A9 DUALLING
PERTH TO INVERNESS

Appendix 12.11

Invertebrates & Fungi

Transport Scotland

August 2018

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Table of contents

Chapter Pages

Tables

1. Introduction

1.1.1. This appendix provides the details of the data collection, survey data, and assessment of habitat suitability for invertebrate and fungi species undertaken to inform the Design Manual for Roads and Bridges (DMRB) Stage 3 Assessment for the Proposed Scheme.

1.1.2. This technical appendix excludes aquatic invertebrate species and associated habitats; these are considered within Environmental Statement (ES) Appendix 12.3, Aquatic Ecology.

1.1.3. Additionally, this technical appendix provides details of the assessment of fungi within the vicinity of the Proposed Scheme. The information in this appendix has been used to inform the DMRB Stage 3 Assessment.

2. Methodology

2.1. Desk Study

2.1.1. Similar methodologies were used to compile information on invertebrates and fungi. The following applies to both groups unless stated otherwise.

2.1.2. Studies reported in this technical appendix relate to the gathering of baseline information which comprised:

- collation of all species on the Scottish Biodiversity List (SBL[i]) and the Cairngorms Nature Action Plan (CNAP[ii]) to form a long-list of species for initial consideration;
- collation of biological records of invertebrates;
- review of information on all species on this list to determine their habitat preferences and distribution; and
- targeted desk-based study to assess the habitat suitability for invertebrates, based on above information.

2.1.3. The Cairngorms National Park Authority (CNPA) provided a draft list of priority non-protected species for consideration within the DMRB Stage 3 Assessment.

2.1.4. The CNPA list (referred to here as the CNPA priority species list), includes invertebrates and fungi and species that are not legally protected but considered important to the Cairngorms National Park as they are scarce and the Cairngorms hold a significant proportion of the UK population. The criteria used to assemble the list includes the following:

- Cairngorms National Park holds a high proportion of UK/National population or range;
- listed as Priority in the UK Biodiversity Action Plan (BAP) or a Local Priority as identified by consultation;
- rarity (at National or UK level or endemic);
- known to be in decline (by 25% in Scotland or UK);
- known to be under threat;
- practical action achievable; and

- ecology & data knowledge understood to an adequate level to allow practical action.

2.1.5. The CNPA priority species list are classified as “priority”, “other high priority”, “medium” and “low priority”. As the thresholds for these sub-divisions are not clear and taking a precautionary approach, all species on the list are treated as priority.

2.1.6. The combined list of species from the SBL, CNAP and CNPA priority non-protected species were reviewed to produce a list of notable invertebrate and fungi species which could be present within the Proposed Scheme based on the habitats present.

2.1.7. Biological records of invertebrates were requested from the Highland Biological Recording Group (HBRG) and the North East Scotland Biological Records Centre (NESBReC) within 1km of the existing A9 by Atkins in 2016.

2.1.8. Biological records of fungi were requested from the Fungal Records Database of Britain and Ireland (managed by the British Mycological Society) and HBRG within 1km of the Proposed Scheme.

2.1.9. Records prior to 2007 have not been included as they are no longer considered to be relevant due to their age.

2.1.10. The habitat preferences and known ranges of notable invertebrates and fungi were researched to refine the list, such that a species was included if:

- habitats or features that support the species are present within the Proposed Scheme; and
- the Proposed Scheme is within the known or likely range of the species.

2.1.11. The CNPA also provided a list of locations where CNPA priority non-protected species are present, or where suitable habitat for them may exist. This list is referred to here as the “CNPA priority species locations”.

2.1.12. The CNPA priority species locations included broad descriptions of habitat and species and were classified as either “red” or “amber”:

- **red –** locations of highest priority, where there are records in the corridor and they are species and habitats which are particularly vulnerable and high priority for conservation. This includes, for example, aspen trees or confirmed records of a species in the CNAP.
- **amber –** locations that are still considered high priority, with no confirmed records but an indication of habitat suitability had been provided by an expert in that particular group.

2.1.13. The detailed locations of the CNPA list were reviewed against field verification that was carried out as part of other ecological surveys undertaken between 2015 and 2017, to determine any broad associations between species and habitat.

2.1.14. This included reviewing the 2017 National Vegetation Classification (NVC) results (ES Appendix 12.2) to identify areas of suitable habitat that may support notable fungi and invertebrate species present in the area based on the compiled lists and desk study data.

2.1.15. Incidental records of wood ant nests (*Formica* spp. exact species not identified), from a 250m wide buffer around the Proposed Scheme, were collected during the other ecological surveys undertaken between 2015 and 2017. These records were collated and compared to the wood ant habitat mapping and other information listed above for broad correlation with habitat types.

2.1.16. Additional desk-based studies were undertaken in May 2017 to identify suitable verge habitat for wood ants. This study involved reviewing roadside verges using online street photography[1] and the detailed habitat mapping collected as part of 2017 NVC survey, to identify locations suitable for wood ants with woodland fringe habitats, sunny aspect and potential for flowering plants (including vetches, eyebrights, heathers and clovers). The habitats were subsequently checked against the overall distribution of wood ant nests along the Proposed Scheme using incidental records.

2.1.17. In relation to wood ant nest locations the Ecological Zone of Influence (EZoI[2]) was assumed to not extend beyond the 5m buffer that is included within the Proposed Scheme. In relation to CNPA priority species locations, the EZoI was assumed to extend 10m beyond the Proposed Scheme to allow for potential indirect impacts but also for imprecision in the point locations. These areas are the Study Areas for these species.

3. Impact Assessment Methodology

3.1.1. Ecological features have been subject to nature conservation evaluation. Impact significance has then been assessed taking into account the nature and magnitude of potential impacts (including duration, extent and reversibility) and their consequent effects on important ecological features. The approach to nature conservation evaluation and impact assessment was agreed across the wider A9 Dualling Programme.

3.2. Nature Conservation Evaluation

3.2.1. The general approach to defining the importance of ecological features follows that of CIEEM (2016)[iii]. The approach is also in line with advice given in DMRB Interim Advice Note 130/10 'Ecology and Nature Conservation: Criteria for Impact Assessment'[iv].

3.2.2. Ecosystems, habitats and species within the Study Area are assigned levels of importance for nature conservation based on the criteria set out in Table 3.1.

3.2.3. The rarity, ability to resist or recover from environmental change, and uniqueness of an ecological feature, function/role within an ecosystem, and level of legal protection or designation afforded to a given ecological feature are all factors considered in determining its importance.

Table 3.1: Importance Criteria

Importance	Criteria
International	**Ecosystems and Habitats** Ecosystems or habitats essential for the maintenance of: • internationally designated areas or undesignated areas that meet the criteria for designation; and/or • viable populations of species of international conservation concern. **Species** Species whose presence contributes to: • the maintenance of qualifying habitats, communities and assemblages that occur within internationally designated sites or within undesignated areas that meet the criteria for such designation.

[1] Google Street View.
[2] EZoI is an area defined by the assessment in which there may be ecological features subject to impacts and subsequent effects as a result of the Scheme.

Importance	Criteria
National	**Ecosystems and Habitats** Ecosystems or habitats essential for the maintenance of: • qualifying communities and assemblages that occur within nationally designated sites or within undesignated areas that meet the criteria for such designation; and/or • viable populations of species of national conservation concern. **Species** Species whose presence contributes to: • the maintenance of qualifying habitats, communities and assemblages that occur within nationally designated sites or within undesignated areas that meet the criteria for such designation; or • the maintenance and restoration of biodiversity and ecosystems at a national level, as defined in the Scottish Biodiversity Strategy (SBS) (Scottish Government, 2013, 2015)[v].
Regional	**Ecosystems and Habitats** Ecosystems or habitats essential for the maintenance of: • communities and assemblages that occur within regionally important sites or localities listed as being of conservation importance in the Highland Biodiversity Action Plan (BAP) or Cairngorms Nature Action Plan (CNAP) (including Local Nature Reserves (LNR)) or within undesignated areas that meet the criteria for such designation; and/or • viable populations of species of regional conservation concern. **Species** Species whose presence contributes to: • the maintenance and restoration of biodiversity and ecosystems at a regional level, as defined in the Highland BAP or CNAP.
Authority Area	**Ecosystems and Habitats** Ecosystems or habitats essential for the maintenance of: • populations of species of conservation concern within the authority area. **Species** Species whose presence contributes to: • the maintenance and restoration of biodiversity and ecosystems within a relevant area such as such as Aviemore in the CNAP.
Local	**Ecosystems and Habitats** Ecosystems or habitats essential for the maintenance of: • populations of species of conservation concern within the local area (for example a Local Nature Reserve). **Species** Species whose presence contributes to: • the maintenance and restoration of biodiversity and ecosystems at a local level.
Less than Local	**Ecosystems and Habitats** • Ecosystems or habitats that do not meet the above criteria, i.e., supporting at least populations of species of conservation concern within the local area. **Species** • Features that are considered to be absent or do not meet any of the above criteria.

3.3. Impact Assessment

3.3.1. For the purposes of this assessment, the impact descriptors in Table 3.2 are taken to summarise the overall characterisation of positive or negative impacts in accordance with CIEEM (2016)[iii], including:

- impact extent/scale (e.g. entire habitat loss, partial habitat loss or indication over specific area affected);
- direct or indirect impact (e.g. direct mortality of individuals from vehicle collisions, or indirect mortality of individuals from reduced prey resources due to pollution of watercourses);
- reversibility of impact (reversible or irreversible);
- frequency of impact (single event, recurring or constant);
- duration of impact (short-term, medium-term, long-term or permanent); and
- likelihood of occurrence (certain/near certain, probable, unlikely or extremely unlikely).

3.3.2. The character of impacts was defined using the criteria set out in Table 3.2 as High, Medium, Low or Negligible, following the above impact characterisation approach.

