7. Ecology and Biodiversity

Introduction

7.1 This section of the ES is concerned with evaluating the ecological and nature conservation value of the Hybrid Application Site based on existing biological records, historical and new survey data. These features and evaluations are then used to determine the potential impacts of the proposed development at the Hybrid Application Site as identified within the Cinderford Northern Quarter Area Action Plan (AAP) from which avoidance, pre-cautionary and mitigation measures are designed and implemented. The ecological and nature conservation value of the mitigation areas (outside the Hybrid Application Site) are also evaluated and the impacts of any mitigation, compensatory or enhancement measures undertaken in these areas taken into consideration.

Policy and Legislative Context

Key Legislation

7.2 This section summarises the key legislation in relation to ecological features, including protected sites and species.

Conservation of Habitats and Species Regulations 2010 (as amended)

7.3 The Conservation of Habitats and Species Regulations 2010 (as amended) (2010 Regulations) supersede the Conservation the (Natural Habitats, &c.) Regulations 1994.

7.4 The 2010 Regulations transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law.

7.5 The 2010 Regulations provide for the designation and protection of European sites and the protection of European protected species. They also set out the requirements on undertaking assessment of impacts on designated or classified “European Sites” through the Habitat Regulations Assessment process.

Wildlife and Countryside Act (WCA) 1981 (as amended)

7.6 The WCA 1981 (as amended) is the primary domestic legislation governing nature conservation in the UK. This legislation incorporates the implementation into national law of the 'Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and the European Union Directive on the Conservation of Wild Birds (Directive 2009/147/EC). The WCA also provides the framework for the protection of various plants and animal, including those listed in the following schedules:

- Schedule 1: Protection of certain bird species
- Schedule 5: Protection of certain animal species

7.7 Additionally it provides legislation to prevent the spread of invasive alien species as listed in Schedule 9 (in relation to section 14)

Natural Environment and Rural Communities (NERC) Act 2006

7.8 The NERC Act aims to enact greater consideration of biodiversity within decisions made by public bodies. Of particular relevance is the duty to conserve biodiversity, contained within Section 40 NERC. This states that "*Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity."* Section 40(3) further states that "*Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat*." The NERC Act also includes Section 41 which lists Species and Habitats of Principal Importance for Conservation of Biological diversity in England. This updates and supersedes the list provided in Section 74 of the CRoW Act.

The Environmental Damage (Prevention and Remediation) Regulations 2009

7.9 The 2009 Regulations apply in relation to prevention and remediation of very serious "environmental damage" to:

- Species or natural habitats protected under the Habitats Directive or Wild Birds Directive
- Sites of Special Scientific Interest (SSSI)
- Surface or ground water, or
- Land

7.10 The objective of the 2009 Regulations, which implement the Environmental Liability Directive (2004/35/EC), is to make operators, of certain activities which cause environmental damage, liable for the remediation and restoration of that damage.

7.11 In the case of damage to water, species and habitats remediation measures may include:

- Primary remediation (cleaning up),
- Complementary remediation (for example cleaning up an alternative site if the damaged site cannot be fully restored), and
- Compensatory remediation (for example carrying out other measures to provide alternative natural resources to compensate for time during which damaged site remains in its damaged state).

The Countryside and Rights of Way (CRoW) Act 2000

7.12 The CRoW Act provides for access on foot for the public to certain land, with amendments to the previous law regarding public rights of way. It also provides for the management and protection for Sites of Special Scientific Interest (SSSI) and Areas of Outstanding Natural Beauty (AONB).

Protection of Badgers Act 1992

7.13 The Protection of Badgers Act 1992 consolidates and improves previous badger legislation (Badgers Act 1973, Badgers Act 1991 and Badgers (Further Protection) Act 1991).

7.14 The 1992 Act protects badgers and their setts through a list of criminal offences which include:

- Wilfully killing, injuring, taking or attempting to kill, injure or take a badger
- Possessing a dead badger or any part of a badger
- Cruelly ill-treating a badger
- Using badger tongs in the course of killing, taking or attempting to kill a badger
- Digging for a badger
- Selling or offering for sale or control any live badger
- Marking, tagging or ringing a badger

- Interfering with a badger sett by intentionally or recklessly: damaging a sett or any part thereof, destroying a sett, obstructing access to a sett, allowing a dog to enter a sett, disturbing an occupied badger sett.

7.15 Badgers are also included within Schedule 6 of the WCA 1981, as an animal which is protected from being killed or taken by certain methods under ss11 WCA 1981.

Key Policies

7.16 This section summarises the key policies in relation to biodiversity and nature conservation.

7.17 The Cinderford Area Action Plan (AAP) was adopted on 23rd February 2012. The AAP features in the Local Development Framework (LDF) as a development plan. The AAP has been developed alongside the Core Strategy for the Forest of Dean. The adoption of the AAP as a development plan document overrides the specific guidance outlined in the Local Plan of 2005.

7.18 Of relevance to the proposed development in the Hybrid Application Site, the AAP is designed to address areas of significant change. It will ensure that the development envisaged within the Northern Quarter is of an appropriate scale, mix and quality for its location within the Forest of Dean.

7.19 The key policies contained in the AAP relating to biodiversity are policies 2, 10, 15 and 26. These are described in Chapter 5: Planning Policy Context.

7.20 The Core Strategy is one of the principal components of the Local Development Framework for the Forest of Dean. It was adopted in February 2012 by Forest of Dean Council. A number of elements are present within the Core Strategy, which include:

- A vision setting out how the district and places should evolve
- Strategic objectives for the overall area
- A strategy for delivery of the objectives
- Explanation of the monitoring of the delivery process

7.21 The Core Strategy defines the spatial strategy for the District and also the planning policy guidance for the Forest of Dean.

7.22 Implementation of the Core Strategy will involve a large number of individuals, as well as private and public organisations, due to the broader outcomes expected to arise from the LDF.

7.23 One of the Policies contained within the Core Strategy document is focused upon "Design and Environmental Protection"- CSP.1

7.24 Policy CSP.1 outlines the strategy of the policy, 'providing quality environments.' The main aims of the policy are outlined below.

"The design and construction of new development must take into account important characteristics of the environment and conserve, preserve or otherwise respect them in a manner that maintains or enhances their contribution to the environment, including their wider context. New development should demonstrate an efficient use of resources. It should respect wider natural corridors and other natural areas, providing green infrastructure where necessary."

7.25 In order to achieve these aims, there are possible impacts considered relevant to the proposed development at the Hybrid Application Site:

- The effect on the landscape (including AONB's) and any mitigation required
- The impact on any protected sites
- Whether the existing infrastructure is adequate – with additional provision where required
- Whether the development is at risk from flooding
- The impact of the development on any land contamination or risk of ground instability
- The potential for the development to cause pollution / mitigation measures in order to avoid pollution
- Provision of water supply and impact upon groundwater and watercourses
- Proposals for waste minimisation

7.26 The Core Strategy concludes that any 'development that is not able to be satisfactorily accommodated in respect of the above will not be permitted'.

7.27 Other policies from the Core Strategy relevant to biodiversity are set out in Chapter 5: Planning Policy Context. A Cinderford Northern Quarter Biodiversity Strategy Technical

guidance document (Committee Draft May 2014) has been produced by Forest of Dean District Council and this is also discussed in Chapter 5: Planning Policy Context.

UK Biodiversity Action Plan/ Local Biodiversity Action Plans (UKBAP/ LBAP)

7.28 In 1992 the UK signed the Convention on Biological Diversity (CBD) in Rio de Janeiro, which led to the UK developing national strategies for the conservation and sustainable use of biological diversity. Following the signing of the CBD, the UK produced The UK Biodiversity Action Plan (UK BAP), which was first published in 1994. Contained within the UK BAP was a description of the biological resources and plans on conservation measures for these resources. Plans are produced every three to five years.

7.29 A detailed explanation is as follows: '*The UK BAP is the UK Government's response to the Convention on Biological Diversity (Rio Convention) 1992. The convention called for the development and enforcement of national strategies and associated action plans to identify, conserve and protect existing biological diversity, and to enhance it wherever possible. The UKBAP describes the biological resources of the UK and provides detailed plans for conservation of these resources, at national and devolved (local) levels. Action plans for the most threatened species and habitats have been set out to aid recovery.'*

7.30 A total of 1150 Priority Species and 65 Priority Habitats have been identified as those most in need of protection.

Gloucestershire Local Biodiversity Action Plan

7.31 Following the production of the UK BAP in 1994, a steering group report was produced '*UK Biodiversity Steering Group Report*' which stated that in order to implement the UK BAP at a local level, it would be necessary to produce Local Biodiversity Action Plans (LBAP's). UK local authorities produced these LBAP's in response to this project. Gloucestershire Local Biodiversity Action Plan was produced and was officially launched on 5th April 2000. The main aim of the LBAP was '*to achieve a county richer in wildlife*.' The Local Biodiversity Action Plan is a key component in local and national plans and contributes in a wider influence to the overall international process/strategy to conserve threatened native species and habitats.

7.32 The Gloucestershire LBAP contains a number of Habitat Action Plans and Species Action Plans which are summarised below:

Summary of Gloucestershire Local BAP Species and Habitats

Habitat Action Plans
HAP 1- Estuaries, Saltmarsh and Mudflats
HAP 2- Rivers and Streams
HAP 3- Canals
HAP 4- Reedbeds
HAP 5- Standing Open Waters
HAP 6- Lowland Wet Grassland
HAP 7- Unimproved Neutral Grassland
HAP 8- Unimproved Limestone Grassland
HAP 9- Cereal Field Margins
HAP 10- Species Rich and/or Ancient Hedgerows
HAP 11- Woodlands
HAP 12- Wood pasture, Parkland and Veteran Trees
HAP 13- Lowland Heathland
HAP 14- Acid Grassland
HAP 15- Limestone Pavement
HAP 16- Urban Habitat
HAP 17- Old Orchards
Species Action Plans
SAP 1- Great Crested Newt
SAP 2-Farmland Birds
SAP 3-Bittern
SAP 4-Nightjar
SAP 5-Woodlark
SAP 6-Spotted Flycatcher
SAP 7-Allis and Twaite Shad
SAP 8-Water Vole
SAP 9-Brown Hare
SAP 10-European Otter
SAP 11-Dormouse
SAP 12-Bats
SAP 13- Ants and Bees
SAP 14- Beetles
SAP 15- Stag Beetle
SAP 16- High Brown Fritillary
SAP 17- Pearl-bordered Fritillary
SAP 18- Marsh Fritillary
SAP 19- Flies
SAP 20- Moths
SAP 21- White-clawed Crayfish
SAP 22- Snail *(Lauria sempronii)*
SAP 23- Freshwater Mussel
SAP 24- Devil's Bolete
SAP 25- Pink Meadow Cap
SAP 26- Lichen *(Bacidia incompta)*
SAP 27- Round-leaved Feather Moss *(Rhyncostegium rotundifolium)*
SAP 28- Arable Wildflowers
SAP 29- Tower Mustard
SAP 30- Prickly Sedge
SAP 31- True Fox-Sedge
SAP 32- Early Gentian

SAP 33- Juniper
SAP 34- Cotswold Pennycress *(Thlaspi perfoliatum)*
SAP 35- Lesser Bearded Stonewort
SAP 36- Starry Stonewort
SAP 37- Tassel Stonewort
SAP 38- Greater Tassel Stonewort

Methodology

Survey Methodologies

7.33 A thorough review has been undertaken of the Environmental Statement Addendum dated December 2012 which informed the Northern United outline planning application (permission granted on 12/02/13, LPA Ref. P1449/12/OUT). The review has also extended to the Ecological Impact Assessment dated 2012 which informed the Forest Vale outline planning application (permission granted on 12/02/13, LPA Ref. P1448/12/OUT). In addition all previous ecological surveys have been reviewed and used in conjunction with the results of the 2013 surveys detailed below to inform the ecological assessment process and preparation of this chapter of the ES.

7.34 Consultation has taken place with the relevant statutory bodies (namely Natural England (NE), Environment Agency (EA) and Forestry Commission (FC)), Forest of Dean District Council and Gloucestershire County Council to ensure the entire baseline data with respect to conservation designations and features of interest are correct and up-to-date and to ensure that all are agreed on the nature and scope of the surveys to be undertaken.

7.35 Following a detailed desk study of the Hybrid Application Site and the wider area and a review of all previous surveys undertaken in relation to previous applications and studies within the AAP area, the following surveys were undertaken in 2013. It is noted that Forest of Dean District Council has on 28 May 2014 requested a further Gloucestershire Centre for Environmental Records search to be carried out in relation to the period since August 2013 when the last such search was carried out (and on which this document is based). This update was completed and the results have been summarised below and within Appendix 7.1.

Biological Records Search

7.36 In 2013 Johns Associates undertook an ecological desk assessment, which comprised of historic information relating to the Cinderford Northern Quarter. The study analysed the biodiversity of the Northern Quarter and the surrounding habitat.

7.37 The assessment included records of protected and notable species, as well as statutory and non-statutory sites designated for nature conservation present within two kilometres of the survey area.

7.38 The site boundary for the desk study, included the Hybrid Application Site and any further areas cited within the Forest of Dean District draft Biodiversity Strategy, (consultation version), as being proposed for ecological mitigation.

7.39 Biological data was supplied and researched from various organisations (refer to Appendix 7.1 for further information).

General Walkover/Habitat Update Survey

7.40 A general walkover and update of the Phase I Habitat Survey was undertaken to highlight any changes to the baseline information. This was undertaken during the early summer months (May and June) 2013 and focused on those areas previously identified as having ecological and nature conservation value.

7.41 The habitat update followed the Handbook for Phase I Habitat Survey guidelines produced by the JNCC and was undertaken by a suitably experienced ecologist.

Dormice Survey

7.42 A total of 100 nest tubes and 30 nest boxes were deployed during surveys undertaken by Johns Associates in May 2012. All tubes and boxes were checked in August, October and November 2012 for signs of use by dormouse (primarily the presence of characteristic dormouse nests). Using the guidance provided by Natural England, which provides an index of probability for finding dormice in tubes in each month between April and November, and based on the level of survey effort carried out, a maximum annual survey effort score of 40 was achieved.

7.43 Further Dormouse surveys were not carried out in 2013 as dormouse has previously been found on site and given the connectivity between habitats it can be assumed that this

species is present throughout the AAP area. This approach has been discussed with and approved by Natural England (in communication with Johns Associates, November 2012).

7.44 A visual assessment of habitat directly affected by the proposed development was undertaken to categorise the likely suitability of features, taking into account their connectivity, diversity of food-plants, structure and management.

Otter Survey

7.45 Previous surveys have confirmed that Otters are present in the wider area however no evidence has been found on site to date. Otter surveys were undertaken in conjunction with other surveys on site in accordance with best practice methodologies, looking for the following evidence of Otter activity:

- Holts and resting up sites – characteristic sites including tree root cavities and dense vegetation cover;
- Spraints – characteristic faeces often deposited in prominent positions, can be described as fresh (up to a few days old), recent (few days to a few weeks old) or old (at least a couple of weeks);
- Sign Heaps – scrapes of sand, mud or vegetation often with additional spraints;
- Footprints – of characteristic shape and size; and
- Feeding Remains – such as fish scales and shellfish or amphibian remains.

7.46 The precautionary approach will be applied when assessing the impacts of and proposing mitigation for the proposed development at the Hybrid Application Site with pre-construction surveys to be undertaken to update records prior to commencement of construction.

Water Vole Survey

7.47 Previous surveys have confirmed that there are suitable Water Vole habitats on site but no evidence of Water Voles has been found. Water Vole surveys were undertaken in conjunction with other surveys on site in accordance with best practice methodologies, looking for the following evidence:

- Latrines – piles of characteristic droppings;
- Footprints – characteristic shape and size;

- Tunnel Entrances – both above and below water level;
- Pathways in Vegetation – often running between tunnels and vegetated waterside habitat;
- Cropped Grass around Tunnel Entrances – a distinctive sign of breeding females; and
- Feeding Remains – large chewed segments of vegetation with distinctive teeth marks.

7.48 The precautionary approach will be applied when assessing the impacts of and proposing mitigation for the proposed development at the Hybrid Application Site with pre-construction surveys to be undertaken to update records prior to commencement of construction.

Bat Survey

7.49 Surveys have been conducted at the Northern Quarter since 2003 monitoring Lesser Horseshoe bats using buildings at the Northern Quarter. Bat activity surveys have been conducted in 2008 and 2011 including with transects and activty loggers. Knight Ecology undertook internal building counts during this period. Kestrel Wildlife Consultants (see Appendix 7.4 of this ES) undertook the first advanced surveys of the site during 2011 including building emergence surveys of buildings within Northern United, 4 evening transect surveys between late June and early September, 6 Lesser Horseshoe transects between late June and mid September, and six static loggers used on eight occasions recording for three hours after sunset and, on two occasions, all night. Radiotracking was also conducted tracking 8 individuals, 4 lactating females and 4 post lactating females. 4 bats were tagged on each of two sessions in July and August and then tracked for up to 10 days. Bats were radiotracked by two surveyors on bicycle using a close approach and triangulation to understand bat movements and foraging areas. To provide greater detail of all bat species across the whole Northern Quarter and to accurately identify the species and breeding status of species present, further detailed surveys were conducted to expand and enhance on the survey work conducted by Kestrel Wildlife Consultants. These surveys were to include surveys across the whole Northern Quarter site to include all of the Hybrid Application Site area and potential mitigation areas, with surveys to be conducted throughout the full survey season, and to achieve consistency of surveys throughout the whole year across the whole site as well as trapping and radiotracking. The trapping surveys were to accurately identify all species, and notably myotis species, on the site and their breeding status. The radiotracking surveys were to identify a more suitable proportion of the Lesser Horseshoe colony foraging areas and flight lines using a

more intensive radiotracking method, as well as to identify roost sites for other maternity colonies of any other species. These surveys of the site were conducted by Johns Associates and AEWC Ltd in 2013 with surveyThe techniques includinged:

- Building Inspections and Counts
- Emergence counts using night vision cameras and surveyors
- Trapping surveys
- Radio tracking
- Transect surveys
- Static logger surveys
- Fixed Point Counts

7.50 AEWC also carried out extensive trapping and radio tracking surveys across the site between July and October 2013, in order to gain further understanding and to identify accurateleyof the number and species of bats using the Northern Quarter Site (especially in relation to Myotis bats) and to survey for the presence of Bechstein bats as previous survey methods had not been capable of achieving this. Surveys in 2013 were also to identify the breeding status of individuals and to locate the roost sites of any maternity colonies. Full details of the 2013 surveys and all weather conditons (table A1)are set out in the bat report at Appendix 7.4 and the survey techniques for the 2013 surveys are summarised below. Through the Discetionary Advice Service offered by Natural England, Natural England has now confirmed in writing to the Homes and Communities Agency's ecologists (see Appendix 7.4 of this ES) that it is satisfied with the level and extent of bat survey information collected for the purpose of this assessment. of the number and species of bats using the site and also the breeding status.

Building Inspection Counts:

7.51 Internal building inspections were conducted on all the remaining buildings within Northern United and the immediate area in order to count and identify any bat species that may have been present. Buildings (Artificial Roost, Shed opposite artificial roost (Building 3),, Office (Building C),, Canteen (Building G) and Bath House (Building H)),), were surveyed every month between May and February with the Bath House included from August, however not all buildings were inspected internally each month due to constraints which included: feasibility, unnecessary disturbance to bats present, access,

health and safety. The location of these buildings can be seen on Figures 1 and 2 of the Bat Survey at Appendix 7.4.

7.52 The Artificial Roost ~~and the Bath House were~~ was not surveyed every month due to high bat activity levels during the summer periods. Counts of high numbers of bats in enclosed spaces would not have been accurate and ~~bat~~ disturbance levels would have been ~~being~~ too high to justify surveys.

Emergence Surveys

7.53 Dusk emergence Lesser Horseshoe bat counts ~~surveys~~ were undertaken on the Bath House, Office Buidling and Artifical roost ~~of all the remaining buildings within Northern United and the artificial roost to the east~~ each month during the active period for bats to provide information regarding the number of Lesser Horseshoe bats present in each building and throughout the site. Buildings were monitored between May and September using night vision cameras at 6 confirmed emergence/entry points.

7.54 Further to the emergence surveys, surveyors were also used to undertake evening emergence and dawn surveys during July and August, with 6 surveyors and 6 cameras present.

7.55 Surveyors remained in static positions throughout the surveys, which were conducted between 15 minutes before sunset to 2 hours after sunset for the emergence surveys and 2 hours before sunrise to sunrise during the dawn surveys. Surveyors had time expansion detectors whilst counting the number and species of bats emerging/re-entering along with behavioural notes. Night vision cameras were only used during the emergence surveys to give the most accurate count results.

7.55a Previously, the 2011 Kestrel Wildlife consultant's emergence surveys used a total of 5 surveyors and no night vision cameras. These surveys followed the same survey methodology as that conducted by AEWC Ltd but the surveys did not survey the Artificial roost and only used 5 surveyors covering 8 buildings that were present on the site at that time.

Trapping Surveys – AEWC

7.56 Trapping surveys were conducted between the end of May and mid-August 2013 using traps and ultrasonic lures, with a total of 9 survey nights totalling 39 trap nights (given the total number of traps used). This period was considered to be the most suitable time for

identification of species present on the site and foraging activity during bats' core foraging periods for breeding females activity.

7.57 Forestry Commission Plantation Trapping Surveys:

- One night of trapping was conducted around a Speculation Plantation site, 3km to the south west of the Northern Quarter, on the 31st August 2013.

7.58 Lesser Horseshoe bat Trapping:

- Seven nights of trapping was conducted at suitable roosting sites/buildings, mainly around the artificial maternity roost to the east of Northern United, in order to radio tag bats between July and September. This species was not targeted for trapping using calls, as it was already known that there were high numbers of bats present breeding on site, and therefore it was considered that disturbance should be kept to a minimum with no lures used close to a maternity roost location for any surveys.

Radio Tracking – AEWC

7.59 In order to identify roost locations, foraging sites and commuting routes for certain bat species, individual bats were radio tagged with Biotrack radio transmitters.. Bats were only tagged when the radio tag was less than 5% of the bats' weight, the bats were considered fit and healty and the bats were not pregnant or carrying pups.

7.60 All radio-tagged Lesser Horseshoe bats were ringed with a unique ring number in order that they could be easily identified, and avoiding unnecessary impacts, including bats being radio tracked within the same year. A total of 20 Lesser Horseshoe bats were tagged and 18 sucessfully radiotracked, representing approximately 5% of the estimated peak Lesser Horseshoe colony population using the Northern Quarter.

7.61 Radiotracking to accurately identify flight lines and foraging areas was conducted by erecting two high fixed masts on the site with highly directional yagi aerials to accurately identify locations of bats on the site through triangulating bearings from masts. Up to three additional mobile teams were used with experienced surveyors to provide additional bearings and fixes and follow bats to foraging areas off the site. ~~Masts were erected on site in order to identify bat locations. Up to five radio tracking teams a night were used with experienced surveyors, in order to accurately radio track bats on site.~~

7.61a Previously, the 2011 radiotracking used the same tagging methodologies using Biotrack radiotransmitters being attached with Torbot Bonding cement to bats following the 5% tag weight rule. Radiotracking of individuals was condcuted by two surveyors on foot/bicycle. Surveyors used close approach and trinagulation to identify the location of any tagged bats.

Transect Surveys

7.62 Eight transects that cover features with potential for use by foraging/commuting bats and also represent/cover the whole Northern Quarter ~~site~~ were carried out by Johns Associates during April and May ~~between April and June~~ 2013 and seven transects were conducted each month during June 2013 by Johns Associates and by AWEC between July and October 2013. Each transect was subject to 1 dusk and one dawn survey and during July an all night transect was conducted. All transect surveys were undertaken by two surveyors with dusk surveys carried out from sunset for a further three hours and with dawn activity surveys carried out from two hours before sunrise until sunrise. The complete transect was walked at least twice during each survey. Surveyors recorded detailed field observations to assist bat identification along with notes on behaviour (e.g. flight pattern, foraging, commuting direction etc.) where possible.

7.63 Data collected from the transect surveys was downloaded to a computer and analysed/interpreted to identify species (using sound analysis software) and then collated to provide numerical data outlining the average number of minutes' presence of each bat species per hour.

7.63a Previously in 2011, Kestrel Wildlife Consultants conducted 4 transects throughout the central part of the Northern Quarter from sunset to three hours past sunset (see Figure 3 of the Kestrel 2011 report in Appendix 7.4). Transects were also walked on 4 occasions with surveyors using different detectors.

Static Logger Surveys – Johns Associates

7.64 16 static detectors were deployed at varying locations during April-June 2013. They were mounted in trees at a height of 3-4m and with the microphone facing a linear feature, and programmed to record between sunset and sunrise, with each detector left in place for 5 nights. Each transect area was covered by two static detectors. These surveys were carried out using Anabats or SM2's (Song Meters) between April and June 2013.

Static Logger Surveys – AEWC

7.65 Static detectors (SM2's) were present in 7 survey areas and surveys were conducted each month across the site between July and October 2013 for a minimum of 5 nights. The detectors were deployed at a different locations ~~site~~ each month within each of the seven survey areas. They were located in areas that were believed to be suitable for bats i.e. good potential for use for foraging and/or commuting.

7.65a Previously, Static Loggers were used in 2011 by Kestrel, which were all Anabat SD1bat detectors. 6 detectors were used on 10 occasions. Loggers were only left in place for short periods but for at least three hours post sunset. Anabats only ran for a complete night on two occasions, and detectors were not left in position for more than one night.

Fixed Point Counts – Johns Associates

7.66 Fixed point surveys were undertaken in order to confirm the locations of previously identified key flyways for Lesser Horseshoe bats (from surveys carried out by Kestrel Wildlife Consultants in 2011) and also to identify any other key flyways for other bat species present within the Northern Quarter.

7.67 All locations were surveyed once in April/May and June, with surveyors evenly spread across the landscape. It was decided that results would be of more significance if a combined count of all point locations was undertaken. These were carried out in May and June 2013, at the same time as the building emergence surveys at Northern United.

7.68 These surveys were conducted at dusk and dawn with dusk surveys commencing 15 minutes before sunset and continuing until 3 hours later, and dawn surveys commenced 2 hours before sunrise and ended at sunrise. Surveyors remained in place throughout the survey with time expansion detectors recording to an Edirol digital recorder where possible although some broadband detectors were used where there were insufficient time expansion detectors available. Again surveyors recorded detailed field observations to assist bat identification along with notes on behaviour (e.g. flight pattern, foraging etc.) where possible.

7.69 ~~It should be noted that definitive bat flight heights are not indicated by survey results as bats do not have fixed flight heights which will vary depending on commuting/flyway features and site conditions. This has been confirmed by work by Henry Schofield, which showed that bat flight height varied with the time of night and light levels. It has also be noted that flight heights will vary depending on what is necessary at the time of~~

~~commuting, for example the bats that cross the A4136 to the north of the Northern Quarter that have been observed returning to the roost in the morning emerge from the tree canopy crossing diagonally at high speed and enter the woodland on the opposite side at grass height around ankle height~~It should be noted that definitive bat flight heights are not always accurately confirmed in the survey results. Bats are most active when it is dark, and as such cannot be seen. Commuting bats early in the evening commonly fly close to any features and/or low to the ground to avoid detection by predators, again making them difficult to be seen by any surveyors. As such very few bats were seen when bat passes were detected during surveys. Bats do not have fixed height commuting routes. This is dependent on habitat features and the time of night with bats commuting higher when it is darker. A number of bats were observed during the surveys and the majority of these were flying low, less than 1.5m from the ground and most were flying very low, less than 1m high from the ground as is typical for commuting Lesser Horseshoe bats. This is especially the case when bats are crossing any open areas. Any Lesser Horseshoe bats observed flying higher were either within woodland where they were under canopy cover or moving between canopies. Bats were regulary observed at one location, crossing the A4136 north of the artifcal roost. These were observed crossing low over the road through the traffic areas, but when returning at dawn bats would dive at speed diagonally out of the canopy on the north side of the road and enter the woodand on the southern side at low height, less than 1m from the ground..

Badger Survey

7.70 Badger surveys were conducted across the AAP area in conjunction with other site surveys during July 2013 following the methodology and guidance given within DMRB Volume 10 Section 4. This involved searching for the following signs of Badger activity:

- Dung pits/latrines – single or multiple pits (latrines) usually found along pathways or as territorial markers;
- Hairs – distinctive texture and colouration;
- Footprints – distinctive size and shape, often with claw marks in deeper sediment;
- Setts – distinctive size and shape of entrance, can be main, annex or outlier;
- Paths and boundary crossing – well used trails through vegetation including through hedges, over banks, across roads and streams, often with additional signs of Badger activity; and

- Feeding signs – often distinctive and include snuffle pits (conical depressions in the soil where the snout has been inserted) and scratched up turf.

7.71 These surveys were undertaken by a suitably experienced ecologist and focused on areas highlighted as having Badger potential.

Breeding Bird Survey

7.72 Four survey visits were undertaken across the site on the 12th April, 10th May, 17th May and 13th June. The survey in May was undertaken by a single surveyor covering the northern section and southern survey sections separately (the survey was spread across 2 visits). Other surveys were undertaken by two surveyors walking separate southern and northern transects during the same survey visit. The survey transects can be seen within the survey report in Appendix 7.5. These transects were designed to ensure both good site and habitat coverage.

7.73 Surveys commenced at sunrise and lasted 3 hours depending upon weather conditions and bird activity. The starting point and direction of survey was varied between visits to optimise detection of species. The surveys were undertaken by experienced ornithologists in fair to good weather conditions (not in heavy rain, following a frost, in dense fog or in wind greater than Beaufort 4).

7.74 All birds observed and heard were recorded on survey maps and aerial photos (as accurately as possible, to the nearest 10 metres) using the British Trust for Ornithology (BTO) codes for species and activity, also recording the number, sex and age of birds where relevant. Breeding activity recorded included singing, calling, alarm-calling, nest building, food/faecal sac carrying, display/courtship and entering occupied nest sites. Surveyors, with the aid of binoculars, recorded all such details. In addition, birds of particular interest noted during other fieldwork on the site (covering the period March to June) were also recorded.

7.75 Two crepuscular visits were undertaken on 12th June and 15th July with additional observations noted by the ornithologist during bat surveys undertaken on the site during the period April to June (particularly during bat surveys on the 9th May, 10th May and 16th May).

