



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**River Camel Special Area of Conservation (SAC)
Site Code UK0030056**

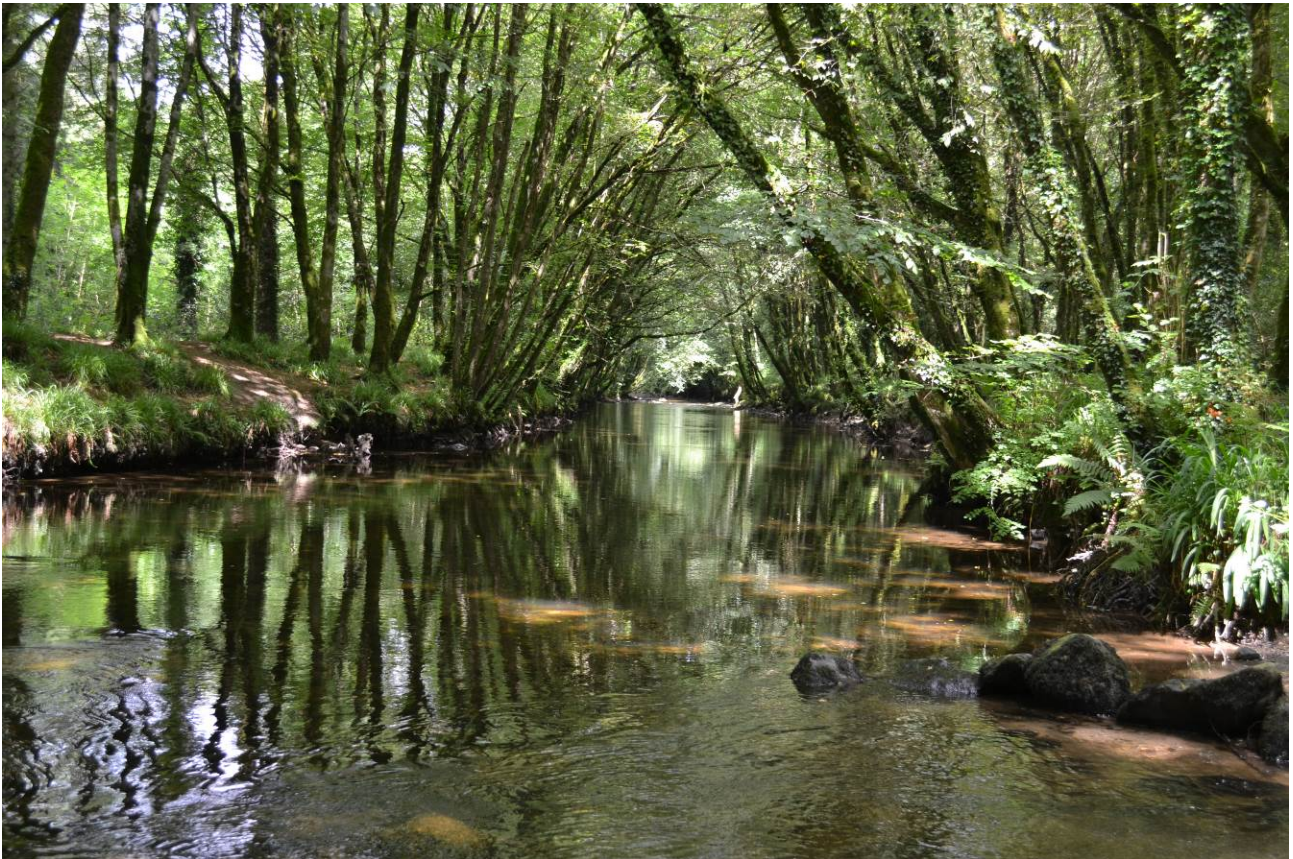


Photo by Tim Rich, TACP

Date of Publication: 14 March 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to River Camel SAC.

This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

This advice replaces a draft version dated 16 January 2019 following the receipt of comments from the site's stakeholders.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England when developing, proposing or assessing an activity, plan or project that may affect this site

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	River Camel Special Area of Conservation (SAC)
Location	Cornwall
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 st April 2005
Qualifying Features	See section below
Designation Area	621.17 ha
Designation Changes	<i>None</i>
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	River Camel Valley and Tributaries SSSI
Relationship with other European or International Site designations	Not applicable

Site background and geography

The River Camel, with its associated woodlands, willow carr, wet meadows, wet heath and mire habitats, is the largest river catchment on the North Cornwall coast, flowing between Bodmin Moor and Wadebridge. The main river rises on Hendrabortnick Down, at a height of 280m, near Camelford, and discharges into the Atlantic Ocean through Padstow Bay, a distance of approximately 50km. The tributaries included within the SAC are the Ruthern, the Allen, the Clerkenwater and the De Lank which drains acid moorland on Bodmin Moor, falling steeply as it flows off the moorland plateau into the Cornish Killas National Character Area. The catchment geology consists predominantly of low or impermeable rock (Upper and Middle Devonian slate), which is intruded by an area of granite to the east, forming Bodmin Moor. The geology and topography of the catchment results in the rapid drainage of watercourses and, as a result, stream levels rise and fall quickly. The underlying substrate of the river is boulder, cobbles, pebbles and gravel with some sandstone and slate bedrock.

Further information on the site National Character Area can be found [here](#).

The River Camel and its tributaries are particularly important for otters, bullhead and salmon. The site represents the full range of conditions used by the otter in freshwater, ranging from the upland headwaters of the De Lank to lowland reaches of varying sizes, flow rates and cover. The lower reaches of the Camel and Allen are tidal providing added diversity while the wooded lower reaches of the river provide excellent habitat for resting and breeding. The clean, fast-flowing, relatively oligotrophic waters with their stony bottoms are also particularly suitable for bullhead, which forms an important part of the total fish biomass. The Camel represents bullhead in the extreme south-west of its range in England. Salmon are an Annex II species present as a qualifying feature, but not a primary reason for site selection.

Some of the largest and best remaining ancient semi-natural woodlands in Cornwall are found alongside the Camel. The steeper valley side woods on acid to neutral soils primarily comprise oak wood while grey willow and alder woodland, with a variable and sometimes rich ground flora, has developed on flatter ground, often in mosaic with a range of fen and wet grassland plant communities. Small areas of wet and humid heath occur, primarily at Brynn Moor and Demelza.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying habitats:

The following Annex I habitats are present as qualifying features, but are not a primary reason for selection of this site:

- **H4030 European dry heaths**

This habitat has a wide European distribution, but it is only extensive in the western oceanic fringes of Europe, including the UK. Dry heaths occur throughout the UK. They are particularly abundant in the uplands, where they may form extensive stands, which dominate the landscape. They are more localised in lowland areas, especially in south and central England, where they have declined in extent due to afforestation, agricultural improvement and other land uses.

European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs dominate the vegetation. The most common is heather *Calluna vulgaris*, which often occurs in combination with gorse *Ulex* spp., bilberry *Vaccinium* spp. or bell heather *Erica cinerea*, though other dwarf-shrubs are important locally. Nearly all dry heath is semi-natural, being derived from woodland through a long history of grazing and burning. Most dry heaths are managed as extensive grazing for livestock or, in upland areas, as grouse moors.

The River Camel SAC supports a small area of lowland heathland, comprising the UK NVC H4 *Ulex gallii* - *Agrostis curtisii* heath community, primarily in the Ruthern valley.

- **H91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles**

In the UK, this Annex I habitat type comprises a range of woodland types dominated by mixtures of oak (*Quercus robur* and/or *Q. petraea*) and birch (*Betula pendula* and/or *B. pubescens*). It is characteristic of base-poor soils in areas of at least moderately high rainfall in northern and western parts of the UK. Frequently the oak woodland occurs as part of a mosaic of woodland types (including other Annex I habitats, such as 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)) that varies with position on the slope, occurrence of streams or other waterbodies, and local soil enrichment. These transitions are important in maintaining the structure and function of the habitat type and differ across the country.

Within the EU, old sessile oak woods with holly *Ilex aquifolium* and hard-ferns *Blechnum* spp. are virtually confined to the UK and Ireland. They are widespread and locally extensive throughout the western part of the UK.

Within the River Camel SAC, this habitat is primarily represented by W10 *Quercus robur*–*Pteridium aquilinum*–*Rubus fruticosus* woodland, with particularly good examples along the Camel at Helsbury Park and fringing the De Lank. A feature of the oak woodlands is that they are dominated by *Quercus robur*, rather than *Q. petraea*, generally lack *Pteridium* in the herb layer, and sometimes have abundant *Fagus sylvatica* in the canopy. There is also one stand of W17 *Quercus petraea*–*Betula pubescens*–*Dicranum majus* woodland, in the De Lank catchment, where there are extensive rocky boulders covered with mosses.

