Date: 15 June 2018
Our ref: 247581
Your ref:

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Dear Mr Richardson,

Emerging Strategic Approach Relating to the Epping Forest Special Area of Conservation (SAC) Mitigation Strategy – Interim Advice for Development

Thank you for your letter dated 21st May 2018, requesting advice from Natural England on how your authority should respond to planning applications for minor development. Having considered your request, we have taken the view that until the updated Habitats Regulations Assessment (HRA) has been produced, all development needs to be considered in the same way, due to the complexities and uncertainties relating to air quality impacts on Epping Forest SAC.

Natural England is keen to work with Epping Forest District Council (EFDC) and other stakeholders to address the challenges of dealing with planning advice at this interim stage. Based on the information we have currently received, Natural England advises that minor developments will require a Habitats Regulations Assessment with EFDC acting as the competent authority. We recognise this is not an ideal situation but nevertheless sets out the situation if EFDC needs to determine planning applications at this moment in time in a manner that is compliant with the requirements of the Habitats Regulations. Natural England understands that further relevant information will be available soon (e.g. the Mitigation Strategy for Recreation and a revised HRA for the EFDC Local Plan) to enable us to review this initial interim advice.

Background to Local Plan Habitats Regulations Assessment (HRA) and Mitigation Strategy

We welcome the productive working relationship we have established with you regarding the development of the Mitigation Strategy to address air pollution and recreational pressure impacts on Epping Forest SAC and SSSI. We also welcome and support the additional work you are undertaking to update the Local plan HRA which we understand will include consideration of the following:

- Visitor Survey assessment (undertaken by Footprint Ecology)
- Updated transport and air pollution modelling
- Identification of proposed mitigation measures to address recreational and air pollution impacts
- Updated conclusions on whether there will be any adverse impacts, either alone or in-

combination.

We therefore recognise that there is going to be a period of difficulty for you in determining planning applications until these additional pieces of information are available. In our view it is going to be very difficult to identify suitable mitigation measures to minimise or remove any air quality impacts to enable a conclusion of no adverse effect on site integrity of the SAC to be reached at the individual planning application until the updated HRA has been prepared. It may therefore not be possible for you to determine such planning applications until the updated Local Plan Habitats Regulations Assessment has been finalised

Recreational Impacts

As part of the work required to produce the Mitigation Strategy, Footprint Ecology undertook a visitor survey to identify a recreational zone of influence and to identify the distance the majority of visitors will travel to visit Epping Forest SAC. This report identified that 75% of visitors travelled up to 6.2Km to the SAC. *Natural England therefore advises that in this interim period a zone of influence of 6.2Km is used to determine whether residential applications will have a recreational impact on Epping Forest SAC.*

Air Pollution Impacts

Given the above Natural England considers that significant uncertainty remains and that this uncertainty undermines the conclusions drawn in section 9. At this stage Natural England advises that neither an adverse effect nor a likely significant effect on Epping Forest SAC can be ruled out.

Work is now ongoing by your authority to update the HRA with respect to the likely air pollution impacts on Epping Forest SAC from the Epping Forest District Local Plan. Natural England has outlined our concerns in relation to the impacts the proposed level of growth and development could have on Epping Forest SAC as part of the local plan consultation process. Whilst we are of the view that there will be impacts u*ntil the HRA has been updated Natural England doesn't have the following critical information to provide any interim advice* regarding how to deal with air pollution impacts:

- The severity of the in-combination air pollution impacts, especially with respect to whether there are any adverse effects and
- The mitigation measures which will be applied to reduce or remove any impacts to enable a conclusion of no adverse effects to be reached (where adverse effects have been identified)

In the absence of this information we are unable to identify additional mitigation measures which could be applied. Also there is uncertainty with respect to how long this interim approach would need to be in place, particularly given the current delay with the local plan.

Interim Approach

Normally minor development would not be considered to be complex or difficult. However, in this instance, due to the in-combination impacts of air pollution and recreational pressure, such cases should be considered as being complex. This is due to the difficulty in identifying mitigation solutions which are compliant with the Habitats Regulations ahead of the strategic approach which will be developed by the Mitigation Strategy, which in turn will be informed by the updated HRA. You might therefore want to regard these applications as complex and outside of routine planning decision targets.