7.76 Standard survey methods for Woodcock and Nightjar (Gilbert et al 1998) were adopted with two separate transects were walked around the site by two experienced ornithologists ensuring that all suitable habitat was assessed for both species. Surveyors

walked at a steady pace and stopped every few minutes to listen for churring Nightjar and roding Woodcock. All birds seen and heard were recorded on maps using the BTO codes for species and activity. Singing and calling owls were also recorded and the characteristic calls of Long-eared Owl juveniles ("squeaky gate") also listened for in May/June. The surveyors were also listening for any Nightingale calls.

Reptile Survey

7.77 Reptile surveys undertaken in 2012 confirmed the presence of reptiles within the Northern United and Forest Vale areas. Presence/absence surveys were undertaken across the site between these two areas between July and September 2013. These surveys confirmed the presence of reptiles on site, which will be included within the assessment and mitigation for the proposed development.

Amphibian (including Great Crested Newt) Survey

7.78 Previous amphibian surveys have confirmed the presence of amphibians on site including Great Crested Newts. Following a pond identification exercise further detailed assessment of the suitability of each pond for breeding great crested newt was calculated using the Habitat Suitability Index (HSI). This was initially calculated during January and then updated in May 2013 to ensure all parameters were calculated accurately at the correct time of year (detailed within Appendix 7.6).

7.79 Following completion of the HSI assessment presence/absence surveys were undertaken in accordance with the Great Crested Newt Mitigation Guidelines (English Nature, 2001) by licensed ecologists. The ponds were initially subject to four survey visits between mid-April and early June (delayed due to the late spring), each comprising an evening and morning visit, to determine the likely presence or absence of Great Crested Newt. A combination of methods was adopted to maximise the likelihood of detecting great crested newt as described below:

- Egg Search: carried out during each survey visit, until eggs were discovered, to identify newt eggs typically folded into aquatic and/or emergent vegetation. Artificial spawning media (submerged strips of thin plastic secured to a pole) were installed in some ponds where natural egg-laying vegetation was lacking. The media was inspected during each survey visit, until eggs are discovered.

- Bottle Trapping: carried out using submerged transparent plastic two litre bottles. Bottle trap densities (approximately one trap per two metres of pond margin) were kept constant for the survey period.
- Torch Survey: a 1,000,000 candlepower torch was used to search the pond for Great Crested Newt adults (although folded leaves indicating eggs can also be seen). Care was taken to avoid direct disturbance of animals with the main beam of the torch. Each pond was generally searched at a constant speed although greater attention was paid to areas with emergent vegetation. Terrestrial vegetation surrounding the pond was also searched.
- Netting: based on a survey standard of 15 minutes of netting of vegetation for every 50m of shoreline in order to target adult Great Crested Newt and efts.

7.80 The evening air temperature was recorded on each visit. Best practice is to undertake the surveys when the evening air temperature is greater than 5 degrees Celsius. However, during several of the survey visits in mid-May and early June, the night-time temperature dropped to 4°C during the course of the survey. This was not deemed to affect the survey results as high and comparable numbers of Great Crested Newt were recorded during these surveys.

7.81 Where ponds were found to support Great Crested Newts a further two survey visits were undertaken between early and mid-June in suitable weather conditions, using egg search, bottle trapping and torchlight survey methods to provide an indication of approximate population size. These were also undertaken in accordance with the Great Crested Newt Mitigation Guidelines (English Nature, 2001) by licensed ecologists.

White Clawed Crayfish Survey

7.82 Previous surveys have confirmed the presence of potential White-clawed Crayfish habitat although this species was not confirmed. Surveys undertaken by Atkins in 2012 in relation to the Forest Vale Junction involved manual searches of all suitable refuges (e.g. boulders and cobbles) which were turned by hand and the presence of crayfish noted. Only refuges in water less than 60cm deep were searched and only in watercourses not considered to be turbid. As explained in paragraph 7.242 below, the results of the Atkins 2012 survey were that no white-clawed crayfish were found. An update of potential White-clawed Crayfish habitat was undertaken in conjunction with other site surveys during 2013 although no specific surveys were considered necessary at that time.

7.83 Due to subsequent changes to the proposed college site layout and the potential need for additional drainage and flood avoidance measures, this has been reviewed. It is now intended that presence/absence surveys be undertaken between May to October 2014, ideally between July and September (to avoid the sensitive period during May and June when the females have attached young, given the current development programme these surveys will be conducted in July 2014). These surveys would be undertaken manually (e.g. stone turning) with frugal use of crayfish traps (with the appropriate approvals from the Environment Agency) in areas of deeper water by suitably experienced ecologist (at least one of whom will have an appropriate Natural England white-clawed crayfish survey licence). The survey area will ~~should~~ cover all of the site stretches of running water and connected off-site running water for a distance of 100m upstream and downstream of the site boundaries. Survey of the site's still water-bodies such as the lake, ponds and drainage ditches is considered unnecessary.

7.83a It is therefore assumed for the purpose of this present Environmental Statement that crayfish are present within all suitable watercourses and avoidance and mitigation measures for white-clawed crayfish are addressed in this Environmental Statement on this basis. This is consistent with environmental impact assessment requirements and with the requirements of Table 4.1 of Forest of Dean District Council's Cinderford Northern Quarter Biodiversity Strategy Techincal Guidance Committee Draft May 2014. Under Table 4.1 white-clawed crayfish fall within the category "other species of principal importance" in relation to which "detailed information encouraged or as a minimum outline information required to demonstrate that impacts can in principle be effectively avoided, mitigated or as a last resort compensated for (more detailed information will be required through planning conditions / obligations)". The absence of detailed survey information from 2014 at this stage is not therefore an obstacle to the grant of planning permission and in any event the July 2014 data will be availble to Forest of Dean District Council prior to determination of the planning application.

Invertebrate Survey

7.84 An invertebrate survey of the Northern Quarter area was carried out by Martin Townsend, in 2013, in order to update the known species baseline of the site. Previous site surveys were carried out by Entec and Atkins in 2007 and 2012 respectively.

7.85 The 2013 survey consisted of 4 sessions of fieldwork between June and October, in 4 separate sampling areas (refer to full survey report within Appendix 7.7) which encompassed the whole Northern Quarter site, as well as areas adjacent to the boundary

of the Northern Quarter. A number of sampling techniques were used including: Sweeping, flight-netting, light-traps, vacuum sampling, water-traps, pond-netting and searching.

7.86 The invertebrate surveys conducted between June and October included sampling for specific species including butterflies and moths, which are both UK Biodiversity Action Plan (BAP) species.

Further surveys

7.87 Surveys for other species including fish and mammals were not required.

7.88 Johns Associates conducted a habitat suitability assessment on each water body, which identified the presence/absence of fish within all of the ponds present on site. This assessment identified the presence of coarse fish species within three of the ponds (Ponds 1, 10 and 12) and stickleback populations within three additional ponds (Ponds 2, 3 and 27a). Given this information it was considered unnecessary to undertake specific surveys for fish.

7.89 Mammal surveys for other (protected, priority, rare/scarce) species including Polecat and Water Shrew were not necessary due to the desk study and previous survey information which highlighted possible presence only of Hedgehog, Otter, Badger and Dormouse.

Assessment Methodology

7.90 The assessment in this chapter has been undertaken in accordance with Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 4, the Institute for Ecology and Environmental Management (IEEM) Guidelines for Ecological Impact Assessment in the United Kingdom and all other relevant guidance.

7.91 The assessment also presents information to inform the Forest of Dean District Council's assessment of the proposed development at the Hybrid Application Site under Part 6 of the Conservation of Habitats and Species Regulations 2010 with regard to the two classified Natura 2000 sites in the vicinity i.e. the Wye Valley and Forest of Dean (Bat Sites) SAC and the River Wye SAC. In relation to the road element of the proposed development, this takes into account DMRB Volume 11, Section 4, Part 1 – (HD 44/09)

entitled Assessment of Implications (of Highways and / or road projects) on European Sites (including Appropriate Assessment).

Value of Environmental Resources and Receptors

7.92 The wildlife value will be assessed using the Ratcliffe Criteria, as described in DMRB Volume 11 Section 3 Part 4. This assesses an ecological feature in terms of:

- Fragility;
- Rarity;
- Size (Area or extent);
- Diversity;
- Potential Value;
- Position within the Ecological/ Geographical Unit;
- Typicality;
- Recorded History;
- Naturalness;
- Intrinsic Appeal.

7.93 In addition to the above, criteria are taken from the Report of the UK Steering Group on Biodiversity and Guidelines for Local Biodiversity Action Plans which will underpin the results:

- Species and Habitats of Principal Importance – in particular those most characteristic of the area;
- Significance – is the habitat confined to the area or does the area have a high proportion of the national resource;
- Opportunity – available to enhance the resource;
- Decline Rates – declines and assessment of change over the last 25 years;
- Threat – lack of management, recreation, pollution, development;
- Distinctiveness – high profile or popular species particularly associated with the area;
- Fragmentation – degree of habitat fragmentation/fragment viability;

- Importance of habitat for key species.

7.94 The degree to which a feature can be substituted is also taken into consideration. Guidance suggests that the loss of a feature of national value that is irreplaceable may be considered more significant than the loss of a feature that can be replaced or substituted.

7.95 The overall ecological value of the area will be considered in the context of the pattern of habitat and interdependencies between habitats, as well as the relative legislative value of any protected species, habitats or sites.

7.96 Values are given in terms of the geographical context in accordance with IEEM (2006) guidance, as shown below:

- International;
- UK;
- National (England);
- Regional;
- County;
- District;
- Local or Parish;
- Zone of Influence.

7.97 Examples of features of value are given below for each value level with respect to ecological features of international, national and local designated features or non-designated features.

Very High Value

- International designations including Ramsar Sites (Convention on Wetlands of International Importance especially Waterfowl Habitat 1971), Special Areas of Conservation (EU Habitats Directive) and Special Protection Areas (EU Birds Directive);
- European protected species (such as Great Crested Newts, Dormice, bats etc.);
- Sites hosting habitats/species of (European) Community interest (annexes 1 & 2, Habitats Directive 1992);

- Sites hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals 1979);
- Non-designated International features such as a large population of a bird that is rare on a European scale.

High Value

- UK and national (England) designations including Sites of Special Scientific Interest (Wildlife & Countryside Act 1981 as amended and National Park and Access to the Countryside Act 1949) and Geological Conservation Review (GCR) sites;
- Sites hosting NERC species of principal importance;
- Sites hosting Red Data book species;
- Sites hosting species not covered by the Berne Convention but in Schedules 1, 5 and 8 of the Wildlife & Countryside Act 1981;
- Species contained in the list adopted under Section 41 of the NERC Act;
- Habitats contained in the list adopted under Section 41 of the NERC Act;
- Species and Habitats of Principal Importance (UK BAP);
- Non-designated UK and national features such as a regionally high population of a nationally rare plant;
- Regional designations which cannot be reasonably substituted including:
- Important "inventory" sites (e.g. ancient semi-natural woodland and grassland inventories);
- JNCC Red List Birds of Conservation Concern 2002 – 2007 (awaiting update);
- JNCC England list of Birds of Conservation Concern 2002 – 2007 (awaiting update);
- Non–designated regional features which cannot be reasonably substituted, such as a locally significant area of a regionally scarce complex natural habitat.

Medium Value

- Regionally important designations which can be reasonably substituted including Local Nature Reserves (LNRs; National Parks and Access to the Countryside Act 1949) and important "inventory" sites (e.g. ancient semi-natural woodland and grassland inventories);
- JNCC Red List of Birds of Conservation Concern 2002 – 2007 (awaiting update);

- JNCC England list of Birds of Conservation Concern 2002 – 2007 (awaiting update);
- Non-designated regional features which can be reasonably substituted such as locally significant areas of regionally scarce simple, man-made habitat.

Lower Value

- Locally designated sites – County and District including Sites of Importance to Nature Conservation (SINCs)/County Wildlife Series (CWSs)/ other local designations and Regionally Important Geological Sites (RIGs);
- Other sites (not described above) with Local Biodiversity Action Plan (LBAP) habitats/species;
- Non-designated local features (County and District) such as a of SINC value where no SINCs have been designated in that region;
- Parish/ward level sites of local nature conservation value or some other biodiversity or geological interest.

Negligible Value

- Sites or habitats with no listed or recognised nature conservation interest.

7.98 It should be noted that the value of each ecological feature can be revised on an individual site basis depending on the habitat area or size of population present and the habitat quality or conservation status of the population. This has been detailed within the baseline information section for each feature. For example if a locally designated site such as a Key Wildlife Site contains S41 NERC listed habitats or species the value of the Key Wildlife Site would increase.

Assessment Criteria

7.99 The IEEM (2006) guidance states that 'the assessment of impacts should be undertaken in relation to the baseline conditions within the zone of influence that are expected to occur if the development were not to take place'.

7.100 The baseline conditions are described as 'the conditions that would pertain in the absence of the proposed project at the time that the project would be constructed/operated/commissioned'. The guidance recommends that these should be

informed by changes arising from other causes. It is also stated that the future baseline condition should take account of:

- Environmental trends;
- Completed developments;
- Developments for which planning consent has been granted.

7.101 A baseline projection will be presented based on the assumption that the land is left in its present condition or the present management regime continues. The significance of the impacts will be re-assessed on the assumption that the proposed mitigation measures are implemented.

7.102 The assessment will include direct, indirect, short-term, medium-term and long-term, secondary and cumulative impacts. Positive and negative impacts on the ecological baseline of the site will also be assessed.

7.103 Magnitude of impact will be assessed by the scale of loss or damage predicted to semi-natural vegetation, wildlife habitats and protected species. Significance will be assigned by looking at the magnitude of change to habitats and species of local and regional importance and assigning higher significance to greater loss of regionally important habitats.

7.104 The following criteria for determining the magnitude of impact will be used and are based upon, or adapted from, those given in the CIEEM and other guidance.

Major negative – *The proposal (either on its own or with other proposals) may adversely affect the integrity of the ecological feature in terms of the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.*

This could include large-scale damage or loss of a large proportion of a particular semi-natural habitat type or protected species habitats that are of regional/national importance or listed as Species or Habitats of Principal Importance (UK BAP).

Moderate negative – *The integrity of the ecological feature will not be adversely affected but the effect on it is likely to be significant in terms of its ecological objectives. If, in the light of full information, it cannot be clearly demonstrated that the proposal will not have an adverse effect on integrity, then the impact should be assessed as major negative.*

This could apply in the case of damage or loss of a small proportion of a particular semi-natural habitat type or protected species habitat that are of local importance or listed as Species or Habitats of Principal Importance (UK BAP).

Slight negative – *Where neither of the above apply, but some minor negative impact is evident. (In the case of Natura 2000 sites (also known as European sites) later assessments may be necessary in accordance with Part 6 of the Conservation of Habitats and Species Regulations 2010 when more detailed plans are submitted for approval).*

This could apply in the case of damage or loss of common semi-natural vegetation, wildlife habitats or important wildlife but not protected species. Habitats are not locally or regionally important.

Neutral – *Where there is no observable impact in either direction; where damage or minor losses arise of common types of habitats or common wildlife; or where habitats are not locally or regionally important.*

Slight Positive – *Impacts which provide a slight net gain for biodiversity overall. This could apply in the case of a predicted increase in the population of a species or area of habitat which is not locally or nationally important.*

Moderate Positive – *Impacts which provide a net gain for biodiversity overall (but which will not positively affect the integrity of the ecological feature). This could include a small predicted increase in the proportion of a semi-natural habitat or habitat of a protected species that are locally important or listed as Species or Habitats of Principal Importance (UK BAP).*

Major Positive – *Impacts which provide a net gain for biodiversity overall in terms of predicted increases in habitat diversity/species population (and which may positively affect the integrity of the ecological feature).*

This could apply in the case of a large-scale increase in a protected species or habitat of a protected species that are locally important or listed as Species or Habitats of Principal Importance (UK BAP).

Overall Significance of Impacts Assessment

7.105 The IEEM guidelines (2006) define an ecologically significant impact as; 'an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area'.

7.106 Significance criteria will be established to take account of:

- Conservation value and/ or sensitivity of ecological feature;
- Magnitude of impact;
- General disturbance/ disruption to habitat;
- Structural and species diversity;
- Timing of impact;
- Duration;
- Reversibility;
- Cumulative effects;
- Impact inter-relationships.

7.107 The overall significance of each impact is determined from the ecological value of the feature and the magnitude of the potential impact, as shown in Table 7.3.1a below which is based on that provided within the Transport Analysis Guidance Unit 3.3.10 The Biodiversity Sub-Objective 8.15 as referenced within IAN 130/108.14. This impact assessment table is similar to that shown within DMRB HA 205/08 (Volume 11, Section 2) 8.16 in that the Nature Conservation/ Environmental Values are the same. However it differs slightly in the classification of Magnitude of Impact in that, while both methodologies have Major, Moderate and Neutral/No Change magnitudes, DMRB HA 205/08 has two further classifications (Negligible and Minor) whereas that shown within Table 8.2.3 only has one (Slight Magnitude). There is therefore some variation in

Significance of Impact between methodologies as a result of the different number of Magnitude of Impact classifications.

Table 7.3.1a. Table of Overall Significance of Impacts Assessment

Magnitude of potential impact	Nature Conservation Value of Sites Damaged or Improved				
	Very High	High	Medium	Lower	Negligible
Major negative	Very large adverse	Very large adverse	Moderate adverse	Slight adverse	Neutral
Moderate negative	Large adverse	Large adverse	Moderate adverse	Slight adverse	Neutral
Slight negative	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Neutral
Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Slight Positive	Slight positive	Slight positive	Slight positive	Slight positive	Neutral
Moderate positive	Large positive	Large positive	Moderate positive	Slight positive	Neutral
Major positive	Very large positive	Very large positive	Moderate positive	Slight positive	Neutral

Baseline Conditions

7.108 This description of the baseline ecology relates both to the Hybrid Application Site and to the areas outside the Hybrid Application Site which are proposed as mitigation areas in respect of the proposed developments (Figure 7.1).

Designated Sites

7.109 The Hybrid Application Site is not within any statutorily protected site. There are a number of European designated sites within 10km of the site boundary, as detailed below (refer to Appendix 7.2 and Figure 7.2):

- Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena Special Area of Conservation (SAC), the nearest component of which (also known as Westbury Brook Ironstone Mine SSSI) is located 1.456km (stated as 2.4km in the Cinderford Northern Quarter Biodiversity Strategy Technical guidance document (Committee Draft 2014), which is to be revised) to the north east of the Hybrid Application Site designated for its Lesser Horseshoe and Greater Horseshoe bat populations;

- River Wye/ Afon Gwy SAC, 3.77km to the north west of the Hybrid Application Site, designated for Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, White-clawed Crayfish (*Austropotamobius pallipes*), Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Alosa fallax*), Atlantic Salmon (*Salmo salar*), Bullhead (*Cottus gobio*) and Otter (*Lutra lutra*). Annex I habitat transition mire and quaking bogs and Annex II species Allis Shad (*Alosa alosa*) are also present but are not primary reasons for designation;
- Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC, 5.84km to the west of the Hybrid Application Site, designated for 'Asperulo-Fagetum beech forests', 'Tilio-Acerion forests of slopes, screes and ravines' and 'Taxus baccata woods of the British Isles' habitats; and also for ~~. Annex II species~~ Lesser Horseshoe Bat ~~are also present but are not primary reasons for designation~~;
- Severn Estuary/ Môr Hafren SAC, 9.29km to the south east of the Hybrid Application Site, designated for Estuaries, mud-flats and sandflats not covered by seawater at low tide, Atlantic salt meadow habitats and Sea lamprey *(Petromyzon marinus),* River lamprey *(Lampetra fluviatilis)* and Twaite Shad *(Alosa fallax);*
- Walmore Common Special Protection Area (SPA) and Ramsar site, 9.12km to the east of the Hybrid Application Site, designated for Bewick's Swan (*Cygnus columbianus bewickii);*
- Severn Estuary SPA and Ramsar site, 9.64km to the south east of the Hybrid Application Site, designated for Gadwall *(Anus strepera),* White-fronted Goose *(Anser albifrons albifrons),* Dunlin *(Calidris alpina alpina),* Shelduck *(Tadorna tadorna)* and Redshank *(Tringa tetanus).* Bewick's Swan is also included within the SPA designation.

7.110 It should be noted that the Wye Valley and Forest of Dean Bat Sites SAC constitutes a number of separate components at varying distances from the Hybrid Application Site, nine of which can be found within 10km of the Hybrid Application Site. Due to the proximity of some of the individual components to one another, together with the scale of Figure 7.2, it is not possible to discern all nine components separately on Figure 7.2.

7.111 There are also a number of statutory designated Sites of Special Scientific Interest (SSSI) within 5km of the Hybrid Application Site, as detailed below:

- Westbury Brook Ironstone Mine, 1.46km to the north east (one of the components of the Wye Valley Bat Sites SAC) – Designated as a hibernation/breeding site for Lesser and Greater Horseshoe bats
- Edgehills Quarry, 1.66km to the north east – Designated as a hibernation site for Lesser and Greater Horseshoe bats, and for geological features
- Puddlebrook Quarry, 2.08km to the north - Designated for important geological and habitat features
- Stenders Quarry, 2.42km to the north east - Designated for geological features
- Speech House Oaks, 2.68km to the south west - Designated for important habitat features
- Scully Grove Quarry, 2.69km to the north - Designated for important geological features
- Buckshraft Mine and Bradley Hill, 2.73km to the south (associated with the Wye Valley Bat Sites SAC) - Designated as a hibernation/breeding site for Lesser and Greater Horseshoe bats, as well as a transitional roost for GH.
- Dean Hall Coach House and Cellar, 3.21km to the south east (associated with the Wye Valley Bat Sites SAC)- Designated as a breeding site/maternity roost for Greater Horseshoe bats
- Wigpool Ironstone Mine, 3.23km to the north (associated with the Wye Valley Bat Sites SAC)- Designated as a hibernation/breeding site for Lesser and Greater Horseshoe bats
- Soudley Ponds, 3.43km to the south east - Designated for important habitat features
- Land Grove Quarry, Mitcheldean, 3.44km to the north east- - Designated for important geological features
- River Wye, 3.77km to the north west – Designated for important geological and habitat features, as well as many nationally and internationally important species.
- Wood Green Quarry and Railway Cut, 4.62km to the east- Designated for important geological features.

7.112 There are 18 non-statutory sites within 2km of the Hybrid Application SSite, which include Gloucestershire Wildlife Trust (GWT) Nature Reserves and Key Wildlife Sites (KWS) as follows:

- Laymoor Quag GWT Nature Reserve, immediately to the south of the site boundary - Designated for heathland and wetland habitats and flora species;
- Woorgreens Lake and Marsh, Crabtree Hill & Foxes Bridge GWT Nature Reserve and KWS, 1km south - Designated for open water, marsh and heathland habitats and associated dragonfly populations;
- Edgehills Bog GWT Nature Reserve and KWS, 1km east- - Designated for heath land and wetland habitats and associated damsel and dragonfly species;
- Plump Hill Dolomite Quarry GWT Nature Reserve and KWS, 1.85km northeast - Designated for grassland habitats and geological features and botanical species;
- Hawkwell Inclosure KWS, within site boundary - Designated for ancient semi-natural woodland habitat features;
- Cinderford Linear Park KWS, within site boundary - Designated for habitat features, alongside invertebrate and vertebrate interest;
- Serridge Green KWS, 275m west - Designated for wetland habitats;
- Heywood Inclosure KWS, 935m east - Designated for ancient semi-natural woodland larger than 2ha;
- Ruardean Hill KWS, 1.14km north- Designated for woodland habitats;
- Fairplay Iron Mine Reservoir KWS, 1.36km east - Designated for wetland and heathland habitats and its botanical and invertebrate interest;
- Merring Meend KWS, 1.43km northeast- Designated for habitats, invertebrate and bird interest;
- Westbury Brook Mine Reservoir KWS, 1.43km northeast- Designated for open water habitats and associated botanical and invertebrate interest;
- Plump Hill Picnic Site KWS, 1.45km northeast- Designated for its semi-natural grassland habitat interest;
- Cinderford Roughs KWS, 1.65km southeast- Designated for its semi-natural grassland habitat interest;
- Dilke Pond KWS, 1.89km south- Designated for a wide biological diversity, including habitats as well as species;
- Serridge Inclosure KWS, 1.95km northeast - Designated for Ancient semi-natural woodland larger than 2ha;

- Wilderness Field Centre KWS, 1.95km northeast - Designated for its habitat and botanical interests;
- Mitcheldean Meend Marsh KWS, 1.95km north- Designated for habitat features including plant interest.

Biological Records Search

7.113 The biological records search (Appendix 7.1) was used to locate statutory designated and non-statutory sites of nature conservation importance, as well as records of legally protected, notable and BAP species.

7.114 Two European sites were identified within 5km of the survey site:

- Wye Valley and Forest of Dean Bat sites SAC
- River Wye SAC

7.115 Two Sites of Special Scientific Interest (SSSI) of national importance were identified within 2km of the survey site

- Westbury Brook Ironstone Mine SSSI
- Edgehills Quarry SSSI

7.116 No national or local nature reserves were identified located within 2km of the survey site, as part of the desk study.

7.117 The desk study search identified 18 non statutory sites within a 2km radius of the survey site, in relation to nature conservation. (These sites are detailed above)

7.118 There were three designated sites identified within the survey site boundary/in close proximity to the Hybrid Application Site.

- Hawkwell Inclosure KWS
- Laymoor Quag KWS
- Cinderford Linear Park KWS

7.119 Areas of ancient and ancient replanted woodland are also located within the Forest of Dean and within 2km of the survey site.

7.120 The desk study also provided records of legally protected, notable and BAP species within 2km of the survey area, with records from the last ten years. Species have been considered due to certain criteria as listed below:

- Listed on Schedule 1, 5 or 8 of the Wildlife and Countryside Act (1981) (as amended) (WCA);
- Listed on Schedule 2 of the Conservation of Habitats and Species Regulations 2010
- Badgers (protected by the Protection of Badgers Act 1992)
- Listed as a Priority Species within either the UK Biodiversity Action Plan or the local Biodiversity Action Plan.
- Other species of national status or concern e.g. listed in one of the IUCN Red Data Book categories; or are Nationally Rare; or Nationally Scarce; and
- Species considered to be notable at a national or local (Gloucestershire) Level.

Habitats

7.121 Entec UK Ltd and Johns Associates undertook Phase 1 habitat surveys for the entire AAP area and immediate surroundings in 2009 and 2013 respectively to underline the existing baseline conditions. The Entec UK surveys in 2009 highlighted a mosaic of different habitats throughout the survey area.

7.122 This work revealed a variety of habitats, which include: buildings and hard standing, coniferous plantation woodland, broad-leaved plantation woodland, mixed plantation woodland, scattered trees, dense and scattered scrub, semi-improved neutral, poor semi-improved and marshy grassland, bare ground, spoil, heath, open standing and running water and ditches (refer to Figure 7.3 and associated target notes within Appendix 7.3)).

7.123 In the descriptions below, which describe the habitats as seen on the Figure 7.3, and where appropriate, descriptions are also given of the relevant habitats in terms of the categorisation of S41 NERC Act habitats of principal importance.

Buildings and hard standing

7.124 Buildings and hard standing occur at three separate locations throughout the survey area – Northern United, the brickworks and Newtown. The buildings throughout the Northern Quarter are relatively modern commercial and industrial units. The buildings present on the Northern United site (early 1900's) consist of brick construction with a mixture of sheet metal, slate or clay tile roofs. Several large derelict warehouses are also present within the site, constructed of pre-fabricated sheet metal over a metal frame.

7.125 The largest collection of buildings is present at the brickworks which are mainly modern, semi open structures including warehouses with attached offices, both of which are still in current use. These are constructed of pre-fabricated sheet metal over metal and brick frames. Newtown, on the eastern edge of the Northern Quarter, also comprises warehouses, constructed of brick and metal with sheet metal roofs. A two storey dwelling with a pitched slate roof, as well as a two storey stone walled barn with a slate tiled pitched roof are adjacent to the warehouses. The majority of these buildings are still in use.

7.126 Two small buildings are present in the woodlands to the east of Northern United, one of which is a brick built semi derelict structure, which may support common nesting birds and cavity-roosting bats. Buildings are generally considered to be of negligible value unless shown to support roosting bats. Such features are considered separately under the relevant section below.

7.127 Hard standing is present on roads and walkways, especially adjacent to buildings at Northern United. The edges of the hard standing provide habitat for ephemeral species to develop. These include Bryophytes, Silverweed (*Potentilla anserina*), White Clover (*Trifolium repens*), Selfheal (*Prunella vulgaris*), Black Medick (*Medicago lupulina*), Common Toadflax (*Linaria vulgaris*), and Lesser Hawkbit (*Leontodon saxatilis*). These areas are considered to be of negligible value.

Coniferous plantation woodland

7.128 The Northern Quarter survey site contains areas of plantation woodland, mainly populated with stands of single species or mixed conifers, which include Corsican Pine (*Pinus nigra*) and Larch, as well as other species of exotic softwoods. The plantations present are primarily located upon freely-draining acidic soils. Norway spruce (*Picea abies*) is present in a block north of the main lake. The botanical diversity of the woodland is poor, with under-storey generally lacking throughout and the ground flora restricted to around six species including: Bramble (*Rubus fruticosus agg.*), Common Nettle (*Urtica dioica*), Ivy (*Hedera helix*) alongside occasional grass species such as Tufted Hair-Grass (*Deschampsia*

cespitosa), Wood False-Brome (*Brachypodium sylvaticum*), as well as three species of ferns: Hard Shield Fern (*Polystichum aculeatum*), Male-Fern (*Dryopteris filix-mas*) and Broad Buckler-Fern (*Dryopteris dilatata*).

7.129 Older plantations within the Northern Quarter have a narrow fringe of semi-natural woody vegetation including Pedunculate Oak *(Quercus robur)*, Hawthorn (*Crataegus monogyna*), Grey Willow (*Salix atrocinerea*), Hazel (*Coryllus avellana*) and Elder (*Sambucus nigra*). Areas where bramble is present in reduced amounts within the ground flora are dominated by Common Bent (*Agrostis capillaris*), Sweet Vernal grass (*Anthoxanthum odoratum*) and Sheep's Fescue (*Festuca ovina*).

