species are presented in Chapter 6: Terrestrial Ecology.

7.3.12 A desk study specific to the aquatic ecology scope was carried out to identify protected / notable aquatic species, and INNS.

7.3.13 The desk study was carried out using the data sources detailed in Table 7.2. The results are shown on Figures 7.1.1 to 7.1.3 of Appendix 7.1 (Volume 5).

Table 7.2 Desk Study Data Sources

Data Source	Date Accessed	Data Obtained
Highland Biological Recording Group (HBRG)	June 2018	Records of protected / notable species and INNS within the Ness and Nairn catchments
SEPA	June 2018	Records of INNS within the Ness and Nairn catchments
Ness and Beaully Fisheries Trust	08 August 2017	NBFT hold no records of fish or INNS within 2 km of the Development Site
Highland-wide Local Development Plan	31 July 2017	Details of local planning policy relevant to nature conservation

Field Survey

7.3.14 Survey locations were chosen according to the proximity of waterbodies to areas of proposed works such as watercourse crossings, and the Tailpond Inlet / Outlet location. Each survey type was completed at each survey location, as shown in Table 7.3, and in Figure 7.1.4 in Appendix 7.1 (Volume 5).

Table 7.3 Aquatic Ecology Survey Locations

Survey Location Reference	Waterbody Name (Where Known)	Central Site Grid Reference
KS01	Un-named watercourse south of Allt a' Chruineachd	NH 58772 33087
KS02	Allt a' Chruineachd upstream of B852	NH 58886 33294
KS03	Allt a' Chruineachd upstream of Track	NH 59108 33123
KS04	Tributary of Allt Dailinn	NH 60017 32945
KS05	Allt a' Mhinisteir	NH 60450 32921
KS06	Allt a' Mhinisteir	NH 60731 33473
KS07	Allt a' Mhinisteir	NH 60887 34144
KS08	Glaic na Ceardaich	NH 60984 34195
KS09	Glaic na Ceardaich	NH 60711 34134
KS10	Glaic na Ceardaich	NH 60376 34803
KS11	Un-named watercourse	NH 59901 34564
KS12	Allt a' Chnuic Chonaig	NH 59452 34063
KS13	Loch Ness shoreline	NH 58771 33368
KS14	Loch Ness shoreline	NH 58618 33194
KS15	Pond US of Tributary of Allt Dailinn	NH 60065 32968

7.3.15 The following is a summary of the methods used for the field surveys completed to establish the baseline conditions at the Development Site. For full details of the survey methods, refer to Appendix 7.1: Aquatic Ecology Survey Report (Volume 5).

7.3.16 All aquatic ecology surveys were carried out by suitably qualified and experienced AECOM ecologists.

Invasive Non-Native Species

- 7.3.17 The aquatic macrophyte and macroinvertebrate surveys included an assessment for INNS at the survey locations. The extent of terrestrial INNS and potential impacts as a result of their presence has been described in Chapter 6: Terrestrial Ecology and appendices.

Macrophyte Survey

- 7.3.18 Watercourses were surveyed between the 19 and the 21 June 2018. The survey methodology undertaken varied depending on the type of watercourse.
- 7.3.19 Survey of flowing watercourses followed the Environment Agency's Operational Instruction for surveying freshwater macrophytes in rivers (Environment Agency, 2007). The survey was made by walking within the channel of each watercourse along a 100 m transect, where safely accessible. Any inaccessible areas were bypassed as necessary before re-entering the channel at the next available access point. A list of all macrophytes encountered was made and their relative abundance was recorded using Taxon Cover Values (TCV).
- 7.3.20 A further 100 m transect was undertaken at the Outlet and Inlet locations within Loch Ness. All macrophytes encountered were recorded and their relative abundance was noted using the DAFOR scale (see below). The strandline was also inspected for plant fragments. The relative abundance of each species present was recorded as below. If a species appears to be intermediate between two categories, it is generally assigned to the lower category.
- D = Dominant (greater than 75 % total cover);
 - A = Abundant (51 to 75 % total cover);
 - F = Frequent (26 to 50 % total cover);
 - O = Occasional (11 to 25 % total cover); and
 - R = Rare (1 to 10 % total cover).
- 7.3.21 The macrophyte survey at survey location KS15 (refer to Table 7.3) followed PSYM (Predictive System for Multimetrics) methodology (Pond Action, 2002). The survey was undertaken by walking the perimeter of the pond and recording all wetland plants present within the outer edge of the pond (This is defined as the upper level at which water stands in winter). Deeper water areas were sampled by grapnel thrown from shallow water. This method was developed to provide a method for assessing the biological quality of still waters in England and Wales. Due to the location therefore the metrics could not be calculated, however the survey methodology is still valid. To maintain consistency with the other watercourses, each macrophyte species recorded was allocated a Taxon Cover Value (TCV), indicating the proportion of habitat covered by that particular species.

Macroinvertebrate Survey

- 7.3.22 Biological macroinvertebrate sampling was undertaken by two suitably experienced aquatic ecologists to assess the biological quality of the surveyed waterbodies. Biological samples were taken using a standard Freshwater Biological Association (FBA) pattern pond net (mesh size: 1 mm) in line with the standard Environment Agency methodology (Environment Agency, 2014). The instream habitats were 'kick sampled' where practicable, or 'sweep sampled', for 3 minutes followed by a 1- minute hand search of larger substrates.
- 7.3.23 This method allows characterisation of the invertebrate communities and establishes the biological quality of freshwater habitats. It does not generate a comprehensive list of every taxon present within the watercourse. To attempt to detect all species that occur, including those at low abundance, or occurring sporadically, would be impractical, would generate

unnecessary information and would not significantly improve the quality assessment of the waterbodies.

- 7.3.24 The collected samples were then preserved in Industrial Methylated Spirits (IMS) prior to laboratory processing.

Analysis of Aquatic Macroinvertebrate Samples

- 7.3.25 Each of the samples collected was sorted and analysed in a laboratory setting by suitably trained and experienced aquatic ecologists. Lists of the aquatic macroinvertebrate taxa present were produced in line with Environment Agency guidance (Environment Agency, 2014). The aquatic invertebrate samples were identified to 'mixed taxon level' using stereomicroscopes. Most groups were identified to species level (where practicable).

- 7.3.26 Macroinvertebrate data were analysed using the following indices:

- 7.3.27 Biological Monitoring Working Party (BMWP) scores and Average Score per Taxon (ASPT) values (Hawkes, 1997). Scores are derived based on the sensitivity of particular taxa (families) of macroinvertebrates to organic pollution. The average of the values for each taxon in a sample, known as ASPT (average score per taxon) is a stable and reliable index of organic pollution. Therefore these assessments can indicate to what extent an aquatic macroinvertebrate community is exposed to organic pollution. It is important to note that these indices can vary between geological regions and habitat types. Ditches for example are unable to support many of the high-scoring taxa associated with fast flowing habitats. Therefore the resultant metrics should be reviewed with an awareness of their potential limitations, and the site-specific context.

- 7.3.28 Community Conservation Index (CCI) method (Chadd and Extence, 2004) – to assess the conservation value of the macroinvertebrate populations present and identify any unusual or rare species. The CCI classifies groups of freshwater macroinvertebrates according to their scarcity and nature conservation value in Great Britain as understood at the time the classification was developed. Species scores range from 1 to 10, with 1 being very common and 10 being Endangered. In some cases, the references used in the CCI classification to define scarcity and value have since been superseded by more recent assessments (e.g. Seddon et al., 2014; Foster, 2010). The CCI cannot be modified to take account of such new information, but it has been considered when making the wider assessment of nature conservation value provided in this report.

Fish Habitat Assessment

- 7.3.29 Fifteen survey sites potentially impacted by the Development were assessed over three days between the 19 and 21 June 2018.

- 7.3.30 At each of the 15 sites fish spawning habitat potential was assessed over a 100 m stretch of the watercourse. Key aquatic features such as channel dimensions, mesohabitat coverage, habitat features, substrate composition, accessibility for migratory species and potential spawning areas for salmonids were analysed following SEPA's Guidance for applicants on supporting information requirements for hydropower applications (SEPA, 2005).

Limitations and Assumptions

- 7.3.31 Refer to Appendix 7.1: Aquatic Ecology Survey Report (Volume 5) for limitations and assumptions in relation to the aquatic ecology surveys. A summary is provided below.

- 7.3.32 There were no significant limitations to the validity of the findings of the aquatic ecology surveys. All surveys were carried out in optimal weather conditions, and flow conditions in watercourses were conducive to accurate survey outcomes.
- 7.3.33 Best practice guidelines for aquatic macroinvertebrate survey include repeat sampling in the summer and autumn seasons. In this case sampling was undertaken in early summer, so recommendations have been made for repeat survey to assess invertebrate species present in the autumn season and further inform the baseline assessment.
- 7.3.34 Survey for the presence of INNS within the Development Site was limited to the survey locations. While this does not provide a definitive picture of the presence / absence of INNS on the Development Site, it indicates the likelihood of their presence / absence in relation to the location of potential impacts of the Development.
- 7.3.35 Whilst the baseline is not expected to change sufficiently to alter the impact assessment at the time of construction, the precise situation regarding protected species may nevertheless differ at the time of construction. For example, watercourse conditions may change through impacts of pollution or other anthropogenic activities. INNS may be introduced or spread through the Development Site. Pre-construction surveys should therefore be undertaken as necessary.

7.4 Baseline Environment

Designated Sites

Statutory Designations

- 7.4.1 Refer to Chapter 6: Terrestrial Ecology for full details of all designated sites within the study area. A summary of the statutory designated sites relevant to the aquatic ecology assessment and within 10 km of the Development is provided below.
- 7.4.2 The Development does not lie within any statutory site designated for nature conservation.

Table 7.4 Statutory Designated Sites in Proximity to the Development

Designated Site	Reason(s) for Designation	Relationship to the Development
Loch Ashie SPA and Site of Special Scientific Interest (SSSI)	Designated for its breeding and passage population of Slavonian grebe. Classified as a heavily modified waterbody with a current WFD classification of 'Bad' for overall ecological potential (Cycle 2 2016).	Loch Ashie adjoins the Development Site boundary at its north-eastern corner and is located approximately 100 m from the Headpond Embankment. There is no apparent aquatic connectivity between the Development and Loch Ashie other than surface water drainage.
Loch Ruthven Special Area of Conservation (SAC), SPA, Ramsar site and SSSI	Loch Ruthven SAC is designated as a clear-water lake with aquatic vegetation and poor to moderate nutrient levels, and for supporting a population of otters. The mesotrophic loch habitat is a notified feature of the SSSI.	Loch Ruthven is situated approximately 1.25 km south-east of the Development Site. There does not appear to be any direct aquatic connectivity between the Site and Loch Ruthven, which drains into Loch Ness to the south-west.
North Inverness Lochs SPA	Contains five lochans which support breeding Slavonian grebe.	The SPA is situated approximately 8.5 km west of the Development Site, on the opposite side of Loch Ness, and therefore there is no aquatic connectivity with the Development Site.

7.4.3 In addition, the NBFT advised that potential effects on the River Moriston SAC from the Development should be considered. At its closest point, where it flows into Loch Ness, the River Moriston SAC is approximately 22 km from the Development. The site is designated for Atlantic salmon *Salmo salar* (hereafter referred to simply as 'salmon') and freshwater pearl mussel *Margaritifera margaritifera*. Salmon migrate between the SAC and the sea via Loch Ness and are likely to pass by the Tailpond Inlet / Outlet structure.

7.4.4 The four statutory designated sites of relevance to the aquatic ecology assessment are considered to be of Very High (International) value due to their international designation, regular occurrence of globally important species, large areas of Annex I habitats, and / or regularly occurring, sustainable populations of species listed in Annex II of the Habitats Directive (Atlantic salmon, freshwater pearl mussel, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis* and / or sea lamprey *Petromyzon marinus*).

Non-statutory Designations

7.4.5 There are no non-statutory designations for nature conservation within 2 km of the Development.

Aquatic Ecology Desk Study

Invasive Non-Native Species

7.4.6 Neither *Phagocata woodworthi* nor *Crangonyx pseudogracilis* were recorded in the desk study within the Loch Ness catchment. However, these species are likely to be under-recorded and *Crangonyx* in particular is a relatively widespread and established species.

7.4.7 Nuttall's waterweed *Elodea Nuttallii* has been recorded 6.3 km to the west of the Development Site boundary in Loch Ness, and therefore there is the potential for this species to occur within the area of the Development Site, notably at the Inlet / Outlet location on the shore of Loch Ness.

