Gatwick Airport Northern Runway Project

Environmental Statement
Appendix 9.9.2: Biodiversity Net Gain Statement – Tracked Version

Book 5

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1 Introduction

1.1.1 This document forms **ES Appendix 9.9.2 Biodiversity Net Gain Statement** (Doc Ref. 5.3) of the Environmental Statement (ES) prepared on behalf of Gatwick Airport Limited (GAL). This version is submitted at Deadline ~~3~~ 5 of the Examination., comprising Version ~~2~~ 4 of the document. The ES presents the findings of the Environmental Impact Assessment (EIA) process for the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report a 'the Project'). The Project proposes alterations to the existing northern runway which, together with the lifting of the current restrictions on its use, would enable dual runway operations. The Project includes the development of a range of infrastructure and facilities which, with the alterations to the northern runway, would enable the airport passenger numbers and aircraft operations to increase. Further details regarding the components of the Project can be found **in ES Chapter 5: Project Description** ~~(~~[APP-030]~~)~~.

1.1.2 This report provides details of the Biodiversity Net Gain (BNG) assessment completed with respect to the Project. The report should be read in conjunction with **ES Appendix 9.6.2 Ecology Survey Report** (APP-125 to APP-130).

1.1.3 ~~[add in text explaining update]~~This Version 4 revision of the BNG Strategy ~~assessment~~ submitted at Deadline 6 includes the following updates:

- Update to overall calculation to include additional woodland planting at Museum Field Environmental Mitigation Area;
- Strategic Significance within the calculation;
- Delay/advanced planting included within calculation;
- Burstow Stream included in watercourse component;
- Commentary added on the relationship to CBC's local policy CH6; and

~~1.1.2~~ Annex 3 has been updated in line with ISH8 requests.

1.2 Project Site

1.2.1 The Project site has been subject to a range of ecology surveys, including a Phase 1 Habitat Survey in 2019/2020 (**ES Appendix 9.6.2 Ecology Survey Report** (APP-125 to APP-130)). These found the Project site to comprise a number of distinct areas:

- the operational airport comprising mainly hard standing with grassland managed for aircraft safety;
- the River Mole corridor;
- the Gatwick Stream corridor;
- Riverside Garden Park;
- a number of woodland blocks; and
- areas of grazed grassland.

1.3 Relevant Legislation

The Environment Act 2021

1.3.1 The Environment Act 2021 included provisions applying certain BNG requirements to the nationally significant infrastructure projects (NSIPs) regime. A BNG requirement is proposed to be imposed on NSIP projects from November 2025, with the level of requirement detailed within a BNG statement(s) (subject to prior publication – currently expected to be November 2023, to allow a period of transition) and presently expected to be set at a minimum of 10%.

1.3.2 The consultation[1] sets out that projects which have been accepted for examination prior to the November 2025 date would not be required to deliver that minimum BNG target, but could choose to do so voluntarily. In this context, and noting the position remains subject to further confirmation from Government, whilst there is no legal requirement for the Project to deliver BNG, the design has been developed such that the extent of net gain possible has been maximised within the parameters of the Project and the safeguarding requirements associated with an operational airport.

2 BNG Methodology

2.1 BNG Approach

2.1.1 The approach to BNG adopted with respect to the Project is in accordance with British Standards: BS 8683 - Process for Designing and Implementing Biodiversity Net Gain (BSI 2021).

2.1.2 All calculations for BNG have been undertaken using the latest Defra Metric 4.0 (known as the Defra Metric) and associated technical guidance notes (NE 2023). This enables a comparison of the before development biodiversity units present on site and the post-development units to be created once the Project is complete.

[1] The Consultation on Biodiversity Net Gain Regulations and Implementation; Consultation outcome Government response and summary of responses. Updated 21 February 2023 (defra.gov.uk).

2.1.3 The Defra Metric uses the UKHabs classification system for each habitat present and assigns a distinctiveness score to each, depending on the rarity of the habitat. Users are required to then assign an ecological condition to each habitat parcel, using the condition assessment criteria provided by Natural England (NE 2023).

2.1.4 The Defra Metric then calculates a habitat unit score based on these factors with those of higher distinctiveness and better ecological condition scoring highest.

2.1.5 The post development calculations also include scaling factors to enable the difficulty to create a habitat and the time taken to establish it to be taken into account within the final scoring. It also accounts for planting taking place in advance of impacts occurring (resulting in a higher score) and when such planting is delayed (decreasing it).

2.1.6 Locations where advance planting could take place have now been identified in Version 2 of the **ES Appendix 8.8.1: Outline Landscape and Ecology Management Plan** (REP4-013 to REP4-016~~Doc Ref. 5.3~~). ~~These will be incorporated into the BNG calculation, along with delays in planting, for the next iteration of the BNG calculation.~~

2.1.7 The Project site is large and the scale of impacts to existing habitats relatively limited. In that context, the assessment compares the baseline conditions within the area of habitats to be lost (Figure 2.1) with the post-development score within those areas to calculate an overall net gain score for the Project. This is considered to be an appropriate approach, given that the majority of the Project site comprises airfield grassland that would not be impacted by the Project. This approach was agreed with Natural England during pre-submission discussions, as set out in paragraph 5.10 of their Relevant Representation [RR-3223].

2.1.8 The Defra Metric for the area impacted is provided in Annex 1.

2.2 Terrestrial Habitat Survey

2.2.1 Habitats within the Project on site were initially recorded using the Phase 1 Habitat Survey methodology (JNCC 2010) as reported in **ES Appendix 9.6.2 Ecology Survey Report** (APP-125 to APP-130).

2.2.2 These were then converted to UKHabs using the translation guidance in the Defra Metric.

2.3 Aquatic Habitat Survey

2.3.1 The River Mole was subject to appropriate surveys to classify the condition of the aquatic habitat present (Annex 2).

2.3.2 A similar survey of the Burstow Stream ~~will~~ has been completed and the river component of the BNG assessment updated accordingly.

2.4 Post Development Plans

2.4.1 The calculation of the post development habitat areas is based on the designs available at the time of submission. Given the nature of an NSIP application, these are currently at a draft stage with the degree of vegetation clearance in particular currently based on the worst-case assumption that all habitats would be cleared from within the construction boundary. The calculations presented here are therefore worst case with respect to vegetation loss/replacement. Details of preliminary landscape details are based on those described in **ES Appendix 8.8.1: Outline Landscape and Ecology Management Plan** (~~Doc Ref. 5.3~~REP4-013 to REP4-016).

2.5 Calculation of Habitat Areas

2.5.1 Areas of habitat were calculated from ArcGIS based on the Phase 1 Habitat plan and post development plans.

2.5.2 Areas were automatically calculated from the GIS using a custom macro and then converted to hectares at an accuracy of 0.001 ha. The rounding of habitat areas to this accuracy means that the before and after area calculations do not match exactly.

2.6 Strategic Significance

2.6.1 The BNG metric includes a Strategic Significance multiplier for both the baseline and post development habitat creation/enhancement. The Metric submitted at Deadline 6 has therefore been updated to include this multiplier.

2.6.2 Strategic Significance has been assigned based on a number of variables:

- If the habitat is located within a Biodiversity Opportunity Area (BOA) for either Sussex or Surrey (as shown on ES Figure 9.6.2 Non-statutory Designated Sites [APP-048]), it is assigned a value of '*Formally identified in local strategy*';
- If the habitat is in a strategically significant location (ie along a water course or through within habitat attached to one) but not formally identified then it is assigned '*Location ecologically desirable but not in local strategy*'; and
- If none of the above apply, habitats have been assigned 'Area/compensation not in local strategy/no local strategy'.

2.6.3 The Surrey BOAs around the Project are located through Riverside Garden Park and associated highway planting along with the habitats at Longbridge Roundabout and Carpark B. The Sussex BOAs are

located to the east of the Project, through the Gatwick Stream corridor, Land East of the Railway, Pentagon Field and associated woodlands.

2.6.4 Habitats that are not within the BOAs but are in ecologically desirable locations include those along the River Mole, Gatwick Stream, Man's Brook and Crawter's Brook (i.e. the main water courses through the site).

2.7 Advance/delay in habitat creation

2.7.1 In order to account for both advance planting (ie that occurring in advance of development impacts) and any delay in habitat creation between impacts occurring and planting taking place, the BNG metric submitted at Deadline 6 has also been updated to including the advance/delay multiplier.

2.7.2 Advance planting has been considered to be that set out in section 1.1.9 and Annex 4 of in **ES Appendix 8.8.1: Outline Landscape and Ecology Management Plan** (REP4-013 to REP4-016). This includes the habitats within the Museum Field Environmental Mitigation Area, scrub/hedgerow habitats along Crawter's Brook and hedgerow along Perimeter Road East.

2.7.3 Planting delay has been including by considering the assessment period within which habitat clearance occurs compared to when those areas are planted. These data have been based on the information in Figures 2.1 to 2.6:

- Habitat lost/gained 2024-2029;
- Habitat lost/gained 2030-2032; and
- Habitat lost/gained 2033-2038.

~~2.5.2~~2.7.4 This has been further refined using the information within ES Chapter 5 Project Description [APP-030] with respect to Project timetables, in particular Table 5.3.1. Where a period of construction activities is shown, it is assumed that habitat clearance occurs at the start of this period and ends at the end of it. For example, South Terminal Roundabout improvements are scheduled to occur from 2029 until 2031. Therefore, clearance would be in 2029 and replanting in 2031, a delay of 2 years.

3 Baseline Conditions

3.1.1 Figure 2.1 shows the areas impacted by the Project (ie those areas where a change in habitat would occur).

3.1.2 The description below (Table 3.~~2~~1.1) relates to each row in the baseline of the Defra Metric 4.0 for the areas impacted (Annex 1).

3.1.3 The total area which would be impacted is ~~230~~241.~~99~~64 ha (Table 3.~~2~~1.1).

Table ~~2.5~~2.7.1~~1~~ Pre-development habitats in area impacted by Project

On-Site Habitat Baseline				
Existing area habitats		**Distinctiveness**	**Condition**	**Area**
Broad Habitat	**Habitat Type**			
Urban	Introduced shrub	Low	Condition Assessment N/A	3.440
Urban	Introduced shrub	Low	Condition Assessment N/A	0.002
Heathland and shrub	Mixed scrub	Medium	Good	0.002
Heathland and shrub	Mixed scrub	Medium	Good	0.006
Woodland and forest	Other woodland; broadleaved	Medium	Good	0.238
Grassland	Other neutral grassland	Medium	Moderate	4.871

On-Site Habitat Baseline				
Existing area habitats		**Distinctiveness**	**Condition**	**Area**
Grassland	Other neutral grassland	Medium	Moderate	0.738
Heathland and shrub	Mixed scrub	Medium	Moderate	3.878
Heathland and shrub	Mixed scrub	Medium	Moderate	0.062
Lakes	Ponds (non-priority habitat)	Medium	Moderate	1.057
Lakes	Ponds (non-priority habitat)	Medium	Moderate	0.917
Sparsely vegetated land	Ruderal/Ephemeral	Low	Moderate	0.020
Sparsely vegetated land	Ruderal/Ephemeral	Low	Moderate	0.008
Wetland	Reedbeds	High	Moderate	0.071
Woodland and forest	Other woodland; broadleaved	Medium	Moderate	8.238
Woodland and forest	Other woodland; broadleaved	Medium	Moderate	0.356
Woodland and forest	Other woodland; broadleaved	Medium	Good	0.006
Urban	Artificial unvegetated, unsealed surface	V.Low	N/A – Other	1.680
Urban	Artificial unvegetated, unsealed surface	V.Low	N/A – Other	0.001
Urban	Built linear features	V.Low	N/A – Other	0.079
Urban	Developed land; sealed surface	V.Low	N/A – Other	137.430

On-Site Habitat Baseline				
Existing area habitats		**Distinctiveness**	**Condition**	**Area**
Urban	Developed land; sealed surface	V.Low	N/A – Other	7.953
Urban	Developed land; sealed surface	V.Low	N/A – Other	0.012
Watercourse footprint	Watercourse footprint	V.low	N/A – Other	0.349
Urban	Developed land; sealed surface	V.Low	N/A – Other	0.610
Grassland	Modified grassland	Low	Poor	50.287
Grassland	Modified grassland	Low	Poor	3.533
Grassland	Modified grassland	Low	Poor	6.876
Grassland	Modified grassland	Low	Poor	0.356
Grassland	Other neutral grassland	Medium	Poor	0.384
Grassland	Other neutral grassland	Medium	Poor	0.171
Heathland and shrub	Mixed scrub	Medium	Poor	1.934
Heathland and shrub	Mixed scrub	Medium	Poor	0.017
Woodland and forest	Other woodland; broadleaved	Medium	Moderate	2.788
Woodland and forest	Other woodland; broadleaved	Medium	Poor	0.100
Sparsely vegetated land	Ruderal/Ephemeral	Low	Poor	0.046
Woodland and forest	Other woodland; broadleaved	Medium	Poor	1.434
Sparsely vegetated land	Ruderal/Ephemeral	Low	Poor	0.006
Urban	Developed land; sealed surface	V.Low	N/A – Other	0.002
Grassland	Other neutral grassland	Medium	Moderate	1.295
Woodland and forest	Other woodland; broadleaved	Medium	Moderate	0.004
Urban	Artificial unvegetated, unsealed surface	V.Low	N/A – Other	0.119
Sparsely vegetated land	Ruderal/Ephemeral	Low	Poor	0.264

3.1.4 The largest habitat within the impacted area is the hard standing of the airport and associated infrastructure (137.430ha) with the next largest habitat being the modified grassland of the airfield (50.287ha).

3.1.5 Table 3.2.1 has been updated (final four rows) with those areas covered by the creation of the constructed wetland (reed bed) system within the Land East of the Railway Line Biodiversity Area that formed part of the Change Application (now accepted by the ExA).

3.1.6 The baseline habitats score for the area impacted (Annex 1) is therefore ~~**343**~~**368**~~**.40**~~ **19** units.

3.1.7 The River Mole was identified as being in moderate condition with no encroachment (Annex 2). This provided a baseline watercourse score of **4.20** units.

3.1.8 The Burstow Stream within the Project site was identified as being in poor condition. The water within the ditch poor quality and very turbid. No signs of pollution (eg oil spill) were present.

3.1.9 The vegetation within the ditch is limited. No aquatic plants were present, with no emergent, submerged, or floating-leaved plants observed with no filamentous algae or duckweed . No marginal vegetation was present along the sides of the ditch.

3.1.10 The ditch was artificial and man-made, with concrete outfalls present either side of the surveyed section of ditch. It was therefore considered to have minor encroachment. No physical damage is present in the ditch. The water depth was approximately 15cm at the time of the site visit, and was slow-flowing.

3.1.11 The ditch is circa 90% shaded as it is located within and area of scrub by the side of Balcombe Road. Shading plants included hawthorn *Crataegus monogyna*, ivy *Hedera helix*, bramble *Rubus sp*. No non-native plant or animal species were present.

~~3.1.7~~3.1.12 The Burstow Stream was therefore calculated as having a value of 0.03 units.

~~3.1.8~~3.1.13 The baseline hedgerows to be lost as part of the Project have been determined following the completion of **Appendix 8.10.1: Tree Survey Report and Arboricultural Impact Assessment**, including Appendices B and C survey schedules, Appendices D and E removal schedules, Appendices F and G survey plans and Appendices H and I tree removal plans (Doc Ref. 5.3 v3) ~~[REP1-026, REP1-027, REP1-028, REP1-029, REP1-030]~~.

