



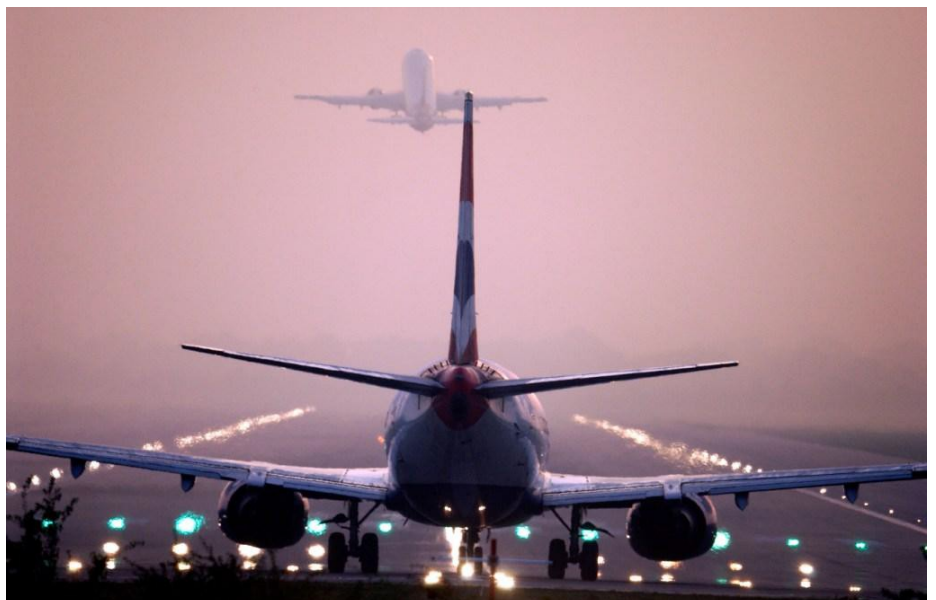
A Second Runway for Gatwick Appendix

A10

Biodiversity

GATWICK R2

UPDATED SCHEME DESIGN
FOR AIRPORTS COMMISSION
MAY 2014

BIODIVERSITY APPENDIX

May 2014
Our Ref: OXF8027

RPS

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EXECUTIVE SUMMARY

- S1 This report sets out the assessment of potential effects on biodiversity arising from the updated scheme design for a second runway at Gatwick Airport. This report responds to the 'Biodiversity' topic module as defined in the Airports Commission (Commission) Appraisal Framework, the aim of which is to avoid harm to biodiversity and where possible provide biodiversity net gains by protecting natural habitats and maintaining biodiversity, including through avoidance and mitigation of impacts. This assessment aims to allow the Commission to understand where impacts on biodiversity and ecosystem services including air quality, noise and management with respect to bird strikes may occur and how they ought to be quantified and addressed. The Commission identify two distinct components to be considered in the module::
- Designated sites, protected and priority species and habitats, habitats regulations screening; and
 - Ecosystem services.
- S2 The area over which baseline features have been identified, the study area, is primarily based on five zones defined by the present boundary of Gatwick Airport; the boundary of the updated scheme design (operational and land-take) and 2, 10 and 15 km boundaries in relation to such aspects as species records and aerial emissions.
- S3 There are two Special Areas of Conservation (SACs) (Ashdown Forest SAC and Mole Gap to Reigate Escarpment SAC) and one Special Protection Area (SPA) (which has the same boundary as Ashdown Forest SAC), parts of which fall into the 15 km boundary of the outer study area. Both Ashdown Forest SAC and SPA and Mole to Reigate Escarpment SAC are also Sites of Special Scientific Interest (SSSIs) although not all of Ashdown Forest SSSI and Mole Gap to Reigate Escarpment SSSI are SAC and SPA or SAC respectively.
- S4 There are 14 biological Sites of Special Scientific Interest (SSSIs) and 17 Local Nature Reserves within the 10 km radius of which one SSSI and three LNRs are within the 2 km boundary.
- S5 There are nine non-statutory designated sites, Sites of Nature Conservation Importance (SNCI) within 2 km of the boundary of Gatwick Airport. Of these there are just two which would be impacted by proposed airport development:
- S6 The baseline conditions with respect to biodiversity and ecosystem services are informed by the Low Weald National Character Area (NCA). Gatwick Airport lies in the Low Weald NCA and is also in the Upper Mole catchment which drains to the north. The land use to north, west and south-west is arable agriculture with occasional small settlements. The agriculture immediately to the south includes grassland and the fields are smaller with hedgerows. To the west and south-west about 2-3 km from the Airport are areas of woodland, some relatively large and there are more woodlands in the south-eastern corner of the Airport. The north-east and beyond the belt of agriculture to the south are urban habitat, parts of Horley and

Crawley respectively. The habitats of likely significance were identified as lowland woodlands, some of which is ancient woodland, veteran trees, grassland, hedgerows and watercourses (rivers and brooks) and standing open water (ponds).

S7 A number of protected species are known to occur in the immediate environs of Gatwick Airport including:

- Great Crested Newt;
- reptile species
- Badger; and
- bats.

S8 A thorough review has been undertaken of the likely effects of the proposed development on the biodiversity and ecosystem services in and around Gatwick Airport. An overall evaluation at this stage is that the effect of the proposed expansion of Gatwick Airport is a significant enhancement in biodiversity, taking into account Gatwick Airport's commitment to necessary mitigation and compensation and enhancement where appropriate:

- There would be no adverse impacts on any sites designated internationally or nationally for their biodiversity value;
- There would be an adverse impact on two Sites of Interest for Nature Conservation, one of which is a Local Nature Reserve;
- There would be an adverse impact on lowland deciduous woodland habitat, including small areas of ancient woodland and on hedgerows, some of which are ancient hedgerows, for which, post mitigation, compensation and enhancement, the overall effect would be highly supportive in the case of woodlands and neutral-supportive for hedgerows;
- There would be an adverse effect on lowland meadows for which, post mitigation the effect would be neutral-supportive;
- The realignment of the River Mole and its tributaries to accommodate the expansion would result in a net improvement to the watercourses, e.g. hydromorphology, biodiversity and eradication of invasive non-native species in conjunction with the Environment Agency with the removal of the length of watercourse presently underground in culvert and replacement of significant lengths presently in canalized concrete channels, overall achieving a highly supportive performance;
- There would be an adverse effect on standing waters including ponds for which, post mitigation and enhancement, the performance would be supportive;
- There would be neutral impacts on protected species including Great Crested Newt, and Grass Snake;

- The performance of the scheme on ecosystem services is almost entirely at a local level. The effects are either neutral or where there is scope for an adverse effect would be neutral or supportive with appropriate mitigation and compensation. For water quality and water regulation services, the impact is both local and regional with the performance ranging from highly supportive to supportive;
- Opportunities have been identified to achieve mitigation, compensation and to achieve an overall significant enhancement in biodiversity including establishing new areas of habitat, supporting long term management of habitats and re-establishment of species lost from the area, e.g. Water Vole and Otter;
- It is recommended that the majority of the mitigation, compensation and enhancement would be delivered through biodiversity offsetting in consultation with the Sussex Local Nature Partnership; and
- Some of the mitigation, compensation and enhancement would be directed at strengthening and extending the Biodiversity Opportunity Areas and other green infrastructure.

- S9 The airport will continue to be required to control and where possible reduce bird hazard within and around its environs, and the Civil Aviation Authority (CAA) will expect that bird hazard is not increased as a result of the scheme. This will require an understanding of the risks that the present habitat poses to aircraft operations and also the extent of the development in respect of the mosaic of surrounding habitats in the Low Weald NCA. In developing the scheme Gatwick will consult with the CAA, Natural England and the Environment Agency.
- S10 It is important to plan and develop a mitigation, compensation and enhancement strategy early on in conjunction with local stakeholders, e.g. through the Sussex Local Nature Partnership and the Environment Agency to ensure the maximum value is achieved from the biodiversity offsetting and minimise constraints and delays to the development programme.
- S11 Overall, the proposed development would result in a significant enhancement of biodiversity and in certain ecosystem services, some at a regional level that would be sustained into the future.
- S12 The assessment has also considered the potential implications of an alternative masterplan scheme that includes the provision of end around taxiways to reduce or eliminate the need for aircraft to cross the existing runway. Overall, based on the limited additional loss of woodland and hedgerow, it is assessed that there would be no change in the performance of the potential scheme with the end around taxiway compared to the scheme without the taxiway.

1 INTRODUCTION

- 1.1 This report sets out the assessment of potential effects on biodiversity arising from the updated scheme design for a second runway at Gatwick Airport, responding to the Biodiversity topic module as defined in the Airports Commission's (Commission) Appraisal Framework, the aim of which is to avoid harm to biodiversity and where possible provide biodiversity net gains by protecting natural habitats and maintaining biodiversity, including through avoidance and mitigation of impacts.
- 1.2 This assessment aims to allow the Commission to understand where impacts on biodiversity and ecosystem services may occur and how they ought to be quantified and addressed. There are two key components:
- Designated sites, protected and priority species and habitats, habitats regulations screening; and
 - Ecosystem services.

2 METHODOLOGY

Relevant Guidance

The Appraisal Framework

- 2.1 The Commission's Appraisal Framework sets out the approach to be taken to the appraisal and the information being sought by the Commission to undertake it. Appendix A, Module 7 of the Appraisal Framework: Biodiversity consists of two key elements: the biodiversity assessment and the ecosystem services assessment.
- 2.2 The Appraisal Framework requires that the biodiversity assessment identifies the sites of particular biodiversity interest, such as designated sites of international, national and local importance, protected and priority species and habitats present in the areas around Gatwick Airport. This is set out in Section 3 of this report. Environmental capital has been assigned to these resources, correlating to the level of protection they are placed under in international, European or national legislation, or local protection policies. Details of the habitats that may be affected by the project are set out in Section 3 of this report, with likely impacts set out in Section 5.
- 2.3 A review of the impact on ecosystem services, as defined in Natural England's National Character Areas (NCA) publications, has been undertaken at a high level, informed in particular by the profile of the Low Weald NCA area within which Gatwick Airport is located (See Section 4 of this report). The NCA profile provides a strategic context for any potential infrastructure development. A full account of the ecosystem services assessment is presented in Appendix 3.
- 2.4 The ecosystem services review covers the broad geographical area surrounding the airport. The value of an ecosystem services approach is that it enables a wider range of impacts on ecosystems and the benefits they provide to society to be captured and considered than a simple biodiversity assessment. The review is contained in Appendix 3 and summarised in Section 4.

Other Relevant Guidance

- 2.5 Relevant guidance additional to The Commission's guidance has been taken into account within this assessment:
- British Standards Institution (2013) BS 42020: 2013 Biodiversity. Code of Practice for Planning and Development;
 - Department for Communities and Local Government (2014) Planning Practice Guidance: Natural Environment – Biodiversity, Ecosystems and Green Infrastructure;
 - Institute of Ecology and Environmental Management (2006) Guidelines for Ecological Impact Assessment in the United Kingdom;

- Institute of Environmental Assessment (1995) Guidelines for Baseline Ecological Assessment; and
- Highways Agency (1993) Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 4 Ecology and Nature Conservation.

Study Area

- 2.6 The area over which baseline features have been identified, the study area, is primarily based on five zones and additionally the takeoff and landing corridors to the east and west of Gatwick Airport (Figure 1).
- 2.7 The five zones are defined by:
- Zone 1, the land between the present boundary of Gatwick Airport and the operational boundary of the updated scheme design;
 - Zone 2, the land between the present boundary of Gatwick Airport and the land take boundary of the updated scheme design;
 - Zone 3, the land between the present boundary and a boundary 2 km from this (the standard zone within which to search for species and habitat information);
 - Zone 4, the present boundary to a 10 km boundary; and
 - Zone 5, the present boundary to a 15 km boundary.
- 2.8 Based on the Environment Agency's H1 Annex F – Air Emissions, the impacts of aerial emissions on conservation sites need to be considered where they fall within set distances of the activity. For SPAs and SACs, the distance is within 10 km of the installation (or 15 km coal or oil-fired power station), for Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Local Nature Reserves (LNRs), local wildlife sites and ancient woodland, it is within 2 km of the location of the installation. On a precautionary basis, the impacts of aerial emissions were considered up to 15 km from the airport.
- 2.9 The protected obstacle limitation surfaces, as required by the CAA's CAP168 (Licensing of Aerodromes) document are shown in Figure 1. CAP168 defines the boundaries of the two principal corridors, which in plan view are wedge shaped and relate to the configuration of the runway. These provide height limits for obstacles so as not to infringe designated take off climb (TOCS) and approach surfaces (APPS) associated with each runway direction.

Data Sources

- 2.10 The baseline for the biodiversity assessment has been defined by identifying all biodiversity features of international, national and local importance that may be affected by the airport schemes, comprising:

European protected sites and species:

- Special Areas of Conservation (SAC);

- Special Protection Areas (SPA);
- Ramsar sites; and
- European Protected Species.

Sites that have the same protection as sites in European protected sites:

- Candidate Special Protection Areas;
- Candidate Special Areas of Conservation;
- Candidate Ramsar sites; and
- Sites identified as essential for compensatory measures to mitigate adverse effects on SACs, SPAs and listed Ramsar sites.

Nationally protected sites and species:

- National Nature Reserves (NNR);
- Sites of Special Scientific Interest (SSSI);
- Ancient Woodlands;
- Marine Conservation Zones;
- Species protected under the Wildlife and Countryside Act;
- Priority habitats and sites holding priority species (including Section 41 of the Natural Environment and Rural Communities Act 2006); and
- Habitats and species listed in the Red Data Book.

Regional and locally protected sites and species:

- Local Wildlife Sites;
- Local Nature Reserves; and
- Species in local Biodiversity Action Plans.

2.11 As guided by the Commission's Appraisal Framework, relevant information on statutory and non-statutory nature conservation sites and protected species was consulted including:

- Joint Nature Conservation Committee or information on European sites;
- Information on boundaries and citations for NNRs and SSSIs from Nature on the Map, Natural England;
- Information on citations for LNRs from Natural England and from local authorities;

- Aviation Sensitivity Maps (Natural England, 2013) which identify nationally and internationally designated terrestrial nature conservation sites and protected landscapes within a range of 0-22 km from airports, depending on the features of interest of the receptor site that are likely to be sensitive to aviation impacts;
 - Citations and boundaries for Local Wildlife Sites in Sussex and Surrey from the Sussex Biodiversity Records Centre and the Surrey Biodiversity Information Centre;
 - The GIS Digital Boundary Datasets held by Natural England;
 - Information on the Low Weald National Character Area (NCA), biodiversity trends and ecosystem services held by Natural England; and
 - The Biodiversity Action Reporting System and the National Biodiversity Network Gateway with reference being made to the UK post 2010 Biodiversity Framework and the Biodiversity 2020 Strategy for England when considering impacts on biodiversity.
- 2.12 Where it has been possible to articulate a clear trend for the biodiversity within these sites, this forms part of the assessment baseline.
- 2.13 Additional to guidance in the Commission's Appraisal Framework, species and habitat data/records have been collated from a range of other sources including:
- Site and habitat assessments undertaken by RPS ecologists and arboriculturalist from public rights of way;
 - An outline study was undertaken of trees, woodland and habitat within the Take-Off Climb and Approach Surfaces of the updated scheme design;
 - Data from surveys undertaken by Biodiversity Gatwick;
 - Chris Blandford Associates 2010. Gatwick Airport Ecological Review. A report for London Gatwick Airport which provides a full summary of the biodiversity of Gatwick Airport's current estate;
 - Hedgerow data from the Sussex Hedgerow Inventory Project co-ordinated by the Sussex Biodiversity Records Centre;
 - Published atlases and other accounts of the flora and fauna of Sussex and Surrey (see Appendix 1);
 - Data from the Biodiversity/Ecology chapters and reports of planning applications undertaken within the 2 km boundary; and
 - Miscellaneous data found searching the Internet.
- 2.14 The data collated from these sources and those as advised in the Commission's Appraisal Framework were accumulated into a database. The database was designed to enable the distributions of the various species to be mapped out and analysed.

- 2.15 The role of local naturalists and ecologists in the compilation of much of the above data, publications and reports is acknowledged. The societies and trusts of which many of these naturalists and ecologists are members play a front line role, directly engaging and enthusing the public about biodiversity. Gatwick Airport recognizes the importance of engaging more people in biodiversity issues and is committed to working with “the local community” “to engage more people and empower them to make a difference” (Biodiversity 2020).
- 2.16 The baseline for ecosystem services has been defined by identifying the performance of the identified ecosystem services within the context of the National Character Area (NCA). Assessments also consider the ecological opportunities identified in the NCA and related documents (Appendix 3).

Consultation

- 2.17 Consultation has been undertaken with a number of stakeholders. The aims of this consultation were wide ranging and included eliciting comment on extent of the study area, methodologies and anticipated impacts.
- 2.18 Biodiversity Gatwick has a substantial database of biodiversity information for Gatwick airport's estate which has been made available and was valuable in this assessment. Biodiversity Gatwick is funded and coordinated by Gatwick Airport and, in addition to direct professional input through the Airport, this includes support from airport organisations (e.g. British Airways Engineering) and works with the Sussex and Surrey Wildlife Trusts, local groups and other volunteers to survey manage and enhance habitat areas at Gatwick. The conservation works undertaken by Biodiversity Gatwick are reported through the Biodiversity Action Reporting System (BARS).
- 2.19 Gatwick Airport also actively supports and sponsors the Gatwick Greenspace Partnership, which forms part of the Sussex Wildlife Trust working across 200 sq. km of countryside around Gatwick Airport. The partnership has helped the airport to develop indicators to evaluate its performance on managing and maintaining biodiversity that are being tracked on an annual basis to quantify the overall health of the natural habitats and biodiversity within the boundary of the airport.
- 2.20 The consultations are summarised in Table 2.1.

Table 2.1: Consultation Responses Relevant to this Chapter

Date	Consultee and Issues Raised	How/ Where Addressed
27 th November 2013	Natural England: Review of assessments undertaken of internationally and nationally significant sites and species and approaches to mitigation, compensation and enhancement.	Acceptance that there are no effects on internationally and nationally significant sites. Approval of approach to protected species
13 th November 2013; 13 th February 2014; 22 nd January,	Environment Agency (including Biodiversity Officer): Issues focussed on river diversions, flood alleviation and Water Framework Directive matters.	Recognition of potential for biodiversity gain from river diversions and associated restoration

Date	Consultee and Issues Raised	How/ Where Addressed
14 th and 26 th March 2014;		
3 rd February and 2 nd March 2014	Biodiversity Gatwick: Review of aims and objectives, achievements, data collected and surveys planned	<p>Impressive aims, objectives and achievements. Substantial data on on-site habitats and species.</p> <p>Ongoing on site survey programme. Strong links with the Surrey and Sussex Wildlife Trusts and local stakeholder groups.</p> <p>Demonstration of Gatwick Airport's long standing commitment to biodiversity management and monitoring.</p>

Assessment Criteria

- 2.21 In order to establish the performance of the updated scheme design relative to the objectives, it was necessary to consider the likely effects of the scheme. Where appropriate, the methodologies used to assess the likely effects are based on those prescribed by the Chartered Institute of Ecology and Environmental Management (CIEEM).
- 2.22 Biodiversity and ecosystem services are very much integrated into and affected by other topic areas. An important part of the overall methodology has therefore included liaison, discussion and interaction with the specialists working on these topics. Of particular importance are Noise, Air Quality and Water and Flood Risk. This involved reading relevant outputs and related documents, one-to-one meetings, team meetings and contributing to workshops.
- 2.23 Potential avoidance, mitigation, compensation and enhancement strategies have been identified and post-mitigation impacts are defined. The former were based on considering a range of options linked to the habitats and species that would be impacted. A review was undertaken of other large contemporary projects elsewhere in the country and the approaches adopted by these projects.
- 2.24 In order to provide information to assist the Commission in determining the performance of the updated scheme design against the Biodiversity objective, information has been provided in response to a series of Gatwick Airport sustainability sub-objectives. These are to be found in Gatwick's Sustainability Assessment.

Assessment of Effects on Biodiversity Features

Sensitivity/Importance of Ecological Receptors

- 2.25 Sites, habitats and known species populations within the study area have been evaluated with reference to their importance in terms of biodiversity conservation and the need to conserve representative areas of habitats and genetic diversity of species populations.
- 2.26 Valued ecological receptors are habitats or species that are of conservation concern and that could be affected by a project.

2.27 For the purposes of this assessment, sites, habitats, species populations and species assemblages have been valued using the following scale:

- International;
- UK or national;
- Regional/County;
- District; or
- Parish/Local.

2.28 Assessing the value of features requires consideration of both existing and future predicted baseline conditions. Therefore, the description and valuation of ecological features takes account of any likely changes, including for example, trends in the population size or distribution of species, likely changes to the extent of habitats and the effects of other proposed developments or land use changes.

Magnitude of Impact

2.29 The likely impacts have been determined in terms of the:

- The likely magnitude of impacts of the updated scheme design based on the scale of predicted change including also consideration of the airport's likely operations, and hence the ecological impacts of bird strike control measures, the ecological impacts of noise and the ecological impacts of changes to air quality;
- The duration of the effect; and
- The reversibility of the effect.

2.30 Table 2.2 below sets out the definitions used within this assessment:

Table 2.2: Magnitude of Impact

Magnitude	Criteria
High	The proposal may affect the conservation status of the site or feature.
Medium	The site or feature's conservation status will not be affected, but the effect is likely to be significant in terms of ecological objectives or populations. If, in the light of full information, it cannot be clearly demonstrated that the proposal will not have an adverse effect on conservation objectives, then the effect should be assessed as high.
Low	Neither of the above applies but some minor effect is likely.
Negligible	Some very limited effects may occur.
No Change	No observable effects.

Assessment of Overall Performance

- 2.31 Having identified the magnitude of impact and the sensitivity of the receptor, these inform the assessment of overall performance. This assessment is based on professional judgement, the approach set out in the Appraisal Framework (paragraph 5.24) and the following scale of effects based on that proposed by the Airports Commission:
- Highly supportive: positive impacts are substantial, or substantially accelerate an improving trend, or substantially decelerate a declining trend;
 - Supportive: positive impacts are notable, or accelerate an improving trend, or decelerate a declining trend;
 - Neutral: no impacts, or on balance (taking account of positive and negative impacts) a neutral outcome occurs;
 - Adverse: negative impacts are notable, or decelerate an improving trend, or accelerate a declining trend; and
 - Highly adverse: negative impacts are substantial, or substantially decelerate an improving trend, or substantially accelerate a declining trend.
- 2.32 Net gains to biodiversity have been captured in this methodology.
- 2.33 Professional judgment on the available scientific evidence has been used to provide reasoned and expert opinions on these criteria. Appropriate consideration has been given to receptor pathway links between habitats, e.g. continuity and green infrastructure.

Assessment of Effects on Ecosystems Services

- 2.34 With regard to the ecosystem services assessment, impacts have been assessed at a high level in terms of the two key drivers of ecosystem change:
- Land use change, resulting from land-take for infrastructure (airport and surface access) and the mitigation, enhancement and compensation measures included in the scheme; and
 - Hydrological change and pollution, e.g. resulting from river diversions and restoration, changes in surface access and air traffic.
- 2.35 The steps involved in defining the impact on ecosystem services were categorized by:
- Defining the environmental stock using previously produced high-level habitat maps, such as those created in conjunction with Natural England's work linking National Ecosystem Assessment to broad habitat types;
 - Identifying the environmental impact of the updated scheme design on a given service;

- Estimating cost or benefit, in terms of the change to a given ecosystem service at a strategic, qualitative level by identifying potential key impacts at a high level rather than undertaking an exhaustive assessment; and
- Sensitivity analysis if necessary.

2.36 The ecosystem services approach is described more fully in Appendix 3.

3 BASELINE CONDITIONS

Planning and Regulatory Context

Legislation

- 3.1 The legislation set out below is relevant to wildlife and nature conservation:

The Conservation of Habitats and Species Regulations (2010), as amended

- 3.2 Conservation of Habitats and Species Regulations 2010 and the Conservation of Habitats and Species (Amendment) Regulations 2012 transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law. Species listed in Schedule 2 of the regulations are known as European protected species. It is an offence to deliberately capture or kill a wild animal of a European protected species; to deliberately disturb any such animal; to deliberately take or destroy the eggs of such an animal; or to damage or destroy a breeding site or resting place of such an animal. This applies to all life stages of the animals.

- 3.3 However, these actions can be made lawful through the granting of licenses by Natural England. Licenses may be granted for a number of purposes (such as science and education, conservation, preserving public health and safety), but only after the appropriate authority is satisfied that there are no satisfactory alternatives and that such actions will have no detrimental effect on the wild population of the species concerned. Schedule 5 lists European protected species of plants.

The Wildlife & Countryside Act (1981), as amended

Section 1, Schedule 1

- 3.4 Section 1 of the Act prohibits the intentional killing, injuring or taking of any wild bird and the taking, damaging or destroying of the nest (whilst being built or in use) or eggs. It prohibits possession of wild birds (dead or alive) or their eggs.
- 3.5 There are additional penalties for offences relating to birds listed on Schedule 1 of the Act. It is an offence to intentionally or recklessly disturb those birds while the bird is building a nest or is in, on or near a nest containing eggs or young and it is an offence to intentionally or recklessly disturb dependent young of such a bird.

Schedule 5

- 3.6 Fauna listed on Schedule 5 of the Act are protected fully or partially under section 9, as outlined below:
- Section 9.1 of the Act makes it an offence to intentionally kill, injure or take any wild animal included in Schedule 5.
 - Section 9.2 makes it an offence to possess an animal or anything derived from an animal included on Schedule 5.