Macrophytes

7.4.8 No protected macrophyte species were identified in the desk study. Species previously listed under the IUCN Red List are now all listed as Least Concern.

Macroinvertebrates

7.4.9 Nine macroinvertebrate species with national or local designation were identified a minimum of 8 km from the Development Site boundary, including a Scottish BAP crane fly species, *Prionocera pubescens*, whose larvae are aquatic, and two Scottish BAP water beetle species. The remaining six species records include five Scottish BAP species and one Dipteran species that are no longer designated.

7.4.10 No macroinvertebrate species records were identified within the Development Site boundary.

7.4.11 No records of freshwater pearl mussel were identified in the catchment-wide data search. The potential for the aquatic habitats to support this species depends upon the presence of suitable salmonid host fish species, upon the gills of which the mussel's larval stage, Glochidia, attach.

Fish

7.4.12 The fish species Arctic char *Salvelinus alpinus* was identified in the desk study in Loch Killin, approximately 20 km from the red line boundary. This species is also known to be present in

Loch Ness, along with other species raised in the Scoping Opinion (Appendix 4.3, Volume 5) including Atlantic salmon, European eel, brown / sea trout, and lamprey species (sea, river and brook lamprey).

- 7.4.13 It is noted that there is a fish farm currently within the Development Site Boundary.

Aquatic Ecology Field Survey

- 7.4.14 The following sections should be read in conjunction with Figure 7.1.4 of Appendix 7.1: Aquatic Ecology Field Survey (Volume 5).

Aquatic Habitats - Lochs and Lochans

- 7.4.15 Loch Ness, as the location of the proposed Tailpond Inlet / Outlet for the Development, is located within the Development Site boundary and will be subject to direct impacts. It is an oligotrophic waterbody (Priority Habitat) of approximately 56 km², the largest freshwater body in the UK. The waterbody is classified as a lake under the WFD, and is currently at Good ecological status (Cycle 2, 2016). The Loch does not constitute a designated site, and the area within the Development Site is a very small proportion of the loch as a whole – the Cofferdam for the construction of the Tailpond Inlet / Outlet is proposed to be approximately 100 m x 280 m in size (< 0.05 % of the total loch area).
- 7.4.16 Loch Ness is considered to be of High (National) value as it represents a sustainable area of a national priority habitat, which is essential to maintain the viability of the catchment, and connected designated sites and waterbodies such as the River Moriston SAC, which in turn support a significant proportion of the species resource for which they are designated. Loch Ness is an essential component of the catchment in providing a migratory route for salmon; in turn upon which freshwater pearl mussel depend.
- 7.4.17 Loch Ashie is a small upland loch of approximately 1.4 km² in size. Due to its designation as a SAC and SSSI it has been assessed above as a receptor of Very High (International) value.
- 7.4.18 Loch Ashie is designated under the WFD as a heavily modified waterbody. It has a current WFD overall ecological potential of 'Bad' due to bad classification for hydromorphological parameters.
- 7.4.19 Loch Duntelchaig is an upland loch of approximately 5.6 km² in size. It is located approximately 650 m from the Development Site boundary at its closest point and is an important loch that is used by Scottish Water to supply drinking water to Inverness. Loch Duntelchaig receives flow from Loch an Eoin Ruadha via a small burn. Therefore it is located within the River Nairn catchment.
- 7.4.20 Loch Duntelchaig is classified under the WFD as a heavily modified waterbody and is currently classified for overall ecological potential as 'Poor', due to poor classification for Hydromorphological parameters.
- 7.4.21 Loch Duntelchaig does not constitute a designated site and there are no records of protected species therein, although protected species locally are likely to utilise the resource. Given the size of the loch and despite the poor WFD status, this waterbody is considered to represent a Medium (Regional) value receptor due to its contribution to the local network of habitats.
- 7.4.22 Lochan an Eoin Ruadha is a small loch of approximately 0.19 km², and therefore constitutes priority habitat: oligotrophic and dystrophic lakes. It is located in the Nairn catchment and drains to Loch Duntelchaig to the south. The loch is not a WFD designated waterbody and therefore no data is available on water quality status. The lochan is located immediately

adjacent to the Development Site boundary and is approximately 280 m from the Headpond Embankment.

- 7.4.23 Lochan an Eoin Ruadha does not constitute a designated site and there are no records of protected species therein, although as above their presence cannot be discounted. The lochan is considered to represent a receptor of Medium (Regional) value as a small area of priority habitat that is an important component of this habitat resource locally.
- 7.4.24 Loch na Curra is a small loch of approximately 0.046 km²; therefore it satisfies the criteria as priority habitat: oligotrophic and dystrophic lakes of surface area larger than 1 ha. It is located within the Development Site boundary, approximately 250 m to the west of Lochan an Eoin Ruadha and 520 m south-west of the Headpond Embankment. The loch is within the Loch Ness catchment and drains via the Allt 'a Mhinisteir watercourse to Dores.
- 7.4.25 Loch na Curra does not constitute a designated site and there are no records of protected species therein, although as above their presence cannot be discounted. It is considered to represent a receptor of Medium (Regional) value as a small area of priority habitat that is an important component of this habitat resource locally.

Flowing Watercourses

- 7.4.26 Flowing watercourses throughout the Development Site represent the priority habitat Rivers, as small fast-flowing headwaters. The main notable watercourses within the Development Site boundary are Allt Dailinn, Allt a' Chruineachd, Allt a' Chnuic Chonaisg, and Allt 'a Mhinisteir (refer to Table 7.3). These small watercourses all flow North West into Loch Ness and together with minor tributaries, land drains, ponds and upland flushes form an important network of aquatic habitats.
- 7.4.27 None of the flowing watercourses on the Development Site are designated under the WFD so no monitoring data is available. However, the baseline surveys have provided detail of the biological water quality within the watercourses and this is assessed as very good / unimpacted in 11 sites, slightly impacted in two sites, and moderately impacted in two sites. However, the slightly and moderately impacted sites are likely to be subject to natural pressures such as peat run-off and siltation, rather than anthropogenic impacts of organic pollution, although there was evidence of recent deforestation alongside watercourses, notably KS07, which may have contributed to this impact.
- 7.4.28 The watercourses were assessed as of moderate (four sites) or fairly high / high conservation value (ten sites). A single sampling location (KS04) was of low conservation value due to the moderately impacted water quality.
- 7.4.29 The flowing watercourses on the Development Site provide sustainable areas of priority habitat that form an essential component of the network of aquatic habitats, including other priority habitats, in the area of the Development. In addition, these watercourses have been assessed as providing suitable habitat for the priority species brown trout *Salmo trutta*, although the regional significance of this population is yet to be established. Therefore they are assessed as a feature of Medium (Regional) value, despite the minor variation in water quality and conservation value indicated by the baseline assessment.

Pond

- 7.4.30 The pond at sampling location KS15 was located upstream of KS04 and was approximately 0.14 ha in size; however, due to the lack of features of high conservation importance, it is not considered to represent priority habitat. No protected or notable macrophyte or

macroinvertebrate species, or potential habitat to support protected or notable fish species, were present.

- 7.4.31 The pond was considered to represent a habitat of Negligible value due to the common habitat and lack of protected or notable species of high conservation value.

Upland Flush

- 7.4.32 Areas of upland flush priority habitat were present around the headwater streams, notably around survey sites KS08 and pond KS15. This habitat was surveyed as part of the aquatic macrophyte survey, with wetland species present including jointed rush *Juncus articulatus*, bulbous rush *Juncus bulbosus*, black sedge *Carex nigra*, marsh horsetail *Equisetum palustre*, pale liverwort *Chiloscyphus* sp. and forked veilwort *Metzgeria furcata*. Dominance of sedges is typical of the sedge mires or flushes component of this priority habitat.
- 7.4.33 KS08 is immediately to the north of proposed Compound 1, and KS15 lies directly above the Power Cavern.
- 7.4.34 Upland flush habitat is likely to be present in other areas of the Development Site in addition to the discrete aquatic survey sites, and is considered an essential component of the local network of wetland and aquatic habitats. Therefore it is assessed as of Medium (Regional) value in the context of the Development Site.
- 7.4.35 Upland flush and the effects on this habitat have been assessed in Chapter 6: Terrestrial Ecology.

Invasive Non-Native Species

- 7.4.36 The invasive amphipod *Crangonyx pseudogracilis* was present at survey location KS13 (Loch Ness). This is the only surveyed site in which this species was recorded, and only two individuals were found, indicating low species density. It was not present in the other Loch Ness sampling location (KS14) or in the smaller waterbodies surveyed nearby.
- 7.4.37 *Crangonyx pseudogracilis* is not listed in Schedule 9 of WCA, and therefore there is no legislative restriction on its spread, or requirement for its control. However, SEPA and SNH monitor data on the distribution of this species to inform annual WFD classification, and together with Scottish Water raised concern about the potential spread of this species in responses to the scoping report.
- 7.4.38 The River Basin Management Plan (RBMP) for Loch Ness in 2016 achieved 'Good' Water Framework Directive (WFD) status for alien species; however, as INNS have been established as present through desk study and site survey, it is likely that the WFD status for this element will reduce.
- 7.4.39 No INNS macrophyte species were recorded at any of the sampling sites.
- 7.4.40 Nuttall's waterweed has been previously been recorded within Loch Ness approximately 6.3 km from the Development Site boundary. As the surveys were limited to shallower water there is still the potential for it to occur in close proximity to the potential sampling locations. Therefore its absence from the survey data should not be interpreted as absence from Loch Ness in the entire area of the Development.
- 7.4.41 The presence of INNS presents potential risks to native species and habitats, and therefore the assessment of impacts will be in relation to these species and habitats rather than to the INNS themselves.

Macrophytes

Flowing Water Habitats (KS01 – KS12)

- 7.4.42 No rare or notable species were recorded within any of the sample sites. The species present were typical of transitional habitats located between moorland acid grassland and adjacent areas of standing and flowing water. For example several sedge and rush species were recorded that grow on drainage impeded ground and the margins of waterbodies. The diversity of strictly aquatic species was limited as a consequence of the prevailing habitat conditions as described in more detail below.
- 7.4.43 All of the sites surveyed were located on small oligotrophic headwater streams typical of upland catchments in this part of Scotland. Watercourses in this type of catchment typically support macrophyte communities characterised by an abundance of bryophytes. Higher plants in comparison are generally confined to the margins and are typified by emergent rushes and sedges, and plants of transitional wetland habitat.
- 7.4.44 In the watercourses surveyed, macrophytes were not well-developed, being of relatively sparse cover and of limited species diversity. This is considered a function of the habitat conditions associated with these small watercourses.
- 7.4.45 The main limiting factors for macrophytes are the small size, limited water depth and flow, and relative uniformity of channel morphology which limits the niches available to macrophytes; shading from surrounding woodland which further reduces suitability for many species, particularly higher plants; the composition of the substrate that was typified by an abundance of small stony substrate; and the relatively steep gradients which are unlikely to provide sufficient bed stability during winter spate conditions to allow the development of extensive or diverse stands of macrophytes.
- 7.4.46 Similar macrophyte communities are likely to be very common across the wider landscape and therefore the macrophyte communities present are considered to be of no greater than local nature conservation value; however, they are an important component of the local landscape and provide a valuable resource for aquatic invertebrates and other aquatic and terrestrial fauna.

Loch Ness (KS13 and 14)

- 7.4.47 No rare or notable species were recorded within either of the sample sites. The communities were species poor and the species present fairly typical of a large oligotrophic lake.
- 7.4.48 The macrophyte community was similar at both sites and indicates that the potential Tailpond Inlet / Outlet location is not a sensitive area for macrophytes. This section is exposed and subject to dynamic conditions, together with seasonally fluctuating water levels, thus limiting the available niches for plants to exploit.
- 7.4.49 The communities present are likely to occur in numerous other locations within Loch Ness and in other similar lochs within the local area. As such, macrophyte community is considered to be of no greater than local nature conservation value.
- 7.4.50 The current WFD status for aquatic macrophytes and other aquatic plants (Phytobenthos) in Loch Ness is 'High'. This means that the loch is unimpacted by pollutant nutrient input that would encourage excessive macrophyte and Phytobenthos growth, and the community present is comparable with what would be expected in such a waterbody.

