AGENDA ITEM 7

APPENDIX 1B

2022/0242/DET

SUPPORTING INFORMATION

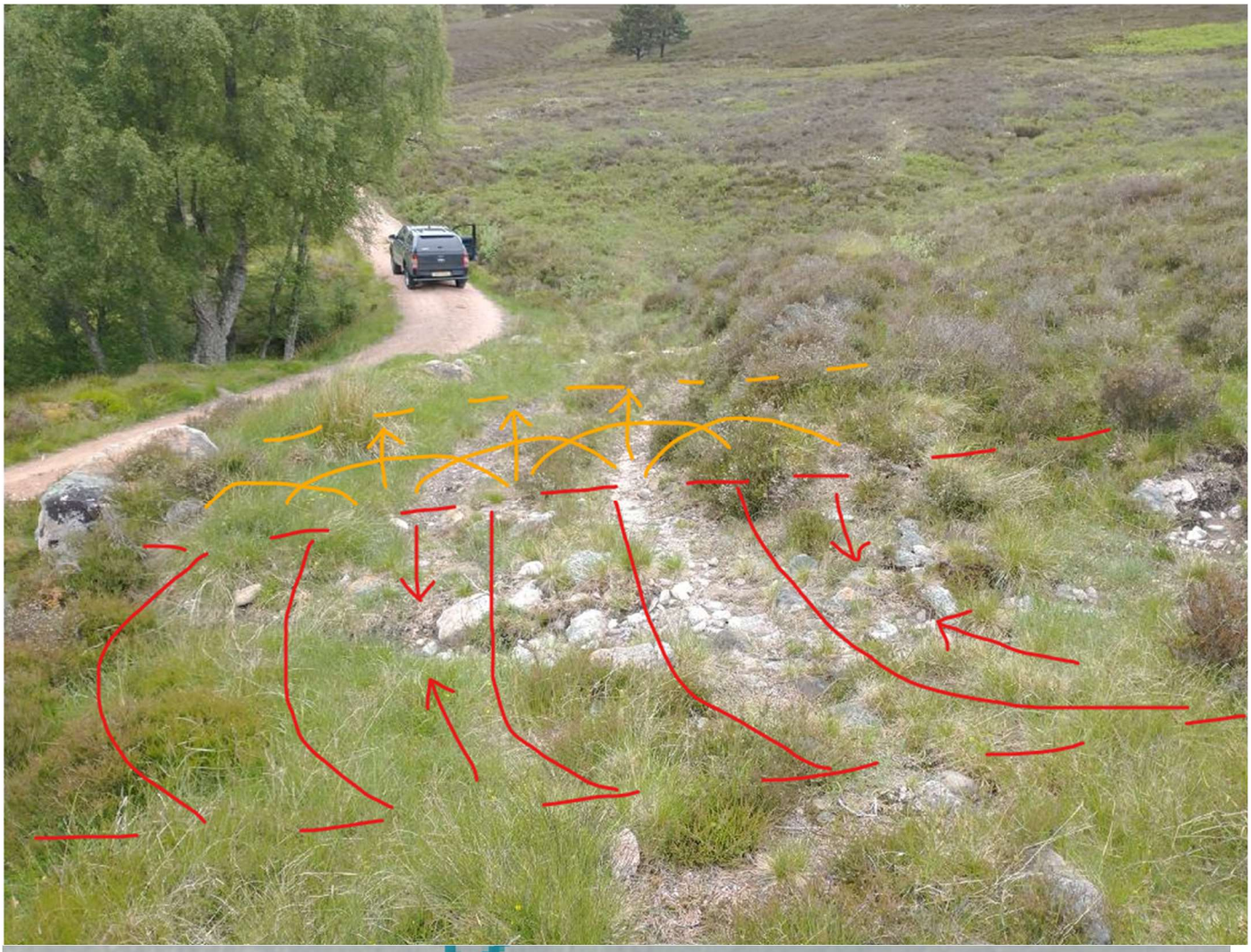
Megan Parker

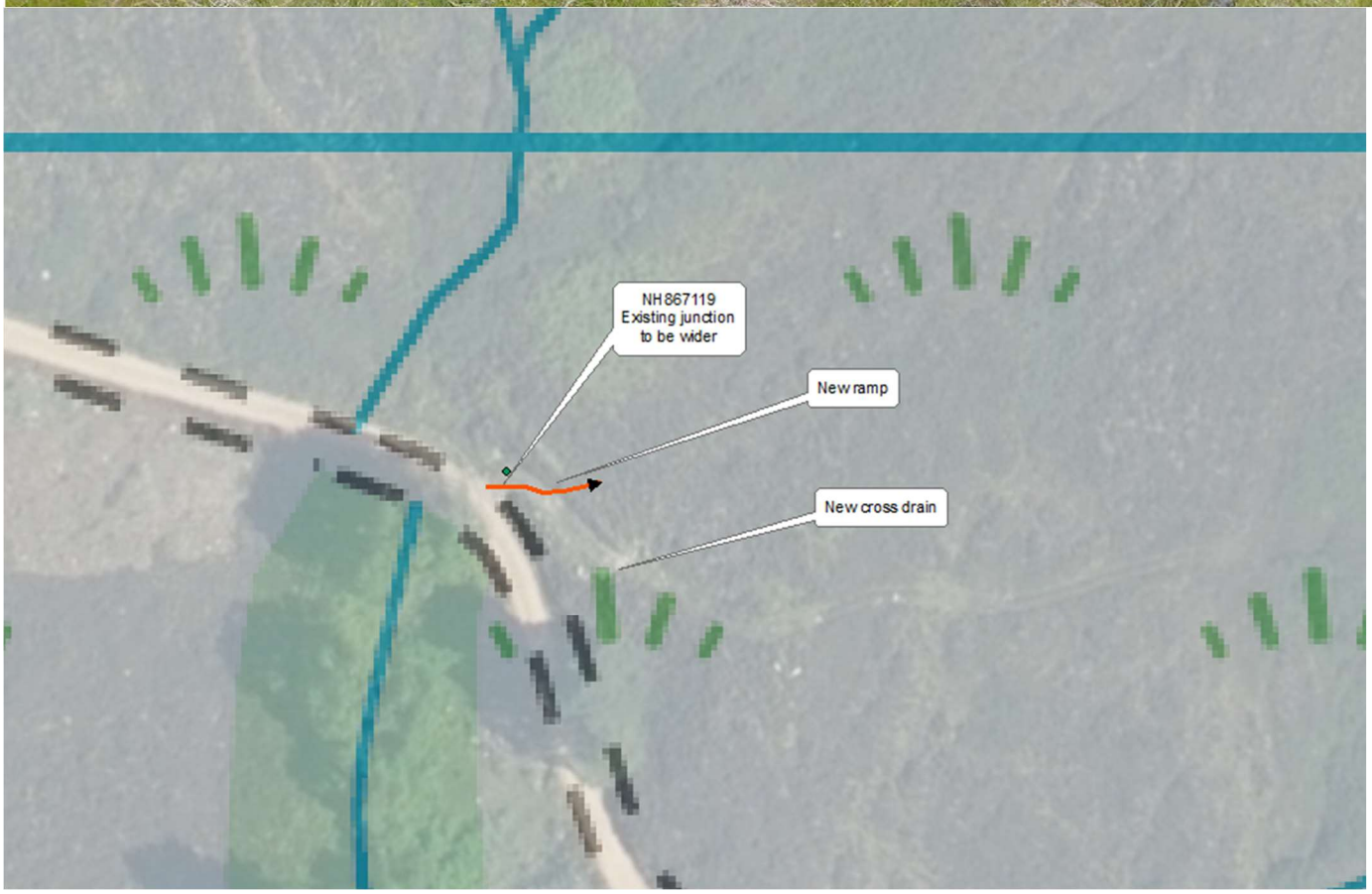
Subject: FW: PNO Lost Forest

22/02715/PNO additional machine ramp supporting information:
Note all illustrations are indicative and not-to-scale.

New machine ramp at NH867119 uses an existing ATV route, this will be widened and realigned with a new scrape for direct access (first photo below) and a new cross-ditch/dip installed across the existing ATV track to ensure surface runoff is pitched away from the track so it will not connect to a ditch which then connects to the nearby watercourse. The new cross drain (shown in the second photo below) will still be passable to ATVs.

Above: route of machine access, note purple mound shown above relates to the photo below.
Below: existing low point in track needs to be enhanced and deepened, with materials used to build a downslope rise in the track ensuring water cannot pass down the track but is forced off the track at this point, it must still be passbale by an ATV.




NH 867119
Existing junction
to be wider
New ramp
New cross drain

New machine ramp at NH867117 shown below, slightly shifted to the downslope side of the existing ditch line culvert, this will have a very marginal amount of fill (shown in yellow, no drainage culvert needed) and cut (shown in red) as shown below. This is just to get the machine up off the track and onto the hill. Expected usage will be minimal and we can consider re-vegetating it after use since its in a sensitive visual area.

KINRARA ESTATE: PROPOSED NEW WOODLAND PLANTING ECOLOGY SURVEYS

INTRODUCTION

SCOPE OF WORKS

Blairbeg Consulting Ltd have been commissioned to carry out a suite of ecological surveys in summer 2021 on behalf of Scottish Woodlands Ltd for proposed new woodland planting at Kinrara Estate, near Aviemore in Highland.

The objectives of the survey are as follows:

- To provide base-line information on the location, extent and floristics of the existing vegetation, and presence and status of protected species within the site as delineated by the extent of the estate open ground (the 'site');
- To produce an annotated vegetation map using the Phase 1 classification to identify and map the habitats. This is supported by habitat descriptions and target notes;
  To provide information on the location of sensitive ornithological interest within the site;
  To evaluate the status and nature conservation value of all sensitive ecological receptors and identify potential impacts resulting from new woodland expansion; and
  Recommend measures to mitigate any potential impacts of significance.

SITE CHARACTERISTICS

The site is located near Aviemore, lying west of the A9 public road and extending across a range of hills south of Kinveachy forest towards the River Dulnain. Beyond to the east, the site extends to headwaters of a number of tributaries of the River Dullnain bounded by Carn Dubh 'Ic an Deoir south to Carn Caol. The site lies within the Cairngorm National Park Authority boundary.

The site rises from approximately 250m above sea level in the southeast to a high point of approximately 800m on the north-east flank of Geal-charn Mor. The site falls to the north-west of this to approximately 400m above sea level along the River Dulnain valley before rising to the range of hills at the western boundary which reach just over 700m above sea level. Much of the site lies higher than 500m above sea level.

All areas of the site are historically managed as grouse moor, with evidence of recent muirburn across the site. Whilst the grouse moor areas are grazed by livestock (sheep) at low-intensity, only the far south-east of the site near Lynwilg and some extensive field systems along the River Dulnain contains any currently active agricultural land management with a network of pasture fields. There are a number of small woodland areas along riparian areas, particularly along the Allt Dubh to the south-east and the River Dulnain but wooded areas are generally scarce. Patchy stands of coniferous woodland are present, particularly on Cnoc Beag, but evidence of regeneration is limited. Several small exclosures for woodland regeneration and planting exist above the mature treeline on the steeper eastern slopes of Creag Ghleannain and Creag na h-Iolaire. There are a number of bothies, stalkers huts and ruins within the site.

TERRESTRIAL ECOLOGY SURVEYS

METHODOLOGY

BACKGROUND SURVEY

Baseline data on the nature conservation interest of the site and its surroundings, including information on protected species and habitats records were sought from the following sources:

Joint Nature Conservation Committee (JNCC) website (http://www.jncc.gov.uk/);
SNH Site Link website (http://gateway.snh.gov.ukl); and
Large-scale 1:10,000 Ordnance Survey (OS) maps in conjunction with colour 1:25,000 OS map (to determine the presence of ponds and other features of nature conservation interest).

Further information relevant to evaluation of the nature conservation features that could be affected by the development and the assessment of its effects upon them was obtained through searches of internet sources (e.g. UKBAPs, LBAPs) and the relevant published literature (i.e. relevant guidance documents and scientific papers).

PROTECTED SPECIES SURVEY

MAMMALS

Protected species surveys were undertaken in summer 2021, and followed the methodologies described below. An evaluation of the mammal species present on this site is provided in the results below.

OTTER

Otter field signs that were searched for, as described in Bang & Dahlstrøm (2001) and Sargent & Morris (2003), and include:

Holts – these are underground features where otters live. They can be tunnels within bank sides, underneath root plates or boulder piles, and even man-made structures such as disused drains. Holts are used by otters to rest up during the day, and are the usual site of natal or breeding sites. Otters may use holts permanently or temporarily;
Couches – these are above ground resting-up sites. They may be partially sheltered, or fully exposed. Couches may be regularly used, especially in reed beds and on in-stream islands. They have been known to be used as natal and breeding sites. Couches can be very difficult to identify, and may consist of an area of flattened grass or earth. Where rocks or rock armour are used as couches, these can be almost impossible to identify without observing the otter in situ;
Prints – otters have characteristic footprints that can be found in soft ground and muddy areas;

Spraints – otter faeces are often used to mark territories, usually deposited on in-stream boulders. They can be present within or outside the entrances of holts and couches. Spraints have a characteristic smell and often contain fish remains;
Feeding signs – the remains of prey items may be found at preferred feeding stations. Remains of fish, crabs or skinned amphibians can indicate the presence of otter;
Paths – these are terrestrial routes that otters take when moving between resting-up sites and watercourses, or during high flow conditions when they will travel along bank sides in preference to swimming; and
Slides and play areas – slides are typically worn areas on steep slopes where otters slide on their bellies, often found between holts/couches and watercourses. Play areas are used by juvenile otters in play, and are often evident by trampled vegetation and the presence of slides. These are often positioned in sheltered areas adjacent to the natal holt.

Any of the above signs are diagnostic evidence of the presence of otter; however, it is often not possible to identify couches with confidence unless other field signs are also present. Spraint is the most reliable identifiable evidence of the presence of this species.

Any evidence of otter presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS.

SCOTTISH WILDCAT

Field signs of wildcat are described in Davis & Gray (2010) and SNH (2011). Field evidence searched for includes:

Dens – can be found in hollow trees, rock crevices, rabbit burrows, disused fox dens and badger setts and under fallen debris;
Prints – are distinctive cat prints, with no claw marks visible and a small palm pad with two indentations at rear;
Scat – is usually cylindrical with a tapered end and contains feathers, fur and bone;
Scratching posts on trees and fence posts; and
Sightings.

Any of the above can be taken as diagnostic evidence that the presence of cats in the area. However, further surveys are required in order to identify if the cats present are wildcat or are a hybridisation with domestic cats i.e. feral cats.

If signs were found then further field survey methods would be required in order to establish if a den is present and if it is active. This can take several days/weeks depending upon the potential numbers of cats and habitat suitability. In areas where there are signs of wildcats camera traps can be used to try and verify presence and also to prove if a wildcat/hybrid or feral cat is present based on pelage characters. This would be the third step in the survey process if required (following the initial site assessment).

