Norfolk County Council

Norwich Western Link Airport Safeguarding Assessment Appendix 3: Wildlife Hazard Management Risk Assessment

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1 Foreword

This document has been prepared to support compliance with all applicable UK legislation and aviation regulatory standards aimed to minimise features and activities that will support increased wildlife hazard risks for aircraft using Norwich Airport and its surrounding critical airspace.

The Applicant is responsible for ensuring delivery of the required measures in this document.

Any enquiries relating to this document are to be addressed to the Applicant.

2 Glossary of Abbreviations

CAA	UK Civil Aviation Authority
DRA	Design Risk Assessment
ICAO	International Civil Aviation Organization
QA	Quality Assurance
QM	Quality Manager
WH DRA	Wildlife Hazard Design Risk Assessment
WHM	Wildlife Hazard Management
WHMP	Wildlife Hazard Management Plan

3 Reference Documents

See Appendix A and Appendix B for a list of all project documents and plans used by the Applicant for inclusion in this wildlife hazard design risk assessment.

4 Introduction

In September 2022, the Applicant undertook a Wildlife Hazard Design Risk Assessment (DRA) of supplied plans and documents to develop an associated wildlife hazard management plan to support the planning application for the Proposed Scheme.

The Applicant engaged Aviaire Limited which is a wildlife hazard management consultancy with subject matters experts in safeguarding aerodromes and aircraft against the risk of wildlife strikes.

4.1 Aim

The aim of this DRA document is to support good practice in aviation wildlife hazard management as part of the Proposed Scheme and to comply with statutory obligations to safeguard aircraft using “subject aerodromes”.

These statutory obligations are implicit within the Construction (Design and Management) Regulations 2015 and the “Town And Country Planning (Safeguarded Aerodromes, Technical Sites And Military Explosives Storage Areas) Direction 2002, Updated 2016”, where the latter also has requirement to mitigate against:

1. An elevation in onsite populations for the wildlife species of aviation concern; and
2. A contribution towards an elevation in wildlife strike risks for aircraft using the subject aerodromes and surrounding critical airspace.

The town and country planning obligations are in perpetuity or until the subject aerodromes are no longer operational.

The “subject aerodromes” can include fixed-wing aerodromes within 13 km of the development site as shown in Appendix C, rotary-wing aerodromes within 1.5 km of the development site, and all associated critical airspace.

For this project, the “subject aerodromes” are:

- Norwich Airport, and
- Norwich Hospital Helicopter Landing Site (please refer to section 5.3.2 of

document 4.05.05 for further detail on why the this “subject aerodrome” has been included in the assessment).

4.2 Goals

The goal of aviation wildlife hazard management is to protect aircraft passengers, flight crews, aircraft, the operational capability of the Airport, all persons on the “subject aerodromes” and in their surrounding local communities.

The goal of this document is to show full and appropriate consideration has been given by subject matter experts to ensure all supplied documents from the Applicant (i.e. the DRA and Wildlife Hazard Management Plan (WHMP)) adequately “guard against new or increased (wildlife) hazards”[1] for the subject aerodromes following statutory and regulatory guidelines, and industry good practice in wildlife hazard management.

4.3 Key Objective

The key objective of this document is to highlight all proposed activity, element, process and/or materials that could create catalysts for likely elevations in wildlife strike risk ratings for the subject aerodromes.

4.4 Process

Aviaire’s DRA employs a Red/Amber/Green (RAG) strike risk rating process, similar to that used by the International Civil Aviation Organization (ICAO)[2] and the UK Civil Aviation Authority (CAA)[3] .

See Table 2 for this project’s wildlife hazard management design risk rating descriptions. See Section 7.4 – Appendix D for the aviation regulatory based design

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[1] Town and country planning (safeguarded aerodromes, technical sites and military explosives storage areas) direction 2002

[2] ICAO, Document 9137, Airport Service Manual, “Part 3 - Wildlife Control & Reduction”, 2020 (5th Edition)

[3] UK CAA, CAP 772 - Wildlife Hazard Management at Aerodromes, 2017 (Issue2)

risk rating descriptions.

5 Design Risk Assessment

5.1 Wildlife Species of Aviation Concern

The wildlife species of aviation concern for the subject aerodromes were determined as follows in September 2022:

Table 1: Wildlife Species of Aviation Concern

1.	Barn Owl	17.	Jay
2.	Black-Headed Gull	18.	Kestrel
3.	Canada Geese	19.	Lapwing
4.	Carrion Crow	20.	Lesser Black-Backed Gull
5.	Collared Dove	21.	Little Egret
6.	Common Buzzard	22.	Magpie
7.	Common Gull	23.	Mallard
8.	Coot	24.	Moorhen
9.	Cormorant	25.	Mute Swan
10.	Egyptian Goose	26.	Peregrine
11.	Feral Pigeon	27.	Rook
12.	Greater Black Backed Gull	28.	Starling
13.	Grey Heron	29.	Stock Dove
14.	Greylag Goose	30.	Tufted Duck
15.	Herring Gull	31.	Woodpigeon
16.	Jackdaw		

This list is based on discussions between Aviaire subject matter experts and Norwich Airport[4] which informed a wildlife strike risk assessment based on all freely available data for the project area.

See Section 7.5 – Appendix E for the full results of the wildlife strike risk assessment based on ICAO process recommendations.

[4] Liaison meeting between Aviaire and Norwich Airport occurred on 9th September 2022.

5.2 Documents for Design Risk Assessment

See Section 7.1 for a full list of all supplied documents for this DRA.

5.3 Design Risk Categorisation

All reviewed documents were assessed against three levels of categorisation.

Table 2: Categorisation of Risk Ratings

Category	Risk Rating Description
“HIGH” (RED)	Proposal has catalysts assessed **MOST LIKELY to contribute to an escalation in strike risk rating** for aircraft using the subject airports if implemented as indicated in plans and/or documents. "HIGH" (RED) **catalysts ALL require review for agreement on implementation of design variations and/or robust management action(s)** to decrease the assessed risk to at least an "MEDIUM" (AMBER) state. The relevant plans and/or documents should be reviewed by the project design team in context to commercial objectives for the project and applicable statutory obligations and applicable standard and recommended practices. Agreed management actions will be incorporated in the WHMP for the project.