Table 3.2: Impact Magnitude and Character for Ecological Features

Impact Descriptor	Impact Characterisation
High	An impact resulting in a permanent effect on the distribution and/or abundance of a habitat, species assemblage/community or population, in such a way as to alter the integrity of the feature and its conservation status. If negative, this type of effect would reduce the integrity of the feature and its conservation status. If positive, it would result in an improvement to the conservation status of the feature.
Medium	An impact resulting in a long-term but reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population. If negative, this type of effect would have neutral long-term implications for the integrity of the feature or its conservation status. If positive, it would not alter the long-term conservation status of the feature.
Low	An impact resulting in a short-term reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population.
Negligible	No discernible impact on the distribution and/or abundance of a habitat, species assemblage/community or population.

Impact Significance

3.3.3. Each feature's importance and the potential impacts upon it have been determined through surveys and consultation, to provide a robust basis for making a professional decision on the appropriate focus of the impact assessment. The assessment is then focused on those impacts that result in potentially significant effects on important ecological features. For example, an area of amenity grassland would not meet the criteria for local ecological importance and would not progress through the assessment process, as the assessment only includes features of local importance or above. However, any impact on a Site of Special Scientific Interest (SSSI) would progress through the assessment process as these sites are designated as nationally important. Habitats, species and species groups that are considered to have a nature conservation

value of less than local are not considered important ecological features[3] in the context of this assessment. Any impact on such a feature as a result of the Proposed Scheme is considered unlikely to have a significant effect on the conservation status of such habitats or species on a local, regional, national or international scale. Therefore, features assessed to be of less than local nature conservation value have been scoped out of the ecological impact assessment (EcIA).

3.3.4. CIEEM (2016)[iii] notes that impacts that are likely to be relevant in an assessment are those that are predicted to lead to significant effects (negative or positive) on important ecological features. Significant effects are those that undermine the conservation status[4] of important ecological features. Knowledge and assessment of construction methods and operational activities, together with the ecological knowledge of ecologists with experience of similar large-scale infrastructure projects, has been used to identify the potential impacts of the project on ecological features.

3.3.5. Following the above approach, the assessment aims to characterise ecological impacts rather than placing a reliance only on magnitude. The character of an impact is used to inform the determination of whether or not the impact on the feature in question is a significant one.

3.3.6. Where impacts on internationally, nationally or regionally important ecological features are characterised as 'Medium' or 'High', they are considered to be potentially significant under the terms of the Environmental Impact Assessment (EIA) Regulations[vi].

3.3.7. Impacts characterised as 'Low' on internationally important features, can be determined as potentially significant as can impacts characterised as 'High' on features of Authority Area importance. There may in addition be a number of impacts on a feature that, whilst not of a character to be significant in themselves, may cumulatively result in a significant effect on that feature.

3.3.8. Where significant impacts are identified, mitigation will be developed to reduce impacts where feasible and are taken into account in the assessment of residual effects Mitigation

3.3.9. The principles of the mitigation hierarchy[v,vii] have been applied when considering potential impacts and subsequent effects on ecological receptors within the Study Area. These principles are that impacts on biodiversity should be subject to the following sequential mitigation actions:

- avoidance;
- mitigation;
- compensation; and
- enhancement.

3.3.10. For the purpose of this assessment, mitigation refers to measures that are considered essential to avoid and reduce negative impacts of the Proposed Scheme. Compensation refers to measures taken to make up for the loss of, or permanent damage to, biological resources through the provision of replacement areas. Unless otherwise stated, all compensatory measures are considered to be part of the essential mitigation package.

[3] An ecological feature is considered important based on many factors including its rarity, diversity, naturalness, context in the wider landscape, size and distribution as set out in A Nature Conservation Review (Ratcliffe, 1977).
[4] Conservation status for habitats is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and function as well as the long-term distribution and abundance of its population within a given geographical area. Conservation status for species is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its population within a given geographical area.

3.3.11. The mitigation measures described within this EcIA have been incorporated into the design and construction programme and taken into account in the assessment of residual effects. The mitigation aims to avoid or negate impacts on ecological features in accordance with best practice guidance and UK, Scottish and local government environmental impact, planning and sustainability policies. These mitigation measures include those required to achieve the minimum standard of established good practice together with additional measures to further reduce any negative impacts of the Scheme. The mitigation measures include those required to reduce or avoid the risk of committing legal offences.

3.3.12. Mitigation is also designed to produce a net gain for biodiversity where practicable in line with policy and guidelines[iii].

3.3.13. Mitigation measures set out in this ES will be specified as environmental commitments in the contract documents to ensure implementation by the appointed Contractor.

3.3.14. Generic mitigation for priority invertebrate and fungi species has been agreed with CNPA and these have been incorporated into the project specific measures listed in Table 7.2 and the assessment of residual impacts against specific locations in Table 8.1 and Table 8.2.

3.3.15. Impacts that are not significant (including those where compliance with regulation is required) would be expected to be avoided or reduced through the application of a Construction Environmental Management Plan (CEMP) and best working practice (e.g. mitigation of potential pollution impacts through adherence to standard best practice and guidelines). Significant ecological impacts are expected to be mitigated through a combination of best practice and typical, proven mitigation methods along with mitigation targeted to specific locations as described in the assessment.

3.4. Limitations

3.4.1. Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.

3.4.2. No detailed invertebrate or fungi surveys have been undertaken as part of the assessment. The desk based approach was agreed with the CNPA[5] as a suitable means of identifying the likely key areas for invertebrates. It is considered that the information collated with respect to invertebrates is sufficient to inform the Stage 3 Assessment.

[5] Email from Dr Sally Mackenzie, Ecological Advisor, CNPA, dated April 21 2016.

4. Results

4.1. Invertebrates

4.1.1. The scientific and common name and associated listing status of all invertebrate species discussed in this report are listed in Annex A.

4.1.2. The CNAP[ii] lists 15 “key” invertebrate species.

4.1.3. The resulting CNPA priority non-protected species includes 16 invertebrates. These are categorised as follows:

- 4 species listed as “priority”;
- 4 species listed as “other high priority”; and
- 3 species listed as “medium and low priority”.

4.1.4. In addition, there are 5 other species listed under various categories by the CNPA that are aquatic therefore considered within ES Appendix 12.3.

4.1.5. The data search identified 119 post-2007 listed invertebrate records, that were identified on the listings documented in Annex A, from within the Study Area. These records are summarised in Table 4.1 and shown on Figure 12.10.

Table 4.1: Desk Study Invertebrate Records

Number of Records	Species	Distribution along Proposed Scheme
35	Rannoch sprawler (*Brachionycha nubeculosa*)	Records from Milton Wood at Aviemore and on the lower parts of Craigellachie National Nature Reserve (NNR).
23	Hairy wood ant (*Formica lugubris*)	Most of the records occur to the north of Carrbridge, from Baddengorm Wood to Slochd. There are also three records around Aviemore and six records between Granish and Carrbridge.
14	Narrow-headed ant (*Formica exsecta*)	The records occur in two clusters near Crannaich and Black Mount Junction.
9	Cousin German moth (*Protolampra sobrina*)	Most of the records occur around Aviemore with an isolated record at Ellan Wood to the north of Kinveachy.
8	Mountain bumblebee (*Bombus monticola*)	One cluster of records occurs between Black Mount and Slochd while most of the records occur between Aviemore and Avielochan.
7	Scottish wood ant (*Formica aquilonia*)	The records are scattered between Granish Junction and Slochd.
7	Kentish glory moth (*Endromis versicolora*)	The records are scattered along the Proposed Scheme at Slochd, Avielochan and around Aviemore.
5	Sword-grass moth (*Xylena exsoleta*)	The records occur near Loch Alvie and Milton Wood near Aviemore.

Number of Records	Species	Distribution along Proposed Scheme
4	Shining guest ant (*Formicoxenus nitidulus*)	All records occur at one location in Baddengorm Wood to the north of Carrbridge.
3	*Hydrochus brevis* (a water beetle)	All records occur in a cluster to the south of Kinveachy.
2	*Berosus luridus* (a water beetle)	Both records occur to the south of Kinveachy.
1	Northern brown argus moth (*Aricia Artaxerxes*)	Record near Granish.
1	Small scabious mining-bee (*Andrena marginata*)	Record near Aviemore.

4.1.6. The CNPA priority species locations included 125 records considered to have potential for Cairngorms priority invertebrate species which fall within 250m of the Proposed Scheme, as shown on Figure 12.9. These locations, which include 91 red and 34 amber sites, are summarised into 12 broad habitat types as listed in Table 4.2.

4.1.7. Thirty-six of the CNPA priority species locations (13 amber, 23 red) occur within the Study Area.

Table 4.2: Summary of Invertebrate CNPA Priority Species Site Locations within the Study Area

Priority	CNPA Priority Record[6]	Number of Records	Interest / Species as detailed by CNPA
Amber	5, 6, 21, 170, 177*, 179, 182*, 183, 187, 188, 189	11	Dry heath. If bearberry present - potential for dark yellow underwing butterfly and netted mountain moth.
	67, 73, 76, 110, 118, 120, 123, 126*, 128, 130*, 144, 158, 160, 162*, 169, 171	16	Conifer woodland. Potential for rare saproxylic hoverflies, spiders and sometimes wood ants.
	63*, 66*, 72*, 132	4	Bare ground/ephemeral/heath/trackside habitats. Solitary bee potential. Solitary bees were identified in a disused quarry located within the Proposed Scheme (NH8513023916), during field verification carried out in conjunction with other ecological surveys.
	53*	1	Oak woodland important for moths. The rare moth *Levipalpus hepatariella* recorded.
	185*	1	Dry heath with base rock and lose stones. Mountain mason bee.
	180*	1	Broad-leaved woodland. Regenerating birch suitable for Kentish Glory.

[6] Record as shown on Figure 12.9. Records that fall within Proposed Scheme denoted with an * and the associated group is highlighted in grey.