The key criteria for identifying Scottish wildcat are complex due to their ability to interbreed with domestic and feral cats. Scottish wildcat features and recognition are summarised in research by Kitchener et al., 2005 with clear methods for identification based on pelage (coat characteristics)

from the study of dead cats. However with live cats in the field this is more problematic due to the difficulty in observing cats. In addition it is believed from field research that true wildcats are now very rare in the field with very low populations in many areas with much larger feral populations now present. Detailed field research is still required to accurately determine wildcat densities in many areas.

Any evidence of Scottish wildcat presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS.

BADGER

Badger field signs that were searched for, as described in Neal & Cheeseman (1996), Bang & Dahlstrøm (2001) and SNH (2002), included:

> Setts – are places of shelter often located in woodland, at woodland edges, in hedgerows or amongst dense patches of gorse and scrub close to fields;
> Prints – tracks lead from setts to latrines and foraging areas and prints are identifiable from broad palm-pad and five toe pads with claw marks in a row;
> Latrines (and dung pits used as territorial markers) – are where badgers deposit faeces in small excavated pits, and are often located at territory edges or close to a main sett;
> Hairs – are often left in barbed wire or fencing as badgers pass through or underneath and are distinctive for their oval shape when rolled between finger and thumb; and
> Feeding signs (snuffle holes) - where badgers have dug up roots, grubs, or wasps nests and can be found throughout their territory.

Any of the above signs can be taken as diagnostic evidence of the presence of badger. Any evidence of badger presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

WATER VOLE

The methodology prescribed in Dean et al. (2016) was followed in order to search for field signs of water vole. The field signs searched for included:

> Faeces – recognisable by their size, shape, and content. If not too dried-out these are also distinguishable from rat droppings by their smell;
> Latrines – faeces, often deposited at discrete locations known as latrines;
> Feeding stations – food items are often brought to feeding stations along pathways and hauled onto platforms. Recognisable as neat piles of chewed vegetation up to 10cm long;
> Burrows – appear as a series of holes along the water's edge distinguishable from rat burrows by size and position;
> Lawns – may appear as grazed areas around land holes;
> Nests – where the water table is high. Above ground woven nests may be found;
> Footprints – tracks may occur at the water's edge and lead into bank side vegetation. May be distinguishable from rat footprints by size; and

Runways in vegetation – low tunnels pushed through vegetation near the water's edge, less obvious than rat runs.

Any of the above signs can be taken as diagnostic evidence of the presence of water vole. Any evidence of water vole presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS.

RED SQUIRREL

Through areas of woodland any sightings of red squirrel, signs of feeding and evidence of active dreys were recorded:

Dreys – are comprised of an outer shell of twigs and branches, with an inner layer of mosses, leaves, grass and conifer needles. Dreys are usually built close to the main stem of a tree;
Feeding signs – can be stripped and nibbled conifer cones, split hazelnuts, nibbled fungus and berries.

Any evidence of red squirrel presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS.

PINE MARTEN

The field signs searched for included:

Scats – These are typically dark in colour and 4-12cm long x 0.8-1.8cm in diameter. They often have a coiled twisted appearance, typical of many mustelid scats. Scats will often contain food remains including fur, feathers, bone, plant content and seeds. Scats vary tremendously in size, shape and colour, and it's difficult even for experts to identify some pine marten scats. Scats are placed in latrines at well-used dens (e.g. on lids of den boxes), as well as at sites elsewhere in an individual's home range, where they probably fulfil a social communication role. Given the difficulty in confirming pine marten scat, any suspected scat will be sent for genetic analysis to conclusively distinguish it from other species.
Footprints – The five-toed but slightly cat-like forefoot imprints measure approximately 40 x 45mm for females and 55 x 65mm for males; fur on the underside of feet in winter may blur prints and make them look larger, especially in soft snow, but pine martens have less fur on their feet pads than stone martens (present in continental Europe). Indistinct trails of bounding martens (stride length 60-100cm) may resemble those of hares, with prints in groups of two or three where one or both hind feet have registered over prints of forefeet.
Den sites – Dens are usually not distinctive unless revealed by visible concentration of scats. Elevated den sites are preferred to keep martens safe from predators and provide insulation and shelter from the elements, and so hollow trees, owl boxes and the roofs of dwelling houses are often used, as well as purpose-built pine marten den boxes. Where such elevated dens are absent, they may den on the ground in rabbit burrows, rocky outcrops or under tree roof plates.

Any evidence of pine marten presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS.

HABITAT SURVEY

The vegetation was described and mapped following the methods described in National Vegetation Classification user's handbook (Rodwell, 2006) and the Joint Nature Conservation Committee (JNCC) Handbook for Phase 1 Habitat Surveys (JNCC, 2010). Plant species were identified and habitat types assigned and mapped in the field. Mapping polygons were delineated based on the composition of habitats. Full data for each polygon is provided in Appendix 2: Habitat data. Polygons were laterally assigned a Phase 1 Habitat Classification, according to the relationships described in Phase One Habitat Classification (JNCC 2010). For the purposes of creating a visual representation of habitat types, the dominant Phase One Habitat Classification for each polygon is reflected. Phase 1 habitat maps were digitised using the ArcView 10.1 GIS package, with figures provided in Appendix 1, Figure 1: Habitat Survey Results.

More widely, target notes were also collected to provide an overview of the habitat types present, features of interest and to place the proposed development in the context of site. All target notes are accompanied by at least one photograph and provided in Appendix 3: Target notes.

Nomenclature for vascular plants follows Stace (2010), bryophytes and liverworts follow Atherton et al (2010) and for lichens Dobson (2011). A full species list for higher plants identified within the site is provided in Appendix 4: Species List.

BASELINE CONDITIONS

PROTECTED SPECIES

DESK STUDY

Through the course of desk studies, reference was provided (pers. comm, Scottish Woodlands) to the presence of water vole in the catchment of the Allt Fionnaich. No detailed information was provided, however specific surveys for water vole in this area were undertaken.

FIELD SURVEY

Water vole burrows and latrines were recorded sporadically along two tributaries of the Allt FIonnaich. Along one tributary lying to the east of the access track (WV1: Start NH82363 1588, End NH8330 1552), a minimum of 14 burrows were recorded, in several patches amongst grasses and rushes along the watercourse banks. On a smaller tributary to the south-west of the access track (WV2: Start NH8234 1572, End NH 8228 1559), four burrows were recorded. At both locations evidence of recent use was indicated by active latrines and clipped vegetation at burrow entrances. Specific locations for burrows are not recorded here, but the extent of each colony is highlighted on Figure 6, Appendix 1.

No signs of other protected species were recorded within the site during the course of ecology surveys. Although not protected species, Rabbit, Mountain hare were observed within the site and signs of Fox were also recorded.

LEGISLATIVE BACKGROUND

Water vole (Arvicola amphibius) receive legal protection through inclusion on Schedule 5 of the Wildlife & Countryside Act 1981 (as amended), in respect of Section 9(4) only. This means that the water vole's places of shelter are protected, but not the animals themselves. The Nature Conservation (Scotland) Act 2004 enhances this protection by inclusion of the term 'recklessly' in the offences quoted below. It is an offence to intentionally or recklessly:

- Damage, destroy or obstruct access to any structure or place which water voles use for shelter of protection; and
- Disturb water voles while they are using such a place.

Water vole can be found along waterway edges in a variety of habitats from upland streams to wide rivers and agricultural ditches. They favour riparian habitats affording bank-side vegetation including grasses and sedges to provide food and cover from predators. They may tolerate brackish water and feed on halophytic plants, but do not generally inhabit areas that dry out twice daily, and so are largely absent from estuaries and salt marshes.

Water voles can create an extensive system of burrows with interconnecting tunnels and entrances both above and below the water surface. Steep banks with a slope angle of 35 degrees or more allow burrowing and importantly provide refuge during flooding events. However, vertical or overhanging

banks may be difficult for water voles to access for burrowing, unless there are access ledges at water level. Rocky banks are generally avoided due to the difficulty of excavation.

Habitat loss and degradation, fluctuations in water levels and pollution have contributed to the water vole's population decline in the UK, which has been greatly exacerbated by the spread of the American mink (Neovison vison), an introduced and efficient generalist predator.

HABITAT

Results from habitat surveys are mapped on Figure 1, Appendix 1. Results are provided in Appendix 2: Habitat data. Assigned GWDTE categories are displayed on Figure 2, Appendix 1. Target notes are provided in Appendix 3, and locations displayed on Figure 3, Appendix 1. A species list is provided in Appendix 4.

The majority of higher ground on the site consists of expanses of blanket mire communities. These are generally dominated by M17 Trichophorum germanicum-Eriophorum vaginatum blanket mire and M19 Calluna vulgaris-Eriophorum vaginatum blanket mire. Mires are subject to historic land drainage across most of their extent. At higher elevations and on exposed ridges and knolls evidence of erosion is apparent, with sometimes extensive areas of gullying and/or bare peat.

Steeper ground and areas of shallower soil are dominated by a mixture of dry and wet dwarf shrub heaths, varying with groundwater movement and substrate dryness. H10 Calluna vulgaris-Erica cinerea, H12 Calluna vulgaris-Vaccinium myrtillus and H16 Calluna vulgaris-Arctostaphylos uva-ursi dry heaths form the bulk of these habitats. The highest elevations and exposed summits are dominated by montane dry heaths and lichen heaths typically represented by H10 and H13 Calluna vulgaris-Cladonia portentosa heaths. Large areas of these dwarf shrub heaths, particularly in the east of the site, have been burnt for grouse moor management purposes, with consequent impacts on the habitat state and NVC classifications.

Gullies and riparian zones are occupied by sedge and rush-dominated acid flush communities, and are frequent and sometimes extensive along narrow drainage lines from higher to lower ground.

Gentle slopes and flatter areas along the River Dulnain and the south-eastern boundary of the site are affected by agricultural improvement, and a network of active and abandoned field systems are dominated by acidic and neutral grassland pasture, with wetter areas transitioning to marshy grasslands.

Woodland communities are semi-natural in nature, with fragments of Birch (Betula sp.) woodland particularly along the Allt Dubh. Stands of scattered of Scot's pine (Pinus sylvestris) woodland are evident with denser stands on Cnoc Beag.

Other habitat types recorded were fragmentary or highly restricted in nature but include bog pools, sedge-mires, calcareous grasslands, marshy grasslands, Willow scrub and Bracken.

COMMUNITY SUMMARY TABLE

Habitat type	Status*	Groundwater dependency**
Broadleaved woodland (A1)		
W17 Quercus petraea-Betula pubescens-Dicranum majus woodland,	Old sessile oak woods with Ilex and Blechnum in Britain and Ireland; Upland oakwood	Low
Scrub (A2)		
W1x Salix cinerea-Galium palustre woodland, Salix aurita upland variant	Wet woodland	Moderate
Scattered trees (A3)		
W17 Quercus petraea-Betula pubescens-Dicranum majus woodland,	Old sessile oak woods with Ilex and Blechnum in Britain and Ireland; Upland oakwood	Low
Acid grassland (B1)		
U4 Festuca ovina-Agrostis capillaris-Galium saxatile grassland		Low
U4a Festuca ovina-Agrostis capillaris-Galium saxatile grassland, Typical sub-community		Low
U4b Festuca ovina-Agrostis capillaris-Galium saxatile grassland, Holcus lanatus-Trifolium repens sub-community		Low
U4e Festuca ovina-Agrostis capillaris-Galium saxatile grassland, Vaccinium myrtillus-Deschampsia flexuosa sub-community		Low
U5 Nardus stricta-Galium saxatile grassland		Low
U6 Juncus squarrosus-Festuca ovina grassland		Low-Moderate
Neutral grassland (B2)		
MG6 Cynosurus cristatus-Lolium perenne ley		Low
MG9 Holcus lanatus-Deschampsia cespitosa grassland		Moderate
MG10 Holcus lanatus-Juncus effusus rush-pasture		Low-Moderate
Calcareous grassland (B3)		
CG10 Festuca ovina-Agrostis capillaris-Thymus polytrichus grassland	Species-rich Nardus grassland, on siliceous substrates in mountain areas; Upland calcareous grassland	Low-Moderate
CG10a Festuca ovina-Agrostis capillaris-Thymus polytrichus grassland, Trifolium repens-Luzula campestris sub-community	Species-rich Nardus grassland, on siliceous substrates in mountain areas; Upland calcareous grassland	Low-Moderate
Marsh/marshy grassland (B5)		
MG10 Holcus lanatus-Juncus effusus rush-pasture		Moderate
M25 Molinia caerulea-Potentilla erecta mire		Moderate
M25a Molinia caerulea-Potentilla erecta mire, Erica tetralix sub-community		Moderate
M6-25 Molinia caerulea-Carex echinata mire	Upland flushes, fens and swamps	Moderate-High
Tall herb and fern communities (C1 and C3)		
U20 Pteridium aquilinum-Galium saxatile community		Low
U20a Pteridium aquilinum-Galium saxatile community, Anthoxanthum odoratum sub-community		Low
U20b Pteridium aquilinum-Galium saxatile community, Vaccinium myrtillus sub-community		Low
U20c Pteridium aquilinum-Galium saxatile community, Species-poor sub-community		Low
OV25 Urtica dioica-Cirsium arvense community		Low
OV27 Epilobium angustifolium community		Low
Dry heath (D1)		