- **H91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)**

This feature comprises woods dominated by alder *Alnus glutinosa* and willow *Salix* spp. on flood plains, typically on moderately base-rich, eutrophic soils subject to periodic inundation. Many such woods are dynamic, being part of a successional series of habitats. Their structure and function are best maintained

within a larger unit that includes the open communities, mainly fen and swamp, of earlier successional stages. On the drier margins of these areas other tree species, notably ash *Fraxinus excelsior* and elm *Ulmus* spp., may become abundant. In other situations the alder woods occur as a stable component within transitions to surrounding dry-ground forest, sometimes including other Annex I woodland types.

These transitions from wet to drier woodland and from open to more closed communities provide an important facet of ecological variation. The ground flora is correspondingly varied. Some stands are dominated by tall herbs, reeds and sedges, while others have lower-growing communities with creeping buttercup *Ranunculus repens*, common marsh bedstraw *Galium palustre*, alternate-leaved golden-saxifrage *Chrysosplenium oppositifolium* and marsh-marigold *Caltha palustris*.

The main alder woodland vegetation type on the River Camel SAC is W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland, at least in the upper part of the catchment where soils are relatively oligotrophic. Most of the stands are referable to the W7b *Carex remota-Cirsium palustre* subcommunity. W6 *Alnus glutinosa-Urtica dioica* woodland is also present, primarily on the richer alluvial soils in the lower part of the catchment and represented by the W6a typical subcommunity, often with nettles in the ground layer under alder. Small areas of W5 *Alnus glutinosa-Carex paniculata* woodland occur, for example, at Helsbury and Colquite.

Qualifying Species:

- **S1163 Bullhead *Cottus gobio***

The Camel represents bullhead in the extreme south-west of its range in England. The clean, fast-flowing, relatively oligotrophic waters with their stony bottoms are particularly suitable for bullhead, which forms an important part of the total fish biomass.

The bullhead is a small bottom-living fish that inhabits a variety of rivers, streams and stony lakes. It appears to favour fast-flowing, clear shallow water with a hard substrate (gravel/cobble/pebble) and is frequently found in the headwaters of upland streams. However, it also occurs in lowland situations on softer substrates so long as the water is well-oxygenated and there is sufficient cover. It is not found in badly polluted rivers.

Bullheads spawn from February to June and up to four times. The male excavates a nest under a suitable large stone to attract a female. Part of this may be achieved by emission of acoustic 'knocking' sounds by the males. The female lays a batch of up to 400 eggs (2–2.5 mm in diameter), which adhere to the underside of the stone. In situations without suitable stones, bullheads may use other media, such as woody debris or tree roots. The male then defends the brood against egg predators such as caddis larvae and manages the nest by fanning the eggs with his pectoral fins. The eggs hatch after 20 to 30 days, depending on water temperature. The newly hatched larvae (6–7mm in length) are supplied by a large yolk sac, which is absorbed after 10 days, after this time they leave the nest.

Generally, bullheads attain a length of 40–50 mm after their first year, 60 mm after their second and 70–90 mm after their third. They do not generally live for more than three or four years, although fish of over 10 years old have been recorded.

Bullhead are widely distributed within the SAC, but are not recorded in the Clerkenwater tributary, at least since 1985, nor from the De Lank river above De Lank quarry. There are a number of bedrock outcrops in the lower sections of the Clerkenwater watercourse that would be natural barriers to bullhead colonisation. The De Lank river is blocked by rubble at the De Lank quarry, from historic mining operations, but it is unclear whether there are natural barriers to bullhead at this point as well.

- **S1355 Otter *Lutra lutra***

The Camel represents otter in its main stronghold in England in the south-west of the country. Records show that these populations persisted even during the period when the otter was in serious decline over much of the rest of its range in England, and this area has acted as a nucleus for recolonisation of other parts of England. The river and its tributaries represent the more upland as well as lowland habitat types

utilised by otters, satisfying requirements for adequate food supply throughout the year. The wooded lower reaches of the river provide excellent habitat for resting and breeding.

Otters are semi aquatic, living mainly along rivers. They primarily eat fish, though crustaceans, frogs, voles and aquatic birds may also be taken. Being at the top of the food chain, an otter needs to eat up to 15% of its body weight in fish daily.

Otters are solitary shy animals, usually active at dusk and during the night. Otters can travel widely over large areas. Some are known to use 20 km or more of river habitat. Otters tend to live alone as they are very territorial. Otters deposit faeces in prominent places along a watercourse (known as spraints) which have a characteristic sweet musky odour. These mark their range which may help neighbouring animals keep in social contact with one another.

The Otter is also a 'European Protected Species' in the UK, and it is an offence to disturb, capture, injure or kill an otter (either on purpose or by not taking enough care), or to damage, destroy or obstruct access to its breeding or resting places, without first getting a Licence.

Otters are widely distributed within the River Camel catchment.

- **S1106 Atlantic salmon *Salmo salar***

The Atlantic salmon is an anadromous species (i.e. adults migrate from the sea to breed in freshwater). Spawning takes place in shallow excavations called redds, found in shallow gravelly areas in clean rivers and streams where the water flows swiftly. The young that emerge spread out into other parts of the river. After a period of 1-6 years the young salmon migrate downstream to the sea as 'smolts'. Salmon have a homing instinct that draws them back to spawn in the river of their birth after 1-3 years in the sea. This behaviour has resulted in genetically distinct stock between rivers and even within individual rivers, with some evidence of further genetic distinctiveness in the tributaries of large rivers.

Salmon occur in the main river and all main tributaries within the SAC, except that they cannot currently access the De Lank river above the De Lank Quarry. It is unclear whether they would be able to access above the quarry in the absence of the rubble blockage (which may conceal a natural blockage, e.g. a waterfall).

Table 1: Supplementary Advice for Qualifying Features: H4030. European dry heaths

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Restore the total extent of the feature to 6.05ha.	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information.</p> <p>The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.</p> <p>At the time of notification, the extent of this feature was detailed as 6.05ha but a recent, more accurate survey (2014/2015) estimates the area to be 2.9ha. It is possible that the original habitat extent included transitional habitats and other elements of the habitat mosaic but that there has also been some encroachment of the habitat by scrub and woodland.</p>	<p>Rich et al (2014, 2015).</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to</p>	<p>Rich et al (2014, 2015).</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p> <p>At the time of notification, the extent of this feature was detailed as 6.05ha but a recent, more accurate survey (2014/2015) estimates the area to be 2.9ha. It is possible that the original habitat extent included transitional habitats and other elements of the habitat mosaic but that there has also been some encroachment of the habitat by scrub and woodland.</p>	
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type:</p> <p>H4 <i>Ulex gallii</i> – <i>Agrostis curtisii</i> heath</p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).</p>	Rich <i>et al.</i> (2014, 2015).
Structure and function (including its typical species)	Vegetation community transitions	<p>Restore any areas of transition between this and communities which form other heathland-associated habitats, such as wet heaths, mires, acid grasslands, scrub and woodland.</p>	<p>Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle.</p>	See above and Rich <i>et al</i> (2014, 2015).
Structure and function	Vegetation structure:	<p>Maintain an overall cover of dwarf shrub species which is</p>	<p>Variations in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is needed to</p>	<p>This attribute will be periodically monitored as</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(including its typical species)	cover of dwarf shrubs	typically between 25-90%	maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle. The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in most cases will be ericoids (i.e. plants that look like heathers, including members of the Ericaceae and Empetraceae families). The ericaceous species heather or ling <i>Calluna vulgaris</i> , bell heather <i>Erica cinerea</i> , cross-leaved heath <i>Erica tetralix</i> , and bilberry or blaeberry <i>Vaccinium myrtillus</i> are the commonest and most characteristic dwarf-shrubs on the site. <i>Calluna</i> is usually the most abundant.	part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation composition: bracken cover	Restore a cover of dense bracken which is low, typically at <10%	The spread of bracken <i>Pteridium aquilinum</i> is a problem on many lowland heathlands. The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic heathland vegetation. Usually active management of bracken is required to reduce or contain its cover across this habitat feature. But this fern has also some nature conservation value, for example on sites where fritillary butterflies occur and utilise bracken litter habitat. A restore target is appropriate here because the recent habitat survey (Rich <i>et al.</i> 2014) noted that the heathland was being invaded by bracken.	Rich <i>et al.</i> (2014) This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure: cover of gorse	Maintain cover of common gorse <i>Ulex europaeus</i> at <25% and the combined cover of <i>U. europaeus</i> and <i>U. gallii</i> at <50%	Gorse as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Mature stands en masse may also be serious fire hazards.	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation structure: tree cover	Maintain the open character of the feature, with a typically scattered and low cover of trees and scrub (<15% cover)	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover will be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure: heather age structure	Maintain a diverse age structure amongst the ericaceous shrubs typically found on the site: Pioneer phase: 10-40%; Building/mature phase: 20-80%; Degenerate phase: <30%; and Dead: <10%.	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation: undesirable species	Maintain the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread: <1% cover of non-native undesirable species <1 % cover of undesirable species and other herbaceous undesirable spp	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants. No undesirable species (except for bracken, dealt with above) have been identified as a problem within the heathland habitat. Non – native species include <i>Rhododendron ponticum</i> and <i>Fallopia japonica</i> . Undesirable species may include <i>Cirsium arvense</i> , <i>Digitalis purpurea</i> , <i>Epilobium</i> spp. (excluding <i>E. palustre</i>), <i>Chamerion angustifolium</i> , <i>Juncus effusus</i> , <i>J. squarrosus</i> , <i>Ranunculus</i> spp., <i>Senecio</i> spp., <i>Rumex obtusifolius</i> , <i>Urtica dioica</i> , 'coarse grasses'	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature;</p> <p><i>Calluna vulgaris, Erica ciliaris, E. cinerea, E. tetralix, Ulex gallii, Vaccinium myrtillus, Agrostis curtisii, Carex panicea, Molinia caerulea, and Potentilla erecta.</i></p>	<p>Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include;</p> <ul style="list-style-type: none"> • Structural species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. <p>There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary.</p> <p>The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.</p>	Typical species taken from quadrat data taken during recent habitat survey Rich <i>et al.</i> (2014, 2015).
Structure and function (including its typical species)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	<p>This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site.</p> <p>These features may also be important to the operation of the</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	<p>The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being moderate, taking into account the sensitivity, fragmentation, topography and management of its habitats/supporting habitats. This means that this site is considered to be vulnerable overall but moderately so.</p> <p>This means that some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p>	NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Supporting processes (on which the feature relies)	Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England.</p> <p>This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI</p>	<p>Views about the Management of the SSSI which underpin this SAC are available from here</p> <p>Natural England (2014) River Camel Site Improvement Plan</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Appropriate management for this feature may include maintaining low nutrient levels to maintain high numbers of species through the management activities of grazing, burning, mowing, sod-cutting and scrub/tree cutting. Management of succession is a critical aspect of management for this habitat, by a combination of active processes and grazing/cutting. A range of invertebrates and plants require bare ground/peat where it is not too frequently disturbed by vehicles or feet.</p> <p>A 'restore' target is appropriate here because some of the heathland within the site suffers from lack of management.</p>	
Supporting processes (on which the feature relies)	Air quality	<p>Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).</p>	<p>This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis.</p> <p>Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p> <p>A 'restore' target has been included here as the maximum Critical Loads and/or Levels are being exceeded and present a risk to this vegetation.</p>	<p>More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).</p>