Standing Water (KS15)

- 7.4.51 Pond KS15 was dominated by macrophytes and supports moderate species diversity. None of the species present were rare or threatened and instead are all typical of the habitat conditions present.
- 7.4.52 The community present was similar to the flowing sites and supported a number of species typical of transitional habitats located between moorland acid grassland and adjacent areas of standing and flowing water. Again, several sedge and rush species were recorded that grow on drainage impeded ground and the margins of waterbodies. The diversity of strictly aquatic species was limited to delicate stonewort and broad-leaved pondweed, neither of which are rare, and are likely to occur in similar habitats across the wider landscape.
- 7.4.53 As such, the aquatic macrophyte community throughout the Development Site is considered to be of Negligible value due to the lack of protected and notable species of high conservation value, and the presence of common and widespread species. However, it does provide a valuable local resource for fauna, in particular aquatic invertebrate community.

Macroinvertebrates

- 7.4.54 In terms of conservation value, KS05, KS13, KS14 and KS15 were of moderate conservation value and KS04 was of low conservation value; the remaining sites surveyed were either of fairly high or high conservation value.
- 7.4.55 There were no taxa recorded that were Red Data Book RDB1 (Endangered), RDB2 (Vulnerable), RDB3 (Rare), or Notable (but not RDB status). Some sites (KS01, KS03 and KS10) contained the stonefly *Leuctra moselyi* larva, identified as 'regionally notable' in the CCI index, but listed as Least Concern in the most recent stonefly (Plecoptera) RDB (Natural England, 2015). This species in its aquatic stage is typically found between May and September. It has a limited distribution, being recorded in upland areas of northern Scotland, upland Wales, northern and south-western England, and is rare but locally abundant. It is found in small stony streams like those typical of this Site.
- 7.4.56 Sites were also assessed to determine if they were potentially impacted by organic pollution using the BMWP and ASPT metrics. Eleven of the fifteen sites had BMWP scores that were indicative of very good, unpolluted and unimpacted status. KS03 and KS15 both had potential slightly impacted status; however, KS15 is a pond and would ideally need a PSYM assessment to inform an accurate assessment of pond quality. If direct impacts to pond KS15 were proposed, further assessment following PSYM methodology would be recommended.
- 7.4.57 KS04 and KS05 both had a moderately impacted status; however, these sites were small drains so the decrease in BMWP here is considered likely to be due to habitat constraints rather than an impact from an organic input. For example, impacts in relation to land drainage, nutrient input from run-off as a result of land use practises, or dredging to facilitate land drainage.
- 7.4.58 While several sites were found to support an aquatic macroinvertebrate community indicative of very good, unpolluted and unimpacted status, all species recorded were widespread and common. Therefore the aquatic macroinvertebrate community throughout the Development Site is assessed as of Negligible value, and similar macroinvertebrate communities are likely to be common across the wider landscape.

Fish Habitat

- 7.4.59 Due to the high gradient, steep banks and the number of impassable barriers for migration throughout the catchment, migratory species including salmon, sea trout, sea lamprey and river lamprey are considered unlikely to be present and utilising the flowing watercourses for spawning throughout the Development Site (sites KS1-KS12).
- 7.4.60 Salmon and sea trout are also unlikely to be utilising the margins of Loch Ness to spawn as it is widely understood that migratory salmonids prefer to spawn in rivers and streams (Jonsson and Jonsson, 2011). Migratory species however will be utilising the loch as a migratory pathway from the sea to rivers such as the river Moriston which is a designated SAC for salmon.
- 7.4.61 Atlantic salmon will be present in Loch Ness and utilising it as a migratory route between the sea and their spawning grounds, including in the River Moriston SAC. Migratory salmonid species, including salmon and sea trout, originating in the upper, middle and lower Ness systems, have the potential to be present within the area of the Development. Lamprey species (brook, river and sea) are also European protected species and are likely to be present in Loch Ness. As European protected species and in the case of salmon a qualifying feature of an internationally designated site, these species are assessed as of Very High (International) value.
- 7.4.62 Consultation with the NDSFB has established that during the annual migration of salmon smolts, large shoals have been reported as gathering at Dores Beach. This means that significant numbers of smolts may be present close to the Tailpond Inlet / Outlet both during construction and operation. Given the known presence of salmon and other migratory fish species in Loch Ness, and the well-known timing of this migration, it is considered that further more detailed survey of fish in Loch Ness, for example smolt or adult salmon tracking studies, is not required to inform the impact assessment.
- 7.4.63 Loch Ness supports a wider community of fish species including the priority species Arctic char, European eel and brown trout, together with a wide range of more common species. Together this fish community is assessed as of High (National) value due to the presence of a nationally significant population of multiple priority species.
- 7.4.64 Resident brown trout populations may be present in the suitable habitats of sites KS08, KS09 and KS10. Spawning habitat is also present here in the form of pools, riffles and a variety of coarse substrates. These populations would be localised between the larger migration barriers such as the weir above survey location KS08 and the multiple waterfalls at survey location KS10. If present these would be small populations restricted due to the size of the watercourses and abundance of foodstuffs from macroinvertebrates or allochthonous input.
- 7.4.65 Brown trout is listed as a priority species, with isolated lochs and watercourses containing genetically distinct populations.
- 7.4.66 Limited habitat to support resident and spawning fish species was found during the baseline surveys. Only sites KS08, KS09 and KS10 were considered to provide suitable spawning habitat for brown trout. There is limited potential for resident trout to disperse widely through the Development Site due to the presence of multiple barriers to migration.
- 7.4.67 Due to the potential presence of brown trout at a limited number of survey sites, this species is considered as of Low (Local) value, as it is not considered to represent a regularly occurring regionally significant population. Other fish species likely to be present within the Development Site are widespread and common, and are assessed as of Negligible value.

Importance of Ecological Features

7.4.68 The assessed importance of those ecological features identified in the baseline conditions, and which have not been screened out above, is set out in Table 7.5 together with rationale. Ecological importance has been assessed considering geographic scale (as per CIEEM (2016) guidelines) and is used in this chapter as a surrogate for ‘sensitivity’ as defined in Chapter 4: Approach to EIA. The approach to valuing ecological features is described in detail in Appendix 6.7 (Volume 5).

Table 7.5 Importance of Ecological Features

Ecological Feature	Importance	Rationale
Loch Ashie SPA and SSSI	Very High (International)	International designation, regular occurrence of globally important species, large areas of Annex I habitats, and / or regularly occurring, sustainable populations of species listed in Annex II of the Habitats Directive (Atlantic salmon, freshwater pearl mussel, brook lamprey, river lamprey and / or sea lamprey).
Loch Ruthven SAC, SPA, Ramsar site and SSSI	Very High (International)	
North Inverness Lochs SPA	Very High (International)	
River Moriston SAC	Very High (International)	
Loch Ness	High (National)	Sustainable area of a national priority habitat, which is essential to maintain the viability of the catchment, and connected designated sites and waterbodies such as the River Moriston SAC.
Loch Duntelchaig	Medium (Regional)	Contribution to the local network of habitats; protected species locally are likely to utilise the resource.
Lochan an Eoin Ruadha	Medium (Regional)	Small area of priority habitat that is an important component of this habitat resource locally; presence of protected species cannot be discounted.
Loch na Curra	Medium (Regional)	Small area of priority habitat that is an important component of this habitat resource locally; presence of protected species cannot be discounted.
Flowing watercourses	Medium (Regional)	Sustainable areas of priority habitat that form an essential component of the network of aquatic habitats, including other priority habitats, in the area of the Development. Provide suitable habitat for the priority species brown trout.
Pond	Negligible	Common habitat and lack of protected or notable species of high conservation value.
Aquatic macrophyte community	Negligible	Lack of protected and notable species of high conservation value, and the presence of common and widespread species.
Aquatic macroinvertebrates	Negligible	All species recorded were widespread and common; similar macroinvertebrate communities are likely to be common across the wider landscape.

Ecological Feature	Importance	Rationale
Atlantic salmon and lamprey species (Loch Ness)	Very High (International)	Loch Ness is a migratory route between the sea and spawning grounds, including in the River Moriston SAC. Salmon and lamprey species are European protected species and are likely to be present in Loch Ness. Salmon is a qualifying feature of an internationally designated site.
Other fish species (Loch Ness)	High (National)	Loch Ness supports a community of fish species including the priority species Arctic char, European eel and brown trout, together with a wide range of more common species. Presence of a nationally significant population of multiple priority species.
Resident brown trout population (flowing watercourses within the Site)	Low (Local)	Potential presence of brown trout at a limited number of survey sites. Not considered to represent a regularly occurring regionally significant population.
Other fish species (flowing watercourses within the Development Site)	Negligible	Other fish species likely to be present within the Development Site are widespread and common

7.5 Assessment of Effects

7.5.1 Relevant ecological features are those that are considered to be ‘important’ and have the potential to be affected by the Development (CIEEM, 2016). In view of the baseline data obtained through desk study and field survey, the following features have been excluded from further assessment because they have been found to be absent from the Development Site or it is clear that no effect from the Development is possible:

- Loch Ruthven SAC, SPA, Ramsar site and SSSI – this site has been scoped out from the assessment as there is no hydrological connection with the Development Site;
- North Inverness Lochs SPA – this site is 8.5 km from the Development with no hydrological connectivity, therefore it is scoped out of the assessment; and
- Sites with non-statutory designation for nature conservation – there are no such sites within 2 km of the Development.

7.5.2 Although not explicit within this section, the likely potential effects on the fish farm should be considered the same as those on wild fish species (such as installation of the cofferdam, underwater noise and water quality). However they have not been directly assessed within this chapter, as any mitigation required is contained with Chapter 14: Socio-Economics and Tourism.

Construction Effects

7.5.3 Considering the above, the potential effects during construction of the Development on aquatic ecological features that require impact assessment are considered to comprise the following:

- Impacts as a result of the construction of the Cofferdam on the shoreline of Loch Ness, including piling, de-watering and substrate removal;
- Effects of construction of temporary Jetty and delivery of materials by barge, including the tunnel boring machine (TBM);

- Effects as a result of watercourse crossings for Temporary Access Track and temporary Compounds, including culverting of watercourses;
- Effects as a result of construction of the Headpond and Headpond Embankment, including land take and transport of excavated material;
- Effects due to the Transport of excavated tunnel material to Headpond via conveyor belt, and management of material from tunnelling works;
- Effects as a result of temporary site drainage, including SUDs, settlement ponds, temporary ditches and other drainage features;
- Effects of general plant movement throughout the Development Site;
- Potential effects as a result of the spread of INNS through the Development Site, notably from Loch Ness during de-watering and substrate excavation, and effects of transporting materials onto the Development Site and the potential introduction of INNS.

Operational Effects

7.5.4 The potential effects during operation of the Development on aquatic ecological features that require impact assessment are considered to comprise the following:

- Lasting effects of the Inlet / Outlet structure on the Loch Ness shoreline, including effects in relation to loch priority habitat, fish and INNS;
- Effects as a result of watercourse crossings for Permanent Access Tracks, including culverting of watercourses;
- Effects as a result of permanent Compounds, including land take and culverting of watercourses;
- Effects due to utilities and diversions, including public road diversion (C1064), core paths and short section of the B862 to create new crossing;
- Spillway crossing of the Allt a' Chraineachd watercourse
- Permanent effects as a result of the Headpond and Embankment, including land take and drainage;
- Effects as a result of permanent site drainage, including SUDs, settlement ponds, temporary ditches and other drainage features;
- Effects due to the spread of INNS through the Development Site as a result of operation of the Development.

Construction Effects

Cofferdam Construction

7.5.5 Potential impacts on the River Moriston SAC due to impacts on qualifying species will be considered and assessed in the HRA Screening Assessment and therefore is not discussed further.

7.5.6 There will be temporary disturbance to the shoreline and margins of Loch Ness, with the temporary Cofferdam extending approximately 100 m out into the loch and 280 m along the shoreline.