Category	Risk Rating Description
"MEDIUM" (AMBER)	Proposal has catalysts that **MAY contribute to an escalation in strike risk rating** for aircraft using the subject airports if implemented as indicated in prodded plans and/or documents. "MEDIUM" AMBER catalysts **ALL require management actions** throughout enabling, construction and in-use phases of the project, or until relevant aerodromes are no longer operational (whichever is shorter) **AND immediate additional implementation of design variations and/or robust management action(s) if assessed** at some time in the future as starting to actively contribute to an increased wildlife strike risk i.e. have become a "HIGH" (RED) catalyst. Agreed management actions will be incorporated in the Wildlife Hazard Management Plan (WHMP) for the project.
"NEGLIGIBLE" (GREEN)	Proposal has **NO LIKELY catalyst(s]** for elevation in wildlife strike risk rating. There will be **No recommended actions**.

5.4 Design Risk Assessment Results

All documents in Section 7.1 were reviewed. Table 3 is a table listing the documents which had either a red or amber result. A detailed DRA for these documents is included in Appendix F.

Section 7.1 documents not listed in Table 3 (ID: 30 – 57) were assessed as GREEN, meaning they had no likely catalyst(s) for likely elevation in wildlife strike risk for aircraft using the subject airports and, therefore, no recommended actions.

Key to results in Table 3:

- "Summary DRA" is based on the highest assessed DRA per document supplied.
- "Initial Risk Rating" is the status of the document prior to the application of any

recommended actions.

- "Residual Risk Rating" will be the status of the document if all recommended actions are implemented.
- "N/A" refers to documents addressing existing (predevelopment) circumstances and/or matters not applicable to a wildlife hazard DRA and/or more adequality covered by other documents.

Table 3: Project documents assessed with red or amber result

ID	Document Titles	Planning Document Reference	Initial Risk Rating	Residual Risk Rating
1.	PK1002-RAM-SBR-GB1-DR-CB-1701_GB1 -The Broadway Green Bridge General Arrangement Sheet 1 of 2	2.06.05	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
2.	PK1002-RAM-SBR-GB1-DR-CB-1702_GB1 -The Broadway Green Bridge General Arrangement Sheet 2 of 2	2.06.05	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
3.	PK1002-RAM-SBR-GB2-DR-CB-1701_GB2 - Foxburrow Plantation Green Bridge General Arrangement Sheet 1 of 2	2.06.06	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
4.	PK1002-RAM-SBR-GB2-DR-CB-1702_GB2 - Foxburrow Plantation Green Bridge General Arrangement Sheet 2 of 2	2.06.06	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
5.	PK1002-RAM-SBR-GB4-DR-CB-1701_GB4 - Additional Green Bridge General Arrangement Sheet 1 of 2	2.06.07	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**

ID	Document Titles	Planning Document Reference	Initial Risk Rating	Residual Risk Rating
6.	PK1002-RAM-SBR-GB4-DR-CB-1702_GB4 - Additional Green Bridge General Arrangement Sheet 2 of 2	2.06.07	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
7.	PK1002-RAM-SBR-GB5-DR-CB-1701_NWL Nursery Woodland Green Bridge GB5 Alignment Refinement GA Sheet 1	2.06.08	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
8.	PK1002-RAM-SBR-GB5-DR-CB-1702_NWL Nursery Woodland Green Bridge GB5 Alignment Refinement GA Sheet 2	2.06.08	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
9.	PK1002-RAM-SBR-BR2-DR-CB-1791_Ringland Lane Bridge BR2 - Alignment Refinement - General Arrangement Sheet 1 of 2	2.06.02	**"HIGH" (RED)**	**"NEGLIGIBLE" (GREEN)**
10.	PK1002-RAM-SBR-BR2-DR-CB-1792_Ringland Lane Bridge BR2 - Alignment Refinement - General Arrangement Sheet 2 of 2	2.06.02	**"HIGH" (RED)**	**"NEGLIGIBLE" (GREEN)**
11.	PK1002-RAM-SBR-BR1-DR-CB-1795_NWL River Wensum Viaduct BR1 AIP General Arrangement Sheet 1 of 2	2.06.01	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**

ID	Document Titles	Planning Document Reference	Initial Risk Rating	Residual Risk Rating
12.	PK1002-RAM-SBR-BR1-DR-CB-1796_NWL River Wensum Viaduct BR1 AIP General Arrangement Sheet 2 of 2	2.06.01	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
13.	PK1002-RAM-SBR-BR1-DR-CB-1798_NWL River Wensum Viaduct BR1 AIP Articulation & Bearings Details	2.06.01	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
14.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0002 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
15.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0003 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
16.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0004 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
17.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0005 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
18.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0006 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**

ID	Document Titles	Planning Document Reference	Initial Risk Rating	Residual Risk Rating
19.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0007 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
20.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0008 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
21.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0009 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
22.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0010 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
23.	Updated to - PK1002-RAM-ELS-MLE-DR-NZ-0011 Road Alignment Refinement Landscape Layout	2.07.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
24.	PK1002-RAM-HDG-MLE-SG-DZ-0001 Drainage Strategy	4.04.00	**"MEDIUM" (AMBER)**	**"NEGLIGIBLE" (GREEN)**
25.	PK1002-RAM-HGN-MLE-DR-CH-0002_Norwich Western Link General Arrangement Sheet 1 of 5 - Zoomed out	2.03.00	**"HIGH" (RED)**	**"NEGLIGIBLE" (GREEN)**