- Section 9.4 makes it an offence to intentionally or recklessly damage or destroy, or obstruct access to, any structure or place which any wild animal included in Schedule 5 uses for shelter or protection and to disturb any such animal while it is occupying a structure or places which it uses for that purpose.
- Section 9.5 makes it an offence to sell or expose for sale an animal included in Schedule 5.

Schedule 8

- 3.7 The Act makes it an offence (subject to exceptions) to pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants.
- 3.8 All actions prohibited by the Wildlife and Countryside Act 1981 can be made legal by licensing by Natural England.

The Natural Environment and Rural Communities Act (2006)

- 3.9 The Natural Environment and Rural Communities Act (2006) makes provision for bodies concerned with the natural environment and rural communities, wildlife, Sites of Special Scientific Interest, National Parks and the Broads; the Inland Waterways Amenity Advisory Council and amends the law relating to rights of way. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitat types and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England, as required by the Act.
- 3.10 The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the NERC Act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.
- 3.11 Fifty six habitats of principal importance are included on the S41 list. These are all the habitats in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. They include terrestrial habitats such as upland hay meadows, lowland mixed deciduous woodland and freshwater and marine habitats such as ponds and sub-tidal sands and gravels.
- 3.12 There are 943 species of principal importance included on the S41 list. These are the species found in England which were identified as requiring action under the UK BAP and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework. In addition, the Hen Harrier has also been included on the list because without continued conservation action it is unlikely that the Hen Harrier population would increase from its current very low levels in England.
- 3.13 In accordance with Section 41(4) the Secretary of State would, in consultation with Natural England, keep this list under review and would publish a revised list if necessary.

The Countryside and Rights of Way Act (2000)

- 3.14 The Countryside and Rights of Way (CRoW) Act, which became law in England and Wales in November 2000, made amendments to the Wildlife and Countryside Act (1981). Part 3 of the CRoW Act deals with Nature Conservation and Wildlife Protection. It includes three wildlife measures concerning SSSIs and other designations; enforcement of wildlife legislation and biological diversity. The Act strengthens the enforcement provisions against wildlife offences laid down in Part 1 of the Wildlife and Countryside Act. In particular, a new offence of 'reckless' disturbance of certain listed birds (Schedule 1) and animal (Schedule 5) at their nest or place of shelter has been introduced.
- 3.15 Section 74 of the CRoW Act provides a list of habitats and species important to biological diversity in England. The list identifies the habitats and living organisms (species) which the Secretary of State, following consultation with her statutory nature conservation advisers, English Nature, considers are of principal importance for the conservation of biological diversity in England, in accordance with the 1992 UN Convention on Biological Diversity.

The Protection of Badgers Act (1992)

- 3.16 Badgers are protected in the UK under the Protection of Badgers Act 1992. This makes it an offence to wilfully kill, injure or take a badger, or attempt to do so; possess or control a dead badger or parts or derivatives of a badger or cruelly ill-treat a badger. The Act also makes it an offence to damage or destroy part or all of a badger sett, obstruct access to any entrance to a sett, disturb a badger while occupying a sett or cause a dog to enter a badger sett.
- 3.17 A licence may be granted by Natural England to interfere with a badger sett, either by disturbing it or destroying it.

The Hedgerows Regulations (1997)

- 3.18 The Hedgerows Regulations (1997) were made under Section 97 of the Environment Act 1995 and came into operation in England and Wales on 1 June 1997. The regulations provide important protection by prohibiting the removal of most countryside hedgerows (or parts of them) without first notifying the local planning authority (LPA). 'Removal' includes acts which could result in the destruction of a hedgerow. A Review of the Hedgerows Regulations 1997 initiated in May 1997 is on-going.

The Town and Country Planning Act 1990 (Trees Regulation 2012)

- 3.19 The Town and Country Planning Act 1990 (Trees Regulation 2012) provides for Tree Preservation Orders. Trees and woodland covered by a Tree Preservation Order protected under the Act and the local authority must be consulted and permission sought for any works that may affect them.
- 3.20 A number of the trees demonstrate features characteristic of a veteran tree including a large girth for the particular tree species, major trunk cavities and of high aesthetic interest. With regard to veteran trees, any management actions should be made in consideration of the National Planning Policy Framework, which notes that veteran trees have value for biodiversity.

- 3.21 In recognition of this and given the abundance of potential wildlife habitats associated with veteran trees any management should accord with the current environmental legislation primarily The Wildlife and Countryside Act 1981. Reference should also be made to Ancient and Other Veteran Trees: Further Guidance on Management (Book) by David Lonsdale (2013).

Other Relevant Legislation - Licensing of Aerodromes

- 3.1 **The Air Navigation Order** “the ANO” is made under provisions contained in Section 60 of the Civil Aviation Act 1982, and forms part of the criminal law. Articles 211(a) and (b) of the ANO require that the CAA issue an Aerodrome License only if it can be satisfied that the License Holder is competent to secure that the aerodrome and its surrounding airspace is safe for use by aircraft. Article 211(d) requires that an Aerodrome Manual is submitted and is adequate.
- 3.2 The CAA publishes **CAP168 “Licensing of Aerodromes”** and requires that Aerodrome License Holders confirm compliance with it. Where compliance is not practicable, the License Holder is required to identify the specific non-compliance, assess the risks it poses and identify appropriate mitigation. The non-compliances must be published and must be taken into account by Pilots (and Airlines) prior to operating at the Aerodrome.
- 3.3 CAP168 defines the take off climb (TOCS), and approach surface (APPS) Obstacle Limitation Surfaces. Paragraph 9.3 to Chapter 4 of CAP168 - “Assessment and Treatment of Obstacles” requires that the Aerodrome License Holder undertakes actions to “as far as practicable” remove obstacles which penetrate designated obstacle limitation surfaces (OLS).
- 3.4 CAP168 also requires appropriate measures to reduce wildlife hazard and requires Aerodrome License Holders to implement a Wildlife Hazard (or Bird) Control Management Plan (WHCMP or BCMP). The CAA provides further information on managing bird hazard in its CAP772 “Birdstrike Risk Management for Aerodromes”, and is currently consulting on an updated version of this document which is likely to have the title “Aerodrome Wildlife Strike Hazard Management and Reduction”.
- 3.5 CAP772 states at paragraph 1.1:
- “As with other forms of aviation risk, the management of the risk of a birdstrike involves specialist knowledge and specific measures. These measures are aimed at deterring birds from flying on and in the lower flightpaths in the vicinity of the aerodrome and primarily include the use of risk assessment, aerodrome habitat management, bird control procedures and safeguarding. However, the birdstrike risk is not uniform across all types of aerodromes and flight operations, and therefore it is essential that the most appropriate measures are identified and adopted to suit the local situation. Effective techniques in risk assessment, bird control, habitat management and safeguarding exist that can reduce the presence of birds on aerodromes and the risk of a birdstrike”.*
- 3.6 CAP772 at paragraph 2.3(e) states that Aerodrome License Holders should develop a BCMP which seeks to control or influence areas in the vicinity of the aerodrome to minimise the attraction to birds, including the:

ii) means to influence land use and development surrounding the aerodrome so that the birdstrike risk does not increase and, wherever possible, is reduced;

iii) means to help encourage landowners to adopt bird control measures and support landowners' efforts to reduce birdstrike risks;

- 3.7 Gatwick Airport's BCMP contains measures which primarily relate to those bird species most hazardous to aircraft, i.e. species of large size and/or which habitually form flocks and covers not only the airport estate but also properties and land around the airport, with individual properties having their own management plan as appropriate. The management plan includes:
- Record keeping and monitoring of birds;
 - Regular review of the management plan;
 - Inspection of properties and adjacent land as necessary; and
 - Implementation of long term management.
- 3.8 In practical terms, measures are taken to deny birds feeding, nesting, loafing and roosting through careful design, good estate management and use of dispersal action/scaring where necessary. There are restrictions with respect to planting trees, landscaping, and also in relation to the planting palette, e.g. that the species used should not be berry bearing. New ponds or open water courses are generally required to be netted to prevent bird hazard.
- 3.9 The Airport is required to be consulted by the Local Planning Authorities on proposed developments that have the potential to be bird attractant within 13 km of the aerodrome.

Policy

- 3.10 Policies governing the protection, management and enhancement of biodiversity with respect to Gatwick Airport are set out within a range of documents. These relate to both the protection and, where possible, enhancement of biodiversity within the context of planned development including the National Planning Policy Framework (NPPF), and the Biodiversity Action Planning Process. Relevant policies are summarised to provide a context for the biodiversity assessment.

Planning Practice Guidance

- 3.11 The Planning Practice Guidance draws attention to Section 40 of the Natural Environment and Rural Communities Act 2006 (see above) and to the National Planning Policy Framework.
- 3.12 The National Planning Policy Framework (NPPF) (DCLG 2012) sets out the Government's policies on all aspects of planning, based on the principle that the purpose of planning is to help achieve sustainable development. A core principle of the NPPF is the presumption in favour of sustainable development, but in replacing Planning Policy Statement 9 (PPS9), it also incorporates measures to conserve and enhance the natural and local environment, including 'Biodiversity and Geological Conservation'.

- 3.13 Paragraph 118 of the NPPF requires that in determining planning applications the following principles are applied to conserve and enhance biodiversity:
- Significant harm resulting from a development should be avoided, adequately mitigated, or, as a last resort compensated for; and
 - Opportunities to incorporate biodiversity in and around developments should be encouraged.
- 3.14 The NPPF is a key government policy document for ancient woodland planning cases. The importance of ancient woodlands is reflected by their specific inclusion:
- “planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss” (paragraph 118).*
- 3.15 This statement in the NPPF provides clear recognition in government policy of the irreplaceable nature of this habitat. However, whilst stating a general presumption against the loss or deterioration of ancient woodland, the NPPF also requires planning authorities to balance the need for, and benefits of, a development in a given location. The NPPF makes no differentiation in the treatment or protection of veteran trees found outside of ancient woodland.
- 3.16 Planning Practice Guidance draws attention to local and neighbourhood plans and planning decisions which have the potential to affect biodiversity or geodiversity outside as well as inside designated areas of importance for biodiversity or geodiversity. Local planning authorities and neighbourhood planning bodies should therefore seek opportunities to work collaboratively with other partners, including Local Nature Partnerships, to develop and deliver a strategic approach to protecting and improving the natural environment based on local priorities and evidence. Equally, they should consider the opportunities that individual development proposals may provide to enhance biodiversity and contribute to wildlife and habitat connectivity in the wider area. The UK Biodiversity Action Plan (BAP) (1994, updated in 2007, 2012)
- 3.17 The UK government identified a number of habitats and species, each of which were to have a detailed Action Plan for their protection and where necessary, restoration. The UK List of Priority Species and Habitats was updated in 2007 and now covers 65 habitats and 1,150 species and the conservation approach for these is now being developed by a partnership of statutory and non-statutory agencies and bodies. The duties of government departments in regard to the UK BAP were first set out in Section 74 of the Countryside and Rights of Way Act (CRoW) 2000 and accompanying guidance.
- 3.18 The UK BAP included specific plans for species and habitats afforded priority conservation action. These plans set out the threats faced by species and habitats as well as the actions being taken or to be taken to help tackle the threats. The document now contains 1,149 species and 65 habitats. These habitats and species are covered by the provisions of the Natural Environment and Rural Communities (NERC) Act (2006) as they are included in the

Section 41 list of Habitats and Species of Principal Importance in England.

Other Relevant Policy, Schemes and Initiatives

3.19 **Biodiversity Offsetting:** Biodiversity offsetting is designed to deliver biodiversity benefits in compensation for losses, in a measurable way. Biodiversity offsets are distinguished from other forms of ecological compensation by the requirement for measurable outcomes: the losses resulting from the impact of the development and the gains achieved through an offset are measured in the same way. Biodiversity offsetting has been piloted in England for two years, from April 2012 (see Natural Environment White Paper) and Government is the process of deliberating the response to a Green Paper, Biodiversity Offsetting in England, produced in September 2013. Biodiversity offsetting would generally not be used in relation to areas that have been given special protection under the European Union's Habitats and Species Directive.

3.20 **Local Biodiversity Action Plans:** The UK Biodiversity Action Plan targets are addressed through the Sussex Biodiversity Action Plan and the Surrey Biodiversity Action Plan. These identify a series of Habitat Action Plans (HAPs) and Species Action Plans (SAPs) relevant within the counties and local context, which encompass the Gatwick Airport estate and surrounding area.

3.21 **Keepers of Time (2005)** is a statement by the Forestry Commission of policy for England's ancient and native woodland which re-emphasises their value, evaluates threats and opportunities and sets out a range of actions to improve their protection and quality. The document provides a strong framework for ancient woodland protection and enhancement, and includes the statement that:

'England's ancient woodlands and trees represent a living cultural heritage, a natural equivalent to our great churches and castles. They are also our richest wildlife habitat and are highly valued by people as places of tranquility and inspiration'.

3.22 The document has as its vision that:

'Ancient woodlands, veteran trees and other native woodlands are adequately protected, sustainably managed in a wider landscape context, and are providing a wide range of social, environmental and economic benefits to society.'

3.23 The document also includes six policy statements for ancient woodland:

- *The existing area of ancient woodland should be maintained and there should be a net increase in the area of native woodland.*
- *Ancient and native woodland and trees should make an increasing contribution to our quality of life.*
- *Ancient and native woodland should be exemplars of sustainable development, and provide opportunities for enterprise and employment".*
- *The ecological condition of ancient and native woodland should be improved and maintained.*
- *Rare, threatened or Priority species associated with ancient and native woodland should be conserved and enhanced.*
- *The cultural heritage associated with ancient woodland and veteran trees should be protected and conserved.*

- 3.24 Keepers of Time recognises a number of threats to ancient woodland, with specific reference to the threat posed by development pressures:

'There are still occasions where native and ancient woodland is threatened by development, and many woods suffer attrition through incursions at their boundaries. Even if the woodland itself is protected, it can suffer serious disturbance where houses or roads are built right up to its margins, both directly from the impact of development, or indirectly through changes to drainage'.

- 3.25 **HLS/ELS Schemes: Woodland Grant Schemes (WGS)** The Forestry Commission (FC) administers the WGS, under which grant aid is available for some kinds of woodland creation and management. This could potentially provide some funding for restoration sites where woodland forms a significant element or where there is woodland on unworked areas.

- 3.26 **Gatwick Airport Limited (GAL) Interim Master Plan (October 2006)** Sections 8.53 and 8.54 – Biodiversity: Gatwick's interim Masterplan (2006) describes the major areas of semi-natural habitat and actions that have been identified for their retention and management.

'The progressive development of Gatwick's North West Zone is having a local nature conservation impact, attributable to the loss of grassland and hedgerows. This is being progressively mitigated by proposals to enhance biodiversity, particularly in the countryside area to the east of the railway and along the River Mole corridor (including Brockley Wood). The part of that corridor on the western side of the North West Zone was created in the late 1990s, when the section of the new river passing through the middle of the zone was diverted to the west, close to the airport boundary. Its landscaping, with attention to biodiversity within and alongside the river channel, is now well established and generally regarded as highly successful.

We remain fully committed to the maintenance of diverse habitats in and alongside the River Mole, and likewise in areas of countryside that we own to the east of the railway, subject to aerodrome safeguarding requirements which, for example, require us to avoid the use of plant species, or the creation of habitats, attractive to large flocking birds. We also have a commitment to replace trees that are lost as a consequence of airport development and, as well as attending to the land within our ownership, we support good countryside management in Gatwick's vicinity'.

- 3.27 **Gatwick Airport Sustainability Policy** Gatwick Airport's Sustainability Strategy sets out the overarching aims and policies for reducing the environmental impacts of the business and seeking to achieve a sustainable business including the following elements relevant in respect of biodiversity:

Policy

- 'To deliver a strong community programme;
- To remove or mitigate our environmental impacts;
- To set the right standards and practices; and
- To enable our staff to be environment champions.

Sustainability Policy Goals

- Reduce adverse impacts on the environment;
- Build and maintaining constructive relationships with stakeholders; and
- Recognise the value of our employees, partners and communities.

The delivery of the sustainability goals will require:

- The setting of clearly defined targets and policies for delivery from now to 2020;
- Effective communication of our approach and performance with stakeholders;
- Development of partnerships with organisations who can help us achieve our goals; and,
- Engagement with our community explaining our positive and negative impacts’.

Our Plan

‘To have an award winning biodiversity approach:

- For biodiversity action plans for three on-airport sites;
- To increase the biodiversity value of the airport;
- To increase the educational value of biodiversity’.

3.28 **Gatwick Airport’s Biodiversity Management Action Plan (2010)** shows how its S106 Legal agreement and its Decade of Change sustainability strategy are aligned to ensure that the airport continues to grow sustainably. The document comprises 10 actions relating to strategy, delivery and monitoring and reporting.

3.29 **Gatwick Airport Limited’s Commitments** Section 4: Land Use, Development and Biodiversity: This document forms the basis of the legal agreement between Gatwick, West Sussex County Council and Crawley Borough Council, which outlines how the airport’s operation, growth and environmental impacts are to be managed responsibly and includes commitments to:

- ‘Replace or otherwise compensate for any loss of trees as a consequence of the development (Commitment 9, Item 4);
- Maintain, implement and monitor the outcomes of biodiversity enhancement and management plans for:
- On-airport watercourses – the River Mole, Mans Brook and Crawlers Brook (in conjunction with the Environment Agency);

- Gatwick's undeveloped land east of the railway; and,
- Brockley Wood.' (Commitment 10).

3.30 **London Gatwick Airport: Decade of Change – Moving towards a Sustainable Gatwick** includes the following aspects relevant to biodiversity and biodiversity assessment:

A Strong Voice within the Community

- 'Core funding made to the Gatwick Greenspace Partnership
- Continued support of the Forest Schools initiatives offering the chance to participate in conservation tasks'.

Reducing Operational Impacts: Biodiversity

'We increase the level of biodiversity through our investment programme through the creation of new habitats. We will seek to improve the quality of the river water flowing around the airport and seek appropriate accreditation for our approach to biodiversity management.'

3.31 **Gatwick Airport Ltd. Policy Review Gatwick Sustainability Performance Review (2009)** (issued 21/09/2010)¹⁰. Section 14. Land Use, Development and Biodiversity: Gatwick's Sustainability Policy Review states:

Biodiversity

'We increase the level of biodiversity through our investment programme through the creation of new habitats. We would seek to improve the quality of the river water flowing round the airport and seek appropriate accreditation for our approach to biodiversity management.'

Licensing of Aerodromes (United Kingdom Civil Aviation Publication (CAP) 168

3.32 CAP168 defines the boundaries of the take-off and landing corridors, typically wedge shaped, and the height tolerance for the land and any other features including trees associated with take off climb surface (TOCS) and approach surface (APPS).

Key Project Parameters

3.33 This assessment is based on the proposed operational boundary for the updated scheme design.

Baseline Conditions

Sites of Importance for Biodiversity under European Legislation

Ashdown Forest SAC and SPA

3.34 Ashdown Forest SAC (2,729 ha) and SPA (3,207 ha) is located 12 km to the south-west of Gatwick Airport (Figure 1). Based on the Environment Agency's H1 Annex F – Air Emissions, Figure 1 shows the 2 km, 10 km and 15 km zones around Gatwick Airport. (The impacts of aerial emissions on conservation sites need to be considered where they fall within set distances of the activity. For SPAs and SACs, the distance is within 10km of the installation

(or 15km coal- or oil-fired power station), for Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Local Nature Reserves (LNRs), local wildlife sites and ancient woodland, it is within 2 km of the location of the installation).

- 3.35 Using data for Ashdown Forest SSSI, the areas occurring in the SAC/SPA within 15 km of the airport are parts of two SSSI units: Broadleaved, mixed and yew woodland – lowland (65.3 ha, of which 8.7 ha lies within the 15 km study area); and Dwarf shrub heath – lowland (5.7 ha, of which 2.3 ha lies within the 15 km study area).
- 3.36 Habitats that are a primary reason for designation of Ashdown Forest SAC and SPA include:
- Lowland heath, which is one of the largest single continuous blocks of this habitat in south-east England known as Northern Atlantic wet heaths with Cross-leaved Heath *Erica tetralix*. This includes both European dry heaths and, in a larger proportion, wet heath. Cross-leaved Heath – Compact Bog-moss *Sphagnum compactum* wet heath provides suitable conditions for several species of bog-mosses *Sphagnum* species, Bog Asphodel *Narthecium ossifragum*, Deergrass *Trichophorum cespitosum*, Common Cotton-grass *Eriophorum angustifolium*, Marsh Gentian *Gentiana pneumonanthe* and Marsh Clubmoss *Lycopodiella inundata*. The site supports important assemblages of beetles, dragonflies, damselflies and butterflies, including the nationally rare Silver-studded Blue *Plebejus argus*, and birds of European importance, such as European Nightjar *Caprimulgus europaeus*, Dartford Warbler *Sylvia undata* and Eurasian Hobby *Falco subbuteo*.
 - European dry heath, an extensive example of the south-eastern Heather – Dwarf Gorse community, is dominated by Heather *Calluna vulgaris*, Bell Heather *Erica cinerea* and Dwarf Gorse *Ulex minor*, with transitions to other habitats. It supports important lichen assemblages, including species such as the lichen *Pycnothelia papillaria* and the most inland remaining population of Hairy Greenweed *Genista pilosa* in Britain.
- 3.37 There is one species present as a qualifying feature for the SAC: Great Crested Newt *Triturus cristatus*.
- 3.38 The qualifying features for the Ashdown Forest SPA are European Nightjar *Caprimulgus europaeus*, Dartford Warbler *Sylvia undata*, both species of lowland heaths.

Mole Gap to Reigate Escarpment SAC

- 3.39 Mole Gap to Reigate Escarpment SAC comprises 887.7 ha and is 10 km to the north of Gatwick Airport. Approximately 82 ha of the SAC lies within the 15 km boundary, i.e. 9% of the SAC. The vegetation types within the SAC are special types of woodland and calcareous grassland. By using the mapping of the 37 units of which the SSSI is comprised, a more accurate picture can be gained of the nature and proportion of these vegetation types. Of the 37 units, 25 lie either wholly within (20 units) or partly within (5 units) the 15 km study area. These are made up mostly of broadleaved woodlands (15 units) and calcareous grassland (10 units).
- 3.40 The primary reason for designation of this site is the presence of three plant community types:

- Mole Gap supports the only area of stable Box *Buxus sempervirens* scrub in the UK, on steep chalk slopes where the River Mole has cut into the North Downs Escarpment, creating the Mole Gap where natural erosion maintains the open conditions required for the survival of this habitat type supporting a stable formation. This habitat is classified as Stable *xerothermophilous* formations with *Buxus sempervirens* on rock slopes (*Berberidion p.p.*) and has good conservation of habitat structure and function.
- A large but fragmented site on the North Downs escarpment supports a wide range of calcareous grassland types on steep slopes, exhibiting a wide range of structural conditions from short turf through to scrub margins, and is particularly important for rare vascular plants, including orchids and in exhibiting transitions to scarce scrub, woodland and dry heath types. The main habitat is known as Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*).
- Yew *Taxus baccata* woodland has been formed both by invasion of chalk grassland and from development within Beech *Fagus sylvatica* woodland following destruction of the beech overstorey. Yew occurs here in extensive stands, with, in places, an understorey of Box at one of its few native locations.

- 3.41 Habitats and species present as qualifying features for the SAC are European dry heaths and Asperulo-Fagetum beech forests, and Great Crested Newt *Triturus cristatus* and Bechstein's bat *Myotis bechsteinii*.

Sites of Importance for Biodiversity under National Legislation

- 3.42 Ashdown Forest SSSI comprises 3,144 ha in area with only 11 ha lying within the 15 km boundary of the outer zone of search (Figure 1) (i.e. 0.3%). Mole Gap to Reigate Escarpment SSSI comprises 999.4 ha in area, of which 82 ha lies within the 15 km zone of search (i.e. 8%). Not all of Ashdown Forest SSSI is within the SAC and SPA and not all of Mole Gap to Reigate Escarpment SSSI is SAC (Figure 1).
- 3.43 The distribution of other statutory designated sites within the 15 km radius is such that there is one SSSI, Glovers Wood SSSI and three Local Nature Reserves (LNRs) within the 2 km zone (Zone 3) (Figure 1), a further 19 SSSIs (six of which are sites designated for their geological interest) and 14 Local Nature Reserves (LNRs) within the 10 km (Zone 4), and a further 15 SSSIs (two of which are sites of geological interest) and two LNRs within 15 km (Zone 5), The latter SSSIs include Ashdown Forest SSSI and Mole Gap to Reigate Escarpment SSSI (Figures 1 and 2).
- 3.44 Sites designated for their geological interest are considered within the Geo-Environmental Appendix. However, it can be noted that there are none within the 2km detailed study area.
- 3.45 An analysis of the habitat types determined that the majority of the SSSIs are or include woodland habitat. In those SSSIs that include woodland, woodland occupies the largest area. The 'standing open water and canals' type comprised ponds (four SSSI sites), two lake sites and a reservoir.