Priority	CNPA Priority Record[6]	Number of Records	Interest / Species as detailed by CNPA
Red	4, 7, 18*, 59, 93, 95, 96*, 97, 100*, 101*, 103, 104*, 107*, 111, 116, 139, 140, 143, 149	19	Aspen trees. Known potential for aspen hoverfly. 4ha of Aspen woodland has been identified across the Proposed Scheme during NVC habitat survey (ES Appendix 12.2).
	109, 114*, 121, 122, 125, 133*, 134*, 135*, 136, 146*, 147*, 152*, 154*, 159*, 164*, 165, 166, 167*, 174*, 176	20	Woodland edge/glade/ride. Narrow-headed wood ant. Wood ant nest (exact species not identified) were verified as widespread across the Proposed Scheme to the north of Granish Junction, during incidental surveys carried out in conjunction with other ecological surveys.
	24, 27, 30, 36, 39, 41, 42, 46, 48, 64, 86, 98, 102	13	Broad-leaved woodland. Wood ants, Kentish glory and the hoverfly *Crionrhina ranunculi*.
	9*, 54, 56, 60, 61*	5	Neutral semi-improved grassland. Potential for small scabious mining bee.
	35, 44	2	Broad-leaved woodland of known interest for butterfly and moth species (*Lepidoptera)*.
	23, 29	2	Craigellachie NNR has notified moth assemblage
	49*, 65*	2	Dry heath and birch. Granish area is hotspot for *Lepidoptera*.
	173	1	Bog and heath. Netted mountain moth and small dark yellow underwing butterfly recorded here
	38	1	Grassland rich in devil's-bit scabious (*Succisa pratensis*) has high potential for small scabious mining bee.
	19	1	Broad-leaved woodland. Pearl bordered & small pearl bordered fritillaries recorded here.
	22*	1	Broad-leaved woodland – birch. Potential for Kentish glory, wood ants.
	43	1	Broad-leaved woodland. Known hotspot for moths, potential habitat for Kentish glory.

4.1.8. Over 220 wood ant (exact species not identified) nest locations, were identified in and adjacent to the Proposed Scheme, from the incidental records collected during the ecological surveys carried out in 2017: 46 of these are located within the Proposed Scheme. The locations of all wood ant nests within and adjacent to the Proposed Scheme are shown on Figure 12.10.

4.1.9. The wood ant nests locations mainly (80%) occurred within woodlands on the NVC mapping. Nest locations that occurred within non-woodland NVC types were generally located within grassy or heath areas adjacent to woodlands.

4.1.10. The CNPA identified some amber priority species locations with potential for wood ant species within broad-leaved woodlands to the west of Aviemore. In addition, there were three hairy wood ant records near Aviemore in the desk study (Figure 12.10). However,

the incidental records did not include any nest locations south of Granish Junction on either side of the A9 (Figure 12.10). The A9 verge in the Proposed Scheme to the south of Granish Junction is generally lacking large areas of suitable habitat for wood ants such as large coniferous woodland.

4.1.11. The incidental records were collected in association with a range of ecological surveys which provided a comprehensive coverage of the area on and adjacent to the Proposed Scheme. Therefore, although the incidental records were not collected systematically, the absence of wood ant nests south of Granish Junction is considered indicative of the overall distribution across the Proposed Scheme.

4.1.12. Suitable habitat for the narrow-headed ant, hairy wood ant or Scottish wood ant is characterised by wood-fringed sunny banks. A total of 12 sections of road verge were identified as suitable for wood ants, as listed in Annex B. These included edges and glades within coniferous and broadleaf woodland on either aside of the road to the north of Granish Junction.

4.1.13. Based on a review of the NVC data in conjunction with all desk study and survey, habitats with high representation of species affiliations and that are present within the Proposed Scheme are:

- conifer woodland;
- neutral semi-improved grassland;
- flowery verges;
- dry heath;
- aspen woodland; and
- woodland edges and glades.

4.1.14. These habitats possess the greatest potential for a range of SBL and CNPA priority listed species as well as a generally rich resource for a range of other invertebrates, especially butterflies and aculeate hymenoptera (bees, wasps and ants). The woodland edge sites and open areas within woodland are the preferred habitat of habitat for narrow headed ants and wood ants.

4.2. Fungi

4.2.1. The scientific and common name and associated listing status of all fungi species discussed in this report are listed in Annex C.

4.2.2. The CNPA priority species list includes 46 fungi. These are categorised as follows:

- 1 species – aspen bracket fungi – is listed as “priority”;
- 15 other species listed as “other high priority”;
- 23 other species listed as “medium and low priority”; and
- 7 other species listed as “research” (required).

4.2.3. A further two species (white web cap (*Leucocortinarius bulbiger*) and upright coral (*Ramaria stricta*)) are included on the SBL and one species (black falls (*Boletopsis perplexa*)) is included on the SBL and the UKBAP.

4.2.4. The CNAP (Anon 2013[ii]) lists two fungal species as key species for focused action in the Cairngorm region: scarlet splash *Cytidia salicina* (on dead branches of willow in damp

situations) and *Hygrocybe punicea* (a waxcap typical of short sward, unimproved grasslands).

4.2.5. The database search returned 21 records within 1km of the Proposed Scheme. All records are greater than 80m from the Proposed Scheme and all records are older than 2007.

4.2.6. The CNPA priority species locations included 63 records considered to have potential for Cairngorms priority fungi species which fall within 250m of the Proposed Scheme, as shown on Figure 12.9. These locations, which include 36 red and 27 amber sites, are summarised into 12 broad habitat types as listed in Table 4.3.

4.2.7. Fifteen of the CNPA priority species locations (nine amber, six red) occur within the Study Area.

4.2.8. Based on the CNPA priority species site locations, the following habitats were identified from the NVC habitat survey maps during the desk study as being present within the Proposed Scheme and with potential for fungal interest:

- grassland: unimproved and semi improved acid grassland, unimproved and semi improved neutral grassland and unimproved calcareous grassland;
- woodland: broadleaf semi-natural, coniferous semi-natural, coniferous plantation where target notes indicated the presence of mature *Vaccinium* understory and mixed semi-natural; and
- aspen woodland.

4.2.9. The CNPA priority species locations include records associated with fungal taxa such as waxcaps, northern bilberry redleaf (*Exobasidium sydowianum*), Milcap (*Lactarius pornisis*) and other CNPA priority and non-priority taxa. However, most of the locations are associated with broad fungal diversity with no individual species identified.

Table 4.3: Summary of Fungi CNPA Priority Species Locations for Fungi within the Study Area

Priority	CNPA Priority Record[7]	Number of Records	Habitat	Associated fungal interest
Amber	12*, 14, 15*, 16*, 45, 55*, 74,	7	Neutral (some poor) semi-improved (some unimproved) grassland	Potential for waxcaps
	168, 172, 175	3	Conifer woodland	Fungi potential
	153, 181	2	Broad-leaved woodland	Fungi potential
	5, 6, 21, 170, 177*, 179*, 182*, 183, 187, 188, 189	11	Dry heath	If bearberry present - northern bilberry redleaf
	8*, 11*, 52, 58*	4	Mature trees	Mature larch associated with Milcap, mature oaks and other species associated with unspecified fungi

[7] Record as shown on Figure 12.9. Records that fall within the Study Area denoted with an * and the associated group is highlighted in grey.

Priority	CNPA Priority Record[7]	Number of Records	Habitat	Associated fungal interest
Red	34*	1	Neutral semi-improved grassland	Waxcap potential including record of crimson waxcap in area
	2	1	Broad-leaved (wet) woodland	Potential for scarlet splash (*Cytidia salicina*) associated with willows
	24, 27, 39, 26, 39, 41, 42, 46, 48, 64, 78, 102	12	Birch woodland (Craigellachie NNR)	Fungi hotspot with high potential for fungi
	68, 69, 71, 75, 77, 119, 124, 127*, 129, 131*, 138, 141, 145, 161, 163*	15	Conifer woodland	Potential for rare fungi, close to known hotspots
	155, 157*	2	Native pinewood	Fungi potential
	91*	1	Roadside	Diverse range of fungi
	81, 82, 87, 89	4	Broad-leaved (wet) woodland	Potential fungi interest - proximity to known fungi hotspot

5. Nature Conservation Evaluation

5.1. Invertebrates

5.1.1. Table 5.1 sets out the valuation of the habitats identified as having interest for invertebrates that have been identified within the Study Area. Given the variation in invertebrate habitat preferences, the habitats that fall within the Study Area have been assessed individually rather than providing a zone wide valuation level.

5.1.2. The 23 red priority invertebrate species locations within the Study Area, include conifer woodland, roadside and semi-improved grassland habitats. These are assessed to be of Authority Area value due to associated records of species and habitats which are particularly vulnerable and high priority for conservation.

5.1.3. Forty-six wood ant nest locations were identified within the Study Area, within or on the edge of woodlands to the north of Granish Junction, were assessed to be of Authority Area value for these species.

5.1.4. Several other habitats that provide suitable habitat for lower priority species at the 11 amber priority locations that fall within the Study Area, are assessed to be of Local value. This includes sunny and grassy verges with common bird's-foot trefoil (*Lotus corniculatus*) and heathers along the existing A9 offer suitability for solitary and social bees and a number of other invertebrate species.