7.5.7 The effects on habitats within Loch Ness (High value) will be localised to the relatively small area of the Cofferdam (< 0.05 % of the total loch area). These effects will consist of disruption and removal of substrate, including dredging after removal of the Cofferdam, and

- de-watering of this area. Due to the small area to be temporarily impacted, this is considered to represent a low magnitude impact, resulting in a **Moderate temporary adverse effect**.
- 7.5.8 The migratory route of salmon through Loch Ness is not known, but it is likely that salmon will be present in the vicinity of the Cofferdam during their migration: late spring and early summer for smolt migration; late autumn or early winter for adult migration.
- 7.5.9 Potential impacts on salmon (Very High value receptor) through the Cofferdam construction include:
- Direct mortality or physical injury through construction, piling and de-watering activities;
 - Physical injury as a result of piling noise – although the effects of piling noise vary with size of piles and blow energy, under the most likely scenario (1.8 m piles and a blow energy of 300 kJ), auditory injury to salmon is calculated to occur out to approximately 20 m from the noise source, a strong avoidance reaction is calculated to occur out to 330 m and a significant avoidance behaviour reaction is calculated to occur out to 2.1 km (Mason and Collett, 2011);
 - Avoidance reaction by salmon, potentially disrupting the migratory pathway; refer to Section 7.5.5 above.
- 7.5.10 In the absence of mitigation, the potential effects on salmon (and lamprey; see Section 7.5.9 below) in Loch Ness through construction of the Cofferdam is considered to be medium due to the disruption of migratory behaviour and potential mortality and physical injury to salmon. This would result in a **Major temporary adverse effect**.
- 7.5.11 It is considered that once constructed, the Cofferdam will effectively mitigate the effects of vibration and noise transmission from non-piling activities within the Cofferdam and in the immediate vicinity of the loch shoreline.
- 7.5.12 There are also potential effects on the community of other fish species in Loch Ness due to Cofferdam construction and piling, including Arctic char and brown trout (fish community assessed as of High value). The impacts of piling noise on these species remains largely unstudied (Hawkins and Popper, 2012); however, the effects are likely to be similar to those for salmon. Therefore, in the absence of mitigation the effects on the High value fish community in Loch Ness is considered to be medium due to the disruption of migratory behaviour and potential physical injury to fish. This would result in a **Moderate temporary adverse effect**.
- 7.5.13 Effects on aquatic macrophytes and macroinvertebrates (Negligible value) through the Cofferdam construction are considered to be negligible, resulting in a **Negligible effect** that is effectively a 'no change' situation.
- 7.5.14 Effects due to the potential spread of INNS through Cofferdam construction are considered in the relevant sections below.

Temporary Jetty Construction and Delivery of Materials by Barge

- 7.5.15 The temporary Jetty will be constructed in parallel with the Cofferdam and the same methodology will be used; therefore the effects of temporary Jetty construction are the same as those described for Cofferdam construction above.
- 7.5.16 The delivery of materials by barge will necessitate the use of existing navigation routes, i.e. the Caledonian Canal, and will be consistent with the existing boat traffic on the loch. Therefore this is not considered to constitute a significant effect to salmon, lamprey and other fish species in Loch Ness, loch habitats, aquatic macroinvertebrates and macrophytes. This is considered a **Negligible effect**.

- 7.5.17 The movement of barges through the loch introduces the potential to spread or introduce INNS. These have been shown to be present in the form of Nuttall's waterweed, *Crangonyx pseudogracilis* and an invasive flatworm. Only *Crangonyx* was found to be present in the Cofferdam area through baseline survey. The potential for spreading these species within Loch Ness (High value receptor) is considered to be negligible due to the known presence of INNS; therefore this is considered a low magnitude resulting in a **permanent Moderate adverse effect**.

Effects on Watercourses for Access Tracks and Temporary Compounds

- 7.5.18 Watercourse crossings will be required for Temporary Access Tracks to provide access to the Headpond, Embankment, and Construction Compounds. Temporary Compounds will cover a total area of 385,000 m². These will incorporate temporary watercourse crossings of Allt a' Chruineachd and Allt a' Chnuic Chonaisg, and a permanent crossing of Allt a' Mhinisteir.
- 7.5.19 The Allt a' Chruineachd watercourse at Compound 2, will be diverted as part of the Compound set up works during the pre-construction phase.
- 7.5.20 Watercourses throughout the Development Site are assessed as of Medium value. Where diversions are required or culverts for temporary watercourse crossings it is not clear whether these will be removed upon completion of the temporary works, and therefore these will be assessed as permanent features. This is considered to be a medium magnitude, which results in a **permanent Moderate adverse effect** due to the loss or alteration of sections of watercourses.
- 7.5.21 Trout are considered unlikely to be present in the Allt a' Chruineachd and Allt a' Chnuic Chonaisg watercourses due to the sub-optimal habitat present including steep sections and barriers to fish movement. However, there is a possibility that isolated populations may be present, and therefore culverting of the watercourse may have an impact on fish passage and localised habitat. Therefore this is assessed as a medium magnitude which results in a **permanent Minor adverse effect**.
- 7.5.22 Effects on aquatic macrophytes, macroinvertebrates and other fish (Negligible value) through watercourse crossings are considered to be low, resulting in a **Negligible effect** that is effectively a 'no change' situation.

Construction of the Headpond and Headpond Embankment

- 7.5.23 Construction of the Headpond and Embankment will not impact directly upon any aquatic habitats or species.
- 7.5.24 The primary potential indirect effects due to construction of the Headpond and Embankment are impacts to water quality in watercourses and waterbodies that will receive temporary and permanent drainage from the Embankment area. The effects of permanent drainage from the Embankment are assessed in the Operational Effects section below (refer to Section 7.5.61).
- 7.5.25 There is the potential for Loch Ashie (Very High value), and Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig (all Medium value) to receive run-off from the Headpond construction area and suffer impacts on water quality. In the absence of mitigation the assessment of impacts for these waterbodies is as follows:
- Loch Ashie – this waterbody is currently at Bad WFD status, and therefore in terms of aquatic ecology is at a lower baseline condition than other waterbodies. Therefore the

potential impacts to Loch Ashie are assessed as low magnitude, resulting in a **temporary Moderate adverse effect**.

- Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig are likely to receive only minimal quantities of run-off due to the surrounding topography. Therefore they are potentially subject to low magnitude impact, resulting in a **temporary Minor adverse effect**.

7.5.26 There is the potential for the Allt a' Mhinisteir watercourse to receive run-off from the area of Headpond and Embankment construction, and suffer associated impacts on water quality. While this is not a WFD waterbody, baseline survey indicates that it is characterised by unpolluted and unimpacted water quality. Effects to water quality in this watercourse are assessed as low impact resulting in a **temporary Minor adverse effect**.

7.5.27 Effects on fish species including brown trout, aquatic macrophytes and macroinvertebrates through the Headpond and Embankment construction are considered to be low, resulting in a **Negligible effect** that is effectively a 'no change' situation.

Transport of Excavated Tunnel Material to Headpond

7.5.28 Material will be excavated from tunnels and from the Cofferdam area in Loch Ness.

7.5.29 The primary potential impact of substrate excavation from Loch Ness is the translocation of INNS, which is assessed in a later section.

7.5.30 Materials excavated from the tunnels will be transported throughout the Development Site and stockpiled in pre-agreed locations. Therefore, the primary potential impacts on aquatic habitats associated with material transport and management are the spread and run-off of sediment, and resulting reductions in water quality.

7.5.31 The effects of sediment input into watercourses and waterbodies on each receptor is assessed in the points that follow:

- Loch Ashie – the assessment of impacts to Loch Ashie from run-off from material management areas is the same as described above for Headpond construction: low magnitude impact resulting in a **temporary Moderate adverse effect**.
- Loch Ness may suffer impacts due to substrate and sediment removal and mobilisation, together with run-off from stockpiled material on the loch shore. Due to the localised area of works on the loch shore and in the context of Loch Ness as a whole, this is considered to constitute a low magnitude impact resulting in a **temporary Moderate adverse effect**.
- Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig are likely to receive only minimal quantities of run-off due to the surrounding topography. Therefore they are potentially subject to low impact, resulting in a **temporary Minor adverse effect**.
- Watercourses may receive run-off from material transport and stockpiling areas and suffer associated impacts on water quality. Effects to water quality in the watercourses are assessed as low magnitude, resulting in a **temporary Minor adverse effect**.
- There is the potential for the pond at KS15 (Negligible value) to receive run-off from the surrounding area. This is assessed as a low magnitude impact, resulting in a **Negligible effect**.
- Salmon and lamprey in Loch Ness are considered unlikely to suffer any adverse effects of sediment run-off due to the localised nature of the works on the loch shoreline in the context of the loch as a whole. Therefore this is assessed as a **Negligible effect**.

- Other fish species in Loch Ness (High value) will also be unlikely to suffer any adverse effects of sediment run-off due to the localised nature of the works on the loch shoreline in the context of the loch as a whole. Therefore this is assessed as a **Negligible effect**.
- Brown trout are potentially present in the Glaic na Ceardaich watercourse and reductions in water quality would reduce the suitability of the burn for this species due to effects such as clogging of gills and reduced oxygen levels. This is assessed as a low magnitude impact resulting in a **Negligible effect**.
- Macrophytes, macroinvertebrates and fish species (other than brown trout) would be subject to similar reductions in water quality and reduced oxygen levels, and therefore impacts to these receptors is assessed as of low magnitude, resulting in a **Negligible effect**.

Temporary Site Drainage

- 7.5.32 It is anticipated that the choice of locations for these components will avoid direct impacts to aquatic receptors, and therefore **no effects** are envisaged.
- 7.5.33 Potential effects of run-off and siltation through these components are assessed in the preceding section for effects due to material transport and management, including in the event that temporary site drainage features fail or are ineffective, and thus result in the introduction of run-off or sediment into aquatic habitats.

General Plant Movement Throughout the Development Site

- 7.5.34 Plant movement through the Development Site has the potential to result in the spread of sediment through the Development Site, or introduce pollutants such as oil or diesel into aquatic habitats. Such effects are assessed in the section above on effects due to material transport and management.
- 7.5.35 Plant movement also has the potential to spread invasive species through the Development Site, and this has been assessed in the section on INNS below.

Potential Spread or Introduction of INNS

- 7.5.36 There is the potential for INNS to be spread through or introduced to the Development Site during construction by:
- Cofferdam construction, including de-watering of Loch Ness;
 - Stockpiling of excavated materials;
 - Transport of materials throughout the Development Site;
 - General plant and vehicle movement onto and through the Development Site;
 - Transfer of INNS on Personal Protective Equipment (PPE), site clothing and other materials and equipment;
 - Transport of materials by barge on Loch Ness, via the Caledonian Canal.
- 7.5.37 The effects of the introduction of INNS on different receptors are summarised in the points below:
- Loch Ashie, although currently at Bad WFD status, is not known to currently hold any INNS, as supported by the baseline assessment. It is considered that the introduction of INNS into Loch Ashie may cause the WFD status of the waterbody to deteriorate in the future, although the current baseline WFD conditions in the waterbody are Bad. Therefore, this is assessed as a medium magnitude impact, resulting in a **permanent Major adverse effect**.

- River Moriston SAC – this site is considered sufficiently distant from the Development Site as to negate the risk of the spread of INNS from construction activities as a result of INNS that are already present in Loch Ness.
- Loch Ness is currently inhabited by several INNS, as established in the baseline assessment. Equipment and materials will be transported to Loch Ness and to the Development Site by barge via the Caledonian Canal, which is an existing navigable watercourse with regular boat traffic. Therefore the potential for the spread of INNS from elsewhere on the Development Site or off-site as a result of construction activity is considered low. Therefore this is assessed as a **Negligible effect**.
- Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig are not known to support any INNS, as supported by the baseline assessment. Therefore any introduction of INNS would lead to a deterioration of their ecological condition, although they are not designated as WFD waterbodies. Therefore this is considered to represent a high magnitude impact, resulting in a **permanent Moderate adverse effect**.
- Watercourses throughout the Development Site have been shown through the baseline assessment as having a likely absence of INNS, although terrestrial INNS were identified during the aquatic surveys (refer to Chapter 6: Terrestrial Ecology). Therefore the introduction of INNS would cause a potential deterioration in the ecological quality of these watercourses, and is considered to constitute a high magnitude impact, resulting in a **permanent Moderate adverse effect**.
- The pond at KS15 has also been shown to have a likely absence of INNS, and therefore any introduction of these species would cause a deterioration of its ecological quality. Therefore this is assessed as a high magnitude impact, resulting in a **permanent Minor adverse effect**.
- Salmon and lamprey in Loch Ness coexist with the INNS that are already present in that waterbody. However, there are other INNS that have the potential to adversely affect the salmon population, namely the salmon fluke, which is currently absent from this country. There is an existing pathway for the introduction of INNS into Loch Ness, namely the Caledonian Canal, therefore it is considered that the potential for the Development to increase the risk of introduction is low. This is assessed as a low magnitude impact, resulting in a **permanent Moderate adverse effect**.
- Other fish species in Loch Ness are similarly unlikely to be adversely affected by the introduction of such INNS as are currently present within the loch. As such, this is assessed as a low magnitude impact, resulting in a **permanent Moderate adverse effect**.
- Brown trout, potentially present in the Glaic na Ceardaich watercourse, would potentially be impacted by the introduction of INNS, for example by choking of the watercourse with invasive plant species. Therefore this is assessed as a high magnitude impact, resulting in a **permanent Moderate adverse effect**.
- Macrophytes, macroinvertebrates and fish species (other than brown trout) are also likely to be adversely affected by the potential introduction of INNS, through factors such as inter-species competition and displacement. Therefore this is assessed as a high magnitude impact, resulting in a **permanent Minor adverse effect**.