We note that your authority has issued an interim statement detailing how planning applications will be considered in this interim period. In light of this statement we would advise that:

- All residential planning applications which are within 6.2Km of Epping Forest SAC need to be subject to a project level HRA to address recreational impacts,
- All residential and employment proposals within Epping Forest District likely to have an air pollution impact on Epping Forest SAC will need to be subject to a project level HRA. The Habitats Regulations Assessment requires the likely effect of plans to be considered alone and in combination with other plans/projects.

The factors which need to be considered to determine if the proposals are likely to have an air pollution impact are as follows:

a) The proximity of the development to Epping Forest SAC and whether the proposal gives rise to emissions which are likely to contribute to adverse air quality effects (e.g. exceedances of AQ thresholds) alone, and in combination within Epping Forest SAC.
b) Whether the proposal will result in an increase in traffic on roads in close proximity to Epping Forest SAC alone and in combination with other plans/projects and,
c) Whether the SAC habitats and species features that are sensitive to air pollution effects are within 200m of the relevant key roads (i.e. all roads relevant to alone and in combination assessments including the EFDC HRA and MoU listed roads).

We have also provided some additional information which should be considered (Annex 1) when undertaking a HRA for impacts on the SAC.

Should you have any queries please do not hesitate to contact Jamie Melvin (e: Jamie Melvin: e: jamie.melvin@naturalengland.org.uk T: 02080261025)

Yours sincerely,

Aidan Lonergan
Area Manager – West Anglia Team

Annex 1

Natural England's Additional Advice for Consideration When Undertaking a Habitats Regulations Assessment for Development Affecting Epping Forest SAC

1. Epping Forest SSSI

A helpful description of the SSSI area and features is provided in the Epping Forest SSSI citation

Many of the SAC features are also SSSI interest features, for example: the listed woodland types, heathlands and greater stag beetle. In addition to this, the SAC feature transitions and mosaics include grasslands, freshwater habitats (including bogs) and other woodland types that are SSSI features. This mosaic of forest-wood pasture habitats supports a nationally important assemblage of ancient and veteran trees, bryophytes, fungi, invertebrates (including dragonflies and saproxylics such as stag beetle), amphibians, breeding birds and nationally notable lichens. In addition to this, the Forest supports features of significant interest that contribute to its overall character and quality, including natural sections of spring-fed watercourses; archaeological sites, ancient soils with seedbanks and complex communities, and many species of national and county significance.

Not all of the SSSI is also notified as SAC, and so it is recommended that the above links are used to confirm which legislation applies, and what assessment criteria apply. Further information on the Habitats Regulations tests is provided below. Preferably, the application (or request for pre-application advice) should reference the SSSI / SAC and include sufficient information to enable an assessment of impacts and mitigation requirements to be made. The range of most likely impacts are outlined below, along with mitigation measures which may be appropriate.

Further background information on the Epping Forest SAC, SSSI; its notified interest features and conservation objectives can be found on the MAGIC website

2. Epping Forest SAC

The Conservation Objectives for Epping Forest SAC can be viewed at http://publications.naturalengland.org.uk/category/6490068894089216

For the purposes of preparing for or undertaking an assessment required by the Conservation of Habitats and Species Regulations 2010 (as amended), all of the qualifying features listed below must all be treated equally.

2.1 The following Annex I natural habitat types and/or Annex II species of European importance were the primary reason for the initial selection of this SAC:

- **H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils**

This qualifying habitat comprises beech *Fagus sylvatica* forests with holly *Ilex*, growing on acid soils, in a humid Atlantic climate. Epping Forest is within the north-eastern part of the habitat's UK range. Sites of this habitat type often are, or were, managed as wood-pasture systems, in which pollarding of beech and oak *Quercus* spp. was common. This is known to prolong the life of these trees.

The vegetation which comprises this habitat falls within three UK National Vegetation Classification (NVC) community types:

- W14 *Fagus sylvatica – Rubus fruticosus* woodland

- W15 *Fagus sylvatica – Deschampsia flexuosa* woodland
- W10 *Quercus robur – Pteridium aquilinum – Rubus fruticosus* woodland

Typical species include holly *Ilex aquifolium*, bracken *Pteridium aquilinum* and bramble *Rubus fruticosus*, with wavy hair-grass *Deschampsia flexuosa* in the most acidic areas.