~~3.1.9~~3.1.14 Table 3.2.2 below provides details of the lengths of hedgerow to be lost. In total, 560m of either species poor or non-native ornamental hedgerow will be lost.

Table ~~2.7~~2.7.22 Pre-development hedgerows in area impacted by Project.

~~3.1.10~~3.1.15 This provides a baseline score of 1.57 units.

On-Site Hedgerow Baseline				
Existing Hedgerow habitats		**Distinctiveness**	**Condition**	**Length (km)**
Hedge number	**Hedge Type**	**Low**	**Moderate**	**0.07**
H8	Native hedgerow	Low	Moderate	0.04
H13	Native hedgerow	Low	Moderate	0.05
H14	Native hedgerow	V.Low	Poor	0.163
H16	Non-native and ornamental hedgerow	V.Low	Poor	0.036
H22	Non-native and ornamental hedgerow	V.Low	Poor	0.027
H24	Non-native and ornamental hedgerow	Low	Moderate	0.119
H25	Native hedgerow	Low	Moderate	0.009
H26	Native hedgerow	Low	Moderate	0.022
H27	Native hedgerow	Low	Moderate	0.025
H28	Native hedgerow	Low	Moderate	0.07

4 Proposed Design

4.1 Habitat Creation

4.1.1 The landscape for the Project has been designed, as far as practicable within the confines of an operational airport, to ensure an overall enhancement for biodiversity and to ensure that any impacts as a result of the Project are fully mitigated.

4.1.2 To this end, an Ecology Strategy for the site has been developed and is set out within **ES Appendix 8.8.1: Outline Landscape and Ecology Management Plan** (REP4-013 to REP4-016~~APP-113-116~~). Broadly, this is based around linking with the existing GAL Biodiversity Areas (Land East of the Railway, LERL and North West Zone) through enhanced corridors of movement around the site, in particular both the River Mole and Gatwick Stream. Additional ecology 'nodes' are to be created to either expand the Biodiversity Areas, along the North West Zone, or create new ones (Longbridge Roundabout and former Car Park B).

4.1.3 In order to ensure that the Project delivers true net gain, areas of the Site that are currently subject to existing management with respect to ecology and would, therefore, already be managed to enhance them as part of GAL's Decade of Change ambitions, have been largely excluded from the Project site (ie ~~all of~~ the majority of both the LERL and ~~the majority of~~ the North West Zone). As such, the Ecology Strategy seeks to augment these areas through physical expansion rather than claim any benefit for enhanced management that would already be happening.

4.1.4 The habitat creation calculations presented in this report have been updated to include the constructed wetland (reed beds) and associated grassland/infrastructure to be constructed within the Land East of the Railway Line Biodiversity Area that formed part of the Change Application (now accepted by the ExA). It is intended that these reed beds form a natural wetland area of benefit to wildlife.

4.2 Habitat condition for newly created habitats

4.2.1 For each habitat to be created, a target habitat condition at maturity needs to be chosen. An outline of the management to be applied for each habitat to ensure these targets are achieved is provided in the **ES Appendix 8.8.1: Outline Landscape and Ecology Management Plan** (REP4-013 to REP4-016~~Doc Ref. 5.3~~)).

4.2.2 GAL has extensive experience of managing habitats for biodiversity benefit through the Gatwick Greenspace Partnership. As such, there is strong confidence that these conditions will be achieved.

4.2.3 The explanation below provides the criteria for each habitat type that will be targeted to demonstrate the targeted condition where that is moderate or good. It is assumed that any with a target of poor condition will occur without any management.

4.2.4 Note that the account below also does not include habitats that do not require condition assessment:

- Ground level planters;
- Introduced shrub;
- Artificial unvegetated, unsealed surface; and
- Urban and Developed land sealed surface.

Other Neutral Grassland – Targeted Condition: Good

4.2.5 Assumptions relating to the criteria for Other Neutral Grassland that would be targeted are:

a) *Criterion 1. The grassland is a good representation of the habitat type, based on its UKHab description – the appearance and composition of the vegetation closely matches the characteristics of the specific grassland habitat type. Indicator species listed by UKHab for the*

specific grassland habitat type are consistently present.

b) *Criterion 2. Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.*

c) *Criterion 3. Cover of bare ground is between 1% and 5%, including localised areas, for example, rabbit warrens.*

d) *Criterion 4. Cover of bracken Pteridium aquilinum is less than 20% and cover of scrub (including bramble Rubus fruticosus agg.) is less than 5%.*

e) *Criterion 5. Combined cover of species indicative of sub-optimal condition and physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging management activities) accounts for less than 5% of total area. If any invasive non-native plant species (as listed on Schedule 9 of WCA4) are present, this criterion is automatically failed.*

f) *Criterion 6. There are 10 or more vascular plant species per m^2 present, including forbs that are characteristic of the habitat type.*

Mixed Scrub – Targeted Condition: Moderate

4.2.6 Assumptions relating to the criteria for mixed scrub are:

a) *Criterion 1. "The scrub is a good representation of the habitat type it has been identified as, based on its UKHab description (where in its natural range). The appearance and composition of the vegetation closely matches the characteristics of the specific scrub type. At least 80% of scrub is native, and there are at least three native woody species, with no single species comprising more than 75% of the cover (except hazel Corylus avellana, common juniper Juniperus communis, sea buckthorn Hippophae rhamnoides or box Buxus sempervirens, which can be up to 100% cover).*

b) *Criterion 2. Seedlings, saplings, young shrubs and mature (or ancient or veteran) shrubs are all present.*

c) *Criterion 3. There is an absence of invasive non-native plant species (as listed on Schedule 9 of WCA4) and species indicative of sub-optimal condition make up less than 5% of ground cover.*

d) *Criterion 4. The scrub has a well-developed edge with scattered scrub and tall grassland and or forbs present between the scrub and adjacent habitat.*

Open Mosaic Habitats on Previously Developed Land – Target Condition: Good

4.2.7 Assumptions relating to the criteria for open mosaic habitats on previously developed land are:

a) *Criterion 1. Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area.*

b) *Criterion 2. The habitat parcel contains different plant species that are beneficial for wildlife, for example flowering species providing nectar sources for a range of invertebrates at different times of year.*

c) *Criterion 3. "Invasive non-native plant species (listed on Schedule 9 of WCA1) and others which are to the detriment of native wildlife (using professional judgement) cover less than 5% of the total vegetated area. Note – to achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover)."*

d) *Additional Criteria (below) must be assessed for open mosaic habitat on previously developed land only:*

Criterion 4. The parcel shows spatial variation and forms a mosaic of at least four early successional communities (a) to (h) PLUS bare substrate. (a) annuals; (b) mosses/liverworts; (c) lichens; (d) ruderals; € inundation species; (f) open grassland; (g) flower-rich grassland; (h) heathland.

e) *Criterion 5. The parcel contains pools of water such as permanent and ephemeral waterbodies.*

Modified grassland – Target Condition: Moderate

4.2.8 Note that this applies to modified grassland outwith the airfield as this would be managed according to CAA requirements. Assumptions relating to the criteria for Grassland Modified grassland are:

a) *Criterion 1. There are 6-8 vascular plant species per m2 present, including at least 2 forbs (this may include those listed in Footnote 1).*

b) *Criterion 2. Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for vertebrates and invertebrates to live and breed.*

c) *Criterion 3. Some scattered scrub (including bramble Rubus fruticosus agg.) may be present, but scrub accounts for less than 20% of total grassland area.*

d) *Criterion 4. Physical damage is evident in less than 5% of total grassland area. Examples of physical damage include excessive poaching, damage from machinery use or storage, erosion caused by high levels of access, or any other damaging management activities.*

e) *Criterion 5. Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens).*

f) *Criterion 6. Cover of bracken Pteridium aquilinum is less than 20%*.

Individual trees and Urban tree – Target Condition: Moderate

4.2.9 Assumptions relating to the criteria for urban trees to achieve moderate condition are

a) *Criterion 1. The tree is a native species (or at least 70% within the block are native species).*

b) *Criterion 2. The tree canopy is predominantly continuous, with gaps in canopy cover making up <10% of total area and no individual gap being >5 m wide (individual trees automatically pass this criterion).*

c) *Criterion 3. The tree is mature (or more than 50% within the block are mature).*

d) *Criterion 4. There is little or no evidence of an adverse impact on tree health by human activities (such as vandalism, herbicide or detrimental agricultural activity). And there is no current regular pruning regime, so the trees retain >75% of expected canopy for their age range and height.*

Lakes and Ponds (non-priority habitat) – Target Condition: Moderate

4.2.10 Assumptions relating to the criteria for Ponds (non-priority habitat non-woodland ponds) are:

a) *Criterion 1. The pond is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution. Turbidity is acceptable if the pond is grazed by livestock.*

b) *Criterion 2. There is semi-natural habitat (moderate distinctiveness or above) completely surrounding the pond, for at least 10 m from the pond edge for its entire perimeter.*

c) *Criterion 3. Less than 10% of the water surface is covered with duckweed Lemna spp. or filamentous algae.*

d) *Criterion 5. Pond water levels can fluctuate naturally throughout the year. No obvious artificial dams, pumps or pipework.*

e) *Criterion 6. There is an absence of listed non-native plant and animal species.*

f) *Criterion 7. The pond is not artificially stocked with fish. If the pond naturally contains fish, it is a native fish assemblage at low densities.*

g) *Criterion 9. The pond surface* is no more than 50% shaded by adjacent trees and scrub.

Ruderal/Ephemeral – Target Condition: Moderate

4.2.11 Assumptions relating to the criteria for Sparsely vegetated land Ruderal/Ephemeral are:

a) *Criterion 1. Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area.*

b) *Criterion 2. The habitat parcel contains different plant species that are beneficial for wildlife, for example flowering species providing nectar sources for a range of invertebrates at different times of year.*

c) *Criterion 3. Invasive non-native plant species (listed on Schedule 9 of WCA1) and others which are to the detriment of native wildlife (using professional judgement) cover less than 5% of the total vegetated area (criterion passed). To achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover).*

Reedbeds – Target Condition: Moderate

4.2.12 Assumptions relating to the criteria for Reedbeds are

a) *Criterion 2. The parcel is a good representation of the wetland habitat type it has been identified as, based on its UKHab descripti–n - as in, the appearance and composition of the vegetation closely matches the characteristics of the specific habitat type. Indicator species for the specific wetland habitat type1 listed by UKHab are consistently present..*

b) *Criterion 4. Cover of scrub and scattered trees are less than 10%.*

c) *Criterion 5. Cover of bare ground is less than 5%.*

d) *Criterion 6. There is an absence of invasive non-native plant species (as listed on Schedule 9 of WCA3) and species indicative of sub-optimal condition make up less than 5% of ground cover.*

e) *Criterion 7. The reedbed has a diverse structure with between 60 and 80% reeds Phragmites*

australis. Other areas may include open water (at least 10%), species-rich fen and or wet woodland.

Woodland (both broadleaved and wet) – Target Condition: Moderate

4.2.13 Assumptions relating to the criteria for woodland to achieve moderate condition are set out in Table 4.2.1.

~~4.2.13~~ On this basis this habitat would result in a total score of 29 and would result in the habitat achieving moderate condition (Moderate score are between 26-32).

~~4.2.14~~

Table 4.2.1 Woodland condition criteria

Indicator		Good (3 points)	Moderate (2 points)	Poor (1 point)	Score per indicator
A	Age distribution of trees	Three age-classes present.	Two age-classes present.	One age-class present.	2
B	Wild, domestic and feral herbivore damage	No significant browsing damage evident in woodland.	Evidence of significant browsing pressure is present in 40% or less of whole woodland.	Evidence of significant browsing pressure is present in 40% or more of whole woodland.	3
C	Invasive plant species	No invasive species present in woodland.	*Rhododendron ponticum or* cherry laurel *Prunus laurocerasus* not present, other invasive species <10% cover.	Rhododendron or cherry laurel present, or other invasive species >10% cover.	3
D	Number of native tree species	Five or more native tree or shrub species found across woodland parcel.	Three to four native tree or shrub species found across woodland parcel.	Two or less native tree or shrub species across woodland parcel.	3
E	Cover of native tree and shrub species	>80% of canopy trees and >80% of understory shrubs are native.	–0 - 80% of canopy trees and –0 - 80% of understory shrubs are native.	<50% of canopy trees and <50% of understory shrubs are native.	2
F	Open space within woodland	–0 - 20% of woodland has areas of temporary open space. Unless woodland is <10ha, in which case–0 - 20% temporary open space is permitted.	–1 - 40% of woodland has areas of temporary open space.	<10% or >40% of woodland has areas of temporary open space. But if woodland <10ha has <10% temporary open space, please see Good category.	2
G	Woodland regeneration	All three classes present in woodland; trees–4 - 7 cm Diameter at Breast Height (DBH), saplings and seedlings or advanced coppice regrowth.	One or two classes only present in woodland.	No classes or coppice regrowth present in woodland.	2
H	Tree health	Tree mortality less than 10%, no pests or diseases and no crown dieback.	11% to 25% mortality and/or crown dieback or low-risk pest or disease present.	Greater than 25% tree mortality and or any high-risk pest or disease present.	3
I	Vegetation and ground flora	Recognisable NVC plant community at ground layer present, strongly characterised by ancient woodland	Recognisable woodland NVC plant community at ground layer present.	No recognisable woodland NVC plant community at ground layer present.	2

Indicator		Good (3 points)	Moderate (2 points)	Poor (1 point)	Score per indicator
		flora specialists.			
J	Woodland vertical structure	Three or more storeys across all survey plots or a complex woodland.	Two storeys across all survey plots.	One or less storey across all survey plots.	2
K	Veteran trees	Two or more veteran trees per hectare.	One veteran tree per hectare.	No veteran trees present in woodland.	1
L	Amount of deadwood	50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, branch stubs and stumps, or an abundanc	Between 25% and 50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities.	Less than 25% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities.	2
		e of small cavities.			
M	Woodland disturbance	No nutrient enrichment or damaged ground evident.	Less than 1 hectare in total of nutrient enrichment across woodland area and or less than 20% of woodland area has damaged ground.	More than 1 hectare of nutrient enrichment and or more than 20% of woodland area has damaged ground.	2
Total Score (out of a possible 39)					**29**

4.3 Habitat creation

4.3.1 The areas of habitat to be created within the area of the Project site which would be impacted and associated target conditions are shown in Table 4.3.1 below.