Operational Effects

Operation in Loch Ness

- 7.5.38 The Inlet / Outlet structure will occupy a relatively small area of the Loch Ness shoreline and during operation it is anticipated that it will operate relatively maintenance-free, with the exception of daily maintenance checks and Screen cleaning. It is also envisaged that the substrate on the bed of Loch Ness will be reinstated to pre-works condition. Therefore the effects of this structure during operation are considered to be **Negligible**.
- 7.5.39 Salmon and lamprey will continue to utilise Loch Ness as a migratory pathway, and may therefore pass the Tailpond Inlet / Outlet structure. The Screen at the Inlet / Outlet structure will have a 2 mm aperture size to prevent the entrapment of fish. It is predicted that the maximum Inlet velocity will be 0.15 m/s.
- 7.5.40 The maximum sustained swimming speed of salmon has been shown to be 0.91 m/s (0.45 m body length) and 0.54 m/s (0.15 m body length) (Tang and Wardle, 1992), with burst swimming speeds much higher than this.
- 7.5.41 The sustained / burst swimming speed of European eel has been shown to be 0.09 m/s / 1.01 m/s (0.10 m body length) and 0.58 m/s / 1.26 m/s (0.70 m body length) (Sheridan et al, 2011).
- 7.5.42 The swimming speed of lamprey ammocoetes (juvenile lamprey) is no more than 0.45 m/s, and more usually between 0.10 and 0.30 m/s (Maitland, 2003). These swimming speeds seem to apply when the lamprey are disturbed or are seeking out food resources, and most larval movement results from passive downstream migration.
- 7.5.43 Lamprey ammocoetes will be among the weaker swimming fish species in Loch Ness, and therefore the majority of fish in the loch will swim sufficiently fast to avoid impingement at the Inlet Screen. Sustained and burst swimming speeds of salmon and eel certainly indicate that they will be able to escape the Inlet Screen. It is not clear for how long the Inlet will operate during a pumping cycle, but it is anticipated that one cycle will operate each day.
- 7.5.44 Given the sporadic operation of the Inlet and the evidence that even the weaker swimming fish species swim sufficiently fast to escape the Inlet velocity, together with the very small size of the Inlet structure in the context of the size of Loch Ness, the potential impact of the Inlet / Outlet on salmon and lamprey is assessed as a **Negligible effect**.
- 7.5.45 As there will be a negligible effect on salmon through impingement at the Inlet, there is considered to be no adverse effect on the integrity of the River Moriston SAC, in terms of freshwater pearl mussels that rely on salmon for the completion of their life cycle.
- 7.5.46 The Outlet may present a rheotactic (the tendency of fish to face into an oncoming current) distraction by attracting migratory fish such as salmon from their migration path (O'Keeffe & Turnpenny, 2005). The main risk of such distraction is fish entering the Outlet and becoming trapped. This will not be the case for this Development, as the Outlet Screen will be completely impassable to fish. The Outlet will not discharge constantly, and the sporadic nature of the discharge, albeit daily, will ensure that fish are not constantly distracted, and are able to continue on their migration. In addition, Loch Ness is approximately 2.1 km wide at the location of the Outlet and the main migration pathway is likely to be on the far side of the loch, downstream of which the River Ness flows out via Loch Dochfour. Therefore, the effect of distraction by the Outlet on salmon and other species is assessed as a **Negligible effect**.

- 7.5.47 Other fish species in Loch Ness are, as above, considered able to escape the Inlet velocity and therefore avoid entrapment and impingement effects. Therefore the effect of the Inlet / Outlet on these species is assessed as of **Negligible effect**.
- 7.5.48 Macrophytes and macroinvertebrates in Loch Ness will not be subject to any adverse effects through the operation of the Inlet / Outlet. A small number of macroinvertebrates may be drawn into the Outlet, but in the context of their populations in Loch Ness as a whole, this is considered to constitute a **Negligible effect**.
- 7.5.49 INNS are known to be present within Loch Ness, with *Crangonyx pseudogracilis* identified at the Inlet / Outlet location. Nuttall's waterweed may also be present, although it was not found during baseline sampling. While *Crangonyx* and fragments of Nuttall's waterweed may be drawn into the Inlet, the closed-loop system has been designed to prevent cross-catchment contamination, although these INNS may become established in the Headpond.
- 7.5.50 The effects of the transfer of INNS through construction activities have been assessed above, and these would result in INNS becoming permanently established in the waterbodies they were transferred to. However, the transfer of INNS into the Headpond would introduce a new pathway for the transfer of INNS, i.e. from the Headpond to nearby waterbodies and watercourses. The effects of the transfer of INNS to those receptors from the Headpond would be comparable with the effects assessed above, and therefore the impact assessment will not be repeated here.

Watercourse Crossings for Permanent Access Tracks

- 7.5.51 The Allt a' Mhinisteir watercourse would be crossed by the Permanent Access Track upstream of survey location KS06. There is an existing forestry access track at this location, but the watercourse crossing may need to be improved and / or widened. Culverting of the watercourse, where required, will follow SEPA best practice guidance, but this would result in a permanent impact on watercourse conditions in that location. This is considered to be a medium magnitude impact, resulting in a **permanent Moderate adverse effect** due to the loss or alteration of a section of the watercourse.
- 7.5.52 Trout are considered unlikely to be present in the Allt a' Mhinisteir watercourse in this area due to the presence of barriers to migration throughout the watercourse and sections of sub-optimal habitat downstream. However, there is a possibility that isolated populations may be present, and therefore culverting of the watercourse may have an impact on fish passage and localised habitat. Therefore this is assessed as a medium magnitude impact, resulting in a **permanent Minor adverse effect**.
- 7.5.53 Effects on aquatic macrophytes, macroinvertebrates and other fish (Negligible value) through the permanent watercourse crossing are considered to be low magnitude impacts, resulting in a **Negligible effect** that is effectively a 'no change' situation.

Spillway Crossing

- 7.5.54 The Spillway Pipeline will cross the Allt a' Chruineachd watercourse either by cut-and-cover tunnel beneath, or by a pipe bridge over. The watercourse is in a steep-sided gully at this location and therefore the latter seems likely. Due to the uncertainty of watercourse crossing methodology at this location, the assessment of effects for this component for all receptors is the same as that for temporary and permanent watercourse crossings described above.

Permanent Compounds

- 7.5.55 Four Compounds will be constructed to facilitate the Development. Three of these Compounds will remain as permanent features, and therefore this assessment encompasses the permanent components of these features.
- 7.5.56 Permanent Compounds will cover a total area of 60,000 m². These areas will include watercourses and riparian habitats.
- 7.5.57 Where Compounds result in the culverting of watercourses, in the absence of mitigation this is considered to be a medium magnitude impact, resulting in a **permanent Moderate adverse effect** due to the loss or alteration of sections of watercourses.
- 7.5.58 There are potential effects on trout (Low value), which are potentially present at KS08, KS09 and KS10 (Glaic na Ceardaich), as this watercourse is located immediately adjacent to Compound 1. This is considered to represent a low magnitude impact, resulting in a **Negligible effect**. All other watercourses to be affected by Compounds were assessed as providing negligible potential to support brown trout.
- 7.5.59 Effects on aquatic macrophytes, macroinvertebrates and other fish species (Negligible value) through the construction of permanent Compounds are considered to be low magnitude impacts, resulting in a **Negligible effect** that is effectively a 'no change' situation.

Headpond and Embankment

- 7.5.60 Loch Ashie, Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig will not be directly affected by the permanent Headpond and its associated Embankment, which is located approximately 100 m from Loch Ashie and a greater distance from the other waterbodies. Potential effects due to drainage from the Embankment are assessed in Section 7.5.61 below.

Permanent Site Drainage

- 7.5.61 During the operational phase, drainage from the Development Site will constitute clean surface water run-off, which will be comparable with current drainage conditions. Chapter 10: Water Environment, assesses the effects of site drainage and hydrology. It is anticipated that the design of site drainage will facilitate the maintenance of water supply to the existing waterbodies and watercourses on the Site.

Spread of INNS Through the Development Site During Operation

- 7.5.62 There is the potential for INNS to be spread or introduced during the operation of the Development, for example through movement of vehicles and personnel, delivery of materials from off-site by barge or vehicles, and through utilisation of the Headpond by wildlife and the transfer of INNS to nearby waterbodies. While the closed-loop system and Inlet Screen will minimise the potential for transfer of aquatic INNS through the Development Site, there remains the potential for plant fragments and macroinvertebrates to be transferred to the Headpond.
- 7.5.63 The effects of the introduction of INNS on different receptors during operation are reduced compared with the construction effects assessed in Section 7.5.35. This is due to the reduced movement of vehicles and personnel during operation, and the design and continuous operation of the Development. There is the potential for INNS plant fragments and invertebrates to be pumped up to the headpond from Loch Ness, resulting in a shorter potential transfer pathway for INNS to Loch Ashie and other waterbodies. However, this pathway already exists from INNS present in Loch Ness, for example through the transfer of INNS by waterfowl. These effects are summarised in the points below:

- Loch Ashie – this waterbody is designated as a SPA for a post-breeding population of Slavonian grebe. The potential introduction of INNS to Loch Ashie is not considered likely to impact adversely upon the qualifying features of the SPA, and may actually increase food availability for the bird population. In consideration of the existing transfer pathway of INNS from Loch Ness, this constitutes a negligible impact, resulting in a **permanent Minor adverse effect**.
- Loch Ness – INNS are already present within Loch Ness, and therefore there is considered a negligible risk through the operation of the Development of their further introduction or spread: **Negligible effect**.
- Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig – there is a likely absence of INNS in these waterbodies currently and a transfer pathway already in existence from INNS in Loch Ness. Given the shortened transfer pathway and the potential adverse effects of INNS on native species in these waterbodies, this is considered a low magnitude impact, resulting in a **permanent Minor adverse effect**.
- Flowing Watercourses – as above and considering the shortened transfer pathway, this is a low magnitude impact, resulting in a **permanent Minor adverse effect**.
- Pond at KS15 – low magnitude impact as above, resulting in a **Negligible effect**.
- Salmon and lamprey in Loch Ness – negligible impact, resulting in a **permanent Minor adverse effect**.
- Other fish species in Loch Ness – negligible impact, resulting in a **permanent Minor adverse effect**.
- Brown trout – low magnitude impact, resulting in a **Negligible effect**.
- Macrophytes, macroinvertebrates and fish species (other than brown trout) – medium magnitude impact, resulting in a **Negligible effect**.

Decommissioning Effects

- 7.5.64 Decommissioning of the Development, if undertaken, will involve the draining of the Headpond and the removal of above-ground infrastructure, including the Inlet / Outlet structure and Screen. Tunnels and the underground Power Cavern would be blocked off following the removal of all mechanical and electrical equipment. A full description of the works associated with all phases of the Development is provided in Chapter 2: Project and Site Description.
- 7.5.65 Given the low likelihood of effects during decommissioning, the potential effects of this stage of the development on each receptor are described below.

Designated Sites

- 7.5.66 Loch Ashie SPA and SSSI lies in close proximity to the Development. Therefore there are potential effects during decommissioning of surface water run-off and associated siltation and pollution. As described in Section 7.5.23, this waterbody is currently at Bad WFD status, and therefore in terms of aquatic ecology is at a lower baseline condition than other waterbodies. Therefore the potential impacts to Loch Ashie during decommissioning are assessed as a **Negligible effect**.
- 7.5.67 Loch Ruthven SAC, SPA, Ramsar site and SSSI, North Inverness Lochs SPA and River Moriston SAC (Very High (International) Importance) are considered sufficiently distant from the development to avoid adverse effects during decommissioning. Therefore the impact of decommissioning on these sites is considered to be a **Negligible effect**.

- 7.5.68 Potential effects on migratory fish, including salmon, as a result of the removal of the Inlet / Outlet structure, and the associated effects on the River Moriston SAC, are considered in Section 7.5.74 below).