7.130 These areas are considered to be of lower ecological value due to the relatively low floral and structural diversity present.

Broad-leaved plantation woodland

7.131 There are two distinct areas of planted woodland, divided into wet and dry. The areas in which Alder carr (*Alnus sp*.) is planted, consist of poorly draining soils, including damper clays in the vicinity of pools and small streams. These areas support typically immature Alder carr alongside Alder (*Alnus glutinosa*) and Grey Alder (*Alnus incana*). There are minimal amounts of under-storey and ground flora present, with these restricted to shade tolerant species including Ivy, herb-Robert (*Geranium robertianum*), Wood Avens (*Geum urbanum*) as well as dominant areas of Tufted Hair-Grass throughout the woodland floor.

7.132 A further block of Alder carr is also located to the north of the brickworks, with common Alder and Grey Alder, and a diverse under-storey of Bramble, Elder and Hawthorn with the inclusion of Remote Sedge (*Carex remota*), Moschatel (*Adoxa moschatellina*) and Male-Fern as ground flora.

7.133 The dry areas of woodland consist of mature Pedunculate Oak with a 20m high canopy. There are occasional hornbeam species within the canopy, and a poorly developed under-storey which includes bramble as well as patches of bare ground due to Wild Boar activity. Local ground flora species recorded during the survey include Bracken (*Pteridium aquilinum*), Creeping Soft-Grass (*Holcus mollis*) and Bluebell (*Hyacinthoides non-scripta*).

7.134 A stand of dense mature Hornbeam (*Carpinus betulus*) dominated by coppiced trees is also present, with the shaded woodland floor covered in leaf litter, and disturbed by boar

foraging, with few ground flora species present, (Bramble, Bluebell, Wood Sorrel (*Oxalis acetosella*) and Tufted Hair-Grass).

7.135 These areas are generally considered to be of lower ecological value although their value to individual protected species may be greater and is addressed in the relevant sections below. It should be noted that none of the wet woodland areas were considered to contain the communities required to be considered under the Woodland: Wet Woodland category of the Section 41 NERC Act 2006 Habitats of Principal Importance in England.

Mixed plantation woodland

7.136 This mixed plantation surrounding the main lake includes mature woodland dominated by 25m high Beech trees, alongside Sweet Chestnut, Larch and Scots Pine. The understorey and ground flora are characterised as being relatively open, with a grassy coverage interspersed with Bramble and Bracken. Deadwood is also present alongside signs of wild boar foraging. In some stands of mixed woodland deciduous canopy species such as Pedunculate Oak, Beech, Alder, Silver Birch (*Betula pendula*) and Sycamore are present.

7.137 This habitat could be considered to fall under the Woodland: Lowland Mixed Deciduous Woodland category of the Section 41 NERC Act 2006 Habitats of Principal Importance in England, although due to the man-made nature of the habitat it is a poor example of such habitat. As such these areas are considered to be of lower ecological value.

Scattered Broad -leaved Trees

7.138 Numerous scattered trees including young Alder saplings spreading from the plantations into adjacent neutral grassland, alongside similar sized saplings of Grey Alder, Italian Alder, Pedunculate Oak and Silver Birch. Due to the scattered nature of this habitat, this habitat has not been mapped and is not shown on Figure 7.3. The habitat is however present in the areas of neutral semi-improved and poor semi-improved grassland shown on Figure 7.3.

7.139 Scattered trees are also present within Norfold Green, which extends from the eastern boundary of the Northern Quarter across to the north east corner of the large lake, and incorporates various habitats including marshy grassland, semi-improved grassland and broad-leaved woodland. These trees are typically Alder, Norway spruce and Corsican pine.

7.140 These features are generally considered to be of lower ecological value although their value to individual protected species may be greater and is addressed in the relevant sections below.

Dense and scattered scrub

7.141 Scattered scrub is associated with semi-improved neutral grassland and typically occurs where colonising shrubs and woody species are spreading into open ground. These species typically comprise of Bramble, Blackthorn, Hawthorn, Common Nettle, with occasional less dominant species such as Butterfly-bush, Rosebay Willowherb (*Chamerion angustifolium*), Wild Angelica (*Angelica sylvestris*) and Woody Nightshade (*Solanum dulcamara*). Other grassy species present on the site consist of Cock's-Foot (*Dactylis glomerata*) and Yorkshire-Fog (*Holcus lanatus*).

7.142 There are several areas within the Northern Quarter that support this habitat including the boundary of the Old Engine Brook, adjacent to Newtown, the ditch in the Steam Mills area, and small patches adjacent to the Northern United complex. There is also a strip of dense scrub present within the Hawkwell Inclosure. Silver Birch, Hawthorn, Blackthorn and Grey Willow saplings have developed in this area.

7.143 Additional to the dense scrub, there are also narrow stands of dense Bracken present along the woodland boundaries and in semi-shaded areas. This is a very species poor community.

7.144 These areas are generally considered to be of lower ecological value although their value to individual protected species may be greater and is addressed in the relevant sections below.

Semi-improved neutral grassland

7.145 Neutral grassland dominates large areas of the survey area (the AAP area and immediate surroundings including mitigation areas).). There are extensive areas of grassland present on clay ground and disturbed ground from previous mining activity. There are stands of semi-improved grassland between blocks of woodland and around paths and banks. These stands are examples of MG1 grassland (as classified by the National Vegetation Classification (NVC)). Species such as False Oat-grass (*Arrhenatherum elatius*), Yorkshire-Fog, Hairy Sedge (*Carex hirta*), Hard Rush (Juncus inflexus), Creeping Cinquefoil (*Potentilla reptans*) and Tufted Hair-grass are frequently present. The areas to the north of the brickworks and surrounding Steam Mills contain an abundant population of False Oat-

grass where lack of management has resulted in a sward. Areas subject to False Oat-grass disturbance contain Perrenial Rye-Grass (*Lolium perenne*), Ribwort Plantain (*Plantago lanceolata*) and Creeping Cinquefoil.

7.146 Other areas of the survey area contain stands situated on base-rich soils or loose rubble from old mining activities. Strong populations of Glaucous sedge (*Carex flacca*) and other herb-rich species are present. On the former landfill site, which is covered by clay, the prominent species include Sweet Vernal-grass, Hoary Ragwort (*Senecio erucifolius*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Ribwort Plantain, Crested Dog's-Tail (*Cynosurus cristatus*), Glaucous Sedge and Red Fescue (*Festuca rubra*).

7.147 The majority of the area surveyed has poor drainage and therefore low lying areas of the site are prone to water-logging. Norfold Green supports abundant populations of bryophytes where ground water-logging occurs. There are enclosed pastures on the site which are grazed by livestock where a variation of the former community exists, in a damp, species poor state. This area supports a co-dominant community of Tufted Hair-grass, Yorkshire-Fog, Creeping Bent (*Agrostis stolonifera*) and Hairy Sedge and is classified in the NVC as an example of an MG9 grassland. Associated vegetation includes Wood Dock (*Rumex sanguineus*), Common Nettle and Creeping Thistle (*Cirsium arvense*).

7.148 The pH varies considerably throughout the Northern Quarter, with three species characteristic of extreme pH present in certain areas of the survey site. These species are: Fairy Flax (*Linum catharticum*), Common Restharrow (*Ononis repens*) and Wild Thyme (*Thymus praecox*). The grassland located to the north of the brickworks has become more established in comparison to other sites throughout the Northern Quarter and there is a lack of Marsh Thistle (*Cirsium palustre*) and rush species.

7.149 The partially shaded damp verges adjacent to minor woodland tracks support fewer herb species and are similar in makeup to the MG9 classification grassland. Many of these verges show evidence of Wild Boar foraging. There is an area of poached clay marshy grassland which is species rich with abundant Glaucous Sedge, Water Mint (*Mentha aquatica*), Common Fleabane (*Pulicaria dysenterica*), Bird's-foot-trefoil and Hard Rush.

7.150 In other sections of the survey area species-rich marshy grassland is interjected by clumps of Hard Rush, covering 25% of the area. There is also a sparse covering of other species including Glaucous Sedge, Common Fleabane, Silverweed and Tufted Hair-Grass. A number of tree saplings are also invading and colonising open ground.

7.151 A distinctive form of marshy grassland occurs in a damp depression in an area of pasture to the eastern part of the site, adjacent to Newtown. This damp site was dominated by Common Sedge (*Carex nigra*), Common Spike-Rush (*Eleocharis palustris*), with sporadic Oval Sedge (*Carex leporina*), Marsh Marigold (Caltha palustris), Celery-leaved Buttercup (Ranunculus sceleratus), and Floating Sweet Grass (*Glyceria fluitans*).

7.152 Overall these areas are generally considered to be of ~~lower~~ medium ecological value given the floral species diversity of these areas although their value to individual protected species may be greater and is addressed in the relevant sections below. Semi-improved grassland is not a section 41 habitat (see for example Table 2.1 of the Cinderford Northern Quarter Biodiversity Strategy Techincal guidance document (Committee Draft May 2014)).

Poor semi-improved grassland

7.153 There are two heavily grazed fields situated at the eastern boundary of the Northern Quarter, located at Newtown. The vegetation present in these fields is characteristic of intensively managed habitats. Species assemblage includes Yorkshire Fog, Crested Dog's Tail, Cock's Foot, Creeping Buttercup (*Ranunculus repens*), Broad Leaved Dock (*Rumex obtusifolius*), Common Field Horsetail (Equisetum arvense) and Creeping Thistle. Pasture was present to the south of this grassland.

7.154 These areas are generally considered to be of negligible~~lower~~ ecological value although their value to individual protected species may be greater and is addressed in the relevant sections below.

Bare Ground

7.155 This type of habitat is very localised within the Northern Quarter, and is mainly associated with car parks, access tracks and areas adjacent to the brickworks and industrial buildings. The substrate is a variety of concrete, consolidated clay or ballast. Excavations north of the brickworks have created bare ground which primarily constitutes spoil mounds, located at Dam Green. These areas are generally considered to be of negligible ecological value.

Spoil

7.156 As mentioned in the previous section regarding bare ground, there are two areas of spoil within the Northern Quarter (not mapped separately on Figure 7.3 but identified through target notes 3 and 9 on Figure 7.3). The mound situated behind the brickworks comprises clay residue with a colonising population of pioneering sparse ephemeral/short perennial

vegetation including Colt's- Foot (*Tussilago farfara*), Tufted Hair-Grass and Weld (*Reseda luteola*). The colliery waste is located to the north of the site, within the mature conifer plantation. The toxicity level of the waste is too high to support vegetation and therefore is characterised by bare ground. The borders between the spoil piles and surrounding woodland, contains small patches of sparsely vegetated dry heath/acid grassland. These areas are generally considered to be of lower ecological value although their value to individual protected species may be greater and is addressed in the relevant sections below. It should be noted that none of the vegetated spoil areas were considered to meet all criteria required so as to be considered under the category of Open Mosaic Habitats on Previously Developed Land of the section 41 NERC Act 2006 Habitats of Principal Importance in England.

Heath

7.157 A small area of heath is present to the west of the brickworks (which is not mapped on Figure 7.3 due to its small scale, although the brickworks are labelled on Figure 7.3). This area is composed of three species of vegetation, Common Heather (*Calluna vulgaris*) which is the dominant species, Wavy Hair Grass (*Deschampsia flexuosa*) and Tormentil (*Potentilla erecta*).

7.158 These areas can be considered to fall under the Heathland: Lowland Heathland category of the Section 41 NERC Act 2006 Habitats of Principal Importance in England but due to its very limited extent and lack of species diversity is considered to be of lower ecological value.

Standing Water

7.159 There are a number of pools on site of varying size. Several of the large pools, including the main area of open water are used for fishing, with relatively deep, turbid water including shallow un-shaded margins. These margins are dominated by rush species including Common Spike-Rush and Soft Rush. Other species within the vicinity include Reedmace (*Typha latifolia*), Branched Bur-Reed (*Sparganium erectum*), Greater Spearwort (Ranunculus lingua) and Water Mint. Well-developed stands of emergent vegetation are present within these ponds. Bankside vegetation includes species such as Meadowsweet (*Filipendula ulmaria*), Marsh Willowherb (*Epilobium palustre*), and Greater Bird's-Foot Trefoil (*Lotus pedunculatus*). A number of smaller, shallower woodland pools which are botanically diverse, are present in the south east corner of the survey area, and contain abundant riparian vegetation. One of the larger woodland pools comprises

diverse marginal flora, including Water Mint, Marsh Speedwell (*Veronica scutellata*), Floating Club-Rush (*Eleogiton fluitans*), Common Marsh-Bedstraw (*Galium palustre*) and Marsh Pennywort (*Hydrocotyle vulgaris*). However the development of these species within the pond has been restricted by the choking presence of Broad-leaved Pondweed.

7.160 Several large pools have been created within the middle of the survey site, however due to their recent creation; they have yet to develop marginal or aquatic vegetation. However well-developed stands of emergent species are present at the edges of some of the larger pools. These stands are typically dominated by Bulrush, however there are diverse mixes of marginal plants, including Yellow Iris (*Iris pseudacorus*), Meadowsweet, Water Mint, Reed Canary- grass (*Phalaris arundinacea*), Skullcap (Scutellaria galericulata), Wild Angelica, Greater Spearwort, Gipsywort (*Lycopus europaeus*) and Brooklime (*Veronica beccabunga*). This area also supports occasional stands of Himalyan Balsam.

7.161 These areas are generally considered to be of medium ecological value due to diversity of aquatic and semi-aquatic vegetation present and their potential to be considered under the Freshwater: Ponds & Rivers category of the Section 41 NERC Act 2006 Habitats of Principal Importance in England.

Running Water

7.162 A few small streams are present within the Northern Quarter, which contain shallow, slow flowing water over a silt/gravel substrate. These streams carry water from springs, through woodland and into larger pools on site, for example the main fishing lake which is fed by a stream originating in Steam Mills, and flowing into the north eastern corner of the lake.

7.163 The majority of these streams are situated within woodland or scrub areas and therefore are too shaded to support vegetation. In open sections where light allows vegetation to flourish, there are occasional Hemlock Water-Dropwort (*Oenanthe crocata*), Fool's Water-Cress (*Apium nodiflorum*) and Soft Rush, which are characteristic of the stream bed substrate.

7.164 The stream originating at Steam Mills passes through the fishing lake and joins the Old Engine Brook on the eastern boundary of the Northern Quarter, adjacent to Newtown.

7.165 Shading of the watercourse by Silver Birch and Common Alder, causes the under-storey and ground vegetation to be dominated by shade tolerant species such as Wood Avens, Creeping- Jenny (Lysimachia nummularia), Enchanter's-Nightshade (*Circaea lutetiana*)

and Ground Ivy (*Glechoma hederacea*). Stands of Himalayan Balsam (*Impatiens glandulifera*) are present adjacent to Steam Mills Lake.

7.166 These areas can be considered to fall under the Freshwater: Ponds & Rivers category of the Section 41 NERC Act 2006 Habitats of Principal Importance in England and as such is considered to be of medium ecological value.

Ditches

7.167 Dry ditches present within the survey area consist of short sections, with little botanical distinctiveness, and typically share the same characteristics as surrounding species – poor neutral grassland. In some places, these ditches appear to be used as a drainage feature. As such these areas are generally considered to be of negligible ecological value.

Bats

7.168 As described above, a number of different survey techniques were carried out during 2013 and early 2014 to accurately identify bat populations and bat species over the whole Northern Quarter site by Johns Associates and AEWC Ltd throughout the whole year. A summary of the results of these surveys are detailed below. In addition where relevant the summary below refers to earlier survey results from Kestrel Wildlife Consultants from 2011 and Knight ecology from 2007 -2012.

7.169 Full details of these 2013/2014 surveys and their results are provided in the report included in Appendix 7.4. Full details of the the 2011 Kestrel Wildlife Consultant surveys are also provided in Appendix 7.4.

Building Inspection Counts:

7.170 Previous surveys of the site by Kestrel Widlife Consultants in 2011 did not include surveying the artifical roost to identify the bat population present. In addition the evening emergence / dawn surveys did not include the use of any cameras at any of the buildings and did not observe all the known emergence locations so no surveys identified the population of Lesser Horseshoe bats using any of the buildings. Also no previous surveys of Lesser Horseshoe bats at the Northern Quarter (ie prior to the 2013 surveys) used night vision cameras to accurately identify the population present. The building surveys undertaken during ~~the spring and summer months~~ 2013 and early 2014. The building surveys undertaken during the spring and summer months 2013 showed that the main

Lesser Horseshoe maternity roost is located within the artificial bat roost with peak counts in August 2013 of 301 while the remaining buildings totalled 54 during the same month.

7.171 Where surveys of all buildings were possible, total numbers of bats present was calculated, with decreasing numbers of bats present after August 2013, the population approximately halving from August to October 2013 and continuing to decrease as bats moved to hibernation sites ~~- survey presence~~ between October and February 2013/2014. Total numbers of bats present in all buildings (see para 7.51 of the bat report at Appendix 7.4 for the list of buildings) across Northern United decreased from 127~~-29 between~~ in October 2013 ~~and~~ to 29 in February ~~2013/~~2014.

7.171a The historical surveys of the Northern Quarter show that the Lesser Horseshoe bat population at the Northern Quarter was much lower and in 2003 peaked at just over 100 individuals. It has grown steadily over the years to a peak maximum count of 355 in 2013. Originally all bats were using the buildings on the Northern United site. The Artificial roost was only constructed in 2004. Bats remained using the existing roost sites until after 2007 when a heater was added to the artificial roost and the existing buildings were identified as becoming increasingly dilapidated.

7.171b Bats were identified as using the Artificial roost in notable numbers in 2009 by Knight Ecology with a peak count of 88 individuals. However the majority of bats on the site continued to use the Northern United buildings in higher numbers with a total population of 193 until after the summer 2009, when most bats were found using the Artificial roost.

7.171c The peak population of Lesser Horseshoe bats using the artificial roost prior to the 2013 surveys was 210 by Knight Ecology, however, the total colony population for the site at this time is unknown.

7.171d The historical surveys show that there has been a notable increase in the population of Lesser Horseshoe bats within the Northern Quarter and since 2007 there has been a steady and continuous movement of bats from the Northern United buildings to the Artificial roost building.

Building usage (see Figure 1 of the bat report at Appendix 7.4 for locations):

7.172 Office Building: This building is currently ~~was~~ identified as being used as a satellite maternity roost/night/nursery roost to the main artificial roost for Lesser Horseshoe bats. The peak number of bats was 43 during August 2013 surveys, which represents 12~~0~~% of the colony present in the office building at that time, with this building also being used as a very minor hibernation site for Lesser Horseshoe bats with a peak count of 2 individuals for

one month in Decmber 2013. Surveys during 2013 also identified a low number of Common Pipistrelle bats present. Previous surveys of the site by Kestel Widlife Consultants in 2011 identified this building as being used by an unidentified myotis and Long-eared bat but these were not identified present roosting within this building in 2013. .

7.173 Canteen: The previous surveys by Kestrel Widlife Consultants in 2011 did not identify any bats using this building. None of the 2013/14 internal inspections, evening emergence or dawn surveys conducted on this building identified any Lesser Horseshoe Bats present inside the building, apart from one ~~a~~ radio tagged Lesser Horseshoe bat roosting inside the building during the day on one occasion the day after being radiotagged in September 2013, which roosted here during the day. This building is only a very occasional intermittent roost for bats, and is classified as being of very low importance to the Lesser Horseshoe colony due to the very low level of use. It was identified through surveys as being a minor occasional solitary roost for Common Pipistrelle bats.

7.174 Bath House: Low numbers of Lesser Horseshoe bats have been identified using this building (peak count of 19 in August 2013). This is also currently a satellite maternity roost to the main maternity roost for Lesser Horseshoe bats. Surveys indicated that Lesser Horseshoe bats were not using the Bath House during November-January and therefore it is unlikely to be a main or regular ~~not a~~ Lesser Horseshoe bat hibernation site.

7.175 This Bath House was used as a night roost for Lesser Horseshoe bats on a regular basis during the summer period. During radiotracking surveys six radiotagged Lesser Horseshoe bats were identified using this on 17 separate nights, in comparison to the artificial roost being used on 39 occasions as a night roost by Lesser Horseshoe bats.

7.176 The Bath House is used occasionally by at least one Brown Long-eared bat which was identified on one occasion, and also by a single adult male Bechstein's bat, which was present during the internal inspections and emergence surveys in August and September 2013.

7.177 None of the surveys conducted during 2013 identified the Northern United buildings, as being used by Greater Horseshoe bats. A single Greater Horseshoe bat was noted commuting past Northern United during the surveys, and it was concluded that due to the low activity levels, the area is not a core foraging site or regular roost location for this species.

Lesser Horseshoe Emergence Counts:

7.178 The 6 emergence locations (see Figure 1 of the bat report at Appendix 7.4 for locations) were monitored once per month between May and September 2013, with between 15320-355 Lesser Horseshoe bats identified during each visit.

Bat Emergence/Dawn surveys:

7.179 All 6 cameras used during the 2013 surveys (see Figure 1 of Bat report at Appendix 7.4 for locations) identified bats emerging from the roosts, with peak numbers of Lesser Horseshoe bats from all six cameras combined of 355 bats (occurring in August).

7.180 Additionally 6 surveyors were present conducting an emergence and dawn surveys during July and August 2013 (see Figure 2 of the bat report at Appendix 7.4 for locations) which identified activity mainly from Common Pipistrelle with a Myotis / Long-eared bat identified present in the bath house on each survey. Lesser Horseshoe Bats identified during the July surveys.

Trapping Surveys:

7.181 Trapping surveys during 2013 caught 112 bats in total comprising of 12 species, with an average of 12.4 bats per night, and 2.87 per trap per night.

7.182 Although 112 bats were trapped during the surveys, the majority of traps only caught low numbers, with only two of the 39 trap locations catching high numbers of bats, which were situated in close proximity to water bodies on site. The total number of bats caught is considered to be very low for the trapping effort with a consistently low capture rate throughout the whole survey period. Pipistrelle bats were the most common species caught throughout these surveys with a combined total of 64, comprising of 20 Common Pipistrelles and 44 Soprano Pipistrelle. Alongside the capture of *Pipistrellus sp.* a total of five Brown Long-eared bats and 2 noctules were caught at the Northern Quarter site. Captures were also made of all four of the Annex II bat species (Greater Horseshoe, Lesser Horseshoe, Barbastelle and Bechstein's) present on the Northern Quarter site.

7.183 Previous surveys on the Northern Quarter site had not provided accurate identification of Myotis sp. bats, however trapping surveys during 2013 caught 5 different myotis species including; Natterer's, Daubentons, Bechstein's and Brandt's and Whiskered.

Forestry Commission Plantation Trapping Survey:

7.184 This trapping survey, located in an area of mature broadleaf oak woodland ~~in~~on the 31st August 2013, caught 21 bats consisting of 6 different species with an average of 5.2 bats per trap. The survey indicates the presence of Bechstein's bats in the wider area surrounding the Northern Quarter where there is suitable habitat for this species present. This was the most commonly caught species in this area, alongside female bats of Bechstein's, Whiskered, Daubenton's and Brown Long Eared, none of which were caught within the Northern Quarter site.

Lesser Horseshoe Bat Trapping:

7.185 This trapping in 2013 was mainly situated around the artificial maternity roost to the east of Northern United to catch bats for radiotagging, with a total of 134 Lesser Horseshoe bats caught throughout all the surveys with 41 adult males, 23 adult females and 70 juveniles.

7.186 This species was not targeted for trapping using ultrasonic lures for trapping surveys across the site calls, as it was already known that there were high numbers of bats present breeding in the survey area and therefore it was considered that disturbance should be kept to a minimum.

Radio Tracking Surveys:

7.187 During the 2013 surveys, 24 bats comprising of 5 species including Lesser Horseshoe, Natterer's, Bechstein's, Common Pipistrelle and Soprano Pipistrelle were caught and subsequently radio tagged in order for tracking to be conducted. Radio-tracking collected data from 20 separate individuals.

7.188 The data collected indicated that Lesser Horseshoe population numbers on site fluctuate over the survey period (June-October) from a peak of 3556~~3~~ in August to 127 in October. This data gives an indication that bats are leaving the area and not returning during this period in the year.

7.189 It also identified that Lesser Horseshoe bats were using 5 building roost locations, four of which are located within the Hybrid Application Site. Alongside these buildings, Lesser Horseshoe bats were also found temporarily night roosting in trees and possibly in a shed near an allotment.

Transect Surveys:

7.190 Overall bat activity levels were low for surveys conducted in April/May and June 2013, however bat activity levels were lower in April/May with an average of only 12% activity with a peak of only 48% activity for the six species identified during the survey of Transect 1 on 2nd May. Activity levels were higher in June due to over 100 minutes of activity occurring on transects 5 and 6 and a likely result of improved weather conditions.

7.191 The transect surveys completed during July – October 2013 were subject to only one dusk and dawn survey each month, with an additional all-night survey conducted in July. In a similar case to the surveys conducted earlier in the year, the activity levels were considered to be low. The exception was transect 3 where more than 100 minutes of activity was recorded in both July and August 2013. The majority of the bat species recorded were Common Pipistrelle, with more of this species present on this transect than all other species combined on all other transects during the whole survey period.

7.192 When the all-night survey was conducted in July, it identified that twice as many Myotis sp. were recorded during this period than both the dusk and dawn surveys combined. This occurred for three transects 1, 6 and 8.

7.193 The surveys only detected low amounts of activity from Lesser Horseshoe bats, given the known population within the Northern Quarter. Only 212 ~~86~~minutes of activity was recorded throughout all surveys months combined, equating to only 8% of all recordings taken.

7.194 Overall results indicated that a total of 2650 minutes of activity was recorded from all bat species. This is a low amount of activity, considering that this total comprises results from seven transects conducted once per month for at least 5 hours.

Static Loggers:

7.195 The static surveys in 2013 confirmed the presence of the following species: Common Pipistrelle, Soprano Pipistrelle, Nathusius' Pipistrelle, Myotis species, Noctule, Lesser Horseshoe, Greater Horseshoe, Brown long-eared and Barbastelle.

7.196 The results of surveys conducted by Johns Associates from April/May-June showed that, from a total of 17 loggers and 69 logger nights, only a total of 2815 minutes of activity from all species was recorded. This output means that only 40 minutes of activity (average) per night per logger for all species was recorded which was considered to be very low, given the known populations of bats present within the Northern Quarter and surrounding area.

7.197 The surveys conducted in April/May and June 2013 and the resulting data indicates that the most commonly detected bat species during the surveys were Common Pipistrelle and Soprano Pipistrelle within a combined activity time total of 79.7%. The most common species other than Pipistrelle sp. were Myotis sp. and Lesser Horseshoe. However these only represent 13.8% and 4.7% of the calls respectively which is very low. This may, however, be due to the quietness of both species when recorded, which may mean they have been under recorded during the surveys. Taking into account that myotis calls are made up of 5 species confirmed to be present on the Northern Quarter, the number of calls is very low.

7.198 AEWC also conducted static logger surveys from July to October 2013, only using the same SM2 loggers for all surveys from July to October with a total of 28 logger locations and 146 nights recording. These surveys identified 10 species, which is higher than the results identified from the April/May and June surveys. These loggers recorded 16,792 calls equating to a total of 9,7219721 minutes of overall activity, an average of only 66 minutes of activity per night.

7.199 The species that have been confirmed or likely to be present in the Northern Quarter include: Common Pipistrelle, Soprano Pipistrelle, Nathusius' Pipistrelle, Myotis, Noctule, Leisler's, Serotine, Lesser Horseshoe, Greater Horseshoe, Brown long-eared bat, Barbastelle. The surveys identified that 53% of all the minutes of activity were attributed to Common Pipistrelle bats.

7.200 A total of 78.9% of all the minutes of activity for bats identified within the survey area from July to October, was attributed to *Pipistrellus sp.* The Myotis species make up 12% of the activity over the whole site, although as this group is made up of 6 species, 5 of which have been confirmed present on the site, this is not a fair representation of presence. This may be due to the fact that many of these species are quiet and therefore under recorded on the detectors used during the surveys.

7.201 This was also the case for the Lesser Horseshoe bats, with results showing that they were only recorded in very low numbers (2.6% of all recorded minutes of activity on the site). Greater Horseshoe bats were also recorded in low numbers ~~showed the opposite~~, with a total of 204 recordings being identified, however ~~although~~ this result is skewed due to 159 recordings identified being recorded during one night, in one hour, for one detector, meaning that there was ~~with~~ likely to have been consistent foraging around the area where the detector was located. This one night resulted in July having 49 minutes of

activity out of a total of 56 minutes of activity for this species recorded over the 4 month survey period.

7.202 Long eared bats are a common and widespread species ~~across the area~~, however due to the difficulty in picking them up on the detector, the species is under recorded, with only 2.5% of activity being noted during this period. This is very typical of this quiet 'whispering bat' species.

7.203 Barbastelle bats are another species which has a confirmed presence within the survey area. However only 4 calls were recorded during August 2013, but this can be accounted for due to the fact it is a rare species and also difficult to record, but also due to the fact that this species is less likely to forage on the site and commute through the area and so is less likely to be detected by static loggers unless on a bat's commuting route.

7.204 The average number of calls/minutes of activity was used to give an indication of activity levels for each bat each month. These figures showed that there was a clear increase in detection of bats during the August surveys and a dramatic decline in activity levels in October. The number of recordings declined from 246 to 2.5 bat recordings per night over the three month period. This is due to increased bat activity in August once juveniles are flying. During September/Ocotber activity decreases as temperatures drop and it becomes too cold for bats to forage throughout the night.

Fixed Point Count surveys:

7.205 Observations of Lesser Horseshoe bats were very low for the fixed point count surveys, which were used to target and observe this species. The lack of observations can be explained due to Lesser Horseshoe bats commuting close to habitat features, and also due to the fact that they are difficult to identify. With the addition of radio tracking during August and September, it was noted that the bats foraged for short periods and commonly returned to their roost within an hour of emerging.