ID	Document Titles	Planning Document Reference	Initial Risk Rating	Residual Risk Rating
26.	PK1002-RAM-HGN-MLE-DR-CH-0003_Norwich Western Link General Arrangement Sheet 2 of 5 - Zoomed out	2.03.00	**"HIGH" (RED)**	**"NEGLIGIBLE" (GREEN)**
27.	PK1002-RAM-HGN-MLE-DR-CH-0004_Norwich Western Link General Arrangement Sheet 3 of 5 - Zoomed out	2.03.00	**"HIGH" (RED)**	**"NEGLIGIBLE" (GREEN)**
28.	PK1002-RAM-HGN-MLE-DR-CH-0005_Norwich Western Link General Arrangement Sheet 4 of 5 - Zoomed out	2.03.00	**"HIGH" (RED)**	**"NEGLIGIBLE" (GREEN)**
29.	PK1002-RAM-HGN-MLE-DR-CH-0006_Norwich Western Link General Arrangement Sheet 5 of 5 - Zoomed out	2.03.00	**"HIGH" (RED)**	**"NEGLIGIBLE" (GREEN)**

5.5 Assessed Features of Concern

If not addressed appropriately in the design phase, there are a number of features of concern that require attention, as obligation in the WHMP, in the enabling, construction and in-use phases of the project. At a minimum this will include monitoring.

Highlighted below are features of particular concern. See Appendix F for details.

Structures (Bridges)

Bridge designs must account for the possibility of Feral pigeons colonising undercrofts and accessible spaces for breeding, loafing, and roosting –Figures 1 and 2.

Feral pigeons will utilise any accessible, sheltered space (e.g. ledges and voids) and will quickly form large colonies which then raise strike risks for aircraft anywhere within the safeguarding zone for a subject aerodrome.

Figure 1: Pigeons colonising under eves in high numbers.

Figure 2: Pigeons colonising the undercroft of a bridge in high numbers.

It is therefore important to either ensure that suitable sheltered locations and accessible voids are minimised in the design process through removal of attractive ledges or the introduction of steel mesh bird screens.

Alternatively, locations attractive to Feral pigeons not designed out should be monitored on completion and varied as and when noted as becoming a location supporting an increased strike risk for aircraft using Norwich Airport.

Note: It has been agreed that the Airport will undertake the monitoring and, “taking into account the evidences, if future urban developments are expected and placed next to the Proposed Scheme area of influence, these would need to be strictly managed by

the Local Authorities or the Developers and they will be the actual source of increase for feral pigeon populations" – See Section 7.7 for a copy of the agreement

Landscape changes

Changes to the existing landscape will directly influence the levels and trends in occurrence of wildlife species of aviation concern for a "subject aerodrome" and its respective safeguarded zone.

Consideration must be given in a project's design process to all soft landscaping changes and street lighting that may give rise to an escalation in the number of bird species of aviation concern and the likelihood of increased entries into the critical airspace for the "subject aerodromes".

The existing landscape for the project already attracts high numbers of corvids, gulls, geese and waterfowl (all species of aviation concern) and their numbers must not increase as a result of the Proposed Scheme and its position in the existing landscape.

In the selection of the Proposed Scheme's planting palate, species type and contextual positioning is important in relationship to the existing landscape surrounding the project site as this includes large expanses of woodland, arable and pastoral farming.

Replacement of felled trees is permitted however there should be no increase in the number and layout density of trees over and above the ratio and layout density stated in Appendix F because dense canopies provide ideal nesting, loafing and roosting attractions for bird species of aviation concern.

Figure 3: Seeding plants and broad-leaved weeds are highly attractive for pigeons as a food source

Figure 4: Corvids gathering in high numbers, attracted to insects on flowering plants

Figure 5: Rooks nesting in English oaks

Figure 6: Waterfowl and Canada geese highly attracted to wetland areas

Consideration should also be given to selection of street lighting to minimise the increased opportunities for perching – see Figure 7 for example of profile to be avoid where possible.

Figure 7: Example of street light profiles to be avoid where possible

Drainage

Following the completion of the Proposed Scheme, the existing landscape and expanses of hard landscaping will produce high levels of water runoff during periods of wet weather. This water will be treated in various SUDS along the new link road, and a mix of draining ponds and permanent ponds.

When considered in context to the wider existing landscape, where there are already large areas of wetland, ponds and streams, the scale and draining down time of new SUDS, draining ponds and permanent ponds have been designed to support minimised additional attraction for bird species of aviation concern. This will be complimented with proposed planting that will also not act as an attractant for an additional number of bird species of aviation concern.

Enabling and construction works

A large number of the bird species of aviation concern can be attracted to freshly opened ground, vehicle ruts and soil movement seeking to feed on uncovered invertebrates and/or to drink from pooled water after rain. These birds should be discouraged from speculatively gathering by using recommended dispersal techniques and products. Products such as hawk kites and bioacoustics can be placed throughout a site where monitoring has observed build-ups of bird activity.

Figure 8: Waterlogged areas can be highly attractive for gulls seeking food

Figure 9: Rooks foraging for food in freshly exposed soil

5.6 Conclusion

In conclusion, having appraised the Proposed Scheme's plans and documents (see Section 7.1), Aviaire assessed there were catalysts which, at some time, could contribute towards an elevation in wildlife strike risk for aircraft using the subject aerodrome and/or their surrounding critical airspace.

A joint review with the Applicant's design team permitted design variations to be applied which removed the red "high" catalysts and reduced the likelihood of remaining amber "medium" catalysts.

All agreed management actions have been incorporated in the WHMP submitted with the planning application for the Proposed Scheme.

Table 4: Results of the wildlife hazard design risk assessment

Initial Risk Rating **Pre application of design changes**	**Residual Risk Rating** **Post application of design changes**
• **07 plans** assessed with **"HIGH"** (**RED**) Catalysts • **22 plans** assessed with **"MEDIUM"** (**AMBER**) Catalysts	• **All plans now** rated with **"NEGLIGIBLE"** (**GREEN**) risk rating

6 Agreements with Norwich Airport

In November 2022 the results of this DRA and required subsequent management actions for inclusion in the Proposed Scheme's Wildlife Hazard Management Plan (WHMP) were agreed between the Applicant and Norwich Airport.

See Appendix H for a copy of documentation supporting this agreement.