Table 4.3.1 Areas of habitat to be created and target condition

Area of Habitats to be created		Area	Distinctiveness	Condition
Broad Habitat	**Habitat Type**			
Urban	Introduced shrub	1.264	Low	Condition Assessment N/A
Grassland	Other neutral grassland	5.539	Medium	Good
Heathland and shrub	Mixed scrub	3.629	Medium	Good
Urban	Open mosaic habitats on previously developed land	0.708	High	Good
Heathland and shrub	Mixed scrub	0.006	Medium	Good
Grassland	Other neutral grassland	3.485	Medium	Moderate
Grassland	Modified grassland	0.022	Low	Moderate
Grassland	Other neutral grassland	17.456	Medium	Moderate
Heathland and shrub	Mixed scrub	5.980	Medium	Moderate
Individual trees	Urban tree	0.361	Medium	Moderate
Lakes	Ponds (non-priority habitat)	0.917	Medium	Moderate
Sparsely vegetated land	Ruderal/ Ephemeral	0.008	Low	Moderate
Urban	Ground level planters	0.034	Low	Condition Assessment N/A
Wetland	Reedbeds	0.236	High	Moderate
Woodland and forest	Other woodland; broadleaved	7.163	Medium	Moderate
Woodland and forest	Wet woodland	0.302	High	Moderate
Urban	Artificial unvegetated, unsealed surface	0.001	V.Low	N–A - Other

Area of Habitats to be created		Area	Distinctiveness	Condition
Urban	Developed land; sealed surface	157.376	V.Low	N–A - Other
Watercourse footprint	Watercourse footprint	1.548	V.low	N–A - Other
Grassland	Modified grassland	26.372	Low	Poor
Grassland	Other neutral grassland	0.171	Medium	Poor
Individual trees	Urban tree	0.100	Medium	Poor
Grassland	Other neutral grassland	0.012	Medium	Moderate
Grassland	Modified grassland	0.018	Low	Poor
Wetland	Reedbeds	1.002	High	Moderate
Grassland	Other neutral grassland	0.475	Medium	Moderate
Woodland and forest	Other woodland; broadleaved	0.004	Medium	Moderate
Urban	Artificial unvegetated, unsealed surface	0.07	V.Low	N–A - Other
Urban	Developed land; sealed surface	0.131	V.Low	N–A - Other

4.3.2 Post intervention, therefore, the above habitat creation scores ~~416~~441~~.77~~ 98 habitat units (Annex 1).

4.3.3 Given that detailed design of the river has not yet been undertaken, it is assumed that the watercourse will be in moderate condition. The proposed diversion of the River Mole delivers an additional 200 m of water course compared to the baseline. The increased length of river will therefore deliver circa **4.90** watercourse units (Annex 1).

4.3.4 The detailed design of the Project has not yet been completed. However, as set out in ES Appendix 8.8.1 Outline Landscape Ecology Management Plan, with the exception of airside, the majority of Landscape Zones will include the provision of new and replacement hedgerows. These will be species rich and native, as far as practicable, as set out in the oLEMP. They would be managed to ensure they were in good habitat condition, in line with the specific LEMP which will incorporate the management schedules set out in the oLEMP.

4.3.5 In order to achieve a minimum of 10%, at least 222m of such hedgerow will be planted across the Project. This would provide 1.74 hedgerow units. The exact location of these hedgerows will be determined during detailed design, but will include along Crawters Brook and to the south of Car Park X. Subject to detailed design, over 1km of new hedgerow may be created between these two locations. It is also anticipated that there will be further planting around other car parking across the Gatwick estate.

4.4 Biodiversity Net Gain calculation

4.4.1 The total area of broad habitat types lost and gained as a result of the Project are provided in Annex 3 together with the value of these habitats based on the Defra metric.

4.4.2 The area of habitat impacted by the Project had a before development score of ~~343~~368~~.40~~ 19 habitat units. Post development, the same area scores ~~416~~441~~.77~~ 98 units, a net gain of **73.~~37~~ 80** units or ~~21~~20~~.37~~04**%.**

4.4.3 Pre development, the River Mole scored **4.20** watercourse units. Post development, the newly-created areas of the River Mole will deliver circa **4.90** watercourse units, a net gain of **0.70** watercourse units or **16.70%** (see Annex 1 Metric).

4.4.4 Pre development, the hedgerow baseline scored 1.57 units. Post development at least 222m of native species rich hedgerow will be planted pursuant to the oLEMP. This would provide 1.74 units. Therefore, the change would be 0.17 units or 10.94%.

4.5 Habitat Trading

4.5.1 It should be noted that in Annex 1 the calculation does not pass the habitat trading rules. These are set to prevent a net gain being delivered through the incorporation of large areas of low value habitat at the expense of higher value habitats. In the case of the Project, this is driven by the loss of woodland not being replaced.

4.5.2 During consultation with GAL's Safeguarding Team, it became clear that planting extensive areas of new woodland within the project would not be possible because of the nature of an operational airport and the requirements with respect to aircraft safeguarding. As such, every effort has been made to ensure that as much woodland planting is incorporated into the Project where it is safe to do so (principally along the highways improvements). However, like for like replacement has not been possible.

4.5.3 Notwithstanding this, the Project still delivers a substantial overall net gain with respect to biodiversity.

4.6 Note on relationship between Crawley Borough Council Policy CH6 and Biodiversity Net Gain

4.6.1 At I~~i~~ssue Specific Hearing 8 (ISH8), it was requested that details were provided of how the BNG described in this ~~annex~~statement related to the Crawley Borough Council Local Plan Policy CH6 on requirements for tree replacement. The policy requires applicants to submit a quantitative assessment of the number of trees lost to a development and then for those trees to be replaced, based on a calculation that recognises

the value of larger trees lost by requiring their replacement with a higher number of trees.

4.6.2 Full details of how the Project complies with CBC Policy CH6 ~~are~~ is set out in **ES Appendix 8.10.1: Tree Survey Report and Arboricultural Impact Assessment** ~~[ADD D6 REFS~~(Doc Ref. 5.3)~~]~~. This shows the Project will have a gain in tree numbers of circa 5,621 trees when considering the Project site as a whole.

~~4.5.3~~4.6.3 The ~~CH6~~ calculation against CBC Policy CH6 is not directly related to BNG since it uses tree numbers rather than a habitat area (in hectares). As such, ~~A~~although there is a net loss of woodland described in the BNG calculations, the Project is still predicted to lead to an overall gain in tree numbers.

5 References

Joint Nature Conservation Committee (JNCC) (2010). Handbook for Phase 1 habitat survey – a technique for environmental audit.

Natural England (2023) Technical Annex 1 – Condition Assessment Sheets and Methodology. Available online at https://publications.naturalengland.org.uk/publication/6049804846366720

The British Standards Institution (2021) BS 8683 - Process for designing and implementing Biodiversity Net Gain – Specification.

6 Glossary

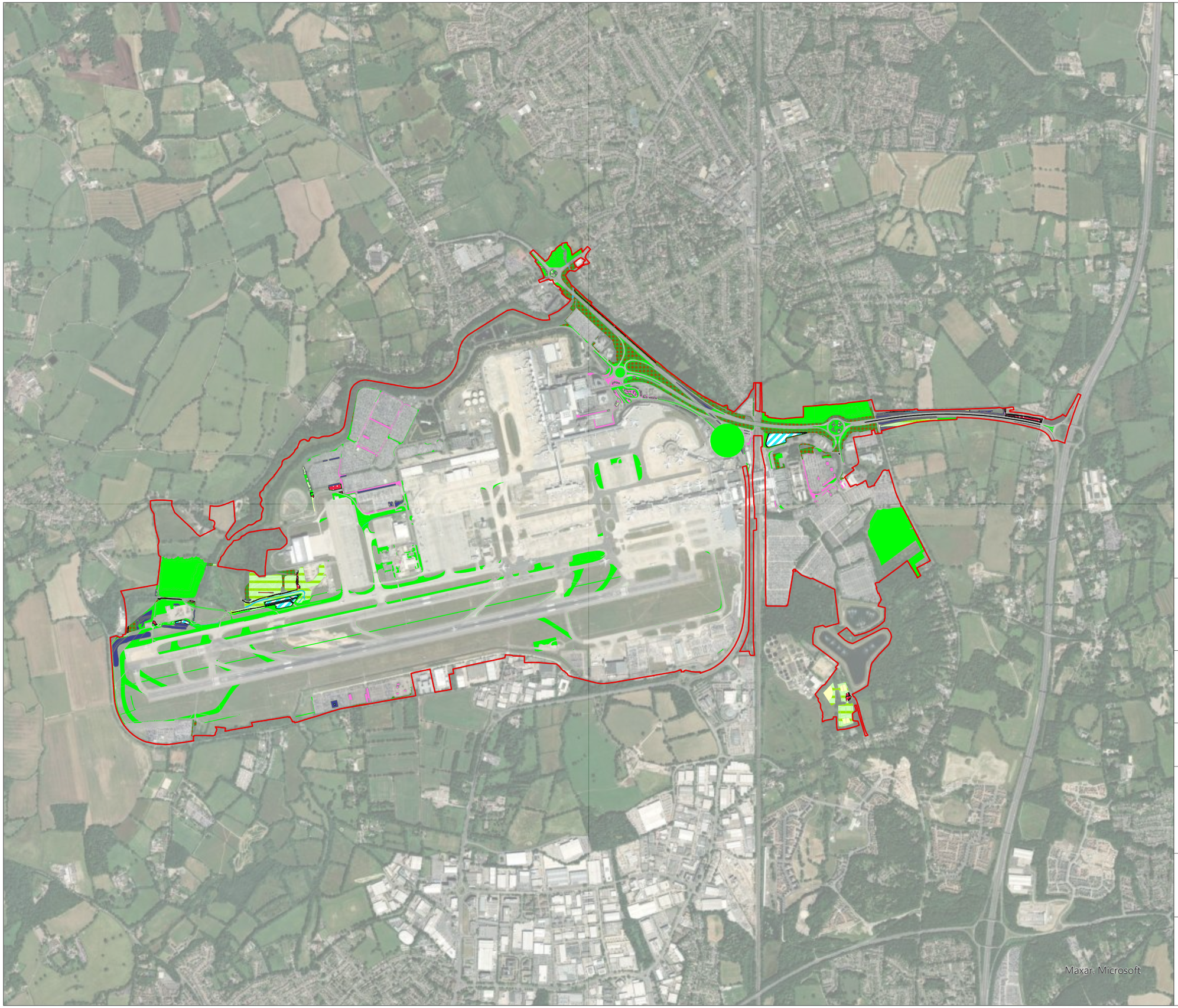
6.1 Glossary of terms

Table 6.1.1 Glossary of terms

Term	Description
BNG	Biodiversity Net Gain
CAA	Civil Aviation Authority
EIA	Environmental Impact Assessment
ES	Environmental Statement
LEMP	Landscape and Ecology Management Plan
LERL	Land East of the Railway

Annex 1

Defra Metric – Area Impacted



LONDON GATWICK

Legend

- Project Site Boundary
- Urban - Introduced shrub
- Sparsely vegetated land - Ruderal/ Ephemeral
- Grassland - Modified grassland
- Grassland - Other neutral grassland
- Heathland and shrub - Mixed scrub
- Woodland and forest - Other woodland; broadleaved
- Lakes - Ponds (non-priority habitat)
- Wetland - Reedbeds
- Urban - Built linear features
- Urban - Artificial unvegetated, unsealed surface
- Urban - Vacant or derelict land
- Watercourse footprint
- Other
- Individual trees - Urban tree

DOCUMENT

Environmental Statement

DRAWING TITLE

Habitats lost
2024-2029

DATE

June 2024

ORIENTATION	DRAWING NO.	REVISION
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LONDON GATWICK

Legend

- Project Site Boundary
- Grassland - Floodplain wetland mosaic and CFGM
- Grassland - Modified grassland
- Grassland - Other neutral grassland
- Heathland and shrub - Mixed scrub
- Individual trees - Urban tree
- Sparsely vegetated land - Ruderal/Ephemeral
- Urban - Artificial unvegetated, unsealed surface
- Urban - Ground level planters
- Urban - Open mosaic habitats on previously developed land
- Watercourse footprint
- Wetland - Reedbeds
- Woodland and forest - Other woodland; broadleaved

DOCUMENT

Environmental Statement

DRAWING TITLE

Habitats Created or Recreated 2024-2029

DATE

June 2024

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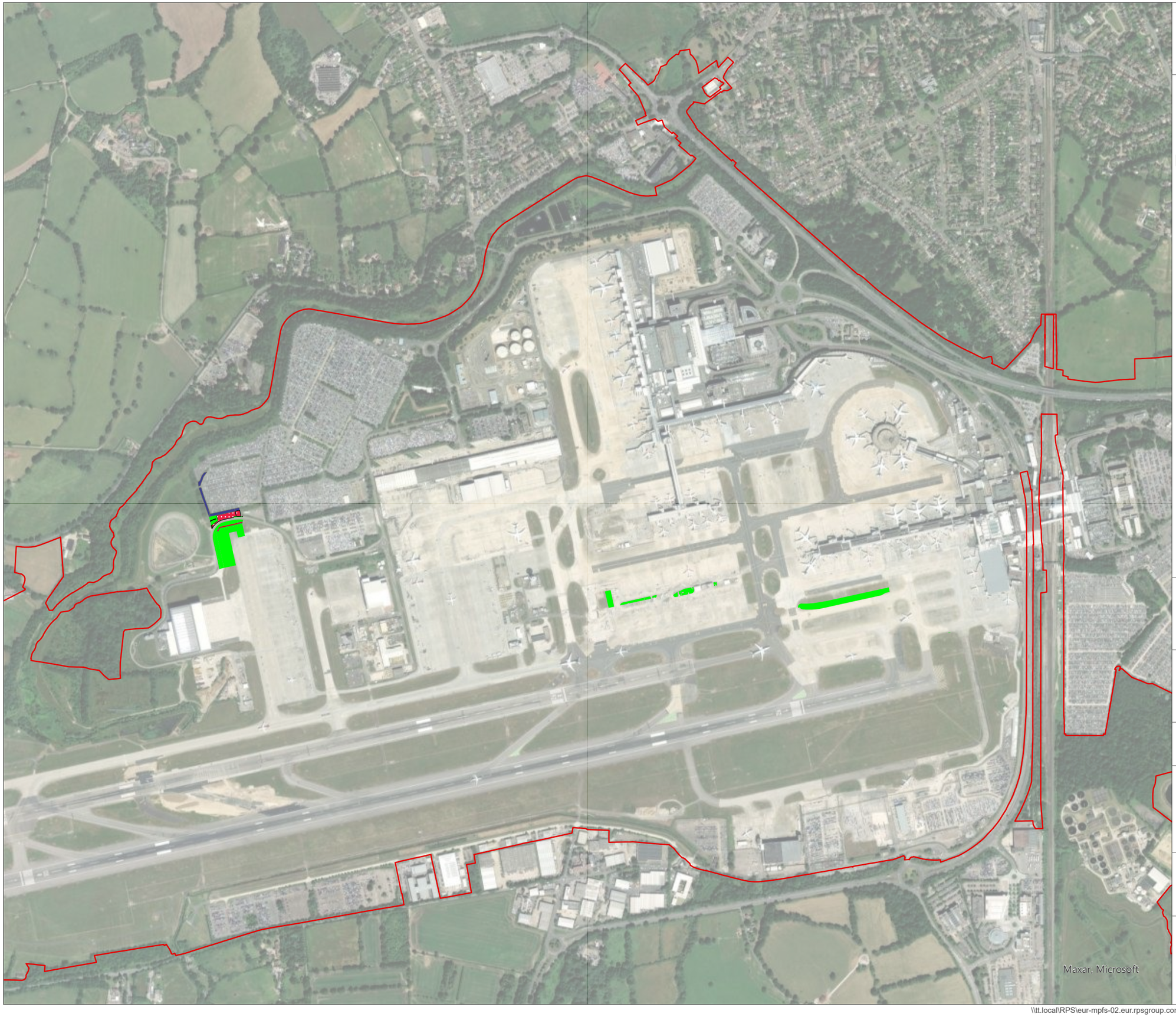

LONDON GATWICK

Legend

- Project Site Boundary
- Grassland - Modified grassland
- Heathland and shrub - Mixed scrub
- Urban - Built linear features
- Urban - Artificial unvegetated, unsealed surface