Flyways for Lesser Horseshoe bats:

7.206 The preliminary radiotracking study by Kestrel Wildlife Consultants in 2011 identified 8 commuting routes by Lesser Horseshoe bats across the site. They used a range of survey techniques, including radiotracking data, transect observations and casual obeservations during surveys (see table 3 and figure 9 Kestrel Wildlife Consultants report set out at Appendix 7.4 to this chapter). Two of these commuting routes (F and H shown on table 3 / figure 9) were movements of Lesser Horseshoe bats within woodland areas to the east of

the Artifical roost. Two flyways (C and D) were of bats emerging from the two emergence points east of the Office Building roost site into the woodland and one was of bats commuting north (A) over the main road, the A4136, from the artifical roost. There were three identified flyways which are of Lesser Horseshoe bats commuting west and south. Key Flyway B (also shown on table 3 / figure 9) was identified as a flyway of bats commuting west from the artificial roost. Key Flyway E is from the south west corner of Hawkwell enclosure where bats were observed entering the bath house during emergence/dawn suveys. Keyflyway G runs south through a vegetative area from Hawkwell enclosure south along the western side of the lake. This was observed being used by Lesser Horseshoe bats on transects and by 7 of the 8 radiotagged Lesser Horseshoe bats in 2011. The surveys in 2013 by AEWC Ltd identified three major and two minor flyways for Lesser Horseshoe bats, these are defined by the number of bats identified / estimated using them. A major flight line is one where evidence suggests that it is used by at least 15% of the colony regularly, such as a nightly movement from roost site to foraging area. These were identified from analysing all of the 2013 survey data from across the survey area to assess the number of Lesser Horseshoe bats observed, and proportions likely to be observed and all radiotracking data during the entire survey season. These are detailed below and shown on Figure 7.4~~within the plans included in the bat survey report (Figure 48, p134, Appendix 7.4)~~.

7.206a Three major and two minor flyways for Lesser Horseshoe bats were identified from analysing the 2013 data from across the survey area. These are detailed below and shown on Figure~~within the plans included in the bat survey report (Figure 48, p134, Appendix~~ 7.4)

Major Flyways:

- Commuting route 3: North from artificial roost over main road (A4136): A peak of 71 Lesser Horseshoe bats was identified crossing the A4136 in a northerly direction during dusk fixed point count surveys and also high numbers returning at dawn during August 2013 to and from the artificial roost. Radio tracking analysis also identified half of the Lesser Horseshoe bats crossing ~~this~~~~the~~the main road and foraging to the north of this feature. It is estimated that a third of this species' colony are regularly foraging in the habitat to the north of the A4136 and crossing and returning to the artificial roost in this location (located at the point in Figure 48 where the blue horizontal line and the red vertical line cross). This was also identified as a key flyway A by Kestrel Wildlife Consultants in 2011 when on one

occasion a number of bats were observed crossing the road and 4 of the radio tagged bats used this route.

- Commuting route 2: Woodland plantation along west end of lake: The fixed point counts identified a low number of Lesser Horseshoe bats in this habitat, ~~although~~ however due to the fact that the woodland is around 50m wide with dense foliage in areas, it was difficult to accurately count and identify bats in this location ~~and~~ and bats could not been seen or heard at this location. Counts conducted in this area are therefore presumed to be an under estimate as through radio tracking it is known that Lesser Horseshoe bats were using this area to commute and were not detected during surveys. Overall it is estimated that at least 25% of the Lesser Horseshoe colony use this habitat as a main commuting route throughout the active season. This was also identified as Key Flyway G by Kestrel Wildlife Consultants as Lesser Horseshoe bats were repeatedly recorded at this location during transects and 7 of the 8 radiotagged Lesser Horseshoe bats used this at some point during radiotracking surveys.
- Commuting route 1: Hawkwell Inclosure and Bath House Junction: A number of Lesser Horseshoe bats were identified commuting to the south west corner of the Hawkwell Inclosure and crossing the track at this location where the bats appeared to split into three main routes. The three main routes were identified in this area: 1-Lesser Horseshoe bats entering and commuting through the Bath House in a westerly direction, identified through the use of night vision cameras. Through the discovery of previously unidentified emergence locations in the western end of the Bath House, it was identified that a low number of bats are commuting from the artificial roost and entering the eastern end of the Bath House and using the building as a commuting route west; 2-commuting south of the Bath House following the track and heras fence line in a south westerly an easterly direction; 3- and commuting in a southerly direction from just on the east of the Bath House crossing the track and open ground at narrow points, where a peak of 19 was identified during the fixed point surveys. 20% of the Lesser Horseshoe bat colony is estimated to use this major commuting route which splits into the three more minor routes throughout the active season.

Minor flyways:

- Commuting route 5: Lesser Horseshoe bats forage and commute to the east from the artificial roost throughout the active season. This includes Lesser Horseshoe bats which stay within Hawkwell enclosure and Lesser Horseshoe bats which commute

further east and north east of the Northern Quarter site. This is a woodland area with no fixed linear feature used as a commuting route. From here Lesser Horseshoe bats have also been identified using the A4136 as a crossing point to the east and north east of the Hawkwell Inclosure in order to reach foraging grounds to the north. These were identified from radio tracking individuals dispersing to foraging areas, predominantly to the north east. Kestrel Wildlife Consultants also identified this route east in 2011 as parts of flyway H and F.

- ~~Lesser Horseshoe bats have also been identified using the [the A4136 as a crossing point to the east and north east of the Hawkwell Inclosure in order to reach foraging grounds to the north.~~

- Commuting route 4: Lesser Horseshoe bats have been identified, using fixed point surveys, commuting west from the artificial roost crossing the existing track between the entrance of Northern United and the main A4136 junction. None of the ~~, with no~~ radiotagged Lesser Horseshoe bats were identified using this route after emergence for dispersing from the roost, however one Lesser Horseshoe bat was radiotracked ~~, [with the exception of] one bat~~ returning to the artificial roost via this commuting route.

Maternity and Tree Roosts:

7.207 These 2013 surveys have identified the presence of a main Lesser Horseshoe bat maternity roost in the artifical roost and two satelite roosts (Office Building and Bath House) on the Northern United site that are also used by other species in low numbers (Common and Soprano Pipistrelle, Brown Long-eared and Bechstein's). The Canteen was found to be used as a day roost by a small number of species including a single radiotagged Lesser Horseshoe bat on one occasion.

7.208 None of the surveys conducted during 2013/2014 have identified the Northern United buildings, as being used by Greater Horseshoe bats.

7.209 These roosts are considered to be of very high ecological value given the population of Lesser Horseshoe bats within the survey area and the status of the roost as a satelite maternity roost. (see section above on Bats - *Building Usage*).

7.210 No tree day roosts for any bat species have been confirmed within the survey area to date. However there are a number of potential tree roost sites throughout the surrounding area which are considered to be of medium ecological value, largely due to the limited value of such roosts to Lesser Horseshoe bats, the absence of any maternity colonies of

tree roosting species identified on the site and the very low levels of site activity from tree roosting species such as Barbastelle and Bechstein's. Any tree roosts at the Northern Quarter are likley to be solitary male tree roosts. ~~, which are known to frequent tree roosts.~~

Conclusions

7.211 These above surveys have confirmed the presence of commuting and / or foraging Lesser Horseshoe, Greater Horseshoe, Barbastelle and Bechstein's bats which are considered to be of very high ecological value given the populations present and / or, in the case of the Lesser Horseshoe bats and Greater Horseshoe bats, due to their links to the Wye Valley and Forest of Dean SAC and in the case of the Lesser Horseshoe bats/ or their links to the Wye Valley Woodlands SAC.

7.212 The commuting and foraging populations of Nathusius' Pipistrelle, other Myotis spp, Brown Long-eared, Noctule, Leisler's and Serotine bats are considered to be of medium ecological value given the numbers present while the populations of Common and Soprano Pipistrelle are considered to be of lower value given the widespread nature of these two species.

7.212a The following sets out a summary of each bat species' patterns of behaviour based on the survey results above and comments in particular on the bats' behaviour in relation to each of the four key areas at the Northern Quarter relating to the proposed development, being the Phase 1 development area, the Phase 1 mitigation areas, the Phase 2 development area and the Phase 2 mitigation areas. These four areas are discussed in further detail later in this chapter, see in particular paragraph 7.253 onwards.

Lesser Horseshoe Bat

7. 212b The Lesser Horseshoe bat is protected as a European Protected Species under the Conservation of Habitats and Species Regulations 2010. It is also a qualifying feature of the Wye Valley and Forest of Dean SAC and the Wye Valley Woodlands SAC and as such a specific assessment of the impact of the proposed development at the Hybrid Application Site on this species is necessary as below.

7. 212c There is a colony of Lesser Horseshoe bats within the Northern Quarter which have been identified using a total of 5 structures with various uses and numbers throughout the season (see AEWC Bat report 2013 at Appendix 7.4). Historically bats at the Northern Quarter were all restricted to the buildings within the Northern United site where bats predominantly roosted within the Bath House and Office Building and the Canteen Building used to a

minor extent. The Artificial Roost was only constructed and became available to be used by Lesser Horseshoe bats in May 2004 and heating was added to the Artificial Roost in 2007.

7. 212d Prior to the construction of the Artificial Roost the colony counts from the site were taken by Keystone Environmental from 2003 to 2007. In 2003 the peak colony count for the Northern Quarter was 103 (with peak counts of individual buildings of 97, 22 and 2 bats in the Office Building, Bath House and Canteen respectively during this year). This rose to peak colony counts across the site in 2004 of 117 individuals, 2005 of 157 individuals, 2006 of 212 individuals and 2007 of 192 individuals. During this time the peak count of bats using the Artificial Roost was only 6 individual bats in 2007, 149 in the Office in 2006, 110 in the Bath House in 2006 and 2 in the Canteen Building on two occasions. These indicate that bats were not using this building as a main roost during this period and remained using the Office and Bath House buildings as the primary roost sites.

7. 212e Surveys of the site conducted by Knight Ecology on the 22nd July 2009 identified a peak count of 88 bats in the Artificial Roost, however the majority of bats were still consistently identified using the Office Building and to a lesser extent the Bath House with peak counts of 107 and 15 respectively. A survey in November 2010 identified a total of 96 individual Lesser Horseshoe bats present in the Artificial Roost and only 20 using other buildings on the site showing that most of the colony were now using the Artificial Roost. During 2011 (unknown date) a peak count of 210 Lesser Horseshoe bats were identified using the Artificial Roost with only 75 using the Office (unknown date) showing a continued increase in population and proportion of bats using the Artificial Roost (ERM Bat report 2012).

7.212f The historical surveys clearly showed that bats started to use the Artificial Roost as a main roost after 2007, a likely result of heating being added to the building. This may be due to the natural behaviour of the species loyal to previously used roosts but it was noted that both the Bath House and the Office Building were dilapidating over this time with roof collapses and notably increased damp within these buildings making them less suitable for this species (Knight Ecology 2010).

7.212g The AEWC 2013 surveys identified a peak colony count of 355 Lesser Horseshoe bats on the Northern Quarter in August 2013 which will include flying juveniles. During this time the number of Lesser Horseshoe bats and peak counts for the year using the Office Building was 43 and Bath House 19 individuals.

7.212h The surveys over the years show that there has not only been a steady increase in the population of Lesser Horseshoe bats on the site but a continued increase in the proportion of the number of Lesser Horseshoe bats using the Artificial Roost. It also shows that they have moved away from using the Office Building and Bath House on the Northern United site. This may be due to continued dilapidation and deterioration of the buildings becoming increasingly unsuitable for Lesser Horseshoe bats as a roost site. The Lesser Horseshoe bats are now consistently predominantly using the Artificial Roost and the Bath House and Office Building are more minor roosts with notably reduced numbers present in these buildings.

7.212i Logger surveys conducted across the site in 2013 by Johns Associates only recorded 133 minutes of activity for Lesser Horseshoe bats, representing less than 5% of all species activity. There were only two locations with over 1% activity. These were on the main pathway through Hawkwell Inclosure leading south east from the Artificial Roost; and the highest number of recordings were in the woodland strip along the west side of the lake (see Figure 34 AEWC 2013). The logger surveys by AEWC 2013 only identified 255 minutes of activity representing 2.5% of all species activity. There was only one location that had an average of over 10 minutes of activity per night which was located near the northern flight line location crossing the A4136 north.

7.212j The surveys by Kestrel Wildlife Consultants in 2011 had the highest activity from loggers on the site from near the Artificial Roost and the tracks leading away from the Artificial Roost. The next highest areas of activity were at the flight line crossing the A4136, around the northern compound area of Northern United and at the south west corner of the Hawkwell Inclosure and Bath House junction.

7.212k Transect surveys conducted in 2013 across the site identified only 212 minutes of activity representing only 8% of all bat activity on the site. Bats were recorded across the site, which would be expected given the large colony present using the building on the site. The highest concentration of activity was identified around the south east corner of Hawkwell Inclosure and the Bath House junction (see figure E5 AEWC Bat report 2013).

7.212l The transects conducted by Kestrel Wildlife Consultants identified the highest levels of activity around the Artificial Roost and track running down the eastern side of the Northern United compound adjacent to the Office Building and at the Bath House track junction. A number of bats were also recorded along the track south and south west of the Bath

House and along the western side of the lake (see Figure 8 Kestrel Wildlife Consultants 2011).

7.212m Fixed point counts were only conducted in 2013. Observations of Lesser Horseshoe bats on the fixed point counts was commonly low, due to the species being very quiet and difficult to detect, especially in cluttered or wooded settings. Lesser Horseshoe bats were consistently identified at three main locations. The highest number of bats was identified crossing the A4136 north near the Artificial Roost, and this was consistently identified at the same location where a large beech branch hangs over the road. The next highest number of bats detected was along the woodland plantation to the west side of the lake. Lower numbers of bats were recorded at locations across the survey locations but these were consistently around the western areas of the Northern Quarter and fewer bats were detected towards the eastern areas.

7.212n Radio tracking has been conducted on Lesser Horseshoe bats from the colony in 2011 by Kestrel Wildlife Consultants with 8 bats tagged and in 2013 by AEWC Ltd with 20 individuals tagged. These have identified a high number of foraging areas, both on and off the Northern Quarter site with many bats foraging to the southern and south western areas of woodland and to the northern woodland areas many kilometres from the site. The radio tracking has also identified a number of bats using communal flight lines dispersing from the site. The radio tracking has also shown that while all tagged bats predominantly use the Artificial Roost, bats are moving occasionally between other roost sites and the Bath House is used regularly as a night roost.

7.212o Phase 1 development area: The development area of Phase 1 will not represent the loss of any confirmed Lesser Horseshoe roost sites which are all identified to the west side of the Northern Quarter and Northern United buildings. There have not been any flight lines identified within the Phase 1 area through any regular use by bats radio tagged or from any locations where bats were regularly recorded either by the 2011 surveys or 2013 transect surveys. The fixed point counts in or near the Phase 1 development area consistently recorded no or only odd individual Lesser Horseshoe bat passes. The 2013 transects recorded a very low number of recordings in and adjacent to the Phase 1 area but activity was low.

7.212p The radio tracking by Kestrel Wildlife Consultants in 2011 did not identify any of the 8 Lesser Horseshoe bats spending any time foraging within the Phase 1 development area. The 2013 AEWC radio tracking surveys did not identify any bats foraging within the Phase 1

development area. One bat foraged near the edge of the Phase 1 area (LHB L03280) and two bats had a couple of odd fixes near the edge of the Phase 1 area (LHB L03271 and L03294)

7.212q As such the Phase 1 development area is only predicted to have an impact on a low number of individual Lesser Horseshoe bats as development of this area amounts to a loss of a small area of more sub quality foraging habitat for this species.

7.212r Phase 1 mitigation areas: The creation of the Phase 1 mitigation areas will not represent the loss of any known roosts or associated flight lines of Lesser Horseshoe bats.

7.212s The removal of coniferous woodland habitat to create the proposed mitigation area for Phase 1 is likely to provide improved foraging habitat for Lesser Horseshoe bats. However, in the short term this could represent a potential temporary minor loss in available foraging. The Kestrel 2011 radio tracking studies identified 3 bats foraging within this area (foraging area 15). However these were all for short periods and represented only a small proportion of the foraging area and was used for a peak of 18 minutes in any night by a bat and does not represent the core foraging area for any bat. The 2013 AEWC radio tracking surveys identified a few bats pass through this area. However, this area was the core foraging area for two individuals (L03271 and L03291) indicating that this area is likely to be used as a foraging area by a low number of individual Lesser Horseshoe bats.

7.212t Phase 2 development area: The development of the Phase 2 area, which will result in the demolition of the buildings within the Northern United compound, will result in the loss of three roost sites for Lesser Horseshoe bats i.e. the Bath House, Office Building and Canteen. The surveys have shown that while these buildings are no longer the main roosting sites for this colony and are now used by only a smaller proportion of the colony as satellite roosts, the loss of the buildings will result in the loss of two regularly used day roosts and night roosts for the Lesser Horseshoe bat colony.

7.212u The loss of the Bath House building will also result in the loss of a minor flight line for Lesser Horseshoe bats (see below). This is because a low number have been identified commuting from the south west corner of the Hawkwell Inclosure heading west commuting through the Bath House building.

7.212v The 2011 Kestrel Wildlife Consultants radio tracking surveys did not identify any Lesser Horseshoe bat foraging areas within the Phase 2 development area. Bats were only identified passing through this area. The AEWC 2013 surveys identified that the Phase 2

development area was on the edge of the core foraging areas for one individual Lesser Horseshoe bat L03257 and includes a small part of the core foraging areas of two Lesser Horseshoe bats L03280 and L03294.

7.212w The Phase 2 area consists of mostly hard standing and buildings in Northern United and more open habitat in the east of the Northern Quarter and sub quality habitat for foraging bats and so the development of this area will only represent a minor loss of sub quality foraging habitat of Lesser Horseshoe bats.

7.212x Phase 2 mitigation area: the Phase 2 mitigation area consists of a number of different areas within and adjacent to the Northern Quarter (refer to mitigation areas referenced on Figure 7.6) which are discussed in the following groups of mitigation areas.

1 – MP-2(R)I + MP-2(R)J + MP-2(R)K: -These areas have had a low number of Lesser Horseshoe bats recorded present, with only the odd detector recording presence from this area. Radio tracking in 2011 identified one Lesser Horseshoe foraging area within these mitigation areas, foraging area 11. This was used for a total of 6 minutes by one bat in 2011 representing less than 1% of this bat's activity and very minor use. The 2013 radio tracking did not identify this area as being the core foraging area of any bats radio tracked.

2 – MP-2(F)A: This area has a low number of Lesser Horseshoe bats detected during transect surveys. The 2011 radio tracking surveys identify this area as about a quarter of foraging area 12. This was the core foraging area for one bat and minor foraging area for two individuals. The 2013 radio tracking identified that this mitigation area is adjacent to or just covering part of four individuals' core foraging areas for Lesser Horseshoe bats.

3 – MP-2(R)G + MP-2(R)H: These are two small areas with low probability to have any impact on Lesser Horseshoe bats given its small size. This area is a small part of the core foraging area of one individual but the small size would not on its own form any bats core foraging area.

4- MP-2(R)A: The transect surveys have recorded a low number of Lesser Horseshoe bats within this area. The 2011 radio tracking did not identify any bats foraging within this area. The 2013 radio tracking surveys identified this area covering a small part of the core foraging area for one individual bat. Most of this area is already very open and bare.

5- MP-2(R)B + MP-2(R)C: these two wooded areas proposed for woodland enhancement are closest to the artificial roost, and as would be expected are used by a number of lesser horseshoe bats. The 2011 radio tracking by Kestrel Wildlife Consultants identified all 8 bats

present within this area at some time, however the roost is in this area. This was not the most used foraging area for any individual but was one of the main foraging areas for two Lesser Horseshoe bats (more than 10% foraging time). The 2013 radio tracking identified that these areas form at least part of the core foraging area for 5 of the 18 individuals data was gathered for.

6- MP-2(R)D + MP-2(R)E + MP-2(R)F: These are three areas located within the eastern half of the Hawkwell Inclosure, the opposite end of the wood to the main Lesser Horseshoe maternity roost. Two areas are proposed for woodland creation and one for grassland enhancement. The open area of grassland enhancement is existing, the woodland creation areas are currently conifer. The 2011 radio tracking did not identify any Lesser Horseshoe bats using these areas for foraging. The 2013 radio tracking identified this area as being used as part of the core foraging area for 3 Lesser Horseshoe bats. Bats using the grassland areas to forage will still be accessible and will not be affected where the conifer will be lost and replanted which could be used by a number of bats.

7 – MP-2(F)B – this is a small area of woodland creation covering the current access track junction with the A4136. This improves connectivity and is part of the minor flyway for Lesser Horseshoe bats and so is a positive enhancement.

8 – MP-2(F)C + MP-2(F) – these are two small thin linear areas of enhancement that are to be created along the edge of the new spine road.

7.212y Phase 3 - Habitat severance and traffic collision risk: The creation of the spine road will have an impact on three identified commuting routes of Lesser Horseshoe bats dispersing from the Artificial Roost to foraging areas.

7.212z The first 2 are flight lines 1 and 2, which bats have been consistently identified as using. These are shown on Figure 7.4.

7.212a1 Flight line 1 runs down south from the Artificial Roost through to the south west corner of Hawkwell Inclosure where it splits into three main directions i.e. sub routes 1A, 1B and 1C. This has been identified through the Kestrel Wildlife Consultants 2011 survey data with higher numbers of bats recorded in this area from transects, static loggers and observations of bats and from the AEWC 2013 surveys from transects, fixed point counts and radio tracking. At this location flight line 1 splits into three sub routes 1A, 1B and 1C.

7.212b1 Sub route 1A is where bats cross the track (leading south along the eastern edge of Northern United) and commute through the Bath House heading west. This was

observed on a number of occasions where bats were observed on night vision cameras entering the east end of the Bath House and emerging from the west end during evening activity surveys. Bats were also radio tracked following this route. The Bath House will be demolished and therefore this commuting route will be lost, likely forcing them to cross at a slightly more southerly location or along the adjacent flight line 1B.

7.212c1 Sub route 1B is where bats cross the track (leading south along the eastern edge of the Northern United) just south of the Bath House heading south west. Bats have been observed following existing fence lines and heras fencing in this direction and surveys in 2011 and 2013 have identified higher numbers of Lesser Horseshoe bats during transect surveys along the two forest tracks leading in a south westerly direction. The creation of the spine road will result in removing connectivity features and widening open areas across this flight line thereby severing connectivity.

7.212d1 Sub route 1C is where bats have been identified in the 2011 and 2013 surveys from radio tracking and fixed point counts where bats commuted south out of the corner of Hawkwell Inclosure and crossed the existing track (leading from the Bath House east along the southern edge of Hawkwell enclosure) and open scrub habitat to commute south-south east. The Phase 2 development will remove this scrub habitat thereby widening the open space and removing connectivity features.

7.212e1 Flight line 2 runs from the Hawkwell Inclosure south through a wide woodland strip running south between the lake and the Brickworks. This was identified as a high area of activity for Lesser Horseshoe bats from static loggers, fixed point counts and transects by both the 2011 and 2013 surveys, but most notably from radio tracking where the Kestrel Wildlife Consultants 2011 data had 7 of 8 radio tagged bats using this route at some time during the study, and AEWC had 8 bats commuting through this location at some time. The results show that a notable proportion of the Lesser Horseshoe bat colony use this flight line at some time.

7.212f1 Flight line 4 is a more minor flight line that runs directly west from the Artificial Roost. This was identified by observations of bats crossing by Kestrel Wildlife Consultants (Key flyway B) and by bats observed crossing during 2013 but with notably lower numbers observed in 2013. However the radio tracking did not identify any bats using this commuting route in the 2011 survey work. In addition the 2013 radio tracking did not identify any bats using this flight line to disperse from the Artificial Roost, but one individual was identified returning to the roost along this flight line. Bats are already crossing the

access track but the creation of the new spine road will increase the width that they must fly, potentially severing the minor commuting route.

7.212g1 As noted, the spine road will intersect two major flight lines, 1 and 2, and one minor flight line, 4, for Lesser Horseshoe bats. The proximity of the road to the existing Artificial Roost, approximately 150m, and the population of Lesser Horseshoe bats on the Northern Quarter will mean that the use of the spine road at night, where the spine road crosses these flight lines, could, present a risk of injury or mortality from collisions with the road traffic. Lesser Horseshoe bats are a species considered at risk of collision if they were forced to fly over the new spine road in the numbers of bats present.

Greater Horseshoe

7.212h1 Greater Horseshoe bat is protected as a European Protected Species under the Conservation of Habitats and Species Regulations 2010 and it is also a qualifying feature of the Wye Valley and Forest of Dean SAC. As such a specific assessment of the impact of the proposed development at the Hybrid Application Site on this species is necessary as below.

7.212i1 Greater Horseshoe bats have been recorded present across the Northern Quarter site. However, the number of detections has been very low from all survey techniques deployed in the 2013 and 2011 surveys. Transect surveys identified only six recordings of Greater Horseshoe bats at the Northern Quarter during the entire 2013 summer period. The fixed point count recorded a total of two recordings in May and June and then ten in July from a total of seven location across the Northern Quarter. Static loggers did not record any bats present in May, and only seven recordings in June (0.2% of all recordings during this period). From July to October there were a total of 204 Greater Horseshoe recordings, however 195 of these were all from July, during which 159 recordings were recorded from one location in one night, indicating that this was a bat foraging in this location.

7.212j1 Previous surveys by Kestrel Wildlife Consultants (2011) are consistent with the 2013 survey data and recorded only four Greater Horseshoe bats during transect surveys representing 0.3% of all recordings and nine recordings from static loggers representing 0.4% of all species recorded.

7.212k1 Historically there is a record from 2007 of one Greater Horseshoe bat roosting within the Bath House at Northern United. However, none of the buildings surveyed during 2011 by Kestrel Wildlife Consultants or during 2013 by AEWC Ltd identified any Greater

Horseshoe bats present during the internal inspections or emergence surveys. The trapping surveys conducted throughout the site in 2013 by AEWC Ltd only caught one individual adult male Greater Horseshoe bat within the Hawkwell Inclosure.

7.212l1 The surveys indicate that the Northern Quarter is used by a low number of individual Great Horseshoe bats, most likely males, which may use the site as occasional foraging areas. No roosts of Greater Horseshoe bats have been recorded on the site since 2007. No current local roosts for this species are known and no flight lines for this species are known throughout the Northern Quarter site.

7.212m1 Phase 1 development area: The development of Phase 1 will not represent the loss of any known roosts or associated flightlines of Greater Horseshoe bats, or the loss of any identified core foraging area for this species. The majority of detections for this species are recorded from areas outside the Phase 1 development area and to the south of the Northern Quarter site. No Greater Horseshoe bats were identified from the transect surveys, fixed point counts or static loggers within the Phase 1 development area to indicate a foraging area or flight line during the 2013 surveys, and only one bat was recorded within this area in the 2011 surveys.

7.212n1 Phase 1 mitigation area: The creation of the Phase 1 mitigation area will not represent the loss of any known roosts or associated flightlines of Greater Horseshoe bats, or the loss of any identified core foraging area for this species. The coniferous woodland habitat to be removed to create the proposed mitigation area for Phase 1 works has a low potential to provide foraging habitat suitable for Greater Horseshoe bats. However, no Greater Horseshoe bats were recorded present in this area during the static loggers or transect surveys. The highest number of Greater Horseshoe detections were located to the south of this area.

7.212o1 Phase 2 development area: There are a very low number of Greater Horseshoe recordings across this area, including low numbers of recordings around the buildings of Northern United. A low number of recordings were taken from the north east, Steam Mills West area indicating occasional intermittent foraging activity within the Phase 2 development area, including along the wooded stream running north east of the main lake. Two of the five transect recordings of Greater Horseshoe bats were recorded at the bath house track junction. The development of phase 2 is likely, affect only a very few individual Greater Horseshoe bats given the very low population present. The demolition

of the buildings at Northern United will include the loss of a historical roost for a solitary individual.

7.212p1 Phase 2 mitigation area: The creation of the Phase 2 mitigation areas will not represent the loss of any known roosts or associated flight lines of Greater Horseshoe bats, or the loss of any identified core foraging area for this species. The coniferous woodland habitat to be removed and woodland enhancement to create the proposed mitigation areas for the Phase 2 development works has potential to provide foraging habitat more suitable for Greater Horseshoe bats. As no Greater Horseshoe bats were recorded present in this area during the transect surveys in 2011 or 2013 the opening up of dense conifer is likely to be a positive change for this species.

7.212q1 Phase 3 - Habitat severance and traffic collision risk: The number of Greater Horseshoe bats identified across the Northern Quarter is very low with the majority of recordings identified to the far south of the Northern Quarter site which is not within any of the proposed phases of the development. Greater Horseshoe bats have not been regularly or consistently recorded at any location to indicate any major flight line through the Northern Quarter site, and as such, no severance of flight lines are predicted. Surveys have identified Greater Horseshoe bats on more than one occasion on the wooded stream running north east of the main lake and at the Bath House Junction, but only a very low number of detections of this specie has been identified.

Bechstein's Bat

7.212r1 The Bechstein's bat is protected as a European Protected Species under the Conservation of Habitats and Species Regulations 2010.

7.212s1 Bechstein's bats were not identified as present on the Northern Quarter site prior to the AEWC 2013 surveys. It is hard to identify Myotis species and can only be confirmed present through trapping/visual identification and cannot be identified through transects, static loggers or fixed point counts. This species specialises in mature broadleaf woodland with a predominance of Oak and has small foraging areas predominantly gleaning in the canopy and averages foraging close to its roost site.

7.212t1 There are two records of Bechstein's bats within the Northern Quarter. One individual juvenile female was caught trapping in the southern area of the site. Radio tracking identified a maternity colony of between 40-50 individuals in an Oak tree just over 3km to the south west of the Northern Quarter. This individual foraged predominantly

outside the Northern Quarter site and partly just inside its south western edge. This foraging area is considered to be a long way from the roost site for this species, however, juveniles are more commonly found to be foraging further from the roost than breeding adult females. It was agreed with Natural England that further radio tracking of this colony was not considered necessary given the distance of the roost site from the Northern Quarter and impact of conducting this on the colony.

7.212u1 One trapping survey was conducted in Speculation Plantation, an area of Mature Oak woodland considered suitable for this species away from Northern Quarter. A total of 7 Bechstein's were found and was the most common species caught, showing that these species are present breeding in the wider area, but breeding females are not using the Northern Quarter site.

