

M42 Junction 6 Development Consent Order Scheme Number TR010027

8.25(a) Outline Bird Strike Management Plan

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The Infrastructure Planning (Examination Procedure) Rules 2010

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Outline Bird Strike Management Plan

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1 Introduction

1.1 Background to the plan

- 1.1.1 The Outline Bird Strike Management Plan (OBSMP) sets out outline management guidance to be implemented as part of the M42 Junction 6 scheme (“the Scheme”), to reduce as far as practicable the potential for an increase in bird activity and the subsequent possibility of a bird strike to aircraft, in general accordance with the safeguarding parameters of Birmingham Airport Limited.
- 1.1.2 The content of this document and the wider construction and operation of the Scheme has been informed and guided by consultation with Birmingham Airport Limited to minimise the disruption and the introduction of risk to aircraft using the airport.
- 1.1.3 This OBSMP will be updated by the Principal Contractor (PC) into a final Management Plan, as appropriate and necessary, prior to commencement of works in accordance with the Requirements in Schedule 2 of the draft Development Consent Order (DCO) [TR010027/APP/3.1]. The OBSMP must also incorporate the requirements of the Outline Environmental Management Plan (OEMP) and the Construction Environmental Management Plan (CEMP).

1.2 Responsibilities

- 1.2.1 In relation to the control and management of the general ecology, the PC shall establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of this OEMP.

1.3 Regulatory framework & guidelines

- 1.3.1 The Scheme has been assessed in the context of the following regulatory framework and guidelines:
 - a. the Convention on International Civil Aviation, European Commission Regulation 139/2014 [REF 1];
 - b. guidelines set out in the UK Government DfT/ODPM Circular 1/2003 [REF 2];
 - c. CAP 772 Wildlife Hazard Management at Aerodromes, produced by the Civil Aviation Authority [REF 3]; and
 - d. The town and country planning (safeguarded aerodromes, technical sites and military explosives storage areas) Direction 2002 [REF 4].

1.4 Report structure

- 1.4.1 The information contained within this document identifies the potential hazards which could occur during the construction phases of the Scheme, considers the likelihood of the hazards occurring, and illustrates how the risks of bird hazard will be minimised through bird avoidance measures. These avoidance measures include those to be implemented both during the construction and through the sensitive design and operational maintenance of the landscaping with the aim of reducing any residual risk to ‘As Low as Reasonably Practicable’.

1.4.2 The structure of this report is as follows:

- a. review of published guidance and planning policy relevant to aviation safeguarding, bird strike, its management and relationship to minerals development;
- b. description of the current conditions (baseline) in the vicinity of the Scheme;
- c. detail of risks likely to affect the risk of bird strike;
- d. the proposed mitigation measures and assessment of the likelihood of bird strike within the Airfield Safeguarding Area (ASA) of Birmingham Airport arising from all stages of the proposed scheme; and
- e. conclusions.

1.5 Airfield safeguarding areas

- 1.5.1 In the UK, ASAs are designated for areas that fall within 13km of an airfield. The purpose of ASAs are to ensure that the operation and development of civil and military airfields is not inhibited by developments, including those which have the potential to increase the number of birds and the 'bird strike' risk. ASAs are based on a statistic that 95% of bird strikes occur below 2,000ft, and that an aircraft approaching an aerodrome on a normal approach would descend below 2,000ft approximately 13km from the runway, reflecting historic angles of take-off and approach [REF 4].
- 1.5.2 For a consenting application that lies within the 13km ASA, the owner or operator of aerodromes are required to be consulted by the project proponent in order to consider the potential bird strike hazard as a result of a proposed development [REF 4].
- 1.5.3 The Scheme is located entirely within the 13km safeguarding zone (**Figure M.1**), with the nearest point approximately 300m southeast of the Birmingham Airport boundary.

1.6 Bird strike

Definition

- 1.6.1 A bird strike is defined as a collision between a bird and an aircraft which is in flight or on a take-off or landing roll. The vast majority (around 90%) of recorded bird strike incidents in the UK occur within the perimeter of the aerodrome itself and at low altitudes [REF 5]. The risk of bird strike arises from birds moving into the path of aircraft, either because they are crossing an aerodrome or crossing flight paths as they move around the local area.

Statistics

- 1.6.2 Statistics released by the UK Civil Aviation Authority (CAA) for reported bird strikes between 2012 and 2016 [REF 6] indicate that:
 - a. a registered aircraft strikes a bird approximately once in every thousand flights;
 - b. approximately 5% of bird strikes cause damage to the aircraft;

- c. approximately 55% of bird strikes occur between June and September; and
 - d. gulls cause more bird strikes than other bird species (approximately 10%).
- 1.6.3 In terms of altitude, the majority of bird strikes occur at very low altitudes (<500ft above ground level). Research by the European Aviation Safety Agency in 2008 [REF 7] indicates that approximately 70% of bird strikes occur at altitudes less than 200ft, 15% occur between 200ft and 800ft, and only 15% of bird strikes occur above 800ft.
- 1.6.4 Not all bird species pose a bird strike risk to aircraft. Species of birds specific to bird strike management are those that occur in flocks and/or are large in size. Typical “problem” groups of birds are gulls, waterfowl, feral pigeon, starling *Sternus vulgaris*, crows and raptors.
- 1.6.5 In the period 2012-2016, 95.3% (7,632) of incidents reported no damage to aircraft, and 4.7% (379) of reports reported damage to aircraft.

2 Conventions, Regulations and Guidance

2.1 International: Convention on International Civil Aviation Annex 14

- 2.1.1 Annex 14 of the Convention on International Civil Aviation, published by the International Civil Aviation Organization (ICAO) provides guidance on wildlife strike hazard reduction and relevant extracts follow below [REF 8]. The American English text is retained from the original document:

9.4 Wildlife strike hazard reduction

Note: — the presence of wildlife (birds and animals) on and in the aerodrome vicinity poses a serious threat to aircraft operational safety.

- 2.1.2 The wildlife strike hazard on, or in the vicinity of, an aerodrome shall be assessed through:
1. *the establishment of a national procedure for recording and reporting wildlife strikes to aircraft;*
 2. *the collection of information from aircraft operators, aerodrome personnel and other sources on the presence of wildlife on or around the aerodrome constituting a potential hazard to aircraft operations; and*
 3. *an ongoing evaluation of the wildlife hazard by competent personnel.*
- 2.1.3 9.4.2 Wildlife strike reports shall be collected and forwarded to ICAO for inclusion in the ICAO Bird Strike Information System (IBIS) database.
- 2.1.4 9.4.3 Action shall be taken to decrease the risk to aircraft operations by adopting measures to minimize the likelihood of collisions between wildlife and aircraft.
- 2.1.5 9.4.4 The appropriate authority shall take action to eliminate or to prevent the establishment of garbage disposal dumps or any other source which may attract wildlife to the aerodrome, or its vicinity, unless an appropriate wildlife assessment indicates that they are unlikely to create conditions conducive to a wildlife hazard problem. Where the elimination of existing sites is not possible, the appropriate authority shall ensure that any risk to aircraft posed by these sites is assessed and reduced to as low as reasonably practicable.
- 2.1.6 9.4.5 Recommendation: — States should give due consideration to aviation safety concerns related to land developments in the vicinity of the aerodrome that may attract wildlife.
- 2.1.7 Paragraphs **9.4.4** and **9.4.5** of this guidance are relevant to the Scheme, with the requirement to prevent the establishment of “...any other source which may attract wildlife to the aerodrome, or its vicinity”.