Table 5.1: Invertebrate Valuation

Habitat type / reference	Valuation	Rational for valuation
Woodland edge/glade or woodland fringed banks and open areas CNPA red records 114, 133, 135, 146, 147, 152, 154, 159, 164, 167, 174 Widespread across the Proposed Scheme to the north of Granish Junction	Authority Area	These areas are suitable for the Scottish and hairy wood ants which are listed on the SBL and as other high priority species by the CNPA. The potential habitat is widespread in the surrounding area. However, these areas also provide suitable habitat for the narrow-headed ant, which is listed as a key species by the CNPA, with a very high importance because the population in the area is considered a national stronghold.
Aspen trees and associated woodland CNPA red records 18, 96,, 100, 101, 104, 107,	Authority Area	These areas are suitable habitat for the aspen hoverfly which is listed on the SBL and as a priority species by the CNPA. The potential habitat is scattered across approximately 20ha in the area on and adjacent to the Proposed Scheme. The species is considered to be of very high importance by the CNPA because the population in the area is considered a national stronghold.
Neutral semi-improved grassland CNPA red records 9, 61	Authority Area	These areas provide habitat for the small scabious-mining bee, listed on the SBL, and other solitary bees. This habitat is widespread in the surrounding area.
Conifer woodland CNPA amber records 126, 130, 162	Authority Area	Based on the presence of conifer woodland these areas were identified by the CNPA as having the potential for suitable habitat for priority species such as the saproxylic hoverfly species, the aspen hoverfly and pine hoverfly (also listed as a 'key species for focussed action' in the CNAP and on the UK BAP and SBL). This habitat may also have suitability to support other CNPA listed species, such as a pine woodland spider (*Clubiona subsultans*). The locations are listed as amber and therefore do not have confirmed records. However, given the high number and diversity of priority species that the areas potentially support and taking the precautionary principle and the potential for the above species to be present, these locations have been assessed to be of Authority level importance.
Dry heath & birch CNPA red record 49, 65	Authority Area	A restricted area near Granish that is a potential hotspot for *Lepidoptera*. Although the level of species identification is generalised it could include listed and priority species.
Oak woodland CNPA amber record 53	Authority Area	This area provides potential habitat for moths. The rare mountain flat-body moth, which is on the SBL, has been recorded at this location.
Bare ground, tracks and ephemeral habitats	Local	Verges containing flowering plant species such as common birds-foot trefoil and heathers are suitable for pollinating insects such as the mountain Mason bee which is listed as priority species by the CNPA and two

Habitat type / reference	Valuation	Rational for valuation
CNPA amber record 63, 66, 72		species of bumble bee listed on the SBL (mountain bumblebee and moss carder-bee). This habitat is widespread in the area surrounding the Proposed Scheme.
Dry heath. If bearberry present - CNPA amber record 177, 1182	Local	This habitat has been identified as having the potential to support CNPA priority species such as potential for dark yellow underwing butterfly and netted mountain moth. This habitat is widespread in the area surrounding the Proposed Scheme.
Dry heath with base rocks and loose stones CNPA amber record 185	Local	This habitat has been identified as having the potential to support CNPA listed species such as mountain Mason bee. This habitat is widespread in the area surrounding the Proposed Scheme.
Broad-leaved woodland. Regenerating birch CNPA amber record 180	Local	Regenerating birch in the Slochd area could be suitable for the locally important Kentish glory moth which is listed as a key species in the CNAP. This habitat is widespread in the area surrounding the Proposed Scheme.

5.2. Fungi

5.2.1. Table 5.2 sets out the valuation of the habitats identified as having interest for fungi that have been identified within the Study Area.

5.2.2. Given the variation in fungi habitat preferences, the habitats that fall within the Study Area have been assessed individually rather than providing a zone wide valuation level.

5.2.3. The six red priority fungi species locations within the Study Area, which include conifer woodland, roadside and semi-improved grassland habitats are assessed to be of Authority Area value due to associated records of species and habitats which are particularly vulnerable and high priority for conservation.

5.2.4. The nine amber priority species locations that fall within the Proposed Scheme are considered of general interest for fungi, with no associated precise and/or listed species and are therefore considered to be of Local value.

Table 5.2: Fungi Valuation

Habitat type / reference	Valuation	Rational for valuation
Neutral (some poor) semi-improved (some unimproved and improved) grassland CNPA amber record 12, 15, 16, 55	Local	Potential for waxcaps which may be CNPA and SBL listed species. No confirmed records but suitable habitat is present.
Dry heath CNPA amber record 177, 182	Local	If bearberry present, potential habitat for northern bilberry redleaf.

Habitat type / reference	Valuation	Rational for valuation
Mature trees CNPA amber record 8, 11, 58	Local	Mature larch associated with *Lactarius pornisis*, mature oaks and other species associated with unspecified fungi. No confirmed records but suitable habitat is present.
Neutral semi-improved grassland CNPA red record 34	Authority Area	Waxcap potential including record of crimson waxcap in area. Confirmed records of species and habitats which are particularly vulnerable and high priority for conservation.
Conifer woodland CNPA red records 1127, 131, 163	Authority Area	Potential for rare fungi, close to known hotspots. Confirmed records of species and habitats which are assumed to be particularly vulnerable and high priority for conservation.
Native pinewood CNPA red records 157	Authority Area	Potential for unspecified species of fungi. Confirmed records of species and habitats which are assumed to be particularly vulnerable and high priority for conservation.
Roadside CNPA red record 91	Authority Area	Diverse range of fungi. Confirmed records of species and habitats which are assumed to be particularly vulnerable and high priority for conservation.

6. Potential Impacts

6.1. Construction

Invertebrates

6.1.1. During construction, invertebrates may be affected as a result of:

- direct loss of habitats through land-take;
- severance of habitat;
- direct mortality due to various construction related activities; and
- disturbance to species due to elevated levels of construction related disturbance, such as increased noise, lighting, and human presence.

Fungi

6.1.2. During construction, fungi may be affected as a result of:

- direct loss of habitats through land-take; and
- direct loss of habitat through habitat degradation as a result of pollution and/or silt/ dust deposition.

6.2. Operation

6.2.1. Invertebrate and fungi species recorded within the Study Area will already be habituated to disturbance from the existing A9. However, there is a risk of increased direct mortality and habitat fragmentation as a result of Proposed Scheme operation.

7. Mitigation

7.1.1. A list of standard mitigation measures has been developed for all projects within the A9 Dualling Programme; a full list of those related to ecology is provided in ES Chapter 12: Ecology and Nature Conservation. Those measures of relevance to invertebrates and fungi are listed in Table 7.1.

7.1.2. The scheme specific mitigation measures relevant to invertebrates and fungi are listed in Table 7.2.

7.1.3. In addition to these, generic mitigation for invertebrates and fungi has been agreed with CNPA[8] and incorporated into the scheme specific mitigation measures. These address general invertebrate and fungi habitats requirements and include retention and reuse of soils from woodland (including aspen) sites (P11-E22) and other habitats (P11-E23), retention and reuse of dead wood from woodland sites (P11-E25) and use of bird's-foot trefoil in heath planting (P11-E24).

7.1.4. The specific mitigation measures for invertebrates and fungi provided to address the habitat and associated requirements at the red and amber priority species locations affected by the Proposed Scheme are to address potential impacts identified in Table 8.1 and Table 8.2.

7.1.5. Project specific mitigation includes a requirement for the translocation of wood ant nests from across the Proposed Scheme, representing the genetic diversity of the affected population, to suitable receptor sites before the commencement of construction. The ant nests selected for translocation will represent the full range of diversity present with priority given to scarcer Scottish wood ants species[9]. This will ensure a viable population representing the wood ant population affected by the Proposed Scheme is secured.

7.1.6. Potential receptor sites in the area surrounding the Proposed Scheme have been identified and provided by the CNPA[9]. This includes the Kinveachy Forest which appears to be highly suited as it is directly adjacent to the A9 and contains suitable habitat that is linked to, but would not disrupt, existing wood ant populations in and adjacent to the Proposed Scheme. The suitable habitat includes long established mature conifer woodlands, suited to the Scottish wood ant.

7.1.7. The potential sites identified are not considered fixed receptor sites as they may be colonised by wood ants prior to construction and thus will require survey prior to any translocation. Therefore, prior to translocation, areas of suitable habitat within the selected receptor site will be identified and clearly marked as an area to be retained and protected. This will include ensuring translocation is compatible with existing management (such as not disturbing the capercaillie populations at Kinveachy Forest).

7.1.8. The proposed receptor sites and associated translocation methods will be documented in a wood ant species protection plan (which is prescribed under mitigation items P11-E62) that will be approved by CNPA. This plan will be completed in sufficient time to allow for and subsequent land holder agreements, site preparation required and translocation of existing nests in the optional time of year (spring), therefore avoiding delays to construction. This may require the species action plan to be completed 12 months before construction commences.

[8] CNPA: Non-Protected Cairngorms A9 Priority Species & Mitigation, October 2016.
[9] Hayley Wiswell, February 2017. A9 Dualling project 11: Dalraddy to Slochd. Wood Ant receptor site scoping (for translocation outside of the road working corridor).

7.1.9. Translocation will be based on the proven methods adopted during the A9 Kincraig to Dalraddy widening[viii] and, for receptor sites outside the road corridor will follow the Scottish Code for Conservation translocations[ix]. Previous experience has shown that, depending on the timing, wood ant nests may recolonise sites after translocation but before construction. Therefore, where possible, nests will be moved to adjacent areas immediately prior to construction with the timing dictated by construction operations. The timing, therefore, may not be optimal for wood ant translocation.

Table 7.1: A9 Standard Mitigation Commitments

Mitigation Item[10]	Approximate Chainage/ Location	Timing of Measure	Description	Mitigation Purpose/ Objective	Specific Consultation or Approval Required
SMC-E1	Throughout Proposed Scheme	Pre-Construction	Pre-construction surveys will be undertaken to verify and, where required, update the baseline ecological conditions set out in the ES. The scope of the pre-construction surveys will be confirmed with SNH prior to them being undertaken.	To update the baseline ecological conditions set out in the ES.	SNH
SMC-E2	Throughout Proposed Scheme	Pre-Construction	Prior to construction a suitably qualified (or team of suitably qualified) Ecological Clerk of Works (ECoW) will be appointed and will be responsible for implementation of the Ecological Management Plan. The ECoW will: • provide ecological advice over the entire construction programme, at all times as required; • undertake or oversee pre-construction surveys for protected species in the areas affected by the Proposed Scheme; and ensure mitigation measures are implemented to avoid and reduce impacts on ecological features; and • monitor the implementation of the mitigation measures during the construction phase to ensure compliance with protected species legislation and commitments within the ES. The ECoW will be a member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and will have previous experience in similar ECoW roles. All ECoWs will be approved by Transport Scotland to be appropriately qualified for the role. The ECoW will be appointed in advance of the main construction programme commencing to ensure pre-construction surveys are undertaken and any advance mitigation measures required are implemented.	To ensure the implementation of the Ecological Management Plan.	None required
SMC-E9	Throughout Proposed Scheme	Pre-Construction, Construction & Post-Construction	Plant and personnel will be constrained to a prescribed working corridor through the use of, where practicable, temporary barriers to minimise the damage to habitats and	To protect habitats and fauna.	None required