7.212v1 One solitary adult male Bechstein's bat was found roosting inside the Bath House building in August and September 2013. Bechstein's bats are woodland specialists and predominantly roost in trees. Building roosts are not suitable and rarely used by this species.

7.212w1 The surveys indicate therefore that the Northern Quarter is used by a low number of odd individual Bechstein's as sub quality foraging by non-breeding females which will, given the foraging requirements of the species, be restricted to areas of mature Oak woodland. There are no known flightlines throughout the Northern Quarter site and it is unlikely there would be any given the absence of any maternity roosts close on or close to the site.

7.212x1 Phase 1 development area: The development of Phase 1 will not represent the loss of any known roosts, known or likely foraging areas or any flight lines of Bechstein's bats.

7.212y1 Phase 1 mitigation area: The creation of the Phase 1 mitigation area will not represent the loss of any known roosts or flight lines of Bechstein's bats. The coniferous woodland habitat to be removed to create the proposed mitigation area for Phase 1 works is not suitable for this species and would not be a foraging area for this species. The broadleaf woodland creation would be beneficial for this species.

7.212z1 Phase 2 development area: This will not have any impact on any known or likely suitable foraging areas or flight lines for this species. The demolition of the Bath House will result in the loss of an intermittent solitary roost site of a single adult male.

7.212a2 Phase 2 mitigation area: The creation of the Phase 2 mitigation areas will not represent the loss of any known roosts or flight lines of Bechstein's bats. The coniferous woodland habitat to be removed to create the proposed mitigation area for Phase 2 works is not suitable for this species and would not be a foraging area for this species. The broadleaf woodland creation would be beneficial for this species.

7.212b2 Phase 3 - Habitat severance and traffic collision risk: Only two individual Bechstein's have been identified across all the surveys of the Northern Quarter site. There is not a maternity colony on or near the site (or breeding females would have been caught) and there are no key flyways for this species on the site. Given the very low population, absence of any maternity roost near the site and species behaviour which forage close to the roost sites no collision risk or habitat severance is predicted.

Barbastelle bat

7.212c2 The Barbastelle is protected as a European Protected Species under the Conservation of Habitats and Species Regulations 2010.

7.212d2 Barbastelle bats are woodland specialists with a quiet echolocation call. Barbastelle bats have been recorded present across the Northern Quarter. However, the number of detections has been very low from all survey techniques deployed in the AEWC 2013 surveys. Transect surveys identified only 18 recordings of Barbastelle bats at the Northern Quarter during the entire 2013 summer period representing 0.6% of all species recordings. The static loggers recorded 12 recordings of Barbastelle bats, less than 0.01% of all species recordings. The fixed point count did record a total of 13 Barbastelle recordings. 9 of these recordings were all recorded from one location during 4 of the 6 months of surveys around the Bath House and Northern United access track junction. The majority of Transect recordings were also recorded at this location (see AEWC Bat report figure 47) with no bats recorded in the southern area of the Northern Quarter.

7.212e2 Previous surveys by Kestrel Wildlife Consultants (2011) are consistent with the 2013 survey data with a very low number of Barbastelle recordings. 31 bats were recorded from transects and 15 recordings from loggers (0.7%). A number of recordings were also taken around the Bath House/access track junction area.

7.212f2 Trapping surveys by AEWC during 2013 only caught one single individual adult male Barbastelle bat in early June. The low number of occurrences of this species on the site and the capture of only a solitary adult male indicates that there is not a maternity

colony on or near the site and the Northern Quarter does not represent a core foraging area for a colony. The surveys indicate that the area is used by the odd individual and indicates that this may commute through the site around the Bath House and corner of Hawkwell Inclosure.

7.212g2 Phase 1 development area: The development of Phase 1 will not represent the loss of any known roosts or likely flightlines of Barbastelle bats. This area has not been identified as a core foraging area for this species with only one recording from a transect survey.

7.212h2 Phase 1 mitigation area: The creation of the Phase 1 mitigation area will not represent the loss of any known roosts, flightlines or foraging areas for Barbastelle bats. No Barbastelle bats have been identified in this area during any of the surveys across the site.

7.212i2 Phase 2 development area: There are no known or likely Barbastelle roosts sites across the Phase 2 development area. There are only a low number of Barbastelle recordings across this area and this area only offers sub quality foraging habitat and is not part of the species core foraging area. There is a potential minor flight line for a low number of individuals of this species around the Bath House and Northern United access track junction.

7.212j2 Phase 2 mitigation area: The creation of the Phase 2 mitigation areas will not represent the loss of any known roosts, flight lines or foraging areas for Barbastelle bats. No Barbastelle bats have been identified in this area during any of the surveys across the site.

7.212k2 Phase 3 - Habitat severance and traffic collision risk: The number of Barbastelle bats identified across the Northern Quarter is very low, and only one adult male has been captured indicating that there is not a maternity colony on or near the site. Due to the low numbers of bats present any collision risks is minimal and there will not be severance of core foraging areas from roost sites. Surveys have predominantly identified Barbastelle recordings around the Bath House and Northern United access road junction on more than one occasion, indicating this is a minor commuting route for a low number of individual Barbastelle bats that appear to commute along or through the Hawkwell Inclosure and cross at this location heading south west, however this number is very low.

Pipistrelle Bats

7.212l2 The Pipistrelle bat group includes three species, Common Pipistrelle, Soprano Pipistrelle and Nathusius Pipistrelle. All species have been identified present on the site. All

are protected as a European Protected Species under the Conservation of Habitats and Species Regulations 2010.

7.212m2 The Common Pipistrelle is the most common species in the UK and utilises a wide variety of habitats including woodland and woodland edges. Soprano Pipistrelle bats have a high affinity with water and are more commonly found around and near water bodies. Nathusius Pipistrelle bats are rarer in the UK but also have a high affinity with large water bodies.

7.212n2 Pipistrelle bats have been recorded across the whole Northern Quarter site during the 2013 surveys, indeed the vast majority of all recordings were identified as Pipistrelle species. Approximately 75% of all transect recordings, (Common Pipistrelle 57%, Soprano Pipistrelle 15% and Nathusius Pipistrelle 1%) were identified as Pipistrelle species. These results were replicated by the static logger results which also identified approximately 75% of all recordings as Pipistrelle species with the majority being Common Pipistrelle and less than 0.1% being Nathusius Pipistrelle.

7.212o2 It was noted that a very high number of the Common Pipistrelle recordings were loud, easily recorded social calls resulting in this species being over recorded. There were only 30 Nathusius Pipistrelle recordings, 5 from static loggers and 25 from transects surveys, of which 21 were all recorded on one transect in one night. The total number of Nathusius Pipistrelle recordings is considered very low, especially for a louder species.

7.212p2 The 2011 Kestrel Wildlife Consultants surveys are consistent with the 2013 survey data, where 69% of the transects' recordings were identified as Pipistrelle species and 77.5% of static loggers' recordings were identified as Pipistrelle species. Although a higher proportion of recordings were identified as Common Pipistrelle, with fewer Soprano Pipistrelle bats recorded, the 2011 surveys did not cover as many of the water bodies as the 2013 surveys in the transect surveys. The 2011 surveys did not identify any Nathusius Pipistrelle bats present.

7.212q2 The trapping surveys caught a total of 20 Common Pipistrelle bats, however only one of these was identified as a breeding female, indicating that there is not a maternity colony on or in close proximity to the site and that the site is a sub quality foraging area for this species and utilised predominantly by males.

7.212r2 A total of 44 Soprano Pipistrelle bats were caught, of which half were adult females. The surveys have not identified a maternity colony on the Northern Quarter site but the presence of females indicate that there is a maternity colony locally.

7.212s2 No Nathusius Pipistrelle bats have been caught during the surveys.

7.212t2 The activity surveys on the buildings have identified that there are a low number of odd individual Pipistrelle bats using the three buildings as a roost within Northern United. Surveys have identified a peak count of 2 using the Office Building (Building G), 2 using the Canteen Building (Building C) and 3 using the Bath House (Building H).

7.212u2 Previous surveys by Kestrel Wildlife Consultants in 2011 did not identify any Pipistrelle bats using any of these buildings during the evening emergence and dawn activity surveys.

7.212v2 Phase 1 development area: The development of Phase 1 will not represent the loss of any known roosts of any Pipistrelle species. The number of Nathusius Pipistrelle bats recorded is very low and intermittent. These were identified only in the 2013 survey and no Nathusius Pipistrelle bats were recorded in the 2011 surveys.

7.212w2 Common Pipistrelle bats are the most commonly recorded, but the trapping shows that the majority of the individuals are males, with only one breeding female caught, demonstrating that this area is sub quality habitat for this species and is unlikely to represent the core foraging habitat for a breeding colony. With the absence of any main breeding colony on or near the site, this will not impact any known or likely flight lines.

7.212x2 Soprano Pipistrelle bats were the second most recorded species, and were recorded across the site, but predominantly around water, as a favoured habitat for this species. This was the most common species caught across the site, partly due to the higher concentrations of this species around water bodies and half of the individuals were adult females. All of the water bodies will be retained but the loss of habitat adjacent to the lake includes are used by this species. No flight lines have been confirmed for this species which will be lost by the development, likely because any roost site may not be on or near the Northern Quarter site.

7.212y2 Phase 1 mitigation area: The creation of the Phase 1 mitigation area will not represent the loss of any known roosts or associated flight lines of any Pipistrelle species. The loss of conifer habitat, which is considered sub quality habitat for all three Pipistrelle

species, the opening up of dense conifer could be considered a positive impact on foraging availability.

7.212z2 Phase 2 development area: This will have an impact on the roost sites of a low number of individual Common Pipistrelle bats roosting within the buildings on the Northern United compound. These were identified during the 2013 surveys but no Pipistrelle bats were found during the 2011 emergence surveys. These are all occasional intermittent roosts used by low numbers of odd individuals and is not a roost site for a maternity colony of these species.

7.212a3 The development of Phase 2 will not impact any known or likely flight lines of any of the Pipistrelle species. Nathusius bats are exceptionally rare and only intermittently recorded on the site. Common Pipistrelle bats are identified as most predominantly male and Soprano Pipistrelle bats have no identified commuting routes likely because the roost is not on or near the Northern Quarter.

7.212b3 Pipistrelle bats utilise a very wide variety of habitats and the development of Phase 2 includes some sub quality habitat used by these species, as with the development of Phase 1. All the water bodies will remain as the core foraging area for Soprano Pipistrelle bats so any loss of core foraging for this species is retained.

7.212c3 Phase 2 mitigation area: The creation of the Phase 2 mitigation area will not represent the loss of any known roosts or associated flight lines of any Pipistrelle species. The loss of conifer habitat, which is considered sub quality habitat for all three Pipistrelle species, does not represent any negative impact on this species and the opening up of dense conifer could be considered improving foraging availability.

7.212d3 Phase 3 Habitat severance and traffic collision risk: The creation of the spine road will not represent a barrier to Pipistrelle bats' movement as this species regularly moves through open areas. There are no key commuting routes for these species identified so there is no high risk of traffic collision. Pipistrelle bats forage over a wide variety of habitats including linear features and open areas as well as within woodland and so the use of the road at night may create a minor risk of mortality by collisions with traffic along its length.

Myotis/Long-eared Bats

7.212e3 All Myotis bats are protected as a European Protected Species under the Conservation of Habitats and Species Regulations 2010.

7.212f3 The Myotis genus includes 6 breeding species in the UK (Natterer's, Daubenton's, Whiskered, Alcathoe, Brandt's and Bechstein's) and the Long-eared bats two species (Brown Long-eared and Grey Long-eared). The Bechstein's bat is not included in this assessment as it is already assessed above. For the long-eared, it is assumed that all long-eared bats are Brown Long-eared as this is not only by far the most common species but this area of the country is not identified as part of the Grey Long-eared species range and the local area is not considered suitable habitat for this species.

7.212g3 These species are grouped together as many of them exhibit the same foraging and flight behaviour and characteristics and many of these species cannot and have not been separated to species level through the various surveys of the site.

7.212h3 Trapping surveys have confirmed that the species present on the site include Brown Long-eared, Natterer's, Daubenton's, Brandt's and Whiskered. No Alcathoe have been identified in the area and all dropping samples collected from all small Myotis bats have come back as the species they were identified as in the field. A national Small Myotis Survey conducted throughout 2013 has indicated that Alcathoe bats may have a notably reduced range and this species has not been identified anywhere in this area of the country.

7.212i3 The trapping surveys caught a number of individuals of Brown Long-eared and Myotis species throughout the Northern Quarter, however the vast majority of all bats were males with only Natterer's bats identified breeding locally and a roost identified to the south off the site.

7.212j3 Most of the Myotis and Long-eared bats use woodland and woodland edges, with a number of small Myotis bats using dense scrub habitat for foraging, with Daubenton's bats specialising in foraging over water, but also commonly within woodland. Natterer's bats will also commonly forage in more open grassland or pasture habitat.

7.212k3 The detector surveys have identified Myotis bats and Brown Long-eared bats present across the Northern Quarter, which is not surprising as this includes 6 species confirmed present on the site and 5 of these species are all considered widespread and relatively common. The transect surveys and static logger surveys in 2013 found that Myotis and Brown Long-eared bats made up less than 15% of all the recordings identified across the site. This is considered to be very low given it is made up of 6 species. This is similar to the Kestrel Wildlife Consultants 2011 surveys where approximately 15% of recordings were identified as Myotis or Long-eared bats.

7.212l3 Phase 1 development area: The development of Phase 1 will not represent the loss of any known or likely roosts of any Myotis or Brown Long-eared bats and will not impact any known flight lines. Only males have been identified on the site for Whiskered, Brandt's, Daubenton's and Brown Long-eared, indicating there are no local maternity colonies that commute to or through the site and the Natterer's colony is 1.5km to the south of the site. The development of Phase 1 will represent a minor loss of foraging area for these species, however none of this area forms the core foraging area for a breeding colony for any of these species.

7.212m3 Phase 1 mitigation area: The creation of the Phase 1 mitigation area will not represent the loss of any known roosts or associated flight lines of any Myotis or Brown Long-eared bats. The conifer woodland is not considered suitable foraging habitat for any of the species and as such the loss of this will not impact the core foraging habitat of a breeding colony of any species. However, this is in foraging range of the Natterer's bat colony and the radio tagged individual did spend some time foraging in this area, although it is not its core foraging area.

7.212n3 Phase 2 development area: This will have an impact on the roost sites of a low number of individuals roosting within the buildings on the Northern United compound. These were identified during the 2013 surveys as individual Brown Long-eared bats, identified roosting within the Bath House building, and the 2011 Kestrel Wildlife Consultants surveys which identified one unidentified Myotis bat and two Brown Long-eared bats emerge from the Office Building. These roosts are occasional or intermittent roosts for solitary individuals and are not maternity roosts and the roost loss would therefore be no more than a very minor negative impact on these individuals, but would not have a negative effect on the species locally.

7.212o3 There are no known flight lines through the Phase 2 development area, no maternity roosts have been identified on or adjacent to the Northern Quarter and for most of the Myotis species and Brown Long-eared bats, only males have been identified indicating there is not a maternity colony locally with commuting bats and the site does not form part of the core foraging area for these species.

7.212p3 A maternity colony of Natterer's bats has been identified 1.5km to the south of the Phase 2 works. Trapping across the site did catch twelve Natterer's bats throughout the Northern Quarter. However, all females caught were in the southern half of the Northern Quarter south of the lake, and only adult males were caught in the northern half indicating

there may be a natural division of the colony's foraging area only utilising the more suitable southern areas.

7.212q3 The Phase 2 development will have a potential negative impact on individuals utilising these areas for foraging or passing through these areas but will not have a negative impact on the species locally and is sufficiently far enough from the Natterer's maternity colony not to have a negative impact on this colony.

7.212r3 Phase 2 mitigation area: The creation of the Phase 2 mitigation areas will not represent the loss of any known roosts or associated flight lines of any Myotis or Brown Long-eared bats. The conifer woodland is not considered suitable foraging habitat for any of the species and as such the loss of this will not impact the core foraging habitat of a breeding colony of any species. The woodland creation and enhancement is considered to be a benefit for most species.

7.212s3 Phase 3 Habitat severance and traffic collision risk: The creation of the spine road does not intersect any locations identified as or considered likely to be main commuting routes for any Myotis bats or Brown Long-eared bats. No maternity roosts are known on or adjacent to the site and as such the spine road will not act as a barrier to any maternity colonies dispersing through the site and will not sever connectivity to any foraging areas. Most Myotis bats, and Brown Long-eared bats predominantly forage in woodland areas and such foraging bats are unlikely to come into contact with traffic so as to pose a collision risk, and so, any risk of mortality / injury of these species is considered low.

7.212t3 Given that there are no colonies locally which will need to commute through this area and most of these species forage predominately in woodland, the number of bats regularly crossing the spine road is considered to be very low and any risk of mortality or injury is considered to be very low.

Big Bats - Nyctalus and Serotine Bats

7.212u3 Both these groups of bat are protected as a European Protected Species under the Conservation of Habitats and Species Regulations 2010.

7.212v3 The Nyctalus genus include 2 species, Noctule and Leisler's bats. These two species are grouped together as they are very similar and exhibit similar behaviours and have overlapping echolocation calls, making it difficult to tell these species apart. The Nyctalus bats are also grouped with Serotine bats as many Serotine and Leisler's calls overlap each

other making it difficult to tell apart and Serotine bats are large, open space foraging species like the Nyctalus bats.

7.212w3 The 2013 trapping surveys have only caught 2 Noctule bats, one female and one male, which is considered exceptionally low capture rate for a species that is common and widespread and commonly caught trapping.

7.212x3 The 2013 detector surveys only identified low numbers of all these bats combined. The static loggers only identified approximately 2.5% of all three species combined however, there was only 1 recording (0.01%) identified as most likely Serotine bat and 14 (0.08%) as Leisler's, with a further 13 calls overlapping the characteristics of these two species. The number of recordings identified of these two species is exceptionally low.

7.212y3 These are similar findings to the 2011 Kestrel Wildlife Consultant's findings where static loggers identified 4 Leisler's and 6 Serotine recordings, 0.2 and 0.3% of all calls respectively.

7.212z3 The 2013 transect surveys only identified 65 recordings of all three species making only 2.5% of all recordings taken and the 2011 transect surveys only identified 26 recordings, approximately 3% of all recordings

7.212a4 Noctule, Leisler's and Serotine bats are all larger, louder, and higher and open flying species that are regularly and easily recorded and identified on detector surveys, unlike Myotis and Long-eared species. The very low number of recordings taken from surveys across the site indicates that there is only a very low population present, as identified from the trapping surveys. Especially in the case of Leisler's and Serotine bats where there have only been odd individual recordings.

7.212b4 During the surveys a maternity roost of Noctule bats was identified within woodland approximately 3km to the south west of the Northern Quarter.

7.212c4 The surveys indicate that the Northern Quarter is used by only a very low number of individual Noctule bats and is not part of the core foraging area for this species, and is only used or visited by an odd individual Leisler's or Serotine bat and there are no maternity colonies of these species in this area.

7.212d4 Phase 1 development area: The development of Phase 1 will not represent the loss of any known roosts or associated flight lines of any Nyctalus or Serotine bats and this area is not identified as a key foraging area for this species.

7.212e4 Phase 1 mitigation area: The creation of the Phase 1 mitigation area will not represent the loss of any known roosts or associated flight lines of any Nyctalus or Serotine bats and this area is not identified as a key foraging area for this species. The loss of conifer habitat and creation of more open areas will rather be beneficial for these species.

7.212f4 Phase 2 development area: The development of Phase 2 will not affect any known roosts or associated flight lines of any Nyctalus or Serotine bats and this area is not identified as a key foraging area for this species.

7.212g4 Phase 2 mitigation area: The creation of the Phase 2 mitigation areas will not represent the loss of any known roosts or associated flight lines of any Nyctalus or Serotine bats and these areas are not identified as key foraging areas for this species, so the Phase 2 mitigation will not have any negative impact on these species. The loss of conifer habitat and creation of more open areas and broadleaf woodland will rather be beneficial for these species.

7.212h4 Phase 3 - Habitat severance and traffic collision risk: The Nyctalus and Serotine bats are high flying and will readily forage and cross large open areas. As such the bats will readily cross the open road development. The numbers of bats identified throughout the site is very low and the flight characteristics of the species mean it is highly unlikely that this species will come into contact with any night time traffic. Any mortality as a result of unmitigated traffic collision is considered negligible.

Dormice

7.213 No dormice were found in the nest tubes or boxes and no signs of dormouse, such as feeding remains (including nuts) or nests were found during the 2007/2008 Entec surveys. Given the survey effort achieved, Entec therefore considered it reasonable to conclude that dormouse was not present within the survey area.

Johns Associates

7.214 No signs of dormouse were recorded during surveys carried out by Johns Associates up to October 2012. When Dr Claire Dowding of Natural England visited the wider Northern Quarter area on 1 November 2012 she found a dormouse and dormouse nest in one of the previously-erected dormouse boxes. Johns Associates was notified of this find on 22 November 2012 and initiated a further full check of the nest tubes and nest boxes on the 22nd and 23rd of November (by a licensed dormouse surveyor, Matt Johns, Natural England licence no. 20122170), the Natural England finding of 1 November 2012 was confirmed

and two other dormouse nests were discovered in tubes (immediately to the east of the former Northern United colliery and to the south west as shown on confirming the presence of a dormouse population associated with this woodland and scrub habitat).

7.215 The 2012 survey results have demonstrated the presence of dormice associated with woodland and scrub habitat immediately adjacent to the Northern United area of the site.

7.216 However, recent Natural England advice with respect to nest tube surveys states that: '*Once detected dormouse should be assumed to be present in all suitable habitat on site, unless there are effective barriers to movement and an adequate survey has been completed on both sides of the site'*. (Interim Natural England Advice Note, December 2011). This approach is adopted here and since there are no barriers to movement around the Northern Quarter, dormice are assumed to be present in all suitable habitats within it.

7.217 The area that supports the recorded population of dormice around Northern United is contiguous with habitat in the proposed college site and spine road areas. There are areas of habitat between the two that are of much greater value for dormice including species rich scrub and mature broad-leaved woodland.

7.218 Dormouse habitat within the survey area is directly connected to contiguous woodland around it which is part of the Forest of Dean (63 km² in total). Thus there is potential for a large viable overall dormouse population to be present across this wider area.

7.219 Whilst the European level of protection that is afforded to dormice is recognised, the habitats present within the Northern Quarter and the population these support is not considered to be of core importance to the wider dormouse population and as such is of medium value.

Otters

7.220 Surveys undertaken by Entec in 2008 found a single Otter spraint on a rock adjacent to the smaller water-body connected to the large fishing lake. No further evidence was found during any of the other 2008 surveys despite the presence of good foraging habitat and vegetation cover. It is considered that this is due to the large size of Otter territories and the level of regular disturbance by members of the public and dogs reducing the likelihood of use. Further surveys were undertaken by Atkins in 2012 during which no

evidence of Otter activity was found although it was still noted that the site was likely to form part of an Otter territory given the habitats present.

7.221 These surveys were repeated in 2013 by TACP during which no evidence of Otter activity was found despite the presence of suitable habitat and foraging areas. It is still considered likely that Otters use the Northern Quarter infrequently and that this use is reduced by the level and frequency of disturbance by members of the public.

7.222 Whilst the European level of protection that is afforded to Otters is recognised, the habitats present within the Northern Quarter and the population these support is not considered to be of core importance to the wider Otter population, particularly given the lack of activity despite repeated surveys. As such the value of this receptor is given as 'lower value'.

Water Vole

7.223 Surveys undertaken by Entec in 2008 highlighted that the large fishing lake and other water-bodies within the survey area provide suitable burrow and nesting habitat for Water Voles although no evidence was found during the surveys. Atkins undertook further surveys in 2012 during which again no evidence of Water Vole activity was found.

7.224 These surveys were repeated in 2013 by TACP during which again no evidence of Water Voles was found despite the suitability of the habitats present.

7.225 The habitats present within the Northern Quarter and the Water Vole population that these support is not considered to be of core importance to the wider population, particularly given the lack of activity despite repeated surveys. As such the value of this receptor is given as 'lower value'.

Badger

7.226 Entec undertook a full survey in 2008 of the survey area and adjacent area during which no definitive evidence of Badger was recorded although numerous tracks were recorded in the Hawkwell Inclosure that could have been used by Badgers but which appeared to be predominantly used by deer and Wild Boar. Old, collapsed holes were also noted in Hawkwell Inclosure, however they were clearly disused to the extent that it was not possible to determine whether they were old Badger setts.

7.227 A search of the survey area and adjacent areas was undertaken by Johns Associates for evidence of Badger activity during the 2012 Extended Phase 1 Habitat survey. These

searches were repeated during the 2013 habitat and other surveys undertaken by TACP in 2013. No evidence was found during either of these searches. However, this is a widespread and common species which is considered likely to make use of suitable habitat areas on site (e.g. areas of woodland, grassland and scrub) at certain times of the year.

7.228 Forestry Commission provided information of a Badger sett within the Linear Park area in early 2014 which was then surveyed and found to be disused with evidence of rabbit activity. It was also noted that a number of the tunnels appear to have partially collapsed or narrowed significantly suggesting that the sett had not been used Badgers for some time. All construction and mitigation areas will be re-surveyed for active setts prior to works being undertaken.

7.229 Badgers are protected for animal welfare, rather than conservation reasons, and although they are only potentially present within the Northern Quarter this is a widespread species within the Forest of Dean and as such the value of this receptor is considered to be lower value.

Breeding Birds

7.230 During the 2008 Entec surveys a total of 5 Red List species were recorded (Bullfinch, House Sparrow, Linnet, Reed Bunting and Song Thrush), all of which were thought to be breeding within the survey area. Crossbill was the only WCA Schedule 1 species recorded within the survey area but was not thought to be breeding. Nightjar was also recorded during the July 2008 survey within the plantation adjacent to Northern United, although again this species was not considered to be breeding on site. These surveys also recorded 12 Amber List species including Cuckoo, Dunnock, Willow Warbler, Robin, Wren, Goldcrest, Chiffchaff and Blackbird.

7.231 Atkins undertook further breeding bird surveys in 2012 recording a total of 58 bird species including 2 species listed on Schedule 1 of the WCA 1981 (as amended), namely Crossbill and Kingfisher although only Crossbill was considered likely to breed on site. A number of Red List species were recorded and considered to be breeding on site including House Sparrow, Linnet, Lesser Redpoll, Nightjar, Starling, Song Thrush and Tree Pipit. A number of breeding Amber List species were also recorded including Bullfinch, Dunnock, Kestrel, Kingfisher, Mistle Thrush, Mallard, Reed Bunting, Common Redstart, Stock Dove, Swallow, House Martin, Tufted Duck, Whitethroat, Willow Warbler and Woodcock. Anecdotal information confirmed the presence of significant numbers of Hawfinch within the site,

particularly around Dam Green/the Brickworks. Goshawk has also been reported breeding in the wider area.

7.232 Johns Associates undertook further breeding bird surveys in 2013 during which a total of 63 were recorded (Appendix 7.5), including:

- 10 species of conservation concern included on the Red List: (Nightjar, Marsh Tit, Willow Tit, Song Thrush, Wood Warbler, Hawfinch, Lesser Redpoll, House Sparrow, Starling and Tree Pipit);
- 21 species of conservation concern included on the Amber List: (Dunnock, Cormorant, Mallard, Tufted Duck, Kestrel, Red Kite, Woodcock, Black-headed Gull, Lesser Black-backed Gull, Stock Dove, Green Woodpecker, Sand Martin, Swallow, Meadow Pipit, Common Redstart, Mistle Thrush, Chiffchaff, Willow Warbler, Whitethroat, Goldcrest and Bullfinch);
- 2 species listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended): Goshawk and Red Kite;
- 12 species listed as priorities within the UK BAP and listed under the NERC Act Section 41: Nightjar, Tree Pipit, Dunnock, Song Thrush, Bullfinch, Wood Warbler, Marsh Tit, Willow Tit, Starling, House Sparrow, Lesser Redpoll and Hawfinch;
- 13 species listed on the Gloucestershire BAP: Woodcock, Nightjar, Tree Pipit, Song Thrush, Dunnock, Wood Warbler, Marsh Tit, Willow Tit, Starling, House Sparrow, Lesser Redpoll, Hawfinch and Bullfinch.

7.233 Given the presence of breeding Hawfinch, Woodcock and Willow Tit and the presence of non-breeding Nightjar the woodland breeding bird assemblage associated with the Northern Quarter site is considered to be of~~, at least,~~ a mediumlower ecological value.

Reptiles

7.234 Previous surveys undertaken by Entec in 2008 across the Northern Quarter area found that the site supported Grass Snake, Common Lizard, Adder and Slow-worm including juveniles of the latter three species indicating that these species were breeding on site. Further surveys were undertaken in 2012 by Johns Associates in relation to the Northern United and Forest Vale areas. These surveys confirmed the presence of all four of these species within Northern United with Slow-worm and Common Lizard confirmed to be breeding but only Slow-worm and Common Lizard at Forest Vale only the latter of which was confirmed to be breeding in this area.

7.235 Further surveys were undertaken by TACP in August and September 2013 across the Northern Quarter. These surveys confirmed the presence of Common Lizard and Slow-worm, both of which were confirmed to be breeding. No Grass Snake or Adder were recorded during these surveys although there have been no significant changes in the habitats present on site therefore it is considered that these species would still be present.

7.236 Due to the number of species present and the potential size of the populations, the reptile interest of the Northern Quarter site is considered to be of a medium ecological value.

Amphibians including GCN

7.237 The presence/absence and population class assessment surveys undertaken by Entec in 2008 confirmed that Great Crested Newts were present in seven of the eighteen ponds surveyed with a peak count of 64, representing a medium population class size. Further surveys were undertaken in 2012 by Johns Associates confirming the presence of Great Crested Newts in four of the eleven ponds surveyed with breeding confirmed in two of these ponds. Atkins also undertook surveys in 2012 on seven other ponds on site confirming GCN presence in three of these, including evidence of breeding in two ponds.

7.238 Johns Associates undertook further surveys across the site in 2013 with presence/absence and population class assessment surveys undertaken on a total of 33 ponds (refer to Appendix 7.6). Great Crested Newts were confirmed in seventeen ponds and breeding in nine ponds with a peak count of 76 across the survey area as a whole. It is considered that there are two populations within the survey area: the medium population class to the eastern part of the survey area and the small population class to the western part of the survey area (refer to the Pond Location Figures with Appendix 7.6). However given the close proximity of these it is considered that there is genetic and individual exchange between these two populations, creating a larger meta-population.