7 Appendix

7.1 Appendix A - Project Documents

Table 5: Project documents referred to in assessment process

ID	Project Document Reference	Planning Document Reference	Document Title
1.	PK1002-RAM-SBR-GB1-DR-CB-1701	2.06.05	The Broadway Green Bridge General Arrangement Sheet 1 of 2
2.	PK1002-RAM-SBR-GB1-DR-CB-1702	2.06.05	The Broadway Green Bridge General Arrangement Sheet 2 of 2
3.	PK1002-RAM-SBR-GB2-DR-CB-1701	2.06.06	Foxburrow Plantation Green Bridge General Arrangement Sheet 1 of 2
4.	PK1002-RAM-SBR-GB2-DR-CB-1702	2.06.06	Foxburrow Plantation Green Bridge General Arrangement Sheet 2 of 2
5.	PK1002-RAM-SBR-GB4-DR-CB-1701	2.06.07	Additional Green Bridge General Arrangement Sheet 1 of 2
6.	PK1002-RAM-SBR-GB4-DR-CB-1702	2.06.07	Additional Green Bridge General Arrangement Sheet 2 of 2
7.	PK1002-RAM-SBR-GB5-DR-CB-1701	2.06.08	NWL Nursery Woodland Green Bridge Alignment Refinement GA Sheet 1
8.	PK1002-RAM-SBR-GB5-DR-CB-1702	2.06.08	NWL Nursery Woodland Green Bridge Alignment Refinement GA Sheet 2
9.	PK1002-RAM-SBR-BR2-DR-CB-1791	2.06.02	Ringland Lane Bridge BR2 - Alignment Refinement - General Arrangement Sheet 1 of 2

ID	Project Document Reference	Planning Document Reference	Document Title
10.	PK1002-RAM-SBR-BR2-DR-CB-1792	2.06.02	Ringland Lane Bridge BR2 - Alignment Refinement - General Arrangement Sheet 2 of 2
11.	PK1002-RAM-SBR-BR1-DR-CB-1795	2.06.01	NWL River Wensum Viaduct BR1 AIP General Arrangement Sheet 1 of 2
12.	PK1002-RAM-SBR-BR1-DR-CB-1796	2.06.01	NWL River Wensum Viaduct BR1 AIP General Arrangement Sheet 2 of 2
13.	NCCT41793-RAM-SBR-BR1-DR-CB-1798	2.06.01	NWL River Wensum Viaduct BR1 AIP Articulation & Bearings Details
14.	PK1002-RAM-ELS-MLE-DR-NZ-0002	2.07.00	NWL Road Alignment Refinement Landscape Layout Sheet 1
15.	PK1002-RAM-ELS-MLE-DR-NZ-0003	2.07.00	NWL Road Alignment Refinement Landscape Layout Sheet 2
16.	PK1002-RAM-ELS-MLE-DR-NZ-0004	2.07.00	NWL Road Landscape Layout Sheet 3
17.	PK1002-RAM-ELS-MLE-DR-NZ-0005	2.07.00	NWL Road Landscape Layout Sheet 4
18.	PK1002-RAM-ELS-MLE-DR-NZ-0006	2.07.00	NWL Road Landscape Layout Sheet 5
19.	PK1002-RAM-ELS-MLE-DR-NZ-0007	2.07.00	NWL Road Landscape Layout Sheet 6
20.	PK1002-RAM-ELS-MLE-DR-NZ-0008	2.07.00	NWL Road Landscape Layout Sheet 7

ID	Project Document Reference	Planning Document Reference	Document Title
21.	PK1002-RAM-ELS-MLE-DR-NZ-0009	2.07.00	NWL Road Landscape Layout Sheet 8
22.	PK1002-RAM-ELS-MLE-DR-NZ-0010	2.07.00	NWL Road Landscape Layout Sheet 9
23.	PK1002-RAM-ELS-MLE-DR-NZ-0011	2.07.00	NWL Road Landscape Layout Sheet 10
24.	PK1002-RAM-HDG-MLE-SG-DZ-0001	4.04.00	Drainage Strategy
25.	PK1002-RAM-HGN-MLE-DR-CH-0002	2.03.00	Norwich Western Link General Arrangement Sheet 1 of 5 - Zoomed out
26.	PK1002-RAM-HGN-MLE-DR-CH-0003	2.03.00	Norwich Western Link General Arrangement Sheet 2 of 5 - Zoomed out
27.	PK1002-RAM-HGN-MLE-DR-CH-0004	2.03.00	Norwich Western Link General Arrangement Sheet 3 of 5 - Zoomed out
28.	PK1002-RAM-HGN-MLE-DR-CH-0005	2.03.00	Norwich Western Link General Arrangement Sheet 4 of 5 - Zoomed out
29.	PK1002-RAM-HGN-MLE-DR-CH-0006	2.03.00	Norwich Western Link General Arrangement Sheet 5 of 5 - Zoomed out
30.	PK1002-RAM-SBR-BR1-DR-CB-1797	2.06.01	NWL River Wensum Viaduct BR1 AIP Abutment Layout

ID	Project Document Reference	Planning Document Reference	Document Title
31.	PK1002-RAM-HGN-MLE-DE-CH-0001	2.04.00	Norwich western link road typical cross sections sheet 1
32.	PK1002-RAM-HGN-MLE-DE-CH-0002	2.04.00	Norwich western link road typical cross sections sheet 2
33.	PK1002-RAM-HGN-MLE-DE-CH-0003	2.04.00	Norwich western link road typical cross sections sheet 3
34.	PK1002-RAM-HGN-MLE-DE-CH-0004	2.04.00	Norwich western link road typical cross sections sheet 4
35.	PK1002-RAM-HGN-MLE-DE-CH-0005	2.04.00	Norwich western link road typical cross sections sheet 5
36.	PK1002-RAM-HGN-MLE-DE-CH-0006	2.04.00	Norwich western link road typical cross sections sheet 6
37.	NCCT41793-RAM-HGN-MLE-DR-CH-2681	2.05.00	Alignment Refinement Southbound Longitudinal Section Sheet 01
38.	NCCT41793-RAM-HGN-MLE-DR-CH-2682	2.05.00	Alignment Refinement Southbound Longitudinal Section Sheet 02
39.	NCCT41793-RAM-HGN-MLE-DR-CH-2683	2.05.00	Alignment Refinement Southbound Longitudinal Section Sheet 03
40.	NCCT41793-RAM-HGN-MLE-DR-CH-2684	2.05.00	Alignment Refinement Southbound Longitudinal Section Sheet 04