[10] Only items relevant to invertebrates and fungi are listed

Mitigation Item[10]	Approximate Chainage/ Location	Timing of Measure	Description	Mitigation Purpose/ Objective	Specific Consultation or Approval Required
			potential direct mortality and disturbance to animals located within and adjacent to the Proposed Scheme.		
n/a (note)	Throughout Proposed Scheme	Construction	Best practicable means will be employed to avoid the disturbance of sensitive species and habitats with noise, dust and air pollution. The Standard Mitigation Measures as detailed in ES Chapter 11 (Road Drainage and the Water Environment), ES Chapter 13 (Landscape and Visual), ES Chapter 16 (Air Quality) and ES Chapter 17 (Noise and Vibration) will be implemented to protect aquatic and terrestrial habitats and species.	To protect aquatic and terrestrial habitats and species.	n/a

Table 7.2: Project Mitigation Commitments

Mitigation Item[11]	Approximate Chainage/ Location	Timing of measure	Description	Mitigation/ Purpose/ Objective	Specific Consultation or Approval Required
P11-E16	Throughout Proposed Scheme	Pre-Construction & Construction	The working area will be kept to the minimum necessary for construction of the project to reduce habitat loss. A Habitat Management Plan will be produced pre-construction and agreed with SNH. This will include specific plans and measures for working on the border of the Craigellachie SSSI/NNR and Alvie SSSI, as well as other sensitive habitats (such as aspen woodland), detailing avoidance, mitigation and rehabilitation measures to further reduce residual impacts.	To protect all habitats, including those located on the boundary of Craigellachie SSSI/NNR and Alvie SSSI.	SNH
P11-E17	Throughout Proposed Scheme	Pre-Construction & Construction	The removal of any trees identified for retention within the ES will be avoided and, if unavoidable, shall be undertaken in consultation with CNPA. Assessment of the trees at such locations will be undertaken and where any trees that were intended to be retained are identified as requiring felling or die as a result of construction works these will be replaced. Any changes to the extent of tree removal from that assessed within the ES, will be subject to assessment using the same methods as detailed within the ES to determine the appropriate mitigation requirements. Where required, any additional impacts identified will be appropriately mitigated for using the same methods as detailed within the ES. The size and species of replacement trees will be agreed in consultation with SNH, CNPA and relevant stakeholders, and will take account of management plans of immediately adjacent woodland.	To protect retained trees.	SNH and CNPA
P11-E18	Throughout Proposed Scheme	Construction	Aspen woodland will be avoided where possible. If felling is required, this shall be undertaken in consultation with CNPA and deadwood over 75cm circumference will be retained where practicable.	To protect aspen and species associated with it (including fungi and invertebrates).	CNPA
P11-E21	Throughout Proposed Scheme	Construction	Planting of new woodland will be undertaken at a variety of locations to mitigate for the loss of ancient woodland which in includes a proposed woodland compensation site (see Landscape and Ecological Mitigation plan, Figure 13.4). Soil will be retained from locations of ancient woodland and reused in areas of woodland planting. These soils will be reused in areas of new woodland	To compensate for the loss of ancient woodland.	SNH and CNPA

[11] Only items relevant to invertebrates and fungi are listed

Mitigation Item[11]	Approximate Chainage/ Location	Timing of measure	Description	Mitigation/ Purpose/ Objective	Specific Consultation or Approval Required
			planting in order to utilise the existing seedbank as much as possible and transfer soil organisms and specialist bacteria that may be adapted to these environments to new areas of woodland. This will include areas that are no longer wooded where appropriate (e.g. areas with a species rich ground layer and associated see bank). A method statement will be produced detailing the approach to soil translocation and woodland creation. The methodology will be agreed with SNH and CNPA. Planting activities will adopt good practice measures from the UK Forestry Standard[x] as appropriate to the nature conservation objectives of the planned woodland creation.		
P11-E22	Throughout Proposed Scheme	Construction	Where practicable, top soil from cleared woodland not on the ancient woodland inventory but still considered important (e.g. aspen woodland or SBL birchwoods) will be stored appropriately for re-use in areas where similar habitat is to be created. See Landscape and Ecological Mitigation plan, Figure 13.4.	To retain the seedbank of cleared woodland (including aspen and SBL birchwoods).	None
P11-E23	Throughout Proposed Scheme	Construction	Where practicable top soils or substrates from areas of Annex I or SBL priority habitat loss, including heath and species rich grassland, will be stored appropriately for re-use in areas where similar habitat is to be created. See Landscape and Ecological Mitigation plan, Figure 13.4. This includes species rich grasslands and areas of fungi habitat (such as grasslands that have been highlighted as potential waxcap habitat: CNPA priority locations 12, 15, 16, 34 and 55 shown on Figure 12.9) where turves will re-used to retain seed sources and botanical value.	To retain the seedbank of lost Annex I/SBL priority habitats.	None
P11-E24	Throughout Proposed Scheme	Construction	Bird's-foot trefoil (*Lotus corniculatus*) will be added to species mix for heath mitigation planting where practical and appropriate (e.g. not already locally abundant).	To maintain/enhance invertebrate habitat and provide additional foraging resources for wild pollinators.	None

Mitigation Item[11]	Approximate Chainage/ Location	Timing of measure	Description	Mitigation/ Purpose/ Objective	Specific Consultation or Approval Required
P11-E25	Throughout Proposed Scheme	Construction	Where retained, deadwood will be placed in a variety of locations and conditions to benefit a number of species. Deadwood should be stored in a location away from the working area to prevent risk of damage and then placed within areas of retained woodland or woodland planting at an appropriate time. Similarly, where possible, selected, blasted rock material will be incorporated into retained woodland and woodland planting for the benefit of a range of species including pine marten under the direction of an ECoW. Tree stumps will be retained in situ where felled on the edge of working areas where this does not pose a constraint to the works. Edges of woodland will be scalloped where practicable increasing variety of conditions to reduce the risk of windthrow. Existing stone dykes shall be retained where possible.	To maintain/enhance habitat for species including reptiles, invertebrates, and pine marten.	None
P11-E26	Throughout Proposed Scheme	Construction	If deadwood exists in wooded areas to be lost that are listed within the ancient woodland inventory, this deadwood will be transferred to nearby areas of ancient woodland to be retained or to areas of new woodland creation, to allow the retention and transfer of specialist ancient woodland invertebrates, fungi and bacteria. Ancient or veteran trees to be felled in these areas will also be moved to new woodland creation areas for the same purposes and to act as an input of new deadwood.	To maintain populations of specialist ancient woodland species, including invertebrates, fungi and bacteria.	None
P11-E62	Throughout Proposed Scheme to north of Granish Junction	Pre-Construction	Wood ant nests from across the affected area, representing the genetic diversity of the affected population, will be translocated to suitable receptor sites before the commencement of construction. Potential receptor sites for translocation adjacent to the Proposed Scheme include Kinveachy Forest. However, this is not considered a fixed receptor site and further survey work is required before construction commences to confirm the sites suitability. Translocation will follow methods adopted during the A9 Kincraig to Dalraddy widening[viii] (Project 10) and for receptor sites outside the road corridor will follow the Scottish Code for Conservation translocations[ix]. Previous experience has shown that, depending on the timing, wood ant nests may recolonise sites after translocation but before construction. Where possible, nests will be moved to adjacent areas immediately prior to construction, with the timing dictated by construction operations.	To maintain diversity of impacted populations of wood ants.	CNPA

Mitigation Item[11]	Approximate Chainage/ Location	Timing of measure	Description	Mitigation/ Purpose/ Objective	Specific Consultation or Approval Required
			A Species Protection Plan, including a monitoring plan, will be produced for wood ants pre-construction and agreed with CNPA to allow sufficient time for land holder agreements, any site preparation required, and translocation of existing nests in the optimal time of year (spring), therefore avoiding delays to construction. The plan shall detail the following: • a detailed methodology, based on successes/failures of previous work on the A9; • all necessary data to be carefully recorded so that monitoring work can be undertaken and comparisons made (e.g. time of translocation, weather, type of supplementary food provided); • all translocation work to take place in spring unless absolutely necessary; • an estimate of how many nests require translocation (based on evidence from Project 10 that larger nests are more likely to survive); • the species of wood ant that require to be translocated; • location and details of receptor sites, both within the LMA and any off-line receptor sites; all receptor sites to be marked on a map; • all receptor sites to be marked on the ground throughout construction - these areas will be strictly off limits to all construction; • protection measures for nests that can be retained alongside the road during construction; • where possible, factor in the requirement for 'extra' space to be made available for additional nests discovered immediately prior to construction; and • a commitment to monitor the nests for at least 5 years post-construction, with detailed instructions as to the data collected during monitoring visits.		

8. Residual Impacts

8.1. Construction

Invertebrates

8.1.1. With the adoption of the mitigation commitments, no effects on invertebrates as a result of degradation by pollution of habitats is predicted.

8.1.2. Impacts as a result of habitat loss on the following species are assessed in Table 8.1:

- the 34 amber and red priority species locations which support CNPA and or SBL listed species within the Proposed Scheme; and
- the 46 wood ant nest locations within the Proposed Scheme, within or on the edge of woodlands to the north of Granish Junction.