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Version Control: N/A			
Variations from national feature-framework of integrity-guidance: Target for tree and scrub cover has been reduced to 15% as more appropriate for site and consistent with Favourable Condition Table. ' Water quality ' and ' hydrology ' attributes are not considered to be key attributes of this feature at this site and have been removed.			

Table 2: Supplementary Advice for Qualifying Features: H91A0. Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles; Western acidic oak woodland

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the H91A0 feature to not less than 90.7ha.	<p>See the explanatory notes for this attribute above in Table 1</p> <p>For this feature tree roots (particularly of veteran trees) can extend a considerable distance beyond the boundary of the site - they can be impacted by soil compaction (such as caused by vehicles or construction works); agricultural operations or other soil disturbance (like trenches); and agro chemicals or other chemicals which get into the soil. Any loss of woodland area - whether at the edge or in the middle of a site will reduce the core woodland area where woodland conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts will clearly disturb the movement of species between the remaining parts of the woodland.</p>	<p>Rich <i>et al.</i> (2014, 2015) & TOR Ecology (2014)</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H91A0 feature, including where applicable its component vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat.</p> <p>Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p>	<p>Rich <i>et al.</i> (2014, 2015) & TOR Ecology (2014)</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).	<p>See Rich <i>et al.</i> (2014, 2015) & TOR Ecology (2014)</p> <p>This attribute will be periodically monitored as</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>Vegetation Classification types</p> <p>W10 <i>Quercus robur</i>– <i>Pteridium aquilinum</i>– <i>Rubus fruticosus</i> woodland</p> <p>W17 <i>Quercus petraea</i>– <i>Betula pubescens</i>– <i>Dicranum majus</i> woodland</p>	<p>Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).</p>	<p>part of Natural England's site condition assessments.</p>
Structure and function (including its typical species)	Vegetation structure - canopy cover	<p>Maintain an appropriate tree canopy cover across the feature, which will typically be between 60-90% of the site</p>	<p>Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages.</p> <p>Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litter-fall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil.</p> <p>Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Structure and function (including its typical species)	Vegetation structure - open space	<p>Restore areas of permanent/temporary open space within the woodland feature, typically to cover approximately 10% of area</p>	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			A 'restore' target is appropriate here as some areas of woodland are lacking open spaces.	
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 10% of the feature at any one time) and the assemblages of veteran and ancient trees (typically 5-10 trees per hectare).	<p>Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning.</p> <p>For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m ³ per hectare of standing or fallen timber or a minimum of 4 fallen trees >20cm per hectare, and 4 standing dead trees per hectare	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning.</p> <p>Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - shrub layer	Maintain an understorey shrubs covering at least 20% of the stand area (this will vary with light levels and site	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		objectives)		
Structure and function (including its typical species)	Vegetation structure - woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations. Grasslands / arable fields managed with high doses of agro-chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment etc).	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See the explanatory notes for this attribute above in Table 1	NATURAL ENGLAND, 2015.
Structure and function (including its typical species)	Browsing and grazing by herbivores	Restore browsing at a (low) level that allows well developed understorey with no obvious browse line, & lush ground vegetation with some grazing sensitive species evident (bramble, ivy etc), and tree seedlings and sapling common in gaps.	<p>Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities.</p> <p>In general, both light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment. Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets of young trees which shade out ground flora and lower plant species. However, heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or poaching damage, canopy fragmentation, heavy browsing, bark stripping and a heavily grazed sward.</p> <p>A 'restore' target is considered appropriate here as parts of the woodland suffer from excessive deer browsing.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its	Regeneration potential	Restore the potential for sufficient natural regeneration of	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and	This attribute will be periodically monitored as part of Natural England's

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate.	<p>shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20.</p> <p>Species with shade tolerant seedlings such as ash, sycamore and beech will establish more readily beneath a canopy than light demanders such as oak which will only grow well if the canopy density is low. Consequently oak regeneration should only be expected where there are large gaps in the canopy or at the woodland edge.</p> <p>A 'restore' target is considered appropriate here as parts of the woodland suffer from lack of regeneration, primarily due to deer browsing.</p> <p>The genetic integrity of the sessile oak within the SAC is particularly important (it includes isolated stands with little/no planting that are likely to have considerable local adaptation) and should be maintained.</p>	site condition assessments.
Structure and function (including its typical species)	Tree and shrub species composition	<p>Restore a canopy and under-storey of which 95% is composed of site native trees and shrubs</p> <p>Beech should not exceed 25% cover in W10 woodlands (overall in any one woodland) by 2020, reducing to 15% by 2050, and Sycamore should not exceed 10% cover in all woodlands.</p>	<p>Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species).</p> <p>Native species include: pedunculate oak <i>Quercus robur</i>, ash <i>Fraxinus excelsior</i>, birch <i>Betula</i> spp., holly <i>Ilex aquifolium</i>, alder <i>Alnus glutinosa</i>, hazel <i>Corylus avellana</i>, rowan <i>Sorbus aucuparia</i>, sallows <i>Salix</i> spp., hawthorn <i>Crataegus monogyna</i>.</p> <p>Some of the woodlands have a high density of beech in the canopy. It is likely that beech is not native to the valley but was planted in some of the woodlands (Rich <i>et al</i> 2014) and spread out from these plantings, and, therefore targets have been set to reduce the cover of this species.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments.
Structure and function (including its	Key structural, influential	Maintain the abundance of the species listed to enable each of them to	See the explanatory notes for this attribute above in Table 1	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)	and/or distinctive species	be a viable component of the Annex I habitat feature; pedunculated oak <i>Quercus robur</i> , holly <i>Ilex aquifolium</i> , ferns <i>Blechnum</i> spp. Otter <i>Lutra lutra</i>		
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature.	Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Particular species of concern are rhododendron, laurel, Himalayan balsam, pick-a-back plant (<i>Tolmiea menziesii</i>) and Japanese knotweed. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.	This attribute will be periodically monitored as part of Natural England's site condition assessments . See Westcountry Rivers Trust (2014, 2015) and Rich et al. (2014) for further detail.
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Root zones of ancient trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort in an un-compacted condition	The management of land within and around forest habitats which are characterised by ancient trees can be crucial to their individual welfare and long-term continuity, and the landscape they are part of can be just as or even more important. The condition of the soil surrounding such trees will affect their roots, associated mycorrhizal fungi and growth. Plants have difficulty in compacted soil because the mineral grains are pressed together, leaving little space for air and water which are essential for root growth. Unless carefully managed, activities such as construction, forestry management and trampling by grazing livestock and human feet during recreational activity may all contribute to excessive soil	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			compaction around ancient trees.	
Supporting processes (on which the feature relies)	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See the explanatory notes for this attribute above in Table 1 A 'restore' target has been included here as the maximum Critical Loads and/or Levels are being exceeded and present a risk to this vegetation.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary), maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. This is included as disruption/ damage to hydrological processes could be caused by activities at some distance from the site boundary, e.g. through extraction of ground or surface waters; diverting or damming river channels; pollution of water source; channel alignment that disrupts natural geomorphological processes; tunnelling etc	
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is maintained to a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.	
Version Control				
Advice last updated:				
27 February 2019: Following stakeholder comments. Additional detail on the genetic integrity of sessile oak has been added to the ' Regeneration potential ' attribute.				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Variations from national feature-framework of integrity-guidance: N/A			