ID	Project Document Reference	Planning Document Reference	Document Title
41.	NCCT41793-RAM-HGN-MLE-DR-CH-2685	2.05.00	Alignment Refinement Southbound Longitudinal Section Sheet 05
42.	NCCT41793-RAM-HGN-MLE-DR-CH-2686	2.05.00	Alignment Refinement Northbound Longitudinal Section Sheet 06
43.	NCCT41793-RAM-HGN-MLE-DR-CH-2687	2.05.00	Alignment Refinement Northbound Longitudinal Section Sheet 07
44.	NCCT41793-RAM-HGN-MLE-DR-CH-2688	2.05.00	Alignment Refinement Northbound Longitudinal Section Sheet 08
45.	PK1002-RAM-HGN-MLE-DR-CH-2689	2.05.00	Alignment Refinement A1067 Fakenham Road Longitudinal Section Sheet 01
46.	PK1002-RAM-HGN-MLE-DR-CH-2690	2.05.00	Alignment Refinement A1067 Fakenham Road Longitudinal Section Sheet 02
47.	PK1002-RAM-HGN-MLE-DR-CH-2691	2.05.00	Alignment Refinement Ringland Lane Longitudinal Section Sheet 01
48.	PK1002-RAM-HML-MLE-DR-CH-2606	2.05.00	NWL Long Section Northbound Sheet 5
49.	PK1002-RAM-HML-MLE-DR-CH-2607	2.05.00	NWL Long Section Southbound Sheet 6

ID	Project Document Reference	Planning Document Reference	Document Title
50.	PK1002-RAM-HML-MLE-DR-CH-2608	2.05.00	NWL Long Section Southbound Sheet 7
51.	PK1002-RAM-HML-MLE-DR-CH-2609	2.05.00	NWL Long Section Southbound Sheet 8
52.	PK1002-RAM-HML-MLE-DR-CH-2610	2.05.00	NWL Long Section Sheet 9
53.	PK1002-RAM-HML-MLE-DR-CH-2611	2.05.00	NWL Long Section Sheet 10
54.	PK1002-RAM-HML-MLE-DR-CH-2612	2.05.00	NWL Long Section Sheet 11
55.	PK1002-RAM-HML-MLE-DR-CH-2613	2.05.00	NWL Long Section Sheet 12
56.	NCCT41793-RAM-ELS-ZZZ-DE-NZ-0091	2.07.00	Norwich Western Link Landscape Detail 1
57.	NCCT41793-RAM-ELS-ZZZ-DE-NZ-0093	2.07.00	Norwich Western Link Landscape Detail 3

7.2 Appendix B - Other Key Reference Documents

Table 4-2 Other WH DRA Reference Documents

Author	Document Title
Aerodrome Operators Association (AOA)	Advice Note 1 – Aerodrome Safeguarding an Overview (2016)
Aerodrome Operators Association (AOA)	Advice Note 3 – Wildlife Hazards (2016)
International Civil Aviation Organization (ICAO)	Document 9137, Airport Service Manual, “Part 3 - Wildlife Control & Reduction”, 2020 (5th Edition)
UK Civil Aviation Authority (CAA)	CAP 738 - Safeguarding of Aerodromes, October 2020 (Issue 03)
UK Civil Aviation Authority (CAA)	CAP 772 - Wildlife Hazard Management at Aerodromes, 2017 (Issue2)
UK Department of Transport:	Town and country planning (safeguarded aerodromes, technical sites and military explosives storage areas) direction 2002; Updated 22 December 2016

7.3 Appendix C – Proposed Scheme Location Maps

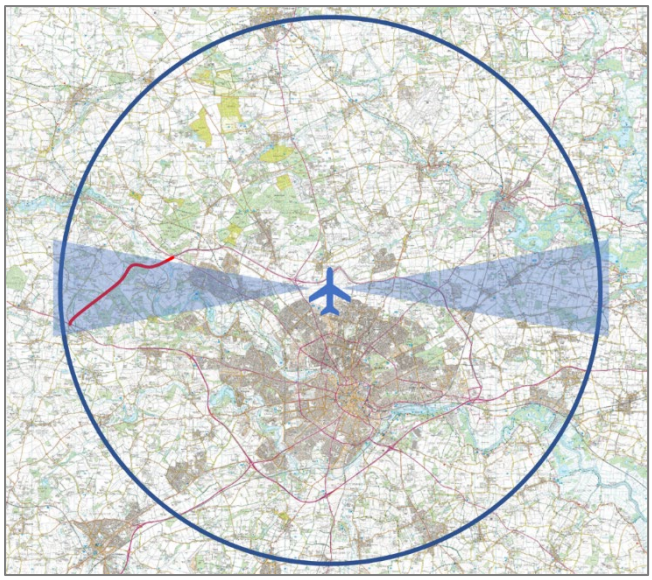


Figure 10: Norwich Airport 13km safeguarded zone and scheme location map

Key:

	Norwich Western Link Site – The Proposed Scheme
	Norwich Airport approach and climb out zones
	Norwich Airport
	Airport 13 km safeguarded zone