Epping Forest SAC contains an extensive area of former beech *Fagus sylvatica* wood-pasture with many old pollards and associated beech and oak *Quercus* spp. Holly *Ilex aquifolium* and honeysuckle *Lonicera periclymenum* are significant components of the shrub layer of the woodlands, with occasional Yew *Taxus baccata* and presence of *Ruscus aculeatus.* The ground flora is frequently dominated by Bracken *Pteridium aquilinum* and brambles *Rubus fruticosus* agg., but more varied mosaics and transitions include scattered patches of wavy hair-grass *Deschampsia flexuosa;* cushions of the distinctive moss *Leucobryum glaucum;* and acid grassland-heathland plants such as *Teucrium scorodonia* and *Calluna vulgaris*.

Although the epiphytes at this site have declined, largely as a result of air pollution, it remains important for a range of rare species, including the Knothole moss *Zygodon forsteri*. The long history of pollarding, and resultant large number of veteran trees, ensures that the site is also rich in fungi, dead-wood invertebrates and notable bryophytes and lichens.

- **S1083*. Lucanus cervus*; Stag beetle.**

The decaying timber in the large woodland area of *Epping Forest supports a large population of stag beetle Lucanus cervus.* The stag beetle requires decaying wood to complete its lifecycle. Its eggs are laid underground in the soil next to logs or the stumps of dead trees (typically apple *Malus* spp., elm *Ulmus* spp., lime *Tilia* spp., beech *Fagus sylvatica* and oak *Quercus* spp.). The beetle larva (or grub) will spend up to seven years in the wood, slowly growing in size. Timber is also utilised, especially sunken fence posts.

Adult stag beetles emerge from mid-May until late July. Males emerge earlier to actively search for females to mate, and can often be seen flying on sultry summer evenings an hour or two before dusk. As adults they are short-lived and generally die after mating, although occasionally some may over-winter in sheltered warm places.

Epping Forest SAC has a large number of ancient trees with decaying timber and a diversity of tree species, habitat structure and canopy conditions characteristic of former royal forests and wood-pasture. The site straddles the Essex and east London population centres of the species and records are widespread and frequent in the SAC. Epping Forest is a site of national importance for the conservation of the fauna of invertebrates associated with the decaying timber of ancient trees.

2.2 The following natural habitat types and/or Annex II species of European importance form important qualifying features of the site and added further justification for the selection of the Epping Forest as a SAC within the Natura 2000 network;

- **H4010. Northern Atlantic wet heaths with *Erica tetralix*; Wet heathland with cross-leaved heath**

Wet heath usually occurs on acidic, nutrient-poor substrates, such as shallow peats or sandy soils with impeded drainage. The vegetation is typically dominated by mixtures of cross-leaved heath *Erica tetralix*, heather *Calluna vulgaris*, grasses, sedges and *Sphagnum* bog-mosses.

At this site, this Annex 1 habitat feature is known to predominantly comprise the following UK National Vegetation Classification (NVC) community; *M16 Erica tetralix - Sphagnum compactum*

wet heath.

- **H4030. European dry heaths**

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.

At this site, this Annex 1 habitat feature is known to predominantly comprise the following UK National Vegetation Classification (NVC) community; *H1 Calluna vulgaris - Festuca ovina heathland.*

- **Additional Site Notes**

The habitat features 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 the core habitats have been broadly categorised by the National Vegetation Classification (NVC) but it should be acknowledged within assessments that conserving the transitions and mosaics with other habitat-types and NVC communities may be important component of favourable conservation status. 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 and the biodiversity it supports. For example, Wet Heathland (M16) may include transitions and mosaics with *Sphagnum* bogs (M-type) and wet acid grasslands. Dry Heathland (H1) may include transitions and mosaics with dry acid grasslands (U1 –types).

This SAC classified area within Epping Forest includes three of the main wood pasture types in Britain namely Beech-Oak, Hornbeam–Oak and mixed Oak. The H9120 community and the broader mosaics and transitions characteristic of ancient forests and wood-pastures are well-represented within the site. Maintaining this characteristic diversity and range is critical for the conservation of site features (e.g., H9120 and stag beetles) and site integrity.

3.0 Assessing Recreational Pressure and Urbanisation Impacts

Epping Forest SAC features are vulnerable to impacts from recreational pressure, including:

3.1 **Trampling pressure** – many SAC habitats (e.g., woodland, heathlands – grasslands/wetlands) support typical and character species that are sensitive to direct damage by trampling, excessive soil compaction and erosion. The Forest is a mosaic of habitats with areas that are subject to a range of recreational pressures. Whilst these are managed overall by City of London Epping Forest, some of these areas are currently experiencing prolonged exceedances of recreational pressure and/or are vulnerable to further increases to the detriment of notable SAC features.