Table 3: Supplementary Advice for Qualifying Features: H91E0. Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae); Alder woodland on floodplains *

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the H91A0 feature to not less than 30.2ha.	See the explanatory notes for this attribute above in Table 1 For this feature tree roots (particularly of veteran trees) can extend a considerable distance beyond the boundary of the site - they can be impacted by soil compaction (such as caused by vehicles or construction works); agricultural operations or other soil disturbance (like trenches); and agro chemicals or other chemicals which get into the soil. Any loss of woodland area - whether at the edge or in the middle of a site will reduce the core woodland area where woodland conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts will clearly disturb the movement of species between the remaining parts of the woodland.	The area of habitat at notification was 30.2ha. Recent surveys suggest that there is now c. 47 ha of this habitat within the SAC (see Rich <i>et al.</i> (2014, 2015) & TOR Ecology (2014)) This attribute will be periodically monitored as part of Natural England's site condition assessments .
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H91A0 feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	See Rich <i>et al.</i> (2014, 2015) & TOR Ecology (2014) This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).	See Rich <i>et al.</i> (2014, 2015) & TOR Ecology (2014) This attribute will be

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>following National Vegetation Classification types:</p> <p>W5 <i>Alnus glutinosa</i>– <i>Carex paniculata</i> woodland,</p> <p>W6 <i>Alnus glutinosa</i>– <i>Urtica dioica</i> woodland and</p> <p>W7 <i>Alnus glutinosa</i>- <i>Fraxinus excelsior</i>- <i>Lysimachia nemorum</i> woodland.</p>	<p>Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).</p>	<p>periodically monitored as part of Natural England's site condition assessments.</p>
Structure and function (including its typical species)	Vegetation structure - canopy cover	<p>Maintain an appropriate tree canopy cover across the feature, which will typically be between 60-90% of the site</p>	<p>Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages.</p> <p>Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litter-fall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil.</p> <p>Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Structure and function (including its typical species)	Vegetation structure - open space	<p>Maintain areas of permanent/temporary open space within the woodland feature, typically to cover</p>	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		approximately 10% of area	invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.	.
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 10% of the feature at any one time) and the assemblages of veteran and ancient trees (typically 5-10 trees per hectare).	<p>Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning.</p> <p>For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m ³ per hectare of standing or fallen timber or a minimum of 4 fallen trees >20cm per hectare, and 4 standing dead trees per hectare	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning.</p> <p>Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its	Vegetation structure - shrub layer	Maintain an understorey shrubs covering at least 20% of the stand area	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most	This attribute will be periodically monitored as part of Natural England's

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		(this will vary with light levels and site objectives)	appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.	site condition assessments .
Structure and function (including its typical species)	Vegetation structure - woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations. Grasslands / arable fields managed with high doses of agro-chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment etc).	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See the explanatory notes for this attribute in Table 1	NATURAL ENGLAND, 2015.
Structure and function (including its typical species)	Browsing and grazing by herbivores	Restore browsing at a (low) level that allows well developed understorey with no obvious browse line, & lush ground vegetation with some grazing sensitive species evident (bramble, ivy etc), and tree seedlings and sapling common in gaps.	<p>Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities.</p> <p>In general, both light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment. Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets of young trees which shade out ground flora and lower plant species. However, heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or poaching damage, canopy fragmentation, heavy browsing, bark stripping and a heavily grazed sward.</p> <p>A 'restore' target is considered appropriate here as parts of the woodland suffer from excessive deer browsing.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its	Regeneration potential	Maintain the potential for sufficient natural regeneration of	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and	This attribute will be periodically monitored as part of Natural England's

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate.	shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20.	site condition assessments .
Structure and function (including its typical species)	Tree and shrub species composition	Maintain a canopy and under-storey of which 95% is composed of site native trees and shrubs	Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species). Site native species include alder <i>Alnus glutinosa</i> , ash <i>Fraxinus excelsior</i> , hazel <i>Corylus avellana</i> , rowan <i>Sorbus aucuparia</i> , willow <i>Salix</i> spp, elder <i>Sambucus nigra</i>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Key structural, influential and/or distinctive	Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature; <i>Alnus glutinosa</i> , <i>Salix</i> spp., <i>Carex</i> spp, <i>Filipendula ulmaria</i> , <i>Galium palustre</i> , <i>Mentha aquatica</i> , <i>Valeriana officinalis</i> , <i>Iris pseudacorus</i> .	See the explanatory notes for this attribute above in Table 1	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Otter <i>Lutra lutra</i>		
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature.	Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Particular species of concern are rhododendron, laurel, Himalayan balsam, pick-a-back plant (<i>Tolmiea menziesii</i>) and Japanese knotweed. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.	This attribute will be periodically monitored as part of Natural England's site condition assessments . See Westcountry Rivers Trust (2014, 2015) and Rich <i>et al.</i> (2014) for further detail.
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Root zones of ancient trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort in an un-compacted condition	The management of land within and around forest habitats which are characterised by ancient trees can be crucial to their individual welfare and long-term continuity, and the landscape they are part of can be just as or even more important. The condition of the soil surrounding such trees will affect their roots, associated mycorrhizal fungi and growth. Plants have difficulty in compacted soil because the mineral grains are pressed together, leaving little space for air and water which are essential for root growth. Unless carefully managed, activities such as construction, forestry management and trampling by grazing livestock and human feet during recreational activity may all contribute to excessive soil compaction around ancient trees.	
Supporting processes (on which the feature relies)	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below	See the explanatory notes for this attribute above in Table 1 A 'restore' target has been included here as the maximum Critical Loads and/or Levels are being exceeded and present a risk to this vegetation.	More information about site-relevant Critical Loads and Levels for this SAC is available by using

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).		the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary), maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	<p>Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.</p> <p>This is included as disruption/ damage to hydrological processes could be caused by activities at some distance from the site boundary, e.g. through extraction of ground or surface waters; diverting or damming river channels; pollution of water source; channel alignment that disrupts natural geomorphological processes; tunnelling etc.</p>	
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is maintained to a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	<p>Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour.</p> <p>For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.</p>	
Version Control				
Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 4: Supplementary Advice for Qualifying Features: S1106. *Salmo salar*; Atlantic salmon