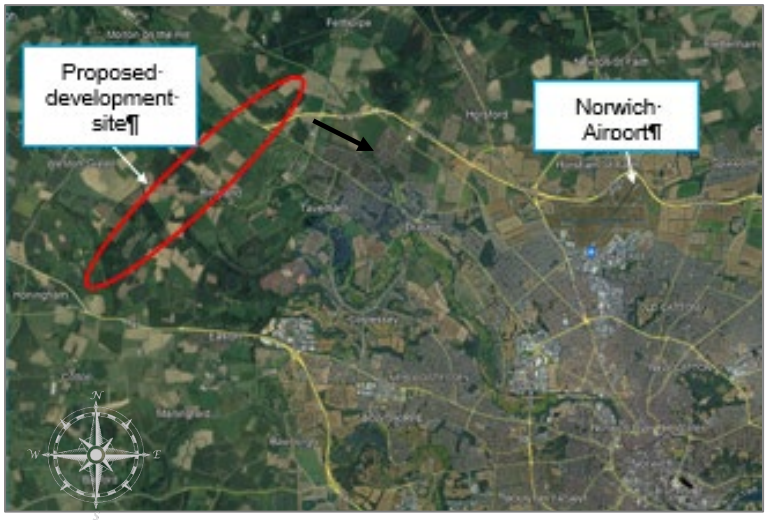


Figure 11: Proposed Scheme location as produced by the Applicant

7.4 Appendix D - Comparison between Aviation Sector and Project Descriptions

** Based on Section 3.4.3 of ICAO Doc 9137

Assessment	Aviation regulator risk rating descriptions **	Project Design Risk Rating Description
RED	"**INTOLERABLE**" Proposal has catalysts assessed as most likely to contribute to an escalation in strike risk rating for aircraft using the subject airports if implemented as indicated in provided plans and/or documents. All red "INTOLERABLE" catalysts require review for agreement on implementation of design variations and/or robust management action(s) to decrease the assessed risk to at least an amber "TOLERABLE" state. The relevant plans and/or documents should be reviewed by the project design team in context to commercial objectives for the project and applicable statutory obligations and applicable standard and recommended practices. Agreed management actions will be incorporated in the Wildlife Hazard Management Plan (WHMP) for the project.	**"HIGH"** Proposal has catalysts assessed as most likely to contribute to an escalation in strike risk rating for aircraft using the subject airports if implemented as indicated in provided plans and/or documents. All red "HIGH" catalysts require review for agreement on implementation of design variations and/or robust management action(s) to decrease the assessed risk to at least an amber "MEDIUM" state. The relevant plans and/or documents should be reviewed by the project design team in context to commercial objectives for the project and applicable statutory obligations and applicable standard and recommended practices. Agreed management actions will be incorporated in the Wildlife Hazard Management Plan (WHMP) for the project.

Assessment	Aviation regulator risk rating descriptions **	Project Design Risk Rating Description
AMBER	"**TOLERABLE**" Proposal has catalysts that may contribute to an escalation in strike risk rating for aircraft using the subject airports if implemented as indicated in provided plans and/or documents. All amber "TOLERABLE" catalysts require management actions throughout enabling and construction phases of the project, and for the in-use life of the project or until relevant aerodromes are no longer operational (whichever is shorter) AND immediate implementation of design variations and/or additional management action(s) if assessed at some time in the future as starting to actively contribute to an increased wildlife strike risk i.e. have become a red "INTOLERABLE" catalyst. Agreed management actions will be incorporated in the Wildlife Hazard Management Plan (WHMP) for the project.	"**MEDIUM**" Proposal has catalysts that may contribute to an escalation in strike risk rating for aircraft using the subject airports if implemented as indicated in provided plans and/or documents. All amber "MEDIUM" catalysts require management actions throughout enabling and construction phases of the project, and for the in-use life of the project or until relevant aerodromes are no longer operational (whichever is shorter) AND immediate implementation of design variations and/or additional management action(s) if assessed at some time in the future as starting to actively contribute to an increased wildlife strike risk i.e. have become a red "HIGH" catalyst. Agreed management actions will be incorporated in the Wildlife Hazard Management Plan (WHMP) for the project.

Assessment	Aviation regulator risk rating descriptions **	Project Design Risk Rating Description
GREEN	"**ACCEPTABLE**" Proposal has no likely catalyst(s) for elevation in wildlife strike risk rating. There will be No recommended actions.	"**NEGLIGIBLE**" Proposal has no likely catalyst(s) for elevation in wildlife strike risk rating. There will be No recommended actions.

7.5 Appendix E – Wildlife Species of Aviation Concern Assessment Results

Review Date: 25/11/2022

Review Range: 01 Jan – 31 Dec 2020

Zone under review: On aerodrome and its surroundings

See Table 6 for the results of the Wildlife Species of Aviation Assessment for Norwich Airport in November 2022.

These results are based on risk assessment processes recommended in ICAO Document 9137 and ICAO Document 9859.

		PROBABILITY				
		VERY HIGH	HIGH	MODERATE	LOW	VERY LOW
SEVERITY	VERY HIGH	5A	4A	3A	2A	1A
	HIGH	5B	4B	3B	2B	1B
	MODERATE	5C	4C	3C	2C	1C
	LOW	5D	4D	3D	2D	1D
	VERY LOW	5E	4E	3E	2E	1E

Figure 12: Air Safety (Strike) Risk Assessment Matrix used in the Wildlife Species of Aviation Assessment

Table 6: Wildlife Species of Aviation Concern Assessment Results

Step 1 Species occurring	Step 2A No. days per year species observed in zone under review	Step 2B Species occurrence rating	Step 3A Mean average mass (g)	Step 3B Body mass value	Step 3C Flocking characteristics	Step 3D Flocking value	Step 3E Severity value	Step 4A Species damage severity rating	Step 4B Species strike risk rating category	Step 4C Species strike risk rating sub-category
Barn Owl	More than 200 days	Very High	403	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C
Black-Headed Gull	50 - 100 days	Moderate	284	8	Often in loose flocks	2	16	High	HIGH	3B
Canada Geese	50 - 100 days	Moderate	3060	16	Often in loose flocks	2	32	Very High	HIGH	3A
Carrion Crow	More than 200 days	Very High	570	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C
Collared Dove	More than 200 days	Very High	149	4	Often in loose flocks	2	8	Moderate	HIGH	5C