3.2 **Dog waste** – many SAC habitats (e.g., woodland, heathlands – grasslands) support typical and character species that can establish and survive in low nutrient soil conditions. Dog faeces adds a significant input of phosphate and nitrate into these Forest soils, locally impacting on ancient soil quality, its seedbank, ground flora and soil fungi. This can change the character vegetation and the overall resilience of the SAC habitat. This is particularly relevant to the root health of

ancient trees in areas of high daily visitor access with the increase in daily visits from the proposed increases in local residential populations

3.3 **Vandalism** – many SAC habitats (e.g., woodlands, heathlands – grasslands/wetlands) support typical and character features that are vulnerable to physical damage (e.g., breaking tree branches, breaking up old stumps, smothering, digging etc.). Other vandalism can adversely impact on infrastructure necessary for conservation management (e.g., interpretation promotes best practice, bridges/culverts/dams manage water flow, fencing manages livestock & access), and/or resources (e.g., repair costs and staff time)

3.4 **Erosion and soil compaction** – many SAC habitats (e.g., woodlands, heathlands – grasslands/wetlands) support typical and character features that are vulnerable to excessive soil erosion (e.g., mountain biking trails can impact on moss habitats, veteran tree roots and heathlands). The Forest is a mosaic of habitats with areas that are subject to a range of recreational pressures. Whilst these are managed overall by City of London Epping Forest, some of these areas are currently experiencing prolonged exceedances of recreational pressure and/or are vulnerable to further increases to the detriment of notable SAC features. The impacts of erosion and compaction are very difficult to ameliorate or reverse or mitigate and avoidance is most important.

3.5 **Disturbance** – many SAC habitats (e.g.- woodlands, heathlands – grasslands/wetlands) support typical and character species (e.g., breeding birds, reptiles) that are vulnerable to excessive disturbance from noise, dogs and people. Whilst these may not be SAC listed features, they may be either listed SSSI features and/or S41 species, and therefore notable within a statutory planning context.

3.6 **Litter & Pollution** – many SAC habitats (e.g., woodlands, heathlands – grasslands/wetlands) support typical and character features that are vulnerable to litter/pollution. The litter may be non-biodegradable thus cumulatively altering local niches (e.g., affecting soil/water quality, trapping small animals) and/or leach contaminants that can impact on habitats/species either acutely or chronically (e.g. affecting soil/water quality) to the detriment of the overall quality of the SAC feature. Whilst some vulnerable species may not be SAC listed features, they may be either listed SSSI features and/or S41 species, and therefore notable within a statutory planning context.

3.7 **Fire** - many SAC habitats (e.g., woodlands, heathlands – grasslands/wetlands) support typical and character features that are vulnerable to fire. For example, these habitats with constituent soils and wildlife they support may be adversely impacted by fires. For example, some veteran trees may be centuries old with nationally significant rarities associated with them (e.g., saproxylic invertebrates, lichens, mosses etc.) and arguably irreplaceable. Fires can also adversely impact on the character of the topsoil causing impacts to the vegetation and fungal communities.

3.8 **Increase in access by vehicle or Foot** Where the application shares a boundary with the SSSI / SAC, our default position is that no new access should be created into the Forest. Boundaries (see below) should not include any gated access or driveways, and the Forest should not be used temporarily by construction vehicles to access a development site (neither should the Forest be used to store construction materials or waste products (such as skips etc.), or erect, assemble or maintain related equipment.

Where appropriate for the location and agreed with City of London Epping Forest, a suitably robust boundary fence of suitable design should be installed (for example, full height fencing, light penetrating where necessary), with monitoring and maintenance responsibilities (in perpetuity) described. For larger sites which may be passed to a grounds maintenance

company, the specification of their responsibilities should include any boundary treatment monitoring and maintenance

There may be additional recreational activities that adversely impact on Epping Forest SAC, that have been identified by City of London Epping Forest as part of their site management and management plan consultations. Individual applications need to be considered based on the information available and the risks they may pose. Some generic information about the impacts of recreation on woodland may be available via https://www.forestry.gov.uk/pdf/FCRP020.pdf/$FILE/FCRP020.pdf

4.0 Assessing air quality impacts

Epping Forest SAC features are 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. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats are not likely to occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) 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. 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. 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 (see www.apis.ac.uk). 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.