Table 3.1: Distribution of habitats in Sites of Special Scientific Interest within 15 km of Gatwick Airport (Note: There can be more than one habitat type in a single SSSI)

Habitat	Number of SSSI sites
Broadleaved, mixed and yew woodland – lowland	13
Standing open water and canals	6
Calcareous grassland – lowland	3
Dwarf shrub heath – lowland	3
Neutral grassland – lowland	2
Fen, marsh and swamp – lowland	2

- 3.46 There are 19 Local Nature Reserves (LNRs) within the 15 km search area (Figure 2). Parts of two of these LNRs (Weir Wood Reservoir and Reigate Heath) are also part of a SSSI and one has the same boundary as an SSSI (Blindley Heath). (Note: Although there is a Warnham SSSI and a Warnham LNR, they are different sites).
- 3.47 The 19 LNRs are characterised by both their urban locations (exceptions being Edolph's Copse, Rowhill Copse and Ardingley Reservoir and Weirwood Reservoir) and the range of habitats found at any one site, e.g. woodland, meadows, ponds/lakes and hedges. Exceptions to the latter are Edolph's Copse, Reigate Heath and Weirwood Reservoir which are broadleaved woodland, lowland heath and open water respectively.
- 3.48 The Greenspace Strategy for Crawley (2007–2012) contains the objective of increasing the number of Local Nature Reserves within the Borough in line with Natural England targets of 1 hectare per 1,000 people. The Council currently has seven LNRs, three of which have been designated only recently:
- Willoughby Fields (20 ha) already designated as a Site of Nature Conservation Importance and formerly a farm, includes the sports pitches of Crawley Rugby Club, two streams, two large unimproved meadows and extensive hedgerows. The meadows and hedgerows are particularly important habitats being uncommon within Crawley Borough. The site provides an accessible natural green space for Crawley residents and is part of an important natural buffer zone between Gatwick Airport and the residential areas of Crawley;
 - Broadfield Park (10 ha), the grounds of a former country house containing lakes and ponds, wet woodland, mixed woodland, meadow and parkland;
 - Waterlea Meadow (3 ha) contains important flood meadow, wetland, hedgerow and woodland habitats and associated wildlife. It supports good populations of reptiles and amphibians, a variety of wetland plants and many species of birds.
- 3.49 Reigate and Banstead Borough Council has identified three proposed additional LNRs at Horley, which are to be safeguarded until the formal declaration process is completed. Enquires have been made as to where these sites are specifically and by when they might be

designated. It is probable that they would be relatively close to Gatwick Airport.

Sites of Importance for Biodiversity under Regional or Local Legislation and/or Policy

- 3.50 There are nine non-statutory designated sites, Sites of Nature Conservation Importance (SNCI) within 2 km of the boundary of Gatwick Airport (Figure 2). Of these, three fall into the boundary of the updated scheme design:
- Horleyland Wood SNCI, immediately east of the Airport (Figure 2) is a semi-natural woodland and a good example of an ancient coppice-with-standards with Bluebell *Hyacinthoides non-scripta* dominant in the ground flora. Although frequent in West Sussex, this woodland type is virtually confined to Britain, so remaining areas are of considerable importance. The site also includes a recently constructed pond.
 - Rowley Wood SNCI is located to the south of Gatwick Airport (Figure 2) and is also a semi-natural woodland and an area of ancient woodland, located on the northern edge of Crawley and bordering a factory site. The woodland is partly old coppice-with-standards, with Bluebell dominant in the ground flora. This woodland type, although common in West Sussex, is largely confined to Britain. Rowley Wood is also of importance as an area of relatively undisturbed habitat on the edge of a large and expanding town.
 - Willoughby Fields SNCI is also a LNR and is described in paragraph 3.48 above.

Habitats Identified in Action Plans, Low Weald NCA and Other Such Sources

- 3.51 As identified above, Gatwick Airport lies in the Low Weald NCA and is also in the Upper Mole catchment which drains to the north. The land use to north, west and south-west currently comprises large grassland fields with occasional small settlements. The agriculture immediately to the south includes more grassland and the fields are smaller with hedgerows. To the west and south-west about 2-3 km from the Airport are areas of woodland, some relatively large, and there are more woodlands in the south-eastern corner of the Airport. The north-east and beyond the belt of agriculture to the south are urban habitat, parts of Horley and Crawley respectively. The habitats of likely significance were identified as the woodlands, some of which is ancient woodland, veteran trees, grassland, hedgerows and watercourses (rivers and brooks).
- 3.52 The Sussex BAP includes a number of Habitat Action Plans. Those that are relevant to the proposed extension to Gatwick Airport are summarised in Tables 3.2. Where available, action plan targets for each habitat have been included to inform the development of mitigation, compensation and enhancement proposals. The Sussex Biodiversity Partnership (2003) aims to conserve and enhance important habitats (and species) in Sussex (Table 3.2). The overall steering group oversees the implementation of the Sussex Biodiversity Action Plan.
- 3.53 The ecology and nature conservation review has gathered information on the woodlands, hedgerows and watercourses. Published information on veteran trees and grasslands of nature conservation value has been hard to find. This could be because there are few

veteran trees and little grassland of any interest, e.g. there are no grassland SNCIs or because the area has not been surveyed in any detail.

Table 3.2: Summary of Extent of Habitats within the proposed operational boundary for the updated scheme design and Section 41 (NERC Act) and Sussex BAP Habitat Action Plans (Zones are shown in Figure 1)

Habitat	Habitat area/length at risk	Action Plan Targets
Lowland mixed deciduous woodland	23.1 ha in Zone 1 including 3 ha ancient woodland 39.0 ha in Zone 2 including 5 ha ancient woodland (See also Table 5.1 for westerly and easterly TOCS and APPS)	<ul style="list-style-type: none"> • No net loss of native woodland; • Achieve favourable or recovering condition of 20,570 ha of native broadleaved woodland by 2015; • Restore 5,433 ha of non-native plantations on ancient woodland sites by 2015; • Expand the current native woodland resource by 3,881 ha by 2015 • Maintain and enhance ancient woodland; • Maximise biodiversity in all woods; • Expand and link woods
Hedgerow	21.3 km in Zone 1 including 10.6 km ancient hedgerow 28.4 km in Zone 1 including 14.7 km ancient hedgerow	<ul style="list-style-type: none"> • Maintain the net extent of hedgerows; • Identify the extent of native species-rich hedgerows in favourable condition; • Maintain the overall number of individual hedgerow trees; • Encourage the planting of new native species-rich hedgerows
Lowland meadows	Potential for lowland meadows to south of Gatwick Airport	<ul style="list-style-type: none"> • Restore 83ha of lowland meadow from semi-improved or neglected grassland by 2015; • Re-establish 41ha of grassland of wildlife value from improved grassland by 2015
Rivers and brooks	1.6 km in Zone 1 including 0.9 km of canalized or conduited channel 1.9 km in Zone 1 including 1.2 km of canalized or conduited channel	<ul style="list-style-type: none"> • Maintain the integrity of all existing wetlands by preventing loss, damage and fragmentation; • Ensure all existing wetlands are maintained and enhanced by appropriate management; • In suitable areas, active restoration and/or creation of wetland habitats should be promoted and encouraged; • Protect and restore the natural function of river floodplains
Notable road verges	None identified (West Sussex Notable Road Verge Scheme)	<ul style="list-style-type: none"> • Develop a set of general guidelines for the management of Notable Road Verges in West Sussex that includes the enhancement of their conservation importance as a priority

Habitat	Habitat area/length at risk	Action Plan Targets
Standing open water including ponds	6-8 ponds	<ul style="list-style-type: none"> • Maintain the integrity of existing open water habitat by preventing loss or damage; • Appropriately manage all open water bodies to enhance their biodiversity interest; • In suitable areas, encourage the creation of open water habitats

Lowland Deciduous Woodland, including Ancient Woodland

- 3.54 The distribution of woodland (ancient woodland and other woodland) is summarised in Figure 3, two sites already having been identified as SNCIs, Horleyland Wood and Rowley Wood (see above and Figure 7). These and Huntsgreen Wood, a small woodland close to the Airport's southern boundary and Bonnetts Copse to the south-western corner (Figure 3), are classified as ancient woodland (Hume and Gorse, 2010).

Figure 7: Horleyland Wood, ancient woodland to the east of Gatwick Airport (source: R. Bicker, Biodiversity Gatwick)



- 3.55 Table 3.2 describes the areas of woodland and ancient woodland that occur within the proposed operational boundary for the updated scheme design. Table 3.2 also includes the Habitat Action Plan targets set for woodlands in Sussex (Sussex Biodiversity Action Plan).

Safeguarded Surfaces Tree and Woodland Assessment

- 3.56 An outline study was undertaken of trees, woodland and habitat within the Take-Off Climb and Approach Surfaces (TOCS and APPS) of the updated scheme design (Appendix 4). The CAA's Licensing of Aerodromes document, CAP168, defines these and other Obstacle Limitation Surfaces (OLS) where obstacles may need to be cleared where practicable to do so.
- 3.57 Figures 8 and 9 describe the Take-Off Climb Surfaces and Approach Surfaces for east and westerly runway directions respectively. Within these areas the TOCS and APPS criteria impact certain woodland and trees (Appendix 4). The impacts have been categorised into:
- Retain and manage for biodiversity (neutral impact);
 - Manage as coppice woodland with standards/ hedgerow trees – re-introduce traditional woodland practices including coppicing and pollarding, target the crown of selective trees, reduce some trees to coppice stools;
 - Coppice – phased reintroduction of rotational coppice;
 - Clearance or felling and selectively manage natural regeneration/replanting to required height; and
 - Clearance and manage under non-woodland habitat type, e.g. species rich grassland/ glade
- 3.58 The above provides for actions in increasing order of severity to the form of the existing woodland and tree cover concerned. This is not to say that the eventual outcomes for biodiversity would follow the stages required above. With the exception of the last option (clearance and management as non-woodland habitat) key features of the woodland and trees concerned, e.g. soil structure, seed bank, and ground flora would be retained to varying degrees, or new habitat characteristics would develop in time. This would apply equally to ancient woodland.
- 3.59 Appendix 4 describes the different woodland types and trees impacted, together with their biodiversity features and the appropriate management approaches to achieve height reduction where essential. Worst case estimates of areas of woodland that would need such management are also provided.

Hedgerows, including Ancient Hedgerows

- 3.60 Figure 4 shows the distribution of hedgerows including ancient hedgerows around Gatwick Airport. The greatest density is to the south corresponding with the higher density of grassland and smaller field areas.
- 3.61 The classification of hedgerows as ancient/species rich is based on the Sussex Hedgerow Inventory Project which relied on the input of a wide range of recorders including members of the general public. Whilst providing a good indication of the extent of this habitat, a follow survey is recommended.

- 3.62 The length of hedgerows within the proposed operational boundary for the updated scheme design is 42-61 km (including 21-32 km of ancient hedgerow) (Table 3.2).

Grasslands

- 3.63 The agriculture immediately to the south of Gatwick Airport includes a complex of both large grassland fields together with a belt of grassland fields of relatively small area bounded by hedgerows, a number of which have been designated as “ancient”. None of these fields has been designated as a SNCI which may be an indication that the biodiversity value is of low significance. It is noted that a number of the fields are used for horse grazing which is likely to have resulted in detrimental effects to the flora. There may be grassland of conservation value within these areas, however, and later stages of assessment would identify and assess this appropriately as required.

Rivers and Brooks

- 3.64 The watercourses comprise rivers and brooks and, as shown in Figure 5, are all part of the Upper Mole catchment, the River Mole being a tributary of the Thames. The three main tributaries of the River Mole are Crawters Brook (Figure 10), Man’s Brook, and the Gatwick Stream. Crawters Brook has been diverted from its natural northward course, at the point it passes under the A23, to run westwards in an engineered channel parallel to the airport boundary. At the point where Crawters Brook reaches the River Mole, both water courses run in the same channel to a culvert under the runway. The Gatwick Stream joins the River Mole at Riverside Garden Park in Holey. Significant lengths of the River Mole, Crawters Brook and the Gatwick Stream have therefore been modified during the original and subsequent development phases of the Airport (Figure 9).
- 3.65 The length of watercourses to be found within the proposed operational boundary for the updated scheme design is 2.5 (Zone 1) (see Figure 1) and 3.9 km (Zone 2), 0.9-2.0 km of which is canalized or conduited channel respectively (Figure 10).
- 3.66 The Environment Agency has sampling points (Water Quality Monitoring Points and Ecology Monitoring Points) located along the River Mole, Gatwick Stream, Man’s Brook and Ifield Brook. Data from these and additional sampling points, e.g. on Crawters Brook, will provide a valuable baseline to monitor change along these watercourses including downstream of the Airport.
- 3.67 The stretch of the River Mole in its newly created channel in the north-west sector of the airport has developed into a well-structured river corridor with functional riparian and floodplain habitat. It represents what can be achieved through a river diversion scheme (Figure 11).

Figure 10. Example of channelized watercourse, Crawters Brook, Lowfield Heath



Figure 11. Example of restored diverted section of River Mole, north-west zone, Gatwick Airport



Road Verges

- 3.68 The West Sussex Notable Road Verge Scheme co-ordinated a survey of road verges in west Sussex. They did not identify any notable road verges within the 2 km zone around Gatwick Airport.

Standing open water including ponds

- 3.69 Six to eight ponds occur in Zones 1 and 2 (Figure 1) in the agricultural land to the south of Gatwick Airport. These are typical field ponds and at least two are overgrown and silted up.

Protected and Priority Species

- 3.70 The database of records of species of plants and animals that was collated from the range of sources as described above includes over 2,300 records for 280 species in the 2 km zone around Gatwick Airport. This has created a sound baseline to indicate the presence of protected and priority species recorded in the recent past in the proposed operational

boundary for the updated scheme design. The latter are summarized in Table 3.3 along with an indication of the protection and priority they receive.

Table 3.3: Summary of protected and priority species recorded in the recent past in the proposed operational boundary for the updated scheme design

Scientific name	Common name	European Protection	Wildlife and Countryside Act	Schedule 41 of NERC Act	Red Data Book
Butterflies					
<i>Calastima argiolus</i>	Holly Blue			Listed	Near threatened
<i>Coenonympha pamphilus</i>	Small Heath			Listed	Near threatened
<i>Limenitis camilla</i>	White Admiral			Listed	Vulnerable
<i>Satyrus w-album</i>	White Letter Hairstreak		Schedule 5	Listed	Endangered
<i>Thecla betulae</i>	Brown Hairstreak		Schedule 5	Listed	Vulnerable
Amphibians					
<i>Triturus cristatus</i>	Great Crested Newt	Listed		Listed	
Reptiles					
<i>Natrix natrix</i>	Grass Snake		Schedule 5	Listed	
Birds					
<i>Acrocephalus palustris</i>	Marsh Warbler		Schedule 1	Listed	Red
<i>Alcedo atthis</i>	Kingfisher		Schedule 1		Amber
<i>Alauda arvensis</i>	Skylark			Listed	Red
<i>Dendrocopos minor</i> subsp. <i>comminutus</i>	Lesser Spotted Woodpecker		Schedule 1	Listed	Red
<i>Vanellus vanellus</i>	Northern Lapwing			Listed	Red
<i>Pyrrhula pyrrhula</i> subsp. <i>pileata</i>	Bullfinch			Listed	
<i>Carduelis cannabina</i> subsp. <i>autochthona/cannabina</i>	Linnet			Listed	
<i>Emberiza schoeniclus</i>	Reed Bunting			Listed	
<i>Turdus philomelos</i> subsp. <i>clarkei</i>	Song Thrush			Listed	
<i>Turdus iliacus</i>	Redwing		Schedule 1		
<i>Turdus pilaris</i>	Fieldfare		Schedule 1		
<i>Tyto alba</i>	Barn Owl		Schedule 1		
Mammals					
<i>Myotis mystacinus</i>	Whiskered Bat	Listed	Schedule 5		
<i>Nyctalus noctula</i>	Noctule Bat	Listed	Schedule 5	Listed	
<i>Myotis bechsteinii</i>	Bechstein's Bat	Listed	Schedule 5	Listed	
Other bat species		Listed	Schedule 5	Listed	

Scientific name	Common name	European Protection	Wildlife and Countryside Act	Schedule 41 of NERC Act	Red Data Book
<i>Meles meles</i>	Badger				
<i>Erinaceus europaeus</i>	Hedgehog			Listed	
Plants					
<i>Mentha pulegium</i>	Pennyroyal		Schedule 8	Listed	Endangered
Total number of species		5	14	20	11

- 3.71 Certain species are notable by their absence. This includes the reptiles Slow-worm, Common lizard and Adder, none of which has been recorded in or around the airport despite relatively intensive surveys, e.g. by Biodiversity Gatwick which recorded Grass Snake but none of the other species.
- 3.72 Water Vole and Otter have been known from the upper Mole catchment but none has been reliably recorded in recent times. Dormouse is known from the area but not from within the proposed operational boundary for the updated scheme design.
- 3.73 The Sussex BAP includes a number of Species Action Plans. The mammal, reptile, amphibian and fish species that are relevant to the proposed extension to Gatwick Airport are summarised in Table 3.4. Where available, Sussex Habitat Action Plan targets for each species have been included to inform the development of mitigation, compensation and enhancement proposals.

Table 3.4: Summary of Sussex BAP Species Action Plans for Fish, Amphibians, Reptiles and Mammals Relevant to the Proposed Development at Gatwick Airport.
(Zones are shown in Figure 1)

Species	Distribution at Gatwick	Objectives
European Eel	No records found (Zones 1-3) (however see para 3.78)	• Improve conditions for the species
Brown Trout	No records found (Zones 1-3) (however see para 3.78)	• Improve conditions for the species
Great Crested Newt	Recorded from Zones 1-3	<ul style="list-style-type: none"> • The establishment of new populations by creating ponds; • Ensure accurate distribution of the species is ascertained and monitored; • Ensure that as many breeding sites as possible and associated terrestrial habitats are identified and protected

Species	Distribution at Gatwick	Objectives
Common Toad	Recorded from Zones 1-3	<ul style="list-style-type: none"> • The establishment of new populations by creating ponds; • Ensure accurate distribution of the species is ascertained and monitored; • Ensure that as many breeding sites as possible and associated terrestrial habitats are identified and protected
Slow-worm	Not recorded from Zones 1-3	<ul style="list-style-type: none"> • Maintain habitat and where possible improve e.g. construction of hibernacula
Common Lizard	Not recorded from Zones 1-3	<ul style="list-style-type: none"> • Maintain habitat and where possible improve e.g. construction of hibernacula
Adder	Not recorded from Zones 1-3	<ul style="list-style-type: none"> • Maintain habitat and where possible improve e.g. construction of hibernacula
Grass Snake	Recorded from Zones 1-3	<ul style="list-style-type: none"> • Maintain habitat and where possible improve e.g. construction of hibernacula
West European Hedgehog	Recorded from Zones 1-3	<ul style="list-style-type: none"> • Incorporate requirements into management of appropriate habitats
Western Barbastelle Bat	Not recorded from Zones 1-3	<ul style="list-style-type: none"> • Maintain and enhance existing populations; • Ensure that large-scale development does not cause significant local reductions
Bechstein's Bat	A single juvenile recorded from north-west zone of Gatwick Airport	<ul style="list-style-type: none"> • Maintain and enhance existing populations; • Ensure that large-scale development does not cause significant local reductions
Noctule Bat	Recorded from Zones 1-3	<ul style="list-style-type: none"> • Maintain and enhance existing populations; • Ensure that large-scale development does not cause significant local reductions
Soprano Pipistrelle	Recorded from Zones 1-3	<ul style="list-style-type: none"> • Maintain and enhance existing populations; • Ensure that large-scale development does not cause significant local reductions

Species	Distribution at Gatwick	Objectives
Brown Long-eared Bat	Not recorded from Zones 1-3	<ul style="list-style-type: none"> • Maintain and enhance existing populations; • Ensure that large-scale development does not cause significant local reductions
European Otter	Not currently recorded but may potentially be present in the future (see para 3.78)	<ul style="list-style-type: none"> • Promotion of sympathetic river habitat management through the Sussex Otters and Rivers Partnership
Polecat	Not currently recorded but may potentially be present in the future	<ul style="list-style-type: none"> • Promotion of sympathetic habitat management
European Water Vole	Not currently recorded but may potentially be present in the future	<ul style="list-style-type: none"> • Promotion of sympathetic river habitat management through the Sussex Otters and Rivers Partnership
Harvest Mouse	Recorded from Zones 1-3	<ul style="list-style-type: none"> • Promotion of sympathetic habitat management
Hazel Dormouse	Not currently recorded but may potentially be present in the future	<ul style="list-style-type: none"> • Promotion of sympathetic habitat management
Brown Hare	Not currently recorded but may potentially be present	<ul style="list-style-type: none"> • Promotion of sympathetic habitat management
Badger	Recorded from around Gatwick further details to follow	<ul style="list-style-type: none"> • Maintain and enhance existing populations; • Ensure that large-scale development does not cause significant local reductions

- 3.74 A total of seven common and widely distributed species of fish were recorded in the sections of the River Mole bordering the north-west zone in 2004 (reported in Chris Blandford, 2010). The most abundant species were Chub, Dace and Gudgeon, with lesser numbers of Pike, Perch and Three-spined Stickleback also present. This provided an estimated maximum population density of 34.7 fish per 100⁻² and a corresponding biomass estimate of 25.9 gm⁻².
- 3.75 A number of invasive non-native species of plants and animals are known from within 2 km of Gatwick Airport being found along the River Mole and its tributaries and other waterbodies. These include the riparian plants: Himalayan Balsam, Japanese Knotweed and the aquatic plants Nuttall's Pondweed and New Zealand Pigmyweed. Animal species include Signal Crayfish and American Mink.
- 3.76 The database of species records provides a very good overview of the biodiversity value of the area in and around Gatwick Airport for the purposes of current biodiversity assessment, exceeding the guidance provided by the Airports Commission's Appraisal Framework. There are nevertheless gaps which would be expected to be filled at the EIA stage.
- 3.77 The River Mole diversion monitoring associated with previous development at the Airport undertook aquatic invertebrate sampling along the length of the diverted channel for 2000-2004 (reported in Chris Blandford, 2010). A total of 98 taxa of aquatic macro-invertebrate

were recorded, with 57 taxa being recorded during the 2004 survey. Two species of cased caddis fly *Mystacides nigra* and *Phryganea grandis*, considered to have local distributions, were recorded in each of the survey periods.

- 3.78 Liaison with Biodiversity Gatwick determined what data they have for the area and ways of sharing the information with a view to establishing a joint Gatwick database and planning for future jointly undertaken surveys. Although Brown Trout, Eel and Otter were not recorded in the Sussex BAP species databases at the time of writing, discussions with stakeholders have indicated that they are confirmed as being present within the Mole catchment. For instance, during the recent works for the Gatwick Flood Attenuation Scheme, Brown Trout and Brook Lamprey were translocated from the Gatwick Stream to other parts of the River Mole. Other species not currently recorded may, therefore be present, and only detailed survey would be able to confirm this in due course.
- 3.79 Gatwick would continue to assemble and review desk study data that may be available, or become available, from a variety of sources as the scheme continues to develop. Ultimately, however, the assessment and mitigation would need to be confirmed by appropriate surveys when access is available to the land at the Environmental Impact Assessment and Development Consent Order stage. The data acquired in the current review would be used to inform decisions of those detailed field surveys of key habitats and species, e.g. grasslands, bats and Great Crested Newts, to be undertaken once the proposed area for development has been agreed upon and fixed.

National Character Area

- 3.80 National Character Areas (NCAs) are areas that share similar landscape characteristics, and which follow natural lines in the landscape rather than administrative boundaries, making them a good decision-making framework for the natural environment. NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and encourage broader partnership working through Local Nature Partnerships. The profiles will also help to inform choices about how land is managed and can change.
- 3.81 Each profile includes a description of the natural and cultural features that shape our landscapes, how the landscape has changed over time, the current key drivers for ongoing change, and a broad analysis of each area's characteristics and ecosystem services. Statements of Environmental Opportunity (SEOs) are suggested, which draw on this integrated information. The SEOs offer guidance on the critical issues, which could help to achieve sustainable growth and a more secure environmental future.
- 3.82 NCA profiles are working documents which draw on current evidence and knowledge. Natural England aim to refresh and update them periodically as new information becomes available.
- 3.83 The baseline conditions with respect to biodiversity and ecosystem services are informed by the Low Weald National Character Area (NCA). This is a broad, low-lying clay vale which largely wraps around the northern, western and southern edges of the High Weald (Natural England web site). This Low Weald is relatively flat without significant geological features. It

owes its lack of topography to the uniformity of its bedrock which is the upper division of the Wealden Beds known as the Weald Clay (Friend, 2008). It is predominantly agricultural, supporting mainly pastoral farming owing to heavy clay soils, with horticulture and some arable on lighter soils in the east, and has many densely wooded areas with a high proportion of ancient woodland. Around 23% of the area is identified as greenbelt land.

3.84 The Low Weald NCA is important for biodiversity, being rated among the most important NCAs for richness of:

- Bat species;
- Bullfinch;
- Lesser Spotted Woodpecker;
- Several plants, including Spiked Rampion *Phyteuma spicatum*, plus a variety of rare lichens; and
- Rare invertebrates, notably woodland butterflies.

3.85 Table 3.3 makes reference to these species with the exception of Spiked Rampion which is not known from the area around Gatwick Airport and lichens for which there are limited records available.

3.86 The Low Weald NCA is generally wet and woody. It is dissected by flood plains and its impermeable clay soil and low-lying nature make many areas prone to localised flooding. Ponds are common, often a legacy of iron and brick-making industries. Gill woodland is a particular feature and a valuable habitat, scarce elsewhere in the south-east of England. (Gill or Wealden gill woodlands are deeply cut ravines, usually with a stream in the base which historically eroded the ravine and which may have their own associated group of plant species more typical of woodlands found to the west of the British Isles. Associated moss, liverwort and lichen communities in particular are likely to be of international importance. Examples include Glovers Wood which is a SSSI and a Woodland Trust reserve).