DOCUMENT

Environmental Statement

DRAWING TITLE

Habitats lost
2030-2032

DATE

June 2024

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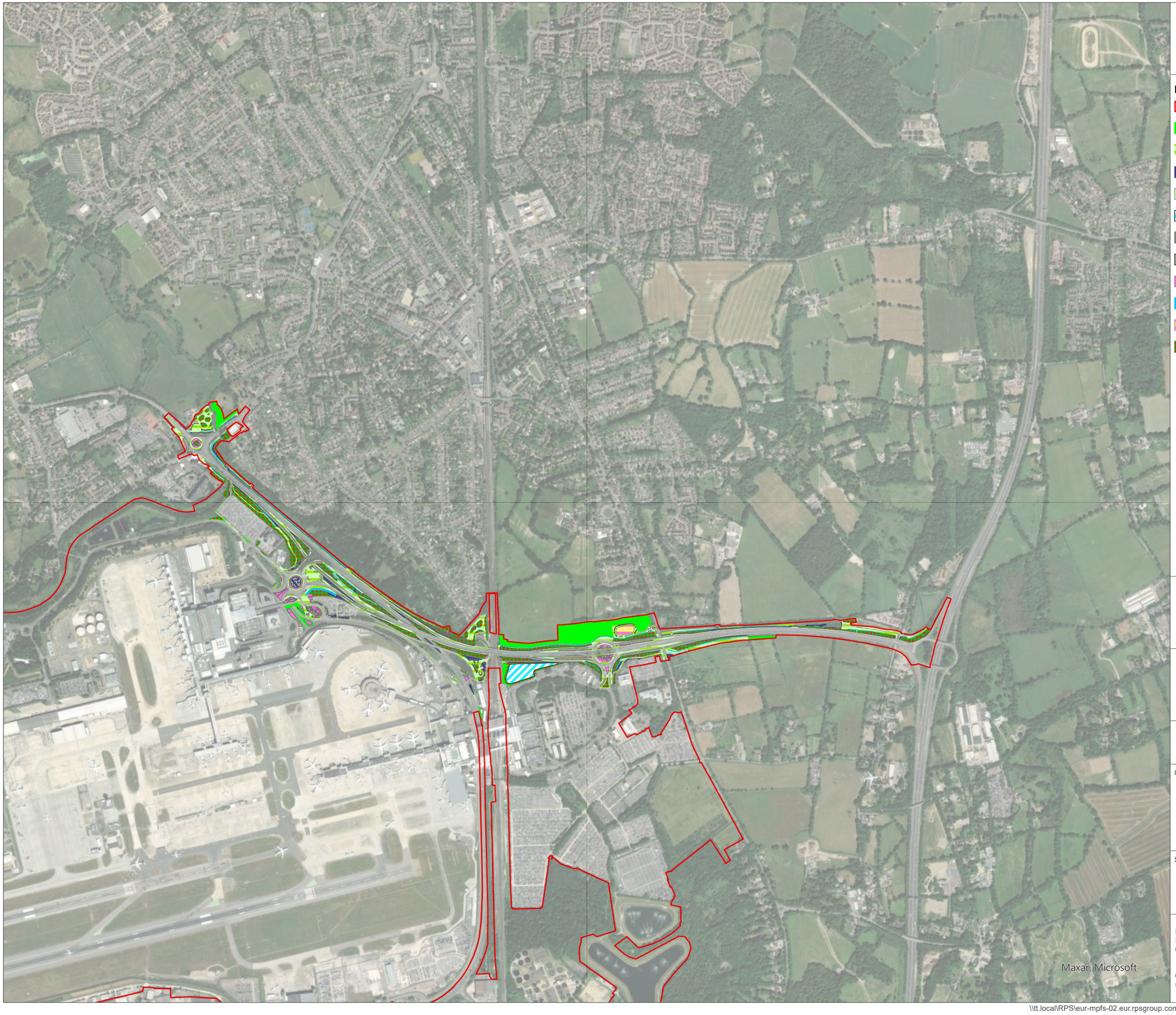

LONDON GATWICK

Legend

- Project Site Boundary
- Grassland - Modified grassland
- Grassland - Other neutral grassland
- Heathland and shrub - Mixed scrub
- Individual trees - Urban tree
- Lakes - Ponds (non-priority habitat)
- Railway with ephemeral/short perennial
- Sparsely vegetated land - Ruderal/Ephemeral
- Urban - Introduced shrub
- Watercourse footprint
- Wetland - Reedbeds
- Woodland and forest - Other woodland; broadleaved

DOCUMENT

Environmental Statement

DRAWING TITLE

Habitats Created or Recreated 2030-2032

DATE

June 2024

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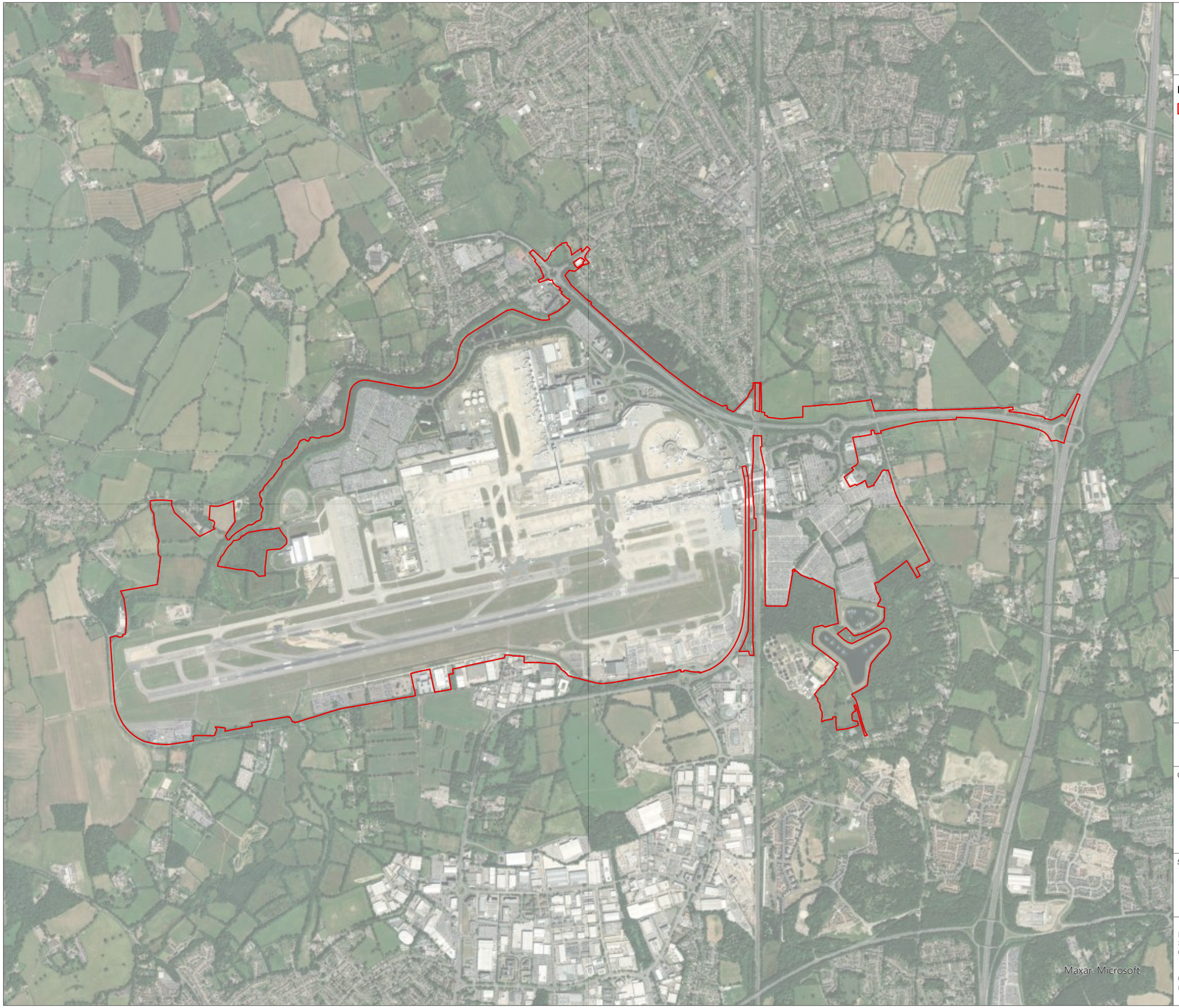

LONDON GATWICK

Legend

Project Site Boundary

DOCUMENT

Environmental Statement

DRAWING TITLE

Habitats lost
2033-2038

DATE

June 2024

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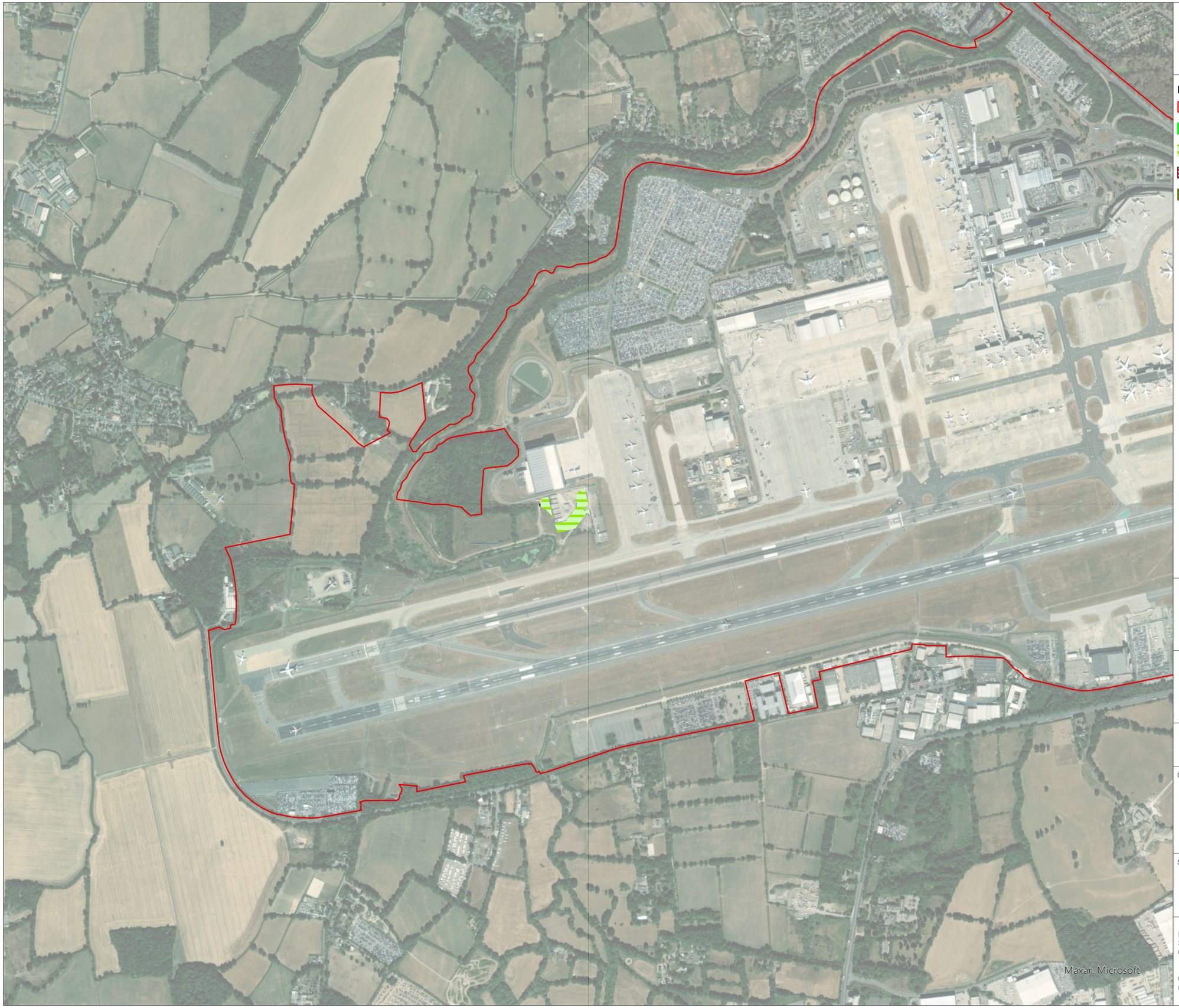

LONDON GATWICK

Legend

- Project Site Boundary
- Grassland - Modified grassland
- Grassland - Other neutral grassland
- Urban - Artificial unvegetated, unsealed surface
- Woodland and forest - Other woodland; broadleaved

DOCUMENT

Environmental Statement

DRAWING TITLE

Habitats Created or Recreated 2033-2038

DATE

June 2024

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Annex 2

River Mole and Gatwick Stream Condition Assessment

Thomson
environmental
consultants

River Condition Assessment

Gatwick Airport

For

RPS Ltd

Project No.: RPS001-022-001

February 2023

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Project Number	Report No.
RPS001-022-001	001

Revision No.	Date of Issue	Author	Reviewer	Approver
001		Alex Charlesworth	Joe Salkeld	Tessa Harding

Disclaimer:

Contents

1. Summary and Main Recommendations

1.1 Summary

1.1.1 Two watercourses, the River Mole and Gatwick Stream will be directly affected by proposals to expand operations at Gatwick airport. The scheme includes the creation of new flood attenuation areas within the River Mole flood plain to the north west of the airport and widening of the existing road crossings of the A23 London Road and Brighton Road over the River Mole. A new discharge point into the Gatwick Brook and discharge of treated effluent from a proposed new water treatment plant.

1.1.2 In line with future legislation and current planning policy, the development will be required to demonstrate that the proposals achieve biodiversity net gain, which includes a net gain for the river habitat on site. Thomson Environmental Consultants was commissioned to undertake a River Condition Assessment of the site comprising a Modular River Physical Habitat (MoRPH) survey and River Type Assessment.

1.1.3 The study area encompasses a 1.3km stretch of the River Mole south of Brockley Wood and a 1.5km stretch of the Gatwick Stream that runs through Riverside Park, Crawley.

1.1.4 The River Mole is assessed as a “Type H” river (i.e. a straight to sinuous river with sand/gravel substrate) in moderate condition with a score 0.62. This provides 1.84 river units per 100m. The Gatwick Stream is assessed as a “Type F” river (i.e. a straight to sinuous river with gravel/cobble substrate) in fairly poor condition with a score -0.16. This provides 1.38 river units per 100m.

1.1.5 Using the river condition assessment methodology it was determined that River Mole and Gatwick Stream will contribute 1.84 and 1.38 baseline river units respectively to the overall Biodiversity Net Gain site baseline calculation. The suggested action in the Biodiversity Metric 3.1 for increasing the score is to restore the existing channel.

1.1.6 The proposed expansion of Gatwick Airport will include re-meandering of an approximately 300m section of the River Mole immediately downstream of the runway culvert. This offers the opportunity to increase the river condition score for the River Mole thereby increasing the number of BNG units in the post development scenario.