2.2 European: European Commission Regulation 139/2014

- 2.2.1 The European regulatory framework for aviation safety is administered by the European Aviation Safety Agency (EASA) and within Regulation 139/2014 [REF 1] the sections relevant to wildlife management at aerodromes are as follows:

Article 9 - Monitoring of aerodrome surroundings

- 2.2.2 *Member States shall ensure that consultations are conducted with regard to human activities and land use such as:*
- 2.2.3 *(e) the creation of areas that might encourage wildlife activity harmful to aircraft operations*

Article 10 - Wildlife hazard management

Member States shall ensure that wildlife strike hazards are assessed through:

- a. the establishment of a national procedure for recording and reporting wildlife strikes to aircraft;*
- b. the collection of information from aircraft operators, aerodrome personnel and other sources on the presence of wildlife constituting a potential hazard to aircraft operations; and*
- c. an ongoing evaluation of the wildlife hazard by competent personnel.*

Member States shall ensure that wildlife strike reports are collected and forwarded to ICAO for inclusion in the ICAO Bird Strike Information System (IBIS) ¹ database.

- 2.2.4 This document considers the potential relevant hazards that may arise with development of the Scheme, and provides the rationale for monitoring and addressing them.

2.3 National: Department of Transport/Office for the Deputy Prime Minister (ODPM) Circular 1/2003

- 2.3.1 Department for Transport/Office of the Deputy Prime Minister Circular 1/2003 [REF 2] places responsibility on aerodrome operators to ensure aerodrome safeguards through their involvement in the consultation process for any development proposals which may affect an aerodrome.
- 2.3.2 As a relevant aerodrome operator, Birmingham Airport Limited must be consulted on any consenting application within the safeguarding area (13km). This process assists the aerodrome operator to take all reasonable steps to ensure that the aerodrome and its surrounding airspace are safe at all times for use by aircraft. The consultation process helps to identify any new potential flight hazards that need to be addressed.

¹ The ICAO Bird Strike Information System (IBIS) is a global reporting system designed to collect and disseminate information on bird strikes which occur as a result of the collision between an aircraft and a bird.

- 2.3.3 One of the purposes of safeguarding of aerodromes in this way is to:
“...ensure that their operation and development are not inhibited...by developments which have the potential to increase the number of birds or the bird hazard risk” [Circular 1/2003 Annex 2 para 3].
- 2.3.4 A primary purpose of the consultation process is to seek to identify proposed developments that may present a possible increase in bird strike risk that will need to be addressed.
- 2.3.5 Annex 2 to Circular 1/2003 sets out specific advice on bird strike hazard and identifies particular forms of development which are most important and where the primary aim is to guard against new or increased hazards.
- 2.3.6 Paragraph 9 from Annex 2 of the Circular 1/2003, which is relevant to the Scheme, advises that:
“...A local planning authority will need to consider not only the individual potential bird attractant features of a proposed development but also whether the development, when combined with existing land features, will make the safeguarded area, or parts of it, more attractive to birds or create a hazard such as bird flight-lines across aircraft flightpaths”.
- 2.4 National: CAP 772 Wildlife Hazard Management at Aerodromes**
- 2.4.1 CAP 772, produced by the Civil Aviation Authority [REF 3], provides guidance to assist aerodrome operators in establishing and maintaining an effective Bird Control Management Plan (BCMP), including the measures necessary to assess the bird strike risk at and around the aerodrome, and the identification of appropriate action to minimise that risk.
- 2.4.2 Aside from the main emphasis on control of bird strike hazard, this guidance also includes suitable landscaping recommendations for areas adjacent to aerodromes that may act as sources of potential bird strike risk.
- 2.4.3 In relation to the procedure for safeguarding of aerodromes, particularly with regard to the risks associated with off-site development, CAP 772 states:
“Where an assessment shows that the wildlife strike risk may increase or could increase under certain conditions in the future, and the aerodrome certificate/ licence holder and developer are unable to agree a solution, the aerodrome operator may object to the planning application on aviation/ air safety grounds. Local knowledge of wildlife populations and activities or an appropriate similar safeguarding case to support any objection can be used and objections withdrawn when measures implemented to manage risks are deemed acceptable (to the airport operator). It may be possible to modify a development (e.g. exclusion of food wastes from a new landfill) or impose planning conditions. Where a safeguarding case is resolved through the imposition of planning conditions, it may be appropriate for the conditions (and ‘wildlife control/ reduction management plan’) to be subject to a legal agreement between the planning authority and the developer or property owner, or its successors.”

“After planning permission has been granted, the aerodrome operator should regularly monitor the development for compliance with any planning conditions relevant to them that are imposed and report any alleged breach or non-compliance to the local planning authority.”

Bird Species

- 2.4.4 The objective of CAP 772 [REF 3] is to reduce the potential for roosting, shelter or feeding and to make sure that landscape areas are not attractive to such large flocking bird species.
- 2.4.5 Species of birds specific to bird strike management are those that occur in flocks and/or are large in size (>100g). Typical ‘problem’ groups of birds are gulls, wildfowl (ducks, geese and swans), wading birds, feral pigeon and corvids (crow family).
- 2.4.6 Smaller perching birds are generally considered less of a risk to aviation as they do not form dense flocks and are therefore considered to present a low air strike hazard potential, with the exception of starlings, which can exhibit flocking behaviour during roosting.
- 2.4.7 The main bird hazards lie in a limited group of species covering starlings *Sturnus vulgaris*, wading birds, pigeons and gulls, with a smaller risk posed by the crow family (corvids).
- 2.5 Other species such as Canada Geese *Branta canadensis* and Greylag Geese *Anser anser* are covered in the CAA Safety Regulation Group document Large Flocking Birds – An International Conflict between Conservation and Air Safety, but are of lesser concern in the UK.

Habitats & Features as Bird Attractants

- 2.5.1 CAP 772 [REF 3] details the habitats and features that may serve as attractants to birds, a summary of which are provided below.
- 2.5.2 Birds need high energy foods and many species depend upon earthworms, snails and slugs, millipedes and insects present in grassland and underlying soils. Thrushes and related birds may occur in large flocks to feed on invertebrates. Few birds eat grass except geese and some wildfowl, such as Eurasian wigeon *Anas penelope*, graze short grass habitats. Arable farming activities like ploughing, harrowing and cropping which disturb the soils and spraying and manure spreading, seed drilling, harvesting, all create feeding opportunities for species such as gulls, corvids (crows), plovers, starlings and pigeons.
- 2.5.3 Areas of open terrain may attract many species of bird, maintaining the grass sward at an appropriate height can eliminate the open aspect of the grassed areas.

- 2.5.4 Landscaping schemes of this nature (have much in common with natural and semi-natural features) attract smaller concentrations of birds from a smaller area and, as such, have less potential for increasing bird strike risk than other developments such as landfill, sewage treatment plants and wetlands.
- 2.5.5 As such, bird attraction and potential bird strike risk of most landscaping development, with the exception of wetlands and starling roosts, is comparatively local in effect, i.e. usually limited to within about 6.5km of the aerodrome or less.
- 2.5.6 Many birds nest in trees and bushes and of particular importance are rooks which nest in large colonies (rookeries) and may be occupied through most of the year. From late-summer through the winter, starlings form large communal roosts in dense vegetation, such as thorn thickets, screening belts and reed beds.
- 2.5.7 Open standing water and watercourses attract waterfowl that are nearly all large birds and may occur in large flocks. The more open water sites there are the more complex the frequency of movements (both daytime and night time) of waterfowl between them.
- 2.5.8 Birds can travel long distances relatively quickly between feeding grounds, nesting sites and overnight roosts. Consequently, flying from one site to another may establish bird flight lines that traverse an aerodrome or low level aircraft arrival and departure routes.