Habitat type	Status*	Groundwater dependency**
H9 Calluna vulgaris-Deschampsia flexuosa heath	European dry heaths; Upland heathland	Low
H9c Calluna vulgaris-Deschampsia flexuosa heath species-poor sub-community	European dry heaths; Upland heathland	Low
H10 Calluna vulgaris-Erica cinerea heath	European dry heaths; Upland heathland	Low
H10a Calluna vulgaris-Erica cinerea heath, Typical sub-community	European dry heaths; Upland heathland	Low
H10c Calluna vulgaris-Erica cinerea heath, Festuca ovina-Anthoxanthum odoratum sub-community	European dry heaths; Upland heathland	Low
H10d Calluna vulgaris-Erica cinerea heath, Thymus polytrichus-Carex pulicaris sub-community	European dry heaths; Upland heathland	Low
H12 Calluna vulgaris-Vaccinium myrtillus heath	European dry heaths; Upland heathland	Low
H12a Calluna vulgaris-Vaccinium myrtillus heath, Calluna vulgaris sub-community	European dry heaths; Upland heathland	Low
H16 Calluna vulgaris-Arctostaphylos uva-ursi heath	European dry heaths; Upland heathland	Low
H16b Calluna vulgaris-Arctostaphylos uva-ursi heath Vaccinium myrtillus-Vaccinium vitis-idaea sub-community	European dry heaths; Upland heathland	Low
H21 Calluna vulgaris-Vaccinium myrtillus-Sphagnum capillifolium heath	European dry heaths; Upland heathland	Low
H21a Calluna vulgaris-Vaccinium myrtillus-Sphagnum capillifolium heath Calluna vulgaris-Pteridium aquilinum sub-community	European dry heaths; Upland heathland	Low
Wet heath (D2)		
M15 Trichophorum germanicum-Erica tetralix wet heath	Northern Atlantic wet heaths with Erica tetralix; Upland heathland	Moderate
M15a Trichophorum germanicum-Erica tetralix wet heath, Carex panicea sub-community	Northern Atlantic wet heaths with Erica tetralix; Upland heathland	Moderate (sometimes High)
M15b Trichophorum germanicum-Erica tetralix wet heath, Typical sub-community	Northern Atlantic wet heaths with Erica tetralix; Upland heathland	Moderate
M6 Carex echinata-Sphagnum fallax/denticulatum mire	Upland flushes, fens and swamps	High
Lichen/bryophyte heath (D3)		
H13 Calluna vulgaris-Cladonia arubuscula heath	European dry heaths; Upland heathland	Low
H13a Calluna vulgaris-Cladonia arubuscula heath Cladonia arbuscula-Cladonia rangiferina community	European dry heaths; Upland heathland	Low
Blanket bog (E1.6.1)		
M1 Sphagnum denticulatum bog pool community	Blanket bog; Blanket bog	Peatland
M2 Sphagnum cuspidatum/fallax bog pool community	Blanket bog; Blanket bog	Peatland
M3 Eriophorum angustifolium bog pool community	Blanket bog; Blanket bog	Peatland
M17 Trichophorum germanicum-Eriophorum vaginatum blanket mire	Blanket bog; Blanket bog	Peatland
M17a Trichophorum germanicum-Eriophorum vaginatum blanket mire Drosera rotundifolia-Sphagnum species sub-community	Blanket bog; Blanket bog	Peatland
M17b Trichophorum germanicum-Eriophorum vaginatum blanket mire Cladonia sub-community	Blanket bog; Blanket bog	Peatland
M19 Calluna vulgaris-Eriophorum vaginatum blanket mire	Blanket bog; Blanket bog	Peatland
M19a Calluna vulgaris-Eriophorum vaginatum blanket mire Empetrum nigrum subsp. nigrum sub-community	Blanket bog; Blanket bog	Peatland
M19a Calluna vulgaris-Eriophorum vaginatum blanket mire Erica tetralix sub-community	Blanket bog; Blanket bog	Peatland
M19c Calluna vulgaris-Eriophorum vaginatum blanket mire Vaccinium vitis-idaea-Hylocomium splendens sub-community	Blanket bog; Blanket bog	Peatland
Wet modified bog (E1.7)		
M19 Calluna vulgaris-Eriophorum vaginatum blanket mire	Blanket bog; Blanket bog	Peatland

Habitat type	Status*	Groundwater dependency**
M20 Eriophorum vaginatum blanket mire	Blanket bog; Blanket bog	Peatland
Dry modified bog (E1.8)		
M17 Trichophorum germanicum-Eriophorum vaginatum blanket mire	Blanket bog; Blanket bog	Peatland
M17b Trichophorum germanicum-Eriophorum vaginatum blanket mire Cladonia sub-community	Blanket bog; Blanket bog	Peatland
M20b Eriophorum vaginatum blanket mire Calluna vulgaris-Cladonia sub-community	Blanket bog; Blanket bog	Peatland
Flushes (E2)		
M6a Carex echinata-Sphagnum fallax/denticulatum mire, Carex echinata sub-community	Upland flushes, fens and swamps	High
M6c Carex echinata-Sphagnum fallax/denticulatum mire, Juncus effusus sub-community	Upland flushes, fens and swamps	High
M6d Carex echinata-Sphagnum fallax/denticulatum mire, Juncus acutiflorus sub-community	Upland flushes, fens and swamps	High
M27 Filipendula ulmaria-Galium palustre tall-herb fen	Upland flushes, fens and swamps	High
Swamp, marginal and inundation		
S9 Carex rostrata swamp	Upland flushes, fens and swamps	Occasionally High
S10 Equisetum fluviatile swamp	Upland flushes, fens and swamps	Low
Other non-NVC habitats		
A1.2.2 Coniferous woodland – plantation		N/A
A1.3.2 Mixed woodland - plantation		N/A
B4 Improved grassland		N/A
G1 Standing water		N/A
G2 Running water	Headwaters	N/A
J3.6 Buildings and gardens		N/A
J4 Bare ground (access tracks)		N/A
*Status key Red text – Annex I habitat under EC Habitats Directive (as translated into UK legislation) Black text – Scottish Biodiversity List / UK Biodiversity Action Plan priority habitat **Groundwater dependency assessed based on: SEPA (2014) Land Use Planning System SEPA Guidance Note 31 – Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems		

WOODLANDS AND SCRUB

There are a number of areas of woodland present within the site boundary. However, established woodlands are generally limited. Fragments are associated with riparian corridors, being located along the Allt na Criche, Dulnain river and tributaries. and dominated by fragments of broadleaved Birch woodlands. Most other woodland areas are derived from regenerating Scot's pine Pinus sylvestris woodland across knolls and ridges throughout the site. These stands differ in density and age structure, with the most concentrated areas on the north-east flank of Cnoc Bheag, towards larger areas of woodland along the Dulnain river. Stands of Scot's pine tend to establish on dry heaths and drier blanket mires.

Patches of willow scrub dominated by Eared willow Salix aurita are occasional in wetter flush and flushed wet heath habitats and scattered throughout the site. Occasional Downy birch Betula pubescens, Rowan Sorbus aucuparia are found on occasion throughout. Scattered wind-blown Scot's pine, Lodgepole pine Pinus contorta and Sitka spruce are also found sporadically. Juniper Juniperus communis can be locally abundant, particularly along the gully along the Allt an Tudair where it forms dense stands of mature shrubs. Small stands of Gorse Ulex europaeus are also found in some heath areas.

MIRES AND HEATHS

Mires and heaths are dominant habitat types across the site. All heath, and on occasion some mire, areas have been subject to regimes of muirburn and in more recent areas of burning precise definition of NVC type is not possible.

Mire communities are frequent throughout the site and occupy areas of deeper peat soils, often found in topographical depressions, gullies and plateaus across the site. On more extensive areas of deeper peats with lower gradients and slower movement of water blanket mire communities are dominant.

Typically, blanket mires on low-mid elevations are dominated by Hare's-tail cotton-grass Eriophorum vaginatum, Deergrass Trichophorum germanicum agg., Heather Calluna vulgaris, Cross-leaved heath Erica tetralix and Sphagna. These blanket mires conform to those described in NVC as M17 Trichophorum germanicum-Eriophorum vaginatum blanket mire communities. Most blanket mire communities are subject to ongoing impacts of drainage, with a network of herring-bone drains across the site. Areas of intact mire where impacts of drainage have been slight are rare, and mostly confined to small pockets of deep peat where the high-water table remains. These areas, especially on the flattest ground, have a rich carpet of Sphagna and few eriocoid shrubs and are typical of M17a Drosera rotundifolia-Sphagnum species sub-community. There can also be frequent bog pools, typically reflecting the M2 Sphagnum cuspidatum bog pool community. M1 Sphagnum denticulatum and M3 Eriophorum angustifolium bog pools are also present, the former more typical of areas in peatlands where there is water movement, and the latter in waterlogged areas in bog pools or on exposed peats. More extensive bog pool systems occur as well, and extensive carpets of Sphagna and Bottle sedge Carex rostrata can form reflecting the M4 Carex rostrata-Sphagnum fallax mire

community. Where there is slight movement of water or an increase in gradient blanket mires sometimes occur in a form that reflects the flushing of water through the habitat. Here coverage of sedges is higher but the diversity of Sphagna remains high. These are typically found on gentle slopes and in areas where water collects at the head of burns.

More common on mid-high elevations are blanket mires dominated by Hare's-tail cotton grass and Heather reflecting the M19 Calluna vulgaris-Eriophorum vaginatum blanket mire. These form small patches of blanket mire at lower altitudes, for example near the north-west of the River Dulnain, but often quickly transition to M17 communities. At higher altitudes however they form extensive stands over intact peatland surface. Here the sward is more tussocky and dense, with lower frequency of bog pools and a less diverse bryophyte community. The summit and plateau mires generally contain some coverage of Woolly-fringe moss Racomitrium lanuginosum and Cladonia lichens with scattered Crowberry Empetrum nigrum. These are typical of M19c Empetrum nigrum subsp. Nigrum blanket mires. Shoulder mires that occupy breaks of slope between mid and high altitudes, often on steeper gradients, have higher coverage of Blaeberry, Cowberry, Crowberry, and a rich carpet of feather mosses with hummocks of Sphagnum capillifolium interspersed. These communities are typical of the M19c Vaccinium vitis-idaea-Hylocomium splendens and frequently occupy north and east facing banks where late snow-lie and lowerirradiation result in more humid conditions.

Areas subject to natural erosion processes, chronic grazing pressure, burning and drainage at all altitudes have suffered some localised drying and tend to reflect the M17b Cladonia sub-community with higher coverage of ericoid shrubs and Cladonia lichens. The surface of these areas is also more broken with small patches of bare peat exposed. In more severe cases of drying blanket mires are severely hagged with bare peat gullies frequent. Patches of vegetation in this state can also be transitional to dry heath communities, being almost entirely dominated by Heather on deeper peat soils. Areas of burnt blanket mire can also display only stands of sparse, leggy Heather and clumps of Hare's-tail cotton-grass, with little or only bleached Sphagna below the sward. These areas will likely reflect the M20b Eriophorum vaginatum blanket mire Calluna vulgaris-Cladonia sub-community. Whilst drying from land management activities reflect one transition to modified bog communities, wet modified bogs are also present, typically in more natural transitions to acid flush and wet heath communities. In these communities, Hare's-tail cotton-grass and Common cotton-grass Eriophorum angustifolium becomes more dominant with reduced diversity of Sphagna and higher frequency of Soft rush Juncus effusus, Common sedge Carex nigra, Star sedge Carex echinata and Haircap moss Polytrichum commune. These communities are typically found at the fringes of acid flush communities and riparian corridors and reflect transitional, modified mires of a community similar to M20 Eriophorum vaginatum blanket mires.

In gullies and slopes mire communities are dominated by flushes and rush-pastures. Acidic flush communities are dominated by M6 Carex echinata-Sphagnum denticulatum/fallax mires, and are often transitional to wet heath, modified blanket mire or rush-pasture communities. M6 mire communities are commonly sedge-rich with Common sedge, Star sedge and Common cottongrass or alternatively dominated by Soft rush Juncus effusus or Sharp-flowered rush Juncus acutiflorus. Besides typical flush communities, M6 communities dominated by Common sedge are frequently found in small stands in areas of dry heaths, perhaps reflecting historical disturbance to heath stands and localised deeper, wetter soils.

Acidic flushes are also represented by flushed wet heath communities, M15a Trichophorum germanicum-Erica tetralix wet heath Carex panicea sub-community. These are dominated by Bog asphodel Narthecium ossifragum, Cross-leaved heath Erica tetralix, Common sedge, Common cottongrass, Lousewort Pedicularis sylvatica, Common butterwort Pinguicula vulgaris and Star sedge. In many areas M6 and M15a mires are transitional between the two communities, forming sedge-rich flushes with a scattering of heathy species.

Heaths are the most common habitat type across the site and on shallow soils or steeper ground are dominated by dry heath communities. Four principal NVC communities are present: H9 Calluna vulgaris-Deschampsia dry heaths, H10 Calluna vulgaris-Erica cinerea dry heaths, H12 Calluna vulgaris-Vaccinium myrtillus dry heaths and H16 Calluna vulgaris-Arctostaphylos uva-ursi dry heaths.

H10 dry heaths are the most prevalent, and common on the steepest ground, and at higher altitudes. Typically, these have a high proportion of Bell heather Erica cinerea in the sward. There are several sub-communities present. Most commonly the sward is typically species-poor with few distinguishing species, reflecting the H10a typical sub-community. At mid-elevations H10 heaths are present more patchily, frequently as the more species-rich H10d Thymus polytrichus-Carex polytrichus sub-community, in amongst dominant swathes of H16 dry heaths. H10d sub-communities are typified by higher frequency of Thyme Thymus polytrichus, Bird's-foot trefoil Lotus corniculatus, Fairy-flax Linum catharticum, Selfheal Prunella vulgaris and Dog violet Viola riviniana. H16 dry heaths are also common across the site, also occupying shallower soils and rocky outcrops, particularly the rocky face at the far east of the site. Here Bearberry Arctostaphylos uva-ursi forms extensive carpets with Heather and Bell heather overlying. Blaeberry Vaccinium myrtillus and Cowberry Vaccinium vitis-idaea are more common in H16 than H10 dry heaths and their presence reflects the H16b Vaccinium myrtillus-Vaccinium vitis-idaea sub-community. Other notable species in this community include Comon wintergreen Pyrola minor, Mountain everlasting Antennaria dioica, Chickweed wintergreen Trientalis europaea and occasional stands of Juniper. H9 and H12 communities are generally present at lower elevations across the site, and are generally both species-poor in nature, the latter being distinguished only by the presence of the two community constants Heather and Blaeberry in many cases. The damper H21 Calluna vulgaris-Vaccinium myrtillus-Sphagnum capillifolium dry heath is present along gullies and shaded banks, typically in deeper riparian ravines, and the sward is dominated by the community constants. In some areas to higher grazing pressure from livestock, dry heaths exist in mosaic with or transition to acid grassland communities. In riparian areas dry heaths can form mosaics with marshy grassland communities with clumps of Heather co-dominant with Soft rush or Purple-moor grass.

High altitude heaths, generally above 700m above sea level, are dominated by clipped Heather, frequently over a carpet of Cladonia lichens reflecting the H13 Calluna vulgaris-Cladonia arbuscula heaths. These stands contain some Cross-leaved heath Erica tetralix, Bell heather, Mat-grass Nardus stricta and fine-leaved grasses and are typical of H13a Cladonia arbuscula-C.rangiferina sub-community. Also common in these areas is a wind-clipped form of H1 heath, where Heather forms dense but very short stands across large areas on exposed summits, with patchy cover of Bell heather, Cladonia, Deergrass, Fir clubmoss Huperiza selago and Woolly-fringe moss.

Wet heath communities – M15 Trichophorum germanicum-Erica tetralix wet heaths – are found across the site, but generally in smaller stands on wetter slopes with some movement of water. As a result almost all M15 wet heaths within the site are typically reflective of the M15a Carex panicea sub-community. More extensive areas are more typical of M15b typical sub-community, with no one species being particularly dominant and some limited coverage of Sphagna and Hare's-tail cottongrass. Wet heaths are often in a transitional zone at changes in gradient between dry heath and mire communities, and may contain patches of Soft rush and Purple-moor grass where found in more modified states. Wet heaths also frequently found in mosaics with other mire, heath and grassland communities.

GRASSLANDS AND MONTANE COMMUNITIES

Acid, neutral, calcareous and marshy grasslands are present within the site boundary but are limited to the River Dulnain valley and small patches elsewhere.

Acid grasslands are frequent and tend to be unimproved on higher ground but do display signs of improvement within field systems. Here U4b Festuca ovina-Agrostis capillaris-Galium saxatile grassland Holcus lanatus-Trifolium repens sub-community dominates, with Ryegrass Lolium perenne, Crested dog's-tail Cynosurus cristatus, White clover Trifolium repens and Yorkshire-fog Holcus lanatus common in the sward. Unimproved U4 communities generally conform to U4a typical sub-community or the heathy U4e Vaccinium myrtillus-Deschampsia flexuosa sub-community. The former has no distinguishing species but forms patches of grassland around abandoned buildings. The latter is less common in isolation but present in mosaic with heath communities, where it may be derived from historic burning and grazing land management practices. Typically, the U4e sub-community has a thick carpet of feather mosses Hylocomium splendens and Pseudoscleropodium purum, and abundant Blaeberry Vaccinium myrtillus. Small stands of U5 Nardus stricta-Galium saxatile grassland are found within the site but are extremely limited in extent. U6 Juncus squarrosus grassland can form larger stands on damp soils, but is almost always derived from mire communities and reflects modification of blanket bog communities. Here, Heath rush is dominant, or co-dominant with Hare's-tail cottongrass and Heather, across patchy Sphagna.