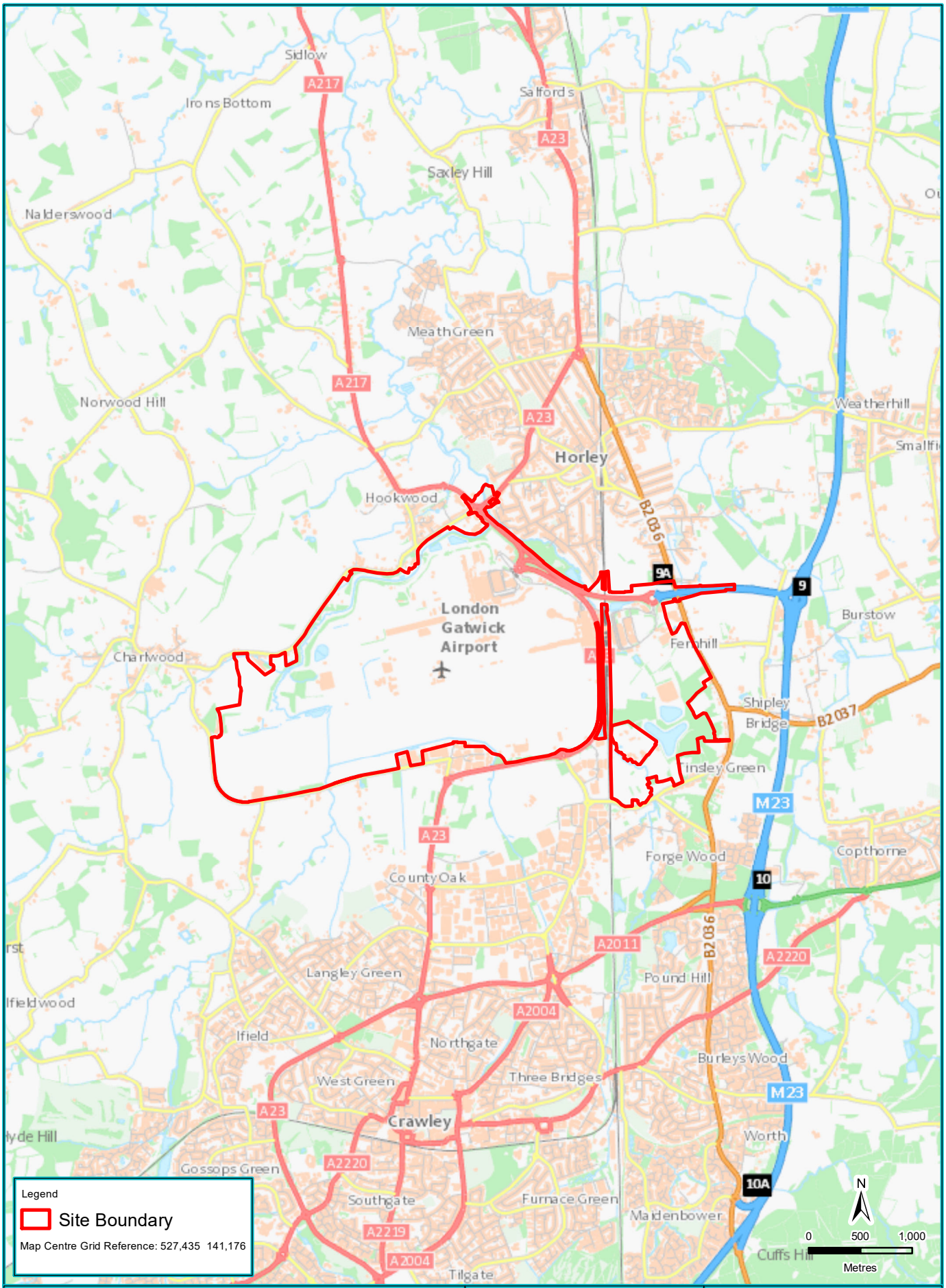
1.2 Main Recommendations

1.2.1 The design of the re-meandered section of the River Mole should aim to increase the number of positive indicators, such as by maximising the hydraulic diversity of the channel. Reducing the extent of invasive non-native species on the bank top and bank faces of the existing channel downstream of the diversion will help to reduce the number of negative indicators.

1.2.2 The following additional actions are suggested to increase the river units:

- Reduction in managed ground cover on bank tops around Gatwick Stream

- Reduction of artificial bank reinforcement on the Gatwick Stream
- Re-naturalise the bank profile of the River Mole
- Reduce siltation in both rivers using nature-based solutions.
- Post MoRPH assessment following completion of diversion design.



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		Date: 20/02/2023	Date: 20/02/2023

Thomson environmental consultants

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enquiries@thomsonec.com

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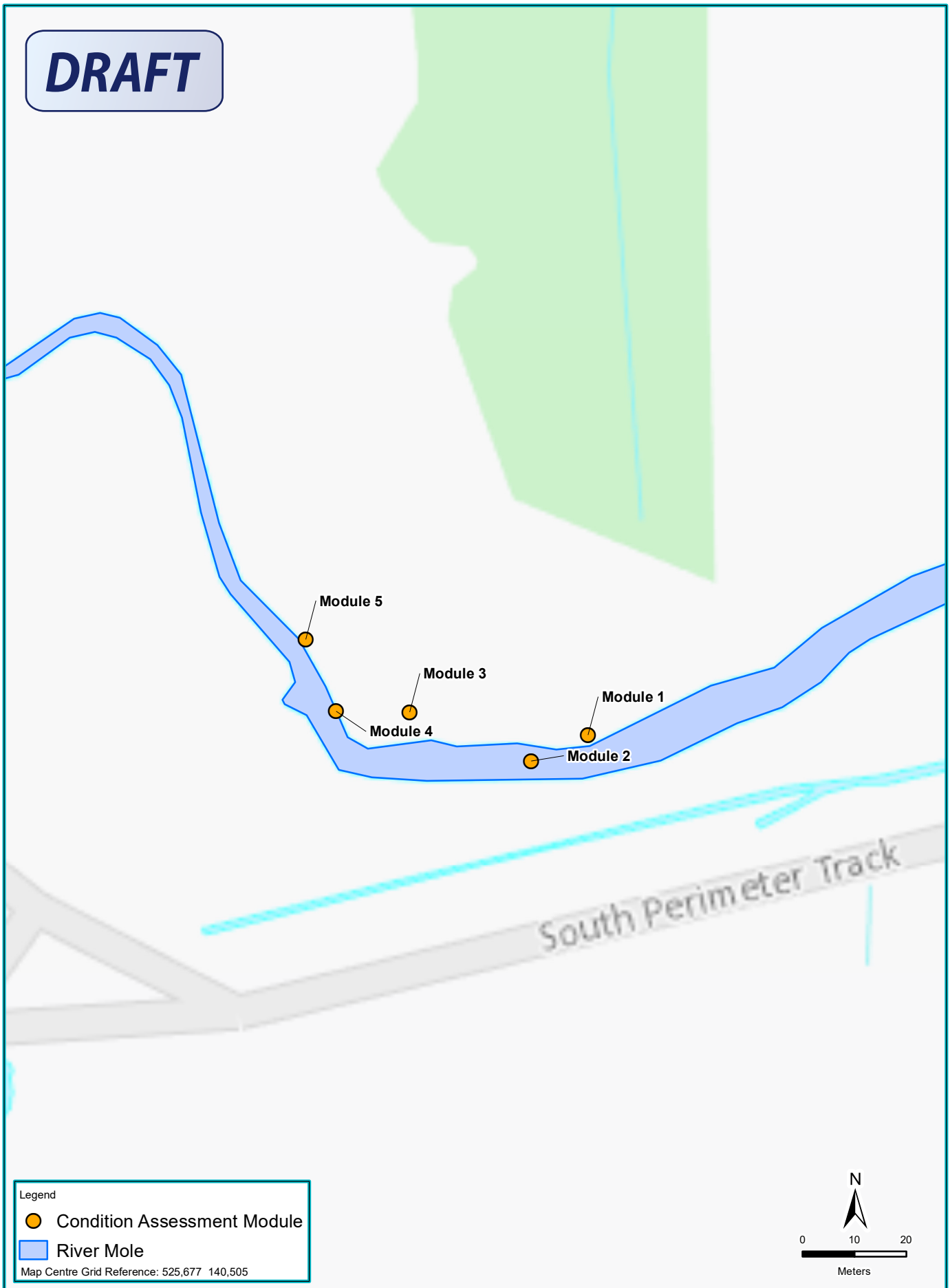

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- River Mole

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		Date: 25/01/2023	Date: 25/01/2023

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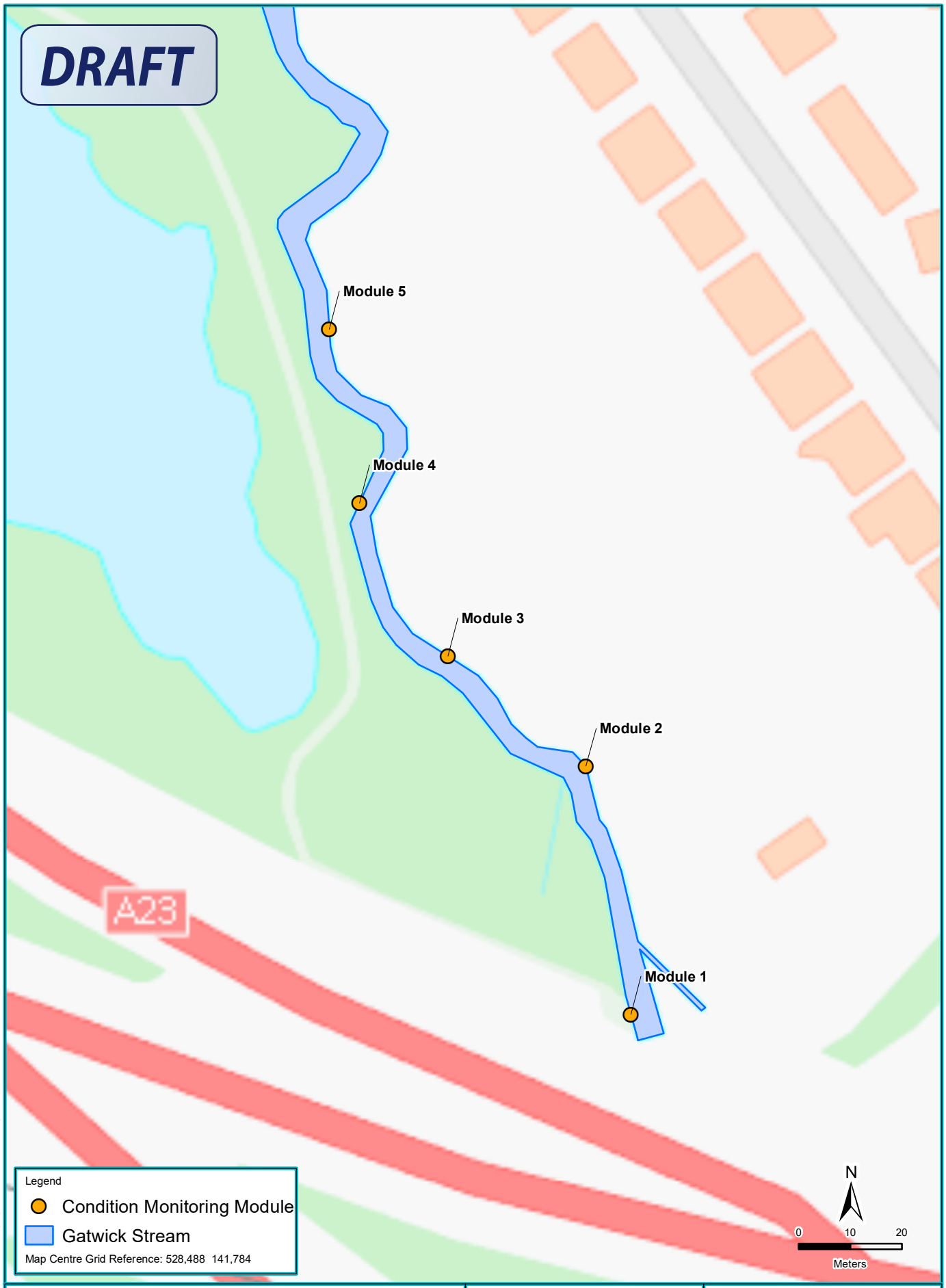

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Photograph 1:
Module 1

Photograph 2:
Module 2

Photograph 3:
Module 3

Photograph 4:
Module 4

Photograph 5:
Module 5

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Figure Title: Photographs of Gatwick Stream		Date: 27/06/2022	

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Module 1

Photograph 2:
Module 2

Photograph 3:
Module 3

Photograph 4:
Module 4

Photograph 5:
Module 5

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Figure Number: Figure 3b		Drawn: LG	Checked: JS
Figure Title: Photographs of River Mole		Date: 27/06/2022	

2. Introduction

2.1 Development Background

2.1.1 Two watercourses, the River Mole and Gatwick Stream will be directly affected by proposals to expand operations at Gatwick airport. The project proposes alterations to the existing northern runway, and development of a range of infrastructure and facilities to increase passenger numbers and aircraft movements. Specifically in relation to the watercourses the proposal includes:

- Creation of additional flood storage to the west of Gatwick Airport within the flood plain of the River Mole;
- Widening of the existing road crossings of the River Mole under the A23 Brighton Road and A23 London Road;
- Lengthening of the River Mole culvert beneath the northern runway;
- Construction of a new discharge point into the Gatwick Brook and discharge of treated effluent from a proposed new water treatment plant;
- An existing straightened section of the River Mole immediately north of the airport will be re-meandered.

2.1.1 The proposals described above are hereafter referred to collectively as “the proposed development”.

2.1.2 A 1.3km stretch of the River Mole south of Brockley Wood (TQ 25703 40486) will be affected by the creation of the additional flood storage and the river diversion. The flood storage area in Museum Field to the west of Gatwick Airport will connect to the River Mole via a new channel resulting in some loss of bank habitat. The new re-meandered section of the River Mole will be created off line and will not result in habitat loss from the existing channel with the exception of short sections of bank lowering at the up and downstream connection points. The re-meandered section is thus considered an enhancement.

2.1.3 The Gatwick Stream will be affected by the creation of an outfall from a new water treatment works treating run-off from the airport runways and aprons. The survey was undertaken on the reach of the Gatwick Stream which runs through Riverside Park (grid reference TQ 28507 41727).

2.2 Ecology Background

2.2.1 Macroinvertebrate and fish surveys were undertaken on both watercourses by Thomson Environmental Consultants in 2020. In addition to repeating fish and macroinvertebrate surveys RPS Ltd have requested that that a river condition assessment is undertaken to inform the biodiversity net gain assessment (BNG) relating to the riparian habitats bordering the site.

2.3 The Brief and Objectives

2.3.1 RPS Ltd commissioned Thomson Environmental Consultants on 22nd June 2022 to carry out a River Condition Assessment of the river on site. The brief was to:

- Carry out a Modular River Physical Habitat (MoRPH 5) Survey of the watercourses on site. Following the survey, use the data collected along with desk-based information (River Type Assessment) to undertake a River Condition Assessment (RCA). These will be undertaken by an accredited MoRPH surveyor.
- Provide a report detailing the methods and results of the MoRPH 5 survey and RCA. The report will include a discussion of the results in relation to the development proposals, including any legal implications and how these may be overcome, and recommendations for any remedial actions that should be undertaken.

2.4 Limitations

2.4.1 The reach of the Gatwick Stream surveyed for the river condition assessment lies downstream approximately 1.5km downstream of the connection point due to access constraints. However, due to the homogenous nature of the reach this is not considered to be a significant limitation to the results of the river condition assessment.

2.4.2 The Biodiversity Net Gain Metric 3.0 calculations are based on the development proposals to Thomson on 14th November 2022. Subsequent changes to the development proposals are likely to result in a requirement to recalculate the biodiversity units for the post-development condition.

2.5 Surveyors

2.5.1 The survey was carried out on 27th June 2022 by Aquatic Consultant, Alex Charlesworth MSc BSc (hons). Alex is a trained and accredited MoRPH surveyor.

3. Methodology

3.1 Modular River Physical Habitat (MoRPH) Survey

3.1.1 MoRPH is a survey technique which provides a sample of the physical character of the river reach within which it is located. Five contiguous MoRPH modules are combined to produce a MoRPH5 survey to record vegetation, sediment and morphological characteristics of short sub-reaches.

3.1.2 The length of modules used in MoRPH surveys vary with rivers of different sizes. The MoRPH River width is measured at a typical cross section within the sub-reach. The MoRPH River width is defined as the width of the water and any bare sediments, bars and areas of emergent aquatic plants at the water's edge. A single typical MoRPH river width, was selected to apply across all modules to ensure that all MoRPH modules were the same length. The appropriate module length for different sized rivers is given in Table 1.