3.87 Despite its proximity to London and continuing pressure for development, the Low Weald remains essentially rural in character with small-scale villages nestled in woodland and many traditional farm buildings, including oast houses, which are more typical in area further to the east of Gatwick Airport.

Future Baseline Conditions

3.88 The activities of Biodiversity Gatwick will bring about changes in the biodiversity of Gatwick Airport and in particular the north-west zone and Gatwick Woods areas. These changes will be under the control of Gatwick Airport and there are opportunities for them to be synergistic with respect to the proposed development.

3.89 A check will be made regarding such changes, e.g. proposals for any new Local Nature Reserves that might be designated and likewise for any new Sites of Interest for Nature Conservation, a review of which is usually undertaken annually.

- 3.90 A review is being undertaken of any relevant future developments that might act in combination with respect to biodiversity resources.

4 ECOSYSTEM SERVICES ASSESSMENT

Introduction

- 4.1 A review of the impact on ecosystem services, as defined in Natural England's National Character Areas (NCA) publications, has been undertaken at a high level (see Appendix 3 for the full account). This was informed in particular by the profile of the Low Weald NCA area within which Gatwick Airport is located (see Section 3 of this report). The NCA profile provides a strategic context for any potential infrastructure development.
- 4.2 The baseline for ecosystem services has been defined by identifying the performance of the identified ecosystem services within the context of the NCA. The review also considers the ecological opportunities identified in the NCA and related documents.

Scheme Performance

- 4.3 The sensitivity of the receptor and the magnitude of impact are identified separately and contribute to the evaluation of the likely significance of the performance of the scheme. The evaluation of significance is based on professional judgement and assessed in accordance with the approach set out in the Commission's Appraisal Framework (paragraph 5.24).
- 4.4 The approach as set out in the Appraisal Framework (paragraph 5.24) is adopted using the following scale of effects based on that proposed by the Airports Commission:
- Highly supportive (or highly beneficial): Positive impacts that are substantial, substantially accelerate an improving trend or substantially decelerate a declining trend;
 - Supportive (or beneficial): Positive impacts that are notable, accelerate an improving trend or decelerate a declining trend;
 - Neutral: No impacts or negligible impacts;
 - Adverse: Negative impacts that are notable, decelerate an improving trend or accelerate a declining trend;
 - Highly adverse: Negative impacts that are substantial, substantially decelerate an improving trend or substantially accelerate a declining trend.

High Level Ecosystem Services Assessment

- 4.5 The impact of land-take on the ecosystem services would in most cases be significant only at the local level with most being **adverse** or **neutral**. In some cases the impact would be **highly supportive**. The latter are due to the immediate improvements to the River Mole and its tributaries and would be at both the local and regional level.
- 4.6 There is significant scope for enhancements to a number of ecosystem services (Appendix 3). Most would experience a **highly supportive** net benefit at the local level and for a number this would be significant and sustainable.

- 4.7 Many of the areas specifically identified by the NCA Ecosystem services document are not close to the airport and would not be directly affected by it.
- 4.8 The impact of operation on most of the ecosystem services is **neutral** though changes to the noise environment might have **adverse** impacts on tranquility and recreation services (Appendix 3).

5 Scheme Assessment: Avoidance, Mitigation, Compensation and Enhancement

5.1 As described in section 2, this assessment uses the Commission's performance criteria as identified in paragraph 5.24 of the Appraisal Framework. The mitigation, compensation and enhancement measures required to achieve performance against the Commission and Gatwick's objectives for biodiversity are also identified, guided by the existing conditions and the Statements of Environmental Opportunity for the NCA including:

- Protection, management and significant enhancement of the area's intricate and characteristic mix of semi-natural ancient woodlands and other habitat features to reduce habitat fragmentation and benefit biodiversity, while seeking to improve and encourage access for health and wellbeing and reinforce sense of local identity;
- Work at a landscape scale to improve the quality, state and structure of all Wealden rivers, streams and standing waterbodies and their appropriate flood plains, taking account of water quality, water flow and hydraulic connection with the flood plain, while seeking to enhance biodiversity, historic features and recreation opportunities and reinforcing sense of place;
- Maintaining the sustainable but productive pastoral landscape of the Low Weald, while expanding and connecting semi-natural habitats to benefit biodiversity, regulating soil and water quality by promoting good agricultural practice, and maintaining the extent and quality of unimproved permanent grassland and meadows; and
- Restoration of degraded neutral grasslands to buffer sites and encourage pollinators and predators for pest regulation.

Assessment of Land-take Impacts Without Mitigation: Biodiversity

Sites of Importance for Biodiversity under European Legislation

5.2 There would be no land take effects from the scheme on sites of importance for biodiversity under European legislation resulting in no change and **neutral** performance. Enhancement opportunities were considered for the SAC/SPA sites but due to the distance from Gatwick airport, these were not pursued at this stage.

5.3 No adverse noise impacts on the integrity of any internationally designated nature conservation site are predicted.

Sites of Importance for Biodiversity under National Legislation

5.4 There would be no land take effects of the proposals on sites of importance for biodiversity under national legislation resulting in no change and **neutral** performance. There is scope to achieve enhancement of Glovers Wood SSSI (see below).

- 5.5 No adverse noise impacts on the integrity of any nationally designated nature conservation site are predicted.

Sites of Importance for Biodiversity under Regional or Local Legislation and/or Policy

- 5.6 The majority of the area of two sites of importance for biodiversity under local legislation and policy would be removed by the proposed development: Willoughby Fields Local Nature Reserve and Site of Interest for Nature Conservation (SNCI) and Rowley Wood SNCI. The impact on these sites would be notable representing an **adverse** performance at the local level.

Habitats Identified in Action Plans, Low Weald NCA and Other Such Sites

- 5.7 The habitats of significance that would be impacted by the extension to Gatwick Airport include:
- Lowland deciduous woodland (a maximum of 23.1 ha in Zone 1 including 3 ha of ancient woodland and a maximum of 39.0 ha in Zone 2 including 5 ha of ancient woodland) with medium sensitivity and moderate magnitude resulting in **adverse** performance at local level;
 - Hedgerows (21.3 km in Zone 1 including 10.6 km ancient hedgerow and 28.4 km in Zone 1 including 14.7 km ancient hedgerow) with medium sensitivity and moderate magnitude resulting in **adverse** performance at local level;
 - Lowland meadow: unknown impact but likely to be medium sensitivity and moderate magnitude giving a performance of **adverse** at the local level;
 - Rivers and brooks (1.6 km in Zone 1 including 0.9 km of canalized or conduited channel and 1.9 km in Zone 1 including 1.2 km of canalized or conduited channel) with medium sensitivity and the transition from concrete to natural channel over significant lengths, would be a notable positive impact resulting in **supportive** performance at the regional level;
 - Notable road verges (none present): **neutral**; and
 - Standing open water including ponds (6-8 ponds) with medium sensitivity and moderate magnitude resulting in **adverse** performance at the local level.
- 5.8 The three habitat categories of most significance are lowland deciduous woodland including ancient woodland; hedgerows including ancient hedgerows; and rivers and brooks.
- 5.9 Although the impact on lowland meadows is likely to be, at worst, **adverse** at the local level, this needs verification through full access to the meadows and surveys undertaken at an appropriate time of year.
- 5.10 Lowland deciduous woodland loss and damage would create a significant compensation need and, as described above, this habitat is one where enhancement should be the target.
- 5.11 Hedgerow loss would also require significant mitigation and compensation.

- 5.12 In contrast, the work on the River Mole and tributaries would produce a net positive impact, e.g. removing the culverting of the River Mole and creating natural channels where watercourses are currently in canalized sections, some being of concrete bases and sides. Water ecosystems would be protected, including habitats and species, through a river basin planning approach. This would include promoting strategies with respect to flood and erosion management which conserve the natural environment and improve biodiversity.
- 5.13 There is scope to deal with any loss of ponds through mitigation on site linked to Biodiversity Gatwick's activities.
- 5.14 The restoration of the River Mole and its tributaries would enhance the Low Weald NCA and there is scope to create ponds to replace not only any ponds lost to the land-take, but furnace ponds which have been lost in past decades.

Protected and Priority Species

- 5.15 A number of protected species are known to occur in the immediate environs of Gatwick Airport. Twenty-three animal species and one plant species occurring within the proposed operational boundary for the updated scheme design would be impacted (Table 3.3). Five are European protected species, 14 are protected under the Wildlife and Countryside Act, 20 under Section 41 of the NERC Act and 11 listed in Red Data Books.
- 5.16 Given the combination of sensitivity and magnitude of impact, without mitigation the performance of the scheme would be **adverse** on most of these species especially those associated with woodland. The only group where this might be a **highly adverse** impact is for bats and potentially Bechstein's bat, a rare species.
- 5.17 In contrast the performance of the scheme on the aquatic fauna and flora of the River Mole and its tributaries would be **highly supportive** at the local and regional levels.

Assessment of Operational Impacts Without Mitigation - Biodiversity

Sites of Importance for Biodiversity under European Legislation

Aerial emissions

- 5.18 Although the area of influence from air quality effects (e.g. NO_x deposition and acidification) on statutorily designated nature conservation sites is typically set at 10 km, it has been recognised that indirect effects might occur due to increases in traffic. Only certain vegetation types are vulnerable to air pollution effects and most habitats found in the two SAC/SPA sites and the closer SSSIs are well buffered against aerial emissions and deposition. The exception is Dwarf shrub heath – lowland which is a component habitat of Ashdown Forest SAC and SPA. The relevant critical level for NO_x concentrations causing adverse effects on such vegetation is 30µg.m⁻³. Air quality modelling undertaken by Ricardo AEA (July 2013) revealed marginal exceedances of this value (up to 31.46µg.m⁻³) on the M23 but air pollution levels are likely to be much less on the A22 which passes by through Ashdown Forest. Furthermore, NO_x levels reduce markedly with distance from the road, considerably so by 20m from the road side. Based on this, it is concluded that the overall performance of the scheme would be **neutral** in terms of the effects of aerial emissions.

Noise impacts

- 5.19 The 54dBLAeq air noise contours may impinge upon the northern perimeter of Ashdown Forest but would not impact on any features of the SAC/SPA. There would be no impacts on the SPA and SAC sites from ground noise sources owing to their significant distance from the airport. None of the SSSI sites is specifically designated for their bird populations or other features sensitive to noise. In addition, based on available research, the noise levels that could be experienced at these SSSIs would not significantly disturb (or otherwise adversely affect) those birds which are present and therefore that the performance of the scheme in relation to these potential impacts is **neutral**.

Sites of Importance for Biodiversity under National Legislation

- 5.20 The effect of operational activities on sites of importance for biodiversity under national legislation is assessed to be **neutral**. This is after consideration of potential air quality and noise environment impacts. No key features (habitats and species) were identified that would be sensitive to the changes in aerial emissions and noise as predicted.

Sites of Importance for Biodiversity under Regional or Local Legislation and/or Policy

- 5.21 The effect of operational activities on sites of importance for biodiversity under regional or local legislation and/or policy is assessed to be **neutral**.

Habitats Identified in Action Plans, Low Weald NCA and Other Such Sources

- 5.22 There would be an impact on certain woodlands and trees to the east and west of the airport due to compliance with CAP168 as set out in Appendix 4 (see also Figures 8 and 9). Table 5.1 summarises the estimates of woodland areas with respect to the different identified management approaches needed to achieve the required height reduction.

Table 5.1: Summary of estimates of woodland areas with respect to the management approach needed to achieve the required height reduction (east) = area to east of proposed new runway; (west) = area to west of proposed new runway

Woodland type	Management approach for height reduction	Woodland area (including ancient woodland (ha))	Ancient woodland area (ha)
Lowland mature mixed woodland	Retain woodland structure and manage height	11.8 (west) 1.4 (east)	5.2 (west)
	Clearance and selective management of natural regeneration/ replanting to required height	10.2 (west)	0.5 (west)
	Clearance and management as non-woodland habitat type e.g. species rich grassland/glade	2.6 (west)	0.5 (west)

Woodland type	Management approach for height reduction	Woodland area (including ancient woodland (ha))	Ancient woodland area (ha)
Lapsed Coppice Woodland	Clearance and management as non-woodland habitat type	0.9 (west)	0
	Coppice - phased reintroduction of rotational coppice	0.25 (west)	0
Woodland or wooded areas of degraded or of limited value	Clearance and selective management of natural regeneration/replanting to required height	2.1 (west)	0
Solitary/Pasture Trees	Retain and manage height	0.2 (east)	
	Clearance and selective management of natural regeneration/replanting to required height	2.1 (west)	
Trees in the Built Form	Retain and manage height	0.9 (east)	
	Clearance	1.1 (east)	

- 5.23 There would only be a relatively small area of woodland, a maximum area of 3.5 ha including 0.5 ha of ancient woodland that would need to be cleared and subsequently managed as non-woodland habitat e.g. species rich grassland or woodland glade where surrounding/adjacent woodland remains (Table 5.1). This includes some small areas of ancient woodland. The performance of the TOCS and APPS associated with the airport proposals, assuming maximum areas estimated would be **adverse** on these lowland woodland areas.
- 5.24 The majority of the performance with respect to TOCS and APPS would range from adverse where the sensitivity and magnitude were high to supportive where woodland is currently in poor condition, i.e. low sensitivity and magnitude. In the latter case restructuring the woodland, e.g. on a phased basis would allow it to be restored and develop greater biodiversity value. The woodland areas impacted include areas of ancient woodland, the effects on which would also range from adverse to supportive.

Effects of bird hazard management practices on existing sites

- 5.25 The effect of operational bird hazard management activities on existing sites of importance for biodiversity under European Legislation and National legislation is assessed to be **neutral**. Further information on the requirement to manage bird hazard in areas of replanting is given below.

Protected and Priority Species

- 5.26 The performance of the operational activities associated with the airport proposals would be **neutral** on protected and priority species. The design of the airport extension would minimize the scope for use by birds and hence the impact through bird control would be insignificant.

Avoidance Measures

- 5.27 The development of the masterplan has been undertaken taking into account recognised biodiversity resources, e.g. designated sites and significant habitat. This has ensured that land take which would have adversely impacted such features has been reduced as far as possible, e.g. avoiding land-take in the Gatwick Woods area to the east of the Airport including Horleyland Wood SINC and the River Mole and its floodplain in the north-west zone.

Mitigation, Compensation and Enhancement Measures

- 5.28 The Airport will continue to be required to control and where possible reduce bird hazard within and around its environs and the CAA will expect that bird hazard is not increased as a result of the proposals as per the directive in CAP772. This will require an understanding of the risks the present habitat poses to aircraft operations, and also the context of the development in respect of the mosaic of surrounding habitats in the Low Weald NCA. In developing proposals Gatwick will consult with the CAA, Natural England and the Environment Agency.
- 5.29 For the river diversion, for example, it is likely that some parts of the river corridors will require to be netted – in particular those sections which pass the runway ends. Whilst the latter prevent waterfowl congregating on waterbodies and watercourses, and in particular prevent use by larger birds, they allow movement of birds such as Kingfisher.
- 5.30 The remainder of this section deals with those habitats for which mitigation, compensation and enhancement are anticipated, with an emphasis on those habitats and species characteristic of the Low Weald NCA. Work to identify opportunities is well under way and benefiting from the experience and input from Biodiversity Gatwick, and the eventual scheme would need to be appropriate to satisfy airport operational safeguarding and wildlife hazard management requirements.
- 5.31 On site habitat management and creation would be used to deal with a significant proportion of habitat and species mitigation. Where this is insufficient to offset the overall impact, off site compensation would need to be undertaken. This would be undertaken carefully and linked in with other assets and the result would be a significant overall enhancement of biodiversity. In keeping with its achievements through Biodiversity Gatwick, Gatwick Airport would use innovative design and mitigation solutions and where possible provide biodiversity net gains.

Although the review of potential opportunities is at an early stage, Gatwick Airport is already considering such initiatives as part of its established biodiversity strategy as well as heeding the call from the Airports Commission to bring forward such an approach. A number of such initiatives are introduced below.

- 5.32 The Commission has emphasised that Natural England's NCA analysis is an important part of the Appraisal Framework. Gatwick agree with this emphasis and, where appropriate, suggest that enhancement should focus on lowland deciduous woodland habitat and the rivers and brooks of this landscape. These are not only characteristic habitats of this landscape, featuring important gill woodlands and rivers and the floodplains, but the species identified (bats, Lesser-spotted Woodpecker and woodland butterflies) are all woodland species.
- 5.33 A project of this scale creates the opportunity to improve the coherence and resilience of ecological networks/green infrastructure, making it more capable of responding to the challenges of climate change and other pressures (Biodiversity 2020). This project would establish and enhance such networks in order to effectively conserve biodiversity and ecosystem services, delivering many benefits to people, while also making efficient use of scarce land and associated resources.
- 5.34 The remainder of this section reviews further opportunities for sites of importance for biodiversity under European and National legislation, and other habitats local to Gatwick.

Potential for Enhancement to Sites of Importance for Biodiversity under European Legislation

- 5.35 Enhancement opportunities were considered for the SAC/SPA sites but due to the distance from Gatwick airport, these were not pursued at this stage.

Potential for Enhancement to Sites of Importance for Biodiversity under National Legislation

- 5.36 Glover Wood SSSI is relatively close to the airport and would be appropriate as an area to target compensation and/or enhancement. This would achieve a positive biodiversity impact, e.g. there may be opportunities to acquire land within Glovers Wood from private land owners to add to the woodland owned and managed by the Woodland Trust at Glovers Wood SSSI with associated benefits over a 25 year period.

Potential for Enhancement to Sites of Importance for Biodiversity under Regional or Local Legislation and/or Policy

- 5.37 Two sites of importance for biodiversity under local legislation and policy would be impacted by the proposed development; Willoughby Fields Local Nature Reserve and Site of Interest for Nature Conservation (SNCI) and Rowley Wood SNCI. Both sites would be removed and Gatwick airport would commit to the provision of compensatory habitat as a result. It is also noted that Willoughby Fields provides an important public access resource for the Community.

Potential to Enhance Habitats Identified in Action Plans, Low Weald NCA and Other Such Sources

Lowland Deciduous Woodland, including Ancient Woodland

- 5.38 Locally to the airport there would always be constraints on what would be achievable owing to the need to strictly manage and reduce bird hazard. Gatwick Airport would sustain the management of on-site areas currently managed for wildlife and these provide good opportunities in which to integrate mitigation and enhancement. These include the woodlands linked to the Biodiversity Gatwick programme. For example, supporting the Gatwick Woods Biodiversity Opportunity Area including:
- Creation of reptile habitat as receptor for Grass Snake; and
 - Creation of ponds as receptors for Great Crested Newts and other amphibians, e.g. Common Frog, and habitat for Grass Snake; and
 - the River Mole in the north-west zone and its riparian and floodplain habitats.
- 5.39 Gatwick Airport would commit to compensating for the loss in extent and in biodiversity value of those lowland woodlands impacted by the proposed scheme and to make lowland woodlands a focus for overall enhancement achieved over a 25 year period. Opportunities to deliver on these aims include:
- Setting up a trust fund to purchase farmland which can be placed into higher level agricultural stewardship;
 - Support for the Gatwick Woods Biodiversity Opportunity Area (BOA) in areas outside of Gatwick Airports land ownership, e.g. entering into a biodiversity offset with the land owner(s) of woodlands in the Gatwick Woods BOA, and potentially setting up a trust fund for the management of the woodlands or extension to woodland areas;
 - Exploring a biodiversity offset with the Sussex Local Nature Partnership including the Woodland Trust and the Wildlife Trust, e.g. there are opportunities to acquire land from private land owners to add to the woodland owned and managed by the Woodland Trust at Glovers Wood SSSI with associated benefits over a 25 year period;
 - The re-establishment of the River Mole and its tributaries creates opportunity for patches of wet woodland integrated into the river corridors with the scope to contribute to carbon budget, landscaping, improvements in water quality and extending green infrastructure, e.g. Ifield Brook BOA.
- 5.40 Gatwick Airport is committed to implementing those compensation measures that would be needed with respect to those species listed in Table 3.3 that are adversely impacted by the proposed airport expansion. This includes the aim to achieve a significant enhancement for bat species and habitat for Dormouse. Although Dormouse is not known within the affected area, the woodland compensation and enhancement offers the opportunity to re-establish this species.

- 5.41 In pure quantitative terms, Gatwick will commit to replacing ancient woodland at 3:1 (i.e. three times as much woodland area will be planted as has been removed), and other woodland at 2:1 (subject to agreement of appropriate strategy with Natural England and other interested stakeholders). In all circumstances, however, the requirement will be to understand the functionality of the proposed habitat replacement within the wider ecological landscape, and to achieve enhancement wherever possible. This is discussed further below.
- 5.42 Outputs from the mitigation and enhancement described would have beneficial inputs to achieving ecosystem services goals including sense of place, regulating water flow, regulating water quality, security, carbon management and recreation, human health and well-being. (see Appendix 3).

Hedgerows, including Ancient Hedgerows

- 5.43 There is scope to undertake hedgerow replanting within the airport boundary to mitigate for part of the significant net loss of this habitat, for example, incorporation of hedgerows into car parks, internal and perimeter landscaped areas and screening and bunding. The scope for mitigation of hedgerow loss in airfield operational areas is very limited. There would therefore be a need to compensate for the hedgerow lost and it is anticipated this would be used to improve connectivity and create and strengthen green infrastructure in the ecological landscape and also integrate with landscape and visual requirements to achieve an overall enhancement. There are two particular areas of opportunity:
- Hedgerows planted as part of the landscape associated with re-established watercourses; and
 - Following an analysis of the landscape to the west of Gatwick Airport, the development of existing hedges and the planting of new hedges to strengthen the green infrastructure of this area and in particular links between woodland areas.
- 5.44 The delivery of the compensation for the remaining hedgerows would be through biodiversity offsetting.

Grasslands

- 5.45 The on-site grassland provides particular opportunities for mitigation and enhancement of airfield grasslands, even though the areas concerned are managed carefully by the Airport to reduce bird hazard. These grassland areas can be designed to have low nutrient soils, which in the longer term (10 years or so) would effectively develop into low productivity lowland grassland. It is recognized that the mowing regime would militate against achieving high floral diversity. Nevertheless, the large area coupled with an appropriate management regime would achieve an equivalent resource to that being displaced by the airport extension. Despite close wildlife hazard management by Airports, such airside grasslands have been known to develop to support population of Brown Hare and Skylark.

Rivers and Brooks

- 5.46 The on-site rivers and brooks provide good opportunities for mitigation and enhancement linked to the programme for Biodiversity Gatwick. These include:

- Further work on the River Mole and its riparian and floodplain habitat;
 - Creation of ponds as receptors for Great Crested Newts and other amphibians, e.g. Common Frog;
 - Linking the habitat management of the River Mole corridor to the re-establishment of Water Vole and/or Otter, both linked to the objectives of the Sussex Otters and Rivers Project and its role in delivering the Water Vole and Otter Species Action Plans;
 - Further habitat management of the River Mole corridor to build on biodiversity Gatwick's work on the re-establishment of Black Poplar linked to the objectives of the Sussex Otters and Rivers Project and its role in delivering the Black Poplar Species Action Plans;
 - Creation of reptile habitat as a receptor for Grass Snake.
- 5.47 Compensation measures would be needed with respect to rivers and brooks and their riparian and floodplain habitats. Significant opportunity is provided by the re-establishment of these watercourses with respect to:
- Water quality;
 - Sediment behaviour and associated hydromorphological features;
 - Biodiversity gain including eradication of invasive plant and animal species; and
 - Riparian and floodplain function with further benefits to the above features.
- 5.48 Enhancement opportunities are presented for Water Vole and Otter already identified for enhancement on the Airport site and with major opportunities afforded by the works on the River Mole and its tributaries effecting significant habitat improvements.
- 5.49 There is also an enhancement opportunity for Black Poplar to be established on the river and its tributaries.
- 5.50 The resultant combination of habitats within the new river corridors could be managed to extend the Ifield Brook Biodiversity Opportunity Area downstream to encompass the River Mole and Crawters Brook and even a linkage through to the north-west biodiversity area within Gatwick Airport where Biodiversity Gatwick have achieved major biodiversity gain. This objective might need to include the acquisition of additional land to ensure the sustainability of the extended River Mole and Ifield Brook Biodiversity Opportunity Area. There are also strong links with landscaping, security, carbon management and water/drainage management.
- 5.51 Outputs from the mitigation and enhancement described would have beneficial inputs to achieving ecosystem services goals.

Compensation and Enhancement Delivery

- 5.52 Biodiversity offsetting as described by Defra and undertaken in the recent pilot projects provides an appropriate vehicle to deliver the compensation and enhancement required by the expansion of Gatwick Airport. A review of a number of recent large scale projects identifies the value of this approach, e.g. HS2 Phase 1, the Thameslink Programme and the Aberdeen Western Peripheral Route.
- 5.53 A feature of such large scale projects using an offsetting approach is the engagement and involvement of local stakeholders (Biodiversity 2020). In the case of the proposed development at Gatwick, an efficient way of engaging locally would be through the Sussex Local Nature Partnership which includes all the key stakeholders locally.
- 5.54 The biodiversity offsetting process would involve:
- Assessing the totals number of credits required to offset habitat loss and degradation (taking into account on-site mitigation);
 - Identifying offset opportunities and an assessment of the associated credits that would be available;
 - Entering into contractual arrangements to deliver the offsetting to agreed criteria and management plans for a period likely to be of the order of 25 years; and
 - Using an independent body to oversee and quality assure the process.
- 5.55 Given the relatively large amount of credits that would be required, the sooner the process of planning for and achieving compensation commences, through biodiversity offsetting or more traditional routes, the better. To that end, at an early stage a Trust Fund would be set up to acquire agricultural land (farmland or series of farms) strategically located with respect to the upper Mole catchment, for developing and extending green infrastructure and proximity to the airport. The area would be managed using an appropriate mechanism, e.g. biodiversity offsetting or an equivalent to high level stewardship in conjunction with the tenant farmers and the Environment Agency. In the early years, before the second runway is constructed, this land would be 'farmed' to meet Upper Mole Catchment management objectives, enhance wildlife and provide public access until needed for the longer term. This would allow the biodiversity value of the land, the River Mole and tributaries to evolve before it is needed to compensate for the loss of other habitats. If desired (and compliant with prevailing policy), we would also participate in separate biodiversity off-setting and/or enhancement schemes at more distant locations from the airport site. Such initiatives would be explored in conjunction with the Local Nature Partnership, the Wildlife Trust, the Woodland Trust and other interested stakeholders.
- 5.56 Gatwick airport would revise and update the airport's Biodiversity Management Action Plan to accommodate new opportunities from the second runway development as well as priority actions for the period after 2020.