Loch Ness

- 7.5.69 The Inlet / Outlet structure and Screen would be removed from Loch Ness during decommissioning. Therefore there would be temporary effects of loch substrate disturbance and sediment mobilisation in a localised area of loch shoreline. Due to the small area to be temporarily impacted, this is considered to represent a low magnitude impact, resulting in a **temporary Moderate adverse effect**.

Loch Duntelchaig, Lochan an Eoin Ruadha and Loch na Curra

- 7.5.70 These receptors of Medium (Regional) importance may be subject to surface water run-off effects, including siltation and pollution, during decommissioning of the Development. Due to the distance of these receptors from the Development, they are likely to receive only minimal quantities of run-off due to the surrounding topography. Therefore they are potentially subject to low magnitude impacts, resulting in a **temporary Minor adverse effect**.

Flowing Watercourses

- 7.5.71 Flowing watercourses are likely to receive surface water run-off during decommissioning, including contamination with sediment and pollution. This will include the removal of culverts from permanent Compounds and Access Tracks, and other Development infrastructure such as the Headpond Embankment and SuDS features.
- 7.5.72 This is considered to be a medium magnitude impact, resulting in a **temporary Moderate adverse effect** due to the temporary disruption to watercourse habitats and the effects of surface water run-off. It is also acknowledged that the removal of culverts would reinstate watercourses to their previous condition, and it is anticipated that during decommissioning all habitats would be reinstated to pre-Development condition.

Pond

- 7.5.73 The pond at survey location KS15 is of negligible importance, and due to its location upstream of the Development the impacts of decommissioning on this receptor are considered to be a **Negligible effect**.

Aquatic Macrophyte, Aquatic Macroinvertebrate and Fish (Other than Brown Trout) Community

- 7.5.74 The potential effects of decommissioning on these receptors are considered to be comparable with effects during construction, as detailed in Section 7.5.19. These effects include the disturbance of habitats through culvert removal, and impacts to water quality through surface water run-off, siltation and pollution. Impacts on aquatic macrophytes, macroinvertebrates and fish (other than brown trout) through decommissioning are considered to be low, resulting in a **Negligible effect**.

Atlantic Salmon and Lamprey Species, and Other Fish Species (Loch Ness)

- 7.5.75 Decommissioning effects on Atlantic salmon and lamprey in Loch Ness will include the disturbance of loch substrate, mobilisation of sediment, and the direct mortality and injury of fish in the precise locality of the works. Due to the localised nature of the decommissioning works and in the absence of mitigation (including the exclusion of fish from the work area

and fish rescue), this is considered to represent a low magnitude impact and a **Moderate temporary adverse effect**.

Resident Brown Trout Population (Flowing Watercourses Within the Development Site)

- 7.5.76 The effects of decommissioning on resident brown trout populations are considered to be comparable with those during construction, as assessed in Section 7.5.18. These include the disturbance of habitats during culvert removal, surface water run-off and associated mobilisation of sediment and pollution. Therefore this is assessed as a medium magnitude impact, resulting in a **temporary Minor adverse effect**. It is acknowledged that the removal of culverts would reinstate watercourses to their previous condition, and it is anticipated that during decommissioning all habitats would be reinstated to pre-Development condition.

7.6 Cumulative Effects

Intra-Project Effects

- 7.6.1 Intra-project effects due to component parts of the Development being undertaken concurrently have been assessed as part of the construction effects assessment above. This assessment has been made on a worst-case precautionary approach, and therefore cumulative intra-project effects will not increase the magnitude or significance of effects on individual receptors.
- 7.6.2 Construction is expected to last up to five years excluding the enabling works. The construction work is anticipated to peak within the first year of construction as the tunnelling construction and the Headpond construction are the two biggest operations and they are sequenced in parallel. Tunnelling is anticipated to be a 24-hour operation, and therefore there may be potential effects of lighting on aquatic habitats, see below.
- 7.6.3 There will be a requirement for lighting during construction, and operational external lighting at tunnel portals and along the perimeter fence of Compound 1, focused around the entry gate. External lighting will also be required at the Headpond and Tailpond for access, although this will only be used occasionally. Navigational lighting will also be fitted to the jetty on Loch Ness. It is envisaged that embedded mitigation, including directional cowlings and restrictions to the hours of operation, will ensure that the potential impacts of this operational lighting will be a **Negligible effect** on all receptors.

Cumulative Developments

- 7.6.4 A new underground water main from Dores to Loch Ashie treatment works is proposed. The requirement for an EIA has been screened out and no planning application has yet been submitted.
- 7.6.5 The proposal is for the installation of an underground water main (5.8 km) from the proposed Dores raw water pumping station to Loch Ashie water treatment works.
- 7.6.6 The proposed intake for the pipeline development is in close proximity to the proposed Tailpond Inlet / Outlet for the Development. Therefore there is the potential for cumulative effects on habitats and fish species present within Loch Ness. The ecology report for the proposed pipeline and associated infrastructure recommended screening at the intake comparable with screening proposed for the Development. Therefore, given the very small and localised scale of the two Inlet structures in the context of Loch Ness as a whole, it is considered that the cumulative effect will be the same as that assessed in Section 7.5.43 as a **Negligible effect**.

7.6.7 The proposed pipeline for the development is underground and will therefore not impact upon any further aquatic habitats in the Development Site. Therefore there are no cumulative effects in this regard.

7.6.8 The proposed discharge from the pipeline development is downstream of Loch Ashie, and therefore it is considered that there will be no cumulative effects on Loch Ashie.

7.7 Mitigation and Monitoring

Embedded Mitigation

Design Evolution

7.7.1 Early on in the design evolution process, Loch Duntelchaig was determined unsuitable as a Headpond for the Development and design was progressed to the two Headpond Options presented for Scoping Opinion. As part of the scoping design, a 0.5 mm Screen was presented within the Tailpond Inlet / Outlet Structure in Loch Ness. The primary function of the Screen was to prevent fish egress into the Development operations, but also to minimise the likelihood of INNS transfer.

7.7.2 In further detailed consultation, post-scoping, SEPA and SNH (meeting on the 27 April 2018) confirmed that the Screen would not require such small aperture dimensions if the operational cross-catchment transfer risk was determined to be negligible through this INNS risk assessment.

7.7.3 As part of this assessment, Crangonyx pseudogracilis and Elodea Nuttallii have been identified as present in Loch Ness within and in proximity to the Development Site. However, the risk of their cross-catchment spread by the operation of the Development is negated by the Option B Headpond design being taken forward post-scoping as a closed loop system within the Ness catchment.

7.7.4 Steps have been taken during the design process to minimise impacts via design evolution, including a design workshop to facilitate input from all disciplines. This facilitated the development of various design principles to minimise impacts, including those summarised below, such as:

- The implementation of numerous SuDs features and attenuation features will control run-off into watercourses and Lochs, and avoid contamination of these waterbodies.
- The design is for a completely 'closed-loop' system, whereby water will be drawn from Loch Ness to the Headpond, and returned to Loch Ness via the High-pressure Tunnel or Spillway. Therefore the risk of water spilling into adjacent waterbodies will be negligible. This will also be ensured by the incorporation of a 4 m gap between the maximum water level in the Headpond and the top of the Headpond Embankment, with the addition of a wave wall on top of the Embankment. This will ensure that the risk of cross-catchment transfer of water is negated.
- The risk of cross-catchment contamination during Headpond construction, for example by the spread of INNS, will be minimised by the distance of approximately 100 m from Loch Ashie, and the incorporation of temporary SuDs and attenuation features in the intervening land. It is also acknowledged that Loch Ashie is within the wider Loch Ness catchment, and therefore represents less significant 'cross-catchment' contamination than to neighbouring catchments.
- The watercourse running through Compound 1, Allt a' Mhinisteir, may be culverted temporarily during construction to allow Access Tracks to cross the watercourse. The

permanent Compound at this location will be located to the west of the watercourse to allow the watercourse itself and associated habitats to be reinstated.

- A mesh Screen of 2 mm aperture, 90 m wide and 30 m down the slope, will be installed at the Inlet / Outlet on the shore of Loch Ness. The Screen will prevent the entrapment or impingement of fish, and the Inlet of INNS.
- The maximum inlet velocity from Loch Ness will be 0.15 m/s given the size of the Tailpond Inlet structure and Screen.
- A silt curtain or equivalent may be installed prior to the Cofferdam being installed. This is to reduce the potential for any sediment to reach Loch Ness during construction.

Construction Environmental Management Plan

7.7.5 An Outline Construction Environmental Management Plan (CEMP) has been prepared and will be further developed by the Construction Contractor post-consent. The CEMP will set out the methods and procedures that will be implemented by the Construction Contractor to minimise environmental effects during construction, including standard measures and good practice to be implemented during the construction phase. These measures specific to aquatic ecology include:

- Dust screens to be installed along Access Tracks to prevent contamination of the surroundings with dust and fine sediments.
- Bottomless box culverts will be installed at watercourse crossings where existing crossing points cannot be utilised.
- Where possible a 50 m buffer from watercourses will be maintained to avoid the need for mitigation such as temporary silt fencing.
- Where considered necessary to prevent silt-laden run-off into aquatic habitats, silt fencing will be installed alongside material stockpiles. This will be supervised and monitored by the ECoW to ensure that silt control measures are effective.
- Material management, including stockpiling and transport, will be carried out according to the good practice measures set out within the Outline CEMP. These measures have been embedded into the design to ensure that management is effective in minimising run-off and subsequent contamination of waterbodies. The Outline CEMP includes such measures as dust screens and vehicle washing facilities to minimise dust and siltation.
- Wherever feasible, a 50 m standoff buffer between works, especially those involving material management, and aquatic habitats will be maintained to reduce the risk of run-off contaminating waterbodies. This buffer will be maintained as a vegetated strip to act as a sediment trap in the event that run-off does occur.

Biosecurity Management Plan

7.7.6 The CEMP outlines the minimum requirements of the Biosecurity Management Plan (BMP) which will manage potential effects on aquatic habitats and species due to INNS during the construction phase. The BMP will include the following measures (not exclusively):

- Once the Cofferdam has been removed there may be a requirement for some localised dredging to remove any material that has built up around the piles. This will require a dredger and a silt curtain (or equivalent) to prevent any pollution to Loch Ness. Dredging should be supervised by the Aquatic Ecological Clerk of Works (ECoW) due to the potential for INNS and fish to be encountered during the works.

- Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS, including Nuttall's waterweed and *Crangonyx pseudogracilis*, which are known to be present in Loch Ness.
- The Aquatic ECoW will supervise all excavation and dredging works in Loch Ness to check for the presence of INNS and ensure that appropriate biosecurity measures, as detailed in the CEMP, are implemented.
- Biosecurity measures should be implemented throughout the development, following 'Check, Clean, Dry' principles. These measures will include, but are not limited to:
 - Vigilance for the presence of INNS, including pre-commencement surveys, supervision and monitoring by the ECoW;
 - Vehicle washing facilities, including washing plant and vehicles before transferring between this and different construction sites;
 - Disinfection of Plant, PPE and materials after works in aquatic habitats, especially in Loch Ness where INNS are known to be present;
 - Ensuring where possible that materials are retained in the habitats where they originated, especially where INNS are known to be present, i.e. Loch Ness;
 - Drying facilities should be provided for equipment and PPE – some INNS can live, or seeds remain viable, in moist conditions for long periods;
 - Avoid the transfer of water between aquatic habitats onsite.

Surface Water Management Plan

- 7.7.7 Good practice drainage and water management measures are contained within the Outline SWMP (Appendix 10.5, Volume 5), any specific measures to be implemented during the Headpond and Embankment works will be implemented by the Construction Contractor as per the finalised SWMP.

CAR Licence

- 7.7.8 Works in Loch Ness (and other watercourses) will require a CAR licence application to SEPA before the works can proceed.
- 7.7.9 Under the CAR licence the works in Loch Ness may be restricted as to the timing of their completion, in order to avoid the salmon migratory season when salmon will be moving through Loch Ness, and thus maximise salmon smolt escapement in line with local objectives. The CAR licence is likely to limit construction works in Loch Ness to between July and October or similar timescale. This will include the timing of piling, tunnel boring, and other noise and vibration-generating activities within the Cofferdam and in the immediate vicinity of the loch shoreline.