Calcareous grasslands are rare, and extremely restricted in extent, but present in small areas along track sides and exposed knolls, particularly to the east of the site. These are all dominated by CG10a Festuca ovina-Agrostis capillaris-Thymus polytrichus grassland Trifolium repens-Luzula campestris sub-community, which has a short, grazed, turf of Thyme, Heath bedstraw Galium saxatile, White clover and occasionally Carnation sedge Carex panicea, Lady's bedstraw Galium verum, Alpine bistort Persicaria vivipara, Pill sedge Carex pilulifera, Selfheal and Ribwort plantain Plantago lanceolata.

Marshy grasslands are frequent in wetter active or abandoned field systems and generally form mosaics with acidic grasslands. Marshy grassland forms the dominant habitat across the flats in the River Dulnain valley. They are almost universally dominated by Sharp-flowered rush or Soft rush and are acid-neutral in nature with frequent Yorkshire-fog, Velvet bent Agrostis canina, Lesser spearwort Ranunculus flammula, Ragged-robin Silene flos-cuculi, Meadow buttercup Ranunculus acris, Marsh bedstraw Galium palustre, Devil's-bit scabious Succisa pratensis. Water avens Geum rivale, Meadowsweet Filipendula ulmaria, Common sorrel Rumex acetosa are also occasionally present.

Stands of Meadowsweet are also common along field drains on lower ground to the south-east of the site and reflect the M27 Filipendula ulmaria-Angelica sylvestris tall-herb fen. These are often in mosaic with Soft rush and Yorkshire-fog and may reflect the M27c Juncus effusus-Holcus lanatus sub-community

OTHER COMMUNITIES

Other communities present within the site boundary include stands of Bracken Pteridium aquilinum reflecting the U20 Pteridium aquilinum-Galium saxatile community. These are typically found on lower slopes or in amongst wooded elements, occasionally in mosaic with acid grassland and dry heaths, or scattered through these communities at low coverage. The more continuous stands sometimes have some grassy understorey in places that reflect the U20a Anthoxanthum odoratum sub-community.

Other communities are present at much lower cover/frequency and include S9 Carex rostrata swamp and S10 Equisetum fluviatile swamp – present at fringes of small lochans.

Stands of Common nettle Urtica dioica and Field thistle Cirsium arvense reflecting the OV25 Urtica dioica-Cirsium arvense community are patchily frequent across field systems in the south-eastern area of the site, but never consistently form a community and are generally ignored in NVC classification for this site. Rosebay willowherb Chamaerion angustifolium is patchily present along banks of field drains on lower ground and reflect the OV27 Epilobium angustifolium NVC community.

Scree slopes are present in mosaic with dry heath communities on the steepest slopes of Geal-charn Mor, Geal-charn Beag and Carn Dearg Mor. These areas are generally free of vegetation bar a few scattered Rowan trees, Polypody Polypodium vulgare and some Woolly-fringe moss Racomitrium lanuginosum.

ORNITHOLOGICAL SURVEYS

METHODOLOGY

MOORLAND BREEDING BIRD SURVEY (MBBS)

The site consists of open moorland therefore the Brown and Shepherd method for use in assessing upland / moorland habitats was used to determine the breeding bird assemblage present at Kinrara. This survey methodology is described in detail in Brown and Shepherd (1993) and in Gilbert et al. (1998), and involved a surveyor walking a pre-determined route ensuring that all parts of the site were approached to within 100m, recording the location and behaviour of all birds encountered using standard BTO notation as defined in Bibby et al. (2000). The method, which is designed for recording waders, is commonly adapted to also record upland passerines. All registrations were mapped on 1:10,000 scale maps. Visits were made in daylight hours and acceptable weather conditions.

A three-visit version of the Brown and Shepherd method (a Moorland Breeding Bird Survey or MBBS) was carried out at Hill of Persie. The dates of the MBBS were as follows:

Visit 1: 26th April – 1st May 2021;
Visit 2: 17th -21th May 2021; and
Visit 3: 17th-21st June 2021

BLACK GROUSE SURVEY

Two coordinated black grouse lek surveys were carried out on 28th April and 16th May 2021. The survey encompassed all suitable habitat for black grouse across the proposed planting area, buffered to a distance of 1.5 kilometres. Survey methods follow those described in Gilbert et al. 1998 and use a combination of walkover survey and a series of vantage point watches. The survey was carried out in calm conditions and from 1hour before until 2hours after sunrise.

BREEDING RAPTOR SURVEY

A modified breeding bird survey was undertaken on 2nd May, 16th May, 16th June and 19th July to identify areas of potential foraging and nesting habitat for breeding raptors within the proposed planting area. The survey comprised walkover and vantage point watches to ascertain the presence/absence of raptor species within the survey area. The survey was carried out in daylight hours and acceptable weather conditions.

BASELINE INFORMATION

The surveys recorded the species, as compiled in Table 1 below.

Table 1: Numbers of registrations for each species during bird surveys.

Species	BTO code	MBBS Visit 1	MBBS Visit 2	MBBS Visit 3	Black Grouse survey	Raptor survey
Barn swallow	SL	0	2	8	0 n/a	n/a
Black grouse	BK	3	1	1	7	n/a
Blue tit	BT	8	12	15	n/a	n/a
Buzzard	BZ	5	4	6	n/a	4
Chaffinch	CH	21	12	18	n/a	n/a
Coal tit	CT	2	8	1	n/a	n/a
Common gull	CM	8	17	13	n/a	n/a
Common sandpiper	CS	1	2	2	n/a	n/a
Cuckoo	CK	2	2	1	n/a	n/a
Curlew	CU	7	4	4	n/a	n/a
Dunlin	DN	2	2	1	n/a	n/a
Golden eagle	EA	1	1	1	n/a	2
Golden plover	GP	15	23	16	n/a	n/a
Goldfinch	GO	2	8	4	n/a	n/a
Greater-spotted woodpecker	GS	1	1	0	n/a	n/a
Greenshank	GK	2	0	1	n/a	n/a
Heron	H.	1	2	1	n/a	n/a
Hooded crow	HC	11	4	18	n/a	6
Jackdaw	JD	8	0	0	n/a	n/a
Jay	J.	0	0	2	n/a	n/a
Kestrel	K.	0	2	3	n/a	1
Lapwing	L.	6	4	6	n/a	n/a
Long-tailed tit	LT	11	16	3	n/a	n/a
Meadow pipit	MP	275	412	610	n/a	n/a
Merlin	ML	1	2	1	n/a	2
Oystercatcher	OC	3	6	2	n/a	n/a
Pied wagtail	PW	4	2	8	n/a	n/a
Raven	RN	2	5	3	n/a	2
Red grouse	RG	44	72 (+10 juv)	60 (+22 juv)	n/a	n/a
Red kite	KT	0	0	1	n/a	1

Species	BTO code	MBBS Visit 1	MBBS Visit 2	MBBS Visit 3	Black Grouse survey	Raptor survey
Red-legged partridge	RL	14	3	8	n/a	n/a
Reed bunting	RB	1	1	1	n/a	n/a
Ring ouzel	RZ	3	0	5	n/a	n/a
Robin	R.	0	0	2	n/a	n/a
Sand martin	SM	14	30+	30+	n/a	n/a
Siskin	SK	6	10	12	n/a	n/a
Snipe	SN	12	24	18	n/a	n/a
Skylark	S.	90	112	141	n/a	n/a
Stonechat	SC	11	15	19 (+8 juv)	n/a	n/a
Tree pipit	TP	0	4	1	n/a	n/a
Twite	TI	0	2	4	n/a	n/a
Wheatear	W.	17	11	21	n/a	n/a
White-tailed eagle	WE	0	1	1	n/a	n/a
Woodcock	WK	0	1	1	n/a	n/a
Woodpigeon	WP	7	5	5	n/a	n/a
Wren	WR	6	12	11	n/a	n/a

Table 2 displays the species of conservation concern recorded during the course of field surveys. Locations of confirmed and probable territories for species of conservation concern are displayed on Figure 5 (confidential), Appendix 1.

Territories for Red grouse, Meadow pipit and Skylark are not mapped due to the difficulty in determining territory boundaries and differentiating between individual birds. During the course of field surveys registrations were summed for each square kilometre, as defined by Ordnance Survey mapping. Average densities of registrations, inclusive of possible juveniles, are estimated as follows:

Meadow pipit: 11.8/km^2;
Skylark: 3.1/km^2; and
Red grouse: 1.6/km^2.

Table 2: Species of conservation concern recorded.

Species	BTO Code	Schedule 1	Annex I	Red	Amber	UKBAP
Barn swallow*	SL					
Black grouse	BK					
Common gull**	CM					
Common sandpiper	CS					
Cuckoo	CK					
Curlew	CU					
Dunlin	DN					
Golden eagle*	EA					
Golden plover	GP					

Greenshank	GK					
Kestrel	K.					
Lapwing	L.					
Meadow pipit	MP					
Merlin	ML					
Oystercatcher	OC					
Red grouse	RG					
Red kite*	KT					
Reed bunting	RB					
Ring ouzel	RZ					
Skylark	S.					
Snipe	SN					
Tree pipit	TP					
Twite	TI					
White-tailed eagle*	WE					
Woodcock	WK					

* Barn swallow, Golden eagle, Red kite and White-tailed eagle are records of overflying birds. Barn swallow and Swift sightings are not mapped.

** Common gull are records of colonial breeding sites.

BLACK GROUSE SURVEY

The Black grouse survey recorded no displaying males at two locations within the site. A total of 7 individuals were however recorded during the survey, with 4 males displaying to the north-east of the site on neighbouring ground at NH829170, and 3 loafing males nearby within the site near the Allt Fionnaich at NH825164. No females were recorded during the course of lek surveys. Ad-hoc records of five individuals were also recorded during breeding bird surveys, including the registration of two female black grouse that were flushed from wet acid flush habitats on the western flanks of Creag na h-Iolaire during the course of the first breeding bird survey visit. Single individual males were observed south east of Lochan Dubh on three further occasions.

LEGISLATIVE BACKGROUND

All wild birds, their nests and eggs are, with few exceptions, protected under the Wildlife and Countryside Act (WCA). Additional protection is provided to species listed under Annex I of the EC Birds Directive.

WILDLIFE AND COUNTRYSIDE ACT 1981

All wild birds in the UK are protected under the Wildlife and Countryside Act (WCA) 1981[1], as amended in Scotland by the Nature Conservation (Scotland) Act 2004[2]. Under this Act, it is and offence to intentionally or recklessly:

kill, injure or take any wild bird; or
take, damage, or destroy or otherwise interfere with the nest of any wild bird while that nest is in use or being built; or
obstruct or prevent any wild bird using its nest;
take or destroy the egg of any wild bird;
disturb any wild bird listed on Schedule 1 whilst it is building a nest or is in, on, or near a nest containing eggs or young, or whilst lekking;
disturb the dependent young of any wild bird listed on Schedule 1; or
harass any wild bird listed on Schedule 1A

In Scotland, under Schedule 1A of the WCA (as amended), it is an offence to intentionally or recklessly harass at any time any wild bird listed on Schedule 1A, i.e. white-tailed eagle (Haliaeetus albricias). Under Schedule A1 of the WCA (as amended), it is an offence to intentionally or recklessly damage, destroy or otherwise interfere with the nest when not in use of any of the above acts to be carried out.

[1] http://www.legislation.gov.uk/ukpga/1981/69

[2] http://www.legislation.gov.uk/asp/2004/6/contents

For Schedule 1 and Schedule 1A bird species, a licence is required from SNH to carry out activities that may disturb birds while they are building a nest or are in, on or near a nest containing eggs or young, or cause disturbance of the dependent young (Hardy et al., 2013).

EC BIRDS DIRECTIVE

Bird species listed on Annex I of the Council Directive 2009/147/EC on the Conservation of Wild Birds (EC Birds Directive)[3] are "the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution".

Annex I species are protected from:

- Deliberate killing or capture by any method;
- Deliberate destruction of, or damage to, their nests and eggs or removal of their nests;
- Taking their eggs in the wild and keeping these eggs even if empty;
- Deliberate disturbance of these birds particularly during the period of breeding and rearing, in so far as disturbance would be significant having regard to the objectives of the Directive; and
- Keeping birds of species, the hunting and capture of which is prohibited.

UK BIRDS OF CONSERVATION CONCERN

A number of bird species considered to be of high nature conservation concern are listed in UK Biodiversity Action Plans (UKBAP), with additional species of local concern listed as Local Biodiversity Action Plan (LBAP) species.

The status of all British birds has been analysed by conservation agencies including the RSPB. On the basis of ongoing population trends, species are assigned to one of three lists of UK Conservation Concern (Eaton et al., 2015). These are the red list, amber list and green list. Although the lists confer no legal status, they are useful in assessing the significance of impacts and appropriate levels of mitigation that may be required when birds are affected by development or other activity.

The red list comprises 67 species whose populations or range are rapidly declining, (recently or historically), and those of global conservation concern. Several common, but rapidly declining farmland birds are included on the red list, such as Skylark, Song Thrush and Tree Sparrow.

The amber list identifies 96 species that have undergone moderate declines in population and/or range. Birds on the green list are not considered threatened.

The status of a species in the lists of Birds of Conservation Concern (UK BoCC) bears little relationship to the statutory protection afforded it. However, inclusion on the red list is a factor in determining the species for which UK BAPs are developed.

[3] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0147:EN:NOT

ASSESSMENT

PROTECTED SPECIES

WATER VOLE

Colony WV1 lies in areas of peatland and/or acid flush, whilst WV2 is surrounded by banks of dry heath communities. As such, woodland establishment in the vicinity of colony WV1 is unlikely due to constraints presented by peatland habitat. In the vicinity of colony WV2 however, woodland establishment may be possible.

RECOMMENDATIONS

To protect water vole and their burrows at their colonies, the best practice mitigation measures detailed below are proposed:

Any woodland establishment or other intrusive activities that involve machinery or ground disturbance in the area (eg. peatland restoration) should remain a minimum of 30 metres from the riparian corridor in which the colony is active. Should works be necessary within this protective buffer zone a disturbance licence should be sought from NatureScot to permit certain activities to proceed under specific control measures. Advice on any licence application required should be sought from a suitably qualified ecologist.

TERRESTRIAL ECOLOGY

HABITATS

Areas dominated by flush and mire habitats are sensitive to disturbance and as such are not considered suitable for planting of trees. Areas where peat depths exceed 45cm are also considered to be indicative of mire habitats, and unsuitable for planting of trees.