- 5.57 Biodiversity offsetting is not appropriate for irreplaceable habitat e.g. Ancient Woodlands, and a means of compensating for any such losses would need to be explored, e.g. woodland creation elsewhere or funding long term management agreements for existing woodlands, and agreed with the relevant local authorities.

Assessment of Land-take Effects Impacts with Mitigation, Compensation and Enhancement Measures

Sites of Importance for Biodiversity under National Legislation

- 5.58 Recommendations have been made with regard to using Glovers Wood SSSI, a gill woodland (a gill is a deeply cut ravine, usually with a stream in the base), for compensation in relation to other impacts. The net effect would be **highly supportive**.

Sites of Importance for Biodiversity under Regional or Local Legislation and/or Policy

- 5.59 Two sites of importance for biodiversity under local legislation and policy would be impacted by the proposed development; Willoughby Fields Local Nature Reserve and Site of Interest for Nature Conservation (SNCI) and Rowley Wood SNCI. Both sites would be displaced, creating the need for compensation. The anticipated outcome post compensation would be **neutral**.

Habitats Identified in Action Plans, Low Weald NCA and Other Such Sources

- 5.60 The effects of proposed compensation and/or enhancement on those habitats of significance negatively impacted by the extension to Gatwick Airport are:
- Lowland deciduous woodland including ancient woodland: **highly supportive** impact at local level;
 - Hedgerows including ancient hedgerows: **neutral-supportive** impact at local level;
 - Lowland meadow: unknown impact but likely to be **neutral-supportive** at the local level;
 - Rivers and brooks: **highly supportive** at the regional level; and
 - Standing open water including ponds: **supportive** at the local level.

Protected and Priority Species

- 5.61 There is a need for compensation with respect to the operational impacts on woodlands and trees associated with the CAA TOCS and APPS obstacle limitation surfaces where there is habitat and tree loss and where there is a reduction in quality of the woodland or tree. Table 5.1 summarises the extent of woodland that would need to be compensated for, including species of fauna and flora. This is mainly with respect to woodland and tree quality. The extent of complete woodland loss within the OLS (Clearance and management as under non-woodland habitat type) is relatively low at a maximum of 3.5 ha including 0.5 ha of ancient woodland (Table 5.1).

- 5.62 In certain cases, the intervention with respects to TOCS and APPS criteria would actually facilitate improvements to certain woodlands and parts of woodlands (Appendix 4).
- 5.63 The impacts on ecosystem services are outlined in Appendix 3. This demonstrates the significant benefits that are expected following compensation and enhancement measures.
- 5.64 The impact of the proposed development on protected species post mitigation and compensation would be **neutral** and for some species could be **highly supportive** especially those associated with woodland and the River Mole and its tributaries.
- 5.65 For some species, e.g. Great Crested Newt and bats, opportunities would be taken to create habitat ahead of the effects of land-take, e.g. through creation of ponds which can mature ready to receive translocated newts when the time arises and woodland management or creation for bats ahead of land-take.

Assessment of Operational Impacts with Mitigation, Compensation and Enhancement Measures

- 5.66 There is a need for compensation with respect to the operational impacts on woodlands and trees associated with the TOCS and APPS OLS where there is habitat and tree loss and where there is a reduction in quality of the woodland or tree. Table 5.1 summarises the extent of woodland that would need to be compensated for, detail being provided in Appendix 4.
- 5.67 The impacts on ecosystem services are outlined in Appendix 3. This demonstrates the significant benefits that are expected following compensation and enhancement measures.

Cumulative and Inter-related Effects

- 5.68 Linking the objectives of Biodiversity Gatwick to the predicted mitigation, compensation and enhancement would have a cumulative positive effect.
- 5.69 A review is being undertaken of any relevant future developments that might act in combination with respect to biodiversity resources.

6 CONCLUSIONS

- 6.1 This report sets out the assessment of potential effects on biodiversity arising from the updated scheme design for a second runway at Gatwick Airport. This report responds to the Biodiversity topic module as defined in the Airports Commission (Commission) Appraisal Framework, the aim of which is to avoid harm to biodiversity and where possible provide biodiversity net gains by protecting natural habitats and maintaining biodiversity, including through avoidance and mitigation of impacts. This assessment aims to allow the Commission to understand where impacts including air quality, noise and management with respect to bird strikes on biodiversity and ecosystem services may occur and how they ought to be quantified and addressed.
- 6.2 A thorough review has been undertaken of the likely effects of the proposed development on the biodiversity and ecosystem services in and around Gatwick Airport.
- 6.3 An overall evaluation at this stage is that the effect of the proposed expansion of Gatwick Airport is a significant enhancement in biodiversity, taking into account Gatwick Airport's commitment to necessary mitigation and compensation and enhancement where appropriate:
- There would be no adverse impacts on any sites designated internationally or nationally for their biodiversity value;
 - There would be an adverse impact on two Sites of Interest for Nature Conservation, one of which is a Local Nature Reserve;
 - There would be an adverse impact on lowland deciduous woodland habitat, including small areas of ancient woodland and on hedgerows, some of which are ancient hedgerows, for which, post mitigation, compensation and enhancement, the overall effect would be highly supportive in the case of woodlands and neutral-supportive for hedgerows;
 - There would be an adverse effect on lowland meadows for which, post mitigation and enhancement the effect would be neutral-supportive;
 - The realignment of the River Mole and its tributaries to accommodate the expansion would result in a net improvement to the watercourses, e.g. hydromorphology, biodiversity and eradication of invasive non-native species in conjunction with the Environment Agency with a significant decrease in the length of watercourse underground in conduit and in canalized concrete channels, overall achieving a highly supportive performance;
 - There would be an adverse effect on standing waters including ponds for which, post mitigation the performance would be supportive;
 - There would be neutral impacts on protected species including Great Crested Newt, and Grass Snake;

- The performance of the scheme on ecosystem services is almost entirely at a local level. The effects are either neutral or where there is scope for an adverse effect would be neutral or supportive with appropriate mitigation and compensation. For water quality and water regulation services, the impact is both local and regional with the performance ranging from highly supportive to supportive;
 - Opportunities have been identified to achieve mitigation, compensation and to achieve an overall significant enhancement in biodiversity including establishing new areas of habitat, supporting long term management of habitats and re-establishment of species lost from the area, e.g. Water Vole and Otter;
 - It is recommended that the majority of the mitigation, compensation and enhancement would be delivered through biodiversity offsetting in consultation with the Sussex Local Nature Partnership and utilising credits achieved through net gains such as those from the new river corridor, perimeter landscaping and re-establishment of species;
 - Some of the mitigation, compensation and enhancement would be directed at strengthening and extending the Biodiversity Opportunity Areas and other green infrastructure.
- 6.4 In circumstances where new habitat is proposed to offset that which is lost, the CAA will require to be consulted closely as will Natural England and the Environment Agency, so as to ensure that risks from Bird Hazard are not increased.
- 6.5 It is important to plan and develop a mitigation, compensation and enhancement strategy early on in conjunction with local stakeholders, e.g. through the Sussex Local Nature Partnership and the Environment Agency to ensure the maximum value is achieved from the biodiversity offsetting credits and minimise constraints and delays to the development programme.
- 6.6 Overall, the proposed development would result in a significant enhancement of biodiversity and in certain ecosystem services, some at a regional level that would be sustained into the future.
- 6.7 The assessment has also considered the potential implications of an alternative masterplan scheme that includes the provision of end around taxiways to reduce or eliminate the need for aircraft to cross the existing runway. Overall, based on the limited additional loss of woodland and hedgerow, it is assessed that there would be no change in the performance of the potential scheme with the end around taxiway compared to the scheme without the taxiway.

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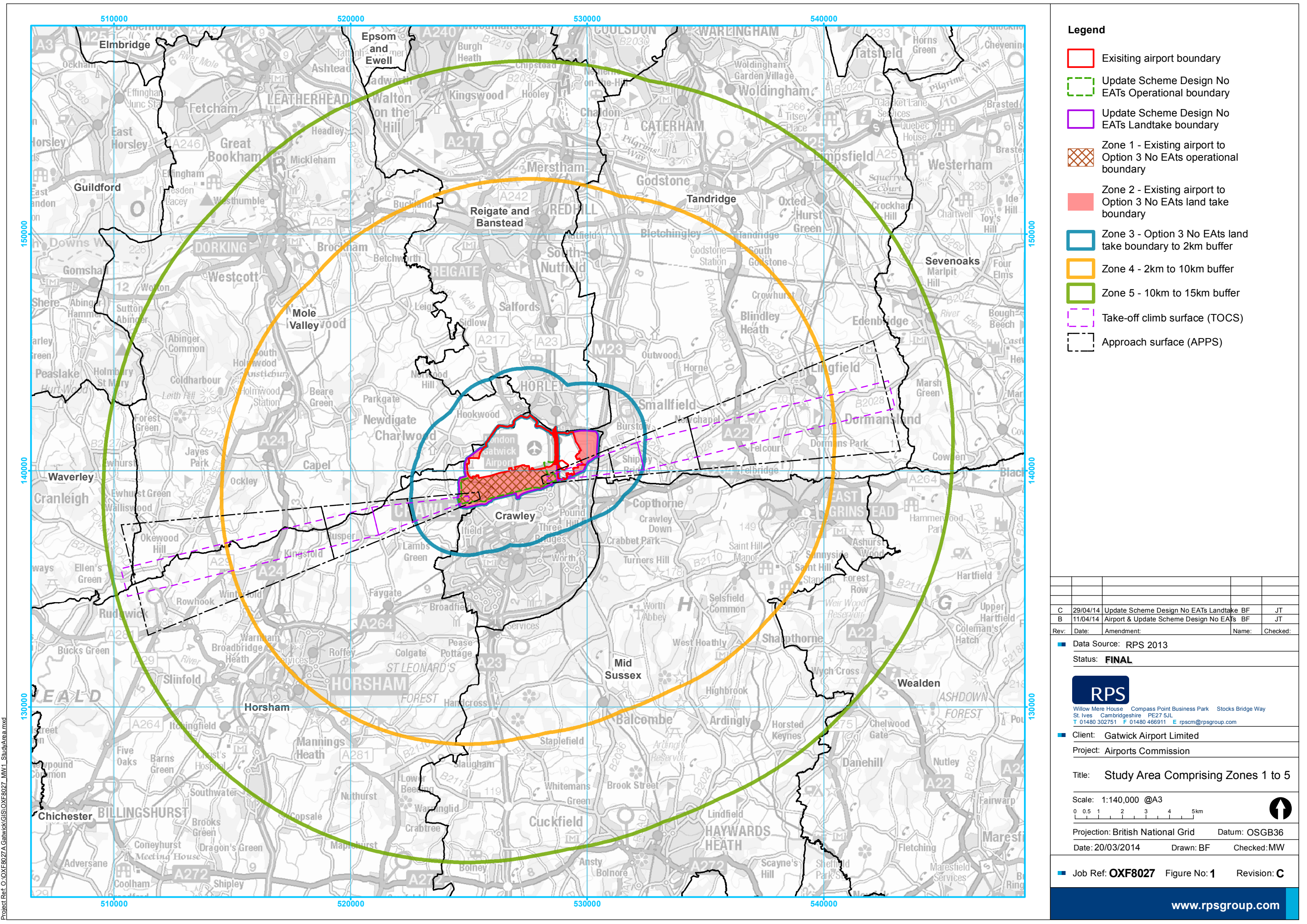
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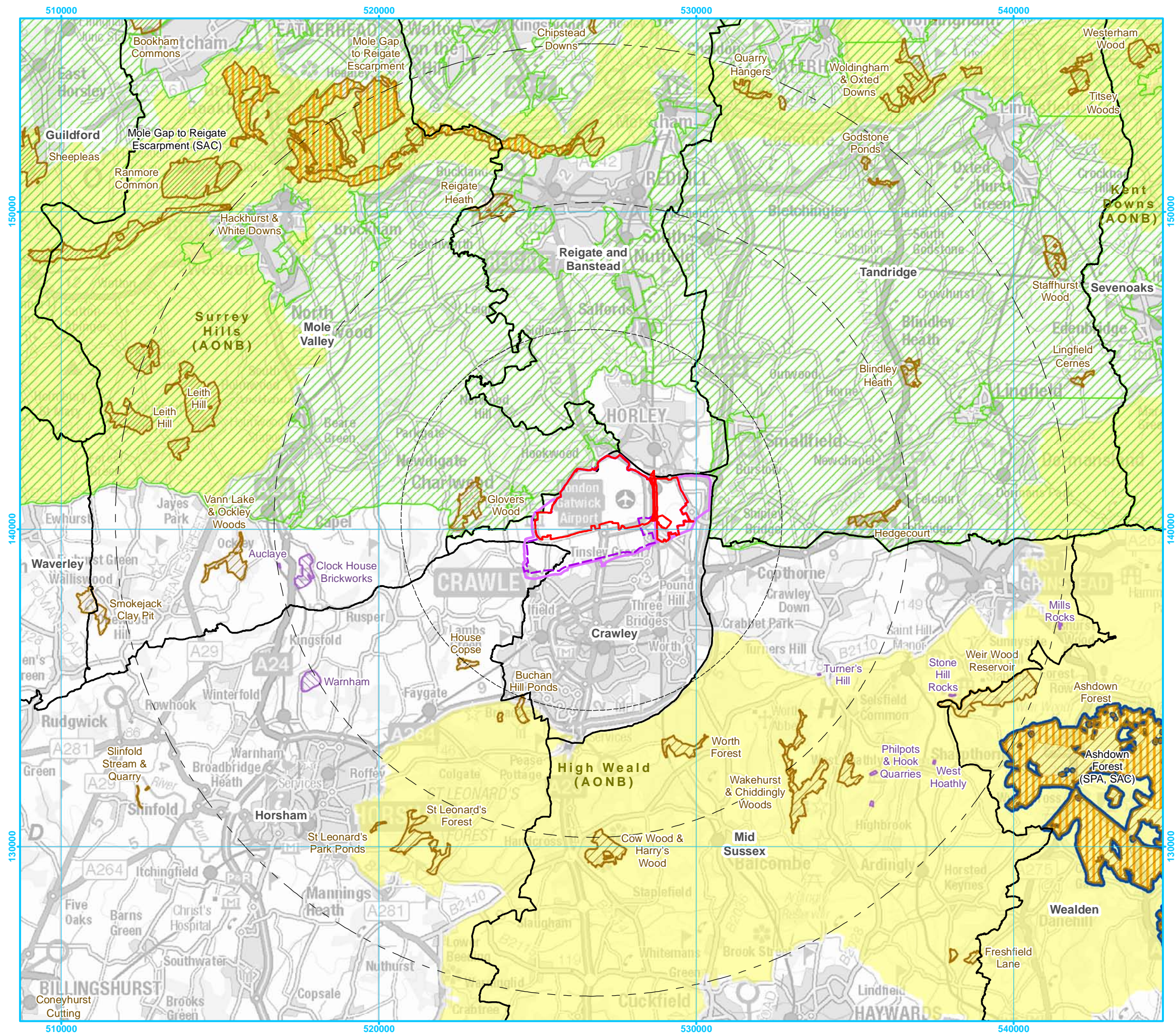
FIGURES



- Legend**
- Existing airport boundary
 - Update Scheme Design No EATs Operational boundary
 - Update Scheme Design No EATs Landtake boundary
 - Zone 1 - Existing airport to Option 3 No EATs operational boundary
 - Zone 2 - Existing airport to Option 3 No EATs land take boundary
 - Zone 3 - Option 3 No EATs land take boundary to 2km buffer
 - Zone 4 - 2km to 10km buffer
 - Zone 5 - 10km to 15km buffer
 - Take-off climb surface (TOCS)
 - Approach surface (APPS)

C	29/04/14	Update Scheme Design No EATs Landtake	BF	JT
B	11/04/14	Airport & Update Scheme Design No EATs	BF	JT
Rev:	Date:	Amendment:	Name:	Checked:
Data Source: RPS 2013				
Status: FINAL				
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Project: Airports Commission				
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Date: 20/03/2014 Drawn: BF Checked: MW				
Job Ref: OXF8027 Figure No: 1 Revision: C				

Project Ref: O:\OXF8027\A\Gatwick\GIS\OXF8027_MW2 Internationally and Nationally Designated Sites.mxd



- Legend**
- Existing airport boundary
 - Update Scheme Design No EATs Operational boundary
 - Update Scheme Design No EATs Landtake boundary
 - 6km site buffer
 - 10km site buffer
 - 15km site buffer
 - Special Protection Area (SPA)
 - Special Area of Conservation (SAC)
 - Site of Special Scientific Interest (SSSI)
 - Site of Special Scientific Interest (SSSI) of geological interest
 - Area of Outstanding Natural Beauty (AONB)
 - Green Belt

C	29/04/14	Update Scheme Design No EATs Landtake	BF	JT
B	11/04/14	Airport & Update Scheme Design No EATs	BF	JT
Rev:	Date:	Amendment:	Name:	Checked:

■ Data Source: RPS 2013

Status: **FINAL**

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■ Client: Gatwick Airport Limited

Project: Airports Commission

Title: **Internationally and Nationally Designated Sites**

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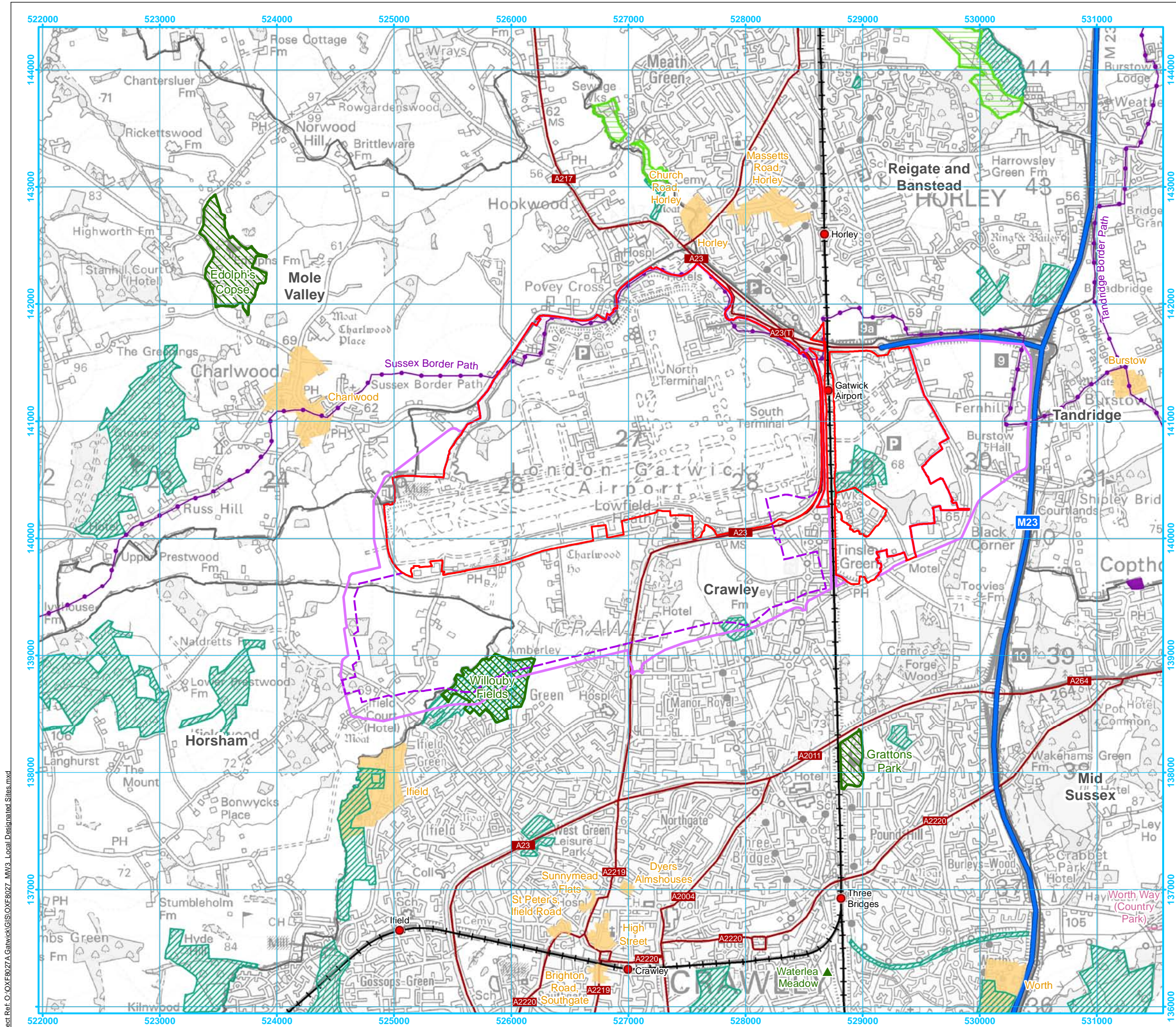
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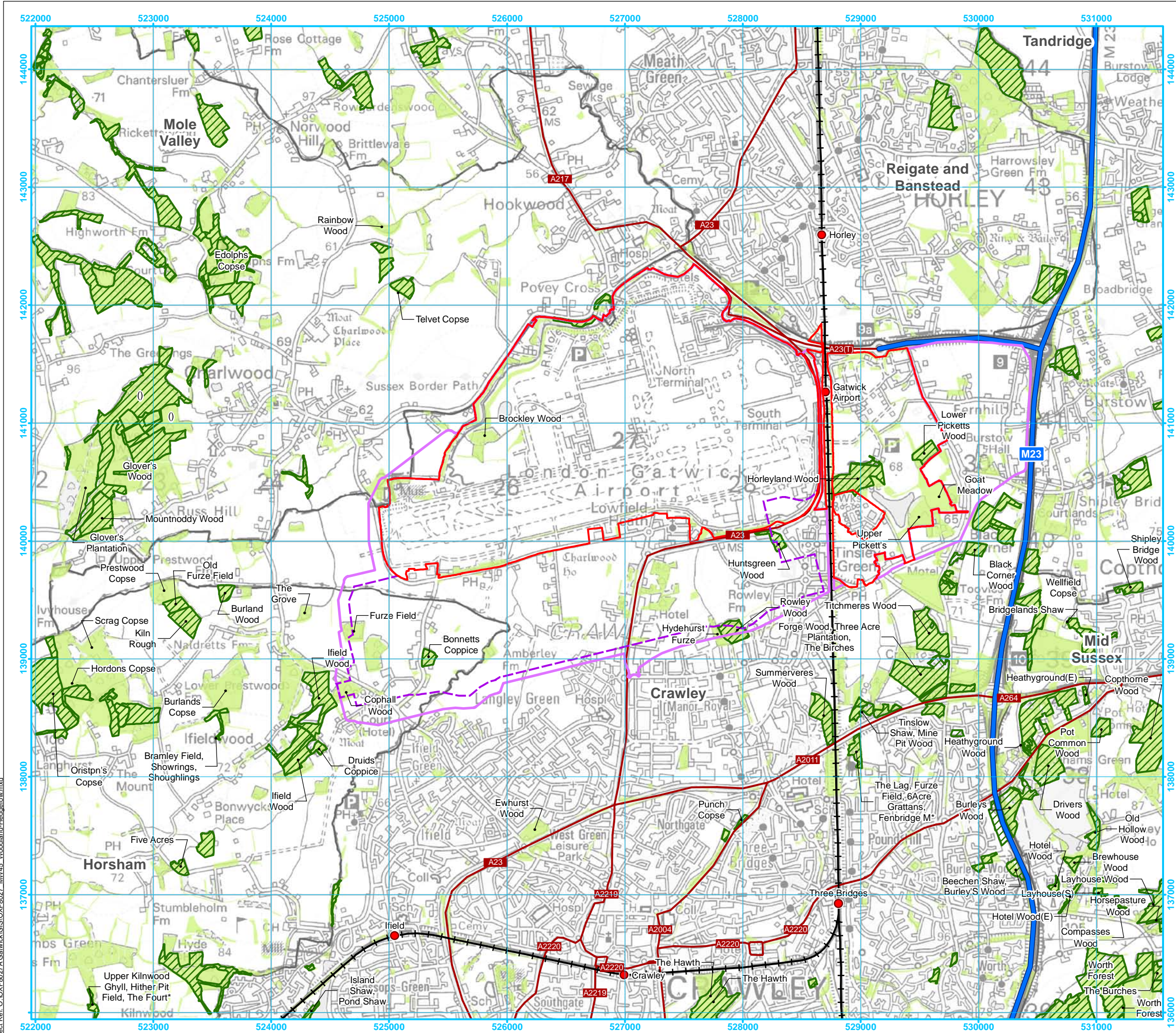
■ Job Ref: **OXF8027** Figure No: **2** Revision: **C**