2.6 Consultation with Birmingham Airport Limited

- 2.6.1 Consultation with Birmingham Airport Limited continued throughout the DCO pre-application and examination period for the Scheme. Relating to aerodrome safeguarding and the hazards represented by wildlife and planting, the following statement from Birmingham Airport Limited was made in correspondence dated 16 February 2018:

“Construction - During construction a high degree of liaison and co-ordination will be required to ensure that there are no impacts for aircraft performance or Obstacle limitation Surfaces. In addition, there will need to be significant efforts made by the contractor to ensure that adequate bird control is maintained throughout the works. It is worth noting that Manchester Airport have been going through a very similar exercise recently which resulted in Airfield Operations staff being seconded to the contractors to ensure adequate bird control and obstacle limitation on site. The issues to be considered during construction also include ensuring appropriate locations for site accommodation including offices and welfare facilities

Obstacle Management upon Completion - The design needs to ensure that following completion there are no new obstacle features that will either infringe Obstacle Limitation Surfaces or compromise the Type A chart, potentially reducing aircraft performance on departure from Runway 15. This would have to be achieved through significant height limitation of street furniture and indeed the vehicles themselves with the CAA assuming a mobile obstacle height on the road of some 4.5m.

Bird Hazard upon Completion - The design should not allow for landscaping or drainage features that have the potential to attract either wetland or flocking birds that can become a strike hazard for aircraft departing and arriving at the airport."

3 Baseline

3.1 Birmingham Airport

- 3.1.1 Birmingham Airport has a CAA Public Use Aerodrome Licence (Number P451) that allows flights for flying instruction and the public transport of passengers. Passenger throughput for Birmingham Airport in 2017 was over 12.9 million, making it the seventh busiest UK airport. The airport supports both domestic flights within the UK and international flights, and is an operating base for a number of airlines [REF 9].
- 3.1.2 The airport is located approximately 10km southeast of Birmingham city centre in the borough of Solihull. It is bordered by the National Exhibition Centre (NEC) to the east, Marston Green to the north, Sheldon to the west, the village of Bickenhill to the south, and the suburb of Elmdon to the south west.

3.2 The site and surroundings

- 3.2.1 The Scheme site location comprises an area of farmland and grassland, with hedgerows and mature trees with a number of field ponds.
- 3.2.2 The agricultural landscapes south of M42 Junction 6 are interspersed by small blocks and pockets of mature woodland, with particularly prominent examples located around the western fringes of Hampton in Arden, at Barber's Coppice on the eastern fringes of Catherine-de-Barnes, and at Aspbury's Copse adjacent to the Solihull Road overbridge over the M42 motorway.
- 3.2.3 Watercourses include Shadow Brook, which traverses agricultural fields and passes beneath the M42 motorway approximately 300m north of Solihull Road, and Holywell Brook, which flows east from the NEC under the M42 motorway approximately 500m north of M42 Junction 6 and parallel to the A45.
- 3.2.4 Birmingham Airport and the leisure complex of the NEC are located to the northwest of the site, the village of Bickenhill lies to the east of the new mainline link road, the village of Catherine-de-Barnes to the southwest and the urban fringe Solihull to the west.
- 3.2.5 Holywell Brook flows across the north of the site and Shadow Brook lies immediately east of the new mainline link road. The A45 runs east-west across the north extent of the new mainline link road and the corridor of the M42 runs north-south along the eastern edge of the site.
- 3.2.6 In the wider area around Birmingham Airport the urban areas of Birmingham and Coventry lie to the west and east of the ASA. The River Blythe flows south to north through the ASA and the River Cole flows from the west. These rivers confluence to the east of Water Orton where they form the River Tame.

3.3 Bird attractants in the local area

- 3.3.1 The following section provides a qualitative review of relevant features within the surrounding landscape that may serve as attractants to birds. The location of open waterbodies and local landfill sites are illustrated in **Figure M.1**.

Woodland and Trees

- 3.3.2 Large areas of tree cover within the wider ASA include Hay Wood (SP 210 714; approximately 9km south of the Scheme) and the woodlands of Close Wood, Birchley Hays Wood and Meriden Shafts (centred on SP 260 838; approximately 5km east of the Scheme). There are also numerous smaller areas of woodland scattered throughout the ASA.

Open Waterbodies

- 3.3.3 Table 3.1 presents the most significant waterbodies within the ASA that have been identified from a review of on-line mapping data [REF 10] and the British Trust for Ornithology Wetland Bird Survey sites [REF 11].
- 3.3.4 The closest waterbody to the Scheme is Pendigo Lake, which is located within the NEC. In the wider area the majority of open waterbodies are associated with the River Blythe and River Tame, comprising a mix of recreational lakes and lakes associated with historical mineral extraction pits. There are also a number of larger waterbodies that serve as reservoirs and recreational lakes within the urban areas of Birmingham.

Table 3.1: Waterbodies within the ASA

Name	Approximate Distance and Direction from the Site*
Pendigo Lake (NEC)	300m north west (SP 193 835)
Packington Deer Park & associated lakes (Broadwater, Great Pool & Hal Pool)	1.2km east (SP 226 843)
Geary's Level, Moland's Mere and associated lakes	1.5km east (SP 221 823)
Lakes at Ravenshaw Hall	1.9km south west (SP 173 793)
Marsh Lane Nature Reserve & associated Sand & Gravel Pits	2.4km east (SP 216 805)
Sand & Gravel Pit	2.5km east (SP 232 823)
Lake at Elmdon Park	2.5km west (SP 159 825)
Lakes at West Midlands Golf Course	2.6km south east (SP 214 795)
Fishing Lakes (River Blythe)	2.9km south (SP 192 782)
Lakes at North Warwickshire Golf Course	3.7km east (SP 232 817)
Lake at Berkswell Hall	4.8km south east (SP 238 791)
Olton Reservoir	4.9km west (SP 134 816)
Lakes at Heart of England Adventure Park	6.6km east (SP 271 852)
Ladywalk Nature Reserve, and associated lakes	8.1km north (SP 216 918)
Shurstoke Reservoir	8.2km north east (SP 227 912)
Kingsbury Water Park & associated lakes	9.8km north (SP210 961)
Plantsbrook Reservoir	9.9km north (SP 139 922)

Name	Approximate Distance and Direction from the Site*
Earlswood Lakes	10km south west (SP 113 741)
Boating Lakes at Stockland Green	11.6km north west (SP 092 912)
Edgbaston Pool	12.5km west (SP 055 841)
Witton Lakes	13km north west (SP 089 923)
Edgbaston Reservoir	14km north west (SP 043 868)
Lakes at Sutton Park Nature Reserve	14.5km north-west (SP 103 968)

* The direction and distance of the closest point for each waterbody or group of waterbodies is presented. Central grid references are provided for each waterbody or group of waterbodies.

Local Landfill Sites

- 3.3.5 The location of authorised landfill sites have been reviewed using data from the Environment Agency 'what's in my backyard' [REF 11].
- 3.3.6 There are a number of authorised landfill sites within the ASA and these are listed in together in Table 3.2. The closest are the Packington Landfill and the Lode Lane Landfill, both of which are no longer active. In the wider area the existing authorised landfill sites are located to the east and north of the site, occupying locations on the fringe of Birmingham and between Birmingham and Coventry.