RECOMMENDATIONS

To maximise the protection of sensitive habitats, and potential biodiversity benefits across the site, the best practice mitigation measures detailed below are proposed:

The fine-scale mosaic of habitats present, particularly on lower elevations, coupled with the partially obscured classification of habitats as a result of extensive muirburn means that planting design should incorporate both mapped habitats and peat depths to ensure sensitive areas are adequately avoided.
Native woodland expansion should consider potential for natural regeneration, particularly around areas of existing regenerating Scot's pine and Birch sp. dominated woodland[4].

[4] Willoughby I H, Jinks R L and Forster J 2019 Direct seeding of birch, rowan and alder can be a viable technique for the restoration of upland native woodland in the UK Forestry: An International Journal of Forest Research 92 324–38

Planting should avoid use of ploughing and mounding where possible, and instead utilise lower intensity methods which will improve avoidance of sensitive areas within mosaic habitats, and also limit release of carbon stored within peat-derived soils across the site[5].

Riparian areas should be carefully considered, and where possible elements of existing native woodland in these zones should be safeguarded, expanded and linked as far as is possible.

Where habitats comprise a mosaic of heath and/or grassland communities with small areas of flush, marshy grassland and/or mire interspersed it is considered that there is scope for planting of some trees. Planted trees should be placed carefully so as to avoid the sensitive elements within the habitat mosaic. It is likely, and preferable, that these areas are suitable for native broadleaved woodland dominated by Downy birch and Willow species.

In areas dominated by marshy grassland (rush-pasture), it is considered there is some scope for scattered or variable density planting of native broadleaved trees at low densities, typically dominated by Alder and/or Willow species and other species suitable for wetter ground conditions.

[5] Friggens N L, Hester A J, Mitchell R J, Parker T C, Subke J and Wookey P A 2020 Tree planting in organic soils does not result in net carbon sequestration on decadal timescales Global Change Biol. 26 5178–88

ORNITHOLOGY

Golden eagle, Greenshank, Merlin and White-tailed eagle are all listed on Schedule 1 of the Wildlife & Countryside Act 1981, as amended, and Annex 1 of the EU Birds Directive (as described above) were recorded within the site through the course of ornithological field surveys. Red kite are also listed on Schedule 1 of the WCA 1981. Eleven red-listed species held breeding territories within or just outside

[redacted]

Locations of confirmed or probable sensitive bird species territories are mapped on Figure 5 (Confidential), Appendix 1.

BLACK GROUSE

[redacted]

Black grouse will feed, nest and lek in native woodland, which provides a mosaic of small-scale habitats, and populations can respond positively to establishment of native woodland in the landscape[6]. Black grouse will also use young conifer plantations (before the tree canopy closes). Whether in a plantation or semi-natural woodland, trees can benefit black grouse, especially when the woodlands are young and tree density is not too high. However, mature plantations can be homogenous and have minimal value for black grouse. Leaving open ground, wide rides and leaving sparse tree cover at the forest edge to encourage ground vegetation can all help to create a plantation which is more suitable for black grouse.

Collisions with deer fences is a significant cause of black grouse mortality. Any new fencing required for the new planting schemes should be marked to reduce collisions by black grouse. Orange barrier netting has been proven to reduce collisions, though other methods are also used and now recommended (e.g. wooden droppers and full or half-height chestnut paling).

RECOMMENDATIONS SPECIFIC TO BLACK GROUSE

Planting design should incorporate designed open ground and low and variable density native woodland within 200m of observed Black grouse lek sites. Tree species planted in these areas will be limited to native species including Scot's pine, Downy birch, Willow species and Rowan.

[6] Scridel D, Groom J D and Douglas D J T 2017 Native woodland creation is associated with increase in a Black grouse Lyrurus tetrix population Bird Study 64 70–83

Connectivity of open ground and native woodland should be provided between the lek locations, and as a result 200m buffer zones may be modified in shape to provide best woodland design.

Black grouse individuals (male and female) were observed to utilise the site and may be at risk of collision with new fencing. Fence-marking for black grouse should be incorporated into new fencing required to enclose the proposed planting site, as per recommendations in FC Technical Guidance Note 19 – Fence marking to reduce grouse collisions (2012).

WADERS

The survey area highlighted a number of wader territories across the site, with particularly high concentrations along the River Dulnain valley, and a more even distribution of Golden plover and Dunlin territories across the mire areas at higher elevations.

Scotland holds approximately 15% of the global population of Curlew[7]. Curlew are recently placed on the Birds of Conservation Concern red-list as a result of a severe decline exceeding 50% between 1994 and 2010 in population numbers across Scotland. At Kinrara, Curlew are not considered to be particularly abundant, with a total of 5 probable or confirmed territories across the survey area (an area of approximately 3640ha). Confirmed breeding attempts included nests with eggs, chicks or adults tending young birds. The approximate density is therefore 0.15prs/km^2. It is considered in general guidance that any woodland proposal that affects more than 5 pairs of nesting Curlew, particularly in areas where densities are greater than 5prs/km^2, is likely to have a detrimental effect on the Curlew population[8]. The site at Kinrara would not be considered a 'hotspot' for breeding Curlew but their presence indicates any woodland proposal in the area will need to consider strategies to avoid impact on Curlew and implement measures to maintain, and potentially enhance, populations of Curlew.

Lapwing are also considered to be of conservation concern, with numbers across Scotland declining by approximately 30% since 1989[4]. At Kinrara 5 possible, probable or confirmed territories were identified within the site, largely focussed on heath and grassland vegetation along the River Dulnain valley. Lapwing, like Curlew, are sensitive to woodland establishment[9], which directly impacts on availability of suitable habitat, provides refuge for generalist predators which may predate ground-nesting birds (eg. Foxes) and reduces the ability of Lapwing to avoid predators as a result of more limited visibility around nest sites[10]. Woodland elements in the landscape can directly reduce Lapwing

[7] Woodward, I.D., Massimino, D., Hammond, M.J., Harris, S.J., Leech, D.I., Noble, D.G., Walker, R.H., Barimore, C., Dadam, D., Eglington, S.M., Marchant, J.H., Sullivan, M.J.P., Baillie, S.R. & Robinson, R.A. (2018) BirdTrends 2018: trends in numbers, breeding success and survival for UK breeding birds. Research Report 708. BTO, Thetford. www.bto.org/birdtrends

[8] Curlew conservation and new woodland in Scotland – essential steps for forest managers, RSPB Scotland, 2019. https://reforestingscotland.org/wp-content/uploads/2020/06/Curlew-and-new-woodland-good-practice.pdf

[9] Wilson JD, Anderson R, Bailey S, Chetcuti J, Cowie NR, Hancock MH, Quine CP, Russell N, Stephen L, Thompson DBA (2014) Modelling edge effects of mature forest plantations on peatland waders informs landscape-scale conservation. J Appl Ecol 51:204–213.

[10] Berg, Å., Lindberg, T. & Källebrink, K.G. 1992. Hatching success of Lapwings on farmland: 226 Differences between habitats and colonies of different sizes. Journal of Animal Ecology 61: 227 469–476.

numbers, but can also generate a feedback system whereby fewer remaining individuals do not benefit from the advantages of greater numbers within a semi-colonial breeding site. Greater densities of Lapwing at breeding sites enhance predator avoidance strategies and therefore smaller colonies are more susceptible to systematic predation themselves.

Oystercatcher are associated with similar habitat to Lapwing and also like more open areas of habitat with access to damper soils for breeding. Dunlin, Golden plover, Greenshank and Snipe however are generally associated with open mire (Dunlin and Golden plover), mire/pool systems (Greenshank) and flush or marsh vegetation (Snipe) at Kinrara. Whilst these wetter habitats are extensive across higher elevations of the site, Golden plover in particular require large territories and good visibility around nest sites to improve avoidance of predators.

All wader species thrive in areas with a mosaic of short and tall vegetation and areas of wet/damp pasture or mires. Access to shallow areas of standing water is also preferred by some. Breeding abundance of waders increases with distance from woodland edges, and many species show broad avoidance of suitable nesting and foraging habitat within 500m of wooded areas[11]. The effect of woodland expansion in the area would be that as trees begin to mature, habitat availability for waders will reduce and there will be a permanent loss of habitat for waders over the site. This may in turn negatively impact breeding wader populations across the site.

RECOMMENDATIONS SPECIFIC TO WADERS

The Strathspey Wetland and Wader Initiative (SWWI) and RSPB Scotland should be consulted to determine the importance of breeding waders at Kinrara in the context of the wider area. This may allow for more accurate assessment of population status and trends.

Further survey should be carried out prior to, and in event of, woodland establishment at Kinrara to monitor breeding wader population habitat use and population trends at Kinrara. This will allow for up-to-date and enhanced 'micro-siting' of woodland areas on establishment.

Planting design should incorporate designed open ground around all areas of mire, flush, grassland and marsh to retain suitable habitat composition and structure for breeding and foraging waders within the area.

Planting design should avoid woodland establishment within a minimum of 500m from known Curlew and Lapwing territory centres.

Planting design should seek to maximise connectivity, by way of open ground, between all areas of mire, flush, grassland and marsh, as well as between known Curlew territory centres and these areas. This will ensure waders can access suitable habitat for nesting, foraging, chick-rearing and roosting.

Nikolas P. Bertholdt, Jennifer A. Gill, Rebecca A. Laidlaw & Jennifer Smart (2017) Landscape effects on nest site selection and nest success of Northern Lapwing Vanellus vanellus in lowland wet grasslands, Bird Study, 64:1, 30-36

[11] Wilson JD, Anderson R, Bailey S, Chetcuti J, Cowie NR, Hancock MH, Quine CP, Russell N, Stephen L, Thompson DBA (2014) Modelling edge effects of mature forest plantations on peatland waders informs landscape-scale conservation. J Appl Ecol 51:204–213.

Curlew, Golden plover, Lapwing and Oystercatcher also nest on drier habitat types eg. heaths and grasslands, as is evident at Kinrara. Each wader species has particular finer-scale requirements for nesting with Curlew preferring tussocky vegetation and cover, and Golden plover and Lapwing preferring more open vegetation. Tussocky vegetation can be provided by Heather, rushes and cottongrass. It is likely that recent muirburn has created greater amounts of suitable nesting habitat for species preferring shorter vegetation. Woodland planting design should incorporate areas of open ground with both short and longer vegetation structures, and with retained open access to foraging areas on damper soils.

Opportunities for habitat enhancement for waders are also apparent at Kinrara. Restoration of peatland areas, management of grassland and heath and a programme of targeted legal predator control may contribute to maintaining successful wader populations. Raising of the water table in degraded peatland areas could be achieved by blocking existing drainage channels with dams. Management of grassland and heath could incorporate cutting and grazing regimes to preserve a mosaic of sward heights across the area. Legal predator control, undertaken in conjunction with a programme of predator population monitoring and wader population survey and nest monitoring could also benefit nest and young survival for wader populations.

RAPTORS

[redacted] Merlin and Kestrel will tolerate some very limited tree cover within their territories, and the latter can often breed within first-rotation plantations. Kestrel will also nest within trees, and tolerate some woodland cover within territories. For both species, relaxation of muirburn practices and lower grazing pressure from livestock and deer within fenced woodlands with designed open ground may increase ground cover across the site. As a result, elements of new native woodland within the landscape may offer improved hunting opportunities for prey items such as voles and small ground-nesting birds.

OTHER SPECIES

Most species recorded at Kinrara and listed as birds of conservation concern are not considered sensitive to woodland establishment, and many are positively associated with woodland eg. Cuckoo, Tree pipit and Woodcock. However, others will be sensitive to loss of open ground habitats eg. Skylark, Meadow pipit, Red grouse, Reed bunting and Twite. No specific measures are considered necessary for these species, as all are considered widespread in a regional context, but woodland planting design should ensure areas of open ground persist across a range of habitat types within the site.

Also of note is a sand martin colony [redacted] Over 30 individual birds were recorded here at any one time through the course of field surveys.

Whilst all other species not listed as birds of conservation concern are considered of lower conservation value, it is compulsory to comply with relevant wildlife legislation for all bird species, as described above.

Potential impacts resulting from the proposed new planting scheme include the following:

Disturbance to, or destruction of birds' nests within the area during the planting; and
Loss of foraging and nesting habitat for breeding bird species.

Direct mortality and disturbance to breeding birds during the planting of the scheme is considered to be low due to the works being planned to take place outwith the breeding bird season (mid-March to end of July inclusive).

RECOMMENDATIONS APPLICABLE TO ALL SPECIES

To limit potential impacts on ornithological features across the site and maximise potential benefits to ornithological receptors within the site, the best practice mitigation measures detailed below are proposed.

Fencing and planting activity should be timed to take place outwith the bird breeding season (late March to the end of July inclusive) to avoid disturbance or potential destruction of wild birds' nests.

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Guide 6.02 Monitoring Water Quality

Regular Checking

The turbidity (cloudiness) of water leaving worksites should be checked periodically during operations to ensure that site activities are not leading to diffuse pollution, in the form of silt, leaving the site. Ideally this should be done once a day, but more frequent checks should be carried out during periods of heavy rain or snowmelt. Operations likely to lead to turbidity problems include timber harvesting, ground preparation, drainage, road building or maintenance operations and quarrying.

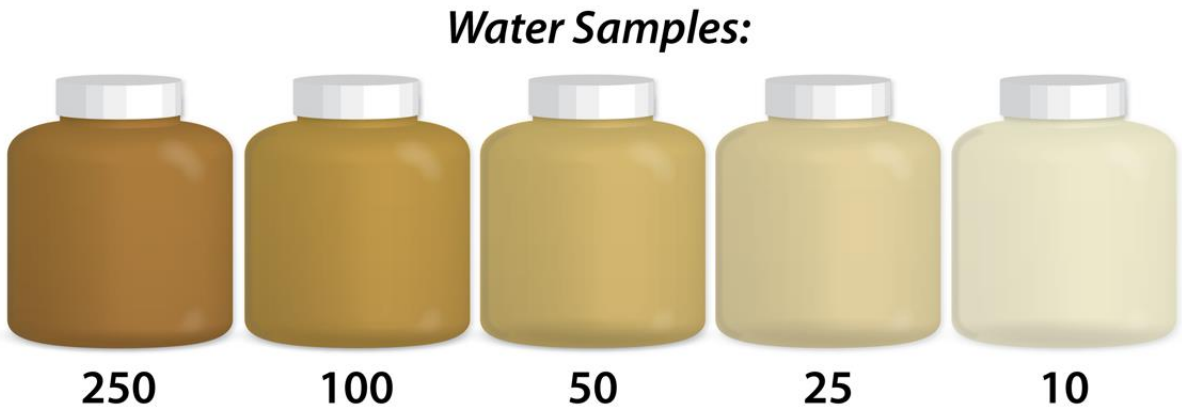
Particular attention should be paid if problems such as deteriorating brash mats or road conditions are experienced on site and after operations likely to disturb silt such as log bridge building or removal.

Check around fuel tanks and in silt traps for signs of an oil sheen.

Remember someone downstream may be relying on the water quality leaving the site for their drinking water or the stream may hold spawning fish. There are potential fines for causing siltation in natural watercourses.