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- Legend**
- Existing airport boundary
 - Update Scheme Design No EATs Operational boundary
 - Update Scheme Design No EATs Landtake boundary
 - Local Nature Reserve (LNR) (Natural England)
 - Recently designated Local Nature Reserve (LNR)
 - Site of nature conservation importance
 - Potential site of nature conservation importance
 - Local Nature Reserve (Local policy plan)
 - Conservation Areas
 - Long distance path

C	29/04/14	Update Scheme Design No EATs Landtake	BF	JT
B	11/04/14	Airport & Update Scheme Design No EATs	BF	JT
Rev:	Date:	Amendment:	Name:	Checked:
Data Source: RPS 2013				
Status: FINAL				
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Project: Airports Commission				
Title: Locally Designated Sites				
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Projection: British National Grid Datum: OSGB36				
Date: 20/03/2014 Drawn: BF Checked: MW				
Job Ref: OXF8027 Figure No: 3 Revision: C				



Legend

- Existing airport boundary
- Update Scheme Design No EATs Operational boundary
- Update Scheme Design No EATs Landtake boundary
- Ancient woodland
- Other woodland

C	29/04/14	Update Scheme Design No EATs Landtake	BF	JT
B	11/04/14	Airport & Update Scheme Design No EATs	BF	JT
Rev:	Date:	Amendment:	Name:	Checked:

Data Source: RPS 2013

Status:

RPS

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T 01480 302751 F 01480 466911 E rpscm@rpsgroup.com

Client: Gatwick Airport Limited

Project: Airports Commission

Title: Woodlands, Including Ancient Woodlands

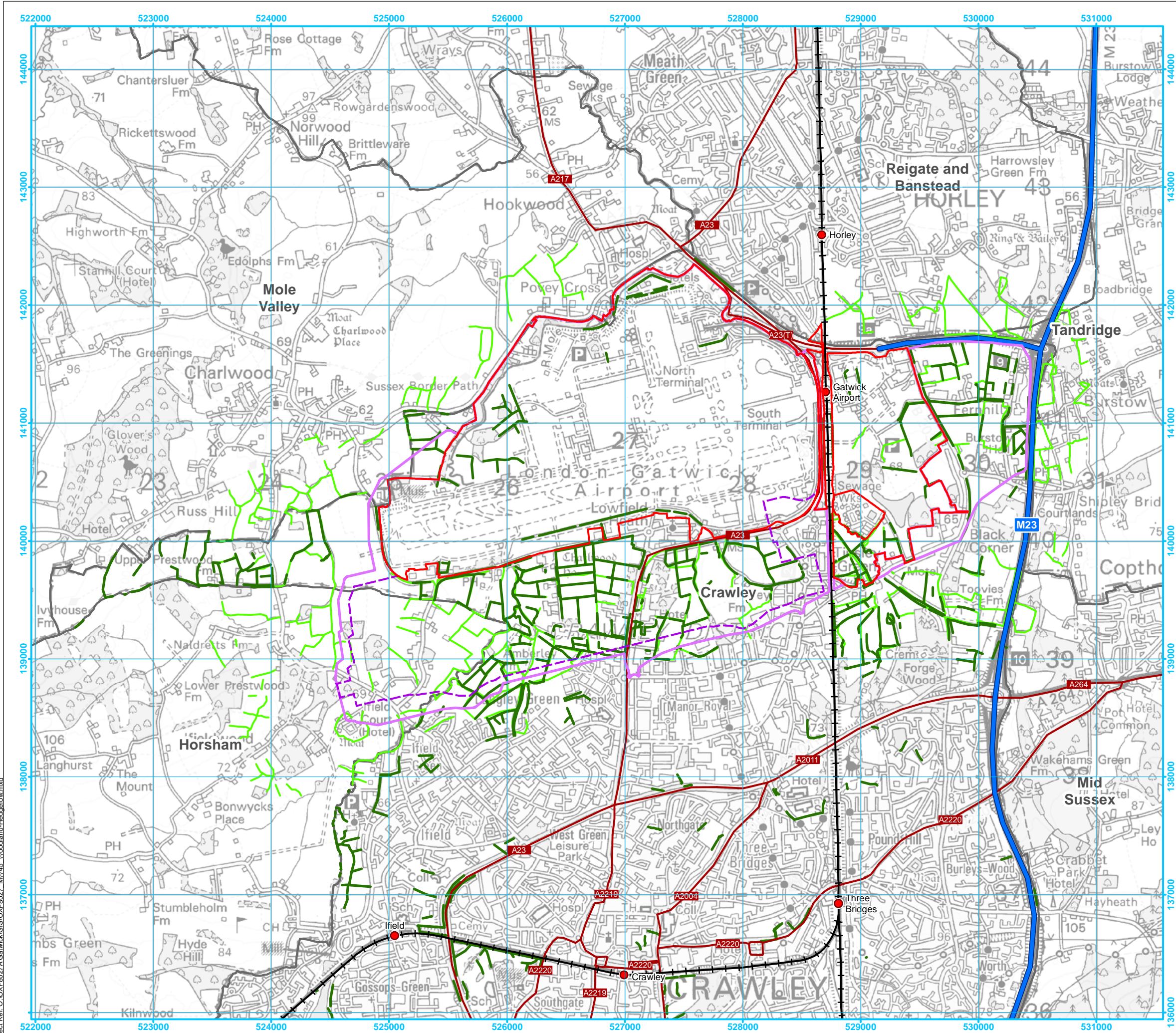
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Date: 25/03/2014 **Drawn:** BF **Checked:** MW

Job Ref: OXF8027 **Figure No:** 4 **Revision:** C

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Legend

- Existing airport boundary
- Update Scheme Design No EATs Operational boundary
- Update Scheme Design No EATs Landtake boundary
- Ancient hedgerow (Crawley Only)
- Other hedgerow

C	29/04/14	Update Scheme Design No EATs Landtake	BF	JT
B	11/04/14	Airport & Update Scheme Design No EATs	BF	JT
Rev:	Date:	Amendment:	Name:	Checked:

Data Source: RPS 2013

Status:

RPS
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Client: Gatwick Airport Limited

Project: Airports Commission

Title: Hedgerows, Including Ancient Hedgerows

Scale: 1:32,000 @A3
0 250 500 1,000 1,500m

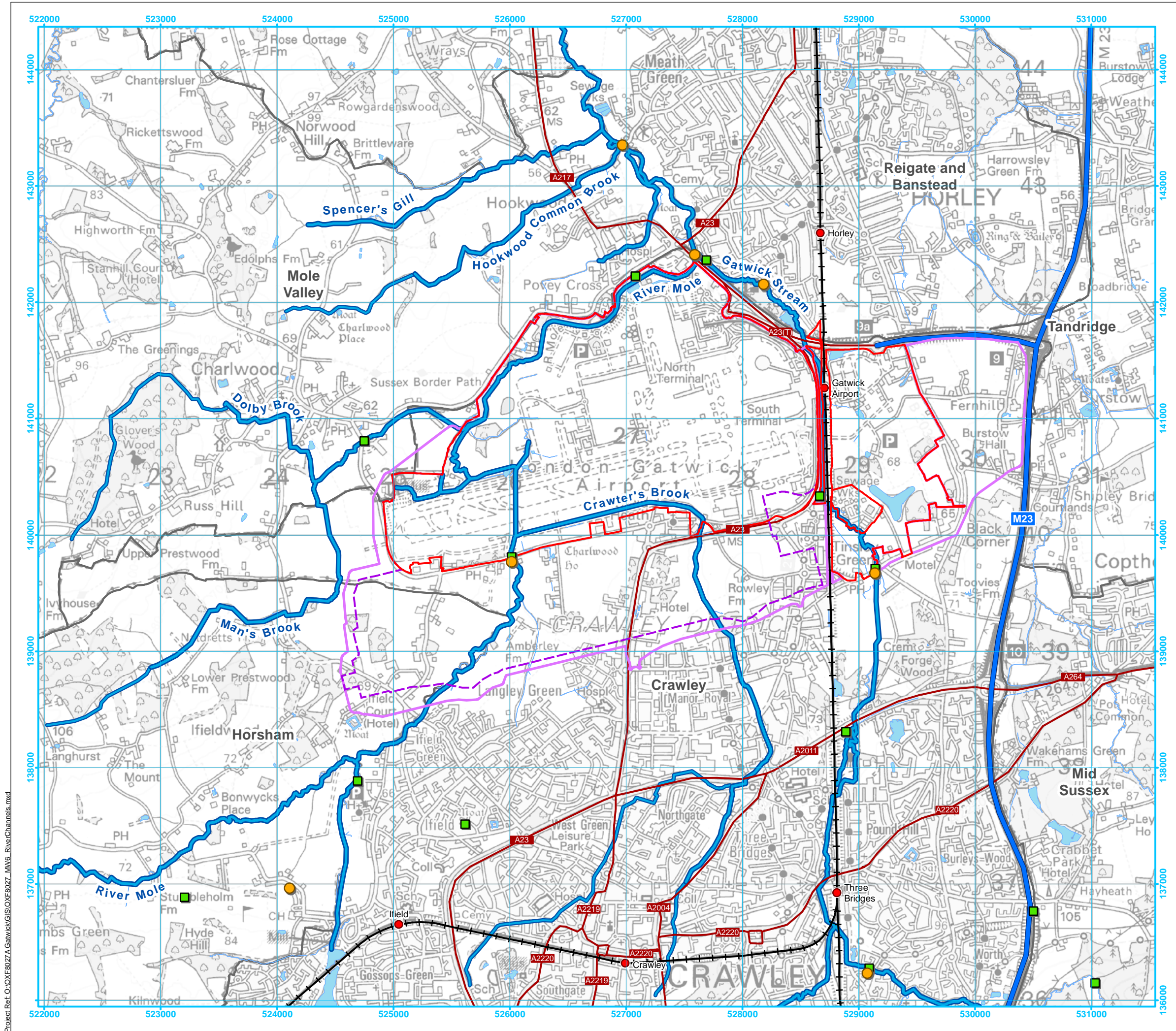
Projection: British National Grid **Datum:** OSGB36

Date: 25/03/2014 **Drawn:** BF **Checked:** MW

Job Ref: OXF8027 **Figure No:** 5 **Revision:** C

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Project Ref: O:\OXF8027\A\Gatwick\GIS\OXF8027_MW45_Woodland-Hedgerow.mxd



Legend

- Existing airport boundary
- Update Scheme Design No EATs Operational boundary
- Update Scheme Design No EATs Landtake boundary
- Existing channel
- Water quality monitoring point
- Ecology monitoring point

D	29/04/14	Update Scheme Design No EATs Landtake	BF	JT
C	25/04/14	Water quality & ecology monitoring points	BF	MW
B	11/04/14	Airport & Update Scheme Design No EATs	BF	JT
Rev:	Date:	Amendment:	Name:	Checked:

■ Data Source: RPS 2013

Status: **FINAL**

Willow Mere House Compass Point Business Park Stocks Bridge Way
St. Ives Cambridgeshire PE27 5JL
T 01480 302751 F 01480 466911 E rpscm@rpsgroup.com

■ Client: Gatwick Airport Limited

Project: Airports Commission

Title: Watercourses

Scale: 1:32,000 @A3

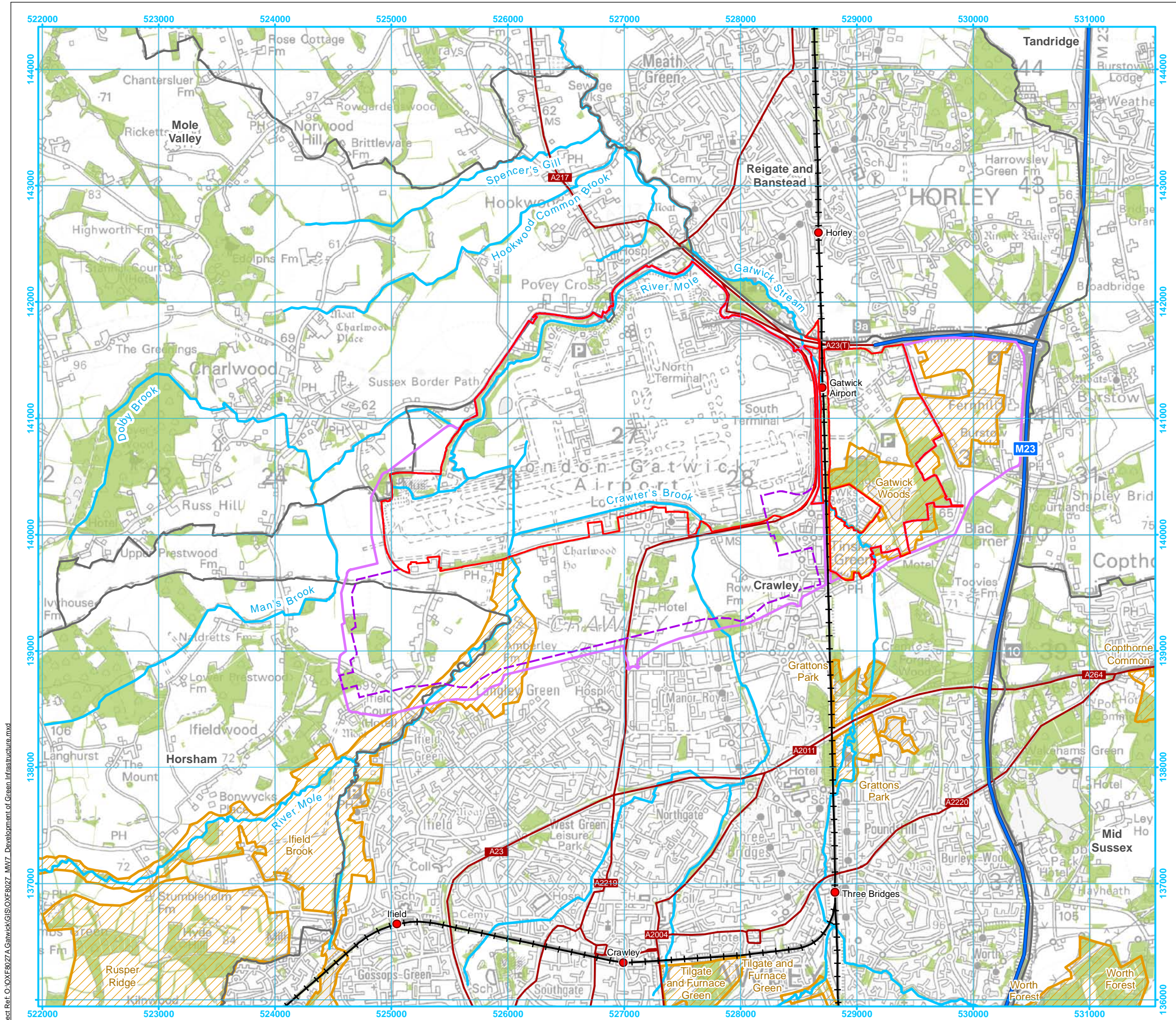
Projection: British National Grid Datum: OSGB36

Date: 20/03/2014 Drawn: BF Checked: MW

■ Job Ref: OXF8027 Figure No: 6 Revision: D

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Project Ref: O:\OXF8027\A\Gatwick\GIS\OXF8027_MW6_RiverChannels.mxd



Legend

- Existing airport boundary
- Update Scheme Design No EATs Operational boundary
- Update Scheme Design No EATs Landtake boundary
- Sussex Biodiversity Opportunity Areas
- Woodland
- River channel

C	29/04/14	Update Scheme Design No EATs Landtake	BF	JT
B	11/04/14	Airport & Update Scheme Design No EATs	BF	JT
Rev:	Date:	Amendment:	Name:	Checked:

■ Data Source: RPS 2014

Status:

Willow Mere House Compass Point Business Park Stocks Bridge Way
St. Ives Cambridgeshire PE27 5JL
T 01480 302751 F 01480 466911 E rpscm@rpsgroup.com

■ Client: Gatwick Airport Limited

Project: Airports Commission

Title: Green Infrastructure, Biodiversity Opportunities

Scale: 1:32,000 @A3

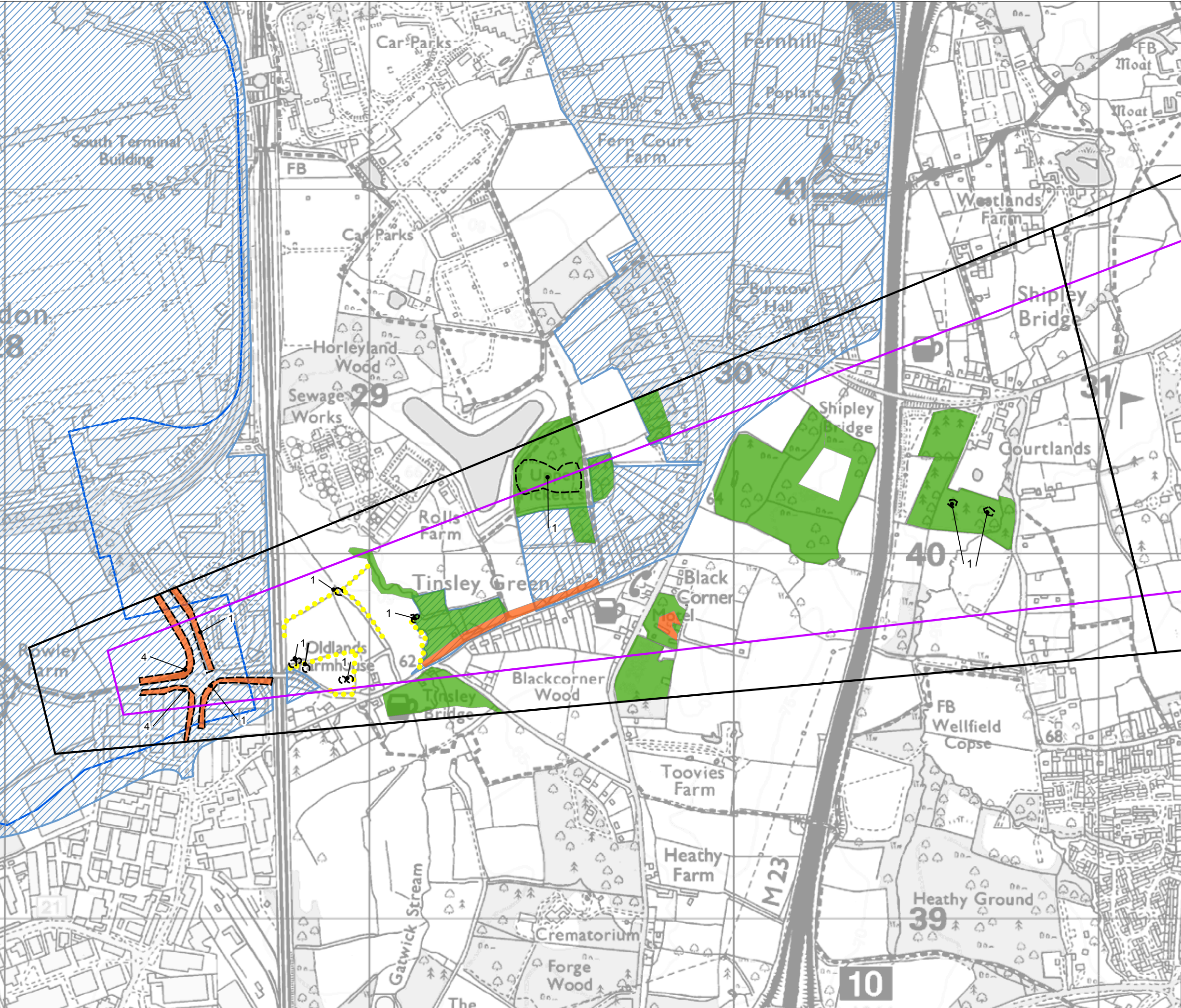
Projection: British National Grid Datum: OSGB36

Date: 20/03/2014 Drawn: BF Checked: MW

■ Job Ref: OXF8027 Figure No: 7 Revision: C

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Project Ref: O:\OXF8027\A.Gatwick\GIS\OXF8027_MW7_Development of Green Infrastructure.mxd



Legend

Operational Boundary

TOCS

Approach

Landtake Boundary

Broad Vegetation Categories:

Lowland mature mixed woodland

Trees in the built form

Solitary/pasture trees

Tree Works

1. Retain structure and manage height

4. Clearance and management as non-woodland habitat type e.g. species rich grassland/glade.

Rev:	Date:	Amendment:	Name:	Checked:
Data Source: RPS 2014				
Status: -				
<div>RPS</div> <div>20 Western Avenue Milton Park Abingdon Oxon OX14 4SH T 01235 821888 F 01235 820351 E rps@rpsgroup.com W rpsgroup.com</div>				
Client: Gatwick Airport Ltd				
Project: Gatwick Airport				
Title: East TOCS and Approach				
Scale: A3 @ 1:10,000 0 0.225 0.45 km				
Date: Apr 2014 Datum: OSGB36 Projection: BNG				
Drawn: JC Checked: ES Job Ref: OXF8027				
Figure No: 9				
Revision: .				

APPENDICES

APPENDIX 1 – LIBRARY OF DOCUMENTS IN TO INFORM BIODIVERSITY ASSESSMENT

* = includes species distribution maps

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APPENDIX 2 – GLOSSARY OF ACRONYMS USED IN REPORT

AA	Airports' Authority
AONB	Area of Outstanding Natural Beauty
APPS	Approach surface
ASNW	Ancient Semi-Natural Woodland
BAP	Biodiversity Action Plan
BARS	Biodiversity Action Reporting System
BM	Booth Museum of Natural History, Brighton
BOA	Biodiversity Opportunity Area
BS	British Standard
CAP	Civil Aviation Publication
CSS	Countryside Stewardship Scheme
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EAT	End around taxiway
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
ELS	Entry Level Scheme
EN	English Nature
EPS	European Protected Species (under the EC Habitats Directive)
ESA	Environmentally Sensitive Area
FC	Forestry Commission
GAL	Gatwick Airport London
GI	Green Infrastructure
HAP	Habitat Action Plan
HLF	Heritage Lottery Fund
HLS	Higher Level Scheme
HRA	Habitat Regulations Assessment (also known as appropriate assessment)
IEEM	Institute of Ecology and Environmental Management (now Chartered Institute of Ecology and Environmental Management)
IRPOI	Imperative Reasons of Over-riding Public Interest
LA	Local Authorities
LDF	Local Development Framework
LNR	Local Nature Reserve
NCA	National Character Area
NE	Natural England
NERC	National Environment and Rural Communities Act 2006
NGO	Non-Governmental Organisation
NNR	National Nature Reserve
OLS	Obstacle limitation surface

PPG	Planning Policy Guidance
PPS9	Planning Policy Statement 9: Biodiversity and Geological Conservation
RDB	Red Data Book
RIGS	Regionally Important Geological or Geomorphological Site
RSNC	Royal Society for Nature Conservation
RSPB	Royal Society for the Protection of Birds
RTPI	Royal Town Planning Institute
SAC	Special Area of Conservation
SAP	Species Action Plan
SBP	Sussex Biodiversity Partnership
SLNP	Sussex Local Nature Partnership
SNCI	Site of Nature Conservation Importance
SOS	Sussex Ornithological Society
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SxWT	Sussex Wildlife Trust
SxBRC	Sussex Biodiversity Record Centre
TCPA	Town and Country Planning Association
TOCS	Take-off climb surface
TPO	Tree Preservation Order
WCA	Wildlife and Countryside Act (1981) as amended
WGS	Woodland Grant Scheme
WSCC	West Sussex County Council

APPENDIX 3 – ECOSYSTEM SERVICES ASSESSMENT

Introduction

- A3.1 A review of the impact on ecosystem services, as defined in Natural England's National Character Areas (NCA) publications, has been undertaken at a high level, informed in particular by the profile of the Low Weald NCA area within which Gatwick Airport is located (see Section 3 of this report). The NCA profile provides a strategic context for any potential infrastructure development.

Method

- A3.2 The assessment baseline for ecosystem services has been defined by identifying the performance of the identified ecosystem services within the context of the Low Weald NCA. These are food provision, timber provision, water availability, genetic diversity, climate regulation, regulating water quality, regulating water flow, pest regulation, sense of place/inspiration, sense of history, tranquillity, recreation, human health and well-being, biodiversity and geodiversity.
- A3.3 The ecosystem services review as undertaken:
- references the area level Ecosystem Services analysis undertaken in the NCA: 121 Low Weald document
 - draws primarily on the biodiversity baseline material within this document,
 - references the assessments prepared for the other Appraisal Modules supporting GAL's submission to the Airports Commission; notably the Water, Place, Community, Air quality and Noise modules.
- A3.4 By referencing both the wider and detail study areas for the other Appraisal Modules, the ecosystems services assessment therefore addresses both the "area" and "local" effects of the scheme. The Topic Modules and Appraisal of Sustainability provide valuable baseline material for the Commission to undertake the ecosystem services assessment.
- A3.5 The steps involved in defining the impact on ecosystem services were categorized by:
- Identifying the environmental impact of the updated scheme design on that service;
 - Estimating and describing the effects (cost or benefit), in terms of the change to a given ecosystem service at a strategic, qualitative level by identifying potential key impacts at a high level rather than undertaking an exhaustive assessment;

Scheme Performance

- A3.6 The sensitivity of the receptor and the magnitude of impact are identified separately and contribute to the evaluation of the likely significance of the effect. The evaluation of significance is based on professional judgement and assessed in accordance with the approach set out in the Appraisal Framework (paragraph 5.24) and the following scale of effects based on that proposed by the Airports Commission:

- Highly supportive (or highly beneficial): Positive impacts that are substantial, substantially accelerate an improving trend or substantially decelerate a declining trend;
- Supportive (or beneficial): Positive impacts that are notable, accelerate an improving trend or decelerate a declining trend;
- Neutral: No impacts or negligible impacts;
- Adverse: Negative impacts that are notable, decelerate an improving trend or accelerate a declining trend;
- Highly adverse: Negative impacts that are substantial, substantially decelerate an improving trend or substantially accelerate a declining trend.