4.1 H4010. Northern Atlantic wet heaths with *Erica tetralix*; Wet heathland with cross-leaved heath

The critical levels for NH3 and critical loads for Nitrogen deposition are being exceeded for the wet heath habitats (and their transitional communities). In addition to this, site–based evidence indicates that the Critical Levels for NOx are also being exceeded. The relevant Critical Levels and Critical Loads for the H4010 wet heath feature at Epping Forest are as follows:

1) NOx – Critical Level: 30ug NOx m^{-3} for an annual mean and 75ug µg NOx m^{-3} for a 24 hour mean

This level is linked to effects that are mainly on growth, photosynthesis and nitrogen assimilation/metabolism within photosynthetic plants. The level is also regard as likely to cause direct damage to the mosses, liverworts and lichens of the wet heath community (and mosaic communities) because they receive nutrients from atmospheric deposition leading to reduced species diversity and an increase in nitrogen-loving species. Furthermore, the wet heath community (and its mosaic/ transitional communities including bog pools etc.) is vulnerable to adverse changes in vegetation composition such as reduced species diversity and an increase in nitrogen-loving species. There is also an increased risk of heather beetles infesting *Calluna vulgaris*, encouraged by higher N levels in plants

2) NH3 – Critical Level: 1 µg NH_3 m^{-3} for an annual mean.

This level is linked to a loss of sensitive mosses and lichens communities. Communities become dominated by robust nitrogen-liking plants at the expense of typical and character

lichens and mosses of an open sward.

3) Nitrogen Deposition – Critical Loads: maximum 10kg N/ha/year (see comments)

This level is linked to changes in species composition with a marked decline in *Calluna vulgaris* and ericoids and an increased dominance of grasses. There are also likely to be losses of bryophytes and lichens as per (2) above. There may also be negative effects on ericoid mycorrhiza and an increase in drought sensitivity. There is an increased risk of heather beetle infestation and vulnerability to insect pests and frost.

It should be noted that the bog pools and transitional bog communities supporting *Sphagnum* moss species may be more vulnerable to Nitrogen deposition than the overall M16 habitat and require a lower critical load of between 5 – 10kg N/ha/year. This should be taken into account when making judgments about the restoration and conservation of the wet heath mosaic, either on a unit basis where detailed survey based information exists or on a precautionary basis for the whole wet heath resource.

4) Sulphur Dioxide – Critical Level: 10 µg SO_2 m^{-3} for an annual mean

This level is linked to the vulnerability of lichens (and possibly bryophytes) within the wet heath community. SO_2 dissolves in water to produce acidic ions which are readily absorbed through the lichen thalli disrupting photosynthesis. SO_2 has also been shown to inhibit the activity of nitrogenase, which is used by cyanobacterial photobionts to fix atmospheric nitrogen.

4.2 H4030. European dry heaths

The critical levels for NH3 and critical loads for Nitrogen deposition are being exceeded for the dry heath habitats (and their transitional communities). In addition to this, site–based evidence indicates that the Critical Levels for NOx are also being exceeded. The relevant Critical Levels and Critical Loads for the H4030 dry heath feature at Epping Forest are as follows:

1) NOx – Critical Level: 30ug NOx m^{-3} for an annual mean and 75ug µg NOx m^{-3} for a 24 hour mean

This level is linked to effects that are mainly on growth, photosynthesis and nitrogen assimilation/metabolism within photosynthetic plants. The level is also regard as likely to cause direct damage to the mosses, liverworts and lichens of the dry heath community (and mosaic communities) because they receive nutrients from atmospheric deposition leading to reduced species diversity and an increase in nitrogen-loving species. Furthermore, the dry heath community (and its mosaic/ transitional communities) is vulnerable to adverse changes in vegetation composition such as reduced species diversity and an increase in nitrogen-loving species. There is also an increased risk of heather beetles infesting *Calluna vulgaris*, encouraged by higher N levels in plants

2) NH3 – Critical Level: 1 µg NH_3 m^{-3} for an annual mean.

This level is linked to a loss of sensitive mosses and lichens communities. Communities become dominated by robust nitrogen-liking plants at the expense of typical and character lichens and mosses of an open sward.

3) Nitrogen Deposition – Critical Loads: maximum 10kg N/ha/year (max – see comments)

This level is linked to changes in species composition with a marked decline in *Calluna*

vulgaris and ericoids and an increased dominance of grasses. There are also likely to be losses of bryophytes and lichens as per (2) above. There may also be negative effects on ericoid mycorrhiza and an increase in drought sensitivity. There is an increased risk of heather beetle infestation and vulnerability to insect pests and frost.