Turbidity Colour Chart

Use the chart below to compare the water quality in watercourses leaving the site with a sample collected in a jam-jar or similar container. Any sample of more than about 25 to 50 on the chart below should be treated as an indication that diffuse pollution problems are occurring on site. Follow the watercourse back to identify the source of the problem and if necessary compare your sample with water drawn from a nearby unaffected watercourse or from above the site, to determine if the silt is the result of your activities. If it is, first inform the Scottish Woodlands site manager then take such steps as are required to rectify the situation.

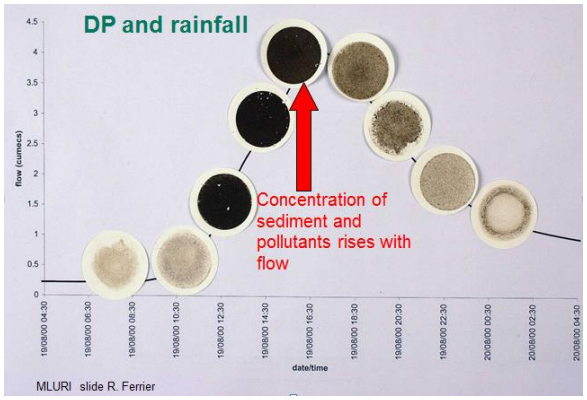


Tubidity Chart Courtesy of SEPA

Colloidal Siltation

The clay fraction of a soil may contain microscopically small particles which from a colloidal suspension in water. These particles remain in suspension and will not settle out even in a silt trap. The only way to deal with colloidal silt is to direct the outflow from the silt trap onto a grassy area or ‘filter zone’.

Peak Flows and Peak Siltation



The charts on the left shows that high flows do not dilute the effects of siltation and the concentration of pollutants actually rises in periods of high rainfall. It is therefore important to monitor water quality during wet weather and we cannot assume that siltation will simply be diluted further downstream.

Fisheries interests report that the greatest damage is done to spawning beds by siltation during high river flows.

Look for the Warning Signs

Warning signs that siltation of watercourses leaving the site are usually obvious and should be acted on before the problem becomes serious. Deteriorating brash mats and log bridges or road surfaces which are beginning to break down are usually indicators that there is a developing problem. Do not be tempted to turn a blind eye and ‘boorach on’, fix the problem or contact the Scottish Woodlands Site Manager to agree a suitable solution. We appreciate that brash may be in short supply and the difficulties of keeping going, but it is always more expensive to fix a big problem than a small one.

Everyone is Involved

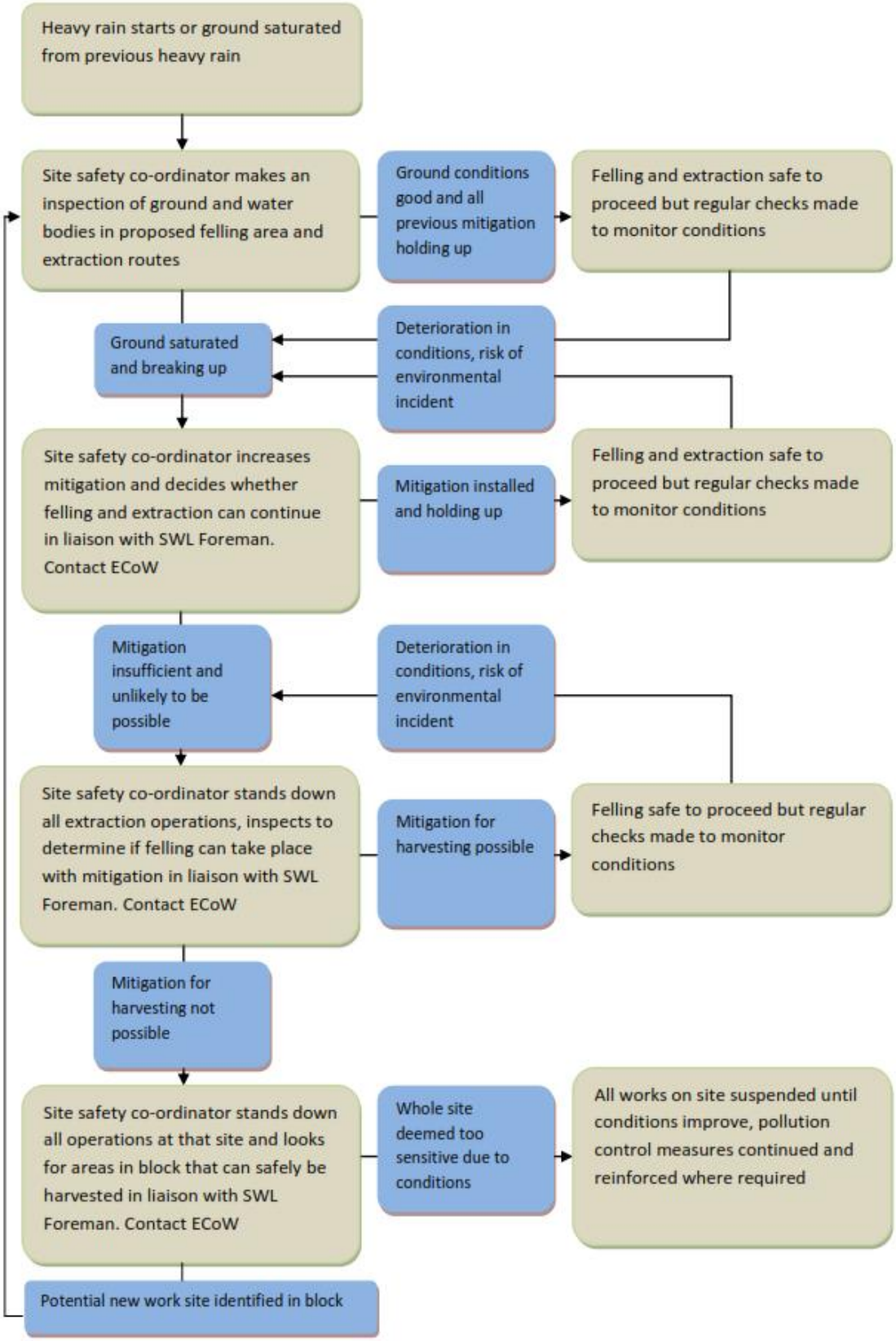
It is not just the Scottish Woodlands Manager and Main Contractor’s job to monitor water quality problems. Everyone on site should keep an eye out for potential problems. Even if this is just a quick check at a burn crossing or culvert end whenever you are passing, if you see a problem developing pass the information on.

Make sure everyone on site knows what to look for.

Additional Information

Forestry and Water Scotland - Know the Rules Booklet

Wet Weather Decision Matrix



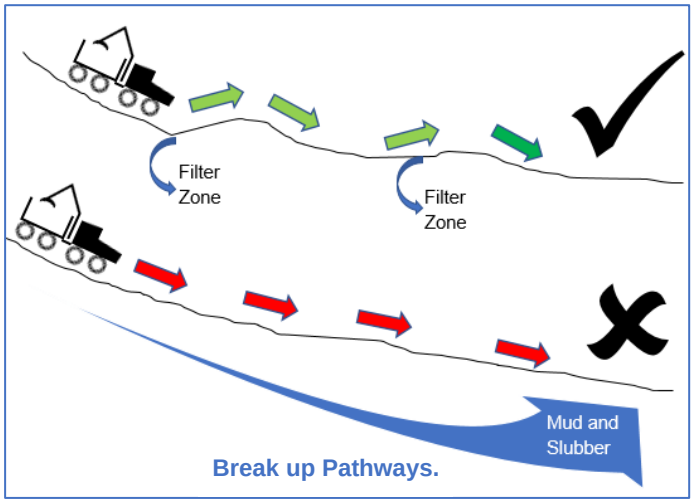
Guide 6.03 Silt Traps and Filter Zones

Planning and Prevention

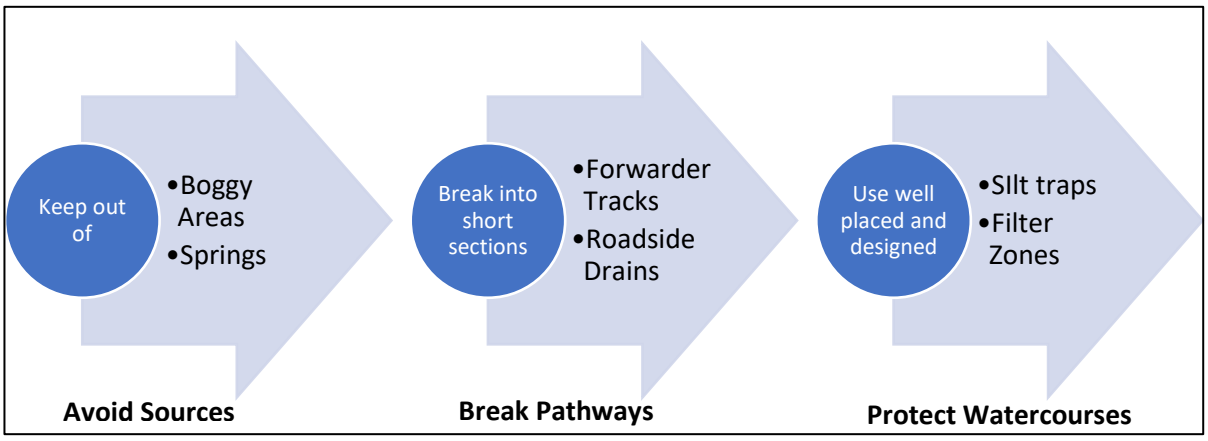
Prevention is the key to good silt management. The less we create the less we there is to deal with. Pre-plan operations with silt management in mind to minimise any problems arising later. See Quest Guide 6.15 Pre-Operational Diffuse Pollution Planning

If siltation occurs always check where any silt (mud) is coming from and try to deal with the problem at source. Determine if the problem can be dispersed well before the point at which a silt trap becomes necessary. Features like forwarder tracks, drains and roads can have the effect of concentrating water and may create siltation problems. Break the pathways water is using to pick up silt and lead it away into less sensitive areas.

Forwarder Tracks Can Easily Become Pathways for Silt and Mud



Break up Pathways.

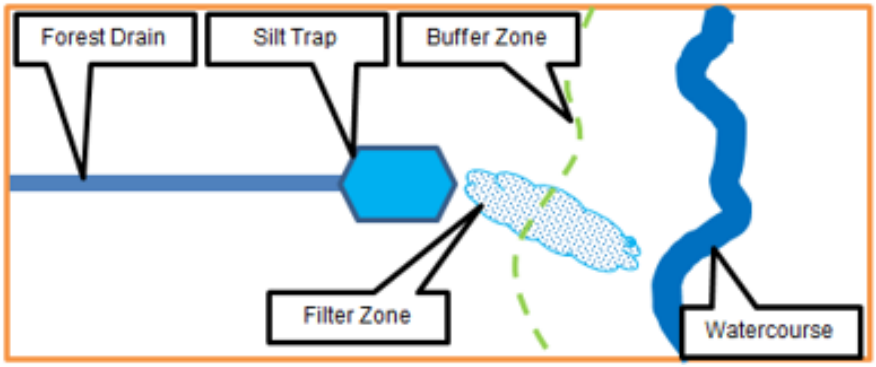


- **Silt traps and their filter zones are the last line of defence and not a solution on their own.**
- **Always go back to the source first, break the pathway and lastly use a silt trap.**

Silt Traps

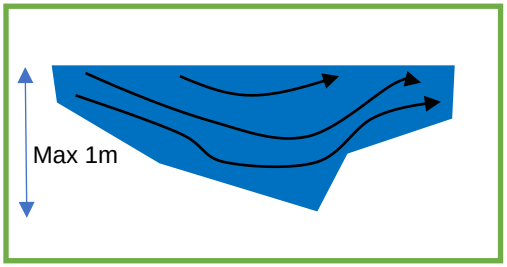
Silt traps are used to slow the flow of muddy water and provide an opportunity for the silt to settle out before entering the natural drainage system. This gives what we call “disconnect” between the forest drain and the natural watercourse. The filter zones is used to filter out any remaining fine suspended particles too small to settle out in a silt trap

The general layout of a silt trap and filter zone is shown below. The profile should change across the trap to slow the flow and maximise sediment deposition.



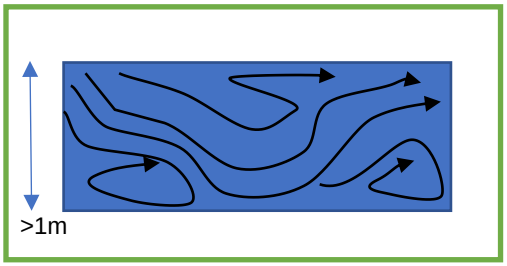
A silt trap should be of sufficient size to cope with the anticipated sediment load and be large enough to provide sufficient settlement of silt before discharging to the filter zone. The filter zone below the silt trap should start well before the watercourse buffer.

Silt traps should not become death traps and should **never exceed 1m in depth**. Ensure that the spoil from the trap is spread at a low angle and that the outflow and inflow are profiled to allow people or animals in the trap to climb out safely.



Cross Section

A well profiled silt trap allows the water to slow and the sediment to drop out. It also allows animals and people to escape should they become trapped.



A poorly profiled deep silt trap makes the water swirl and scour, and the sediment is less likely to drop out. It also makes it difficult for animals and people to escape should they fall in.

During active operations, harvesting, ground prep etc, silt traps require to be checked at least daily and maintained as required. Always ensure that there is plenty of room for silt to accumulate and clean traps out as necessary. Smaller silt traps require more maintenance and are more likely to be overwhelmed in periods of heavy rain. Larger silt traps require less frequent maintenance and are also more effective in reducing sediment load.

Rough Guide to Silt Trap Sizes	Volume
New forest drains (stable level sites)	>1m^3
New forest drain (vulnerable and steep sites)	>2m^3
Drains on harvesting sites	>2m^3
Roadside drains near stacking/turning areas	>2m^3
Silt traps for problem areas	>4m^3
Last trap before main watercourse	>4m^3

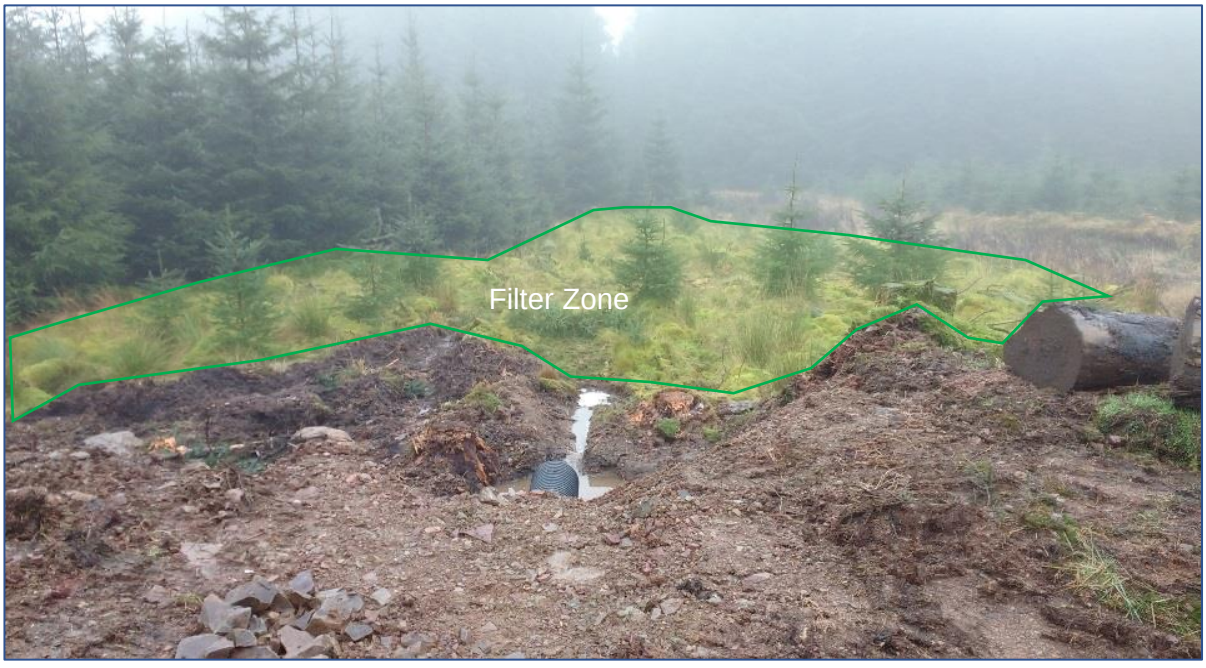
The aim is to create a silt trap that can be left in a safe condition at the end of the job and so that no-one needs to go back and check it.