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Adult run size	<p>Maintain the population to that expected under un-impacted conditions, allowing for natural fluctuations. This should include a seasonal pattern of migration characteristic of the river and maintenance of the multi-sea-winter component.</p> <p>The salmon stock should meet or exceed the conservation limit of 176 eggs/100m² of accessible wetted area (56ha), which equates to 0.98 million eggs in at least four out of the five preceding years. In addition, the seasonal pattern of migration should be characteristic of the river including the multi-sea-winter component.</p>	<p>Impacts on physical, chemical or hydrological integrity, or from non-native species, or from exploitation in freshwater or marine and coastal waters, may suppress adult run size. Stocking may also artificially augment adult run size, and may mask environmental problems or generate impacts on naturally spawned individuals. The Conservation Limit should be based on the adult run size required to fully utilise all parts of the catchment that would be suitable for spawning and juvenile development under un-impacted conditions.</p>	<p>This attribute will be periodically monitored as part of Natural England's SSSI condition assessments. Site Data may be made available from Natural England upon request.</p>
Population (of the feature)	Juvenile densities	<p>Restore juvenile densities at those expected under un-impacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations.</p>	<p>Impacts on physical, chemical or hydrological integrity, or from non-native species, or from exploitation of spawning adults in freshwater or marine and coastal waters, may suppress juvenile densities.</p> <p>A 'restore' target is considered appropriate here as fry and parr densities in some sections of the river are currently well below historic levels (see EA, 2012).</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Population (of the feature)	Spawning distribution	<p>Restore the distribution of spawning to reflect un-impacted conditions through the site, and avoid reductions in existing levels.</p>	<p>After a year or more at sea, adult salmon return from their feeding grounds back to their river. Once it is time for them to spawn they will migrate upstream to the areas of the SAC where they were born to spawn themselves. These spawning areas may be in small tributaries of river systems where there is clean gravel and a good flow of fresh clean water. Maintaining these spawning areas is critical to the successful reproduction and long-term viability of this feature.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			A 'restore' target is considered appropriate here as access to spawning areas is impeded by instream structures in some parts of the river system.	
Structure and function (including its typical species)	Adaptation and resilience	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See the explanatory notes for this attribute above in Table 1 A 'restore' target has been applied here as the ability of the river to move within its natural floodplain is currently constrained by features such as bank reinforcement in some sections.	NATURAL ENGLAND, 2015.
Supporting habitat: extent and distribution	Distribution of supporting habitat	Restore the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability. A 'restore' target has been applied here as the river is disconnected from its supporting habitat by features such as bank reinforcement in some cases.	
Supporting habitat: extent and distribution	Extent of supporting habitat	Restore the total extent of the habitat(s) which support the feature at: 621.17ha (the total area of the SAC, comprising a mix of woodland, fen, marsh, swamp and heath habitats as all habitats are considered to provide supporting habitat, helping to maintain the quality and quantity of the river flow).	In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data. A 'restore' target has been applied here as some areas of supporting habitat such as fen vegetation are currently being lost to factors such as scrub encroachment and agricultural improvement.	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Biological connectivity	Restore the movement of characteristic biota which should not be artificially constrained.	Freedom of movement throughout the river system is critical to all life stages of salmon. Barriers to adult migration have cumulative effects on the ability of individuals to reach spawning grounds and need to be considered in combination.	See Atkins (2012) for further detail. This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Riparian zone	Maintain a patchy mosaic of natural woody and herbaceous (tall and short swards) riparian vegetation (except in upland areas above the natural tree line). The riparian zone should be sufficiently wide to act as a healthy and functional habitat zone within the river corridor.	High riparian tree cover is beneficial to salmon, in terms of physical habitat provision and combatting increasing temperatures caused by climate change. However, the extent of tree cover needs to be optimised to provide suitable conditions for the whole characteristic biological community.	
Supporting habitat: structure/function	Thermal regime	Maintain a natural thermal regime to the river subject to a changing climate, ensuring that water temperatures should not be significantly artificially elevated.	Water temperature can affect egg development, fish survival, feeding and growth. The salmon is considered particularly vulnerable to increasing temperatures in the southern part of its English range, most notably in chalk streams.	
Supporting habitat: structure/function	Water quality - nutrients	Restore the natural nutrient regime of the rivers, with any anthropogenic enrichment above natural/background concentrations limited to levels at which adverse effects on the feature are unlikely. Long-term targets for all units are: Organic pollution: 10%ile DO: 85% saturation	In addition to the wider ecosystem effects of eutrophication that have a detrimental effect on salmon habitat, enrichment can place salmon at a competitive disadvantage, for instance relative to brown trout. Salmon are efficient foragers that are adapted to low productivity environments, and increased productivity makes efficient foraging obsolete. Eutrophication and episodic pollution causes direct mortalities, whilst chronic pollution affects substrate condition through the build-up of excessive microbial populations. Salmon are particularly sensitive to reduce dissolved oxygen levels, in the water column and within the gravel substrate of spawning redds (nests). A 'restore' target has been applied here as water quality and quantity are currently not meeting appropriate targets set to ensure the natural	See Ahern (2014) for detailed monitoring data in addition to data available from the Environment Agency. This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>Mean BOD: 1.5 mg L⁻¹</p> <p>90%ile total ammonia: 0.2 mg L⁻¹ NH₃-N</p> <p>95%ile un-ionised ammonia: 0.025 mg L⁻¹ NH₃-N</p> <p>Nutrients: Long-term SRP targets (mg L⁻¹) are given below</p> <p>Unit 50 of the underlying SSSI: All monitoring points above Gam Bridge: 0.01 Unit 50 Gam Bridge and downstream: 0.02 Units 51 & 52: 0.04 Unit 53 Sladesbridge: 0.03 Unit 53 (all other monitoring points): 0.02 Unit 56: 0.015 Unit 78: 0.015 Unit 79: 0.02</p> <p>Trophic Diatom Index (TDI): EQR of 1.0. This is equivalent to the standard for WFD HES. To be used only as an adjunct to, not a replacement for, nutrient targets.</p> <p>Other pollutants: Target is Good Chemical Status according to the WFD</p>	<p>functioning of the river system.</p> <p>Targets have been set separately for individual units of the underlying SSSI.</p>	
Supporting habitat: structure/	Woody debris	Maintain the presence of coarse woody debris within the structure of the channel	Woody debris is an important component of river habitat for salmon as well as the wider biological community.	This attribute will be periodically monitored as part of Natural England's site