Table 3.2: Authorised Landfill within the ASA

Site Name	Approximate Direction and Distance from the Site*
Packington Landfill	2km east (SP209 853)
Lode Lane Landfill Site	2.0km west (SP 158 823)
Meriden Quarry Area G	4.4km east (SP231 827)
Coleshill Quarry	5.7km north (SP 202 900)
Minworth Sewage Treatment Work	6.2km north east (SP 174 919)
Dunton Island Landfill Site	7.8km north (SP188 930)
Railway Cutting	7.8km north west (SP 090 888)
Lavender Hall Farm	7.3km east (SP 240 780)
Lea Marston Purification Lakes	13km north (SP 205 940)
Coneybury Farm	13km north (SP 195 981)

* The direction and distance of the closest point for each landfill is presented. Central grid references are provided for each landfill identified.

3.4 Desk study and bird surveys

- 3.4.1 There is no publically available data that captures the number of confirmed bird strikes on aircraft using Birmingham Airport that originate from birds within the site.

- 3.4.2 A desk study² and specific bird surveys have been undertaken by AECOM of the site and surrounding area. These comprise a Breeding Bird Survey the spring/summer of 2018 reported in Appendix 9.6 [TR010027/APP/6.3] and Wintering Bird Survey in the winter period of 2017/18 reported in Appendix 9.7 [TR010027/APP/6.3].
- 3.4.3 The desk study identified that in the area surrounding the site:
- a. small numbers of common wetland species make use of Elmdon Park (peak count of 61 mallard and 14 greylag geese); and
 - b. larger numbers of wetland birds were associated with the lakes at Marsh Lane Nature Reserve (including 5-year peak means of 511 black-headed gull *Chroicocephalus ridibundus*, 505 lapwing *Vanellus vanellus*, 446 greylag geese and 315 wigeon).
- 3.4.4 In summary the bird surveys undertaken by AECOM and presented within Breeding Bird Survey, Appendix 9.6 [TR010027/APP/6.3] and Wintering Bird Surveys, Appendix 9.7 [TR010027/APP/6.3] identified:
- 1) wading birds species during the breeding and wintering surveys. Wading birds typically require unrestricted views of their foraging and breeding habitats, and will be deterred by planting species rich grassland in areas which would otherwise be attractive to these species;
 - 2) significant flocks of larger bird species, such as geese and swans, had not been recorded regularly using the area of the Scheme;
 - 3) larger species of birds in the local area, including arable fields to the east, Pendigo Lake to the north and Elmdon Park to the west;
 - 4) winter surveys included a number of waterbodies in the surrounding area, including Pendigo Lakes at the NEC. Pendigo Lakes attracts an assemblage of birds that are typical of open waterbodies, including flocks of Canada goose (peak count 52) and mallard (peak count 12);
 - 5) flocks of teal *Anas crecca* in association with a tributary of the River Blythe, approximately 600m south-west of the Scheme;
 - 6) flocks of gulls (peak count 50) in fields between Bickenhill and the M42;
 - 7) the remainder of the existing habitats within the area of the study area support typical farmland and woodland birds, which include flocks of winter thrushes and occasional use by low numbers of larger species, including lapwing; and
 - 8) no significant flocks of birds flying across the site during any survey dates as presented within Breeding Bird Survey, Appendix 9.6 [TR010027/APP/6.3] and Wintering Bird Surveys, Appendix 9.7 [TR010027/APP/6.3].

² Wetland Bird Survey data, providing numbers of recorded wetland birds and corresponding 5 year peak means for the period 2011/12 to 2015/16 from waterbodies in the local area.

3.5 Summary evaluation

- 3.5.1 As detailed in Section 1.4, the majority of known bird strike incidents happen at low levels where planes are either taking off or landing. As such, the immediate area surrounding the airport runway should be kept as free of bird attractant sites (and associated flyways³ between sites) as possible.
- 3.5.2 The distribution of features (including manmade) within the landscape and the results of desk studies and bird surveys are consistent with the valleys of the River Blythe and River Tame, providing a flyway for birds.
- 3.5.3 Records indicate that smaller numbers of birds make use of the waterbodies within the urban area and fringe of Birmingham. The site and Birmingham Airport are situated between the river valleys and the urban area of Birmingham. Therefore, it is considered that although none were recorded during surveys in 2017/2018, there remains a reasonable likelihood that small flocks of birds will fly across the site, particularly during the passage and winter periods.
- 3.5.4 As a result, this OBSMP has been produced to reduce, as far as practicable, the risk to aircraft bird strikes by means of controlling the extent of the site that would be used to construct the Scheme.

³ Flyways: the airborne route bird(s) take between attractant sites, either directly or using landscape features (such as rivers, valleys or other visible landscape features as a means of travelling from site to site).

4 Risk assessment & mitigation

4.1 Risk identification

4.1.1 The principal risks associated with the Scheme are as follows:

- a. creating areas of open soil that provide new feeding opportunities, i.e. during site clearance for construction;
- b. creating areas of open terrain, either during site clearance for construction or in the completed scheme design;
- c. landscaping, planting or built structure that create bird attractants; and
- d. creating open waterbodies that can attract flocks of birds.

4.1.2 In accordance with CAP 772 [REF 3], the habitats that are most likely to attract bird species include woodland/tree belts and wetland, and each of these are considered in the following paragraphs.

4.1.3 In summary, the clearance of existing habitats during construction and the proposed landscaping of the Scheme would create new or additional habitats that could prove attractive to birds, which as a consequence of their species and numbers could in turn increase the risk of bird strike to aircraft in the vicinity.

Bird Species

4.1.4 Not all bird species pose a bird strike risk to aircraft.

4.1.5 The bird species which may pose a risk to aviation safety and will require mitigation are as follows:

- a. **Wildfowl:** the small reedbeds which would be created as part of the Scheme could provide a suitable breeding/roosting habitat for some wildfowl, such as mallard;
- b. **Corvids (Rook):** rooks nest communally in woodlands and may be attracted to the new woodland (once it has established and a canopy formed, approximately 5-10 years post planting);
- c. **Wood pigeon:** additional woodland would also provide a suitable nesting/roosting habitat for wood pigeons;
- d. **Gulls:** there is a risk that aggregations of gulls would be attracted to the bare loose soil which would be exposed during ground works and excavations, undertaken during the construction phase of the proposed scheme. However, during the operation phase of the Scheme, foraging habitat availability for gulls would be reduced as areas which are currently arable land would become built development. No known breeding habitat currently exists on the site and none would be created; and
- e. **Starling:** flocks may be attracted to litter or waste containers used during the construction phase or suitable roosting sites created as part of the landscaping.