It should be noted that the bog pools and transitional bog communities supporting *Sphagnum* moss species of the H1/M16 mosaic may be more vulnerable to Nitrogen deposition than the overall dry heath habitat and therefore require a lower critical load of between 5 – 10kg N/ha/year. Furthermore, areas where transitions include acid grasslands may also require a lower critical load of 8 kg N/ha/year. This should be taken into account when making judgments about the restoration and conservation of the H1/M16 mosaic and H1/acid grassland areas, either on a unit basis where detailed survey based information exists or on a precautionary basis for the whole heathland resource.

4) Sulphur Dioxide – Critical Level 10 µg SO_2 m^{-3} for an annual mean

This level is linked to the vulnerability of lichens (and possibly bryophytes) within the dry heath community. SO_2 dissolves in water to produce acidic ions which are readily absorbed through the lichen thalli disrupting photosynthesis. SO_2 has also been shown to inhibit the activity of nitrogenase, which is used by cyanobacterial photobionts to fix atmospheric nitrogen.

4.3 H9120. Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrub layer (Quercion robori-petraeae or Ilici-Fagenion); Beech forests on acid soils

The critical levels for NH3 and critical loads for Nitrogen deposition are being exceeded for the H9120 woodland feature (and the defined mosaic). In addition to this, site–based evidence indicates that the Critical Levels for NOx are also being exceeded. The relevant Critical Levels and Critical Loads for the H9120 woodland feature at Epping Forest are as follows:

1) NOx – Critical Level: 30ug NOx m^{-3} for an annual mean and 75ug µg NOx m^{-3} for a 24 hour mean

This level is linked to effects that are mainly on growth, photosynthesis and nitrogen assimilation/metabolism within photosynthetic plants. The level is also regard as likely to cause direct damage to the mosses, liverworts and lichens of the dry heath community (and mosaic communities) because they receive nutrients from atmospheric deposition leading to reduced species diversity and an increase in nitrogen-loving species.

Responses to nitrogenous pollutants can be further modified and exacerbated by interactions with other environmental factors, including frost, drought and pest organisms. These interactions generally include increased susceptibility to these factors, which may in turn lead to major ecological changes. Nitrogen oxides are known to have greater adverse effects in the presence of SO_2 or O_3, and hence the critical level should apply where these pollutants are also close to their critical level.

2) NH3 – Critical Level: 1µg NH_3 m^{-3} for an annual mean.

This level is linked to a loss of sensitive mosses and lichens communities. Communities become dominated by robust nitrogen-liking species at the expense and virtual loss of acidic-liking species, as bark pH becomes less acidic. The threshold needs to ensure there is a suitable air quality for significant species such as Knothole moss and nationally scarce lichens. Prolonged exceedances may cause direct damage to foliage, (e.g. leaf discoloration, premature senescence and loss) and reduce the ability of stomata to close

under drought conditions, leading to plant water stress. There may be increased sensitivity to drought and spring frost and increased risk of pest and pathogens attack. There may also be a loss of mycorrhiza and fungal fruit bodies and through stimulated nitrification, an increasing soil acidity. Furthermore, there may be changes in the composition of the ground flora, bryophyte and lichen communities and an increase in grasses and ruderal species within the understorey. Collectively, these factors are likely to reduce the H9120 feature's resilience against the pressures of climate change and increasing recreation.

3) Nitrogen Deposition – Critical Loads: 10kg N/ha/year (max – see comments)

This level is linked to changes in ground vegetation and mycorrhiza; nutrient imbalance and changes in soil fauna. Prolonged exceedances may cause a change in mycorrhizal flora and reduction in the numbers of large sporocarps, fruiting bodies, which appear particularly sensitive to NH_4^+. Sensitive mycorrhizas are replaced by those preferring rich conditions, which tend to be those that are efficient at taking up Phosphate. The characteristic tree species may also develop increased sensitivity to abiotic and biotic stress - reduced frost hardiness, associated with effects on late growth cessation and early bud burst, as young tissue is highly frost sensitive. Notably, Beech may be vulnerable to winter desiccation; increased defoliation by leaf feeders; increased pathogen infection. There may also be a loss of species diversity in the understorey and ground flora (including forbs and mosses), with increased abundance of nitrophilous plants especially grasses. Epiphytes growing on Oak are particularly vulnerable due to their high sensitivity (notably to ammonia) and this is probably brought about by increases in bark pH. Furthermore, pleurococcoid algae can be stimulated and outcompete other epiphytes in areas subject to elevated nitrogen deposition, particularly if P and K are available. Prolonged exceedances of Nitrogen deposition may also affect the composition of leaf litter through changes in species composition and changes in leaf litter chemistry. For example, cellulose activity may be stimulated and the level of lignins and phenol compounds can restrict fungal activity. Additionally, the activity of phenol oxidase often goes down, leading to increased rates of decomposition. Overall mineralisation tends to be increased by N deposition, potentially increasing nutrient availability.