Table 1: River module lengths for MoRPH surveys for a typical river width

MoRPH river width	Module length
<5m	10m
5 to <10m	20m
10 to <20m	30m
20 to <30m	40m
≥ 30m (or where channel bed is not visible)	50m

3.1.3 The MoRPH module survey is designed to characterise the river channel, banks (or generally steeper areas next to the active channel) and immediate bank tops (adjacent flatter areas) up to 10 m from the bank top edge. A 10 m distance from the bank top edge is chosen to enclose features (particularly vegetation) on the bank top that may provide habitat for river organisms or may act as a pressure on the river ecosystem.

3.1.4 For each river module, general information on the river was recorded, followed by the physical features and vegetation properties (both natural and human-modified) for each of the following:

- Bank top/floodplain (within 10 m of the bank top edge);
- Bank faces and channel edges; and
- Channel bed.

3.1.5 Where abundances were recorded the following scale was used, as shown in Table 2.

Table 2: Abundance scale used in MoRPH surveys

Scale	Percent cover
Absent (A)	0%
Trace (T)	<5%
Present (P)	5 - 33%
Extensive (E)	>33%

3.1.6 All data was collected following The MoRPH Survey Technical Reference Manual (Modular River Survey; 2020). Survey data was collected using the Modular River Surveys online survey forms and uploaded to the Thomson Environmental Consultants' Modular River Survey Cartographer workspace.

General Information

3.1.7 For each module the general information detailed below was recorded:

- River name
- Reach name
- Sub-reach name
- Module number
- Module length
- Grid reference - midpoint
- MoRPH river width (m)
- Bankfull width (m)
- Left bank height (m)
- Right bank height (m)
- Water width (m)
- Water depth (m)

Bank top/floodplain

3.1.8 For each module the following was recorded for the bank top/floodplain:

- Dominant and sub-dominant artificial ground cover[1] (type and abundance) for the left and right bank;
- Abundance of terrestrial vegetation types[2] on the left and right bank;
- Non-native invasive plant species (type and abundance) on the left and right bank; and
- Bank top water related features[3] (type and abundance) on the left and right bank.

Bank face/channel margin

3.1.9 For each module the following was recorded for the bank face and channel margin:

- Dominant and sub-dominant bank profile[4] (type and abundance) for the left and right bank;
- Sediment type[5] for the top 2/3 and bottom 1/3 of the bank face for the left and right bank;
- Extent (vertical and horizontal) of bank face reinforcement for the left and right banks;
- Dominant and sub-dominant bank reinforcement type[6];
- Natural physical features[7] (type, abundance and sediment size[8]) for the left and right banks;
- Artificial physical features[9] for the left and right banks;
- Abundance of terrestrial vegetation[10] on the bank face for the left and right banks;
- Abundance of aquatic vegetation[11] at the bank-water margin for the left and right banks; and
- Non-native invasive plant species (type and abundance) on the left and right bank faces.

[1] Pedestrianised footpath, transport infrastructure, buildings (commercial/industrial), buildings (residential), storage area, landfill area, arable agriculture/allotments, permanently vegetated agriculture, permanently vegetated recreation, plantation woodland, open water.
[2] Unvegetated (bare soil/rock), mosses/lichens, short/creeping herbs/grasses, tall herbs/grasses, scrub/shrubs, saplings/trees, fallen trees, leaning trees, j-shaped trees, tree/shrub branches tailing into channel, large wood, predominant tree type
[3] Pond – disconnected from river, pond – connected to river, side channel, wetland – short non-woody vegetation, wetland – tall non-woody vegetation, wetland – shrubs and trees.
[4] Vertical, vertical with overhang, undercut or vertical with undercut, vertical with toe, steep (>45º), gentle (<45º), composite, reshaped, artificial two-stage, embanked, set-bank embankment, poached bank
[5] Artificial, bedrock, boulder, cobble, gravel-pebble, sand, silt, clay, organic, peat, earth, not visible
[6] Concrete, concrete and brick, blocks or stone, brick/ laid stone/ block, sheet piling, wood piling, builders waste, rip-rap, gabions, willow spiling/faggot bundles, planted reeds, biotex/coir, washed out
[7] Bare unvegetated side bar, vegetated side bar, berm, bench, stable cliff, eroding cliff, toe, nest hole or animal burrows, marginal backwater, tributary junction/confluence (count)
[8] Unvegetated/vegetated side bar only
[9] Pipes/outfalls (count), Jetty/Deflector (major, intermediate, minor, absent
[10] Unvegetated (bare soil/rock), mosses/lichens, short/creeping herbs/grasses, tall herbs/grasses, scrub/shrubs, saplings/trees, fallen trees, leaning trees, j-shaped trees, tree/shrub branches tailing into channel, large wood, exposed tree roots, discrete organic accumulation
[11] Liverworts, mosses and lichens, emergent broad-leaved, emergent linear-leaved (inc. horsetails), amphibious, filamentous algae

Channel bed

3.1.10 For each module the following was recorded for the channel bed:

- Channel bed sediment size[12] (type and abundance);
- Channel bed reinforcement (extent and dominant/sub-dominant type[13]);
- Water surface flow patterns[14] (type and abundance);
- Channel bed natural physical features[15] (type and abundance);
- Channel bed artificial features[16] (type and abundance);
- Vegetation within the wetted channel[17] (type and abundance);
- Vegetation interacting with the wetted channel[18] (type and abundance); and
- Non-native invasive plant species (type and abundance).

3.2 River Type Assessment

3.2.1 The river reach was allocated to one of 13 river types (A to M). The 13 river types are defined primarily by their planform (e.g. straight, meandering or braided) and bed material, supported by the degree to which they are confined by their valley and also the valley gradient. The 13 types represent the range of near-natural river types likely to be encountered in England.

3.2.2 For the purposes of MoRPH rivers greater than 20m wide are considered to be 'large rivers' and are not surveyed using the methodology since it is considered that they will be too deep for their bed material to be assessed accurately. Canals and navigable rivers are also excluded since their modified nature prevents the assignment of an indicative 'near natural' type (Gurnell et al., 2020).

3.2.3 The river type for the reach within which the site is located was determined using an extended reach. The reach selected for analysis was long enough to determine its type robustly and was a

[12] Bedrock, boulder, cobble, gravel-pebble, sand, silt, clay, organic, peat, silt overlying coarser sediments (continuous or patchy).
[13] Concrete, concrete and brick, blocks or stone, brick/ laid stone/ block, sheet piling, wood piling, builders waste, rip-rap, gabions, willow spiling/faggot bundles, planted reeds, biotex/coir, washed out
[14] Free fall, chute, broken standing waves, unbroken standing waves, upwelling, rippled, smooth, no perceptible flow, dry
[15] Exposed bedrock, exposed unvegetated boulders/rocks, exposed vegetated boulders/rocks, unvegetated mid channel bar, vegetated mid channel bar, island, cascade, pool (count), riffle (count), step (count), waterfall (count)
[16] Large trash, weir (major, intermediate, minor – as count), bridge piers (count), bridge shadow (wide, intermediate, narrow), culvert (count)
[17] Unvegetated, liverworts, mosses, lichens, emergent broad-leaved, emergent linear-leaved, floating leaved (rooted), free floating, amphibious, submerged broad-leaved, submerged linear-leaved, submerged fine-leaved, filamentous algae, channel choked with plants (Y/N)
[18] Vegetation shading the channel, submerged tree roots, trees, shrubs, saplings growing on river bed, large wood in channel, organic material, large wood dam (count), fallen trees (count)

length which broadly showed a similar width and planform along its length and did not include large structures (dams) or large tributaries.

3.2.4 For rivers which will be one of the A – M river types the following information was recorded using maps and aerial images:

- A1 - Braiding index (BI)[19]
- A2 - Sinuosity index (SI)[20]
- A3 - Anabranching index (AI)[21]
- A4 - Level of confinement[22] (U, PC, C)[23]
- A5 - Valley gradient[24]
- A6 - Bedrock[25]
- A7 - Coarsest bed material size class[26]
- A8 - Average alluvial bed material size class[27]

3.2.5 The results for the values of each of the above indicators were entered into the Thomson EC workspace on the Cartographer data base and an indicative river type was generated.

3.3 River Condition Assessment

3.3.1 The river condition was assessed using 32 condition indicators that are automatically extracted from the MoRPH5 field surveys. Each river condition indicator was assigned a score of 0 to +4 (positive indicators[28]), or 0 to -4 (negative indicators[29]). Positive indicators represent diversity

[19] Average number of distinct flowing threads counted across 10 equally-spaced cross-sections of the river corridor. Reaches may be single thread (BI $\leq$1.1) or multithread (BI >1.1)
[20] For single thread rivers (BI $\leq$1.1). The ratio of the river reach length along the centre line divided by the length of the broad river or valley course. Reaches may be straight-sinuous (SI <1.5), or meandering (SI $\geq$ 1.5)
[21] Average number of distinct flowing channels separated by islands, counted across 10 equally-sapaced cross-sections.
[22] Proportion of the river reach's bank length that is in contact with the valley side slopes or ancient terraces.
[23] U = unconfined - <10% total river bank in contact, PC = partly confined 10 – 90% contact, C = confined - >90% contact.
[24] Difference in elevation between the start and end of the river reach divided by the length of the broad valley course.
[25] Recorded where bedrock is observed as 'extensive' (i.e. >33% cover) in at least 3 survey modules or is 'extensive' in 2 modules and 'present' (i.e. 5 to 33% cover) in the remaining 3 modules of the subreach.
[26] records the coarsest bed material size class that is observed as present or extensive in any module in the subreach.
[27] weighted average of the alluvial bed material size classes (i.e. excludes bedrock) recorded as present or extensive in all 5 modules within the subreach
[28] Bank top vegetation structure, bank top tree feature richness, bank top water related features, bank face riparian vegetation structure, bank face tree feature richness, bank face natural bank profile extent, bank face natural bank profile richness, bank face natural material richness, bank face bare sediment extent, channel margin aquatic vegetation extent, channel margin aquatic morphotype richness, channel margin physical feature extent, channel margin physical feature richness, channel aquatic morphotype richness, channel bed tree features richness, channel bed hydraulic features richness, channel bed natural features extent, channel bed natural features richness, channel bed material richness.
[29] Bank top NNIPS cover, Bank top managed ground cover, Bank face artificial bank profile extent, bank face reinforcement extent, bank face reinforcement material severity, bank face NNIPS cover, channel margin artificial

(richness) and abundance (extent) of physical habitats offered by vegetation, sediment, vegetation-sediment-related physical features and hydraulic habitats. Negative indicators represent the extent and severity of local human interventions or pressures.

3.3.2 The Preliminary Condition Score for each MoRPH5 sub-reach was calculated as the sum of the average of the positive condition indicator scores and the average of the negative condition indicator scores for the sub-reach.

3.3.3 The preliminary condition score for a MoRPH5 sub-reach is translated into a final condition score (5-Good, 4-Fairly Good, 3-Moderate, 2-Fairly Poor, 1-Poor) according to the river type under consideration. The boundaries for assigning a final condition score or class, based on the numerical preliminary condition scores are presented in Table 3. For example, a Type A river scoring 1.9 or above would be classed as 'Good'. A Type B river would need to score >2.2 to be classed as Good.

3.3.4 Once the score or class has been assigned the Biodiversity Metric 3.1 (Natural England, undated) calculator is used to derive the baseline river units, which contribute to the overall Biodiversity Net Gain for the site. The information used to derive the baseline river units is presented in Table 7. In addition to the river condition score, it includes habitat distinctiveness based on whether it is a priority habitat under Section 41 of the Natural Environment and Rural Communities Act 2006; its strategic significance, based on whether it is a main river in the river basin management plan; and whether the development will result in encroachment into the watercourse or riparian zone.

features, channel bed siltation, channel bed reinforcement extent, channel bed reinforcement severity, channel bed artificial features severity, channel bed NNIPS extent, channel bed filamentous algae extent

Table 3: Likely best and worst preliminary condition scores for each river type, and lower condition score threshold values.

River type	Canals / navigable	Large	A	B	C	D	E	F	G	H	I	J	K	L	M
Likely best average condition score	1.8	2.5	2.4	2.7	2.7	2.7	2.7	2.8	3.0	2.9	3.1	2.8	2.4	2.4	2.4
Lower threshold for 'Good'	>1.4	>2.0	>1.9	>2.2	>2.2	>2.2	>2.2	>2.3	>2.5	>2.4	>2.5	>2.3	>1.9	>1.9	>1.9
Lower threshold for 'Fairly Good'	>0.7	>1.3	>1.2	>1.4	>1.4	>1.4	>1.4	>1.5	>1.6	>1.6	>1.7	>1.5	>1.2	>1.2	>1.2
Lower threshold for 'Moderate'	>-0.1	>0.3	>0.2	>0.2	>0.2	>0.2	>0.2	>0.4	>0.5	>0.5	>0.6	>0.4	>0.2	>0.2	>0.2
Lower threshold for 'Fairly Poor'	>-1.2	>-1.0	>-1.0	>-0.9	>-0.9	>-0.9	>-0.9	>-0.9	>-0.9	>-0.9	>-0.8	>-0.9	>-1.0	>-1.0	>-1.0
Likely worst average condition score	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5

4. Results

4.1 River Mole MoRPH 5 Survey

4.1.1 The results of the MoRPH 5 surveys for the River Mole are presented in Appendix 1 (Tables 8 to 10). The locations of the modules surveyed are shown on Figure 2a and photographs on Figure 3.

4.1.2 The general information recorded for each module is shown in Table 4 below.

Table 4: General information recorded for River Mole

Module name and location					
River name	River Mole				
Location/Reach name	River Mole South of Brockley Wood				
Sub-reach name (used to reference a sub-reach of contiguous modules)	1				
Module length (m)	20m				
Grid reference - midpoint	TQ 25701 40490	TQ 25690 40483	TQ 25667 40492	TQ 25652 40492	TQ 25647 40505
River channel dimensions	**1**	**2**	**3**	**4**	**5**
MoRPH river width (m)	9	9	9	8	8
Bankfull width (m)	15	15	10	10	10
Left bank height (m)	0.85	0.85	0.2	0.3	0.2
Right bank height (m)	2	2	3	1.5	1.5
Water width (m)	9	9	9	8	8
Water depth (m)	1	1	1	1	1

4.1.3 The River Mole varies between 8 and 9m wide in the section surveyed and therefore does not qualify as a large river so can have a "Type Assessment" carried out. Both banks are relatively natural with no artificial ground cover recorded. A range of terrestrial vegetation was recorded along the survey section. An artificial bank face was recorded in only one module, comprising a two stage channel on the right bank in module 4. The invasive non-native species Himalayan balsam (*Impatiens glandulifera*) was recorded as 'extensive' on the left bank face in module 5 and, given that this is the most downstream module, is also likely present downstream of the survey section. The channel bed substrate ranged from gravel to silt with sand the predominant substrate.

4.2 River Mole River Type Assessment

4.2.1 The River Mole river type for the extended reach in which the site is located was assessed to be a "Type H" river . Type H is defined as 'a straight to sinuous river with sand/gravel substrate'.

4.3 River Mole River Condition Assessment

4.3.1 The full results of the RCA for each indicator type are presented in Table 6.

4.3.2 The preliminary RCA score was **0.62 (**Table 6**)**. As per Table 3 this gives a final river condition score for a Type H River of **Moderate.** The lower threshold for Fairly Good condition for Type H is 1.6.