4.2 Embedded mitigation

- 4.2.1 The following measures have been embedded into the Scheme to reduce the bird attractants created. These measures have been incorporated into the design of the Scheme following consultation with Birmingham Airport Limited and the Environment Agency. Each of the measures are illustrated in **Figure 2**:
- a. where possible drainage and attenuation features have been located below ground, e.g. as attenuation tanks rather than ponds, which may have served as wildlife attractants. These are located to the south-west of the existing Junction 6 and to the north and south of the proposed Junction 5a (**Figure M.2**);
 - b. the Scheme has avoided the creation of additional wetland (i.e. other than for the purpose of essential drainage);
 - c. any above-ground drainage features have been designed to ensure that they comprise vegetated basins that do not permanently hold standing water. They have also been located as far as possible from the boundary of Birmingham Airport, i.e. to the north and south of the proposed Junction 5a and north of Junction 6 (**Figure M.2**);
 - d. planting of woodland and trees for the purpose of visual mitigation has been minimised where possible (**Figure M.2**); and
 - e. where proposed replanting of woodland and clusters of trees will be planted, these have been located as far as practicable from Birmingham Airport boundary, i.e. to the south of and around the proposed Junction 5a (**Figure M.2**). Planting has also sought to reduce the possibility of increasing bird movements in a north-south and south-north direction within the wider surrounding areas to the east of Birmingham Airport.

4.3 Standard Mitigation

Construction

- 4.3.1 During construction the PC will be responsible for on site bird control measures, under the guidance of and in agreement with Birmingham Airport Limited Airfield Operations.
- 4.3.2 The methods and measures to construct of the Scheme is outlined within the OEMP.
- 4.3.3 Due to the nature of the Scheme, extensive ground works would be required. In relation to ground works the guidance provided in CAP 772 should be taken into consideration, where practicable and which states:

“Ground works on, and immediately adjacent to, the airfield can create temporary havens for birds and other wildlife. Any works requiring the removal of the grassed surface should be undertaken by competent personnel working to a reinstatement programme guided by the habitat management specialist. The airside works programme should ensure a successful and timely reinstatement. Timing of works should be carefully planned to ensure ground is reinstated with full grass cover well before the onset of the winter period.”

“Consideration should be given to the following when undertaking ground works”:

- a. Proximity to air traffic;*
- b. Time of year;*
- c. Control of dust generation and creation of foreign object debris (e.g. grass clippings);*
- d. Soil type;*
- e. Drainage; and*
- f. Grass species.”*

4.3.4 It should be noted that the required period for construction may not allow for all areas to be grassed in advance of winter. It is acknowledged that there is a risk that areas of open soil temporarily created during construction may form an attractant to birds, and this has been taken into consideration in the following recommendations for mitigation.

4.3.5 Regular (weekly at a minimum) monitoring of bird activity will be completed throughout construction of the Scheme, with particular emphasis during any phase of new topsoil stripping and excavations. In addition, reporting will include the identification of bird strike hazards (Section 4.4), which will be used to inform a system of continual improvement of the bird management strategy.

4.3.6 The following mitigation measures will be implemented based on monitoring and regular consultation with Birmingham Airport Limited and their bird hazard control team:

- a. continual interface of the Birmingham Airport Limited Airfield Operations staff and the appointed contractor to ensure an adequate system of bird control is established;
- b. education of all site personnel on the potential risks of bird strike, including ensuring that a copy of the most up to date version of the agreed Bird Strike Management Plan is available in all on-site offices;
- c. ensuring appropriate siting of site accommodation, including both offices and welfare facilities;
- d. careful control of vehicle movements to manage the risk of displacing any birds present into the flight path;
- e. control of construction drainage and surface water run off to ensure that areas of permanent open water do not develop;
- f. control and appropriate disposal of all on-site waste, including food waste, to avoid any unwanted build-up that could attract scavenging birds, such as gulls and corvids. This may include the depositing of waste in covered skips and signage in high risk areas warning site personnel of the dangers associated with littering and bird strikes;
- g. compacting (where possible) bare loose soil to reduce its suitability for birds;

- h. where possible the seeding of temporary spoil mounds and other areas of bare earth;
- i. erection of fencing around earth mounds and other areas of exposed earth to deter birds, such as 'orange ticker fencing'. The fencing will be monitored to ensure their integrity until the earth mound is removed; and
- j. if necessary, the targeted use of audio deterrents.

Late Construction and Operational Phase

- 4.3.7 The following section applies specifically to those features created as part of the scheme that are considered to represent potential attractants to birds. This comprises the drainage and wetland features and areas of landscaping (i.e. woodland, scrub and grassland).
- 4.3.8 In all cases management and maintenance will be achieved by the following:
 - a. as a result of on-going management of the Highways England estate;
 - b. through the powers and right so access granted to Highways England from the Development Consent Order; and
 - c. where land lies outside the Highways England estate, through the continuation of existing land management practices that are already subject to restrictions of the Birmingham Airport.

Drainage & Wetland Features

- 4.3.9 A drainage strategy has been incorporated into the Scheme to manage surface water runoff. In addition to storage tanks, new wetland features, including attenuation consisting of reedbeds and swales, will be created as part of the drainage strategy. The drainage strategy has been assessed using the Highways Agency Water Risk Assessment Tool (HAWRAT) [REF 12]. The purpose of the HAWRAT is to help highway designers decide whether or not pollution mitigation measures are needed in specific circumstances. The tool determined that the proposed mitigation measures provide adequate levels of treatment, particularly in terms of dissolved and sediment-bound pollutants.
- 4.3.10 New attenuation below ground tanks will be designed such that they will hold water to prevent flooding on or around the new road surfaces. Swales are a common component of Sustainable Drainage Systems (SuDS), and use shallow, broad and vegetated channels to store and/or convey runoff, aiding the removal of pollutants.
- 4.3.11 It is acknowledged that there is a risk that water may occasionally accumulate for short periods of time in the reedbeds and swales. Therefore, mitigation measures will be included to reduce the risk (as far as practicable) of attracting birds to water features. These measures will be discussed with Birmingham Airport Limited as part of their wider management of the area.
- 4.3.12 The attenuation features and ponds will be constructed with consideration to the guidance provided in CAP 772 [REF 3] where practicable, which states the following habitat controls where drainage cannot be achieved:

“Wet and waterlogged grass areas that attract hazardous wildlife should be drained or the site re-graded to eliminate hollows that hold standing water. If drainage cannot be achieved, active control measures will be needed to ensure that the site does not result in increased risk.”

“The following habitat controls may also reduce the attractiveness of water bodies to wildlife that are part of the safeguarding process”:

- a. The water should be as deep as possible (over 4m) to minimise bottom - growing vegetation;*
- b. In order to reduce nesting opportunities, there should be no development of islands. Attached promontories or spits can be used to reduce the open expanse of water bodies and prevent gull roosts forming;*
- c. Banks should be as steep as possible (preferably vertical), with vegetation only deployed to prevent wildlife from walking in and out of the water;*
- d. A vertical fence approximately 1m high could be constructed around the water edge to prevent wildlife such as Canada geese getting access;*
- e. On smaller lakes, wires suspended above the surface may deter wildlife that requires long take-off and landing runs (e.g. swans and geese). The wires should be made visible with tags (10cm x 6cm minimum), to increase the visibility to wildlife;*
- f. Dense vegetation that provides nesting cover should be avoided. The water should be surrounded with long grass or a sterile substrate; and*
- g. Water should not be stocked with fish.”*

4.3.13 The drainage design has been engineered so as not to include the creation of waterbodies that hold permanent water. Therefore, the recommendations of CAP 772 [REF 3] for deep waterbodies that deter aquatic plant growth are not appropriate in this case.

4.3.14 The embedded mitigation measures that have formed part of the design of the Scheme have sought to limit the creation of wetland features as per the discussions with Birmingham Airport Limited This comprises:

- a. the use of below ground attenuation features;
- b. avoiding the of wetland habitats (other than for the purpose of essential drainage); and
- c. ensuring essential drainage features do not permanently hold water, but comprise vegetated basins.