Table 8.1: Invertebrates: Specific Impacts, Mitigation and Residual Impacts - Construction

Feature, Location and Value	Potential Impact	Characterisation of Impact (Pre-mitigation)	Essential Mitigation	Residual Impact
Woodland edge/glade. Woodland fringed banks and open areas. Habitat for narrow-headed, Scottish and hairy wood ants. CNPA red records 114, 133, 135, 146, 147, 152, 154, 159, 164, 167, 174 Widespread across the Scheme to the north of Granish Junction. **Value:** Authority Area	Habitat loss	**Extent:** Widening of the A9 to between Granish Junction and Slochd will result in the loss of woodland. These areas include edge habitat and potential habitat for narrow-headed and other species of wood ant. The incidental survey identified 37 wood ant nest locations within the Proposed Scheme. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E1, SMC-E2, SMC-E9, P11-E16, P11-E17, P11-E21, P11-E62 – This details specific mitigation measure for wood ants which includes translation of nests from within the Proposed Scheme. Prior to translocation, a Wood Ant Habitat Protection Plan will be prepared which will include areas of suitable habitat will be identified and clearly marked as an area to be retained and protected. Wood ant nests will be translocated to appropriate receptor sites following methods adopted during the A9 Kincraig to Dalraddy widening.	Not significant
Aspen woodland. Habitat for aspen hoverfly. CNPA red records 18, 96, 100, 101, 104, 107 and potentially from other areas of aspen woodland **Value:** Authority Area		**Extent:** Widening of the A9 will result in the loss of aspen woodland at these locations and across 4.0ha and at 27 point locations[12] elsewhere on the Proposed Scheme. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E17, P11-E18, P11-E21, P11-E25 Replanting along the new road verge will include 5.4ha of aspen woodland located adjacent to areas of aspen impacted.	Not significant

[12] Areas are mapped where aspen trees are scattered or greater density throughout minimum mappable unit. Point locations are isolated or small groups of trees. The extent of aspen areas and point locations across the Study Area and within the Proposed Scheme are shown on Figure 12.7.

Feature, Location and Value	Potential Impact	Characterisation of Impact (Pre-mitigation)	Essential Mitigation	Residual Impact
Neutral semi-improved grassland. Potential habitat for *Andrena marginata* and other solitary bees. CNPA red records 9, 61 **Value:** Authority Area	Habitat loss	**Extent:** Widening of the A9 will to the south of Aviemore and at Granish Junction will result in partial loss of semi-improved grassland. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16 Similar grassland habitats are proposed to be recreated (see Landscape and Ecological Mitigation plan, Figure 13.4) and similar habitat remains adjacent to the Proposed Scheme, at both locations.	Not significant
Dry heath & birch. Hotspot for Lepidoptera. CNPA red record 53 **Value:** Authority Area	Habitat loss	**Extent:** Widening of the A9 to the south of Granish Junction will result in the partial loss of birch woodland. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E24 Replanting along the new road verge will include 3.7ha of birch woodland, including ~1ha directly adjacent to Granish Junction (Figure 13.4, sheet 6).	Not significant
Conifer woodland. Potential habitat for rare saproxylic hoverflies, spiders. CNPA amber records 118, 126, 130, 162 **Value:** Authority Area	Habitat loss	**Extent:** Establishment of access road in the area south of Crannaich will result in the loss of coniferous plantation woodland. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely	SMC-E2, SMC-E9, P11-E16, P11-E17, P11-E21 Replanting along the new road verge will include 16.7ha of coniferous woodland.	Not significant

Feature, Location and Value	Potential Impact	Characterisation of Impact (Pre-mitigation)	Essential Mitigation	Residual Impact
		Impact Descriptor: Medium		
Oak woodland. Potential habitat for moths including the mountain flat-body moth. CNPA amber records 53 **Value:** Authority Area	Habitat loss	**Extent:** Establishment of access road in the area south of Crannaich may indirectly impact on oak woodland. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E17, P11-E21 Replanting along the new road verge will include 19.8ha of mixed species woodland.	Not significant
Bare ground, ephemeral habitat. Potential habitat mountain Mason bee species of bumblebee. CNPA amber records 63, 66, 72 **Value:** Local	Habitat loss	**Extent:** The widening of A9 to the south of Avielochan, and elsewhere along the Scheme, will result in the loss of bare ground directly adjacent to the existing road verge. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16 Similar habitats will be created adjacent to the Proposed Scheme.	Not significant
Dry heath. Habitat for mountain mason bee. CNPA amber records 185	Habitat loss	**Extent:** Widening of the A9 to the south of Slochd summit, will result in the partial loss of dry heath on the edge of the Scheme footprint. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event	SMC-E2, SMC-E9, P11-E16, P11-E24 – This includes adding bird's-foot trefoil to species mix for heath compensatory planting where practical.	Not significant

Feature, Location and Value	Potential Impact	Characterisation of Impact (Pre-mitigation)	Essential Mitigation	Residual Impact
Value: Local		Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium		
Dry heath. Potential habitats for species such as potential for dark yellow underwing butterfly and netted mountain moth. CNPA amber record 177, 1182	Habitat loss	**Extent:** Widening of the A9 near Slochd summit, will result in the partial loss of dry heath. The community is widespread in the surrounding area. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E24 – This includes adding bird's-foot trefoil to species mix for heath compensatory planting where practical.	Not significant
Broad-leaved woodland. Regenerating birch in this area could be suitable for Kentish glory moth. CNPA Amber records 180 **Value:** Local	Habitat loss	**Extent:** The widening of an existing access road where it joins the A9 to the north of Slochd, will result in the partial loss of regenerating birch. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E17, P11-E21 Replanting along the new road verge will include 3.7ha of birch woodland.	Not significant

Fungi

8.1.3. With the adoption of the mitigation commitments degradation by pollution, silt or dust of habitats associated with fungal interest is not anticipated.

8.1.4. Impacts as a result of habitat loss on the 15 amber and red priority species locations within the Study Area which support CNPA priority and/or SBL listed species are assessed in Table 8.2.

8.1.5. Mitigation of impacts on fungi habitat loss is not easily achieved other than through habitat creation. Therefore, the fungi specific mitigation measures listed in Table 8.2 general include reuse of soils, turves and wood in adjacent areas of mitigation habitat creation.

Table 8.2: Fungi: Specific Impacts, Mitigation and Residual Impacts - Construction

Feature Location and Value	Potential Impact	Characterisation of Impact (Pre-mitigation)	Mitigation	Residual Impact
Grassland with waxcap potential including record of crimson waxcap in area CNPA red priority species location 34 **Value:** Authority Area	Habitat loss	**Extent:** Construction of access roads near Aviemore will result in the direct loss of habitat and disturbance to substrate that support CNPA priority species at this location. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E23 This includes reuse of turves in adjacent areas of grassland mitigation to retain biodiversity value.	Not significant
Coniferous and woodland with potential for rare fungi and close to known hotspots. CNPA red priority species locations 127, 131, 163 **Value:** Authority Area	Habitat loss	**Extent:** Widening of the A9 and construction of access roads and junctions will result in the direct loss of habitat and disturbance to substrate that support CNPA priority species at these locations. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E17, P11-E21, P11-E22, P11-E265 Replanting of 48.2ha of woodland as specified in the Landscape and Ecological Mitigation plan, Figure 13.4.	Not significant
Roadside with diverse range of fungi recorded. CNPA red priority species location 91	Habitat loss	**Extent:** Widening of the A9 near Kinveachy will result in the direct loss of habitat and disturbance to substrate that support CNPA priority species at this location. **Effect:** Direct negative	SMC-E2, SMC-E9, P11-E16	Not significant

Feature Location and Value	Potential Impact	Characterisation of Impact (Pre-mitigation)	Mitigation	Residual Impact
Value: Authority Area		**Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium		
Conifer woodland with fungi potential CNPA red priority species location 157 **Value:** Authority Area	Habitat loss	**Extent:** Widening of the A9 will result in the direct loss of habitat and disturbance to substrate that support CNPA priority species at these locations. A large area of pinewood will remain in this location. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E17 P11-E21, P11-E22 P11-E25 Replanting of conifer woodland at this location as shown in the Landscape and Ecological Mitigation plan, Figure 13.4.	
Grassland with potential for waxcap species. CNPA amber priority species location 12, 15, 16, 55 **Value:** Local	Habitat loss	**Extent:** Widening of the A9 and construction of access roads and junctions will result in the direct loss of habitat and disturbance to substrate that potentially support CNPA priority species at this location. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E23 This includes reuse of turves in adjacent areas of grassland mitigation to retain biodiversity value.	Not significant

Feature Location and Value	Potential Impact	Characterisation of Impact (Pre-mitigation)	Mitigation	Residual Impact
Dry heath, Potential for northern bilberry red leaf where bearberry present. CNPA amber priority species location 34 **Value:** Local	Habitat loss	**Extent:** Widening of the A9 and construction of access roads and junctions will result in the direct loss of habitat and disturbance to substrate that potentially support CNPA priority species at this location. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E17, P11-E23, P11-E24	Not significant
Mature larch associated with *Lactarius pornisis*, mature oaks and other species associated with unspecified fungi. CNPA amber priority species location 8, 11, 58 **Value:** Local	Habitat loss	**Extent:** Widening of the A9 at Granish Junction will result in the direct loss of habitat and disturbance to substrate that potentially support CNPA priority species at this location. **Effect:** Direct negative **Duration:** Permanent Frequency and timing: Single-event Reversibility: Irreversible Likelihood: Likely Impact Descriptor: Medium	SMC-E2, SMC-E9, P11-E16, P11-E17, P11-E21, P11-E22, P11-E25 Replanting along the new road verge will include 48.2ha of woodland and replanting of larch trees adjacent to Granish Junction (Figure 13.4, sheet 6).	Not significant

8.2. Operation

8.2.1. Invertebrate and fungi species recorded within the Study Area will already be habituated to disturbance through ambient road noise levels, due to the presence of the existing A9. Therefore, impacts on species as a result of noise disturbance have been discounted. Furthermore, air quality modelling undertaken during the Stage 3 assessment indicated that changes in NO_2 and particulate emissions will not be significant (ES Appendix 16.1). As such operational impacts on species are considered to be limited to direct mortality and effects from increased severance as a result of the road widening and additional access tracks and junctions.

8.2.2. During operation of the Proposed Scheme, invertebrate and fungi habitat will be more fragmented, particularly within the vicinity of Granish and associated access roads. This is unlikely to significantly affect invertebrate populations within the local area due to the abundance of similar and high-quality habitat in the area around the Proposed Scheme. Direct mortality of invertebrates is unlikely to be any greater than the existing baseline.