It should be noted that the transitional wetlands and bog communities supporting *Sphagnum* moss species within the ancient Forest - wood pasture mosaic may be more vulnerable to Nitrogen deposition than a typical H9120 woodland community and therefore require a lower critical load of between 5 – 10kg N/ha/year. Similarly, areas of acid grassland/lowland heathland within Forest Wood pasture may be regarded as requiring a critical load of 8kg N/ha/year. It would be nonsensical to deal with the ancient Forest mosaic as isolated community types, so the most sensitive features should be taken into account when making judgments about the restoration and conservation of compartments within the SAC. This may be best achieved by considering thresholds on a unit basis where detailed survey based information exists or on a precautionary basis for the whole ancient Forest – Wood Pasture resource.

4) Sulphur Dioxide – Critical Level: 10 µg SO_2 m^{-3} for an annual mean

This level is linked to the vulnerability of lichens (and possibly bryophytes) within the H9120 feature (for example, these include species growing on trees, dead wood and on the ground). Prolonged exceedances above these levels may impact on tree health in a number of ways. There may be visible decline symptoms (e.g., abnormal branching patterns, reduced crown density and leaf discoloration); poor general health and subtle changes in morphology, physiology and biochemistry which do not affect tree growth but

increase the sensitivity of trees to environmental factors such as wind, frost, drought and pests. The most sensitive component is often the ephipytic lichen flora. A large number of foliose and fruticose lichens are particularly sensitive to SO_2 exposure leading to the use of lichens as bio indicators for SO_2.

4.4 S1083. Lucanus cervus; Stag beetle

The relevant Critical Levels and Critical Loads for the S1083 stag beetle feature at Epping Forest broadly align with the thresholds for the H9120 woodland feature and the defined habitat mosaic. Site–based evidence also indicates that the Critical Levels for NOx are being exceeded. Noting the principle reliance of stag beetles on the decaying wood of trees, it may be argued that the higher Critical Level threshold of 3µg NH_3 m^{-3} for Ammonia is relevant for areas beyond the SAC and SSSI boundary. However, the prolonged effect of levels above 1µg NH_3 m^{-3} on fungi mycorrhiza and host tree sustainability (when considered in combination with pests, climate change, recreational pressures) is unclear, so it is recommended that the relevant NH3 threshold for this feature aligns with the precautionary position of 1µg NH_3 m^{-3} to ensure a viable and resilient supporting habitat is maintained within the SAC and SSSI.

5.0 Other impacts

5.1 Root Zone Protection - Mature or veteran trees close to the boundary of the application site may have roots extending outwards crossing the red-line boundary. An appropriate root protection zone should be clearly marked on plans, and no buildings (or other operations likely to result in soil compaction) should be constructed within this zone. The root protection zone should be in accordance with British Standard BS 5837:2012 ("Trees in relation to design demolition and construction"). We recommend the advice of a suitably experienced arboriculturalist is sought. In some situations, where there are vulnerable veteran trees the root protection zone may need to be greater, perhaps fifteen times the trunk diameter (see http://www.ancienttreeforum.co.uk/wp-content/uploads/2015/02/ancient-tree-guide-3-development.pdf).

5.2 Tree Surgery Works - Trees growing within the SSSI / SAC close to the boundary of the application site may also have boughs and branches extending within the red-line boundary. Our advice is that these should not be removed or cut back for aesthetic reasons (e.g. to increase light levels to a garden, or reduce leaf drop in Autumn), and might only be permitted for health and safety reasons. The advice of a professional arboriculturalist should be sought, and a full survey commissioned prior to permission being granted. The site layout may need to be adjusted to take account of both limitations on tree surgery works as well as the root protection zone.

5.3 Drainage - The application should confirm that drainage (foul and grey water) will be to mains sewer, or suitable alternative arrangements proposed (separate advice may be needed in this circumstance). Care should be taken to ensure that the development will adhere to Environment Agency best practice and avoid polluting local watercourses or clear pathways (e.g., surface run-off) that may enter the SSSI, SAC. This will be achieved through the implementation of an appropriate design and methodology during the construction phase and through activities enabled by the development (e.g., operations, occupancy etc.).