Occasionally it is necessary to create a larger deep silt trap. These tend to be part of a longer-term sustainable drainage system and must be fenced off.

Ideally water should be dispersed to make large silt traps unnecessary but if this is not feasible it is better to use multiple well profiled silt traps in line than a single large deep and dangerous one.

Filter Zones

Every silt trap should have an associated filter zone. The filter zone at the outflow from a silt trap is there to remove fine particles that do not normally settle out. These fine particles are known as colloidal silt.



If the filter zone is becoming choked with larger particles, then this is an indication that the silt trap is not working properly, either because it has filled up or because it is not big enough.

Filter zones are an area of undisturbed grass or other vegetation between the worksite and the natural watercourse. Areas of standing or felled crop can also be used as a filter zone, but care is needed to ensure that any old drains in the area do not lead directly into a watercourse. The long-term use of an area of standing crop may lead to waterlogging and a lack of stability. Standing crop should therefore be used with care and only as a temporary solution where there is an immediate problem with silt entering a watercourse.

On forest roads the silt trap for relief culverts is usually placed before the culvert and the filter zone on the opposite side of the road.

Filter zones should begin before reaching the buffer zone of any watercourse.

Buffer Width	Situation
10m	Along permanent watercourses less than 2m wide. (narrower widths may be allowable along watercourses less than 1m wide, especially on steep ground
20m	Along watercourses more than 2m wide and along the edges of lakes, reservoirs, ponds and wetlands
50m	Around abstraction points for public or private water supplies, such as springs, wells, boreholes and surface water intakes

Silt Fence

Silt fence can be used to reduce 'splash' of muddy water caused by road haulage at bridges and culverts over sensitive watercourses.

The use of silt fence to control siltation problems should be avoided and like straw bales and sheep fleece could be a sign that the diffuse pollution control plan has failed.

Silt fence is a temporary 'fire brigade' measure to mitigate short term siltation perhaps after heavy rain or where other measures have failed. Roadside ditches close to harvesting sites and stacking areas can be disconnected from the natural drainage system or old forest drains intercepted. Silt fence is not however a long term or permanent solution, and the source of the problem should be addressed. The gathered silt must be dig out and the silt fence removed as soon as possible after the immediate problem has passed. Silt fence should be removed at the end of all harvesting jobs and replaced with a permanent solution.

Guide 6.08 Forest Road Works

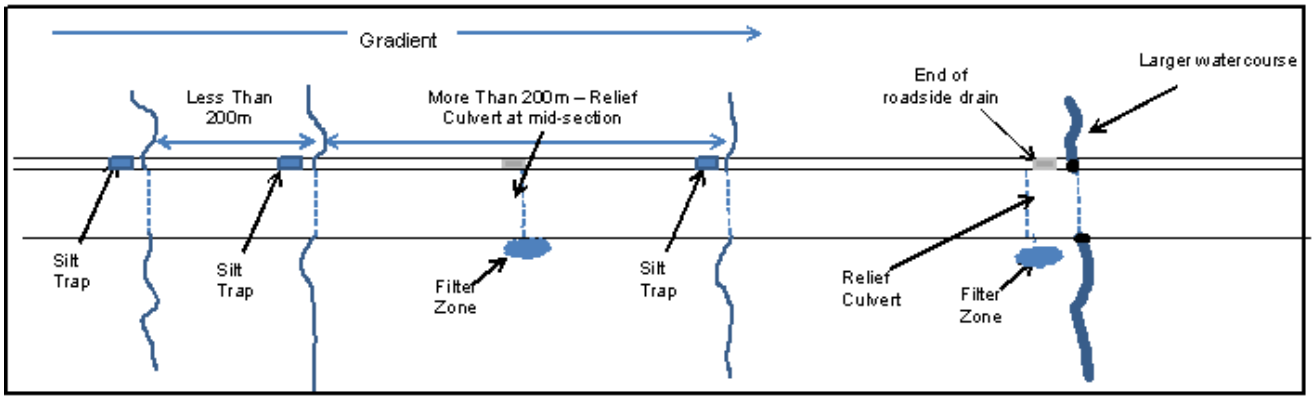
General

- In this document a large watercourse is generally any permanent watercourse shown on the OS 1:50,000 scale map for which a CAR licence would be required. However, there may be smaller watercourses not shown on these maps which form part of the permanent water framework which should be managed on site as large watercourses. Small watercourses include water emanating from springs, flushes, forest or roadside drains or other small non-permanent watercourses.
- Machines must not sit in streams while work progresses unless this is specifically authorised in the method statement and agreed under licence with SEPA.
- Plan the job to ensure that silt and silt management are considered prior to starting on site and that any preventative measures are in place before work commences.
- Stop road construction or maintenance during periods of heavy rain or when run-off is high.
- Liaise with the Harvesting Manager regarding the location of any forwarder ramps or loading benches to ensure that they do not interfere with watercourses and that the flow in roadside ditches can be led or culverted away from these areas.
- Use temporary silt fencing or silt traps to control runoff from the worksite during road construction and maintenance
- Excavations close to watercourses for bridge abutments and wing walls can potentially lead to siltation and should be undertaken with great care and planning.
- Temporary drainage may occasionally be needed if there is a risk of inundation of the work area. Temporary measures may be needed to avoid damaging either the environment or the engineering structure in the short term but must not become permanent solutions.

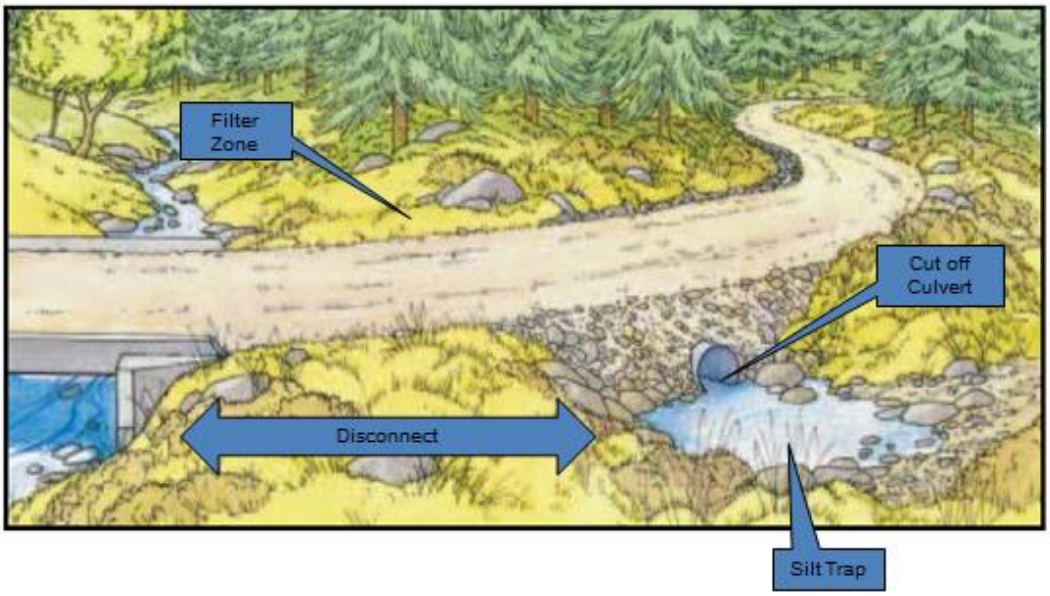
Culverts

- Roadside drains should not intercept large volumes of water from the ground above. Any watercourse, however small or intermittent in their flow, which is intercepted by a track or road line, should be culverted or bridged at that point. Pipes should be placed to follow the line of the existing watercourse whenever possible.
- The maximum distance between culverts should be no more than 200m in normal ground conditions and 100m on wet or steep ground. Additional intermediate relief culverts may be required to prevent the build-up of flow in, and scouring of, the topside drain. On steep sections of the road, relief culverts may be required more frequently.
- Culvert ends should be placed on the stream bed and should not create an overhang. This can lead to undercutting and be a barrier to fish. On steep ground relief culverts for minor watercourses or drains may be allowed to ‘hang’ where culvert angles may otherwise be too steep and fish passage unlikely. Here large stones shall be placed below the culvert to prevent undercutting.
- Silt traps shall be dug at the time of construction in the topside drain above all culvert pipes carrying a small watercourse. These should be about 3m above the culvert end.
- For large permanent watercourses, a cut off culvert should be inserted before the watercourse and the outflow allowed to filter through vegetation before reaching the stream. This second solution is also suitable for small watercourses or on wet steep ground or where the soil is particularly prone to erosion and peak flows may be high.

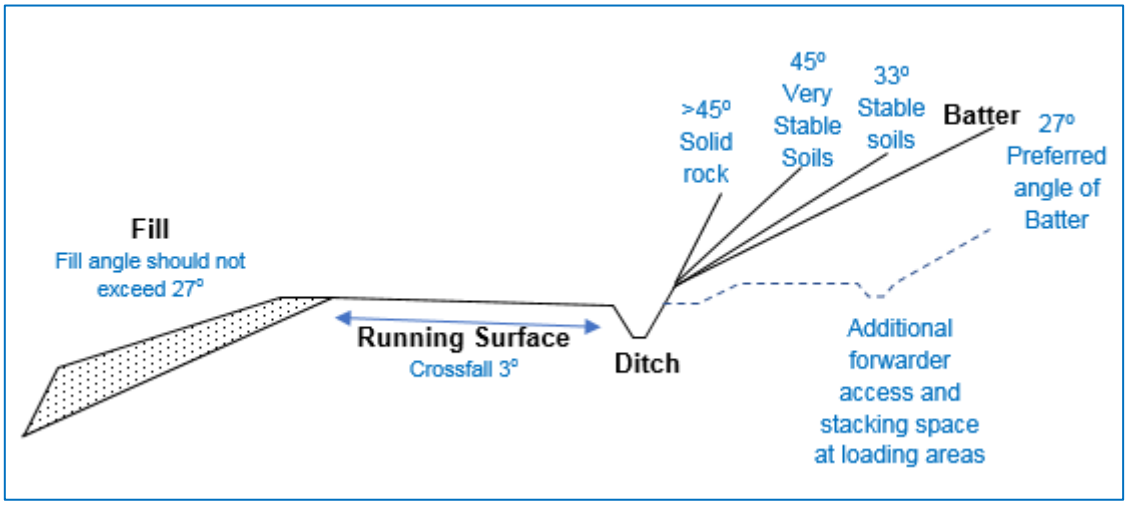
Lay out of culverts, silt traps and filter zones.



Layout of cut off culvert before major watercourse crossing



Layout of Batters and Spills



Checking and Maintenance

- Check the downstream flow below culverts and worksites frequently during the working day for signs of silt. Be particularly vigilant during or just after heavy rain.
- Stop and maintain silt traps if they are full. Check and empty all silt traps at the end of the job.
- Report any siltation problems to the Scottish Woodlands Site Manager immediately.

Protected Sites

- Take particular care where watercourses form part of a water supply catchment or salmon/trout spawning river.
- Avoid entering protected zones near otter holts etc. (These are marked on site and site maps).

References

The Forest and Water Guidelines 5th Edition - Forestry Commission

Forest Road Specification

Guide 6.15 Pre-Operational Diffuse Pollution Planning

Forestry operations often involve practices that have a potential to cause environmental damage by pollutants. Diffuse pollution is by far the most difficult to control and to implement suitable prevention measures. As opposed to point-source pollution, which would come from a fuel spill or pesticide application, diffuse pollution is generally associated with broad areas of drainage that accumulate pollutants like sediment and transport them into watercourses. Unfortunately, in many cases, early prevention measures are not sufficiently planned out and result in remedial works being required later in the operation when diffuse pollution becomes even more concentrated and difficult to control. Severe storm events have also been on the increase due to climate change and this makes diffuse pollution management even more challenging.

This guide aims to give managers a strategy to identify, assess, and plan for targeted prevention measures before operations begin to allow the best possible line of defence against diffuse pollution incidents, as well as demonstrate that suitable provisions have been made to protect the company from litigation if incidents occur.

Diffuse Pollution Incident Investigations, Fines and Penalties

The various forestry authorities and environment agencies across the UK are becoming more involved in regulating compliance with UKFS Forest and Water Guidelines and may issue fines and penalties as well as recover the costs of investigating incidents from offenders. They may also require the offending party to repair any environmental damage or pay the costs of making repairs to third parties such as river fisheries trusts. Together these costs can be substantial. In one forestry related case an estimated cost to one company was over £100,000. Issues may also be raised as a complaint with the forest owner's certification bodies, FSC and PEFC.

Investigations will look at various elements that led to the pollution occurring.

1. What did the Forestry Works Manager (FWM) do to identify potential problems before the job started?
2. What mitigation was put in place before the job started? Was this to an appropriate standard?
3. What instructions were given to the contractor at the pre-commencement meeting?
4. Did the contractor follow those instructions?
5. What supervision did the FWM do to ensure that the pre-commencement plan was followed?
6. Was there adequate maintenance of mitigation measures?
7. Did supervision identify developing problems, or changes in site conditions, and move to mitigate them before a problem arose?

Only after these key elements are reviewed will investigators consider what remedial actions the FWM and Contractor took after the incident occurred. It is recognised, at least by Scottish Forestry, that if the FWM can demonstrate that the above seven steps were correctly followed and that all reasonable steps were taken to follow the Forest and Water Guidelines then, if a diffuse pollution incident happens and the FWM has moved swiftly to mitigate it, then there may be no case to answer.

> *In other words, if the site was prepared for 'exceptionally heavy rain' through appropriate prevention measures and additional measures were put in place during the operations when problems arose, then diffuse pollution occurring as a result of 'exceptionally heavy rain' may be accepted as non-preventable.*

The FWM must of course be able to evidence this. The 'exceptionally heavy rain' defence will not be accepted without proper pre-operational diffuse pollution planning and implementation.