8.2.3. Given the above, operational impacts on invertebrates and fungi are not considered to be significant.

9. Conclusions

9.1.1. In summary, a number of locations have been identified within the Proposed Scheme that are suitable for SBL listed and CNPA priority invertebrate and fungi species. These comprise 29 red locations identified by the CNPA as known to support priority species. These locations are assessed to be of Authority Area importance.

9.1.2. Wood ant nests have been identified at over 220 locations, on and adjacent to the Proposed Scheme to the north of Granish Junction. Twelve sections of road verge to the north of Granish that are highly suitable for wood ants have been identified (Annex B). These verges and wood ant nest locations are assessed to be of Authority Area importance.

9.1.3. Several other locations provide potential suitable habitat for high and lower importance invertebrate and fungi species at CNPA amber priority species locations. These locations are widespread and are assessed to be of Local importance.

9.1.4. A9 standard mitigation for invertebrates and fungi species have been agreed with CNPA and a list of mitigation measures that address the potential impacts at the invertebrate and fungi priority species locations have been developed.

9.1.5. Project specific mitigation measures include the translocation of wood ant nests from across the Proposed Scheme to suitable receptor sites in adjacent areas before the commencement of construction on the Proposed Scheme.

9.1.6. The impact assessment concluded that, with the specified mitigation there would be no significant residual impacts from the construction phase of the proposed Scheme.

9.1.7. Operational impacts on notable invertebrate and fungi species are also not expected to be significant.

[i] Scottish Government (2013) Scottish Biodiversity List (2013) Available at: http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL (Accessed 22/06/2016)
[ii] Cairngorms National Park Association (2013) Cairngorms Nature Action Plan 2013-2018. Available at http://www.cairngorms.co.uk/resource/docs/publications/13052013/CNPA.Paper.1898.Cairngorms%20Nature%20Action%20Plan%202013-2018.pdf. (Accessed 22/8/2018)
[iii] CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.
[iv] Design Manual for Roads & Bridges (2010) Interim Advice Note (IAN) 130/10 - Ecology and Nature Conservation: Criteria for Impact Assessment.
[v] Scottish Government (2013) Scottish Biodiversity Strategy. Available at: http://www.gov.scot/Publications/2013/06/5538 (Accessed 14/06/2016)
[vi] http://www.legislation.gov.uk/uksi/2011/1824/contents/made (Accessed 18/04/2017)
[vii] Department for Communities and Local Development (2012). National Planning Policy Framework, Paragraph 118. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 (Accessed 14/06/2016)
[viii] Atkins (2004) A9 Kincraig to Dalraddy - Wood ant translocation method statement.
[ix] Scottish Natural Heritage (undated) Scottish Code for Conservation Translocations. Available at: https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/reintroducing-native-species/scottish-code-conservation-translocations (Accessed 12/08/17)
[x] Forestry Commission (2017) The UK Forestry Standard. Forestry Commission. Edinburgh. Available at: https://www.forestry.gov.uk/pdf/FCFC001.pdf/$FILE/FCFC001.pdf (Accessed August 2018)

Annex A. Potential Invertebrates Species from the Study Area and Associated CNAP Key Species, CNPA Priority, Listing on SBL and UKBAP and Legal Protection

Table A.1: Potential Invertebrates Species from the Study Area and Associated CNAP Key Species, CNPA Priority, Listing on SBL and UKBAP and Legal Protection

Group[1]	Species common name	Species scientific name	CNAP[3] key species	CNPA non-protected species priority[4]	UK BAP	Scottish Biodiversity List[5]	Threatened species[6]	Legally protected[7]
Lepidoptera	Small dark yellow underwing	*Anarta cordigera*			Yes			
Hymenoptera	Small flecked mining bee	*Andrena coitana*	Yes					
Hymenoptera	Small scabious mining-bee	*Andrena marginata*	Yes			Yes		
Hymenoptera	Tormentil mining bee	*Andrena tarsata*			Yes	Yes		
Lepidoptera	Garden tiger moth	*Arctia caja*			Yes	Yes		
Lepidoptera	Northern brown argus	*Aricia artaxerxes*			Yes	Yes	VU	WCA
Coleoptera	A water beetle[2]	*Berosus luridus*				Yes	NT	
Diptera	Pine hoverfly	*Blera fallax*	Yes	Priority	Yes	Yes	EN	
Lepidoptera	Pearl-bordered fritillary moth	*Boloria euphrosyne*	Yes		Yes	Yes	EN	WCA
Lepidoptera	Small pearl-bordered fritillary moth	*Boloria selene*	Yes		Yes	Yes		

Group[1]	Species common name	Species scientific name	CNAP[3] key species	CNPA non-protected species priority[4]	UK BAP	Scottish Biodiversity List[5]	Threatened species[6]	Legally protected[7]
Hymenoptera	Mountain bumblebee	*Bombus monticola*				Yes		
Hymenoptera	Moss carder-bee	*Bombus muscorum*				Yes		
Lepidoptera	Rannoch sprawler	*Brachionycha nubeculosa*						
Lepidoptera	Pearl-bordered fritillary	*Brachionycha putata*	Yes		Yes	Yes		
Diptera	A stonefly[2]	*Brachyptera putata*	Yes	Research	Yes	Yes		
Hymenoptera	Northern Osmia ruby tailed wasp	*Chrysura hisuta*		Other high priority	Yes	Yes		
Araneae	A pine woodland spider	*Clubiona subsultans*		Other high priority	Yes	Yes	VU	
Diptera	Northern damselfly[2]	*Coenagrion hastulatum*	Yes	Priority		Yes	EN	
Lepidoptera	Large heath moth	*Coenonympha tullia*			Yes	Yes	VU	WCA
Lepidoptera	Small dark yellow underwing butterfly	*Coranarta cordigera*						
Diptera	Hoverfly	*Crionrhina ranunculi*						
Coleoptera	Ten-spot pot beetle	*Cryptocephalus decemmaculatus*		Medium and low priority	Yes	Yes		
Coleoptera	A reed beetle[2]	*Donacia aquatica*		Medium and low priority	Yes	Yes		
Diptera	Phoenix fly (picture winged fly)	*Dorycera graminum*		Medium and low priority	Yes			
Lepidoptera	Kentish glory moth	*Endromis versicolora*	Yes			Yes		
Lepidoptera	Grey mountain carpet moth	*Entephria caesiata*			Yes	Yes		

Group[1]	Species common name	Species scientific name	CNAP[3] key species	CNPA non-protected species priority[4]	UK BAP	Scottish Biodiversity List[5]	Threatened species[6]	Legally protected[7]
Lepidoptera	Dark bordered beauty moth	*Epione vespertaria*	Yes		Yes		NT	
Lepidoptera	(Small) mountain ringlet moth	*Erebia epiphron*			Yes	Yes	NT	WCA
Lepidoptera	Autumnal rustic	*Eugnorisma glareosa*			Yes	Yes		
Hymenoptera	Scottish wood ant	*Formica aquilonia*	Yes	Other high priority	Yes			
Hymenoptera	Narrow-headed wood ant	*Formica exsecta*	Yes	Priority	Yes	Yes	EN	
Hymenoptera	Hairy wood ant	*Formica lugubris*	Yes	Other high priority	Yes			
Hymenoptera	Shining guest ant	*Formicoxenus nitidulus*	Yes		Yes	Yes		
Diptera	Aspen hoverfly	*Hammerschmidtia ferruginea*		Priority	Yes	Yes	EN	
Coleoptera	A water beetle[2]	*Hydrochus brevis*				Yes	NT	
Lepidoptera	Mountain Flat-body	*Levipalpus hepatariella*				Yes		
Diptera	Scottish yellow splinter[2] (a cranefly)	*Lipsothrix ecucullata*		Medium and low priority	Yes	Yes		
Lepidoptera	Brindled beauty moth	*Lycia hirtaria*			Yes	Yes		
Lepidoptera	Rannoch brindled beauty moth	*Lycia lapponaria*			Yes			
Mollusc	Freshwater pearl mussel[2]	*Margaritifera margaritifera*	Yes	Priority	Yes	Yes	EN	WCA
Coleoptera	Violet oil beetle	*Meloe violaceus*	Yes		Yes	Yes		
Hymenoptera	A nomad bee	*Nomada obtusifrons*				Yes		
Hymenoptera	A nomad bee	*Nomada roberjeotiana*				Yes		
Hymenoptera	Mason bee	*Osmia inermis*		Priority	Yes	Yes	VU	

Group[1]	Species common name	Species scientific name	CNAP[3] key species	CNPA non-protected species priority[4]	UK BAP	Scottish Biodiversity List[5]	Threatened species[6]	Legally protected[7]
Hymenoptera	A mason bee	*Osmia uncinata*			Yes	Yes	VU	
Lepidoptera	Cousin German moth	*Protolampra sobrina*			Yes	Yes		
Diptera	A cranefly	*Rhabdomastix laeta (=hilaris)*		Medium and low priority	Yes	Yes		
Lepidoptera	Argent and sable moth	*Rheumaptera hastata*			Yes	Yes		
Lepidoptera	Netted mountain moth	*Semiothisa carbonaria*			Yes			
Diptera	A stiletto fly[2]	*Thereva (=Spririverpa) lunulata*	Yes	Research	Yes	Yes		
Coleoptera	A rove beetle[2]	*Thinobius newberyi*		Research	Yes			
Mollusc	A whorl snail[2]	*Vertigo geyeri*		Medium and low priority	Yes	Yes	EN	ELD
Lepidoptera	Heath rustic moth	*Xestia agathina*			Yes	Yes		
Lepidoptera	Northern Dart	*Xestia alpicola subsp. alpina*			Yes			
Lepidoptera	Neglected rustic moth	*Xestia castanea*			Yes	Yes		
Lepidoptera	Sword-grass moth	*Xylena exsoleta*			Yes	Yes		

[1] Araneae: spiders;
Coleoptera: beetles;
Diptera: flies;
Hymenoptera: bees, wasps, ants and sawflies;
Lepidoptera: butterflies and moths; and