7.239 Given the size of the Great Crested Newt population associated with the AAP area, the qualitative importance of this population as a breeding population, the higher than normal population class for the area and the European protection afforded this species, this feature is considered to have very high ecological value.

7.240 These surveys also confirmed the presence of Smooth and Palmate Newts (both confirmed to be breeding with juveniles found), Common Frog and Common Toad within the survey area.

7.241 The amphibian populations (excluding Great Crested Newt) present within the survey area are considered to be of lower ecological value given the widespread nature of all four of these species.

White Clawed Crayfish

7.242 The presence/absence surveys undertaken by Atkins in relation to the Forest Vale Junction in 2012 did not find any evidence of White Clawed Crayfish. It was noted that the Old Engine Brook supported suitable crayfish habitat, although this was outside the 2012 survey area.

7.243 Surveys undertaken in 2013 confirmed that the crayfish potential remains along Old Engine Brook. Further surveys, including manual searches and frugal use of traps, will be undertaken along both Old Engine Brook and Cinderford Brook in July 2014 (surveys must take place ideally between July and September) to determine presence/absence. As explained above at paragraph 7.83, it is assumed for the purpose of this present Environmental Statement that crayfish are present within all suitable watercourses.

7.244 ~~Whilst thet~~The domestic ~~European~~ level of protection that is afforded to White-clawed Crayfish and its inclusion as a section 41 species is recognised along with the potential habitats present within the Northern Quarter. On this basis, together with the assumption above that white clawed crayfish are present in suitable watercourses, this species ~~the lack of evidence of this species reduces this value and as such~~ is considered to be of medium value.

Invertebrates

7.245 A total of 1,440 species were recorded, with no legally protected species being found (refer to Appendix 7.7 for full report). Provisional designations suggest that within the identified species, 6 are Red Data Book, 43 are nationally scarce and 164 are local. One butterfly located within the survey area is classed as Endangered, 2 are vulnerable and 1 is near threatened. These four butterflies are UK BAP species and 32 of the macro-moths present are BAP (R). A total of 53 species were recorded which have a high conservation status designation.

7.246 The large number of species recorded during the surveys, (1,440) were divided into separate areas, Area A (843), Area B (710), Area C (561), Area D (728). The relevant habitat features present on site for invertebrates are noted below:

- Stands of mature, semi-mature broadleaved, mixed and coniferous woodland;
- Woodland edges and rides;
- Open semi-improved tall neutral grassland, willow and alder scrub;
- Marsh and carr/damp woodland, swamp and ponds with riparian edges;
- Damp low-lying pasture; and
- Medium/ short dry grassland, including brownfield.

7.247 The extensive size of the survey area (105 Ha) and the complexity of the semi-natural habitats within the site reflects the 1,440 species found and recorded during the surveys. The majority of the significant species were located within broadleaved woodland. However there are also notable important habitat features which include woodland edges, scrub, rough grassland and wetlands. There are two habitats on site which have low value and these are coniferous woodland and poor lowland pasture.

7.248 Previous invertebrate surveys carried out in 2007 and 2012, differed in methodology to the 2013 survey and also covered a smaller area and therefore are not comparable. The previous surveys provide useful supplementary information, as the 2013 survey did not record some of the species noted in 2007/2012, however these species may still be present within the site, although not recorded.

7.249 The 2007 results were compiled from limited fieldwork carried out in late September. 324 species were recorded in total, including 1 Red Data Book species and 5 which are Nationally Scarce. Although since the 2007 survey, these Nationally Scarce species have been downgraded to Local level significance.

7.250 The 2012 survey included fieldwork from May-September; however species coverage suffered from suppressed numbers due to an exceptionally wet summer. In total, 443 species were recorded, with no Red Data Book species present, 4 Nationally Scarce Species, 17 Local, no UK BAP species and 11 BAP (R) moths. As a similarity to the 2007 survey, 2 of the Nationally Scarce species have been downgraded to Local significance.

7.251 No legally protected species were found and some of the Red Data Book species should or will be reduced, despite remaining uncommon. However other species present are in decline therefore it is considered that the invertebrate communities supported by the survey area are of medium ecological value.

Potential Effects

7.252 The proposed development at the Hybrid Application Site will be constructed and come online in three distinct phases. The month / year dates set out below in relation to each phase are based on an assumption that planning permission is granted in the late summer of 2014. Further dates provided in this chapter are also based on this assumption. If granting of planning permission is for any reason delayed then clearly the dates provided will alter. However the overall conclusions of the assessment provided in this chapter will remain valid as long as the seasonal constraints detailed are adhered to;

Phase 1 (intended completion date of August 2015)

- Construction of the spine road from Broadmoor Road, including alterations to the junction arrangements (known as Forest Vale), to the college plot;
- Construction of the college and associated car parking, landscaping, access and lighting; and
- Habitat creation and enhancement works within the identified phase 1 mitigation areas to the south and south west of the Hybrid Application Site as shown on Figures 7.5 and 7.6 (included within the assessment below to ensure that impacts from these works are given due consideration). Table 7.3.1b below also provides wherever possible the areas of loss, creation and enhancement of the various relevant habitat types during phase 1, both in relation to phase 1 development and phase 1 mitigation.

Phase 2 (2015 - 2025)

- Operation of the college and first part of the spine road as described above;
- Construction of the spine road from the college plot to the A4136, including alterations to the junction arrangements with the A4136 (known as Northern United);
- Construction of the remaining development plots;
- Habitat creation and enhancement works within the identified phase 2 mitigation areas to the west, south and north of the Hybrid Application Site as shown on Figure 7.5. Figure 7.5 clearly delineates the mitigation areas identified for the aspects of phase 2 for which full planning permission is sought (i.e. construction of the spine road from the college to the A4136) i.e. "detailed permission Phase 2 mitigation areas". Mitigation areas in respect of the aspects of phase 2 for which outline permission only

is sought are shown as "outline permission Phase 2 mitigation areas" on Figure 7.5. Table 7.3.1b below also provides, wherever possible, the areas of loss, creation and enhancement of the various relevant habitat types arising from both development and creation of the mitigation land for (i) Phase 2 detailed permission development; and (ii) Phase 2 outline permission development. ~~(due to uncertainties with regard to the extent of the Phase 2 mitigation areas , the exact location of the Phase 2 mitigation works and timetable of such works it has not been possible to assess quantitatively in the second "Potential effects" table below the likely impacts of creating the Phase 2 mitigation on the various habitat types listed in the tables (whereas this has been undertaken for Phase 1). However qualitative impacts from the creation of the Phase 2 mitigation areas on protected species are considered in the tables as far as possible given current information~~.

Phase 3 (2025 thereafter)

- Whole site operational.

7.253 Key for Characterisation of Impacts used in the three Impact tables below:

- SI (sign) – positive (beneficial (+ve)) or negative (adverse (-ve))
- PO (probability of occurring) – certain, probable, unlikely
- CO (complexity) – direct, indirect, cumulative
- EC (extent) – area/population measures and percentage of total (e.g. area of habitat/numbers lost). The notes here must be read together with Table 7.3.1b. It should be noted that it is not possible to provide hectarage in the three Impact tables or in Table 7.3.1b for certain habitat types (and hence these entries are marked N/A on Table 7.3.1b). This is due to their scattered nature (e.g. scattered broad leaved trees) and/or small scale nature (e.g. spoil, ditches and heath). It is also not possible to provide in the three Impact tables specific habitat losses for certain species and species groups. This is due to their low levels of activity on the site which prevent an accurate determination of detailed habitat use, e.g. Otters, Water Voles, and Badgers. More detailed information on the habitat use by breeding birds was not obtained during the surveys due to the potential for disturbing these species in order to record such information.
- SZ (size) – description of the level of severity of influence

- RE (reversibility) – reversible or not reversible (and whether or not this is planned)
- DU (duration) – permanent or temporary in ecological terms (where differing timescale are required due to life cycles etc. these will be defined)
- TF (timing and frequency) – important seasonal and/or life cycle constraints and relationship with frequency

Approach to Predicting Effects on Ecological Receptors

7.254 The likely effects of the various phases of the Hybrid Application are described below, in relation to each of the ecological receptors described above. It is important to note that, although potential impacts are identified below in the absence of mitigation measures, the iterative design process by which the Hybrid Application has been developed means that potential impacts have been avoided and minimised where possible in order to design the Scheme as described in this ES (refer to Section 7.6). Following the three Impact tables below, this chapter goes on to describe the proposed mitigation in respect of the relevant impacts. Where necessary, the mitigation commentary explains in more detail how the relevant impact assessment in the Tables has been arrived at.

Construction Impacts

7.255 Predicted impacts during construction (phase 1 and part of phase 2) vary in their detailed characterisations between individual ecological receptors, however the predicted impacts fall into several discrete types. Potential direct impacts include loss of habitats as per Table 7.3.1b below, or loss of habitat areas for key species, which would occur as a result of vegetation clearance and topsoil stripping at the start of construction works or during initial habitat creation works within the mitigation areas. Mortality of key species could also occur during these works, if individuals are present within the construction/mitigation boundaries when the vegetation clearance and topsoil stripping take place.

Notes to Table 7.3.1b:

7.255a This Table 7.3.1b is based on the phase 1 mitigation areas, the phase 2 detailed planning mitigation areas and the phase 2 outline permission mitigation areas shown on Figure 7.5.

7.255b For each phase of the proposed development at the Hybrid Application Site the habitat loss areas, habitat creation areas (those areas that will be clear felled and 'new' habitats created, such as grassland, broad-leaved woodland etc. as detailed within Appendix 7.11) and (where relevant) habitat enhancment areas (those areas where the existing habitats will be retained and ecological improvements made, such as understorey creation and conifer replacement etc. as detailed within Appendix 7.11) are shown.

7.255c This Table does not reflect the further enhancement areas as discussed in paragraphs 7.264 below (these further enhancement areas are shown on Figure 7.6 (but not shown on Figure 7.5)).

7.255d A further Table 7.3.1c below shows the total, for each habitat type, of habitat loss, creation and enhancement across all three phases of the proposed development at the Hybrid Application Site, together with the envisaged habitat loss and gain for each habitat type as from Table 4.6 of the Cinderford Northern Quarter Biodiversity Strategy Technical Guidance document (Committee draft May 2014). This enables the reader to see how the habitat loss, habitat creation and habitat enhancement across all three phases of the proposed development compares with that envisaged by Table 4.6 of the Biodiversity Strategy.

7.255e This table shows that the basic principles of the Strategy have been met with more habitat creation and enhancement than habitat losses for broadleaved woodland, semi-improved grassland and ponds. It should be noted that while the open grassland provided within the mitigation areas (Figure 7.5) do not quite meet the total creation area required by the Strategy, the creation of grassland within the areas to the south of the Northern Quarter (Figure 7.6) will meet and exceed this total. The total area for pond replacement has also not been met area for area however given the much lower levels of pond loss (0.02ha rather than 0.3ha) than that predicted within the Strategy it is not considered necessary to meet the area requirement but the ration requirement. This would require 1.6ha of pond creation for every 1ha lost which is currently exceeded by the

creation measures detailed which provides a replacement ratio of 5.8 for every 1ha of pond habitat lost.

Table 7.3.1b: Habitat losses, creation and enhancement associated with each phase of the proposed development at the Hybrid Application Site

-	Phase 1 Development (ha)		Phase 1 Mitigation (ha)			Phase 2 Detailed Permission Development (ha)		Phase 2 Detailed Permission Mitigation (ha)			Phase 2 Outline Permission Development (ha)		Phase 2 Outline Permission Mitigation (ha)			Phase 3 (h	
	Loss	Creation	Loss	Creation	Enhance	Loss	Creation	Loss	Creation	Enhance	Loss	Creation	Loss	Creation	Enhance	Loss	Crea
Buildings and hard standing	0.167	3.567	0	0	0	1.47	4.082	0	0	0	2.43	10.42	0	0	0	N/A	N/
Coniferous plantation woodland	0	0	4.61	0	0	0.49	0	3.75	0	0	0	0	5.25	0	0	N/A	N/
Broad-leaved plantation woodland	0.78	0	0	1.09	0.43	0.84	0.10	0	2.46	0	1.95	0	0	4.71	5.68	N/A	N/
Broad-leaved plantation woodland (temporary)	0.02	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
Mixed plantation woodland (s41 Lowland Mixed Deciduous Woodland Habitat)	0	0	0	0	0	0.27	0	0	0	0	0.81	0	6.79	0	0	N/A	N/

	Phase 1 Development (ha)		Phase 1 Mitigation (ha)			Phase 2 Detailed Permission Development (ha)		Phase 2 Detailed Permission Mitigation (ha)			Phase 2 Outline Permission Development (ha)		Phase 2 Outline Permission Mitigation (ha)			Phase 3 (h	
	Loss	Creation	Loss	Creation	Enhance	Loss	Creation	Loss	Creation	Enhance	Loss	Creation	Loss	Creation	Enhance	Loss	Crea
Scattered Broad-leaved Trees	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
Dense and scattered scrub	0.04	0	0	0	0	0.03	0	0	0	0	0.5	0	0	0	0	N/A	N/
Dense and scattered scrub (temporary)	0.04	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
Semi-improved neutral grassland	1.97	0	0	3.52	1.2	0.98	0	0	1.4	0	4.62	0	0	7.34	0	N/A	N/
Semi-improved neutral grassland (temporary)	0.85	0.85	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
Poor semi-improved grassland	0.61	0	0	0	0	0	0	0	0	0	0.09	0	0	0	0	N/A	N/
Poor semi-improved grassland (temporary)	0.013	0.013	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
Bare ground	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/

	Phase 1 Development (ha)		Phase 1 Mitigation (ha)			Phase 2 Detailed Permission Development (ha)		Phase 2 Detailed Permission Mitigation (ha)			Phase 2 Outline Permission Development (ha)		Phase 2 Outline Permission Mitigation (ha)			Phase 3 (h	
	Loss	Creation	Loss	Creation	Enhance	Loss	Creation	Loss	Creation	Enhance	Loss	Creation	Loss	Creation	Enhance	Loss	Crea
Spoil	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
Heath (s41 Lowland Heath Habitat)	0	0	0	0	0	0.002	0	0	0	0	0	0	0	0	0	N/A	N/
Standing water (s41 Ponds and Rivers Habitat)	0	0	0	0	0.046	0	0	0	0	0.046	0.02	0	0	0	0.024	N/A	N/
Running water (s41 Ponds and Rivers Habitat)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
Ditches	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
Total	**4.49**	**4.49**	**4.61**	**4.61**	**1.676**	**4.082**	**4.182**	**3.75**	**3.86**	**0.046**	**10.42**	**10.42**	**12.04**	**12.05**	**5.704**	**0**	**0**
Total (excluding buildings)	4.323	0.923	4.61	4.61	1.676	2.612	0.10	3.75	3.86	0.046	7.99	0	12.04	12.05	5.704	0	0

Table 7.3.1c: Habitat loss, creation and enhancement by comparison with Table 4.6 of Cinderford Northern Quarter Biodiversity Strategy Technical guidance document

-	Hybrid Application Development		Hybrid Application Mitigation		Hybrid Application Development and Mitigation		Biodiversity Strategy (ha)	
	Loss	Creation and Enhancement	Loss	Creation and Enhancement	Loss	Creation and Enhancement	Loss	Gain
Coniferous plantation woodland	0.49	0	13.61	0	14.1	0	0.22	0
Broad-leaved plantation woodland	3.57	0.55	0	14.37	3.57	14.92	1.76	9.3
Broad-leaved plantation woodland (temporary)	0.02	0.02	0	0	-	-	-	-
Mixed plantation woodland (s41 Lowland Mixed Deciduous Woodland Habitat)	1.08	0	6.79	0	7.87	0	0.31	0
Scattered Broad-leaved Trees	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dense and scattered scrub	0.57	0	0	0	0.57	0	0	0

	Hybrid Application Development		Hybrid Application Mitigation		Hybrid Application Development and Mitigation		Biodiversity Strategy (ha)	
	Loss	Creation and Enhancement	Loss	Creation and Enhancement	Loss	Creation and Enhancement	Loss	Gain
Dense and scattered scrub (temporary)	0.04	0.04	0	0	-	-	-	-
Semi-improved neutral grassland	7.57	0	0	13.46	7.57	13.46	9.02	19.15
Semi-improved neutral grassland (temporary)	0.85	0.85	0	0	-	-	-	-
Poor semi-improved grassland	0.7	0	0	0	0.7	0	0	0
Poor semi-improved grassland (temporary)	0.013	0.013	0	0	-	-	-	-
Bare ground	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spoil	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heath (s41 Lowland Heath Habitat)	0.002	0	0	0	0.002	0	0	0
Standing water (s41 Ponds and Rivers Habitat)	0.02	0	0	0.116	0.02	0.116	0.3	0.48
Running water (s41 Ponds and Rivers Habitat)	0	0	0	0	0	0	0	0
Ditches	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Hybrid Application Development		Hybrid Application Mitigation		Hybrid Application Development and Mitigation		Biodiversity Strategy (ha)	
	Loss	Creation and Enhancement	Loss	Creation and Enhancement	Loss	Creation and Enhancement	Loss	Gain
Total	**14.925**	**1.473**	**20.4**	**27.946**	**34.402**	**28.496**	**11.61**	**28.93**

7.256 Potential indirect impacts include damage to retained habitats adjacent to the construction and potentially mitigation areas through dust deposition during construction or through small-scale disruptions in hydrology (groundwater) caused by earthworks during construction or through mobilisation of contamination during construction. Individuals of key species which are resident in retained habitats close to the construction/mitigation works could be disturbed by activities such as noise, construction site lighting etc, and this could affect breeding success or survival of these species locally. The other main source of potential indirect impacts during construction/mitigation works is the potential for pollution events to affect watercourses crossed by or adjacent to the works, and as a result affect key species and habitats downstream of the pollution incident. There is also the issue of possible traffic increases linked to construction.

Operation Impacts

7.257 Predicted effects on key ecological receptors during operation of phase 1 (included within the phase 2 assessment) and phases 1 and 2 (included within the phase 3 assessment) also vary in their characteristics, but fall into several broad types. Potential direct impacts include the risk of road mortality for a number of species, where these species attempt to cross the Hybrid Application Site developments, particularly the spine road sections (e.g. bats) or in situations where the landscaped areas of the Hybrid Application Site developments, particularly along the spine road, provide habitat for species which are subsequently at risk from road traffic collisions (e.g. bird species), or from routine management of these areas (e.g. reptiles and amphibians).

7.258 The majority of potential effects identified during operation of the Hybrid Application are indirect, including risk of adverse effects from lighting associated with the Hybrid Application Site developments causing disturbance to bats in retained roosts or using identified commuting routes/flyways and to dormice and amphibians (in particular Great Crested Newts) in retained habitats, and the potential for the Hybrid Application Site developments, particularly the spine road, to represent a physical or psychological barrier to key species, and therefore to result in fragmentation of populations.

7.259 Impacts due to ground contamination, air quality changes, hydrology and noise and vibration from on-site construction or operation or from construction-related or operational- related traffic issues are predicted to ~~should~~ be non existent or minimal and limited to the site itself both during the construction and operational phases. Any such impacts will be reduced further following implementation of the mitigation measures

detailed within the relevant chapters and to be included within the Construction Environmental Management Plan (CEMP) which is described in this document in the relevant chapters and which, for Phase 1, is to be submitted to the FoDDC prior to determination of the planning application (refer to the relevant individual Land Quality and Ground Conditions, Transport and Access, Noise and Vibration, Air Quality and Hydrology chapters for more detail).

7.259a In relation to the Severn Estuary SAC, SPA and Ramsar site (9.29 – 9.64km to the southeast of the Hybrid Application Site) and the Walmore Common SPA and Ramsar site (9.12km to the east of the Hybrid Application Site) Forest of Dean District Council has queried the potential impacts on these designated sites from any increased traffic along the A48 and, in the case of the Severn Estuary SAC, SPA and Ramsar site, have also queried the potential for water pollution impacts on the designated sites during construction at the Hybrid Application Site from the Cinderford Brook / Old Engine Brook. These issues are addressed in the three Impact tables below but the points are also summarised here.

7.259b Severn Estuary SAC, SPA and Ramsar site: The Transport chapter 9 predicts that there will be no perceptible impact across the 3 phases on the A48 from traffic related to the Hybrid Application Site, also taking into account potential cumulative impacts. (For the avoidance of doubt (and in response to a specific query raised by Natural England) the Transport chapter 9 does take account of the 20 houses at Steam Mills West which are part of the proposed development at the Hybrid Application Site). The Noise and Vibration chapter (chapter 10) states that there will be an increase in noise of up to 0.5dB along the A48 as a worst case and that this represents an imperceptible change at the Severn Estuary SAC/SPA/Ramsar site. The Air Quality chapter (chapter 11) concludes that there will be no impact from the A48 on the Severn Estuary SAC/SPA/Ramsar site. As such there will be no appreciable effects on the Severn Estuary SAC/SPA/Ramsar site in relation to traffic related noise and air quality from the proposed development, alone or in combination with other plans or projects.

7.259c It is also ~~considered that the proposals will~~ relevant that the A48 is at a significant distance (0.43km) from the nearest point of these sites and the sites are extremely large (73,500ha for the SAC and 24,420ha for the SPA and Ramsar site) so that the A48 is aligned with only 23km of the overall boundaries of 394km for the SAC and 532km for the SPA and Ramsar site, which equates to a tiny proportion of the total perimeter and area of the sites. As such there is no basis for concern regarding negative impacts on the qualifying features of these sites from these matters.

7.259d As regards the concern about water pollution impacts on the ~~designated~~ Severn Estuary SAC, SPA and Ramsar sites during construction (ie via the Cinderford Brook / Old Engine Brook), it is noted that there is no *direct* hydrological link to the designated sites. Although Cinderford Brook does connect *indirectly* to the Severn Estuary and therefore to these designated sites via Blackpool Brook 5.9km to the south, the Hydrology chapter 13 explains that sufficient treatment of potentially contaminated surface water runoff from the Hybrid Application Site will occur naturally in the upstream water courses prior to discharge to the Severn Estuary through dilution, settlement, entrapment, biological treatment and oxygenation. Therefore, no impact is predicted to the Severn Estuary SAC/SPA/Ramsar site. The risk of pollution of the Cinderford Brook / Old Engine Brook will also be avoided through a number of mitigation measures including (during construction) controlling and capturing silt and construction site run off; incorporating interceptors and containment measures for hydrocarbons, oils and other hazardous materials and maintaining safe handling distances away from water bodies; appropriate dust, waste and sewage management; preapration and implementation of a Flood Emergency Response Plan; and (in the operational stage) implementation of SUDS treatment stages and a maintence regime for drainage systems and attenuation of water from the devleopment including an allowance for climate change. There will therefore be no appreciable effects on these sites from hydrological impacts of the proposed development, alone or in combination with other plan or projects.

7.259e It is also noted that hydraulic continuity exists between groundwater and surface water with an inferred flow towards Old Engine Brook/Cinderford Brook (Ground Conditions chapter 6, paragraphs 6.76 and 6.115). However, the Ground Conditions chapter 6 explains that there will be no measurable impact on the Severn Estuary SAC/SPA/Ramsar site due to its distance, hydrologically, from the Hybrid Application Site. The risk of pollution of the Cinderford Brook / Old Engine Brook will also be avoided through a number of mitigation measures including consideration of storage and disposal of groundwater during de-watering activities so as not ~~significantly increase traffic~~ to negatively impact base flows ~~and~~to surface water features, in particular Cinderford Brook. Following mitigation, no residual effects on grounwater are identified.

7.259f ~~In addition, the~~The long distances hydrologically as between Cinderford Brook / Old Engine Brook and these designated sites (approximately 11.2km as along the watercourses themselves and 7.3km as the crow flies), together with the brooks' / rivers' associated ~~disturbance impacts on major routes in the wider area such as the A48.~~dilution effects, means that there is no risk of these designated sites or their qualifying features being

impacted by pollution at the Cinderford Brook / Old Engine Brook. —There will be no appreciable effects on the Severn Estuary SAC/SPA/Ramsar site from hydrological impacts related to the proposed development, alone or in combination with other plan or projects.

7.259g Walmore Common SPA and Ramsar sites: As already noted the Transport chapter 9 predicts that there will be no perceptible impact across the 3 phases on the A48 from traffic related to the Hybrid Application Site, also taking into account potential cumulative impacts. The Noise and Vibration chapter 10 states that there will be an increase in noise of up to 0.5dB along the A48 as a worst case and that this represents an imperceptible change at the Walmore Common SPA/Ramsar site. The Air Quality chapter 11 concludes that there will be imperceptible traffic related impacts on the Walmore Common SPA/Ramsar site.

7.259h There will therefore be no appreciable effects on the site from the traffic related noise or air quality impacts from the proposed development, alone or in combination with other plan or projects.

7.259i The Hydrology chapter 13 confirms that Walmore Common SPA/Ramsar site is not in hydraulic connectivity to the Hybrid Application Site and that there will be no impact to this designated site.

7.259j In relation to Speech House Oaks SSSI (2.68km to the south west of the Hybrid Application Site) Forest of Dean District Council has queried the potential impacts from any increased traffic along the B4226. These issues are addressed in the three Impact tables below but the points are also summarised here.

7.259k The Transport chapter 9 predicts that there will be no perceptible impact across the 3 phases on the B4226 from traffic related to the Hybrid Application Site, also taking into account potential cumulative impacts. The Air Quality chapter 11 states that impacts are limited to 20 metres from the roadside and that any exceedance of critical load in terms of nitrogen deposits applies whether or not the development goes ahead.

7.259l The Hydrology chapter 13 confirms that Speech House Oaks SSSI is not in hydraulic connectivity to the Hybrid Application Site and that there will be no impact to the Speech House Oaks SSSI.~~It is also relevant that the A48 is 0.km from the nearest point of these sites and the sites are large (ha) so that the A48 is located close to only km of the overall boundaries of km for the site, which equates a of the total perimeter and area of the~~

~~Walmore Common SPA / Ramsar sites. As such there is no basis for concern regarding negative impacts on the qualifying features of these sites.~~