Further Surveys and Pre-Commencement Checks

- 7.7.10 It is recommended that the following pre-commencement surveys are completed prior to the commencement of construction (as outlined in the CEMP):
- Electric fishing surveys of the Glaic na Ceardaich watercourse (sites KS08, KS09 and KS10), Allt a' Chruineachd (KS03), Allt a' Chnuic Chonaisg (KS12) and Allt a' Mhinisteir (KS05 and KS06) to inform mitigation for permanent and temporary watercourse crossings. The presence of resident brown trout populations is considered most likely in the Glaic na Ceardaich watercourse due to the suitability of habitat and passability of

the watercourse. The potential for brown trout to be present at the other sites is low but cannot be discounted.

- A repeat aquatic macroinvertebrate survey is recommended in the autumn sampling season (September to November). Best practice guidelines state that both spring and autumn sampling should be undertaken to gain an accurate indication of the invertebrate community present at a site due to the seasonal life cycles and hatching periods of different invertebrate groups.
- Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed.
- Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species (to be combined with pre-commencement surveys for terrestrial INNS: refer to Chapter 6: Terrestrial Ecology).

Additional Mitigation During Construction

Construction of the Cofferdam

- 7.7.11 To minimise the effects of noise from piling on fish, there should be a 'soft start' to piling works to deter fish from the immediate area where physical injury may occur. Mason and Collett (2011) suggest a soft start to piling using a blow energy of 150 kJ, and show that using a soft start will have a lower impact on the salmon initially.
- 7.7.12 A fish rescue will be required during de-watering of the Cofferdam as it is highly likely that fish will congregate in these sheltered areas during construction and then become trapped as the Cofferdam is sealed. This process will form part of the CAR licence, and detailed methodology will be provided for the licence application.
- 7.7.13 Construction of Temporary Jetty and Delivery of Materials by Barge. For materials delivered by barge, a local barge should be sourced to reduce the potential to introduce INNS from other waterbodies. This would preferably be a barge in existing usage on Loch Ness and the Caledonian Canal. Where possible, the barge should be inspected prior to arrival on-site and between deployments for the presence of INNS, and biosecurity measures implemented as considered necessary, according to check, clean, dry principles.

Watercourse Crossings for Temporary Access Tracks

- 7.7.14 In addition to the pre-commencement fish surveys described above, it is recommended that culverting of watercourses is supervised by the Aquatic ECoW, and this is likely to form a condition of the CAR licence. The ECoW will ensure the correct installation and functioning of SuDS and silt control measures.
- 7.7.15 Culverting of watercourses will require sections to be isolated and fish rescues carried out, according to the conditions of the CAR licence. This process will be informed by the fish surveys of watercourse crossing locations.

Construction of the Headpond and Headpond Embankment

- 7.7.16 Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies, notably Loch Ashie SPA.

Effects as a Result of Temporary Site Drainage, Including SUDs

- 7.7.17 As described above, the installation of temporary site drainage will be supervised and monitored by the ECoW to ensure that it is effective in preventing the contamination of watercourses and waterbodies.

Monitoring during Operation

- 7.7.18 Monitoring of aquatic habitats upon completion of the Development is recommended for the following aspects:
- Regular monitoring surveys for the presence of INNS, to be combined with surveys for terrestrial INNS, in watercourses within the Development Site and assessed as receptors in relation to INNS above.
 - Regular monitoring of the Inlet / Outlet on the shore of Loch Ness should be carried out to ensure the integrity of the Screen and assess any potential impacts in relation to fish, in particular migratory salmon and other species due to the potential for distraction and entrapment / impingement.
 - Where permanent culverts are installed in watercourse crossings, it is recommended that these are monitored to ensure that there are no lasting effects on fish passage, especially in the event that brown trout or other protected / notable species are shown to be present in pre-commencement fish surveys.

7.8 Residual Effects

- 7.8.1 Design and construction mitigation has been taken into account when evaluating the significance of the potential impacts meaning that in some instances the significance of residual effects is the same as that reported for potential effects.
- 7.8.2 Where residual effects are the same as those reported for potential effects, they have not been repeated in this section but are presented in the summary of effects Table 7.5.

Construction of the Cofferdam on the Shoreline of Loch Ness

- 7.8.3 Taking into account the proposed mitigation, it is considered that the residual effect of Cofferdam construction on each receptor will be as follows:
- Salmon and lamprey – low magnitude impact, resulting in a **temporary Moderate adverse effect**. The likelihood of adverse effects to salmon and lamprey during Cofferdam construction is considered low due to the implementation of embedded and additional mitigation including a 'soft start' to piling and conditions of the CAR licence;
 - Other fish species in Loch Ness – low magnitude impact, resulting in a **temporary Moderate adverse effect**. As above, the likelihood of adverse effects to other fish species in Loch Ness is considered to be low;
 - Loch Ness habitat – remains as a **Negligible effect**.

Construction of Temporary Jetty and Delivery of Materials by Barge

- 7.8.4 The methodology for temporary Jetty construction will be the same as that for construction of the Cofferdam, and therefore the same mitigation principles apply.
- 7.8.5 These aspects will be supervised by the Aquatic ECoW under the conditions of the CAR licence, as above.
- 7.8.6 Residual effects of delivery of materials by barge on each receptor, with the implementation of recommended biosecurity mitigation measures, are as follows:

- Effects on Loch Ness due to the potential introduction of INNS by barge are assessed as a **Negligible effect**.

Watercourse Crossings for Temporary Access Tracks

7.8.7 Taking into account the implementation of additional mitigation measures under the conditions of a CAR licence, the residual effects of watercourse crossings for temporary and permanent access Tracks are as follows:

- Flowing watercourses – low magnitude impact, resulting in a **permanent Minor adverse effect**;
- Trout – low magnitude impact, resulting in a **Negligible effect**;
- Aquatic macrophytes, macroinvertebrates and other fish - **Negligible effect**.

Temporary Permanent Compounds

7.8.8 As above, taking into account the implementation of additional mitigation measures under the conditions of a CAR licence, the residual effects of temporary Compounds, including land take and culverting of watercourses, are as follows:

- Flowing watercourses – low magnitude impact, resulting in a **permanent Minor adverse effect**;
- Trout – low magnitude impact, resulting in a **Negligible effect**;
- Aquatic macrophytes, macroinvertebrates and other fish - **Negligible effect**.

Construction of the Headpond and Headpond Embankment

7.8.9 Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies, notably Loch Ashie SPA.

7.8.10 Residual effects as a result of construction of the Headpond and Embankment for each receptor are as follows:

- Loch Ashie – Negligible effect;
- Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig – **Negligible effect**.

Transport of Excavated Tunnel Material to Headpond

7.8.11 With the implementation of mitigation in addition to that built into the design, the residual impacts of material excavation, transport and management are as follows:

- Loch Ashie – due to the current WFD classification of Bad for this waterbody, it is considered that additional mitigation will reduce the residual effect of sediment run-off from material drainage to a **Negligible effect**;
- Loch Ness – Negligible effect;
- Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig – **Negligible effect**;
- Flowing watercourses, including Allt a' Mhinisteir – **Negligible effect**;
- Pond (KS15) – Negligible effect;
- Salmon and lamprey – **Negligible effect**;
- Other fish species in Loch Ness – **Negligible effect**;
- Brown trout – Negligible effect;
- Macrophytes, macroinvertebrates and fish species (other than brown trout) - **Negligible effect**.

Potential Effects as a Result of the Spread of INNS

- 7.8.12 Specific additional mitigation measures have been recommended to minimise the risk of spreading INNS through or introducing them to the Development Site, including material management, ECoW supervision, and strict biosecurity measures, including during operation of the Development.
- 7.8.13 Residual effects as a result of the potential spread or introduction of INNS are as follows:
- Loch Ashie - Negligible effect;
 - Loch Ness - Negligible effect;
 - Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig - **Negligible effect**;
 - Watercourses - Negligible effect;
 - Pond (KS15) - low magnitude impact, resulting in a **Negligible effect**;
 - Salmon and lamprey - **Negligible effect**;
 - Other fish species in Loch Ness - **Negligible effect**;
 - Brown trout - low magnitude impact, resulting in a **Negligible effect**;
 - Macrophytes, macroinvertebrates and fish species (other than brown trout) - medium magnitude impact, resulting in a **Negligible effect**.