4.3.3 Negative indicators recorded which affected the condition score include:

- The presence of non-native invasive plant species on the bank top and bank face; and
- Extent of artificial bank faces.

4.4 Gatwick Stream MoRPH 5 Survey

4.4.1 The results of the MoRPH 5 surveys for the Gatwick Stream are presented in Appendix 1 Tables 11 to 13. The locations of the modules surveyed are shown on Figure 2b and photographs on Figure 3.

The general information recorded for each module is shown in

4.4.2 Table 5.

Table 5: General information recorded for Gatwick Stream

Module name and location					
River name	Gatwick Stream				
Location/Reach name	Riverside Garden Park				
Sub-reach name (used to reference a sub-reach of contiguous modules)	1				
Module length (m)	20m				
Grid reference - midpoint	TQ 28520 41712	TQ 28508 41755	TQ 28482 41776	TQ 28469 41807	TQ 28457 41847
River channel dimensions	**1**	**2**	**3**	**4**	**5**
MoRPH river width (m)	8	8	7	7	7
Bankfull width (m)	8	8	8	8	8
Left bank height (m)	3	1	2	3	3
Right bank height (m)	3	3	2	3	3
Water width (m)	8	8	7	7	7
Water depth (m)	0.3	0.3	0.8	0.8	0.3

4.4.3 The Gatwick Stream flows along the northeast boundary of the airport before confluencing with the River Mole immediately east of the A23 Brighton Road/London Road junction. It is slightly narrower than the River Mole but considerably shallower with 3 of the modules only recording a depth of 30cm.

4.4.4 Given the location of the survey module within a public park, the surrounding land comprised artificial ground cover uses in all modules including playing field, buildings and footpaths.. Nevertheless, natural morphological bank features were noted including extensive stable earth cliffs on the bank face in modules 2, 3, 4 and 5, and leaning trees on the bank top in modules 1, 2 and 5. Himalayan balsam was observed along both banks. The channel bed was predominantly sand and gravel with occasional larger material.

4.5 Gatwick Stream River Type Assessment

4.5.1 The Gatwick Stream river type for the extended reach in which the site is located was assessed to be a “Type F” river. Type F is defined as 'a straight to sinuous river with gravel/cobble substrate’.

4.6 Gatwick Stream River Condition Assessment

4.6.1 The full results of the RCA for each indicator type are presented in Table 6.

4.6.2 The preliminary river condition assessment score was **-0.16 (**Table 6**)**. As per Table 3 this gives a final river condition score for a large river of **Fairly Poor.** The lower threshold for Moderate condition for Type F rivers is 0.4.

4.6.3 Negative indicators recorded which affected the condition score include:

- Managed ground cover;
- The presence of non-native invasive plant species on the bank;
- Siltation; and
- Channel bed artificial feature.

4.7 Baseline River Units

4.7.1 The baseline river units for the site calculated using the Biodiversity Metric 3.1 Calculation Tool is 1.84 river units per 100m of the river Mole and 1.38 river units per 100m of the Gatwick Stream, as shown in Table 7.

Table 6: River Condition Assessment for River Mole and Gatwick Stream

	Indicator type	River Mole Baseline Condition Score	Gatwick Stream Baseline Condition Score
Bank top	B1: Vegetation structure	2	3
	B2: Tree feature richness	2	2
	B3: Water related features	1	2
	B4: NNIPS cover	-1	-2
	B5: Managed ground cover	0	-4
Bank Face	C1: Riparian vegetation structure	1	2
	C2: Tree feature richness	1	1
	C3: Natural bank profile extent	2	2
	C4: Natural bank profile richness	4	3
	C5: Natural bank material richness	1	1
	C6: Bare sediment extent	2	1
	C7: Artificial bank profile extent	-3	0
	C8: Reinforcement extent	0	-2
	C9: Reinforcement material severity	0	-2
	C10: NNIPS cover	-3	-2
Channel - Water Margin	D1: Aquatic vegetation extent	2	0
	D2: Aquatic morphotype richness	2	0
	D3: Physical feature extent	1	2
	D4: Physical feature richness	1	1
	D5: Artificial features	0	-1
Channel Bed	E1: Aquatic morphotype richness	3	0
	E2: tree related features	0	1
	E3: Hydraulic feature richness	0	2
	E4: Natural features extent	0	2
	E5: Natural features richness	0	1
	E6: Material richness	3	3
	E7: Siltation	-2	-2
	E8: Reinforcement extent	0	-1
	E9: Reinforcement severity	0	-2
	E10: Artificial features severity	0	-4
	E11: NNIPS extent	0	0
	E12: Filamentous algae extent	-2	0
	Average of Positive Indicators	**1.47**	**1.52**
	Average of Negative Indicators	**-0.84**	**-1.69**
	Preliminary Condition Score	**0.62**	**-0.16**
	Final Condition Score	**Moderate**	**Fairly Poor**

Table 7: Baseline River Units

Existing river type		Habitat distinctiveness		Habitat condition		Strategic significance			Watercourse encroachment		Riparian encroachment		Suggested action	Ecological baseline
River type	Length KM	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic position multiplier	Extent of encroachment	Multiplier	Extent of encroachment	Multiplier		Total river units
Priority Habitat (River Mole)	0.1	V.High	8	Moderate	2	Within River Basin Management Plan	High strategic significance	1.15	No Encroachment	1	No Encroachment	1	Restore	1.84
Priority Habitat (Gatwick Stream)	0.1	V.High	8	Fairly Poor	1.5	Within River Basin Management Plan	High strategic significance	1.15	No Encroachment	1	No Encroachment	1	Restore	1.38

5. Legal and Planning Policy Considerations

5.1.1 The Environmental Bill became an act of parliament on 9th November 2021 making Biodiversity Net Gain (BNG) a mandatory requirement for new development. The requirement will also be incorporated into the forthcoming amendments to the Town & Country Planning Act 1990 to be enacted in England in 2023. A BNG baseline calculation has been undertaken using the Biodiversity Metric 3.1 calculator, and will subsequently be undertaken for the post development scenario with the updated 4.0 calculator.

5.1.2 Himalayan balsam is included on Part 2 of the Invasive Alien Species (Enforcement and Permitting) Order 2019 reinforcing existing offences under Schedule 9 of the Wildlife and Countryside Act 1981 to introduce or cause its spread in the wild.

6. Conclusions and recommendations

6.1 Conclusions

6.1.1 The River Mole was found to have a final condition score of Moderate and the Gatwick Stream of Fairly Poor. The final condition score is derived from the sum of the positive and negative indicators. The Gatwick Stream had a higher average for positive indicators (1.52) compared with the River Mole (1.47), but also a lower average for negative indicators (-1.69 compared with -0.84) giving a total of -016 compared with 1.62 for the River Mole. The lowest scoring indicators on the Gatwick Stream related to artificial ground cover on the bank top, due to the location of the survey reach within a public park, and artificial features on the channel bed. The presence of the invasive non-native species Himalayan balsam on the bank top, reinforcements to the bank face and bed, and siltation were also negative indicators.

6.1.2 The River Mole scored lower than the Gatwick Stream in relation to artificial bank profile extent due to the presence of an artificial two-stage channel in module 4, and non-native species on the bank face, but overall had greater natural bank profile richness, and less artificial reinforcement to the bank face and channel bed. To increase river condition scores, it will be necessary to either remove or reduce the extent of features which give rise to negative indicators, such as bank and channel reinforcements and invasive non-native species, or increase the positive indicators.

6.1.3 Using the river condition assessment methodology it was determined that River Mole and Gatwick Stream will contribute 1.84 and 1.38 baseline river units respectively to the overall Biodiversity Net Gain site baseline calculation. The suggested action in the Biodiversity Metric 3.1 for increasing the score is to restore the existing channel.

6.1.4 The proposed expansion of Gatwick Airport will include re-meandering of an approximately 300m section of the River Mole immediately downstream of the runway culvert. This offers the opportunity to increase the river condition score for the River Mole thereby increasing the number of BNG units in the post development scenario.

6.2 Recommendations

6.2.1 The design of the re-meandered section of the River Mole should aim to increase the number of positive indicators. The diversion will have a two stage profile with a central narrow channel to increase flow velocities during low flow condition. A marginal berm will be created on alternate sides of the channel to create a central meandering course. The marginal berm will be flooded during high flow conditions and will be colonised by reeds and other emergent and bankside species. Introducing features such as pools and riffles into the new channel course will increase hydraulic feature richness, for which the River Mole currently scores 0.

6.2.2 Introducing measures to reduce siltation would improve condition scores for both watercourses. Silt interceptors should be incorporated into river outfalls, such as from car park X into the R Mole, and the new treatment works on the Gatwick Stream. Ideally, these should use nature-based solutions such as reed beds.

6.2.3 Reducing the extent of invasive non-native species on the bank top and bank faces of the existing channel downstream of the diversion will help to reduce the number of negative indicators.

6.2.4 Once the design of the diversion is finalised the post development MoRPH assessment should be undertaken.

7. References

7.1.1 Gurnell, England, Scott, Shuker (2020) A Guide to Assessing River Condition – Part of the Rivers and Streams Component of the Biodiversity Net Gain Metric.

7.1.2 Modular River Survey (2020) The MoRPH Survey Technical Reference Manual

7.1.3 Natural England (undated) The Biodiversity Metric 3.1 auditing and accounting for biodiversity. Calculation Tool. ISBN 978-1-78354-953-5

Appendix 1 MoRPH Results

Table 8: Bank top/floodplain data recorded for each module River Mole

Bank top - Artificial/managed ground cover											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Artificial ground cover	Dominant type	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
	Sub-dominant type	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Bank top - Natural/lightly managed ground cover											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Terrestrial vegetation	Unvegetated (bare soil/rock)	T	P	P	A	T	T	P	T	E	T
	Mosses/lichens	A	A	A	A	A	A	A	A	A	A
	Short/creeping herbs/grasses	T	T	A	A	A	A	T	A	T	T
	Tall herbs/grasses	E	P	T	T	P	T	P	P	P	P
	Scrub/shrubs	E	E	E	E	A	E	T	P	A	T
	Saplings/trees	A	T	P	P	P	P	T	A	P	P
	Fallen trees	A	A	A	A	A	A	A	A	A	A
	Leaning trees	A	A	A	A	A	T	A	A	A	A
	J-shaped trees	A	A	A	A	A	A	A	A	A	A
	Tree/shrub branches trailing into channel	P	T	T	P	T	T	T	T	P	T

		Bank top - Natural/lightly managed ground cover									
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
	Large wood	A	A	A	A	A	A	A	A	A	A
	Predominant tree type	A	Deciduous	A	Deciduous	Deciduous	Deciduous	A	Deciduous	Deciduous	Deciduous
Non-native invasive plant species	Himalayan balsam	A	A	A	A	A	A	T	A	A	A
	Japanese knotweed	A	A	A	A	A	A	A	A	A	A
	Giant hogweed	A	A	A	A	A	A	A	A	A	A
	Floating pennywort	A	A	A	A	A	A	A	A	A	A
	Other	A	A	A	A	A	A	A	A	A	A

Bank top - Water related features											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Pond	Disconnected from river at the time of the survey	A	A	A	A	A	A	A	A	A	A
	Connected to river by water-filled channel at time of the survey	A	A	A	A	A	A	A	A	A	A
Side channel		A	A	A	A	A	A	A	A	A	A
Wetland	Short non-woody vegetation	A	A	A	A	A	A	A	A	A	A
	Tall, non-woody vegetation	T	A	T	A	A	A	A	A	A	A
	Shrubs and trees	A	A	A	A	A	A	A	A	A	A

Table 9: Bank face/channel margin data recorded for each module River Mole

Bank face - Profile											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Natural/artificial bank profile	Dominant type	Vertical (E)	Set-Back Embankment (E)	Gentle (E)	Embanked (E)	Vertical (E)	Set-Back Embankment (E)	Vertical (E)	Artificial Two Stage (E)	Vertical (E)	Vertical (E)
	Sub-dominant type	Vertical with Toe (P)	Vertical with Undercut (P)	Gentle (P)	Vertical with Toe (P)	Gentle (P)	Vertical (E)	Gentle (P)	Artificial two stage	A	A
Bank face - sediment type	Top 2/3 of bank	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Artificial	Earth
	Bottom 1/3 of bank	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth
Bank face - Reinforcement	Which part of the bank is reinforced	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
	Horizontal extent of reinforcement in module	A	A	A	A	A	A	A	A	A	A
	Dominant type	A	A	A	A	A	A	A	A	A	A
	Sub-dominant type	A	A	A	A	A	A	A	A	A	A
Natural Physical Features											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Unvegetated Side Bar		A	A	A	A	A	A	A	A	A	A
Vegetated Side Bar		A	A	A	A	A	A	A	A	A	A
Berm		A	A	A	A	A	A	A	A	A	A
Bench		A	A	A	A	A	A	A	A	A	A

Natural Physical Features										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	LB	RB	LB	RB	LB
Stable Cliff	P	A	A	A	A	E	A	P	A	E
Eroding Cliff	A	A	A	A	A	A	A	A	A	A
Toe	T	A	A	P	A	A	A	A	A	A
Animal Burrows	A	A	A	A	A	A	A	A	A	A
Marginal Backwater	A	A	A	A	A	A	A	A	A	A
Tributary Confluence	0	0	0	0	0	0	0	0	0	0
Artificial Physical Features										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Pipes/Outfalls	0	0	0	0	0	0	0	0	0	0
Jetty	0	0	0	0	0	0	0	0	0	0
Deflector	0	0	0	0	0	0	0	0	0	0
Terrestrial Vegetation										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Unvegetated (bare soil/rock)	T	P	P	P	A	P	A	T	T	T
Mosses/lichens	A	A	A	A	A	A	A	A	A	A
Short/creeping herbs/grasses	A	A	A	A	A	A	A	A	T	A

Terrestrial Vegetation										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	LB	RB	LB	RB	LB
Tall herbs/grasses	T	T	T	T	T	T	P	T	E	E
Scrub/shrubs	A	A	A	E	A	E	A	P	A	P
Saplings/trees	A	A	A	T	A	T	A	A	A	A
Fallen trees	A	A	A	A	A	A	A	A	A	A
Leaning trees	A	A	A	A	A	T	A	A	A	A
J-shaped trees	A	A	A	A	A	A	A	A	A	A
Tree/shrub branches trailing into channel	P	T	T	P	P	P	P	T	P	T
Large wood	A	A	A	A	A	A	A	A	A	A
Exposed tree roots	A	A	A	A	A	A	A	A	A	A
Discrete organic accumulations	A	A	A	A	A	A	A	A	A	A
Vegetation at water margin										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Liverworts, mosses, lichens	A	A	A	A	A	A	A	A	A	A
Emergent broadleaved	A	A	P	A	P	A	P	A	P	P
Emergent reeds/linear leaved	T	T	P	A	P	A	P	A	P	P
Amphibious	A	A	A	A	A	A	A	A	A	A
Filamentous algae	E	E	T	T	T	T	T	T	A	A

Vegetation at water margin										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Himalayan balsam	A	A	A	A	A	A	A	T	E	A
Japanese knotweed	A	A	A	A	A	A	A	A	A	A
Giant hogweed	A	A	A	A	A	A	A	A	A	A
Floating pennywort	A	A	A	A	A	A	A	A	A	A
Other	A	A	A	A	A	A	A	A	A	A

Table 10: Channel bed data recorded for each module River Mole

Channel bed material					
	1	2	3	4	5
Bedrock Abundance	A	A	A	A	A
Boulder Abundance	A	A	A	A	A
Cobble Abundance	A	A	A	A	A
Gravel-Pebble Abundance	P	P	P	P	P
Sand Abundance	P	P	P	P	P
Silt (and Finer Non-Sticky Particles) Abundance	P	P	E	P	E
Clay Abundance	A	A	A	A	A
Organic Abundance	T	A	A	A	A
Peat Abundance	A	A	A	A	A