The application should ensure through appropriate design and methodology implemented that the proposed development (at construction phase and activities enabled) will not adversely impact on the natural drainage of the habitats within the adjacent SSSI, for example, by increasing flows to and/or impeding flows to the SSSI areas.

5.4 Dust - Best practise measures should be deployed to minimise dust arising from construction, which in excess can smother leaves and hinder normal photosynthetic functioning of plants. It can also impact on lower plants (e.g., mosses, lichens, liverworts etc.) that grow on the trunk and branches of trees.

5.5 Soil and ground vegetation protection - No cut vegetation, compost, soil or construction materials will be deposited into the SSSI or on the SSSI boundaries and if there is a need for temporary placement within the application site in adjacent areas this will require effective containment during the development works and disposal to an appropriate Council Waste facility outside the SSSI, as part of development completion.

5.6 Lighting - Outside lighting should be directed into the boundaries of the property and should avoid illuminating areas within the SSSI. Light pollution has been shown to impact on bats, invertebrates and birds, and may have a detrimental affect on vegetation.

5.7 Stag Beetles The SSSI / SAC is notified for stag beetles and land adjacent to the designated site may contain mature or veteran trees which provide valuable supplementary habitat for this species (whose larvae rely on dead wood for their growth and maturity to adulthood). Stag beetles are also a s41 species of principal importance for the purpose of conserving biodiversity under the NERC Act 2006. National planning policy1 sets out that where these species are present and affected they are material planning considerations. We recommend that any trees within the red-line boundary are surveyed by an experienced arboriculturalist for their suitability to support stag beetle larvae, and advise on their retention where possible. In this scenario, it is beneficial for such trees to be integrated within a larger area of long grass to provide optimal habitat conditions, which could be designed into a landscaping scheme (see Extant ODPM Circular: Biodiversity & Geological Conservation paragraph 84)

Advice should be sought on how standing / fallen / felled dead wood could be accommodated to provide a feature such as stag beetle pyramids etc. Further advice is available from Peoples Trust for Endangered Species Stag Beetles and additional pages.

6.0 Application of the Habitats Regulations Tests

6.1 This applies to plans or projects affecting the Epping Forest SAC only. The planning authority is the competent authority under the Habitats Regulations, and must ascertain that the project will not adversely affect the integrity of the European site in question before granting planning permission, for any plan or project that is likely to have a significant effect on that site (Regulation 61). This process is preferably set within the framework of a Habitats Regulations Assessment (HRA), which covers all the necessary tests in a sequential manner. There is no set format for HRA assessment, however as the competent authority you may request any information you require from the applicant to complete this assessment.

6.2 Requirements are set out within Regulations 61 and 62 of the Habitats Regulations, where a series of steps and tests are followed for plans or projects that could potentially affect a European site. The steps and tests set out within Regulations 61 and 62 are commonly referred to as the 'Habitats Regulations Assessment' process. The Government has produced core guidance for competent authorities and developers to assist with the Habitats Regulations Assessment process. This can be found on the Defra website.

6.3 You should also take into account Natural England's advice (within these notes) when undertaking your HRA.

6.4 In most instances, the assessment of effects under the Habitats Regulations will also cover the assessment of impacts to nationally designated Sites of Special Scientific Interest (SSSI), under

the Wildlife & Countryside Act 1981 (as amended). However, this should not be presumed, and the SSSI notified interest features should be checked as part of the assessment process.

6.5 Other Strategic Impacts to Epping Forest SSSI / SAC Please note that Natural England's remit for this proposed development is specific and narrow with respect to the adjacent designated SSSI. The Council should ensure that it consults more widely with other parties and stakeholders with a wider interest in the Forest (in particular the City of London Corporation as the Conservators of Epping Forest), noting the Forest's additional non designated wildlife and biodiversity importance, as well as its local and historic landscape setting and context. In reaching its decision on any subsequent planning application, the Council should ensure that the full range of impacts to the Forest have been afforded due consideration, assessment and mitigation where appropriate.

If the developer requires substantive pre-application advice in addition to that provided above, Natural England advises that the applicant/developer consults Natural England directly, so that they have the opportunity to express an interest in using DAS. The first step is for the developer to fill out a simple form, so we can register their interest, and make sure they have the right adviser for their case. Please visit our website (http://www.naturalengland.org.uk/ourwork/planningdevelopment/spatialplanning/das/default.aspx) for more information and a downloadable request form here .