Table 7.6 Summary of Effects

Construction Effects

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Loch Ashie SPA and SSSI	Receive run-off from the Headpond construction area and suffer impacts on water quality.	Moderate Adverse	Supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds will be effective.	Negligible	Not significant
	Effects of sediment input in run-off from transport and stockpiling of excavated materials	Moderate Adverse	Supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective.	Negligible	Not significant
	Introduction of INNS	Major Adverse	Material management, ECoW supervision, and strict biosecurity measures. Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant
Loch Ness (Habitats)	Temporary disturbance to the shoreline and margins of Loch Ness; disruption and removal of substrate, including dredging after removal of the Cofferdam, and de-watering of this area.	Moderate Adverse	Works in Loch Ness should be carried out under the supervision of an Aquatic ECoW.	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Potential for spreading INNS within Loch Ness by barge transport	Moderate Adverse	Supervised by the Aquatic ECoW under the conditions of the CAR licence. Local barge sourced to reduce the potential to introduce INNS from other waterbodies; preferably a barge in existing usage on Loch Ness and the Caledonian Canal. Where possible, the barge should be inspected prior to arrival on-site and between deployments for the presence of INNS, and biosecurity measures implemented as considered necessary, according to check, clean, dry principles.	Negligible	Not significant
	Impacts due to substrate and sediment removal and mobilisation, together with run-off from stockpiled material on the loch shore.	Moderate Adverse	Supervised by the Aquatic ECoW under the conditions of the CAR licence.	Negligible	Not significant
	Potential for INNS to be spread through or introduced to the Development Site during construction.	Negligible	Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Local barge sourced to reduce the potential to introduce INNS from other waterbodies; preferably a barge in existing usage on Loch Ness and the Caledonian Canal. Where possible, the barge should be inspected prior to arrival on-site and between deployments for the presence of INNS, and biosecurity measures implemented as considered necessary, according to check, clean, dry principles. Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS. The Aquatic ECoW will supervise all excavation and dredging works in Loch Ness to check for the presence of INNS and ensure that appropriate biosecurity measures, as detailed in the CEMP, are implemented. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Temporary Jetty construction and delivery of materials by barge and associated disturbance.	Negligible	Supervised by the Aquatic ECoW under the conditions of the CAR licence.	Negligible	Not significant
Loch Duntelchaig, Lochan an Eoin Ruadha and Loch na Curra	Receive run-off from the Headpond construction area and suffer impacts on water quality.	Minor Adverse	Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies.	Negligible	Not significant
	Effects of sediment input in run-off from transport and stockpiling of excavated materials	Minor Adverse	None required	Negligible	Not significant
	Introduction of INNS	Moderate Adverse	Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS.	Negligible	Not significant
Flowing watercourses	Watercourse crossings for temporary access Tracks and temporary Compounds, including diversion and culverting of watercourses.	Moderate Adverse	Culverting of watercourses supervised by the Aquatic ECoW to ensure the correct installation and functioning of SuDS and silt control measures.	Minor	Not significant
	Potential for the Allt a' Mhinisteir watercourse to receive run-off from the area of Headpond and Embankment construction, and suffer associated impacts on water quality	Minor Adverse	Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies.	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Impacts to water quality in watercourses that will receive temporary and permanent drainage from the Embankment area.	Minor Adverse	Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies.	Negligible	Not significant
	Material transport and management: the spread and run-off of sediment, and resulting reductions in water quality.	Minor Adverse	None required	Negligible	Not significant
	Potential for INNS to be spread through or introduced to the Development Site during construction.	Moderate Adverse	Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant
Pond	Impacts on aquatic habitats associated with material transport and management are the spread and run-off of sediment, and resulting reductions in water quality.	Negligible	None required	Negligible	Not significant
	Potential for INNS to be spread through or introduced to the Development Site during construction.	Minor Adverse	Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Aquatic macrophyte and aquatic macroinvertebrate community	Potential effects on the macrophyte and aquatic macroinvertebrate community in Loch Ness due to Cofferdam construction and piling.	Negligible	Repeat aquatic macroinvertebrate survey is recommended in the autumn sampling season (September to November).	Negligible	Not significant
	Watercourse crossings for Temporary Access Tracks and temporary Compounds, including diversion and culverting of watercourses.	Negligible	Repeat aquatic macroinvertebrate survey is recommended in the autumn sampling season (September to November). Culverting of watercourses supervised by the Aquatic ECoW to ensure the correct installation and functioning of SuDS and silt control measures.	Negligible	Not significant
	Construction of the Headpond and Headpond Embankment, including land take and transport of excavated material.	Negligible	Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies.	Negligible	Not significant
	Transport of excavated tunnel material to Headpond via conveyor belt, and management of material from tunnelling works.	Negligible	None required	Negligible	Not significant
	Potential for INNS to be spread through or introduced to the Development Site during construction.	Minor Adverse	Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant
	Temporary Jetty construction and delivery of materials by barge and associated disturbance.	Negligible	None required	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Atlantic salmon and lamprey species (Loch Ness)	Direct mortality or physical injury through construction, piling and de-watering activities; Physical injury as a result of piling noise; Avoidance reaction by salmon, potentially disrupting the migratory pathway.	Major Temporary Adverse	There should be a 'soft start' to piling works to deter fish from the immediate area where physical injury may occur. Works in Loch Ness should be carried out under the supervision of an Aquatic ECoW. A fish rescue will be required during de-watering of the Cofferdam as it is highly likely that fish will congregate in these sheltered areas during construction and then become trapped as the Cofferdam is sealed.	Moderate Temporary Adverse	Significant
	Transport of excavated tunnel material to Headpond via conveyor belt, and management of material from tunnelling works.	Negligible	None required	Negligible	Not significant
	Potential for INNS to be spread through or introduced to the Development Site during construction - factors such as inter-species competition and displacement.	Moderate Adverse	Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant
Other fish species (Loch Ness)	Direct mortality or physical injury through construction, piling and de-watering activities; Physical injury as a result of piling noise.	Moderate Temporary Adverse	There should be a 'soft start' to piling works to deter fish from the immediate area where physical injury may occur. Works in Loch Ness should be carried out under the supervision of an Aquatic ECoW. A fish rescue will be required during de-watering of the Cofferdam as it is highly likely that fish will congregate in these sheltered areas during construction and then become trapped as the Cofferdam is sealed.	Moderate Temporary Adverse	Significant
	Temporary Jetty construction and delivery of materials by barge and associated disturbance.	Negligible	None required	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Transport of excavated tunnel material to Headpond via conveyor belt, and management of material from tunnelling works - adverse effects of sediment run-off.	Negligible	None required	Negligible	Not significant
	Potential for INNS to be spread through or introduced to the Development Site during construction - factors such as inter-species competition and displacement.	Moderate Adverse	Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant
Resident brown trout population (flowing watercourses within the Development Site)	Watercourse crossings for Temporary Access Tracks and temporary Compounds, including diversion and culverting of watercourses.	Minor Adverse	Electric fishing surveys of the Glaic na Ceardaich watercourse (sites KS08, KS09 and KS10), Allt a' Chruineachd (KS03), Allt a' Chnuic Chonaisg (KS12) and Allt a' Mhinisteir (KS05 and KS06) to inform mitigation for permanent and temporary watercourse crossings. Culverting of watercourses supervised by the Aquatic ECoW to ensure the correct installation and functioning of SuDS and silt control measures. Watercourse sections to be isolated and fish rescues carried out, according to the conditions of the CAR licence.	Negligible	Not significant
	Construction of the Headpond and Headpond Embankment, including land take and transport of excavated material.	Negligible	Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies.	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Impacts on aquatic habitats associated with material transport and management are the spread and run-off of sediment, and resulting reductions in water quality.	Negligible	None required	Negligible	Not significant
	Potential for INNS to be spread through or introduced to the Development Site during construction - factors such as inter-species competition and displacement.	Moderate Adverse	<p>Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed.</p> <p>Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species.</p> <p>Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS.</p> <p>Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.</p>	Negligible	Not significant
Other fish species (flowing watercourses within the Development Site)	Watercourse crossings for Temporary Access Tracks and temporary Compounds, including diversion and culverting of watercourses.	Negligible	<p>Electric fishing surveys of the Glaic na Ceardaich watercourse (sites KS08, KS09 and KS10), Allt a' Chruineachd (KS03), Allt a' Chnuic Chonaisg (KS12) and Allt a' Mhinisteir (KS05 and KS06) to inform mitigation for permanent and temporary watercourse crossings.</p> <p>Culverting of watercourses supervised by the Aquatic ECoW to ensure the correct installation and functioning of SuDS and silt control measures.</p> <p>Watercourse sections to be isolated and fish rescues carried out, according to the conditions of the CAR licence.</p>	Negligible	Not significant
	Construction of the Headpond and Headpond Embankment, including land take and transport of excavated material.	Negligible	Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies.	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Transport of excavated tunnel material to Headpond via conveyor belt, and material management of material from tunnelling works.	Negligible	None required	Negligible	Not significant
	Potential for INNS to be spread through or introduced to the Development Site during construction - factors such as inter-species competition and displacement.	Minor Adverse	<p>Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed.</p> <p>Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species.</p> <p>Material excavated or dredged from Loch Ness must be retained in the immediate area, i.e. stockpiled on the loch shoreline, to prevent the spread of INNS.</p> <p>Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.</p>	Negligible	Not significant

Operational Effects

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Loch Ashie SPA and SSSI	Introduction of INNS during operation.	Minor Adverse	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Regular monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Loch Ness (Habitats)	Inlet / Outlet structure on Loch Ness shoreline, including Screen during operation.	Negligible	Works in Loch Ness should be carried out under the supervision of an Aquatic Ecological Clerk of Works (ECoW).	Negligible	Not significant
	Introduction of INNS during operation.	Negligible	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Regular monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Loch na Curra, Lochan an Eoin Ruadha and Loch Duntelchaig	Introduction of INNS during operation.	Minor Adverse	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Regular monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Flowing watercourses	Watercourse crossings for Permanent Access Tracks, including culverting of watercourses.	Moderate Adverse	None required	Minor	Not significant
	Permanent Compounds, including land take and culverting of watercourses.	Moderate Adverse	None required	Minor	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Introduction of INNS during operation.	Minor Adverse	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Regular monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Pond	Introduction of INNS during operation.	Negligible	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Regular monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Aquatic macrophyte and aquatic macroinvertebrate community	Inlet / Outlet structure on Loch Ness shoreline, including Screen during operation.	Negligible	None required	Negligible	Not significant
	Watercourse crossings for Permanent Access Tracks, including culverting of watercourses.	Negligible	None required	Negligible	Not significant
	Permanent Compounds, including land take and culverting of watercourses.	Negligible	None required	Negligible	Not significant
	Introduction of INNS during operation.	Negligible	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Regular monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Atlantic salmon and lamprey species (Loch Ness)	Inlet / Outlet structure on Loch Ness shoreline, including Screen during operation.	Negligible	None required	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Rheotactic (the tendency of fish to face into an oncoming current) distraction by attracting migratory fish such as salmon from their migration path.	Negligible	None required	Negligible	Not significant
	Introduction of INNS during operation.	Minor Adverse	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Regular monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Other fish species (Loch Ness)	Inlet / Outlet structure on Loch Ness shoreline, including Screen during operation - entrapment and impingement effects.	Negligible	None required	Negligible	Not significant
	Introduction of INNS during operation.	Minor Adverse	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Annual monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Resident brown trout population (flowing watercourses within the Development Site)	Watercourse crossings for Permanent Access Tracks, including culverting of watercourses - impact on fish passage and localised habitat.	Minor Adverse	Electric fishing surveys of the Glaic na Ceardaich watercourse (sites KS08, KS09 and KS10), Allt a' Chruineachd (KS03), Allt a' Chnuic Chonaisg (KS12) and Allt a' Mhinisteir (KS05 and KS06) to inform mitigation for permanent and temporary watercourse crossings.	Negligible	Not significant
	Permanent Compounds, including land take and culverting of watercourses.	Negligible	None required	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Introduction of INNS during operation.	Negligible	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Annual monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant
Other fish species (flowing watercourses within the Development Site)	Watercourse crossings for Permanent Access Tracks, including culverting of watercourses.	Negligible	Electric fishing surveys of the Glaic na Ceardaich watercourse (sites KS08, KS09 and KS10), Allt a' Chruineachd (KS03), Allt a' Chnuic Chonaisg (KS12) and Allt a' Mhinisteir (KS05 and KS06) to inform mitigation for permanent and temporary watercourse crossings.	Negligible	Not significant
	Permanent Compounds, including land take and culverting of watercourses.	Negligible	None required	Negligible	Not significant
	Introduction of INNS during operation.	Minor Adverse	Biosecurity measures implemented throughout the operation of the Development, following 'Check, Clean, Dry' principles. Annual monitoring surveys for the presence of aquatic and terrestrial INNS for a period of five years after the completion of construction.	Negligible	Not significant

Decommissioning Effects

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Loch Ashie SPA and SSSI	Surface water run-off and associated siltation and pollution	Negligible	Supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds will be effective.	Negligible	Not significant
Loch Ruthven SAC, SPA, Ramsar site and SSSI, North Inverness Lochs SPA and River Moriston SAC	Sufficiently distant from the development to avoid adverse effects during decommissioning	Negligible	Specific mitigation in relation to species that are qualifying features of the River Moriston SAC.	Negligible	Not significant
Loch Ness (Habitats)	Temporary effects of loch substrate disturbance and sediment mobilisation in a localised area of loch shoreline due to removal of Inlet / Outlet structure and Screen.	Moderate	<p>Works in Loch Ness should be carried out under the supervision of an Aquatic Ecological Clerk of Works (ECoW).</p> <p>Supervised by the Aquatic ECoW under the conditions of the CAR licence.</p> <p>Local barge sourced to reduce the potential to introduce INNS from other waterbodies; preferably a barge in existing usage on Loch Ness and the Caledonian Canal. Where possible, the barge should be inspected prior to arrival on-site and between deployments for the presence of INNS, and biosecurity measures implemented as considered necessary, according to check, clean, dry principles. The Aquatic ECoW will supervise all excavation and dredging works in Loch Ness to check for the presence of INNS and ensure that appropriate biosecurity measures, as detailed in the CEMP, are implemented.</p> <p>Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.</p>	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Loch Duntelchaig, Lochan an Eoin Ruadha and Loch na Curra	Surface water run-off effects, including siltation and pollution, during decommissioning of the Development.	Minor Adverse	Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies. Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species.	Negligible	Not significant
Flowing watercourses	Watercourses are likely to receive surface water run-off during decommissioning, including contamination with sediment and pollution.	Moderate Adverse	De-culverting of watercourses supervised by the Aquatic ECoW to ensure the correct installation and functioning of SuDS and silt control measures. Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies. Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Minor	Not significant
Pond	Potential to receive contaminated run-off during decommissioning.	Negligible	Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant
Aquatic macrophyte and aquatic macroinvertebrate community	Effects include the disturbance of habitats through culvert removal, and impacts to water quality through surface water run-off, siltation and pollution.	Negligible	Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies. Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Atlantic salmon and lamprey species (Loch Ness)	Disturbance of loch substrate, mobilisation of sediment, and the direct mortality and injury of fish in the precise locality of the works	Moderate Adverse	Works in Loch Ness should be carried out under the supervision of an Aquatic Ecological Clerk of Works (ECoW). A fish rescue will be required during de-watering. Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant
Other fish species (Loch Ness)	Disturbance of loch substrate, mobilisation of sediment, and the direct mortality and injury of fish in the precise locality of the works.	Moderate Adverse	Works in Loch Ness should be carried out under the supervision of an Aquatic Ecological Clerk of Works (ECoW). A fish rescue will be required during de-watering. Survey of the extent of the proposed Cofferdam and temporary Jetty works in Loch Ness for the presence of INNS, notably Nuttall's waterweed. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant
Resident brown trout population (flowing watercourses within the Development Site)	Disturbance of habitats during culvert removal, surface water run-off and associated mobilisation of sediment and pollution.	Minor Adverse	De-culverting of watercourses supervised by the Aquatic ECoW to ensure the correct installation and functioning of SuDS and silt control measures. Watercourse sections to be isolated and fish rescues carried out. Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies. Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species. Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.	Negligible	Not significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Other fish species (flowing watercourses within the Development Site)	Disturbance of habitats through culvert removal, and impacts to water quality through surface water run-off, siltation and pollution.	Negligible	<p>De-culverting of watercourses supervised by the Aquatic ECoW to ensure the correct installation and functioning of SuDS and silt control measures. Watercourse sections to be isolated and fish rescues carried out.</p> <p>Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds will be effective in preventing the run-off of silt-laden water to adjacent watercourses and waterbodies.</p> <p>Walkover survey of the watercourse crossing locations for INNS, both aquatic and riparian species.</p> <p>Biosecurity measures implemented throughout the Development, following 'Check, Clean, Dry' principles.</p>	Negligible	Not significant

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