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function		(except in upland areas above the natural tree line). In smaller watercourses, temporary debris dams should be a feature of channel dynamics.		condition assessments .
Supporting habitat: structure/function	Biotope mosaic	Restore the extent and pattern of in-channel and riparian biotopes (habitats) to that characteristic of natural fluvial processes.	<p>Within the river, a characteristic habitat mosaic shaped by natural processes provides the diversity of water depths, current velocities and substrate types necessary to fulfil the spawning, juvenile, adult and migratory requirements of salmon as well as other characteristic species. Some river sections will be naturally sub-optimal for some salmon life stages, and this is just a characteristic of the river. The species requires adult holding areas (generally pools of at least 150 cm depth, with cover from features such as undercut banks, vegetation, submerged objects and surface turbulence), spawning habitat (stable, clean gravel/pebble-dominated substrate without an armoured layer and with <10% fines in the top 30cm, and with 15-75cm of overlying water), nursery habitat (for fry, water of <20 cm deep and a gravel/pebble/cobble substrate; for parr, water 20-40 cm deep and similar substrate). Close juxta position of biotopes is needed to allow easy movement of individuals between suitable areas of the channel under different flow conditions and with age.</p> <p>A 'restore' target has been set for this target to reflect the fact that some river sections lack the characteristic habitat mosaic shaped by natural processes.</p>	<p>See Grieve (2009) and Atkins (2012) for further details.</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Supporting habitat: structure/function	Flow regime	<p>Restore the natural flow regime of the river, with daily flows as close to what would be expected in the absence of abstractions and discharges (the naturalised flow).</p> <p>Maximum % reduction from daily naturalised flows: *</p> <ol style="list-style-type: none"> 1. <math>Q_{n95}</math> (Low flows) - 5 2. Q_{n50-95} (Low-moderate flows) – 10 	<p>The natural flow regime is critical to all aspects of the salmon life cycle, including migratory passage through the estuary and up the river to spawning grounds, egg incubation in redds, fry and parr habitat quality and extent, and downstream smolt migration.</p> <p>A 'restore' target has been set for this target to reflect the fact that some sections of the river suffer from depleted flows.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		3. Qn10-50 (Moderate-high flows) - 10 4. >Qn10 (High flows) – 10		
Supporting habitat: structure/function	Sediment regime	Restore the natural supply of coarse and fine sediment to the river.	<p>Natural levels of coarse sediment supply are critical to the maintenance of high quality juvenile and salmon habitat, maintaining spawning gravels and characteristic biotope mosaics. Excessive delivery of fine sediment, from the catchment or artificially enhanced bank erosion, can damage gills, impair vision and cause siltation of spawning and nursery areas.</p> <p>A 'restore' target has been set for this target to reflect the fact that some sections of the river suffer from excessive levels of fine sediment, primarily as a result of run-off from farmland, while others experience depletion of coarse sediment, primarily as a result of gravels being trapped upstream of weirs. Excessive fine sediment is currently being supplied to the River Camel from within its catchment, primarily from diffuse agricultural sources; incidents of diffuse pollution are occurring across the catchment.</p>	See Ahern (2014) and APEM (2014) for further detail.
Supporting habitat: structure/function	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, within typical values for the supporting habitat	Soil supports basic ecosystem function and is a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with the supporting habitat of this Annex II feature.	
Supporting habitat: structure/function	Vegetation composition: invasive non-native species	Ensure non-native species categorised as 'high-impact' in the UK under the Water Framework Directive are either rare or absent but if present are causing minimal damage to the feature.	<p>Species such as signal crayfish can have a serious effect on salmon habitat and can predate heavily on salmon juveniles if present at high densities. Chinese mitten crab has the potential to migrate long distances up rivers and damage marginal habitats used by both adult and juvenile salmon.</p> <p>High impact species that have been found in and along the River Camel include Japanese knotweed and Himalayan balsam – the latter can result in destabilisation of banks and increased erosion.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Westcountry Rivers Trust (2014, 2015) for further detail.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Water quality - acidification	Maintain levels of acidity to those which reflect un-impacted conditions, equivalent to high ecological status under the WFD (Mean ANC for all waters >80 and mean pH >6.54).	Salmon are highly sensitive to acidification stress. ANC=Acid neutralising capacity Note that all EA monitoring points currently have average pH >7.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. A 'restore' target has been applied here as a number of management measures are required both within and outside the boundary are required to restore the feature at this site, for example, appropriate stocking levels to reduce sediment run-off from poached agricultural land.	Natural England's Views about the Management of the SSSI which underpin this SAC are available from http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm APEM(2014) Diffuse Water Pollution Plan (2015) Natural England (2014) River Camel Site Improvement Plan
Supporting processes (on which the feature and/or its supporting habitat relies)	Control of livestock grazing activity	Restore grazing activity in the riparian zone and in the river channel at or to suitably low levels.	Over-grazing of riparian areas can have a dramatic effect on salmon habitat. A 'restore' target is considered appropriate here as some sections of the river experience over-grazing.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Fisheries - exploitation	Ensure exploitation (e.g. netting or angling) of Atlantic salmon is undertaken sustainably without compromising any components of the population, including multi-sea winter fish and seasonal components of	Controls on exploitation should include migratory passage within territorial waters, including estuarine and coastal net fisheries, as well as exploitation within the river from rod fisheries	EA (2012) for assessment of exploitation impact.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		the adult run.		
Supporting processes (on which the feature and/or its supporting habitat relies)	Fisheries - introduction of fish species	Ensure fish stocking/introductions do not interfere with the ability of the river to support self-sustaining populations of the feature	<p>The presence of artificially high densities of other fish creates unacceptably high levels of predatory and competitive pressure on juvenile salmon. The management aim is to provide conditions in the river that support a healthy, natural and self-sustaining salmon population, achieved through habitat protection/restoration and the control of exploitation as necessary. Stocking represents a loss of naturalness and, if successful, obscures the underlying causes of poor performance (potentially allowing these risks to perpetuate). It carries various ecological risks, including the loss of natural spawning from broodstock, competition between stocked and naturally produced individuals, disease introduction and genetic alterations to the population.</p> <p>No fish stocking currently takes place within the SAC.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting processes (on which the feature and/or its supporting habitat relies)	Fisheries - introduction of salmon	Ensure fish stocking/introductions do not interfere with the ability of the river to support self-sustaining populations of the feature	<p>The management aim is to provide conditions in the river that support a healthy, natural and self-sustaining salmon population, achieved through habitat protection/restoration and the control of exploitation as necessary. Stocking represents a loss of naturalness and, if successful, obscures the underlying causes of poor performance (potentially allowing these risks to perpetuate). It carries various ecological risks, including the loss of natural spawning from broodstock, competition between stocked and naturally produced individuals, disease introduction and genetic alterations to the population.</p> <p>No fish stocking currently takes place within the SAC.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting processes (on which the feature and/or its supporting habitat relies)	Integrity of off-site habitats	Restore any supporting habitats beyond the site boundary upon which salmon depend.	Salmon populations are dependent on the integrity of sections of river channel, riparian areas, and transitional and marine waters that lie outside of the site boundary. Headwater areas and tributaries such as the Greylake and Stannon tributaries do not fall within the site boundary, yet salmon use these areas for spawning and juvenile development and may be critical for sustaining populations within the site. Fully developed riparian zones are essential for salmon habitat, yet part of this zone may lie outside of the site boundary, particularly if the river channel is operating under natural processes and moves	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>laterally over time within the floodplain. The conditions experienced by salmon on their marine migration (through the saline transition zone, estuary, coastal waters and into the high seas) are critical to the well-being of populations within the river, and vice versa.</p> <p>A 'restore' target is considered appropriate here as some of the habitats on which the salmon depend are in need of restoration (for example some tributaries of the river outside the SAC boundary).</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Screening of intakes and discharges	All intakes and discharges likely to trap a significant number of individuals of characteristic species are being adequately screened.	Salmon can be seriously affected by inadequate screening on their adult and smolt migrations, as well as on their smaller juvenile dispersion movements between spawning grounds and nursery areas.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting processes (on which the feature and/or its supporting habitat relies)	Vegetation structure: cover of submerged macrophytes	Maintain a sufficient proportion of all aquatic macrophytes to allow them to reproduce in suitable habitat and unaffected by river management practices.	In rivers where it naturally occurs, submerged and marginal vegetation is an important element of juvenile salmon habitat.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Restore water quality and quantity to a standard which provides the necessary conditions to support the feature.	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type.</p> <p>Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p>	See River Camel Valley and Tributaries SSSI Diffuse Water Pollution Plan (2015) for more detail regarding impacts of catchment management on water quality.
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: Air quality attribute removed from this feature as No Critical Load has been assigned				

Table 5: Supplementary Advice for Qualifying Features: S1163. *Cottus gobio*; Bullhead

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance	<p>Maintain the abundance of the population at a density which is close to that expected under un-impacted conditions throughout the site (subject to natural habitat conditions and allowing for natural fluctuations), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p> <p>There should be no reduction in densities from existing levels, and in any case no less than 0.2 m⁻² (20/100m²) in upland rivers (source altitude >100m).</p>	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK.</p> <p>Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years).</p> <p>The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature. Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise that the figures stated are the best available.</p> <p>Routine EA monitoring data on the River Camel does not provide accurate estimates of bullhead population densities. However, bullhead</p>	<p>River Camel cSAC Conservation Strategy (2004) v2. Produced by Peter Barfield for EA and English Nature</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>numbers have been monitored by EA at 42 sites on the Camel between 2004 and 2009 (but not all sites monitored each year). These are divided between 1-run and 3-run survey sites. The results of 1- and 3-run surveys are not comparable for non-salmonids.</p> <p>In 1997 and 2000 survey results (Table 3, R Camel SAC Conservation Strategy) suggest that the mean densities at those times were > 20/100m².</p> <p>1-run surveys (all years 2006-2009 combined): mean = 11.7/100m² Highest density recorded: 44.7/100m² 3-run surveys (2006, no 3-run surveys conducted post 2006): mean = 35.6/100m² Highest density recorded: 112.2/100m² (at Trefrew)</p> <p>Consequently, while the 3-run data suggests that the river does meet its target of average densities > 0.2/m² (20/100m²), the data are very limited in extent (9 sites, dating from 2006). However the 3-run data results are supported by the 1-run estimates. One-run results are the density based upon just one run so they are not a total bullhead density in the river and are likely to underestimate numbers by at least 50%. In addition, the EA survey method is generally likely to underestimate bullhead numbers because:</p> <ol style="list-style-type: none"> 1. Electric fishing surveys have historically targeted salmonids with bullheads as a bycatch. Therefore, the number of bullheads recorded may be lower than actually present because not every single bullhead seen was retrieved from the river and recorded. 2. The catchability of bullheads will vary between sites- deeper fast flowing sites will produce fewer bullheads than shallower sites where bullheads are easier to catch. 	
Population (of the feature)	Juvenile densities	Maintain juvenile densities at those expected under un-impacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations	Impacts on physical, chemical or hydrological integrity, or from non-native species, may suppress juvenile densities.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Biological connectivity	Ensure the movement of bullhead is not significantly artificially constrained.	Vertical drops of >18-20 cm are sufficient to prevent upstream movement of adult bullheads. They will therefore prevent re-colonisation of upper reaches affected by lethal pollution episodes or drought, and more generally will also lead to constraints on genetic interactions that may have adverse consequences.	See Grieve (2009) and Atkins (2012) for more detail. This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Biotope mosaic	Restore the extent and pattern of typical in-channel and riparian habitats to that characteristic of natural fluvial processes associated with this river type	Habitat conditions for bullhead vary naturally in rivers. Some river sections may provide optimal habitat whilst others may be largely unsuitable. More natural river morphology provides the diversity of breeding/nursery habitat for fish, cover from predators, refuge against high flows and feeding opportunities that best meet the full life cycle requirements of the species. Optimal conditions typically occur in relatively shallow, fast flowing reaches with coarse substrates (used for egg-laying and juvenile/adult cover). A characteristically diverse biotope mosaic allows the bullhead and other species to move within the channel to locate optimal habitat conditions in the face of a fluctuating flow regime. Pools, exposed tree root systems and marginal shallows are important high-flow refugia for the species.	See Grieve (2009) for more detail. This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Fisheries - introduction of fish species	Ensure fish stocking/introductions do not interfere with the ability of the river to support self-sustaining populations of the feature.	The presence of artificially high densities of fish can create unacceptably high levels of predatory pressure on bullhead. The management aim is to provide conditions in the river that support healthy, natural and self-sustaining populations, achieved through habitat protection/restoration and the control of exploitation as necessary. Stocking represents a loss of naturalness and, if successful, obscures the underlying causes of poor performance (potentially allowing these risks to perpetuate). It carries various ecological risks, including the loss of natural spawning from brood-stock, competition between stocked and naturally produced individuals, disease introduction and genetic alterations to the population	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Flow regime	Restore the natural flow regime of the river, with daily flows as close to what would	The natural flow regime is critical to all aspects of the bullhead life cycle, maintaining the high current velocities and substrate conditions that are optimal for the species.	This attribute will be periodically monitored as part of Natural England's site