4.3.15 In addition, the following measures are considered appropriate for the size and anticipated recharge/water capture regime of the reedbeds:

- a. from the outset the reedbeds will be netted in order to deter birds from landing and/or roosting;
- b. the netting will be maintained at a height to ensure the reed-bed remains inaccessible to roosting birds (such as starling); and

- c. the banks shall be planted with shrubs (using non-fruit & seed-bearing species) to break up the available sight lines of birds.

- 4.3.16 The swales will also support stands of reeds that are required as part of the SuDS⁴ treatment train. These stands of reed will have a limited width, which is likely to significantly reduce their suitability as breeding or roosting habitat for bird species. Notwithstanding this limitation further measures may be required to limit the suitability of swales for birds. In relation to the design and management of ditches, i.e. swales, CAP 772 [REF 3] states:
- 4.3.17 *“Ditches should be regularly inspected and maintained to ensure throughput of water is not restricted at any time and to prevent bankside vegetation from providing a habitat attractant. Bankside vegetation may need to be cut to 50mm at least twice per year, with all arisings removed”*
- 4.3.18 The inspection and management measures for the swales associated with the Scheme will be inspected and maintained in accordance with the measures outlined within CAP 772.
- 4.3.19 All drainage features discussed above will fall within the applicable authority's management obligations, and therefore there are considered to be no impediments to their long-term maintenance as set out herein.
- 4.3.20 Overall this combination of measures is considered sufficient to ensure that the suitability of the balancing ponds and swales for breeding/roosting birds is significantly limited in accordance with CAP 772 [REF 3].

Landscaping

- 4.3.21 Areas of new woodland, scrub and hedgerows will be planted to mitigate the loss of habitat due to the Scheme. The location of the new woodland and hedgerows areas have been carefully and sympathetically selected to expand upon existing habitats, to minimise the effect of habitat fragmentation and also to provide essential visual mitigation. These measures are an important part of the design that ensures the impacts upon protected and notable species are adequately addressed.
- 4.3.22 However, it is acknowledged that the planting of such landscaping will inevitably introduce attractant habitat for bird species. As such, and as detailed in Section 4.2 and illustrated in **Figure M.2**, the proposed replanting of woodland and clusters of trees have been limited in extent, planted as far as practicable from Birmingham Airport and have sought to reduce the possibility of increasing bird movements in a north-south and south-north direction within the wider surrounding areas to the east of Birmingham Airport. This measure is considered to reduce the risk of bird strike associated with woodland species.

⁴ SuDS: Measures designed to control surface runoff close to its source, including management practices and control measures such as storage tanks, basins, swales, ponds and lakes. Sustainable drainage systems allow a gradual release of water and thereby reduce the potential for downstream flooding.

- 4.3.23 The following measures will be implemented (where practicable) to further manage the risk of increased bird strike that may be associated with these areas.
- avoid the planting of species that provide an abundant winter food source, such as hawthorn *Crataegus monogyna*, holly *Ilex aquifolium*, rowan *Sorbus aucuparia*, crab apple *Malus sylvestris*, honeysuckle *Lonicera spp.* *Viburnum sp.* and *Cotoneaster sp.*;
 - planting of wind-dispersed and non-seed or fruit-bearing species will be encouraged. Appropriate species include field maple *Acer campestre*, common alder *Alnus glutinosa*, silver birch *Betula pendula*, hazel *Coryllus avellana*, privet *Ligustrum vulgare*, goat willow *Salix caprea*, grey willow *Salix cinerea* and gorse *Ulex europaeus*;
 - reducing tree planting density to 4m centres or lower⁵ and thinning existing stands to avoid formation of Starling roosts;
 - avoiding planting of large blocks and encourage the planting of small, single species groups comprising 3-15 plants;
 - no trees with potential to grow in excess of 20m, or to encroach the vertical safeguarding areas (whichever height limit is breached first), due to their potential to attract rooks; and
 - ensuring timely routine management of fruit forming hedges such as hawthorn to limit berry production.
- 4.3.24 As detailed above, the requirements of management and maintenance will be achieved through the applicable authority's management obligations, the powers and rights of access granted from the DCO and/or the continued enforcement of the safeguarding requirements of Birmingham Airport Limited.
- 4.3.25 The Scheme includes areas of grassland on the verges, embankments and other areas of the highway. The majority of these grasslands will be subject to low intensity management for the purpose of maintaining their floral diversity. Although these areas shall necessarily include areas of long grass, their location on verges or embankments that are immediately adjacent to the highway is considered likely to significantly reduce their suitability for the majority of bird species. Therefore, these areas are not considered to represent a risk of increased bird strike.

⁵ The density of tree planting will be approximately 2,250 trees/ha, in accordance with National Forest Guidelines [REF9] for establishing native woodlands. However, a reduced planting density may be applied if the risk of bird strike is deemed too high by Birmingham Airport Ltd. If deemed necessary, the planting density of the some woodland area could be reduced to make the area less attractive to birds, such as wood pigeons.

- 4.3.26 As illustrated in **Figure M.2**, some other grassland areas may also be established outside the highway for the purpose of benefiting wildlife. In these areas the restriction of field compartment size (by hedgerow planting) and the planting of scrub may be utilised to break up the available sight lines for birds, thereby reducing the suitability of any areas for any flocking species, such as waders and geese. These measures are considered sufficient to minimise the risk of any increase in bird strike from the creation of these grassland areas.

Nests

- 4.3.27 Removal of nests or additional roosting/ nesting deterrents would be considered as advised by monitoring and regular consultation with Birmingham Airport Limited.
- 4.3.28 As detailed in Appendix D of the OEMP [TR010027/APP/6.11], the removal will have due regard to the legal protection afforded to all wild birds and their active nests by the Wildlife & Countryside Act 1981 (as amended) [REF 13], and will only be conducted under the advice and supervision of a suitably qualified ecologist.

4.4 Monitoring and Liaison

- 4.4.1 During the construction phase of the Scheme, within all reasonable site safety constraints, Birmingham Airport Limited Airfield Operations staff and Birmingham Airport Limited's specialist bird hazard consultants are to be granted access to the site at all times, if required, for the purposes of monitoring the presence of birds and ensuring the effectiveness of the bird control measures undertaken by the PC.
- 4.4.2 A contact list will be created by the PC which identifies a 24/7 contact number and duty manager who will be the point of contact for the Birmingham Airport Limited Airfield Operations Staff.
- 4.4.3 Construction staff and contractors will be required to continuously survey high risk areas. Notwithstanding this, any observations of significant flocks of birds within the vicinity of the active construction area will be reported immediately to Birmingham Airport Limited.
- 4.4.4 The numbers of birds present in the vicinity of the Scheme during the construction period will be recorded and provided to Birmingham Airport Authority as part of the regular site monitoring.
- 4.4.5 Areas of the Scheme construction which are deemed to have a high potential of increasing the risk of bird strike to the airport ("high risk areas") will be agreed in consultation with Birmingham Airport Limited prior to the commencement of construction works.
- 4.4.6 Where hazardous bird activity is identified, the appointed contractor will report such activity to the airport, so that appropriate bird prevention methods can be actioned. The main contractor will include details of bird activities, or potential bird hazards, in daily briefing to all site staff and contractors in areas considered to 'high risk areas'.

- 4.4.7 Additionally, start and end of shift visual inspections will be undertaken in high risk areas by a nominated person. This is to ensure that any aggregations of bird on the ground at this time don't disperse without due control. If there are aggregations of birds on the ground, in particular Woodpigeon, Starling or Gulls, then this will be communicated immediately to the bird hazard control team of Birmingham Airport Limited who will advise when/ how the birds can be dispersed; taking into account aircraft movements.