Step 1 Species occurring	Step 2A No. days per year species observed in zone under review	Step 2B Species occurrence rating	Step 3A Mean average mass (g)	Step 3B Body mass value	Step 3C Flocking characteristics	Step 3D Flocking value	Step 3E Severity value	Step 4A Species damage severity rating	Step 4B Species strike risk rating category	Step 4C Species strike risk rating sub-category
Common Buzzard	More than 200 days	Very High	875	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C
Common Gull	50 - 100 days	Moderate	403.5	8	Often in loose flocks	2	16	High	HIGH	3B
Common Sandpiper	50 days	Low	48	2	Often in loose flocks	2	4	Low	LOW	2D
Coot	More than 200 days	Very High	836	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C
Cormorant	More than 200 days	Very High	2935	16	Usually solitary or widely spaced	1	16	High	HIGH	5B
Egyptian Goose	50 - 100 days	Moderate	1873	16	Often in loose flocks	2	32	Very High	HIGH	3A

Step 1 Species occurring	Step 2A No. days per year species observed in zone under review	Step 2B Species occurrence rating	Step 3A Mean average mass (g)	Step 3B Body mass value	Step 3C Flocking characteristics	Step 3D Flocking value	Step 3E Severity value	Step 4A Species damage severity rating	Step 4B Species strike risk rating category	Step 4C Species strike risk rating sub-category
Feral Pigeon	More than 200 days	Very High	354.5	8	Often in loose flocks	2	16	High	HIGH	5B
Fieldfare	50 days	Low	106	4	Often in tight flocks	4	16	High	MEDIUM	2B
Gadwall	50 - 100 days	Moderate	917	8	Usually solitary or widely spaced	1	8	Moderate	MEDIUM	3C
Golden Plover	50 days	Low	135	4	Often in loose flocks	2	8	Moderate	LOW	2C
Greater Black Backed Gull	50 - 100 days	Moderate	1658.5	16	Usually solitary or widely spaced	1	16	High	HIGH	3B

Step 1 Species occurring	Step 2A No. days per year species observed in zone under review	Step 2B Species occurrence rating	Step 3A Mean average mass (g)	Step 3B Body mass value	Step 3C Flocking characteristics	Step 3D Flocking value	Step 3E Severity value	Step 4A Species damage severity rating	Step 4B Species strike risk rating category	Step 4C Species strike risk rating sub-category
Grey Heron	More than 200 days	Very High	1443	16	Usually solitary or widely spaced	1	16	High	HIGH	5B
Greylag Goose	100 - 200 days	High	3308.5	16	Often in tight flocks	4	64	Very High	HIGH	4A
Herring Gull	100 - 200 days	High	1085	16	Often in loose flocks	2	32	Very High	HIGH	4A
Jackdaw	More than 200 days	Very High	246	8	Often in loose flocks	2	16	High	HIGH	5B
Jay	More than 200 days	Very High	168	4	Usually solitary or widely spaced	1	4	Low	HIGH	5D
Kestrel	More than 200 days	Very High	184	4	Usually solitary or widely spaced	1	4	Low	HIGH	5D

Step 1 Species occurring	Step 2A No. days per year species observed in zone under review	Step 2B Species occurrence rating	Step 3A Mean average mass (g)	Step 3B Body mass value	Step 3C Flocking characteristics	Step 3D Flocking value	Step 3E Severity value	Step 4A Species damage severity rating	Step 4B Species strike risk rating category	Step 4C Species strike risk rating sub-category
Lapwing	50 - 100 days	Moderate	218.5	8	Often in tight flocks	4	32	Very High	HIGH	3A
Lesser black-backed gull	100 - 200 days	High	715	8	Often in loose flocks	2	16	High	HIGH	4B
Little Egret	More than 200 days	Very High	312	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C
Little Grebe	50 days	Low	135	4	Usually solitary or widely spaced	1	4	Low	LOW	2D
Little Ringed Plover	50 days	Low	38.7	2	Often in loose flocks	2	4	Low	LOW	2D

Step 1 Species occurring	Step 2A No. days per year species observed in zone under review	Step 2B Species occurrence rating	Step 3A Mean average mass (g)	Step 3B Body mass value	Step 3C Flocking characteristics	Step 3D Flocking value	Step 3E Severity value	Step 4A Species damage severity rating	Step 4B Species strike risk rating category	Step 4C Species strike risk rating sub-category
Magpie	More than 200 days	Very High	206	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C
Mallard	More than 200 days	Very High	1082	16	Usually solitary or widely spaced	1	16	High	HIGH	5B
Moorhen	More than 200 days	Very High	382	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C
Mute Swan	More than 200 days	Very High	10735	32	Often in loose flocks	2	64	Very High	HIGH	5A
Oyster-catcher	50 days	Low	526	8	Often in loose flocks	2	16	High	MEDIUM	2B
Peregrin	More than 200 days	Very High	811	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C

Step 1 Species occurring	Step 2A No. days per year species observed in zone under review	Step 2B Species occurrence rating	Step 3A Mean average mass (g)	Step 3B Body mass value	Step 3C Flocking characteristics	Step 3D Flocking value	Step 3E Severity value	Step 4A Species damage severity rating	Step 4B Species strike risk rating category	Step 4C Species strike risk rating sub-category
Pintail	50 days	Low	946.5	8	Usually solitary or widely spaced	1	8	Moderate	LOW	2C
Pochard	50 days	Low	823	8	Usually solitary or widely spaced	1	8	Moderate	LOW	2C
Redwing	50 days	Low	61.5	4	Often in tight flocks	4	16	High	MEDIUM	2B
Rook	More than 200 days	Very High	453.5	8	Often in loose flocks	2	16	High	HIGH	5B
Shoveler	50 days	Low	614.5	8	Usually solitary or widely spaced	1	8	Moderate	LOW	2C
Starling	50 - 100 days	Moderate	62	4	Often in tight flocks	4	16	High	HIGH	3B