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function		<p>be expected in the absence of abstractions and discharges (the naturalised flow).</p> <p>Long-term targets for all units are: <5% deviation at <Qn95 and <10% at >Qn95 (ie the flow standards for WFD high ecological status).</p> <p>Maximum % reduction from daily naturalised flows: *</p> <ol style="list-style-type: none"> 1. <Qn95 (Low flows) - 5 2. Qn50-95 (Low-moderate flows) – 10 3. Qn10-50 (Moderate-high flows) - 10 4. >Qn10 (High flows) – 10 	<p>A 'restore' target has been set for this target to reflect the fact that some sections of the river suffer from depleted flows. Interim targets have been set for the second cycle of River Basin Management Plans (RBMP2) which apply to the period 2015-2021.</p>	<p>condition assessments. Site Data may be made available from Natural England upon request.</p>
Supporting habitat: structure/function	Sediment regime	Restore the natural supply of coarse and fine sediment to the river.	Natural levels of coarse sediment supply are critical to the maintenance of high quality bullhead habitat, maintaining bed substrates in optimal condition for egg-laying and juvenile and adult cover. Excessive delivery of fine sediment, from the catchment or artificially enhanced bank erosion, can cause siltation of egg-laying sites and juvenile and adult refugia.	See Diffuse Water Pollution Plan (2015)
Supporting habitat: structure/function	Integrity of off-site habitats	Restore any supporting riverine habitats present beyond the site boundary upon which the bullhead depend.	<p>Bullhead populations within the SAC may be dependent on the integrity of sections of river channel and riparian areas that lie outside of the site boundary. Headwater areas and tributaries may not fall within the site boundary, yet bullhead may use these areas for spawning and juvenile development and be critical for sustaining populations within the site.</p> <p>A 'restore' target is considered appropriate here as some of the habitats on which the bullhead depend are in need of restoration (for example some tributaries of the river outside the SAC boundary).</p>	
Supporting habitat: structure/function	Riparian zone	Restore a patchy mosaic of natural woody and herbaceous (tall and short swards) and	Active marginal vegetation including riparian trees provides important cover for bullhead. A mosaic of vegetation types and sward heights provides suitable conditions for the whole characteristic biological	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function		<p>riparian vegetation.</p> <p>The riparian zone should be sufficiently wide to act as a healthy and functional habitat zone within the river corridor.</p>	community including bullhead.	
Supporting habitat: structure/function	Vegetation composition: invasive non-native species	Ensure any non-native species categorised as 'high-impact' in the UK are either rare or absent but if present are causing minimal damage to the bullhead populations.	Species such as signal crayfish can have a serious effect on bullhead habitat (by destabilising banks and enhancing fine sediment input), and can predate heavily on bullhead if present at high densities. Chinese mitten crab has the potential to migrate long distances up rivers and can cause similar damage to bullhead habitat. Neither species are currently present in the SAC, nor are there thought to be any other high-impact non-native species living within the river.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Woody debris	Maintain the presence of coarse woody debris within the structure of the river channel. In smaller watercourses, temporary debris dams should be a feature of channel dynamics.	Woody debris is an important component of river habitat for bullhead as well as the wider biological community. Bullheads are particularly associated with woody debris in lowland reaches, where it is likely that it provides an alternative source of cover from predators and floods. It may also be used as an alternative spawning substrate.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Vegetation structure: cover of submerged macrophytes	Maintain a sufficient proportion of all aquatic macrophytes to allow them to reproduce in suitable habitat and unaffected by river management practices.	In rivers where it naturally occurs, submerged and marginal vegetation can provide important cover for bullhead, particularly if coarse (cobble) substrates are in short supply for cover.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Water quality - nutrients	See targets for Atlantic salmon in Table 4 above.	Nutrient enrichment can lead to loss of substrate condition for bullhead due to benthic algal growth and associated enhanced siltation. The bullhead is susceptible to both episodic and chronic organic pollution. Episodic pollution causes direct mortalities whilst chronic pollution affects substrate condition through the build-up of excessive microbial populations.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat:	Water quality - acidification	See targets for Atlantic salmon in Table 4 above.	The bullhead is susceptible to acidification stress in low alkalinity waters. Maps of critical loads provide an indication of acidification hotspots.	This attribute will be periodically monitored as

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
structure/ function				part of Natural England's site condition assessments .
Supporting habitat: structure/ function	Control of livestock grazing activity	Restore grazing activity in the riparian zone and in the river channel at or to suitably low levels.	Over-grazing of riparian areas can have a dramatic effect on bullhead habitat, eliminating marginal habitat and generating excessive loads of fine sediment. A 'restore' target is considered appropriate here as some sections of the river experience over-grazing.	
Supporting habitat: structure/ function	Screening of intakes and discharges	Ensure all intakes and discharges likely to trap a significant number of individuals of characteristic species are being adequately screened.	Bullhead can be entrained in intakes and discharges along with other fish species.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/ function	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, within typical values for the supporting habitat	Soil supports basic ecosystem function and is a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with the supporting habitat of this Annex II feature.	
Supporting habitat: extent and distribution	Extent of supporting habitat	Restore the total extent of the habitat(s) which support the feature at: 621.17ha (the total area of the SAC, comprising a mix of woodland, fen, marsh, swamp and heath habitats as all habitats are considered to provide supporting habitat, helping to maintain the quality and quantity of the river flow).	In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: extent and distribution	Distribution of supporting habitat	Restore the distribution and continuity of the feature and its supporting habitat, including where applicable its	A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		component vegetation types and associated transitional vegetation types, across the site	Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.	Natural England (2014) River Camel Site Improvement Plan
Structure and function (including its typical species)	Adaptation and resilience	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See the explanatory notes for this attribute above in Table 1	NATURAL ENGLAND, 2015.
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater restore water quality and quantity to a standard which provides the necessary conditions to support the feature. See targets for salmon above	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.	

Version Control: Advice last updated: N/A

Variations from national feature-framework of integrity-guidance: N/A

Table 6: Supplementary Advice for Qualifying Features: S1355. *Lutra lutra*; Otter