5 Conclusion

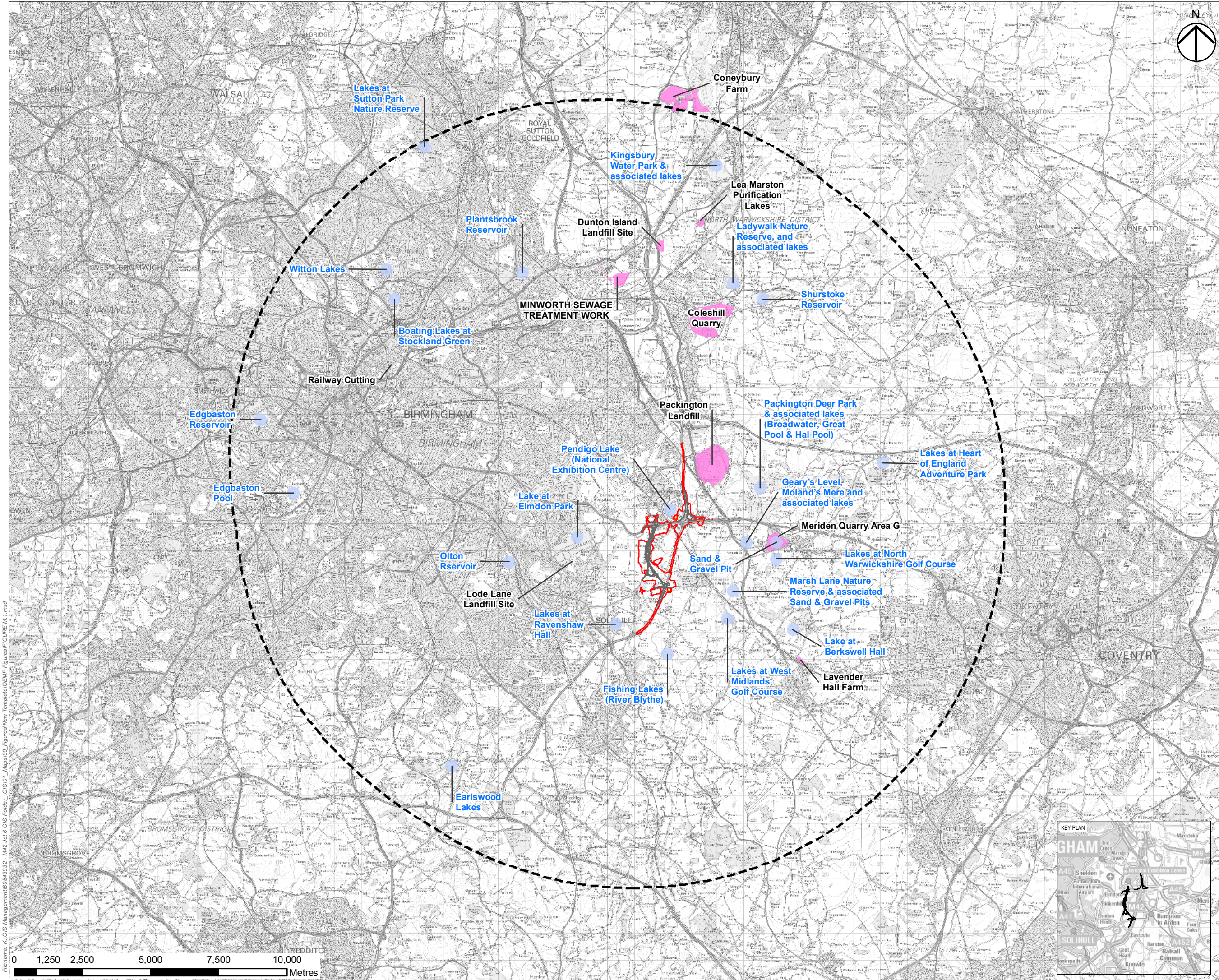
- 5.1.1 The information presented in this OBSMP has considered the local context and design of the Scheme to evaluate the likelihood of any increased risk to the operations of Birmingham Airport as a result of bird strike.
- 5.1.2 Birmingham Airport and the Scheme lie in close proximity to a bird flyway formed by the valleys of the River Blythe and River Tame.
- 5.1.3 The iterative design of the Scheme in consultation with Birmingham Airport Limited and the Environment Agency has sought to design out potential attractant habitat for birds. Notwithstanding this, there is a risk that management of the Scheme during both its construction and operation could result in an increased risk of bird strike.
- 5.1.4 To reduce this possible risk to aircraft:
 - a. embedded mitigation measures to reduce the risk of bird strike have been agreed in consultation with Birmingham Airport Limited;
 - b. in accordance with best practice guidance provided by CAP 772, a risk assessment has been carried out of the Scheme during both construction and operation, with recommendations made to mitigate any bird strike hazards. This includes:
 - (i) the monitoring and control construction activities; and
 - (ii) the sensitive design and maintenance of drainage and landscaping to reduce their suitability for birds (further detail presented in the body of this report).
- 5.1.5 The proposed measures will be continually reviewed through site monitoring and reporting to Birmingham Airport Limited, thereby ensuring that a robust and pro-active approach to any risks of increased bird strike.
- 5.1.6 Overall it is considered that in accordance with best practice the mitigation measures detailed in this document are sufficient to ensure that any risks of bird strike associated with the Scheme have been reduced as low as reasonably practicable.

6 References

REF 1	<p>Regulation 139/2014. Laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council. European Commission (2014).</p> <p>https://www.easa.europa.eu/document-library/regulations/commission-regulation-eu-no-1392014</p>
REF 2	<p>ODPM Circular 1/2003 - Safeguarding Aerodromes. UK Government DfT (2003).</p> <p>https://www.gov.uk/government/publications/safeguarding-aerodromes-technical-sites-and-military-explosives-storage-areas</p>
REF 3	<p>CAP 772: Wildlife Hazard Management at Aerodromes. Civil Aviation Authority (2017).</p> <p>https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=2726</p>
REF 4	<p>The town and country planning (safeguarded aerodromes, technical sites and military explosives storage areas) direction 2002. Department for Transport (2016).</p> <p>https://www.gov.uk/government/publications/safeguarding-aerodromes-technical-sites-and-military-explosives-storage-areas/the-town-and-country-planning-safeguarded-aerodromes-technical-sites-and-military-explosives-storage-areas-direction-2002</p>
REF 5	<p>Mineral Sites and Bird Strike Hazard and Risk: Practice Guide for Mineral Development and Restoration within Aerodrome Safeguarding Areas. Mineral Products Association (2015).</p> <p>https://mineralproducts.org/documents/MPA_Birdstrike_Guidance_Revised_Version_May_2015.pdf</p>
REF 6	<p>Civil Aviation Authority (2017) Reported Birdstrikes 2012-2016.</p> <p>https://www.caa.co.uk/Data-and-analysis/Safety-and-security/Datasets/Birdstrikes/</p>
REF 7	<p>Bird Strike Damage and Windshield Bird Strike. European Aviation Safety Authority (2008).</p> <p>https://www.easa.europa.eu/document-library/research-projects/easa2008c49</p>