Ecosystem Services Baseline

- A3.7 The NCA profile identifies the key services provided in the Low Weald NCA. These are summarized in Table 1.

Table 1: Low Weald NCA Ecosystem Services Review

Ecosystem Services	"Area" level features identified by the 121: Low Weald NCA Document	"Local" level baseline
Food Provision	Livestock were traditionally reared on the pasture and continue to be a major land use. Dairy farming is in decline but survives, particularly in a small area around Edenbridge in the centre of the NCA. Arable and horticultural farming remain important, particularly in the east.	<p>The Agricultural Resources module topic for a 2 km study area of the updated scheme design boundary describes:</p> <ul style="list-style-type: none"> • The nature of the agricultural soil resource; • The quality of the agricultural land based on the Ministry of Agriculture Fisheries and Food Agricultural Land Classification (ALC) System (October 1988); and • The structure of farming, based on the location of individual farm holdings. <p>Virtually all of the agricultural land surveyed in detail has been found to be of Subgrade 3b quality confirming the more subjective assessments made for the Provisional Map of the 1970s.</p> <p>There are few locations indicated as farms on the Ordnance Survey mapping with apparent activity and places which are called farms. The agricultural land is being used predominantly as permanent pasture in connection with livestock enterprises (e.g. as with the beef suckler herd at Rowley Farm) or for horse grazing.</p>
Timber Provision	Despite the wooded nature of the NCA and the long history of wood supply, the area does not supply a large amount of timber.	As for the NCA as a whole, the area does not supply a significant amount of timber.

Ecosystem Services	“Area” level features identified by the 121: Low Weald NCA Document	“Local” level baseline
Water Availability	The area contains the Arlington Reservoir which can store up to 8,300 million litres of water and was created in 1971. It supplies water to the Eastbourne, Hailsham, Polegate and Heathfield areas, while Bough Beech Reservoir was constructed in the 1960s and supplies 15% of the water for Sutton and East Surrey Water.	<p>The baseline for Water resources is presented in the Water module topic.</p> <p>The airport is supplied by Sutton and East Surrey Water, from the Bough Beech reservoir.</p> <p>Since 2010, Gatwick has significantly reduced its consumption of potable water by renewing infrastructure, adopting best practices and targeting leaks.</p> <p>The proposed development does not impact on Arlington Reservoir.</p>
Genetic Diversity	Some old and traditional orchards and remnants of the hop-growing industry survive and contain important local varieties that are now rarely available, such as Sussex Forge apple. The Sussex cattle breed and the Southdown sheep were developed largely in the Low Weald. See also Biodiversity.	<p>There are no or very few orchards and/or hop field in the area around the Airport.</p> <p>There is limited stock rearing around the Airport, with cattle herds at Ifield Court and Rowley Farm.</p> <p>Se also Biodiversity</p>
Climate Regulation	Longstanding woodland is abundant in the Low Weald and is a good carbon store, as is the undisturbed soil beneath which has a high carbon content, Similarly, its long ley and semi- and unimproved grassland will tend to have higher soil carbon content than cultivated equivalents. Growing timber is good carbon sequestration, particularly in habitats such as wet woodland with rapid deposition.	<p>The Biodiversity topic module identifies the locations of woodland and grassland around the airport, and describes these resources in Section 3. The Gatwick Woods and Ifield Brook Biodiversity Opportunity Areas create green infrastructure which will be valuable in responding to climate change.</p> <p>No habitats or species of particular sensitivity to climate change were noted.</p>

Ecosystem Services	"Area" level features identified by the 121: Low Weald NCA Document	"Local" level baseline
Regulating Water Quality	Water quality is particularly important in the reservoirs that provide water for the surrounding areas. Buffering watercourses and reservoirs, thereby slowing the pathway of run-off, could have a significant impact, along with working with farmers and land managers within the Low Weald and particularly on the higher ground and catchments in adjacent NCAs to promote good practice.	Presently the River Mole and its tributaries provide a relatively poor service with respect to regulating water quality, significant proportions being canalised and in the case the River Mole passing through a culvert (0.5 km). The lack of a riparian zone and a floodplain, limits the service function.
Regulating Water Flow	Predominantly clay flood plain soils with naturally high groundwater and the area's low-lying nature make many areas in the Low Weald susceptible to flooding.	The River Mole and its tributaries provide a relatively poor service with respect regulating water flow, significant proportions being canalised and in the case the River Mole passing through a conduit (0.5 km). The lack of a riparian zone and a floodplain, limits the service function.
Regulating soil erosion and quality	The underlying clay gives rise to clayey or loamy over clay soils. This is reflected by the presence of arable farmland as well as pasture, paddock and some ungrazed grassland.	Increasing area of arable farming increases risk of damage to soil and losses through erosion, e.g. land to west of runway.
Pest Regulation	The significant proportion of ancient woodland, particularly oak, makes this NCA especially vulnerable to introduced pests and diseases. Mature elm has been lost from most of the Low Weald with the exception of parts which fall within the Dutch Elm Disease Control Area in East Sussex.	The areas of ancient woodland, particularly oak make this NCA especially vulnerable to introduced pests and diseases. Integrated woodland management to optimize resilience to pest infestation is limited in the area.
Sense of Place/Inspiration	Oast houses are a distinctive feature in the east, though almost all have been converted to other uses, usually residential. Ditchling became a centre for artists and craftsmen with the foundation of the Guild of St Joseph and St Dominic by Eric Gill in the early 20 th century.	The Cultural Heritage, Landscape, and Community baseline for the areas surrounding the airport is described in the Place and Community module topics. The features associated with oast houses and Ditchling are absent from the area around the Airport.

Ecosystem Services	"Area" level features identified by the 121: Low Weald NCA Document	"Local" level baseline
Sense of History	<p>The Low Weald has a strong sense of being an anciently settled and farmed landscape, with farmsteads (often of medieval origin) set in landscapes also enclosed in the medieval period and successively reorganised. The landscape is influenced by remnants of the Wealden iron industry. There are many fine houses, many medieval in origin and often set within historic parkland, including Knepp Castle and Newick Park, as well as many smaller gardens and designated landscapes.</p>	<p>The Cultural Heritage of the area within and around the airport, comprising Archaeology, Heritage Buildings and Historic Landscape is described in the Place and Community module topics.</p> <p>The area immediately adjacent to the airport has been significantly affected by 20th Century development. The historic landscape, whilst remaining legible, has been fragmented; field boundaries provide evidence of periods of enclosure from the mediaeval period onwards.</p> <p>There are also Conservation Areas close to the airport, some contained within or bordering 20th Century development (for example at Ifield and in Horley). There are also place names which indicate past associations with the Wealden iron industry (e.g. Forge Wood at Tinsley Green).</p> <p>Outside of the main urban centres, there are settlements which have historic cores (for example at Charlwood) and these contain timber framed buildings typical of the Low Weald NCA.</p> <p>The area immediately adjacent also includes mediaeval farmsteads, for example at Rowley Farm. There are Scheduled Monuments at Ifield Court and at Tinsley Green.</p>
Tranquility	<p>The Low Weald is a predominantly pastoral and wooded landscape that is largely still rural and relatively tranquil outside the main urban centres.</p>	<p>The Landscape, Townscape, and Waterscape document reviews the baseline Tranquility Maps produced by CPRE. The tranquility assessment is also referenced in the Cultural Heritage document</p> <p>The Airport lies between the busy settlements of Crawley and Horley. The main London to Brighton railway line runs north/south through the airport boundary, and to the east of this is the M23. The A23 runs north from Crawley to join the M23 spur to the south of Horley.</p>

Ecosystem Services	“Area” level features identified by the 121: Low Weald NCA Document	“Local” level baseline
		<p>The area to the west of the A23, and around the western perimeter of the Airport towards the village of Charlwood, becomes increasingly rural in character, albeit aircraft can be seen and heard.</p> <p>Relatively quickly, with increasing distance from the airport and its flight paths, and away from the settlements and the major transport corridors, the pastoral and wooded landscape character of the Low Weald is increasingly asserted.</p>
Recreation, human health and well-being	<p>Recreation is supported by 3,974 km of public rights of way. Arlington Reservoir is an important resource for angling (as a trout fishery), birdwatching and walking. Bough Beech Reservoir also allows sailing at its southern end. The Wealdway runs through part of the NCA. The Cuckoo Trail follows 17 km of former railway line between Polegate and Heathfield. It is used by about 200,000 people a year and forms part of National Cycle Network 21. Commons such as Ditchling and Chailey are popular for recreational activities.</p>	<p>The Community document discusses recreational facilities available to local residents in the Langley Green, Northgate and Pound Hill areas which border the airport. Other module topics (Landscape, Biodiversity) identify other areas locally and further afield which are used for recreation including:</p> <ul style="list-style-type: none"> • The pitches of Crawley Rugby Club, and other sports facilities at Langley Green • Riding centres at Kilmarnock Farm and at Teizer’s Farm • Public access areas and footpaths within the woodland at Glover’s Wood <p>The Sussex Border Path joins the River Mole corridor to the north of the Airport and follows the airport perimeter for around 2 km, routing through Charlwood and onward to Rusper. Public rights of way in the area immediately around the Airport are, otherwise, relatively limited.</p> <p>Footpaths in the Tinsley Green area provide access to small areas of woodland (Horleyland and Pickets Woods) within the Airport’s landholding.</p>

Ecosystem Services	“Area” level features identified by the 121: Low Weald NCA Document	”Local” level baseline
		<p>The wooded areas and country lanes in the wider locale are used by walkers, cyclists and horse riders.</p>
Biodiversity	<p>The 49-hectare site of Arlington Reservoir supports diverse habitats, with 173 recorded bird species and a wintering population of up to 10,000 wildfowl; it is also important for migrating osprey. Part of Bough Beech Reservoir is leased to Kent Wildlife Trust and forms a nature reserve.</p> <p>The Low Weald is the most important area for Spiked Rampion in England and is among the top five NCAs for several other species, such as chamomile and True Fox-sedge.</p> <p>The area is rated in the top ten NCAs for containing Bullfinch and Lesser Spotted Woodpecker and its wooded character supports many rare species, including Nightjar and notably woodland butterflies such as the Wood White and moths such as the forester and scarce Brown Hairstreak. It is also rated in the top twelve in terms of species richness by the Bat Conservation Trust and there are colonies of rare Barbastelle and Bechstein’s bats. The wet woodland also makes it important for fungi, mosses, liverworts and lichens.</p>	<p>The Biodiversity elements of this module topic provide a very comprehensive description of the baseline within a 2 km study area of the airport.</p> <p>The biodiversity value of the area around the Airport is concentrated in woodlands and the unculverted sections of the River Mole and its tributaries.</p> <p>Within the airport landholding, Horleyland and Upper Pickets Woods are managed by the Gatwick Biodiversity Partnership. To the west of the airport, Glover’s Wood is gill woodland and a SSSI.</p> <p>Other plants referenced in the are Low Weald NCA (e.g. Spiked Rampion and True Fox-sedge) are not recorded as being present in the area around the Airport.</p> <p>The Brown Hairstreak is known from just outside the area around the Airport but not the Wood White.</p> <p>Lesser Spotted Woodpecker, although very scarce, has been known from the area around the Airport whereas Bullfinch and Nightjar have not.</p> <p>The woodlands around the Airport are recognized for their importance for a range of bat species including Bechstein’s Bat.(but not Barbastelle). A characteristic of these species is that they are primarily woodland species.</p>

Ecosystem Services	"Area" level features identified by the 121: Low Weald NCA Document	"Local" level baseline
		There are great crested newts in the area around the airport, other species present include Badger and grass snake.
Geodiversity	The NCA is geologically important and contains 11 geological SSSI and 19 local sites. Geological features include Jurassic-Cretaceous stratigraphy sites notable for well-preserved fossils. Clay pits, such as those at Lower Dicker, excavated for the brick and tile industry often exposed clear geological sections illustrating varied lithologies, particularly sandstones and limestones, as well as fossil remains. Many of these sites are critical to our understanding of the complex Wealden geology.	There are no sites of geological interest in the area around the Airport

High Level Ecosystem Services Assessment

- A3.8 The impact of land-take on most of the ecosystem services outlined in Table 1 will in most cases be local and be **adverse** or **neutral** or, in some cases **highly supportive**. The latter are due to the immediate improvements to the River Mole and its tributaries, the impacts being at the regional level. The development proposed is **neutral** at national level. Table 2 summarises these impacts including the potential enhancements to ecosystem services that could be achieved. Most would experience a positive net benefit and for a number this would be significant and sustainable.
- A3.9 Many of the areas specifically identified by the NCA Ecosystem services document are not close to the airport and will not be directly affected by it.
- A3.10 The examples as referenced as representative or characteristic of the areas affected.
- A3.11 The impact of operation on most of the ecosystem services is **neutral** though changes to the noise environment might have **adverse** impacts on tranquillity and recreation services.

Table 2: “Area” level Impacts on Low Weald NCA Ecosystem Services

Services	Assets/attributes: main contributors to service at area level (source NCA 121: Low Weald)	Effects of scheme on this ecosystem service	Current level and performance of service	Level and performance of service post development	Opportunities
Food provision	<p>The area affected is predominantly permanent pasture used for livestock enterprises or for horse grazing.</p> <p>Total farm area in 2009 was 83,074ha.</p> <p>Grazing livestock accounts for 29% of the area; cereals for 14%, with other uses making up the remainder.</p>	The updated scheme design would affect a total of approximately 359.5 ha of agricultural land. The area affected equates to less than 0.5% of the whole.	Supportive at local level	Supportive depending on mitigation and compensation at a local level	Within mitigation and compensation
Timber provision	Woodland, a limited area of which is used in supplying timber	The area proposed for development does not contain woodland supplying amounts of timber commercially	Supportive at local level	Potentially supportive at a local level depending on mitigation and compensation	Within mitigation and compensation
Water Availability	Bough Beech Reservoir.	<p>The area lies in the upper Mole catchment. Sutton & East Surrey Water abstract water from the River Mole at a location downstream of the Airport.</p> <p>See Water Environment Module Topic.</p>	Supportive at regional level	Supportive at regional level and highly supportive at local level	<p>The strategies under consideration to reduce potable water usage, harvest rainwater, and recycle waste water are reviewed in the Water Resources module topic</p> <p>The design of the river diversions and the restoration</p>

Services	Assets/attributes: main contributors to service at area level (source NCA 121: Low Weald)	Effects of scheme on this ecosystem service	Current level and performance of service	Level and performance of service post development	Opportunities
					of the channel, riparian zone and floodplain function will have significant benefits to water retention and availability. Similarly there is scope to use woodland management and creation to further enhance this service (see Water module topic)
Genetic Diversity	Orchards and remnants of hop-growing land. Rare apple species, such as Sussex Forge. Sussex cattle breed. Southdown sheep breed. See Biodiversity below	These features are not present within the Gatwick area	Neutral at a local level	Supportive at a local level	Incorporate orchard creation into the compensation needed for woodland thereby achieving enhancement See Biodiversity below
Climate Regulation	Woodland including ancient woodland. Long ley, semi-improved and unimproved grassland. Woodland supplying timber. Initial stages in creating coherent green infrastructure	Scope to develop a more coherent and extensive response to climate change	Supportive at a local level	Supportive at a local level	Achieving a net gain in woodland extent and quality will enable an overall gain in climate regulation. Contributions to extent and coherence of green infrastructure will buffer climate change locally
Regulating Water Quality	Land buffering watercourses and reservoirs.	The relocation and restoration of the River Mole	Supportive at regional level	Highly supportive at regional level	The re-location and restoration of the River Mole and its

Services	Assets/attributes: main contributors to service at area level (source NCA 121: Low Weald)	Effects of scheme on this ecosystem service	Current level and performance of service	Level and performance of service post development	Opportunities
		and tributaries will improve water quality through in-channel process as well as riparian and floodplain habitats			tributaries creates the opportunity to repair in-channel, riparian and floodplain function and linked into woodland creation improvements to catchment function. This would, overall, have a significant impact on water quality with benefits all the way down to the River Thames.
Regulating Water Flow	<p>None identified. However, features that help to regulate water flow or store water would be important e.g.: reservoirs.</p> <p>Land buffering watercourses and reservoirs.</p>	Restoration of the River Mole and tributaries will ensure regulation of water flow	Supportive at local level	Highly supportive at regional level	The re-location and restoration of the River Mole and its tributaries creates the opportunity to pair riparian and floodplain function including hydromorphological features that together will and naturally regulate flow and discharge as well as achieving a more natural sediment behaviour linked to reduction in unnatural flooding and low flow episodes. This would overall, have a significant impact on regulating water flow, for some aspects this would extend downstream of the Airport.

Services	Assets/attributes: main contributors to service at area level (source NCA 121: Low Weald)	Effects of scheme on this ecosystem service	Current level and performance of service	Level and performance of service post development	Opportunities
Regulating soil erosion and quality	Clayey or loamy over clay soils with range of agricultural land use	Loss of soils to land-take	Neutral to slightly adverse	Neutral – slightly supportive	Land used to mitigate and compensate for habitat loss and river diversion and restoration work will enable regulation of soil erosion and conserve and enhance soil quality
Pest Regulation	Ancient woodland. Oak and elm woodland.	Develop an integrated response to pest regulation	Neutral at a local level	Supportive at a local level	Incorporate pest regulation into woodland management and/or into the planning of new woodlands to be created building on improvements in green infrastructure
Sense of Place/Inspiration	Oast houses and Ditchling – not present in Gatwick area.	The area contains listed buildings some of which date from medieval times.	Supportive at a local level	Potentially supportive at a local level	Compensation and enhancement with respect to woodland including orchards and hedgerows creation and planting respectively would contribute to maintain and/or restoring a sense of place in particular localities
Sense of History	Farmsteads of medieval origin. Wealden iron ore industry. Historic parkland and associated houses, particularly Knepp Castle and Newick Park. Designated landscapes and smaller gardens.	Limited resources based on current knowledge	Neutral at local level	neutral at local level	Compensation and enhancement with respect to any features and associated interpretation

Services	Assets/attributes: main contributors to service at area level (source NCA 121: Low Weald)	Effects of scheme on this ecosystem service	Current level and performance of service	Level and performance of service post development	Opportunities
Tranquility	Tranquil and rural areas.	Limited resources due to significant urban areas, transport infrastructure including the airport	Neutral to adverse at local level	Neutral to adverse at local level	Compensation and enhancement with respect to woodland and hedgerows creation and planting respectively would contribute to maintain and/or restoring tranquility, e.g. through including public access linked in the public rights of way/cycleway networks
Recreation, human health and well-being	Public rights of way, including the Cuckoo Trail, the Wealdway and National Cycle Network 21. Arlington Reservoir. Bough Beech Reservoir. Commons, including Ditchling and Chailey.	Opportunity to extend the public rights of way, further enhancement of Gatwick Woods and other opportunities linked to re-location of Willoughby woods LMR and recreation resource	Supportive at local level	Supportive to highly supportive at local level	Compensation and enhancement with respect to woodland and hedgerows creation and planting respectively would contribute to maintain and/or restoring recreation opportunities, e.g. through including public access linked in the public rights of way/cycleway networks
Biodiversity	Arlington Reservoir. Bough Beech Reservoir (nature reserve area). Rare plant species, notably spiked rampion, chamomile and true fox-sedge. Rare bird species, notably bullfinch, lesser-spotted woodpecker and nightjar.	The main resource is associated with the woodland and watercourses locally. The proposed scheme would not impact Arlington Reservoir or Bough Beech Reservoir.	Highly supportive at local level	Highly supportive at regional level	Compensation and enhancement with respect to woodland and hedgerows creation and planting respectively coupled with the re-location and restoration of the River Mole and its tributaries (channel, riparian and floodplain habitat) creates the opportunity to enhance

Services	Assets/attributes: main contributors to service at area level (source NCA 121: Low Weald)	Effects of scheme on this ecosystem service	Current level and performance of service	Level and performance of service post development	Opportunities
	Woodland butterflies, such as wood white, and moths such as the forester and scarce brown streak. Bats, notably barbastelle and Bechstein's bats. Wet woodland and associated species: fungi, mosses, liverworts and lichens.				biodiversity through natural colonization but also targeted re-introductions, e.g. Water Vole and Otter.
Geodiversity	Geological SSSIs. Locally designated geological sites. Clock House Brick Works, Auclaye and Smokejack Clay Pit. Clay pits. Bethersden Marble	No effect	Neutral at local level	Neutral at local level	None identified

A3.12 Particular drivers of ecosystem change which could be brought by the scheme include:

- Land use change, resulting from land-take in relation to infrastructure (airport and surface access) and the mitigation, enhancement and compensation measures included in the scheme; and
- Hydrological change and pollution, e.g. resulting from river diversions and restoration, changes in surface access and air traffic.

Conclusion

A3.13 The evaluation of the likely significance of the net performance of the scheme on ecosystem services has identified that these are almost entirely at a local level.

A3.14 The effects are either **neutral** or where there is scope for an adverse effect, with appropriate mitigation and compensation will be **neutral**. For a number of services there is potential to achieve a **supportive** effect post mitigation and/or compensation.

A3.15 With respect to water quality and water regulation services, the significance is both local and regional with the net performance ranging from **highly supportive** to **supportive**. These derive from the restoration of rivers and brooks and their associated habitats.

A3.16 Gatwick Airport would be very willing to work closely with the Airports Commission when the Commission comes to undertake its own assessment.

APPENDIX 4 – TOCS and APPS OLS SURFACES OUTLINE TREE AND WOODLAND ASSESSMENT AND MANAGEMENT

Introduction

- A4.1 The Civil Aviation Authority's "Licensing of Aerodromes" document, CAP168, defines Obstacle Limitation Surfaces (OLSs) and requires that these should be cleared of obstacles where practicable to do so. An outline assessment has been undertaken of the potential impact on the trees, woodland and habitat within the footprint of the "Approach Surface" (APPS) and "Take-Off Climb Surface" (TOCS) OLSs of the updated scheme design as defined in Chapter 4 of CAP168 "The Assessment and Treatment of Obstacles". The OLSs are intended to provide a safe operating zone clear of obstacles for aircraft. The APPS is an inclined plane which terminates at 60 m before the runway threshold marking the safe area to land on the runway. The TOCS is an inclined plane which may originate at 60m after the "declared" (i.e. permitted) take-off run available, depending again on the particular configuration of the runway.
- A4.2 Figure 8 and 9 illustrate the east-and west-bound Take-Off Climb Surfaces and Approach respectively.
- A4.3 The schedules (Table 1) describe the significant vegetation groups and provide a description of the woodland/ vegetative type with a summary species composition, amenity/ landscape value, vegetation height and outline of management options.

Outline of Statutory Arboricultural Constraints

Ancient woodlands

- A4.4 Ancient woodlands are particularly important because they are exceptionally rich in wildlife, including many rare species and habitats; are an integral part of England's historic landscapes; and act as reservoirs from which wildlife can spread into new woodlands.

Veteran Trees

- A4.5 A number of the trees demonstrate features characteristic of a veteran tree including a girth large for the particular tree species, major trunk cavities and being of high aesthetic interest. With regard to veteran trees any management actions should be made in consideration of the National Planning Policy Guidance (formerly PPS): Biodiversity and Geological Conservation which notes that veteran trees have value for biodiversity. In recognition of this and given the abundance of potential wildlife habitats associated with veteran trees any management should accord with the current environmental legislation primarily in The Wildlife and Countryside Act 1981. Reference should also be made to Ancient and Other Veteran Trees: Further Guidance on Management (Book) by David Lonsdale (2013).

Tree Preservation Orders

- A4.6 Trees and woodland covered by a Tree Preservation Order are protected under the Town and Country Planning Act 1990 (Trees Regulation 2012) and the local authority must be consulted and permission sought for any works that may affect them.

The Hedgerows Regulations

- A4.7 The Hedgerows Regulations 1997 were made under Section 97 of the Environment Act 1995 and came into operation in England and Wales on 1 June 1997. The regulations provide important protection by prohibiting the removal of most countryside hedgerows (or parts of them) without first notifying the local planning authority (LPA). 'Removal' includes acts which could result in the destruction of a hedgerow.

Assessment Methodology

- A4.8 For the purpose of the assessment the trees and woodland were summarised into the following broad vegetation categories. These categories are further described in Table 1

- Lowland mature mixed woodland
- Historic coppice woodland
- Solitary trees in hedges
- Woodland or wooded areas of degraded or of limited value
- Solitary/ pasture trees
- Trees in the built form

- A4.9 Trees and woodlands were broadly assessed and categorised with the method explained in BS5837:2012. This method categorizes individual trees, groups and woodlands in a systematic way. The selected areas

- A4.10 Trees and woodlands were assessed from ground level during a site visit.

- A4.11 Height information for the trees and woodland was extracted from aerial photographs provided by data BlueSky.

Recommendations

Considerations towards the decision to reduce the height of vegetation

- A4.12 The decision to undertake works should be determined on the basis of the management objective relating to requirements described in CAP168 Civil Aviation Authority and:

- the physiological condition of the individual tree;
- an assessment of the ability of the tree to withstand the treatment;

- the biomechanical integrity on the tree and its likely future growth;
- the logistics of safely accessing the trees or woodland under consideration.