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Anthropogenic mortality	Reduce levels of mortality as a result of anthropogenic (man-made) factors so that they are not adversely affecting the overall abundance and viability of the population.	High numbers of otter casualties within or adjacent to SAC catchments will adversely affect the condition and viability of the population and mitigation measures should be initiated as quickly as possible. Causes of mortality may include roads, accidents with fishing equipment (nets, lobster creels), poisoning, pollutants, hunting and acidification/contamination of water courses (which reduces fish populations). It should be noted that otters are also a European protected species, and that it is an offence to deliberately disturb, capture, injure or kill an otter.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Population (of the feature)	Population abundance	Maintain the continued presence of an actively-breeding otter population within the SAC, whilst avoiding deterioration from current levels as indicated by the latest mean peak count, estimate or equivalent.	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK.</p> <p>Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into</p>	<p>Otters were reported from throughout the North Cornwall area and using all the available watercourses in the EA (2010) Otter survey.</p> <p>See EA (2010) Fifth otter survey of England 2009 – 2010 for more detail.</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>account in any assessment.</p> <p>For otters, it is difficult to estimate population size. It could be assumed that where there is a high frequency of positive signs in an area, such as a large number of spraints (of several ages), that otters are likely to be occupying the site. Breeding will be indicated by the presence of natal dens, cub sightings and intensive otter activity (e.g. feeding, sprainting, pathways through vegetation). DNA analysis of spraints is now being used as a technique for identifying otters.</p>	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See the explanatory notes for this attribute above in Table 1	NATURAL ENGLAND, 2015.
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the habitat(s) which support the feature at: 621.17ha (the total area of the SAC, comprising a mix of woodland, fen, marsh, swamp and heath habitats as all habitats are considered to provide supporting habitat).	In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Abundance of breeding and resting places	Maintain an abundance of natural breeding and resting sites within the site	It should be noted that otters are highly mobile and are likely to spend their time within wider territories, where designated sites only form a proportion of their range and make a contribution to their wider requirements. Otters are a European protected species, and it is an offence to disturb their resting places. Otters will often use many holts at any one time. They may give birth in one, but raise their young in another. Important features of a successful breeding site are the availability of food, limited disturbance and safety from the risk of flooding. It is important to consider the whole site and not just the known holts as appropriate management will influence all of these factors. Some natal den structures have a limited lifespan (e.g. hollow tree trunks, piles of timber etc) and if alternative opportunities for natal dens are limited, suitable replacements can be created or constructed. Maintaining dense bank vegetation, areas of reed etc will ensure that there are suitable areas for resting couches.	
Supporting habitat: structure/function	Availability of refugia	Maintain an abundance of dense bankside vegetation to limit significant disturbance to animals	For rivers, most of the floodplain is outside the boundary of the site, yet the integrity of the interest feature will often be dependent upon the quality of the adjacent habitat outwith the boundary of the site. This is likely to be the case where bankside vegetation may be an important barrier to disturbing activity but may lie adjacent to and outside the boundary. Nevertheless it will be important to maintain, or in some cases, to restore dense bankside cover.	
Supporting habitat: structure/function	Food availability	Restore fish biomass within expected natural levels for the supporting habitat (subject to natural fluctuations).	In freshwater, key fish prey sources for otters include eels, salmonids, roach and sticklebacks. Frogs can also form an important part of the diet, depending on the habitat and time of year. Crayfish and water beetles may also form part of the diet, as well as an occasional waterbird (young coots, moorhens, ducks) or mammal (rabbits, water voles - although this is uncommon). The diet of otters varies depending on the availability of prey, which in turn varies with the time of year. There should be a diverse range of food sources available throughout the year, within the normal expectations of each particular water course. It should be noted however, that otters may take prey from adjacent fisheries which are stocked to an artificially high level, especially where there are numerous stocked gravel pits on a floodplain. This can lead to artificially high prey densities adjacent to European sites, which might be expected to, in turn, result in artificially high densities of otter on the designated sites.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			This highlights the importance of biosecurity around stocked fisheries, and if implemented at all artificial still water fisheries on a floodplain might result in a legitimate reduction in otter density.	
Supporting habitat: structure/function	Habitat quality - river habitat	Maintain the quality of supporting river habitat features, based on natural river function, which provides a characteristic biotope mosaic that caters for otters.	<p>Dense bank vegetation, marshes and reedbeds are important for otters, but they will use a long stretch of river and this won't necessarily fall within a protected site. Dense bank vegetation and reedbeds are favoured as resting areas, but otters will often travel some distance to a preferred 'couch' and this will not necessarily be along the edge of the river.</p> <p>The structure and quality of bankside vegetation, reedbeds and other nearby habitats should be maintained, particularly where there is evidence of use by otters. However, it is thought that the most significant determinant of otter usage of a habitat is the abundance of prey (Kruuk et al, 1998)</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/function	Habitat quality - waterway habitat	Maintain the quality of supporting waterways habitat features	<p>Smaller tributaries of larger river systems (streams, becks etc.) are extremely important for otters and have been shown to have been used more frequently by otters than larger rivers (Kruuk et al, 1993). This is thought to be in part due to differences in fish density and preference for hunting in shallow water with areas of riffles and boulders.</p> <p>Otters were reported from throughout the North Cornwall area and using all the available watercourses in the EA (2010) Otter survey.</p>	See EA (2010) for more detail.
Supporting habitat: structure/function	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, within typical values for the supporting habitat	Soil supports basic ecosystem function and is a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with the supporting habitat of this Annex II feature.	
Supporting habitat: structure/fun	Water flow	Restore the natural flow regime of the river to that close to what would be	Permanent or long-lasting reductions in flow may affect the availability and diversity of prey. This could lead to otters moving into new areas, increasing the likelihood of conflict with other otters. This	This attribute will be periodically monitored as part of Natural England's site condition

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
ction		expected in the absence of abstractions and discharges (the 'naturalised' flow).	may also alter they prey targeted by otters as they may hunt for low-preference food such as birds, rabbits, fish carrion or for frogs, depending on the time of year.	assessments .
Supporting habitat: structure/function	Water quality/ quantity	Restore water quality and quantity to a standard which provides the necessary conditions to support the feature	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle. Poor water quality and inadequate quantities of water can adversely affect the availability and suitability of breeding, rearing and feeding habitats.</p> <p>Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the SAC Conservation Objectives but in some cases more stringent standards may be needed to support the SAC feature. Further site-specific investigations may be required to establish appropriate standards for the SAC.</p> <p>The main impact of water chemistry on this feature is its effect on the food supply. For example, moderate levels of levels of eutrophication may increase certain fish populations, but excessive eutrophication can be detrimental. Excessive acidity in watercourses may also affect fish populations. Impacts from toxic pollutants can be devastating and were the major cause of otter population declines in the 50s, 60s and 70s.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting processes (on which the feature and/or its supporting habitat relies)	Air quality	Maintain or, where necessary, restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	<p>See the explanatory notes for this attribute above in Table 1.</p> <p>A 'restore' target has been included here as the maximum Critical Loads and/or Levels for the supporting habitat are being exceeded and present a risk to this vegetation.</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature and/or	Connectivity within and to the site	Ensure there are no significant artificial barriers to the safe passage and movement of otters into,	Barriers such as roads, weirs etc can generally increase the risk of harm to animals as they traverse or avoid them. If these barriers are considered a problem then mitigating measures could be taken. Otter populations within the SAC are dependent on the integrity of sections	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
its supporting habitat relies)		within and away from the site	of river channel, riparian areas, freshwater still-waters, floodplains and transitional and marine waters that lie outside of the site boundary. Headwater areas and tributaries may not fall within the site boundary, yet otters may use these areas for feeding and these will be critical for sustaining populations within the site. Boundaries to river SACs often follow the first break of slope on the bank, with the result that much of the riparian habitat will lie outside the SAC, particularly if the river channel is operating under natural processes and moves laterally over time within the floodplain. It is possible that holts of otters that form part of the population for a SAC may lie on the adjacent floodplain outside the boundary of the SAC.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.	Natural England's Views about the Management of the SSSI which underpin this SAC are available from http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm Natural England (2014) River Camel Site Improvement Plan
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quality : Toxic chemicals	Reduce the presence of pollutants affecting the site, which are potentially toxic to otters. Target is Good Chemical Status according to the WFD	The major cause of the decline in otter populations in the 60s and 70s was toxic chemicals such as dieldrin and related pesticides. Such contaminants can have indirect effects (e.g. on food supply - organic pollution, eutrophication, acidification from mine waste and acid rain), a mainly direct effect (e.g. oil spillage, radioactivity) or effects of bioaccumulation (e.g. metals, especially mercury, cadmium and lead; pesticides and PCBs).	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, restore water quality and quantity to a standard which provides the necessary conditions to support the feature:	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		See Table 4 above for site specific instream water quality targets.	2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.	
Version Control				
Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

References

- AHERN 2014. Water quality and diffuse pollution monitoring on the River Camel and Tributaries SSSI. March 2014. Report to Natural England.
- APEM 2014. Catchment walkover survey for the River Camel. Report to Natural England. Report to Natural England.
- ATKINS 2012. River Camel Restoration Plan: Geomorphological assessment of physical modifications. Report to Environment Agency.
- ENVIRONMENT AGENCY / NATURAL ENGLAND 2004. The River Camel cSAC Conservation Strategy. Unpublished report.
- ENVIRONMENT AGENCY 2010. Fifth otter survey of England 2009 – 2010.
- ENVIRONMENT AGENCY 2012. River Camel Net Limitation Order review South West Region, Environment Agency. Unpublished report.
- GRIEVE 2010. Development of an Ecologically Based Vision for the River Camel Valley and Tributaries SSSI. Report to Natural England. SWR/CONTRACTS/10-11/1. Report to Natural England.
- NATURAL ENGLAND, 2014. Site Improvement Plan: River Camel (SIP187). Improvement Programme for England's Natura 2000 Sites, Natural England.
- NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability Assessments (NBCCVAs) for SACs and SPAs in England. Available at: <http://publications.naturalengland.org.uk/publication/4954594591375360>].
- RICH, T, BENALLICK, I AND BILHAM, J. 2014. River Camel SSSI NVC Survey 2014. TACP, Cardiff. Report to Natural England.
- RICH, T, BENALLICK, I AND BILHAM, J. 2015. River Camel SSSI NVC Survey, part 2 2015. TACP, Cardiff. Report to Natural England.
- TOR ECOLOGY 2015. NVC survey of the River Camel Valley SSSI (units 71-73). Report for Natural England. Report to Natural England.
- WESTCOUNTRY RIVERS LTD 2014. Pollution Risk Assessment and Source Apportionment: Camel Catchment. Report to Natural England.
- WESTCOUNTRY RIVERS TRUST 2014. River Camel – Invasive Non-Native Species (INNS) control Himalayan balsam (*Impatiens glandulifera*) clearance Final report 2014. Report to Natural England.
- WESTCOUNTRY RIVERS TRUST 2015. River Camel – Invasive Non-Native Species (INNS) control Himalayan balsam (*Impatiens glandulifera*) clearance Final summary report 2015. Report to Natural England.