REF 8	Convention on International Civil Aviation Annex 14. Aerodromes - Aerodrome Design and Operations. International Civil Aviation Organisation (2010). http://cockpitdata.com/Software/ICAO%20Annex%2014%20Volume%201
REF 9	Birmingham Airport Celebrates Its Busiest Year in History. Birmingham Airport Website (2018). https://www.birminghamairport.co.uk/media-information/news/2018/01/birmingham-airport-celebrates-its-busiest-year-in-history/
REF 10	Magic map website. Department for Environment, Farming and Rural Affairs (2018). https://magic.defra.gov.uk/
REF 11	British Trust for Ornithology Wetland Bird Survey British Trust for Ornithology (2018). https://www.bto.org/volunteer-surveys/webs
REF 12	Highways Agency Water Risk Assessment Tool (HAWRAT). Highways Agency (2009).
REF 13	Wildlife & Countryside Act 1981 (as amended). HMSO 1981. https://www.legislation.gov.uk/ukpga/1981/69

Figure M.1: Bird Strike Management Plan Location Plan



- NOTES
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
- LEGEND
- THE SCHEME
 - LIMITS OF LAND TO BE ACQUIRED OR USED PERMANENTLY OR TEMPORARILY (THE ORDER LIMITS)
 - LIMITS OF LAND TO BE TEMPORARILY ACQUIRED FOR SIGNAGE INSTALLATION
 - LAND NOT INCLUDED WITHIN THE ORDER LIMITS
 - BIRD SAFEGUARDING
 - LOCATION OF LAKES AND
 - AUTHORISED LANDFILL

FIRST ISSUE	GB	JG	08/05/19	P01
Revision Details	By	Check	Date	Suffix

FOR INFORMATION

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Development Consent Order Number
TR010027

Project Title
M42 JUNCTION 6
IMPROVEMENT

Drawing Title
FIGURE M.1
BIRD MANAGEMENT PLAN

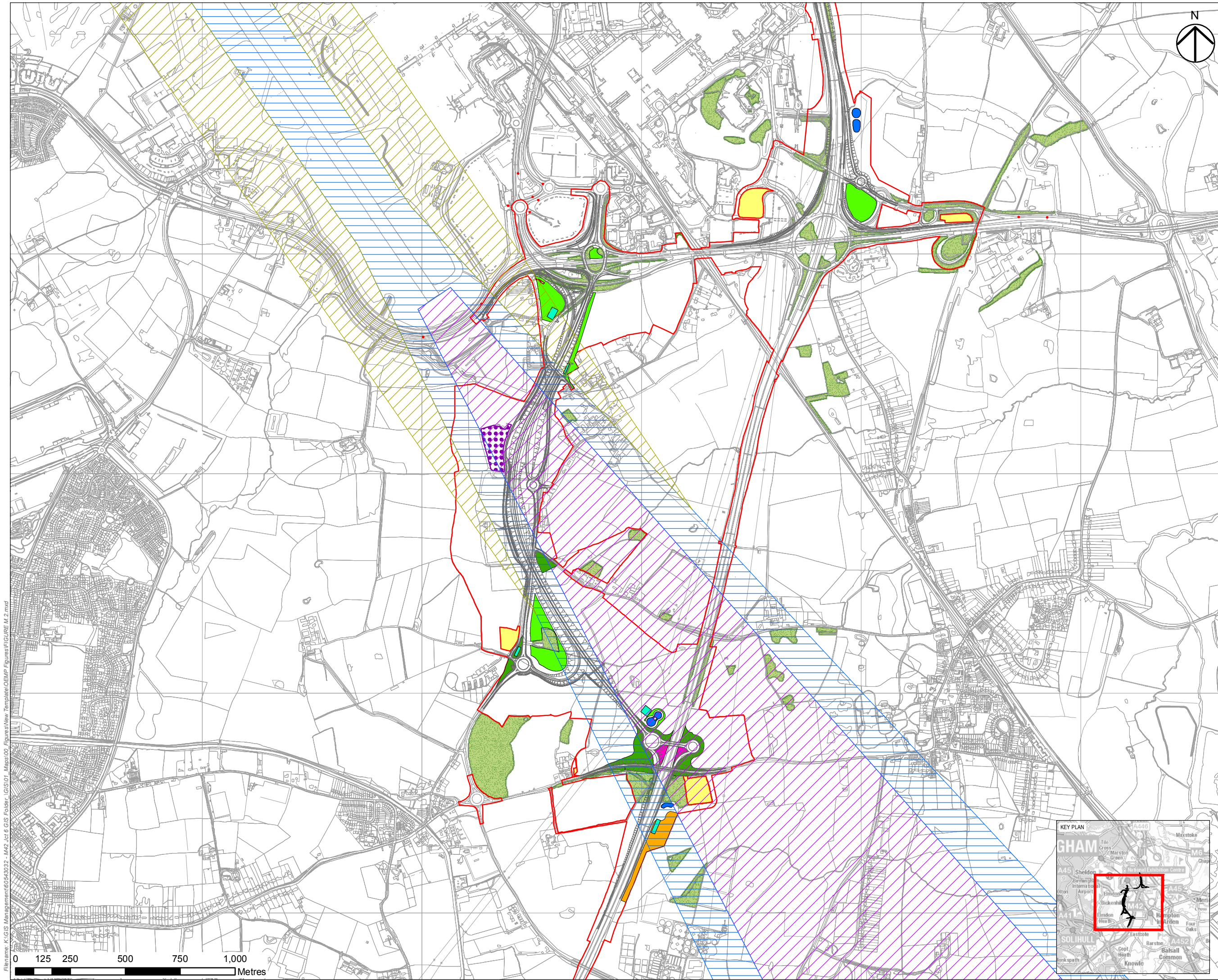
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Location M42_SW_ZZ_ZZ	Type -DR-DC-0254	Role NTS	Number P01

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Figure M.2: Ecological Features and Airfield Safeguarding Areas Plan



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 - LAND NOT INCLUDED WITHIN THE ORDER LIMITS
 - AIRPORT SAFEGUARDING ZONES
 - TAKE OFF FLIGHT PATH & TAKE OFF CLIMB SURFACE
 - APPROACH SURFACE
 - TRANSITIONAL SURFACE
 - EXISTING WOODLANDS
 - PROPOSED PLANTING
 - AREA OF SHRUB
 - LANDSCAPE - WOODLAND/WOODLAND EDGE - LE 2.1 / LE 2.2
 - ECOLOGICAL - PROPOSED AREA FOR POSSIBLE ANCIENT WOODLAND TRANSLOCATION
 - AREA OF HABITAT ENHANCEMENT
 - AREA FOR HABITAT TRANSLOCATION
 - PROPOSED REEDBEDS
 - PROPOSED UNDERGROUND STORAGE

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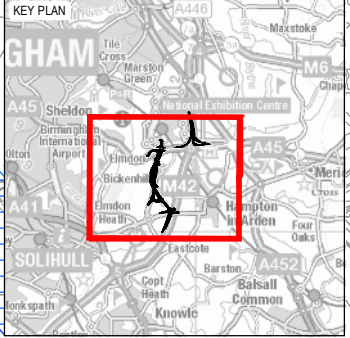
Project Title
M42 JUNCTION 6
IMPROVEMENT

Drawing Title
FIGURE M.1
ECOLOGICAL FEATURES
& AIRFIELD SAFEGUARDING
AREAS PLAN

Designed MWH	Drawn GB	Checked MWH	Approved JG	Date 07/05/19
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Location M42 SW ZZ ZZ	Type -DR-DC-0253	Role 	Number



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