Channel bed material					
	1	2	3	4	5
Continuous Silt Layer Abundance	P	P	P	P	P
Patchy Thin Silt Layer Abundance	A	A	A	A	A
Channel bed reinforcement	A	A	A	A	A
Surface flow type					
	1	**2**	**3**	**4**	**5**
Free fall	A	A	A	A	A
Chute	A	A	A	A	A
Broken standing waves	A	A	A	A	A
Unbroken standing waves	A	A	A	A	A
Upwelling	A	A	A	A	A
Rippled	A	A	A	A	A
Smooth	E	E	E	E	E
No perceptible flow	A	A	A	A	A
Dry	A	A	A	A	A
Natural Physical Features					
	1	**2**	**3**	**4**	**5**
Exposed bedrock	A	A	A	A	A
Unvegetated rocks	A	A	A	A	A
Vegetated rocks	A	A	A	A	A

Natural Physical Features					
	1	2	3	4	5
Unvegetated mid-channel bar	A	A	A	A	A
Vegetated mid-channel bar	A	A	A	A	A
Island	A	A	A	A	A
Cascade	A	A	A	A	A
Pool	0	0	0	0	0
Riffle	0	0	0	0	0
Step	0	0	0	0	0
Waterfall	0	0	0	0	0
Artificial Physical Features					
	1	**2**	**3**	**4**	**5**
Large trash	A	A	A	A	A
Major weir	0	0	0	0	0
Intermediate weir	0	0	0	0	0
Minor weir	0	0	0	0	0
Bridge piers in river bed	0	0	0	0	0
Bridge shadow	0	0	0	0	0
Culvert	0	0	0	0	0

In Channel Vegetation					
	1	**2**	**3**	**4**	**5**
Unvegetated	T	A	A	A	A
Liverworts, mosses, lichens	E	A	P	P	P
Emergent broadleaved	T	T	P	P	E
Emergent reeds/linear leaved	T	P	P	P	E
Floating Leaved (Rooted) Abundance	P	E	P	T	P
Free-Floating Abundance	A	E	T	E	E
Amphibious Abundance	A	A	A	A	A
Submerged broadleaved	A	P	P	T	P
Submerged linear leaved	A	A	A	A	A
Submerged fine leaved	A	A	A	A	A
Filamentous algae	E	A	A	A	A
Channel choked with plants	No	No	Yes	Yes	Yes
Vegetation Interacting with Channel					
	1	**2**	**3**	**4**	**5**
Shading	A	A	T	T	T
Submerged tree roots	A	A	A	A	A
Trees, shrubs, saplings growing on channel bed	A	A	A	A	A
Large wood	A	A	A	A	A
Discrete organic accumulation	A	A	A	A	A

Vegetation Interacting with Channel					
	1	2	3	4	5
Large wood dam	0	0	0	0	0
Fallen tree	0	0	0	0	0
Himalayan balsam	A	A	A	A	A
Japanese knotweed	A	A	A	A	A
Giant hogweed	A	A	A	A	A
Floating pennywort	A	A	A	A	A
Other	A	A	A	A	A

Table 11: Bank top/floodplain data recorded for each module Gatwick Stream

Bank top - Artificial/managed ground cover											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Artificial ground cover	Dominant type	Permanently vegetated recreation (e.g. playing fields) Extensive	Buildings (residential) Extensive	Permanently vegetated recreation (e.g. playing fields) Extensive	Buildings (residential) Extensive	Permanently vegetated recreation (e.g. playing fields) Extensive	Buildings (residential) Extensive	Pedestrianised, footpath Extensive	Buildings (residential) Extensive	Pedestrianised, footpath Extensive	Buildings (residential) Extensive
	Sub-dominant type	Plantation woodland Extensive	Plantation woodland Present	Plantation woodland Extensive	Plantation woodland Present	Plantation woodland Extensive	Absent	Absent	Absent	Permanently vegetated recreation (e.g. playing fields) Present	Absent
Bank top - Natural/lightly managed ground cover											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Terrestrial vegetation	Unvegetated (bare soil/rock)	T	A	T	T	A	A	E	T	P	T
	Mosses/lichens	T	T	T	T	A	A	A	A	A	A
	Short/creeping herbs/grasses	P	A	P	P	T	P	P	T	T	T
	Tall herbs/grasses	P	T	T	P	E	E	E	E	P	P
	Scrub/shrubs	A	P	E	E	P	P	A	T	P	P
	Saplings/trees	P	P	P	P	P	T	T	T	A	A
	Fallen trees	A	A	A	A	A	A	A	T	A	A
	Leaning trees	T	A	T	T	A	A	A	T	A	A
	J-shaped trees	A	A	A	A	A	A	A	A	A	A

	Bank top - Natural/lightly managed ground cover										
		1		**2**		**3**		**4**		**5**	
		LB	RB	LB	RB	LB	LB	RB	LB	RB	LB
	Tree/shrub branches trailing into channel	P	T	P	P	P	P	T	P	T	T
	Large wood	A	A	A	A	A	A	A	A	A	A
	Predominant tree type	Deciduous	Deciduous	Deciduous	Deciduous	Deciduous	Deciduous	Deciduous	Deciduous	Deciduous	Deciduous
Non-native invasive plant species	Himalayan balsam	A	A	P	A	T	P	A	P	A	A
	Japanese knotweed	A	A	A	A	A	A	A	A	A	A
	Giant hogweed	A	A	A	A	A	A	A	A	A	A
	Floating pennywort	A	A	A	A	A	A	A	A	A	A
	Other	A	A	A	A	A	A	A	A	A	A
Bank top - Water related features											
		1		**2**		**3**		**4**		**5**	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Pond	Disconnected from river at the time of the survey	A	A	A	A	A	A	E	A	E	A
	Connected to river by water-filled channel at time of the survey	A	A	A	A	A	A	A	A	A	A
Side channel		A	A	A	A	A	A	A	A	A	A
Wetland	Short non-woody vegetation	A	A	A	A	A	A	A	A	A	A

	Bank top - Water related features									
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Tall, non-woody vegetation	A	A	A	A	A	A	A	A	A	A
Shrubs and trees	A	A	A	A	A	A	A	A	A	A

Table 12: Bank face/channel margin data recorded for each module, Gatwick Stream

Bank face - Profile											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Natural/artificial bank profile	Dominant type	Steep (E)	Steep (E)	Vertical (E)	Steep (E)	Vertical (E)	Steep (E)	Vertical (E)	Vertical (E)	Vertical (E)	Vertical (E)
	Sub-dominant type	Vertical (E)	Vertical (E)	Steep (E)	Vertical (E)	Steep (E)	Vertical (E)	Undercut or vertical with undercut	A	Steep (E)	Steep (E)
Bank face - sediment type	Top 2/3 of bank	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Artificial	Earth
	Bottom 1/3 of bank	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth
Bank face - Reinforcement	Which part of the bank is reinforced	Whole	Whole	Absent	Absent	Absent	Top	Absent	Absent	Absent	Absent
	Horizontal extent of reinforcement in module	P	P	A	A	A	T	A	A	A	A
	Dominant type	Concrete and brick/laid stone (cemented)	Concrete	A	A	Wood piling/panels	A	A	A	A	A
	Sub-dominant type	Concrete	Concrete	A	A	A	A	A	A	A	A
Natural Physical Features											
		1		2		3		4		5	
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Unvegetated Side Bar		A	A	A	A	A	A	A	A	A	A
Vegetated Side Bar		A	A	A	A	A	A	A	A	A	A
Berm		A	A	A	A	A	A	A	A	A	A
Bench		A	A	A	A	A	A	A	A	A	A

Natural Physical Features										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Stable Cliff	P	P	E	P	E	P	E	E	E	E
Eroding Cliff	A	A	A	A	A	A	A	A	A	A
Toe	A	A	A	A	A	A	A	A	A	A
Animal Burrows	A	A	A	A	A	A	A	A	A	A
Marginal Backwater	A	A	A	A	A	A	A	A	A	A
Tributary Confluence	0	0	0	0	0	0	0	0	0	0
Artificial Physical Features										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Pipes/Outfalls	0	1	0	0	0	0	0	0	0	0
Jetty	0	0	0	0	0	0	0	0	0	0
Deflector	0	0	0	0	0	0	0	0	0	0
Terrestrial Vegetation										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Unvegetated (bare soil/rock)	P	P	T	T	A	A	T	T	P	T
Mosses/lichens	T	T	T	T	A	A	T	T	A	A
Short/creeping herbs/grasses	A	A	T	P	A	A	A	A	T	T

Terrestrial Vegetation										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Tall herbs/grasses	A	T	P	P	P	P	E	P	P	P
Scrub/shrubs	A	T	P	P	T	T	A	A	A	A
Saplings/trees	T	T	T	T	T	A	A	A	A	A
Fallen trees	A	A	A	A	A	A	A	A	A	A
Leaning trees	T	A	T	A	T	A	A	A	A	A
J-shaped trees	A	A	A	A	A	A	A	A	A	A
Tree/shrub branches trailing into channel	T	T	P	P	P	P	P	P	T	T
Large wood	A	A	A	A	A	A	A	A	A	A
Exposed tree roots	T	T	T	T	T	A	A	A	A	T
Discrete organic accumulations	A	A	A	A	A	A	A	A	A	A
Vegetation at water margin										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Liverworts, mosses, lichens	A	A	A	A	A	A	A	A	A	A
Emergent broadleaved	A	A	A	A	A	A	A	A	A	A
Emergent reeds/linear leaved	A	A	A	A	A	A	A	A	A	A
Amphibious	A	A	A	A	A	A	A	A	A	A
Filamentous algae	A	A	A	A	A	A	A	A	A	A

Vegetation at water margin										
	1		2		3		4		5	
	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Himalayan balsam	A	A	A	A	A	T	P	P	A	A
Japanese knotweed	A	A	A	A	A	A	A	A	A	A
Giant hogweed	A	A	A	A	A	A	A	A	A	A
Floating pennywort	A	A	A	A	A	A	A	A	A	A
Other	A	A	A	A	A	A	A	A	A	A

Table 13: Channel bed data recorded for each module, Gatwick Stream

Channel bed material					
	1	2	3	4	5
Bedrock Abundance	A	A	A	A	A
Boulder Abundance	A	A	T	A	A
Cobble Abundance	T	T	A	A	T
Gravel-Pebble Abundance	E	E	P	P	E
Sand Abundance	T	E	P	E	E
Silt (and Finer Non-Sticky Particles) Abundance	A	T	E	E	T
Clay Abundance	A	A	A	A	A
Organic Abundance	A	A	A	A	A
Peat Abundance	A	A	A	A	A

Channel bed material					
	1	2	3	4	5
Continuous Silt Layer Abundance	A	T	E	P	T
Patchy Thin Silt Layer Abundance	A	A	A	A	A
Channel bed reinforcement	T	A	A	A	A
Surface flow type					
Surface flow type	**1**	**2**	**3**	**4**	**5**
Free fall	T	A	A	A	A
Chute	A	A	A	A	A
Broken standing waves	A	A	A	A	A
Unbroken standing waves	T	A	A	A	P
Upwelling	A	A	A	A	A
Rippled	E	E	T	A	E
Smooth	A	E	E	E	P
No perceptible flow	A	A	A	A	A
Dry	A	A	A	A	A
Natural Physical Features					
	1	**2**	**3**	**4**	**5**
Exposed bedrock	A	A	A	A	A
Unvegetated rocks	A	A	A	A	A
Vegetated rocks	A	A	A	A	A

Natural Physical Features					
	1	2	3	4	5
Unvegetated mid-channel bar	A	A	A	A	A
Vegetated mid-channel bar	A	A	A	A	A
Island	A	A	A	A	A
Cascade	A	A	A	A	A
Pool	0	1	1	0	0
Riffle	1	0	0	0	2
Step	0	0	0	0	0
Waterfall	0	0	0	0	0
Artificial Physical Features					
	1	2	3	4	5
Large trash	A	T	A	A	T
Major weir	0	0	0	0	0
Intermediate weir	0	0	0	0	0
Minor weir	0	0	0	0	0
Bridge piers in riverbed	0	0	0	0	0
Bridge shadow	0	0	0	0	0
Culvert	1	0	0	0	0

In Channel Vegetation					
	1	2	3	4	5
Unvegetated	E	E	E	E	E
Liverworts, mosses, lichens	A	A	A	A	A
Emergent broadleaved	A	A	A	A	A
Emergent reeds/linear leaved	A	A	A	A	A
Floating Leaved (Rooted) Abundance	A	A	A	A	A
Free-Floating Abundance	A	A	A	A	A
Amphibious Abundance	A	A	A	A	A
Submerged broadleaved	A	A	A	A	A
Submerged linear leaved	A	A	A	A	A
Submerged fine leaved	A	A	A	A	A
Filamentous algae	A	A	A	A	A
Channel choked with plants	No	No	No	No	No
Vegetation Interacting with Channel					
	1	2	3	4	5
Shading	A	A	A	T	T
Submerged tree roots	A	A	A	A	A
Trees, shrubs, saplings growing on channel bed	A	A	A	A	A
Large wood	A	A	P	P	A
Discrete organic accumulation	A	A	A	T	A

Vegetation Interacting with Channel					
	1	2	3	4	5
Large wood dam	0	0	0	0	0
Fallen tree	0	0	0	0	0
Himalayan balsam	A	A	A	A	A
Japanese knotweed	A	A	A	A	A
Giant hogweed	A	A	A	A	A
Floating pennywort	A	A	A	A	A
Other	A	A	A	A	A

Annex 3

Habitat areas lost and gained (ha)

On-site change by broad habitat type								
	Total in Project Site	Total Retained	Baseline		Post-development on-site		On-site change	
Habitat group			**On-site existing area within assessment area**	**On-site existing value within assessment area**	**On-site proposed area within assessment area**	**On-site proposed value within assessment area**	**On-site area change within assessment area**	**On-site unit change within assessment area**
Cropland	0.00		0.000.00	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00
Grassland	227.50	158.21	69.2968.51	194.45179.56	59.4460.44	292.06281.41	-9.85-8.07	97.61104.86
Heathland and shrub	10.42	5.28	5.145.90	38.6739.42	9.419.97	72.9173.09	4.274.07	34.2433.67
Lakes	12.46	10.49	1.971.97	17.7615.80	0.920.92	6.826.60	-1.06-1.06	-10.94-9.20
Sparsely vegetated land	1.64	0.99	0.650.34	1.380.74	0.310.01	0.620.03	-0.34-0.34	-0.76-0.72
Urban	437.70	287.22	150.48151.33	7.056.88	158.58159.58	8.368.49	8.118.26	1.311.60
Wetland	0.27	0.23	0.040.07	0.590.85	1.241.24	10.597.76	1.201.17	10.006.91
Woodland and forest	37.63	24.84	12.7913.16	100.36100.12	9.667.47	49.0535.02	-3.12-5.70	-51.31-65.13
Intertidal sediment	0.00	0	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00
Coastal saltmarsh	0.00	0	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00
Rocky shore	0.00	0	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00
Coastal lagoons	0.00	0	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00
Intertidal hard structures	0.00	0	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00	0.000.00
Watercourse footprint	3.47	3.12	0.350.35	0.000.00	1.521.55	0.000.00	1.181.20	0.000.00
Individual trees	0.89	0	0.890.00	7.940.00	0.500.46	1.591.38	-0.380.46	-6.351.38