Phase 1 Construction

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Wye Valley and Forest of Dean Bat Sites SAC	Very high	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
River Wye SAC	Very high	No direct or indirect impacts are predicted. Site located 3.77km to the northwest, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Wye Valley Woodlands SAC	Very high	No direct or indirect impacts are predicted. Site located 5.84km to the west , no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
		Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
Severn Estuary SAC	Very high	No appreciable effects are predicted. Site located 9.29km to the southeast. No direct connectivity through hydrological links and, although Cinderford Brook connects indirectly to the SAC via Blackpool Brook 5.9km to the south, the long distance, natural treatment of water upstream through actions such as dilution and settlement together	No perceptible traffic impact on A48 during phase 1.	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		with the predicted low risk of ground or surface water contamination during this phase at the Hybrid Application Site and together with the dilution effects of the watercourses means no impact is predicted. Any noise or air quality impacts generated at Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48.			
Walmore Common SPA and Ramsar Site	Very high	No appreciable effects are predicted. Site located 9.12km to the east. No direct or indirect connectivity through hydrological links. Any noise and air quality impacts generated at Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48.	No perceptible traffic impact on A48 during phase 1	N/A	N/A
Severn Estuary SPA and Ramsar Site	Very high	No appreciable effects are predicted. Site located 9.29km to the southeast. No direct connectivity through hydrological links and, although Cinderford Brook connects indirectly to the SAC via Blackpool Brook 5.9km to the south, the long distance, natural treatment of water upstream through actions such as dilution and settlement together with the predicted low risk of ground or surface water contamination during this phase at the Hybrid Application Site and together with the dilution effects of the watercourses means no impact is predicted. Any noise or air	No perceptible traffic impact on A48 during phase 1.	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		quality impacts generated at Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48.			
Westbury Brook Ironstone Mine SSSI	High	No direct impacts are predicted as site is located 1.46km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
		Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Edgehills Quarry SSSI	High	No direct or indirect impacts are predicted. Site located 1.66km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Puddlebrook Quarry SSSI	High	No direct or indirect impacts are predicted. Site located 2.08km to the north, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Stenders Quarry SSSI	High	No direct or indirect impacts are predicted. Site located 2.43km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Speech House Oaks SSSI	High	No significant impacts are predicted. Site located 2.68km to the southwest, no direct	No perceptible traffic impact on B4226 during phase 1.	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		connectivity through hydrological links and noise and air quality impacts not significant to extend this distance. Air quality impacts from B4226 limited to 20 metres from the roadside			
Scully Grove Quarry SSSI	High	No direct or indirect impacts are predicted. Site located 2.69km to the north, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Buckshaft Mine and Bradley Hill SSSI	High	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Dean Hall Coach House and Cellar SSSI	High	Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Wigpool Ironstone Mine SSSI	High	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Soudley Ponds SSSI	High	No direct or indirect impacts are predicted. Site located 3.43km to the southeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Land Grove Quarry, Micheldean SSSI	High	No direct or indirect impacts are predicted. Site located 3.44km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		this distance			
Wood Green Quarry and Railway Cut	High	No direct or indirect impacts are predicted. Site located 4.62km to the east, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Laymoor Quag GWT Nature Reserve	Lower	No direct or indirect impacts are predicted as the site is located to the immediate south of Linear Park no direct connectivity through hydrological links and noise and air quality impacts not significant for this area	N/A	N/A	N/A
Woorgreens Lake and Marsh, Crabtree Hill & Foxes Bridge GWT Nature Reserve and KWS	Lower	No direct or indirect impacts are predicted. Site located 1km to the south, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Edgehills Bog GWT Nature Reserve and KWS	Lower	No direct or indirect impacts are predicted. Site located 1km to the east, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Plump Hill Dolomite Quarry GWT Nature Reserve and KWS	Lower	No direct or indirect impacts are predicted. Site located 1.85km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Hawkwell Inclosure KWS	Lower	No direct or indirect impacts are predicted in association with phase 1 construction (phase 1 operation is considered in the table below), no direct connectivity through hydrological links and noise and air quality impacts not significant for	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		this area			
Cinderford Linear Park KWS	Lower	Site will be directly impacted by the footprint of the development	Impacts have been characterised under individual impacts within the habitats and species sections below	Moderate/large negative	Slight adverse
Serridge Green KWS	Lower	No direct or indirect impacts are predicted. Site located 275m to the west, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Heywood Inclosure KWS	Lower	No direct or indirect impacts are predicted. Site located 935m to the east, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Ruardean Hill KWS	Lower	No direct or indirect impacts are predicted. Site located 1.14km to the north, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Fairplay Iron Mine Reservoir KWS	Lower	No direct or indirect impacts are predicted. Site located 1.36km to the east, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Merring Meend KWS	Lower	No direct or indirect impacts are predicted. Site located 1.43km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Westbury Brook Mine Reservoir KWS	Lower	No direct or indirect impacts are predicted. Site located 1.43km to the northeast, no direct connectivity through hydrological	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		links and noise and air quality impacts not significant to extend this distance			
Plump Hill Picnic Site KWS	Lower	No direct or indirect impacts are predicted. Site located 1.45km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Cinderford Roughs KWS	Lower	No direct or indirect impacts are predicted. Site located 1.65km to the southeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Dilke Pond KWS	Lower	No direct or indirect impacts are predicted. Site located 1.89km to the south, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Serridge Inclosure KWS	Lower	No direct or indirect impacts are predicted. Site located 1.95km to the west, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Wilderness Field Centre KWS	Lower	No direct or indirect impacts are predicted. Site located 1.95km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Micheldean Meend Marsh KWS	Lower	No direct or indirect impacts are predicted. Site located 1.95km to the north, no direct connectivity through hydrological links and	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		noise and air quality impacts not significant to extend this distance			
Buildings and hard standing	Negligible	Loss of habitat area	SI: -ve PO: certain CO: direct EC: 0.167ha within the construction site. See Table 7.3.1b phase 1 SZ: habitat lost would only represent a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Negligible	Neutral
Coniferous plantation woodland	Lower	Loss of Loss of habitat area	SI: -ve PO: certain CO: direct EC: 4.61ha within the phase 1 mitigation area. See Table 7.3.1b phase 1 SZ: represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Negligible	Neutral
Broad-leaved plantation woodland	Lower	Loss of habitat area	SI: -ve PO: certain CO: direct EC: 0.80ha within the construction site. See Table 7.3.1b phase 1 SZ: represents a small proportion of the local resource RE: not reversible DU: permanent (0.02ha temporary) TF: one off loss	Negligible	Neutral
		Damage to retained habitats	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to	Negligible	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction		
Mixed plantation woodland (s41 Lowland Mixed Deciduous Woodland Habitat)	Lower	No direct or indirect impacts are predicted as part of the phase 1 construction (phase 1 operation is considered in the Phase 2 table)	N/A. See Table 7.3.1b phase 1	N/A	N/A
Scattered Broad-leaved Trees	Lower	Loss of habitat area	SI: -ve PO: certain CO: direct EC/SZ: represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Damage to retained habitats	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Negligible	Neutral
Dense and scattered scrub	Lower	Loss of habitat area	SI: -ve PO: certain CO: direct EC: 0.08ha within the construction site. See Table 7.3.1b phase 1 SZ: represents a small proportion of the local resource RE: not reversible DU: permanent (0.04ha temporary) TF: one off loss	Slight negative	Slight adverse
		Damage to retained habitats	SI: -ve	Negligible	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction		
Semi-improved neutral grassland	Medium	Loss of habitat area	SI: -ve PO: certain CO: direct EC: 2.82ha within the construction site. See Table 7.3.1b phase 1 SZ: represents less than a fifth of the local resource RE: not reversible DU: permanent (0.85ha temporary) TF: one off loss	Slight negative	Slight adverse
		Damage to retained habitats	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Slight adverse
Poor semi-improved grassland	Negligible	Loss of habitat area	SI: -ve PO: certain CO: direct EC: 0.623ha within the construction site. See Table 7.3.1b phase 1 SZ: represents a majority of the local resource RE: not reversible DU: permanent (0.013ha temporary) TF: one off loss	Moderate negative	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Damage to retained habitats	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a majority of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Neutral
Bare Ground	Negligible	No direct or indirect impacts are predicted as part of the phase 1 construction (phase 1 operation is considered in the table below)	N/A	N/A	N/A
Spoil	Negligible	No direct or indirect impacts are predicted as part of the phase 1 construction (phase 1 operation is considered in the table below)	N/A	N/A	N/A
Heath (s41 Lowland Heath Habitat)	Lower	No direct or indirect impacts are predicted as part of the phase 1 construction (phase 1 operation is considered in the table below)	N/A	N/A	N/A
Standing Water (s41 Ponds and Rivers Habitat)	Medium	Damage to retained habitats	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area. See Table 7.3.1b phase 1 SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Running Water (s41 Ponds and Rivers Habitat)	Medium	Damage to retained habitats	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area. See Table 7.3.1b phase 1 SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Slight adverse
Ditches	Negligible	Loss of habitat area	SI: -ve PO: certain CO: direct EC/SZ: represents a small proportion of the local resource. See Table 7.3.1b phase 1 RE: not reversible DU: permanent TF: one off loss	Negligible	Neutral
		Damage to retained habitats	SI: -ve PO: probable CO: indirect EC/SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Negligible	Neutral
Lesser Horseshoe Bat Maternity Roosts (Office Building, Bath House and Canteen) – also used by other species in low numbers (Common and Soprano Pipistrelle, Brown Long-eared and	Very High	Disturbance of roosting sites due to increased site activities, particularly construction traffic	SI: -ve PO: probable CO: indirect EC/SZ: disturbance of important maternity roost RE: reversible DU: temporary TF: during construction, in the spring	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Bechstein's)			and summer months when roosts are in use		
Trees suitable for roosting bats	Medium	Loss of trees with the potential to be used as a roosting resource by bats	SI: -ve PO: certain CO: direct EC/SZ: loss of potential roosting resource. Represents a small proportion of local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of bats within tree roost during site clearance work	SI: -ve PO: probable CO: direct EC/SZ: loss of individual bats within roost at time of works RE: not reversible DU: permanent TF: one off loss	Major negative	Moderate adverse
		Disturbance of tree roosts on site through increased activity, including construction traffic and lighting, noise and vibration during works	SI: -ve PO: probable CO: indirect EC/SZ: disturbance to potential roosting resource. Represents a small proportion of local resource RE: reversible DU: temporary TF: during construction, in the spring and summer months when roosts are in use	Slight negative	Slight adverse
Commuting and foraging Lesser Horseshoe, Greater Horseshoe, Barbastelle and Bechstein's Bats	Very High	Loss of foraging habitat due to development and mitigation site clearance work	SI: -ve PO: certain CO: direct EC: 8.933ha of habitat within the footprint of the development and phase 1 mitigation areas SZ: the area which would be lost represents a small proportion of the local resource RE: not reversible	Moderate negative	Large adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			DU: permanent TF: one off loss		
		Disturbance of foraging habitat due to construction works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction and phase 1 mitigation areas SZ: the area affected represents a small proportion of the local resource RE: reversible DU: temporary TF: during construction, in the spring and summer months when bats are active	Slight negative	Slight adverse
		Disruption of commuting routes due to removal of linear vegetation features or construction site lighting (no lighting to be used within the mitigation area and no linear features are present in the mitigation area)	SI: -ve PO: certain CO: direct EC: limited to areas where commuting bats have been identified SZ: Features lost represents a small proportion of the local resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Commuting and foraging Nathusius pipistrelles, other Myotis Sp., Brown Long-eared, Noctule, Leisler's and Serotine Bats	Medium	Loss of foraging habitat due to development and mitigation site clearance work	SI: -ve PO: certain CO: direct EC: 8.933ha of habitat within the footprint of the development and phase 1 mitigation area SZ: the area which would be lost represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance of foraging habitat due to construction works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction and phase 1 mitigation areas SZ: the area affected represents a small proportion of the local resource RE: reversible DU: temporary TF: during construction, in the spring and summer months when bats are active	Slight negative	Slight adverse
		Disruption of commuting routes due to removal of linear vegetation features or construction site lighting (no lighting to be used within the mitigation area and no linear features are present in the phase 1 mitigation areas)	SI: -ve PO: certain CO: direct EC: limited to areas where commuting bats have been identified SZ: Features lost represents a small proportion of the local resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			active		
Commuting and Foraging Common and Soprano Pipistrelles	Lower	Loss of foraging habitat due to development and mitigation site clearance work	SI: -ve PO: certain CO: direct EC: 8.933ha of habitat within the footprint of the development and phase 1 mitigation areas SZ: the area which would be lost represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Moderate negative	Slight adverse
		Disturbance of foraging habitat due to construction works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction and phase 1 mitigation areas SZ: the area affected represents a small proportion of the local resource RE: reversible DU: temporary TF: during construction, in the spring and summer months when bats are active	Slight negative	Slight adverse
		Disruption of commuting routes due to removal of linear vegetation features or construction site lighting (no lighting to be used within the mitigation area and no linear features are present in the phase 1 mitigation areas)	SI: -ve PO: certain CO: direct EC: limited to areas where commuting bats have been identified SZ: Features lost represents a small proportion of the local resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Dormice	Medium	Loss of woodland and scrub habitats due to development and mitigation site clearance work	SI: -ve PO: certain CO: direct EC: 0.88ha within construction site and 4.61ha sub-optimal habitat within phase 1 mitigation area SZ: habitat lost would only represent a small proportion of the local resource. RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of dormice during all site clearance activities	SI: -ve PO: probable CO: direct EC: would be limited to small numbers of animals present within the clearance footprint at the time of site clearance works SZ: likely to affect only a small proportion of the local dormouse population RE: not reversible DU: permanent TF: one off loss	Moderate negative	Moderate adverse
		Damage/disturbance of nests during all site clearance work	SI: -ve PO: probable CO: direct EC: would be limited to small numbers of animals present within the clearance footprint at the time of site clearance works SZ: likely to affect only a small number of nests RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of dependent young during site clearance work	SI: -ve PO: probable CO: direct	Moderate negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			EC: would be limited to small numbers of animals present within the clearance footprint at the time of site clearance works SZ: likely to affect only a small proportion of the local dormouse population RE: not reversible DU: permanent TF: one off loss		
		Disturbance of dormice in nearby retained habitats through construction site or clearance work noise, lighting or vibration	SI: -ve PO: probable CO: indirect EC: would be limited to small numbers of animals present close to the development and clearance footprints during works SZ: likely to affect only a small proportion of the local dormouse population RE: reversible DU: temporary TF: during works, and primarily during the summer months when dormice are active	Slight negative	Slight adverse
Otters	Lower	Loss of habitat during the site clearance works	SI: -ve PO: unlikely CO: direct EC/SZ: habitat lost would only represent a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to Otters adjacent to the site during construction/ clearance	SI: -ve PO: unlikely CO: indirect EC: limited to animals close to the development during construction/clearance	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			SZ: likely to affect a small proportion of resident animals RE: reversible DU: temporary TF: could occur at any point during works, though more likely to occur during earthworks		
		Injury/mortality to Otters accessing the site during construction/clearance	SI: -ve PO: unlikely CO: indirect EC: limited to animals that access the site during construction/clearance SZ: likely to affect a small proportion of resident animals RE: reversible, dependant on injuries sustained, not reversible for mortality DU: temporary TF: could occur at any point during works, though more likely to occur during earthworks	Slight negative	Slight adverse
Water Vole	Lower	Loss of suitable habitat	SI: -ve PO: unlikely CO: direct EC/SZ: habitat lost would only represent a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to Water Voles adjacent to the site during construction/clearance	SI: -ve PO: unlikely CO: indirect EC: limited to animals close to the development during construction/clearance SZ: likely to affect a small proportion of resident animals RE: reversible	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			DU: temporary TF: could occur at any point during works, though more likely to occur during earthworks		
		Injury/mortality to Water Voles accessing the site during construction/clearance	SI: -ve PO: unlikely CO: indirect EC: limited to animals that access the site during construction SZ: likely to affect a small proportion of resident animals RE: reversible, dependant on injuries sustained, not reversible for mortality DU: temporary TF: could occur at any point during works, though more likely to occur during earthworks	Slight negative	Slight adverse
Badgers	Lower	Disturbance to Badgers adjacent to the site during construction/clearance	SI: -ve PO: unlikely CO: indirect EC: limited to animals in setts close to the development during construction SZ: likely to affect a small proportion of resident animals RE: reversible DU: temporary TF: could occur at any point during works, though more likely to occur during earthworks	Slight negative	Slight adverse
		Injury/mortality to Badgers accessing site during construction/clearance	SI: -ve PO: unlikely CO: indirect EC: limited to animals that access the site during construction SZ: likely to affect a small proportion of resident animals RE: reversible, dependant on injuries sustained, not reversible for	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			mortality DU: temporary TF: could occur at any point during works, though more likely to occur during earthworks		
		Loss of foraging and sett habitat	SI: -ve PO: probable CO: direct EC/SZ: minor area of existing resource RE: not reversible DU: permanent TF: one-off loss	Slight negative	Slight adverse
Nesting birds	Medium	Loss of nesting bird habitat during site clearance works, including foraging habitat within territories for breeding pairs	SI: -ve PO: certain CO: direct EC/SZ: limited to clearance footprint which is a minor area of the existing resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of nesting birds during all site clearance works	SI: -ve PO: probable CO: direct EC/SZ: limited to clearance footprint which is a minor area of the existing resource RE: not reversible DU: permanent TF: during site clearance activities taking place during the bird breeding season	Slight negative	Slight adverse
		Damage or destruction of active nests/eggs/dependant young during all site clearance works	SI: -ve PO: probable CO: direct EC/SZ: limited to development footprint which is a minor area of the existing resource RE: not reversible	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			DU: permanent TF: during site clearance activities taking place during the bird breeding season		
		Disturbance to nesting birds (including potentially to birds listed on Schedule 1 of the WCA) in nearby retained habitat during construction/ clearance works	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of works, depending on sensitivity of the species concerned RE: reversible DU: temporary TF: during works taking place during the bird breeding season	Slight negative	Slight adverse
Reptiles	Medium	Loss of slow worm, common lizard, adder and grass snake habitat during all site clearance work	SI: -ve PO: certain CO: direct EC: 4.323ha within construction site and 4.61ha within phase 1 mitigation areas SZ: Works affect a small proportion of the area occupied by the reptile population RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of reptiles during construction/ clearance	SI: -ve PO: likely CO: direct EC/SZ: likely to affect only a small proportion of population. Common lizard and slow worm are species most likely to be affected. RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to reptiles in nearby retained habitat during construction/ clearance works	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			of works, depending on sensitivity of the species concerned RE: reversible DU: temporary TF: during works taking place during the active season		
Great Crested Newt	Very High	Loss of Great Crested Newt habitat during all site clearance work	SI: -ve PO: certain CO: direct EC: 4.323ha within construction site and 4.61ha within phase 1 mitigation areas SZ: Works affect a small proportion of the area occupied by the GCN population RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of Great Crested Newts during construction/ clearance	SI: -ve PO: likely CO: direct EC/SZ: likely to affect only a small proportion of population RE: not reversible DU: permanent TF: one off loss	Moderate negative	Large adverse
		Disturbance to Great Crested Newt in nearby retained habitat during construction/ clearance works	SI: -ve PO: likely CO: indirect EC/SZ: limited to immediate vicinity of works RE: reversible DU: temporary TF: during works taking place during the active season	Slight negative	Slight adverse
Common frog, Common toad, Palmate newt and Smooth newt	Lower	Loss of amphibian habitat during all site clearance work	SI: -ve PO: certain CO: direct EC: 4.323ha within construction site and 4.61ha within phase 1	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			mitigation areas SZ: Works affect a small proportion of the area occupied by the GCN population RE: not reversible DU: permanent TF: one off loss		
		Injury/mortality of amphibians during construction/ clearance	SI: -ve PO: likely CO: direct EC/SZ: likely to affect only a small proportion of population RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to amphibians in nearby retained habitat during construction/ clearance works	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of works, depending on sensitivity of the species concerned RE: reversible DU: temporary TF: during works taking place during the active season	Slight negative	Slight adverse
White-clawed Crayfish	Medium	Indirect loss of crayfish habitat within development area during construction work – impacts within mitigation area not expected due to lack of watercourses	SI: -ve PO: probable CO: indirect EC/SZ: Development affects a small proportion of the area occupied by the crayfish population RE: not reversible DU: temporary TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of crayfish during construction – impacts within mitigation area not expected due to lack of watercourses	SI: -ve PO: unlikely CO: indirect EC/SZ: likely to affect only a small proportion of population, if present RE: not reversible	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			DU: permanent TF: one off loss		
		Disturbance to white clawed crayfish in nearby retained habitat within the development area during construction works – impacts within mitigation area not expected due to lack of watercourses	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development RE: reversible DU: temporary TF: during construction activities	Slight negative	Slight adverse
Invertebrates	Medium	Loss of habitats during all site clearance	SI: -ve PO: probable CO: direct EC: 4.323ha within construction site and 4.61ha within phase 1 mitigation areas SZ: Development affects a small proportion of the available habitat resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse

Phase 1 Operation/Phase 2 Construction

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Wye Valley and Forest of Dean Bat Sites SAC	Very high	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Major negative	Very large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
River Wye SAC	Very high	No direct or indirect impacts are predicted. Site located 3.77km to the northwest, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Wye Valley Woodlands SAC	Very high	No direct or indirect impacts are predicted. Site located 5.84km to the west, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
		Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Major negative	Very large adverse
Severn Estuary SAC	Very high	No appreciable effects are predicted. Site located 9.29km to the southeast. No direct connectivity through hydrological links and, although Cinderford Brook connects indirectly to the SAC via Blackpool Brook 5.9km to the south, the long distance, natural treatment of water upstream through actions such as dilution and settlement together with the predicted low risk of ground or surface water contamination during this phase at the Hybrid Application Site means no impact is predicted. Any noise or air quality impacts generated at Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48.	No perceptible traffic impact on A48 during phase 2 and imperceptible changes in noise and air quality from the A48. Prediction of negligible only increase in air pollution outside the Hybrid Application Site and given 9.29km distance no impact predicted on SAC.	N/A	N/A
Walmore Common SPA and Ramsar Site	Very high	No appreciable effects are predicted. Site located 9.12km to the east. No direct or indirect connectivity through hydrological	No perceptible traffic impact on A48 during phase 2 and imperceptible changes in noise and air quality from the A48.	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		links. Any noise and air quality impacts generated at Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48.	Prediction of negligible only increase in air pollution outside the Hybrid Application Site and given 9.12km distance no impact predicted on SPA/ Ramsar.		
Severn Estuary SPA and Ramsar Site	Very high	No appreciable effects are predicted. Site located 9.64km to the southeast. No direct connectivity through hydrological links and, although Cinderford Brook connects indirectly to the SPA / Ramsar via Blackpool Brook 5.9km to the south, the long distance, natural treatment of water upstream through actions such as dilution and settlement together with the predicted low risk of ground or surface water contamination at the Hybrid Application Site means no impact is predicted. Any noise or air quality impacts generated at the Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48.	No perceptible traffic impact on A48 during phase 2 and imperceptible changes in noise and air quality from the A48. Prediction of negligible only increase in air pollution outside the Hybrid Application Site and given 9.64km distance no impact predicted on SPA/ Ramsar.	N/A	N/A
Westbury Brook Ironstone Mine SSSI	High	No direct impacts are predicted as site is located 1.46km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
		Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Major negative	Very large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Edgehills Quarry SSSI	High	No direct or indirect impacts are predicted. Site located 1.66km to	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance			
Puddlebrook Quarry SSSI	High	No direct or indirect impacts are predicted. Site located 2.08km to the north, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Stenders Quarry SSSI	High	No direct or indirect impacts are predicted. Site located 2.43km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Speech House Oaks SSSI	High	No significant impacts are predicted. Site located 2.68km to the southwest, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance. Air quality impacts from B4226 limited to 20 metres from the roadside	No perceptible traffic impact on B4226 during phase 2. Air quality impacts from B4226 limited to 20 metres from the roadside	N/A	N/A
Scully Grove Quarry SSSI	High	No direct or indirect impacts are predicted. Site located 2.69km to the north, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Buckshaft Mine and Bradley Hill SSSI	High	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Major negative	Very large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Dean Hall Coach House and Cellar SSSI	High	Impacts on Greater Horseshoe Bat populations (refer to the 'bats'	Impacts have been characterised under individual impacts within the	Moderate negative	Large adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		section below for details)	'bats' section below		
Wigpool Ironstone Mine SSSI	High	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Major negative	Very large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Soudley Ponds SSSI	High	No direct or indirect impacts are predicted. Site located 3.43km to the southeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Land Grove Quarry, Micheldean SSSI	High	No direct or indirect impacts are predicted. Site located 3.44km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Wood Green Quarry and Railway Cut	High	No direct or indirect impacts are predicted. Site located 4.62km to the east, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Laymoor Quag GWT Nature Reserve	Lower	No direct or indirect impacts are predicted as the site is located to the immediate south of Linear Park , no direct connectivity through hydrological links and noise and air quality impacts not significant enough to effect this area	N/A	N/A	N/A
Woorgreens Lake and Marsh, Crabtree Hill & Foxes Bridge GWT Nature Reserve and KWS	Lower	No direct or indirect impacts are predicted. Site located 1km to the south, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Edgehills Bog GWT Nature	Lower	No direct or indirect impacts are	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Reserve and KWS		predicted. Site located 1km to the east, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance			
Plump Hill Dolomite Quarry GWT Nature Reserve and KWS	Lower	No direct or indirect impacts are predicted. Site located 1.85km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Hawkwell Inclosure KWS	Lower	Indirect impacts associated with the phase 2 construction works and phase 1 operation	Impacts have been characterised under individual impacts within the habitats and species sections below	Moderate/large negative	Slight adverse
Cinderford Linear Park KWS	Lower	Site will be directly and indirectly impacted by the footprint of the phase 2 development and operation of phase 1	Impacts have been characterised under individual impacts within the habitats and species sections below	Moderate/large negative	Slight adverse
Serridge Green KWS	Lower	No direct or indirect impacts are predicted. Site located 275m to the west, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Heywood Inclosure KWS	Lower	No direct or indirect impacts are predicted. Site located 935m to the east, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Ruardean Hill KWS	Lower	No direct or indirect impacts are predicted. Site located 1.14km to the north, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Fairplay Iron Mine Reservoir KWS	Lower	No direct or indirect impacts are predicted. Site located 1.36km to the east, no direct connectivity	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		through hydrological links and noise and air quality impacts not significant to extend this distance			
Merring Meend KWS	Lower	No direct or indirect impacts are predicted. Site located 1.43km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Westbury Brook Mine Reservoir KWS	Lower	No direct or indirect impacts are predicted. Site located 1.43km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Plump Hill Picnic Site KWS	Lower	No direct or indirect impacts are predicted. Site located 1.45km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Cinderford Roughs KWS	Lower	No direct or indirect impacts are predicted. Site located 1.65km to the southeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Dilke Pond KWS	Lower	No direct or indirect impacts are predicted. Site located 1.89km to the south, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Serridge Inclosure KWS	Lower	No direct or indirect impacts are predicted. Site located 1.95km to the west, no direct connectivity through hydrological links and	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		noise and air quality impacts not significant to extend this distance			
Wilderness Field Centre KWS	Lower	No direct or indirect impacts are predicted. Site located 1.95km to the northeast, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Micheldean Meend Marsh KWS	Lower	No direct or indirect impacts are predicted. Site located 1.95km to the north, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance	N/A	N/A	N/A
Buildings and hard standing	Negligible	Loss of habitat area due to phase 2 development	SI: -ve PO: certain CO: direct EC: 3.9ha within the construction site, none to be lost through phase 2 mitigation. See Table 7.3.1b phase 2 SZ: represents a significant proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Major negative	Neutral
		Damage to retained habitats due to phase 2 construction works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a significant proportion of the remaining local resource RE: reversible depending on extent DU: temporary TF: during construction	Negligible	Neutral
Coniferous plantation woodland	Lower	Loss of habitat area due to phase 2 development and mitigation	SI: -ve PO: certain CO: direct	Negligible	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			EC: 0.49ha within the construction site and 9.0ha within the mitigation areas (See Table 7.3.1b – phase 2) SZ: represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss		
		Damage to retained habitats due to phase 2 construction and mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Negligible	Neutral
Broad-leaved plantation woodland	Lower	Loss of habitat area due to phase 2 development	SI: -ve PO: certain CO: direct EC: 2.79ha within the construction site (see Table 7.3.1b phase 2, none lost through mitigation) SZ: represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Damage to retained habitats due to phase 2 construction and mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Slight adverse
Mixed plantation woodland (s41 Lowland	Lower	Loss of habitat area due to phase 2 development	SI: -ve PO: certain	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Mixed Deciduous Woodland Habitat)			CO: direct EC: 1.08ha within the construction site and 6.79ha within the mitigation areas (see Table 7.3.1b phase 2 , none lost through mitigation) SZ: represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss		
		Damage to retained habitats due to phase 2 construction and mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Slight adverse
Scattered Broad-leaved Trees	Lower	Loss of habitat area due to phase 2 development and mitigation	SI: -ve PO: certain CO: direct EC/SZ: represent a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Damage to retained habitats due to phase 2 construction and mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Negligible	Neutral
Dense and scattered scrub	Lower	Loss of habitat area due to phase 2 development	SI: -ve PO: certain	Moderate negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			CO: direct EC: 0.53ha within the construction site. See Table 7.3.1b phase 2, none lost through mitigation SZ: represents approx. one third of the local resource RE: not reversible DU: permanent TF: one off loss		
		Damage to retained habitats due to phase 2 construction and mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Slight adverse
Semi-improved neutral grassland	Medium	Loss of habitat area due to phase 2 development	SI: -ve PO: certain CO: direct EC: 5.6ha within the construction site. See Table 7.3.1b phase 2, none lost through mitigation SZ: represents a significant proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Major negative	Slight adverse
		Damage to retained habitats due to phase 2 construction and phase 2 mitigation works	SI: -ve PO: unlikely (remaining area to south of works) CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a significant proportion of the remaining resource RE: reversible depending on extent DU: temporary	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			TF: during construction		
Poor semi-improved grassland	Negligible	Loss of habitat area due to phase 2 development	SI: -ve PO: certain CO: direct EC: 0.09ha within the construction site. See Table 7.3.1b phase 2, none lost through mitigation SZ: represents a significant proportion of the remaining resource RE: not reversible DU: permanent TF: one off loss	Moderate negative	Neutral
		Damage to retained habitats due to phase 2 construction and phase 2 mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a significant proportion of the remaining resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Neutral
Bare Ground	Negligible	Loss of habitat area due to phase 2 development and phase 2 mitigation works	SI: -ve PO: certain CO: direct EC/SZ: limited to development area, represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Negligible	Neutral
		Damage to retained habitats due to phase 2 construction and phase 2 mitigation works	SI: -ve PO: probable CO: indirect EC/SZ: limited to development area, represents a small proportion of the local resource RE: reversible depending on extent DU: temporary	Negligible	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			TF: during construction		
Spoil	Negligible	Loss of habitat area due to phase 2 development and phase 2 mitigation works	SI: -ve PO: certain CO: direct EC/SZ: limited to development area, represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Negligible	Neutral
		Damage to retained habitats due to phase 2 construction and phase 2 mitigation works	SI: -ve PO: probable CO: indirect EC/SZ: limited to development area, represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Negligible	Neutral
Heath (s41 Lowland Heath Habitat)	Lower	Loss of habitat area due to phase 2 development	SI: -ve PO: certain CO: direct EC/SZ: potential for the entire habitat resource to be lost (less than 0.002ha See Table 7.3.1b phase 2) within development area, due to limited extent of habitat type RE: not reversible DU: permanent TF: one off loss	Major negative	Slight adverse
Standing Water (s41 Ponds and Rivers Habitat)	Medium	Loss of habitat area due to phase 2 development	SI: -ve PO: certain CO: direct EC: 0.02ha within the construction site (single pond) see Table 7.3.1b phase 2 , none lost through mitigation SZ: represent a small proportion of the local resource RE: not reversible	Negligible	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			DU: permanent TF: one off loss		
		Damage to retained habitats due to phase 2 construction and phase 2 mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Slight adverse
Running Water (s41 Ponds and Rivers Habitat)	Medium	Damage to retained habitats due to phase 2 construction and phase 2 mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area. See Table 7.3.1b phase 2. SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	Slight negative	Slight adverse
Ditches	Negligible	Damage to retained habitats due to phase 2 construction and phase 2 mitigation works	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction area. See Table 7.3.1b phase 2 SZ: represents a small proportion of the local resource RE: reversible depending on extent DU: temporary TF: during construction	8. Negligible	9. Neutral
Lesser Horseshoe Bat Maternity Roosts (Office	Very High	Loss of roosting sites due to phase 2 development	SI: -ve PO: certain	Major negative	Very large adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Building, Bath House and Canteen) – also used by other species in low numbers (Common and Soprano Pipistrelle, Brown Long-eared and Bechstein's)			CO: direct EC/SZ: loss of important maternity roost RE: not reversible DU: permanent TF: one off loss		
		Injury/mortality of bats within roosts	SI: -ve PO: probable CO: direct EC/SZ: loss of individual bats within roost at time of works RE: not reversible DU: permanent TF: one off loss	Major negative	Very large adverse
Trees suitable for roosting bats	Medium	Loss of trees with the potential to be used as a roosting resource by bats due to phase 2 development or creation of phase 2 mitigation	SI: -ve PO: certain CO: direct EC/SZ: loss of potential roosting resource. Represents a small proportion of local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of bats within tree roosts due to Phase 2 development or creation of Phase 2 mitigation	SI: -ve PO: probable CO: direct EC/SZ: loss of individual bats within roost at time of works RE: not reversible DU: permanent TF: one off loss	Major negative	Moderate adverse
		Disturbance of tree roosts within vicinity of phase 2 works through increased activity, including construction traffic and lighting, noise and vibration during works	SI: -ve PO: probable CO: indirect EC/SZ: disturbance to potential roosting resource. Represents a small proportion of local resource RE: reversible DU: temporary TF: during construction, in the spring and summer months when roosts	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			are in use		
		Disturbance of tree roosts within vicinity of phase 1 during operation through increased activity, particularly lighting and noise	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to retained roosts, particularly those close to junctions. Represents a small proportion of local resource RE: not reversible DU: permanent TF: impacts would occur during first active bat season following phase 1 completion	Moderate negative	Moderate adverse
Commuting and foraging Lesser Horseshoe, Greater Horseshoe, Barbastelle and Bechstein's Bats	Very High	Loss of foraging habitat due to phase 2 development or creation of Phase 2 mitigation	SI: -ve PO: certain CO: direct EC: 26.392ha potential foraging habitat (2.61ha within Phase 2 detailed development, 3.75ha Phase 2 detailed mitigation, 7.99ha Phase 2 reserved matters development and 12.04ha Phase 2 reserved matters mitigation) SZ: the area which would be lost represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Moderate negative	Large adverse
		Disturbance of foraging habitat due to phase 2 development or creation of Phase 2 mitigation	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction/ mitigation areas SZ: the area affected represents a small proportion of the local resource RE: reversible DU: temporary TF: during construction, in the spring and summer months when bats are	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			active		
		Disruption of commuting routes due to removal of linear vegetation features or construction site lighting associated with phase 2 development or creation of Phase 2 mitigation	SI: -ve PO: certain CO: direct EC/SZ: limited to areas where commuting bats have been identified which includes 2 major and 1 minor flyways for Lesser Horseshoe Bats (as labelled on Figure 7.4) RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Major negative	Very large adverse
		Disturbance and fragmentation of commuting routes and foraging habitats due to completion of phase 1, particularly section 1 of the spine road (being the spine road from Forest Vale to the College)	SI: -ve PO: certain CO: direct and indirect EC/SZ: limited to the eastern part of the NQ where commuting and foraging bats have been recorded very infrequently RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Slight negative	Slight adverse
		Injury/mortality of bats through vehicle collisions associated with operation of phase 1	SI: -ve PO: unlikely CO: direct EC/SZ: limited to the eastern part of the NQ where commuting bats are recorded in very low numbers only (as shown within the bat survey report figure 48 page 134, Appendix 7.4) RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Commuting and foraging Nathusius Pipistrelles, other Myotis Sp., Brown Long-eared, Noctule, Leisler's and Serotine Bats	Medium	Loss of foraging habitat due to phase 2 development or creation of Phase 2 mitigation	SI: -ve PO: certain CO: direct EC: 26.392ha potential foraging habitat (2.61ha within Phase 2 detailed development, 3.75ha Phase 2 detailed mitigation, 7.99ha Phase 2 reserved matters development and 12.04ha Phase 2 reserved matters mitigation) SZ: the area which would be lost represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance of foraging habitat due to phase 2 development or creation of Phase 2 mitigation	SI: -ve PO: probable CO: indirect EC: limited to habitat adjacent to the construction/ mitigation areas SZ: the area affected represents a small proportion of the local resource RE: reversible DU: temporary TF: during construction, in the spring and summer months when bats are active	Slight negative	Slight adverse
		Disruption of commuting routes due to removal of linear vegetation features or construction site lighting associated with phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: certain CO: direct EC/SZ: limited to areas where commuting bats have been identified RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Slight negative	Slight adverse
		Disturbance and fragmentation of	SI: -ve	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		commuting routes and foraging habitats due to completion of phase 1, particularly section 1 of the spine road (being the spine road from Forest Vale to the College)	PO: certain CO: direct and indirect EC/SZ: limited to the eastern part of the NQ where commuting and foraging bats have been recorded infrequently RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months		
		Injury/mortality of bats through vehicle collisions associated with operation of phase 1	SI: -ve PO: unlikely CO: direct EC/SZ: limited to the eastern part of the NQ where commuting bats are recorded in very low numbers only RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Slight negative	Slight adverse
Commuting and Foraging Common and Soprano Pipistrelles	Lower	Loss of foraging habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: certain CO: direct EC: 26.392ha potential foraging habitat (2.61ha within Phase 2 detailed development, 3.75ha Phase 2 detailed mitigation, 7.99ha Phase 2 reserved matters development and 12.04ha Phase 2 reserved matters mitigation) SZ: the area which would be lost represents a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance of foraging habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: probable CO: indirect	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			EC: limited to habitat adjacent to the construction/ mitigation areas SZ: the area affected represents a small proportion of the local resource RE: reversible DU: temporary TF: during construction, in the spring and summer months when bats are active		
		Disruption of commuting routes due to removal of linear vegetation features or construction site lighting associated with phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: certain CO: direct EC/SZ: limited to areas where commuting bats have been identified RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Slight negative	Slight adverse
		Disturbance and fragmentation of commuting routes and foraging habitats due to completion of phase 1, particularly section 1 of the spine road (being the spine road from Forest Vale to the College)	SI: -ve PO: certain CO: direct and indirect EC/SZ: limited to the eastern part of the NQ where commuting and foraging bats have been recorded infrequently RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Slight negative	Slight adverse
		Injury/mortality of bats through vehicle collisions associated with operation of phase 1	SI: -ve PO: unlikely CO: direct EC/SZ: limited to the eastern part of the NQ where commuting bats are recorded in very low numbers only RE: not reversible DU: permanent	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			TF: ongoing during operation of phase 1, during the summer months		
Dormice	Medium	Loss of woodland and scrub habitats due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: certain CO: direct EC: 20.68ha within construction and mitigation sites (refer to Table 7.3.1b phase 2 above) SZ: habitat lost would only represent a small proportion of the local resource, RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of dormice due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: probable CO: direct EC: would be limited to small numbers of animals present within the development/ mitigation footprint at the time of clearance works SZ: likely to affect only a small proportion of the local dormouse population RE: not reversible DU: permanent TF: one off loss	Moderate negative	Moderate adverse
		Damage/disturbance of nests due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: probable CO: direct EC: would be limited to small numbers of animals present within the development/ mitigation footprint at the time of clearance works SZ: likely to affect only a small number of nests RE: not reversible DU: permanent	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			TF: one off loss		
		Injury/mortality of dependent young due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: probable CO: direct EC: would be limited to small numbers of animals present within the development/ mitigation footprint at the time of clearance works SZ: likely to affect only a small proportion of the local dormouse population RE: not reversible DU: permanent TF: one off loss	Moderate negative	Moderate adverse
		Disturbance of dormice in nearby retained habitats through phase 2 construction site noise, lighting or vibration or creation of phase 2 mitigation area	SI: -ve PO: probable CO: indirect EC: would be limited to small numbers of animals present close to the development footprint during construction or mitigation area clearance SZ: likely to affect only a small proportion of the local dormouse population RE: reversible DU: temporary TF: during construction, and primarily during the summer months when dormice are active	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Fragmentation of habitats and populations through the barrier effect created by operation of phase 1	SI: -ve PO: unlikely CO: indirect EC: wherever dormice are present in adjacent vegetation SZ: likely to affect only a small proportion of the local dormouse population RE: not reversible DU: permanent TF: ongoing during operation, primarily during the summer months when dormice are active	Slight negative	Slight adverse
		Ongoing disturbance of dormice in retained habitats surrounding operational phase 1	SI: -ve PO: probable CO: indirect EC: would be limited to small numbers of animals present close to the development footprint SZ: likely to affect only a small proportion of the local dormouse population RE: reversible DU: permanent TF: ongoing during operation, primarily during the summer months when dormice are active	Slight negative	Slight adverse
Otters	Lower	Loss of habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: direct EC/SZ: habitat lost would only represent a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to Otters adjacent to the site during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC: limited to animals close to the development during construction	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			or mitigation area clearance SZ: likely to affect a small proportion of resident animals RE: reversible DU: temporary TF: could occur at any point during construction, though more likely to occur during earthworks		
		Injury/mortality to Otters accessing the site during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC: limited to animals that access the site during construction or mitigation area clearance SZ: likely to affect a small proportion of resident animals RE: reversible, dependant on injuries sustained, not reversible for mortality DU: temporary TF: could occur at any point during construction, though more likely to occur during earthworks	Slight negative	Slight adverse
		Fragmentation of habitats and populations through the barrier effect created by operation of phase 1	SI: -ve PO: unlikely CO: indirect EC: wherever there is potential Otter habitat adjacent to phase 1, particularly where watercourses are crossed SZ: likely to affect a small proportion of resident animals RE: not reversible DU: permanent TF: ongoing during operation	Slight negative	Slight adverse
		Ongoing disturbance of Otters utilising retained habitats surrounding phase 1	SI: -ve PO: unlikely CO: indirect EC: would be limited to small numbers of animals present close to the development footprint	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			SZ: likely to affect a small proportion of resident animals RE: reversible DU: permanent TF: ongoing during operation		
Water Vole	Lower	Loss of suitable habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: direct EC/SZ: habitat lost would only represent a small proportion of the local resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to Water Voles adjacent to the site during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC: limited to animals close to the development during construction or mitigation area clearance SZ: likely to affect a small proportion of resident animals RE: reversible DU: temporary TF: could occur at any point during construction, though more likely to occur during earthworks	Slight negative	Slight adverse
		Injury/mortality to Water Voles accessing the site during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC: limited to animals that access the site during construction or mitigation area clearance SZ: likely to affect a small proportion of resident animals RE: reversible, dependant on injuries sustained, not reversible for mortality DU: temporary TF: could occur at any point during construction, though more likely to	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			occur during earthworks		
		Fragmentation of habitats and populations through the barrier effect created by operation of phase 1	SI: -ve PO: unlikely CO: indirect EC: wherever there is potential Water Vole habitat adjacent to phase 1 SZ: likely to affect a small proportion of resident animals RE: not reversible DU: permanent TF: ongoing during operation	Slight negative	Slight adverse
		Ongoing disturbance of Water Voles utilising retained habitats surrounding phase 1	SI: -ve PO: unlikely CO: indirect EC: would be limited to small numbers of animals present close to the development footprint SZ: likely to affect a small proportion of resident animals RE: reversible DU: permanent TF: ongoing during operation	Slight negative	Slight adverse
Badgers	Lower	Disturbance to Badgers adjacent to the site during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC: limited to animals in setts close to the development during construction or mitigation area clearance SZ: likely to affect a small proportion of resident animals RE: reversible DU: temporary TF: could occur at any point during construction, though more likely to occur during earthworks	Slight negative	Slight adverse
		Injury/mortality to Badgers accessing site during construction or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC: limited to animals that access	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			the site during construction or mitigation area clearance SZ: likely to affect a small proportion of resident animals RE: reversible, dependant on injuries sustained, not reversible for mortality DU: temporary TF: could occur at any point during construction, though more likely to occur during earthworks		
		Loss of foraging and sett habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: probable CO: direct EC/SZ: minor area of existing resource RE: not reversible DU: permanent TF: one-off loss	Slight negative	Slight adverse
		Ongoing disturbance of Badgers utilising retained habitats surrounding phase 1	SI: -ve PO: unlikely CO: indirect EC: would be limited to small numbers of animals present close to the development footprint SZ: likely to affect a small proportion of resident animals RE: reversible DU: permanent TF: ongoing during operation	Slight negative	Slight adverse
Nesting birds	Medium	Loss of nesting bird habitat due to phase 2 development, including foraging habitat within territories for breeding pairs or creation of phase 2 mitigation area	SI: -ve PO: certain CO: direct EC/SZ: limited to the development/ mitigation area footprint which is a minor area of the existing resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of nesting birds due to phase 2 development or	SI: -ve PO: probable	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		creation of phase 2 mitigation area	CO: direct EC/SZ: limited to the development/ mitigation area footprint which is a minor area of the existing resource RE: not reversible DU: permanent TF: during site clearance activities taking place during the bird breeding season		
		Damage or destruction of active nests/eggs/dependant young due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: probable CO: direct EC/SZ: limited to the development/ mitigation area footprint which is a minor area of the existing resource RE: not reversible DU: permanent TF: during site clearance activities taking place during the bird breeding season	Slight negative	Slight adverse
		Disturbance to nesting birds (including potentially to birds listed on Schedule 1 of the WCA) in nearby retained habitat during phase 2 construction works or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development/ mitigation area clearance, depending on sensitivity of the species concerned RE: reversible DU: temporary TF: during construction activities taking place during the bird breeding season	Slight negative	Slight adverse
		Ongoing disturbance to birds utilising retained habitats surrounding phase 1	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development, depending on sensitivity of the species concerned RE: reversible DU: permanent TF: ongoing during operation,	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			during the breeding season (variable depending on the species concerned)		
Reptiles	Medium	Loss of slow worm, common lizard, adder and grass snake habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: certain CO: direct EC: 26.392ha within construction and mitigation sites (see Table 7.3.1b phase above) SZ: Development affects a small proportion of the area occupied by the reptile population RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of reptiles during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: likely CO: direct EC/SZ: likely to affect only a small proportion of population. Common lizard and slow worm are species most likely to be affected RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to reptiles in nearby retained habitat during phase 2 construction works or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development/ mitigation area, depending on sensitivity of the species concerned RE: reversible DU: temporary TF: during construction activities taking place during the active season	Slight negative	Slight adverse
		Fragmentation and isolation of habitats and populations due to the operation of phase 1	SI: -ve PO: unlikely CO: indirect EC: wherever reptiles are present in	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			adjacent habitats SZ: likely to affect only a small proportion of the local reptile populations RE: not reversible DU: permanent TF: ongoing during operation, during the active season		
		Ongoing disturbance to reptiles utilising retained habitats surrounding phase 1	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development, depending on sensitivity of the species concerned RE: reversible DU: permanent TF: ongoing during operation, during the active season	Slight negative	Slight adverse
Great Crested Newt	Very High	Loss of Great Crested Newt habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: certain CO: direct EC: 26.392ha within construction and mitigation sites (see Table 7.3.1b phase 2 above) pond 33 lost, no GCN and HSI below average as shown within the GCN HSI survey report, Section 2 page 24 Appendix 7.6 SZ: Development affects a small proportion of the area occupied by the GCN population RE: not reversible DU: permanent/ temporary if landscaping made suitable TF: one off loss	Moderate negative	Moderate adverse
		Injury/mortality of Great Crested Newts during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: likely CO: direct EC/SZ: likely to affect only a relatively small proportion of population due to location of	Moderate negative	Large adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			works away from confirmed breeding ponds RE: not reversible DU: permanent TF: one off loss		
		Disturbance to Great Crested Newt in nearby retained habitat during phase 2 construction works or creation of phase 2 mitigation area	SI: -ve PO: likely CO: indirect EC/SZ: limited to immediate vicinity of development/ mitigation area RE: reversible DU: temporary TF: during construction activities taking place during the active season	Slight negative	Slight adverse
		Fragmentation and isolation of habitats and populations due to the operation of phase 1, including breeding ponds	SI: -ve PO: unlikely CO: indirect EC: wherever GCN are present in adjacent habitats, no breeding ponds are affected at this stage SZ: likely to affect only a small proportion of the local GCN population RE: not reversible DU: permanent TF: ongoing during operation, during the active season	Slight negative	Slight adverse
		Ongoing disturbance to GCN utilising retained habitats surrounding phase 1	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development RE: reversible DU: permanent TF: ongoing during operation, during the active season	Slight negative	Slight adverse
Common frog, Common toad, Palmate newt and Smooth newt	Lower	Loss of amphibian habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: certain CO: direct EC: 26.392ha within construction	Moderate negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			and mitigation sites (see Table 7.3.1b phase 2 above) pond 33 lost, HSI below average, as shown within the GCN HSI survey report, Section 2 page 24 Appendix 7.6 SZ: Development affects a small proportion of the area occupied by the GCN population RE: not reversible DU: permanent TF: one off loss		
		Injury/mortality of amphibians during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: likely CO: direct EC/SZ: likely to affect only a small proportion of population due to location of works away from confirmed breeding ponds RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to amphibians in nearby retained habitat during phase 2 construction works or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development/ mitigation area, depending on sensitivity of the species concerned RE: reversible DU: temporary TF: during construction activities taking place during the active season	Slight negative	Slight adverse
		Fragmentation and isolation of habitats and populations due to the operation of phase 1, including aquatic habitats	SI: -ve PO: unlikely CO: indirect EC: wherever amphibians are present in adjacent habitats, no aquatic habitats affected by the operation of phase 1 SZ: likely to affect only a small	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			proportion of the local amphibian populations RE: not reversible DU: permanent TF: ongoing during operation, during the active season		
		Ongoing disturbance to amphibians utilising retained habitats surrounding phase 1	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development, depending on sensitivity of the species concerned RE: reversible DU: permanent TF: ongoing during operation, during the active season	Slight negative	Slight adverse
White-clawed Crayfish	Medium	Indirect loss of crayfish habitat due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: probable CO: indirect EC/SZ: Development/ mitigation clearance affects a small proportion of the area occupied by the crayfish population RE: not reversible DU: temporary TF: one off loss	Slight negative	Slight adverse
		Injury/mortality of crayfish during phase 2 construction or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: direct EC/SZ: likely to affect only a small proportion of population, if present, no watercourses present within mitigation areas RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse
		Disturbance to crayfish in nearby retained habitat during phase 2 construction works or creation of phase 2 mitigation area	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development, no watercourses	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			present within mitigation areas RE: reversible DU: temporary TF: during construction activities		
Invertebrates	Medium	Loss of habitats due to phase 2 development or creation of phase 2 mitigation area	SI: -ve PO: probable CO: direct EC: 26.392ha within development and mitigation areas (see Table 7.3.1b phase 2 above) SZ: Development affects a small proportion of the available habitat resource RE: not reversible DU: permanent TF: one off loss	Slight negative	Slight adverse

Phase 3

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Wye Valley and Forest of Dean Bat Sites SAC	Very high	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
River Wye SAC	Very high	No operational impacts expected	N/A	N/A	N/A
Wye Valley Woodlands SAC	Very high	No operational impacts expected	N/A	N/A	N/A
		Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
Severn Estuary SAC	Very high	No appreciable operational effects expected. Site located 9.29km to the southeast. No direct connectivity through hydrological	No perceptible traffic impact on A48 during phase 3 and imperceptible changes in noise and air pollution from the A48.	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		links and, although Cinderford Brook connects indirectly to the SAC via Blackpool Brook 5.9km to the south, the long distance, natural treatment of water upstream through actions such as dilution and settlement together with the predicted low risk of ground or surface water contamination during this phase at the Hybrid Application Site means no impact is predicted. Any noise or air quality impacts generated at Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48.	No increases in air pollution have been identified, with decreases in annual mean concentrations of air pollutants expected during phase 3 and given 9.29km distance no impact predicted on SAC.		
Walmore Common SPA and Ramsar Site	Very high	No appreciable effects are predicted. Site located 9.12km to the east. No direct or indirect connectivity through hydrological links. Any noise and air quality impacts generated at Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48	No perceptible traffic impact on A48 during phase 3 and imperceptible changes in noise and air pollution from the A48. No increases in air pollution have been identified, with decreases in annual mean concentrations of air pollutants expected during phase 3 and given 9.12km distance no impact predicted on SPA / Ramsar.	N/A	N/A
Severn Estuary SPA and Ramsar Site	Very high	No appreciable operational effects expected. Site located 9.29km to the southeast. No direct connectivity through hydrological links and, although Cinderford Brook connects indirectly to the SAC via Blackpool Brook 5.9km to the south, the long distance, natural treatment of water upstream through actions such as dilution and settlement together with the predicted low risk of ground or surface water	No perceptible traffic impact on A48 during phase 3 and imperceptible changes in noise and air pollution from the A48. No increases in air pollution have been identified, with decreases in annual mean concentrations of air pollutants expected during phase 3 and given 9.29km distance no impact predicted on SAC.	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		contamination during this phase at the Hybrid Application Site means no impact is predicted. Any noise or air quality impacts generated at Hybrid Application Site not significant to extend this distance and imperceptible changes in noise and air quality from the A48.			
Westbury Brook Ironstone Mine SSSI	High	No operational impacts expected	N/A	N/A	N/A
		Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Edgehills Quarry SSSI	High	No operational impacts expected	N/A	N/A	N/A
Puddlebrook Quarry SSSI	High	No operational impacts expected	N/A	N/A	N/A
Stenders Quarry SSSI	High	No operational impacts expected	N/A	N/A	N/A
Speech House Oaks SSSI	High	No significant operational effects expected. Site located 2.68km to the southwest, no direct connectivity through hydrological links and noise and air quality impacts not significant to extend this distance. Air quality impacts from B4226 limited to 20 metres from the roadside	No perceptible traffic impact on B4226 during phase 3. Air quality impacts from B4226 limited to 20 metres from the roadside	N/A	N/A
Scully Grove Quarry SSSI	High	No operational impacts expected	N/A	N/A	N/A
Buckshaft Mine and Bradley Hill SSSI	High	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Dean Hall Coach House and Cellar SSSI	High	Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Wigpool Ironstone Mine SSSI	High	Impacts on Lesser Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Moderate negative	Large adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Impacts on Greater Horseshoe Bat populations (refer to the 'bats' section below for details)	Impacts have been characterised under individual impacts within the 'bats' section below	Slight negative	Slight adverse
Soudley Ponds SSSI	High	No operational impacts expected	N/A	N/A	N/A
Land Grove Quarry, Micheldean SSSI	High	No operational impacts expected	N/A	N/A	N/A
Wood Green Quarry and Railway Cut	High	No operational impacts expected	N/A	N/A	N/A
Laymoor Quag GWT Nature Reserve	Lower	No operational impacts expected	N/A	N/A	N/A
Woorgreens Lake and Marsh, Crabtree Hill & Foxes Bridge GWT Nature Reserve and KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Edgehills Bog GWT Nature Reserve and KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Plump Hill Dolomite Quarry GWT Nature Reserve and KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Hawkwell Inclosure KWS	Lower	Indirect impacts associated with phase 3	Impacts have been characterised under individual impacts within the species sections below	Moderate negative	Slight adverse
Cinderford Linear Park KWS	Lower	Indirect impacts associated with phase 3	Impacts have been characterised under individual impacts within the species sections below	Moderate negative	Slight adverse
Serridge Green KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Heywood Inclosure KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Ruardean Hill KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Fairplay Iron Mine Reservoir KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Merring Meend KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Westbury Brook Mine Reservoir KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Plump Hill Picnic Site KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Cinderford Roughs KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Dilke Pond KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Serridge Inclosure KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Wilderness Field Centre KWS	Lower	No operational impacts expected	N/A	N/A	N/A
Micheldean Meend	Lower	No operational impacts expected	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Marsh KWS					
Buildings and hard standing	Negligible	No operational impacts expected	N/A	N/A	N/A
Coniferous plantation woodland	Lower	No operational impacts expected	N/A	N/A	N/A
Broad-leaved plantation woodland	Lower	No operational impacts expected	N/A	N/A	N/A
Mixed plantation woodland (s41 Lowland Mixed Deciduous Woodland Habitat)	Lower	No operational impacts expected	N/A	N/A	N/A
Scattered Broad-leaved Trees	Lower	No operational impacts expected	N/A	N/A	N/A
Dense and scattered scrub	Lower	No operational impacts expected	N/A	N/A	N/A
Semi-improved neutral grassland	Medium	No operational impacts expected ditto	N/A	N/A	N/A
Poor semi-improved grassland	Negligible	No operational impacts expected	N/A	N/A	N/A
Bare Ground	Negligible	No operational impacts expected	N/A	N/A	N/A
Spoil	Negligible	No operational impacts expected	N/A	N/A	N/A
Heath (s41 Lowland Heath Habitat)	Medium	No operational impacts expected	N/A	N/A	N/A
Standing Water (s41 Ponds and Rivers Habitat)	Medium	No operational impacts expected	N/A	N/A	N/A
Running Water (s41 Ponds and Rivers Habitat)	Medium	No operational impacts expected	N/A	N/A	N/A
Ditches	Negligible	No operational impacts expected	N/A	N/A	N/A
Lesser Horseshoe Bat Maternity Roosts (Office Building, Bath House and Canteen) – also used by other species in low numbers (Common and Soprano Pipistrelle, Brown Long-eared and Bechstein's)	Very High	Feature already removed as part of phase 2 development therefore no operational impacts	N/A	N/A	N/A

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Trees suitable for roosting bats	Medium	Disturbance of tree roosts during operation through increased activity, particularly lighting and noise	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to retained roosts. Represents a small proportion of local resource RE: not reversible DU: permanent TF: impacts would occur during first active bat season following completion	Moderate negative	Moderate adverse
Commuting and foraging Lesser Horseshoe, Greater Horseshoe, Barbastelle and Bechstein's Bats	Very High	Disturbance and fragmentation of commuting routes and foraging habitats	SI: -ve PO: certain CO: direct and indirect EC/SZ: limited to areas where commuting bats have been identified which includes 2 major and 1 minor flyways for Lesser Horseshoe Bats (as shown on Figure 7.4) RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Moderate negative	Large adverse
		Injury/mortality of bats through vehicle collisions, particularly along spine road	SI: -ve PO: unlikely CO: direct EC/SZ: limited to areas where commuting bats have been identified which includes 2 major and 1 minor flyways for Lesser Horseshoe Bats (as shown on Figure 7.4) RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Moderate negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Commuting and foraging Nathusius Pipistrelles, other Myotis Sp., Brown Long-eared, Noctule, Leisler's and Serotine Bats	Medium	Disturbance and fragmentation of commuting routes and foraging habitats	SI: -ve PO: certain CO: direct and indirect EC/SZ: limited to areas where commuting bats have been identified RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Slight negative	Slight adverse
		Injury/mortality of bats through vehicle collisions particularly along spine road	SI: -ve PO: unlikely CO: direct EC/SZ: limited to areas where commuting bats have been identified RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Slight negative	Slight adverse
Commuting and Foraging Common and Soprano Pipistrelles	Lower	Disturbance and fragmentation of commuting routes and foraging habitats	SI: -ve PO: certain CO: direct and indirect EC/SZ: limited to areas where commuting bats have been identified RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Injury/mortality of bats through vehicle collisions particularly along spine road	SI: -ve PO: unlikely CO: direct EC/SZ: limited to areas where commuting bats have been identified RE: not reversible DU: permanent TF: ongoing during operation of phase 1, during the summer months	Slight negative	Slight adverse
Dormice	Medium	10. Fragmentation of habitats and populations	SI: -ve PO: unlikely CO: indirect EC: wherever dormice are present in adjacent vegetation SZ: likely to affect only a small proportion of the local dormouse population, potential isolation of small numbers RE: not reversible DU: permanent TF: ongoing during operation, primarily during the summer months when dormice are active	Moderate negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Ongoing disturbance of dormice in retained habitats	SI: -ve PO: probable CO: indirect EC: would be limited to small numbers of animals present close to the development footprint SZ: likely to affect only a small proportion of the local dormouse population RE: reversible DU: permanent TF: ongoing during operation, primarily during the summer months when dormice are active	Slight negative	Slight adverse
11. Otters	12. Lower	13. Fragmentation of habitats and populations	SI: -ve PO: unlikely CO: indirect EC: wherever there is potential Otter adjacent habitat, particularly where watercourses are crossed SZ: likely to affect a small proportion of resident animals RE: not reversible DU: permanent TF: ongoing during operation	Moderate negative	Slight adverse
		Ongoing disturbance of Otters utilising retained habitats	SI: -ve PO: unlikely CO: indirect EC: would be limited to small numbers of animals present close to the development footprint SZ: likely to affect a small proportion of resident animals RE: reversible DU: permanent TF: ongoing during operation	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Water Vole	Lower	14. Fragmentation of habitats and populations	SI: -ve PO: unlikely CO: indirect EC: wherever there is potential Water Vole adjacent habitat SZ: likely to affect a small proportion of resident animals RE: not reversible DU: permanent TF: ongoing during operation	Moderate negative	Slight adverse
		Ongoing disturbance of Water Voles utilising retained habitats	SI: -ve PO: unlikely CO: indirect EC: would be limited to small numbers of animals present close to the development footprint SZ: likely to affect a small proportion of resident animals RE: reversible DU: permanent TF: ongoing during operation	Slight negative	Slight adverse
Badgers	Lower	15. Ongoing disturbance of Badgers utilising retained habitats	SI: -ve PO: unlikely CO: indirect EC: would be limited to small numbers of animals present close to the development footprint SZ: likely to affect a small proportion of resident animals RE: reversible DU: permanent TF: ongoing during operation	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Nesting birds	Medium	16. Ongoing disturbance to birds utilising retained habitats surrounding phase 3	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development, depending on sensitivity of the species concerned RE: reversible DU: permanent TF: ongoing during operation, during the breeding season (variable depending on the species concerned)	Slight negative	Slight adverse
Reptiles	Medium	17. Fragmentation and isolation of habitats and populations	SI: -ve PO: unlikely CO: indirect EC: wherever reptiles are present in adjacent habitats SZ: likely to affect only a small proportion of the local reptile populations RE: not reversible DU: permanent TF: ongoing during operation, during the active season	Moderate negative	Moderate adverse
		Ongoing disturbance to reptiles utilising retained habitats	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development, depending on sensitivity of the species concerned RE: reversible DU: permanent TF: ongoing during operation, during the active season	Slight negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Great Crested Newt	Very High	18. Fragmentation and isolation of habitats and populations, including breeding ponds	SI: -ve PO: unlikely CO: indirect EC: wherever GCN are present in adjacent habitats, 1 breeding pond affected, low numbers recorded (as shown within the GCN survey report, Section 3 page 25 Appendix 7.6) SZ: likely to affect only a small proportion of the local GCN population RE: not reversible DU: permanent TF: ongoing during operation, during the active season	Moderate negative	Moderate adverse
		Ongoing disturbance to GCN utilising retained habitats	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development RE: reversible DU: permanent TF: ongoing during operation, during the active season	Slight negative	Slight adverse
Common frog, Common toad, Palmate newt and Smooth newt	Lower	19. Fragmentation and isolation of habitats and populations, including aquatic habitats	SI: -ve PO: unlikely CO: indirect EC: wherever amphibians are present in adjacent habitats, 1 pond affected (as shown within the GCN survey report, Section 3 page 25 Appendix 7.6) SZ: likely to affect only a small proportion of the local amphibian populations RE: not reversible DU: permanent TF: ongoing during operation, during the active season	Moderate negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Ongoing disturbance to amphibians utilising retained habitats	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of development, depending on sensitivity of the species concerned RE: reversible DU: permanent TF: ongoing during operation, during the active season	Slight negative	Slight adverse
White-clawed Crayfish	Medium	No operational impacts expected	N/A	N/A	N/A
Invertebrates	Medium	No operational impacts expected	N/A	N/A	N/A