A4.13 When assessing the suitability of a tree for crown reduction, particular regard should be paid to the characteristics of the species as well as the physiological condition of the individual tree.

A4.14 Consideration needs to be given to follow-up work after crown reduction or reshaping in terms of the likely phased programme for further crown reduction to maintain the reduced crown as a framework for cyclic management, whereby the new branches are periodically cut back close to their points of origin to establish a new framework by “shoot renewal pruning”, so that the crown attains a relatively natural appearance but remains at a lesser size than before the reduction or reshaping.

A4.15 Where height considerations require trees to be significantly reduced or, for the reason above, mean that trees cannot be crown reduced, the tree should be felled and the stump retained for coppice regrowth.

A4.16 The nature of works can be broadly categorised as follows (see also Table 1):

- Retain structure and manage height: the retention of the entire woodland mid-storey shrub layer and the crown reduction or/ selective felling of individual trees within the woodland to realise the required height.
- Coppice - phased reintroduction of rotational coppice: the extensive phased felling of trees/ lapsed coppice or shrubs to form coppice stools. Coppicing is a form of management of trees where an area of woodland vegetation is periodically cut back to ground level to stimulate growth. The coppice regime shall follow a 10 – 15 year cycle, with woodland revisited for re-coppicing after a +10 year period to realise the required height.
- Clearance and selective management of natural regeneration/ replanting to required height: the extensive clear- felling of trees and woodland vegetation followed by replanting and/ or management of regrowth to the required height. Ultimately, the aim would be to establish and maintain the areas as low growing scrub.
- Clearance and management as non-woodland habitat type e.g. species rich grassland/ glade: The extensive clear- felling of trees and woodland vegetation of the entire area and removal of stumps by grubbing/ grinding-out or herbicide treatment followed by the instatement of a low growing habitat type e.g. species rich grassland/glade.

Considerations on the potential impact of trees works

A4.17 To retain the associated amenity and habitat, tree works should be undertaken in accordance with principles of environmental arboriculture and conservation pruning. Namely, methods that mimic natural retrenchment by reducing the height and spread of the crown in gradual stages. Initial, pruning cuts should be made in small diameter younger growth to avoid wounding the trees severely.

- A4.18 In some instances the woodland areas contain lapsed coppice, i.e. where stems have not been cut for a long time (e.g. more than 30 years). Where these are to be 're-coppiced' and managed for coppice, they should generally be cut just above the height of the last cuts, leaving short stumps.
- A4.19 In some instances lapsed coppiced trees may be re-coppiced if they are assessed as being likely to survive this form of severe cutting, taking account of the age of the stems, the species of tree and the site conditions. If it is doubtful whether new shoots would develop from cuts made near ground-level, the stems may be reduced in phases, or the cuts may be made above the origins of the stems on the stool, in order to provide a larger surface for shoot-production. This may help to reduce the loss of wildlife habitats associated with lapsed coppice. New stems may subsequently be thinned so as to retain selectively any stems that have originated near ground level and that are thus likely to become stabilized by the formation of new roots.
- A4.20 Ancient and semi-natural woodland often retain archaeological evidence. These features provide a valuable source of information on the ecological and landscape history of the wood and these shall be protected from physical damage.
- A4.21 It is imperative to that these archaeological features are located and recorded through observation, records and advice. Archaeological features shall be marked-off to avoid damage during management operations. Where possible operations with the potential to cause ground disturbance shall be carried out in dry conditions.
- A4.22 Hedgerows and linear vegetation features set with large solitary trees are characteristic of British lowland countryside. In many instances trees in hedgerows (in comparison to those grown into woodland) establish to great stature and often reach veteran stature. Furthermore, hedgerow trees provide a valuable connective habitat for wildlife particularly bats and birds. Natural gaps occurring in the hedge should be utilised for planting where possible.
- A4.23 The timing of management operations and the methods adopted will need to take into account seasonal and operational constraints imposed by protected species. This may require a suitably qualified ecologist holding the appropriate licences to check the site in advance of and during any operation.

Conclusions

- A4.24 The airport development proposed will require the management of trees within designated obstacle limitation surfaces (OLSs) as defined within the CAA's CAP168 Licensing of Aerodromes document. The extent to which trees falling within particular OLSs will be required to be managed/removed will depend on a number of factors relating to:
- The final design levels and declared distances for the runway;
 - The extent of infringement of the OLSs by the trees concerned, and the gradient presented by the tree to the point of origin of the OLSs;

- The particular OLS which will be affected and operational requirements relating to instrument approach and departure procedures for aircraft; and
- The extent to which works would be required periodically to prevent the trees becoming obstacles.

A4.25 Close to the ends of the runway there will also be a requirement to manage bird hazard very closely and this may be a further contributory factor in respect of the extent of tree removal required.

A4.26 The extent of tree removal required will be subject to ongoing evaluation as the project develops with the intent to reduce it to as low as practicable consistent with flight safety and the licensing requirements of the CAA.

Woodland/Vegetation categories and outline management approach

Woodland/Vegetation Category and Description	Objectives	Management for Biodiversity	Management Approach to Height Reduction	Woodland area (ha)
Lowland mature mixed woodland Chiefly hardwood often with large well-formed climax trees and a wide range of vascular plants and mid-story shrubs and coppice stools. <i>e.g. Ifield Wood, Upper Thickets</i>	<ul style="list-style-type: none">- Biodiversity and wildlife: to maintain the value of the trees to native wildlife.- Landscape: to maintain and improve the landscape value of the trees.- Compensation: replace or compensate for any loss of trees as a consequence of the development.	<ul style="list-style-type: none">- Thin out trees in an poor condition to selectively open-up dense woodland.- Favour native trees, remove invasive non-native species.- Succession planting and natural regeneration to be encouraged with the aim of creating wooded areas and trees of a varied age range and species structure to help ensure that as trees reach senescence successors will provide continued cover.- Where self seeded native trees such as oak are present, promote natural regeneration to continue natural succession and allow the furtherance of the specific gene pool within the woodland.- Management will seek to encourage and control selective regeneration and where necessary protect such growth from browsing.- Opportunities for planting should be explored to target the re-introduction of rare species indigenous to the area such as Black Poplar – (<i>Populus nigra subspecies betulifolia</i>) and the promotion of species characteristic to the local landscape such as Hornbeam.	Retain woodland structure and manage height <ul style="list-style-type: none">- Targeted crown reduction of large trees and coppicing of smaller, drawn or etiolated trees.- Larger, significant trees to be individually assessed to decide how the level of required reduction will affect their capacity to tolerate the treatment and to grow in response.- Retention of the associated amenity and habitat, tree works should be undertaken in accordance with principles of conservation pruning. Namely, methods that mimic natural retrenchment by reducing the height and spread of the crown in gradual stages, initial pruning cuts should be made in small diameter younger growth to avoid wounding the trees severely.- Introduce phased/rotational coppice management.	West: 11.8 (5.2 ancient woodland) - East: 1.4
			Clearance and selective management of natural regeneration/ replanting to required height <ul style="list-style-type: none">- Where required render vegetation to the ground and replant with species according to ultimate/manageable height.	West: 10.2 (0.5 ancient woodland)
			Clearance and management as non-woodland habitat type e.g. species rich grassland/glade <ul style="list-style-type: none">- Where guidelines require the operational surface to be managed at existing ground level.	West: 2.6 (0.5 ancient woodland)
Lapsed Coppice Woodland Typically formed of areas with large lapsed coppice trees and a rich understorey. These may be of significant age/charcoal coppice remnant. <i>e.g. Ancient woodland area adjacent Burlands Copse.</i>	<ul style="list-style-type: none">- Biodiversity and wildlife: to maintain the value of the trees to native wildlife.- Landscape: to maintain and improve the landscape value of the trees.- Compensation: replace or compensate for any loss of trees as a consequence of the development.	<ul style="list-style-type: none">- Reintroduce phased coppice system of management. Note management should be modified to take into consideration the age of the stems and use a phased approach characteristic to the local landscape such as Hornbeam.- Selectively replant with lower-growing mid-story shrub and vascular plant plugs.- Fence-off to protect/encourage new growth.	Retain coppice structure and manage height <ul style="list-style-type: none">- Lapsed coppice, i.e. where stems have not been cut for a long time (e.g. more than 30 years) and are to be 're-coppiced', they should generally be cut just above the height of the last cuts, leaving short stumps.- In some instances lapsed coppiced trees may be re-coppiced if they are assessed as being likely to survive this form of severe cutting, taking account of the age of the stems, the species of tree and the site conditions. If it is doubtful whether new shoots would develop from cuts made near ground-level, the stems may be reduced in phases, or the cuts may be made above the origins of the stems on the stool, in order to provide a larger surface for shoot-production. This may help to reduce the loss of wildlife habitats associated with lapsed coppice. New stems may subsequently be thinned so as to retain selectively any stems that have originated near ground level and that are thus likely to become stabilised by the formation of new roots.- Fence off to protect/encourage new growth from browsing.	
			Clearance and management as non-woodland habitat type e.g. species rich grassland/glade <ul style="list-style-type: none">- Where guidelines require the operational surface to be managed at existing ground level.	
			Coppice - phased reintroduction of rotational coppice	West: 0.25

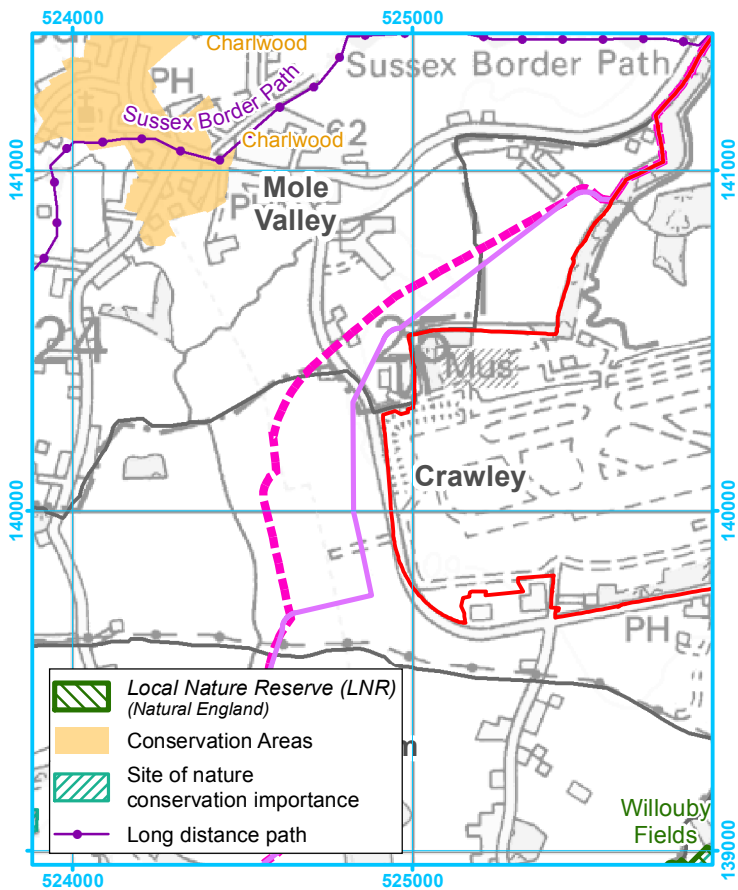
Woodland/Vegetation Category and Description	Objectives	Management for Biodiversity	Management Approach to Height Reduction	Woodland area (ha)
Hedgebank Trees Large solitary trees set within hedgeline or trees which often lineate historic defunct boundaries. <i>Site Wide</i>	- Biodiversity and wildlife: to maintain the value of the trees to native wildlife. - Landscape: to maintain and improve the landscape value of the trees. - Compensation: replace or compensate for any loss of trees as a consequence of the development.	- Hedgerow trees provide a valuable connective habitat for wildlife, particularly bats and birds. - Natural gaps in the hedgerows should be utilised for new tree planting where possible. - Compensatory replanting/ encouragement of trees into hedgerows in the vicinity.	Retain woodland structure and manage height - Larger, significant trees to be individually assessed to decide how the level of required reduction will affect their capacity to tolerate the treatment and to grow in response. - Retention of associated habitat and amenity, tree works should be undertaken in accordance with principles of conservation pruning. Namely, methods that mimic natural retrenchment by reducing the height and spread of the crown in gradual stages. Initial pruning cuts should be made in small diameter younger growth to avoid wounding the trees severely.	
			Clearance and management as non-woodland habitat type - where required fell and reintegrate trees into hedgerows.	
Solitary/Pasture Trees Consisting large solitary specimens typically lowland pasture in character. Trees have future veteran potential some may be interpreted as being typical veteran features. <i>e.g. Trees located in the fields near Oaklands Farmhouse</i>	- Biodiversity and wildlife: to maintain the value of the trees to native wildlife. - Landscape: to maintain and improve the landscape value of the trees. - Compensation: replace or compensate for any loss of trees as a consequence of the development.	- Management as ancient wood pasture. - In recognition of the abundance of potential wildlife habitats associated with veteran trees any management should accord with the current environmental arboriculture/conservation pruning.	Retain and manage height - Solitary trees may have a well formed lower crown which, in the need for height reduction the upper portion may be removed in a single operation without significant impairment of the physiological form. - Retention of associated habitat and amenity, tree works should be undertaken in accordance with principles of conservation pruning. Namely, methods that mimic natural retrenchment by reducing the height and spread of the crown in gradual stages. Initial pruning cuts should be made in small diameter younger growth to avoid wounding the trees severely.	East: 0.2
			Clearance and selective management of natural regeneration/replanting to required height - Where required render vegetation to the ground and replant with species according to ultimate/manageable height.	West: 2.1
			Clearance and management as non-woodland habitat type e.g. species rich grassland/glade - Where guidelines require the operational surface to be managed at existing ground level.	
Trees in the Built Form Trees are located alongside roads or buildings. <i>e.g. Roadside trees located alongside the Gatwick Road and James Watt Way and roundabout</i>	- Landscape: to improve the landscape value of the trees.	- Phased replacement with native species.	Retain and manage height. - Where height reduction is required lower tree crowns as a continuance of existing pollard management or remove and replace with more suitable species. - Roadside location allows safe (stable) access to undertake works.	East: 0.9
			Clearance - Where guidelines require the operational surface to be managed at existing ground level.	East: 1.1

Woodland/Vegetation Category and Description	Objectives	Management for Biodiversity	Management Approach to Height Reduction	Woodland area (ha)
Woodland or wooded areas of degraded or of limited value Woodland or wooded areas dominated by non-native/invasive species with either limited or no ground flora. Trees irreparably damaged likely grazing/herbivore pressure. <i>e.g. area fronting Burlands Copse</i>	- Biodiversity and wildlife: to promote the value of the trees to native wildlife. - Landscape: to improve the landscape value of the trees. - Compensation: replace or compensate for any loss of trees as a consequence of the development.	- Succession planting and natural regeneration to be encouraged with the aim of creating wooded areas and trees of a varied age range and species structure to help ensure that as trees reach senescence successors will provide continued cover. - Manage invasive non-native species. - Where self seeded native trees such as oak are present, promote natural regeneration. - Management will seek to encourage and control selective regeneration and where necessary protect such growth from browsing. - Opportunities for planting should be explored to target the re-introduction of rare species indigenous to the area such as Black Poplar (<i>Populus nigra subsps Betulifolia</i>) and the promotion of species characteristic to the local landscape such as Hornbeam.	Clearance and selective management of natural regeneration/replanting to required height - Where required render vegetation to the ground and replant with species according to ultimate/manageable height.	West: 2.1
			Clearance and management as non-woodland habitat type e.g. species rich grassland/glade - Where guidelines require the operational surface to be managed at existing ground level, manage for biodiversity and selectively replant with lower-growing mid-storey shrub and vascular plant plugs. Fence-off to protect/encourage new growth.	

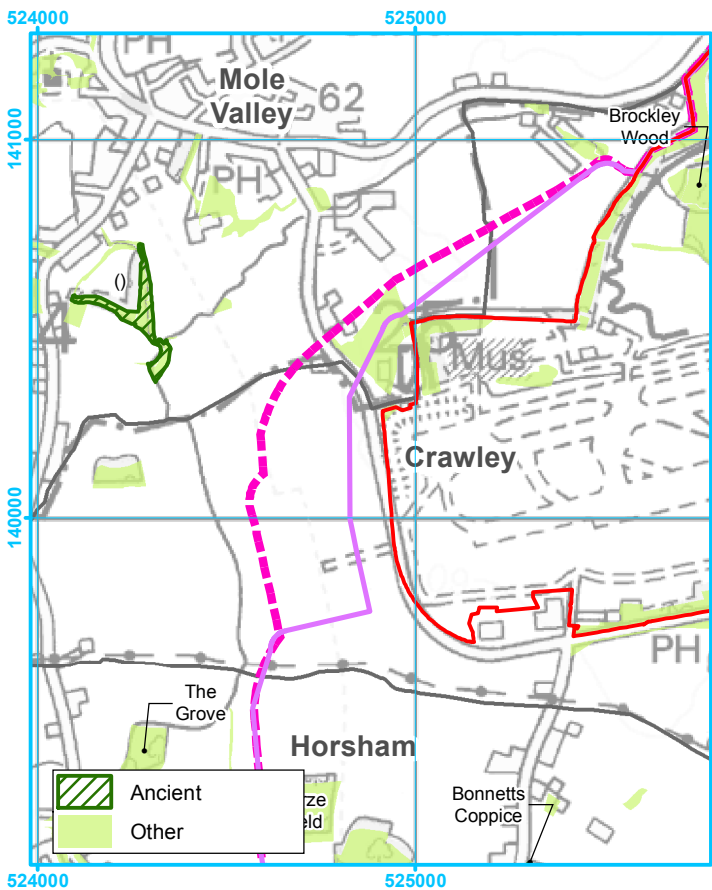
APPENDIX 5 – END AROUND TAXIWAY ASSESSMENT

- A5.1 The Figure A.1 included in this Appendix illustrates the effects of the additional land take that would be required for the provision of the end around taxiway (EAT) on biodiversity interests. The provision of the taxiway would not affect any internationally, nationally or locally designated sites and no areas of ancient woodland would be affected.
- A5.2 The land take would affect an additional area of approximately 1.4 ha of lowland woodland, together with approximately 250 m of hedgerow of which 110 m is classified as Ancient Hedgerow by Crawley Borough Council. No ancient woodland is affected.
- A5.3 Overall, based on the limited additional loss of woodland and hedgerow, it is assessed that there would be no change in the performance of the potential scheme with the end around taxiway compared to the scheme without the taxiway.

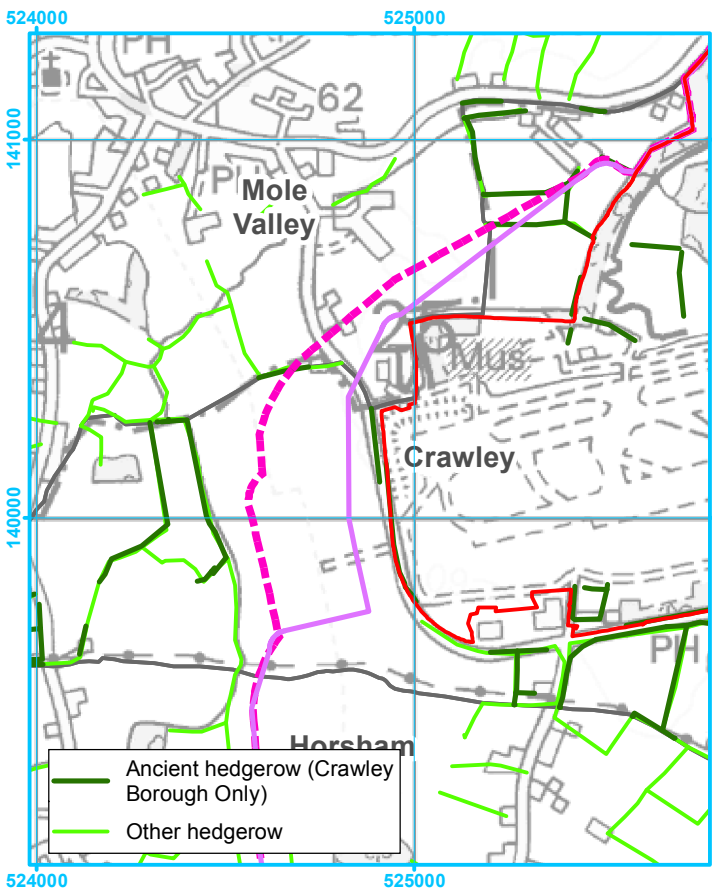
Locally Designated Sites



Woodland, including Ancient Woodland



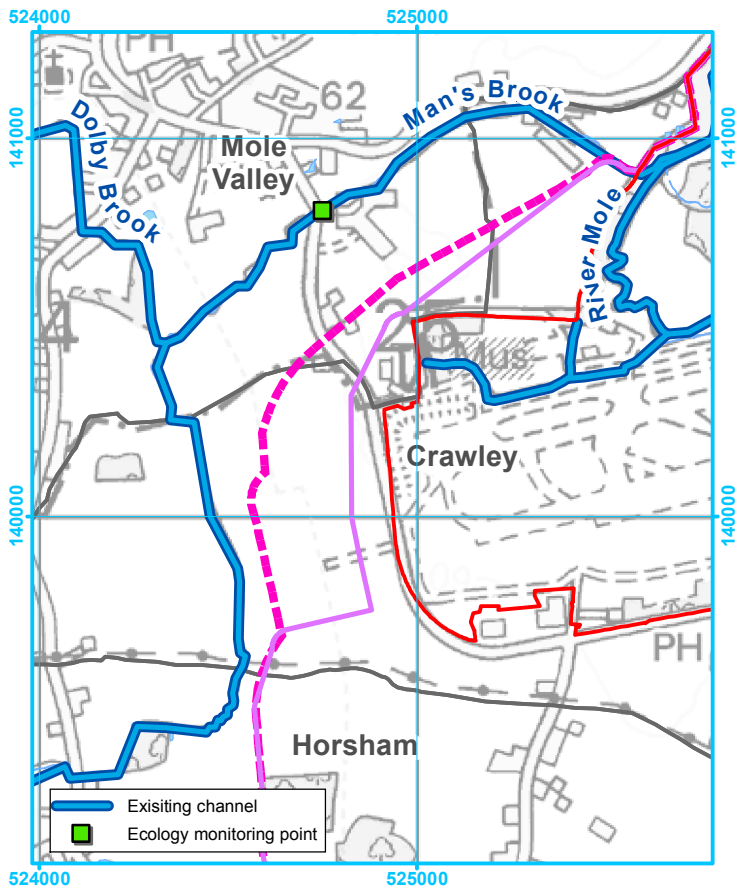
Hedgerows, including Ancient Hedgerows



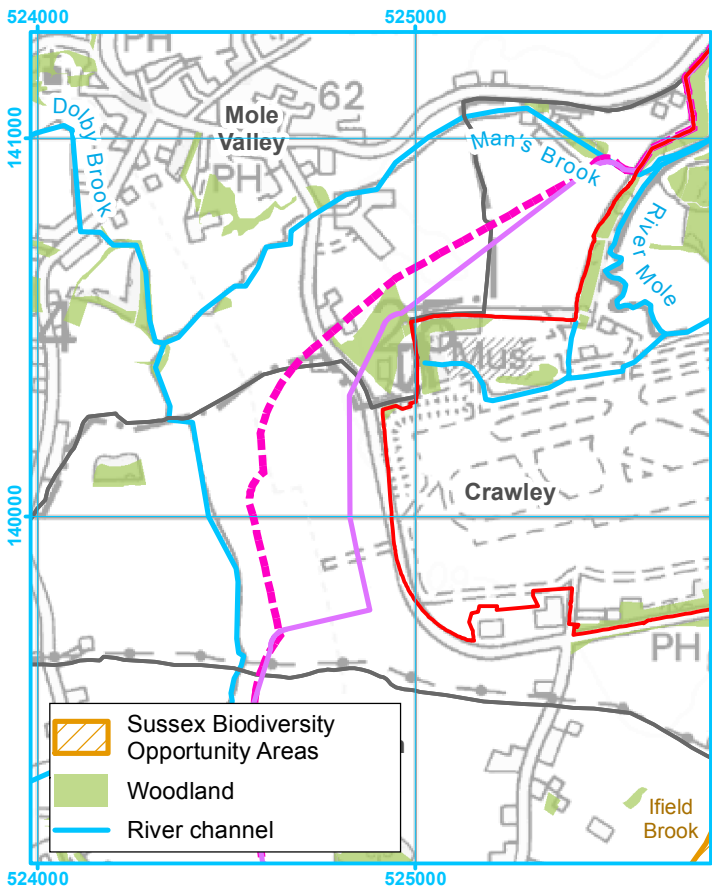
Legend

- Existing airport boundary
- Update Scheme Design No EATs Landtake boundary
- Update Scheme Design with EATs Landtake boundary

River Channels



Development of Green Infrastructure



Rev:	Date:	Amendment:	Name:	Checked:
Data Source: RPS 2014				
Status:				
<div><div>RPS</div><div>Willow Mere House Compass Point Business Park Stocks Bridge Way St Ives Cambridgeshire PE27 5JL T 01480 302751 F 01480 466911 E rpscm@rpsgroup.com</div></div>				
Client: Gatwick Airport Limited				
Project: Airports Commission				
Title: Update Scheme Design with EATS				
Scale: 1:20,000 @A3 0 100 200 400 600m				
Projection: British National Grid Datum: OSGB36				
Date: 29/04/2014 Drawn: BF Checked: MW				
Job Ref: OXF8027 Figure No: A1 Revision: A				