Failure to plan would be viewed by SEPA and the other UK Environment Agencies as a negligent approach to site management and could lead to more serious action being taken by them in the event of an incident.

Planning and Pre-Operational Survey

The key to successful diffuse pollution control is making sure that diffuse pollution mitigation measures are planned effectively and put in place before work begins. In previous incidents there has been little evidence of diffuse pollution surveys and planning. Silt traps or other measures were only installed after a problem occurred to limit the damage rather than prevent it.

A pre-operational survey should be carried out before every operation to identify potentially vulnerable features (water supplies and watercourses etc sometimes called "receptors") and potential sources of pollution, (forwarder tracks, refuelling areas, stacking and turning areas) as well as the potential pathways (old forest drains, roadside ditches, forwarder ruts) for the pollution to travel from the source to the receptor.

The operation should be planned to disrupt potential connections between sources and receptors and to keep them as far apart as possible. For example, by minimising watercourse crossings, keeping out of buffer zones, planning refuelling areas. Whenever possible, separate sources and receptors so that there is no possibility of pollution from one finding a pathway to the other. Contaminated water can travel a significant distance across a site. **Where it is not possible to separate the receptor from the source, we need to insert some control measures to break the pathway and prevent contamination.** For example, cutting off a roadside ditch at multiple locations to reduce the amount of water carried and divert outflows to suitable filter zones before the job starts. Placing suitable mitigation before operations begin ensures that most diffuse pollution will be intercepted before it becomes a problem and will buy a lot of time in the event of a more serious situation developing.

The method of working should also be planned to minimise the risk of diffuse pollution. For example, keeping main brash runs away from watercourse buffers and to avoid watercourse crossings or lifting the plough tine to break up plough furrows into short sections.

Based on previous incidents here are some key areas to look at.

Area of Worksite	What to look out for
Roadside drains	These can often gather several different sources of water together into one larger flow and direct it straight into a watercourse. This can cause mixing of clean and dirty water compounding the problem. Break up the length of connected roadside drains, and make sure the last break is disconnected from the watercourse with a suitable filter zone.
Watercourse crossings and log bridges	The forwarder route will tend to pull mud towards these and straight into the watercourse. Be especially careful around watercourse crossings and ensure that they are well designed and maintained. Avoid routes that slope down into watercourses wherever possible.
Old forest drains	These can have the same effect in pulling together clean and dirty water as roadside drains. They are often dry when felling starts but may wet up once the canopy has been removed and if the flow of water is restricted by brash this results in a wet hole developing.
Water supply catchments	Private water supplies can be especially sensitive to even a very low level of diffuse pollution and require extra care.
Stacking and turning areas	Extraction will tend to pull mud towards these areas. Stacking can impede water flow in the roadside drain and the forest road can begin to break up under heavy use. If a timber lorry bursts a hose it will be at the stacking area. See also roadside drains above.
Refuelling and maintenance areas	Spillage while refuelling or refilling tanks is common. Maintenance areas my become contaminated with waste oils, old parts, and grease cartridges. Provision of spill materials.

The Importance of Supervision

Most pollution incidents develop from a dynamic situation. It is therefore important that contractors and managers continually review diffuse pollution management and adjust their provision accordingly. During periods of adverse weather, inspections should be carried out on a more frequent basis. If necessary, sites should be shut down until the weather improves. If sites are to be left unattended over winter periods (i.e. Christmas and New Year), then a review and strengthening of mitigation measures should be carried out before they are shut down.

Evidence of interactive supervision of a worksite will be important if a serious diffuse pollution incident occurs. As with all areas of legal compliance, it is important to ensure that eWIFs reflect ongoing inspection, management, and supervision has been carried out and make specific notes about diffuse pollution control.

"The art of war teaches us to rely not on the likelihood of the enemy's not coming, but on our own readiness to receive him; not on the chance of his not attacking, but rather on the fact that we have made our position unassailable." (Sun Tzu, "The Art of War", 490BC)

22/02715/PNO 2022/0242/DET prior approval for forest track works at Altnacriche, near Lynwilg, Aviemore

Pollution prevention and control schedule

This document sets out what pollution prevention and control measures will be implemented and where on site during ground clearing, preparation and construction works (including landscaping). Should the proposed development gain consent, the schedule will require to be incorporated into a detailed Construction Method Statement (CMS) and/or Construction Environment Management Plan (CEMP) if a CMS or CEMP is required by condition.

Stage of development	**Description of pollution prevention and control measures to be implemented** (answering the principles of why, what, where, how and when)
Stage 1 - ground clearing (eg vegetation stripping, tree felling, etc)	**Why** *Briefly (one or two sentences) describe what requires to be done at this stage to facilitate development.* To facilitate machine access and maintain ATV tracks, vegetation to be stripped at machine access ramp locations, no veg stripping required on ATV tracks **What, where** *Briefly describe what works will happen, what ppc measures will be put in place and where.* Heather and humus layer to be removed along footprint of ramp sites. This will be stored approximately 10m northeast of each ramp site on vegetated areas to restrict sediment loss. **How** *Briefly describe how the works will take place.* Machine scraping will be used. **When** *Briefly describe when works will take place in relation to other stages of development, and in what weather conditions they should not.* Site prep stage, Note 'Site pre-commencement pollution control plan'
Stage 2 - ground preparation (eg reprofiling and excavations)	**Why** *Briefly (one or two sentences) describe what requires to be done at this stage to facilitate development.* Machine ramp reprofiling of ground required to reduce hillside gradient to allow machine access. **What, where** *Briefly describe what works will happen, what ppc measures will be put in place and where.*

	Cut and fill at each location. Silt traps to be placed downslope of excavations and regularly maintained while excavated material is exposed. **How** *Briefly describe how the works will take place.* Cut and fill will be minor and only to the degree required to reprofile the slope at these two locations. Photo diagram produced showing indicative cut/fill generally less than 0.5m. Note 'Site pre-commencement pollution control plan' **When** *Briefly describe when works will take place in relation to other stages of development, and in what weather conditions they should not.* In conjunction with construction phase. No cut and fill works to be carried out during or immediately prior to forecast wet weather or snow melt conditions. Note 'Site pre-commencement pollution control plan'
Stage 3 - construction (eg installation of services, built development, roads, etc)	**Why** *Briefly (one or two sentences) describe what requires to be done at this stage to facilitate development.* Culverting of watercourses and regrading of ATV tracks where they have become eroded. Installation of machine ramps noted above. **What, where** *Briefly describe what works will happen, what ppc measures will be put in place and where.* Installation of culvert as per SEPA CAR approval, installation of machine ramps, and maintenance of ATV tracks. Silt traps to be placed downslope of excavations and regularly maintained while excavated material is exposed. Note 'Site pre-commencement pollution control plan' **How** *Briefly describe how the works will take place.* Culvert installation will follow standard best practice and be in line with specifications noted in the approved SEAP CAR licence. All mitigations included in the 'Site pre-commencement pollution control plan' to be followed. ATV track maintenance will scrap areas of eroded track and re-integrate materials into eroded areas, there should be no waste material produced. Camber to be planned to shed surface water quickly and often. Where existing topographic 'humps' have been eroded, these will be re-established to prevent water running down the surface of the existing tracks.

	Ground disturbance shall be kept to a minimum and where vegetation does not require disturbance it shall remain in place. **When** *Briefly describe when works will take place in relation to other stages of development, and in what weather conditions they should not.* Following site prep stage. No works that would displace sediment to be carried out during or immediately prior to forecast wet weather or snow melt conditions
Stage 4 - landscaping (eg planting, turf reinstatement)	**Why** *Briefly (one or two sentences) describe what requires to be done at this stage to facilitate development.* Machine ramps may be reprofiled following completion of afforestation works to alleviate landscape sensitivities. **What, where** *Briefly describe what works will happen, what ppc measures will be put in place and where.* Where vegetation has been removed and stored, this will be reinstated as needed to minimise exposed soils and encourage rapid revegetation. Note 'Site pre-commencement pollution control plan' **How** *Briefly describe how the works will take place.* Where it was feasible to remove vegetation in turfs, these will be placed back onto disturbed ground. **When** *Briefly describe when works will take place in relation to other stages of development, and in what weather conditions they should not.* Prior to final afforestation completion inspection. No works that would expose soil to be carried out during or immediately prior to forecast wet weather or snow melt conditions.

The plan overleaf shows where the measures above will be implemented.

See attached site detail maps 1-4, control measures described in the 'Site pre-commencement pollution control plan' will be followed at all locations.

Polution Control Plan **Road Construction and Maintenance**

Estate	**Kinrara**	**Site Name**	**Lost Forest WC Phase 1**
Contractor	**On Capacity**		
Completed by	**M Parker**		
Date	**23/08/2022**	**Certified**	**No**

Potential Receptors	**Type of receptor**	**Present**	**Shown on Map**	Notes
	Water Courses	**X**	**Y**	2 watercourse crossings, multiple watercourses in close proximity
	Water Bodies (lochs,lakes,ponds etc)			
	Water Supplies			
	Fish Farm Intake			
	Spawning Redds			
	Freshwater pearl Mussels			
	GWDTE/Springs			
	Acid sensitive catchments			
	Open Water or Wetland			
	Designated Sites, SSSI/SAC etc	**X**	**Y**	designated sites nearby, River Spey SAC, Loch Alvie SSSI, Craigellachie SSSI
	Other	**X**	**Y**	Cairngorms National Park
	Biosecurity Required?			

Factor	**Guidance**	**Risk Level**	Notes
Soils	Generally stable and free draining (Brown Earth and	M	exposed soils are readily erodible
Slope	Less that 12% low risk above 12% high risk	H	steep track gradients in places
GWDTE	If road crosses any GWDTE then the site is high risk	H	areas of wet heath, deep peat, and bogs present adjacent to tracks
Watercourse Crossings	If any watercourse crossings are required the site is high risk.	H	2 watercourse crossings are planned
Time of year	April to June (Low) - July to Sept (Med) - Oct to Feb	M	August/September
Residential Neighbours	Residential properties in potential flood zone	L	no
Other			
Overall Rating	Additional mitigation required if not low	M/H	Mitigations required asnoted in green section below

Consultation	**Is specific consultation required?**	Notes
SEPA/EA/ NRW/NIEA	CAR Licence or other consultation	Yes, CAR licence secured from SEPA
Neighbours (Water Supplies)	No	
Fishery Board or Trust	No	
Other	Yes	PRION from Council, called in by CNPA, awaiting decision

	Standard Risk Reduction Measures	Additional Site Specific Risk Reduction Measures (added by manager as appropriate)
Fuels, Oils and Lubricants	All diesel to be stored in double bunded labelled tanks. Tanks to have a self-sealing spill proof inner lid.	Follow standard measures noted to the left and measures included in QUEST Guides and as specified within "Forestry & Water Scotland - Know The Rules" 2nd Edition. Always follow Forest and Water Guidelines.
	The bund base and walls must be impermeable to water and oil and checked regularly for leaks.	
	Tanks to be kept locked at all times except when fuelling up machinery or being refilled by tanker.	
	Filling hoses and ancillary equipment to be stored within bund when not in use.	
	No storage of fuels or oils or fuelling or filling within 10m of a water course or 50m of a water supply.	
	Tanks to be positioned in safe locations to avoid damage, on firm level ground and be marked with Hi-Vis tape.	
	2 x Oil absorbent booms to be inserted in roadside drains below the refuelling point before work commences.	
	Any slight spillage at refuelling to be cleaned up immediately using oil absorbent materials	
	Main site spill kit capable of containing minimum 500l spill maintained and accessible near the refuelling point.	
	Maintain at least basic “Cab Kit” oil spill response materials in all machinery cabs.	
	All lubricants and oils to be stored within a bund and within a site safe or secure location.	
	All maintenance and servicing of plant to be done over a drip tray or plant nappy.	
	Hydraulic hoses to be checked frequently for signs of chaffing or ware and replaced as necessary	
	All waste oils and lubricants, empty drums and containers, grease cartridges, filters or other contaminated parts to be removed from site by the end of the working day.	
	No waste or litter to be left on site	
	All spills of fuel, oils and lubricants to be reported to Scottish Woodlands immediately.	

	Standard Risk Reduction Measures	Additional Site Specific Risk Reduction Measures (added by manager as appropriate)
Specification	Road to conform to FC CAT 1a specification	Not applicable, ATV tracks and machine access ramps only
	All batter heights and angles to be minimised	Not applicable, existing track design to be maintained
	All springs, minor watercourses and forest drains to be piped under the road at point of origin. (Must not be allowed to run the roadside drain)	Not applicable, maintain all existing drainage
	All roadside drains to end in a sump before the next culvert.	Follow standard measures noted to the left and measures included in QUEST Guides and as specified within "Forestry & Water Scotland - Know The Rules" 2nd Edition. Always follow Forest and Water Guidelines.
	No hanging culverts to be left except on very steep ground.	
	Culverts to be inserted in roadside drain above all turning areas and forwarder ramps to take water across the road	Not applicable
	All roadside drains to be culverted across the road 20m above all watercourses and spilt into a silt trap and filter zone.	Follow standard measures noted to the left and measures included in QUEST Guides and as specified within "Forestry & Water Scotland - Know The Rules" 2nd Edition. Always follow Forest and Water Guidelines.

	On steep sections insert silt traps in the roadside ditch at frequent intervals (50m)	Not applicable, maintain all existing draiange
Quarries and Borrow pits	All quarry and borrow pit run off to be directed to a large silt trap and filter zone.	Not applicable, no borrow puts/quarries
	The roadside drain above all quarries and borrow pits to be diverted either through a culvert or away from the quarry or borrow pit to a silt trap and filter zone.	not applicable
	No quarrying within buffer zones	not applicable
	De-watering of quarries and borrow pits to discharge into a large silt trap with suitable filter zone	not applicable
Drains	No roadside drains to lead directly into watercourses.	Follow standard measures noted to the left and measures included in QUEST Guides and as specified within "Forestry & Water Scotland - Know The Rules" 2nd Edition. Always follow Forest and Water Guidelines.
	All drainage to end a large silt trap and filter zone	
Weather	Work to stop in periods of very heavy rain or if contamination of watercourses is likely	
	Inspection for potential diffuse pollution to be doubled if heavy rain persists over 24hr period until water levels drop.	
Watercourse Crossings	Repeated fording of watercourses to be avoided. Only ford watercourses the minimum number of times required to construct appropriate full specification crossing	
Construction	No cement to be stored within buffer zones.	not applicable, no cement to be used
	De-watering of bridge foundations etc to discharge into a large silt trap with suitable filter zone	not applicable, no bridges

Biosecurity	**Biosecurity Risk Reduction Measures**	**Site Specific Biosecurity Measures**
		All machinery to be thoroughly cleaned before leaving site. See Quest Guide - Washing Machines
		All boots and vehicle wheels to be cleaned and disinfected before leaving site at the disinfecting point

Buffers	**Buffer Width**	**Situation**
	10m	**Along permanent watercourses less than 2m wide. (narrower widths may be allowable along watercourses less than 1m wide, especially on steep ground**
	20m	**Along watercourses more than 2m wide and along the edges of lakes, reservoirs, ponds and wetlands**
	50m	**Around abstraction points for public or private water supplies, such as springs, wells, boreholes and surface water intakes**