[2] Aquatic species which are addressed in ES Appendix 12.3

Mollusc: snails, mussels.	
[3] Cairngorms National Action Plan (CNPA, 2013[ii])	[4] Provided by CNPA consultation
[5] Scottish Biodiversity List (Scottish Government, 2013[i])	
[6] IUCN Red lists categories CE: critically endangered EN: endangered VU: vulnerable NT: near threatened	[7] Protected categories WCA: Wildlife and Countryside Act 1981 ELD: Environmental Liability Directive

Annex B. Verge Habitat Suitable for Wood Ants

Table B.2: Verge Habitat Suitable for Wood Ants

Suitability of habitat (high/low)	Grid ref. start	Grid ref. end	Length (m)	Northbound/ Southbound	Habitat/incidental records
North of Granish Junction (Northbound)					
Low	NH 89950 15320	NH 90060 15640	300	N	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 90060 15640	NH 90500 16980	1420	N	Coniferous plantation woodland. Moderately dense incidental wood ant records.
High	NH 90870 17550	NH 90940 17910	580	N	Coniferous plantation woodland. Moderately dense incidental wood ant records.
Low	NH 90964 18131	NH 91053 18712	480	N	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 91056 18721	NH 90786 20617	1970	N	Coniferous plantation woodland. Dense incidental wood ant records.
Low	NH 90785 20625	NH 90658 20988	380	N	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 90658 20988	NH 90567 21210	235	N	Coniferous plantation woodland. Moderately dense incidental wood ant records.
Low	NH 90567 21210	NH 90439 21483	315	N	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 90439 21483	NH 89904 22289	960	N	Coniferous plantation woodland. Moderately dense incidental wood ant records.
Low	NH 89343 22870	NH 89121 23134	340	N	Grassland adjacent to road verge. No incidental wood and records.
High	NH 89121 23134	NH 87699 24056	1760	N	Coniferous plantation woodland. Moderately dense incidental wood ant records.

Suitability of habitat (high/low)	Grid ref. start	Grid ref. end	Length (m)	Northbound/ Southbound	Habitat/incidental records
High	NH 85907 23841	NH 85269 23869	640	N	Coniferous plantation woodland. Moderately dense incidental wood ant records.
Low	NH85097 23885	NH 84778 23979	340	N	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
North of Granish Junction (Southbound)					
Low	NH 89978 15320	NH 90115 15720	430	S	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 90115 15720	NH 90240 16391	680	S	Coniferous plantation woodland. Moderately dense incidental wood ant records.
Low	NH 90240 16391	NH 90712 17201	950	S	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
Low	NH 90975 18016	NH 91040 19569	1560	S	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 91037 19572	NH 90805 20625	1070	S	Coniferous plantation woodland. Very dense incidental wood ant records.
Low	NH 90805 20625	NH 90676 20989	380	S	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 90676 20989	NH 90228 21906	1000	S	Coniferous plantation woodland. Moderately dense incidental wood ant records.
Low	NH 90228 21906	NH 89944 22270	440	S	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
Low	NH 89226 23028	NH 89126 23156	170	S	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 89121 23163	NH 87276 24064	2200	S	Coniferous plantation woodland. Moderately dense incidental wood ant records.
Low	NH 86417 23897	NH 86238 23882	170	S	Scattered trees or grassland adjacent to road verge. No incidental wood and records.
High	NH 85905 23861	NH 85337 23885	570	S	Coniferous plantation woodland. Moderately dense incidental wood ant records.

Suitability of habitat (high/low)	Grid ref. start	Grid ref. end	Length (m)	Northbound/ Southbound	Habitat/incidental records
North of Loch Alvie (Northbound)					
Low	NH 85310 09453	NH 85724 09591	80	N	Mainly coniferous and some broad-leaved plantation. No incidental wood and records.
Low	NH 86475 10004	NH 87252 10271	830	N	Mainly coniferous plantation in a narrow band adjacent to road verge. No incidental wood and records.
Low	NH 87584 10303	NH 88143 10495	600	N	Mainly coniferous plantation in a narrow band adjacent to road verge. No incidental wood and records.
North of Loch Alvie (Southbound)					
Low	NH 85310 09061	NH 87008 10204	1500	S	Mainly coniferous and some broad-leaved plantation. No incidental wood and records.
Low	NH 87154 10242	NH 87623 10290	460	S	Mainly coniferous and some mixed plantation in a narrow band adjacent to road verge. No incidental wood and records.
Low	NH 87837 10342	NH 88061 10415	240	S	Mainly coniferous and some mixed plantation in a narrow band adjacent to road verge. No incidental wood and records.
Low	NH 88379 10609	NH 88835 10894	540	S	Mainly broad-leaved woodland in a narrow band adjacent to road verge. No incidental wood ant records.

Annex C. Potential Fungi Species from the Study Area and Associated CNAP Key Species, CNPA Priority and Listing on SBL and UKBAP

Table C.3: Potential Fungi Species from the Study Area and Associated CNPA Priority and Listing on SBL and UKBAP

Species common name	Species scientific name	CNAP[1] key species	CNPA non-protected species priority[2]	Cairngorms importance - UK or national stronghold	UK BAP priority	Scottish Biodiversity List[3]
Aspen bracket fungus	*Phellinus tremulae*	Yes	Priority	Very high	No	No
Tooth fungi (15 species)			Other high importance	High	No	Yes
Drab tooth	*Bankera fuligineoalba*					
Orange tooth	*Hydnellum aurantiacum*	Yes			Yes	Yes
	H. caeruleum					
Zoned tooth	*H. concrescens*	Yes				
Mealy tooth	*H. ferrugineum*	Yes				
	H. peckii					
	H. scrobiculatum					
	H. spongiosipes					
Fused tooth	*Phellodon confluens*	Yes			Yes	Yes
Grey tooth	*P. melaleucus*					
Black tooth	*P. niger*					
	P. tomentosus					
	Sarcodon glaucopus				Yes	Yes

Species common name	Species scientific name	CNAP[1] key species	CNPA non-protected species priority[2]	Cairngorms importance - UK or national stronghold	UK BAP priority	Scottish Biodiversity List[3]
	S. scabrosus					
Scaly tooth	*S. squamosus*	Yes				
Mountain grisette	*Amanita nivalis*		Medium & low importance	Unknown	No	Yes
Rose spindler	*Clavaria rosea*		Medium & low importance	Unknown	No	No
Violet coral	*Clavaria zollingeri*		Medium & low importance	Unknown	No	No
Scarlet splash	*Cytidia salicina*	Yes	Medium & low importance	Unknown	No	Yes
Big blue pinkgill	*Entoloma bloxamii*		Medium & low importance	Unknown	Yes	Yes
Northern bilberry redleaf	*Exobasidium expansum*		Medium & low importance	Unknown	No	Yes
Snowbed mossbell	*Galerina harrisonii*		Medium & low importance	Unknown	No	Yes
Star earthtongue	*Geoglossum starbaeckii*		Medium & low importance	Unknown	No	Yes
Mountain cup	*Geopora arenosa*		Medium & low importance	Unknown	No	No
Lilac waxcap	*Hygrocybe lilacina*		Medium & low importance	Unknown	No	Yes
Milcap	*Lactarius pornisis*		Not listed	-	No	No
White web cap	*Leucocortinarius bulbiger*	Yes	Not listed	-	No	Yes
Litter decomposing fungi (23 species)	-		Medium & low importance	Unknown	No	No

Species common name	Species scientific name	CNAP[1] key species	CNPA non-protected species priority[2]	Cairngorms importance - UK or national stronghold	UK BAP priority	Scottish Biodiversity List[3]
Darkpurple earthtongue	*Microglossum atropurpureum*		Medium & low importance	Unknown	No	No
Sideshoot bonnet	*Mycena latifolia*		Medium & low importance	Unknown	No	No
Rooting bonnet	*Mycena megaspora*		Medium & low importance	Unknown	No	No
Mycorrhizal fungi (43 species)	-		Medium & low importance	Unknown	No	No
Mealy meadowcap	*Porpoloma metapodium*		Medium & low importance	Unknown	No	No
Upright coral	*Ramaria stricta*	Yes	Not listed	-	No	Yes
	Rhexophiale rhexoblephara	Yes	Not listed	-	No	No
Willow brittlegill	*Russula laccata (norvegica)*		Medium & low importance	Unknown	No	No
Alpine brittlegill	*Russula nana*		Medium & low importance	Unknown	No	No
Bog jellydisc	*Sarcoleotia turficola*		Medium & low importance	Unknown	No	No
Contorted strangler	*Squamanita contortipes*		Medium & low importance	Unknown	No	No
Powdercap strangler	*Squamanita paradoxa*		Medium & low importance	Unknown	No	Yes
Strathy strangler	*Squamanita pearsonii*		Medium & low importance	Unknown	No	Yes
Jellied bolete	*Suillus flavidus*	Yes	Not listed	-	No	No
Wood decomposing fungi (7 species)	-		Medium & low importance	Unknown	No	No

Species common name	Species scientific name	CNAP[1] key species	CNPA non-protected species priority[2]	Cairngorms importance - UK or national stronghold	UK BAP priority	Scottish Biodiversity List[3]
Pink waxcap	*Hygrocybe calyptriformis*		Research	High	Yes	Yes
Black falsebolete	*Boletopsis leucomelaena*		Research	High	Yes	Yes
Black falls	*Boletopsis perplexa*	Yes	Not listed	-	Yes	Yes
Oak fern rust	*Hyalopsora aspidiotus*		Research	High	No	No
White stalkball	*Tulostoma niveum*		Research	High	Yes	Yes
Marsh honey fungus	*Armillaria ectypa*		Research	Unknown	Yes	Yes
Olive earthtongue	*Microglossum olivaceum*		Research	Unknown	Yes	Yes
Giant knight	*Tricholoma colossus*		Research	Unknown	No	Yes

[1] Cairngorms National Action Plan (CNPA, 2013[ii])	[3] Provided by CNPA during consultation
[4] Scottish Biodiversity List (Scottish Government, 2013[i])	