Step 1 Species occurring	Step 2A No. days per year species observed in zone under review	Step 2B Species occurrence rating	Step 3A Mean average mass (g)	Step 3B Body mass value	Step 3C Flocking characteristics	Step 3D Flocking value	Step 3E Severity value	Step 4A Species damage severity rating	Step 4B Species strike risk rating category	Step 4C Species strike risk rating sub-category
Stock Dove	More than 200 days	Very High	255	8	Often in loose flocks	2	16	High	HIGH	5B
Teal	50 - 100 days	Moderate	305.5	8	Usually solitary or widely spaced	1	8	Moderate	MEDIUM	3C
Tufted Duck	More than 200 days	Very High	701.5	8	Usually solitary or widely spaced	1	8	Moderate	HIGH	5C
Wigeon	50 days	Low	771.5	8	Usually solitary or widely spaced	1	8	Moderate	LOW	2C
Wood-pigeon	More than 200 days	Very High	490	8	Often in loose flocks	2	16	High	HIGH	5B

7.6 Appendix F – Detailed Design Risk Assessment Sheets for High and Medium Concerns

In Sections 7.6.2 - 7.6.5 are the results of detailed Design Risk Assessments (DRA) made by subject matters experts on the likely hazards of concerns and the required measures.

Refer to Section 5.4 for the key to the DRA results; and "Appropriate Authorities" are the parties with the decision-making authority and ability to implement the above required actions as and when necessary.

See Appendix G for a comparison between satellite images and proposed scheme layout plans. These were comparisons undertaken during the DRA process to aid assessment of proposed changes in landscape by subject matter experts.

7.6.1 Plans reviewed under the DRA

In Section 7.6.2 - Broadway, Foxburrow Plantation, Nursery Woodland Green Bridges

Date of Assessment: November 2022

- NCCT41793-RAM-SBR-GB1-DR-CB-1701_GB1 -The Broadway Green Bridge General Arrangement Sheet 1 of 2_P01
- NCCT41793-RAM-SBR-GB1-DR-CB-1702_GB1 -The Broadway Green Bridge General Arrangement Sheet 2 of 2_P01
- NCCT41793-RAM-SBR-GB2-DR-CB-1701_GB2 - Foxburrow Plantation Green Bridge General Arrangement Sheet 1 of 2_P01
- NCCT41793-RAM-SBR-GB2-DR-CB-1701_GB2 - Foxburrow Plantation Green Bridge General Arrangement Sheet 2 of 2_P01
- NCCT41793-RAM-SBR-GB4-DR-CB-1701_GB4 - Additional Green Bridge General Arrangement Sheet 1 of 2_P01

- NCCT41793-RAM-SBR-GB4-DR-CB-1701_GB4 - Additional Green Bridge General Arrangement Sheet 2 of 2_P01
- NCCT41793-RAM-SBR-GB5-DR-CB-1701_NWL Nursery Woodland Green Bridge GB5 Alignment Refinement GA Sheet 1_P01
- NCCT41793-RAM-SBR-GB5-DR-CB-1701_NWL Nursery Woodland Green Bridge GB5 Alignment Refinement GA Sheet 2_P01

In Section 7.6.3 - Ringland Lane Bridge

Date of Assessment: November 2022

- NCCT41793-RAM-SBR-BR2-DR-CB-1791_Ringland Lane Bridge BR2 - Alignment Refinement - General Arrangement Sheet 1 of 2_P02
- NCCT41793-RAM-SBR-BR2-DR-CB-1792_Ringland Lane Bridge BR2 - Alignment Refinement - General Arrangement Sheet 2 of 2_P02

In Section 7.6.4 - River Wensum Viaduct

Date of Assessment: November 2022

- NCCT41793-RAM-SBR-BR1-DR-CB-1795_NWL River Wensum Viaduct BR1 AIP General Arrangement Sheet 1 of 2_P01
- NCCT41793-RAM-SBR-BR1-DR-CB-1795_NWL River Wensum Viaduct BR1 AIP General Arrangement Sheet 2 of 2_P01
- NCCT41793-RAM-SBR-BR1-DR-CB-1798_NWL River Wensum Viaduct BR1 AIP Articulation & Bearings Details_P01

NOTE: There are no assessed hazards related to plan number: NCCT41793-RAM-SBR-BR1-DR-CB-1797_NWL River Wensum Viaduct BR1 AIP Abutment Layout_P01

In Section 7.6.5 - Drainage Strategy and Landscape Layout

Date of Assessment: February 2024

- PK1002-RAM-ELS-MLE-DR-NZ-0002 TO 0011
- NCCT41793-RAM-HDG-MLE-SG-DZ-0001_P04_Drainage Strategy

- PK1002-RAM-ELS-FSC-BQ-NZ-0001_P02 Landscape BoQ

Section 7.6.6 – General Arrangements

Date of Assessment: November 2022

- NCCT41793-RAM-HGN-MLE-DR-CH-0001_Norwich Western Link General Arrangement Sheets 1 to 5 - Zoomed out

Continued next page ....

7.6.2 DRA of plans for Broadway, Foxburrow Plantation, Nursery Woodland Green Bridges

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
1.	**Covered ledge providing shelter for pigeons**	**MEDIUM**	**Assessed potential hazard** • Ledge area may be attractive to pigeons for nesting, loafing and roosting as it will be sheltered from the elements, in particular in the central section below the bridge 8m from either end. • U Beams within structure should not allow for bird activity as there will be no associated ledges. **Recommended Actions**: • Either create 45° finish to ledge during construction OR monitor on completion and vary feature if noted as an issue of concern.	During a site visit in Oct 2022 very low numbers of feral pigeon were noted on and surrounding the proposed site. It was assessed feral pigeon are unlikely to establish colonies on the proposed bridges. Norwich Airport agreed on 31 Oct 2022 with this assessment	**NEGLIGIBLE**	• Norwich Airport to undertake periodic monitoring of green bridges as part of off-airport monitoring programme. • Norwich Airport to confirm to appropriate authorities when pigeons are contributing to an “intolerable” safety risk. • Appropriate Authorities to undertake actions to implement the recommended actions as necessary to mitigate pigeons from nesting, loafing and roosting.

Aspects of concern from provided project plans:

Below abstracts from reviewed plans with highlighted locations of concern

Key:

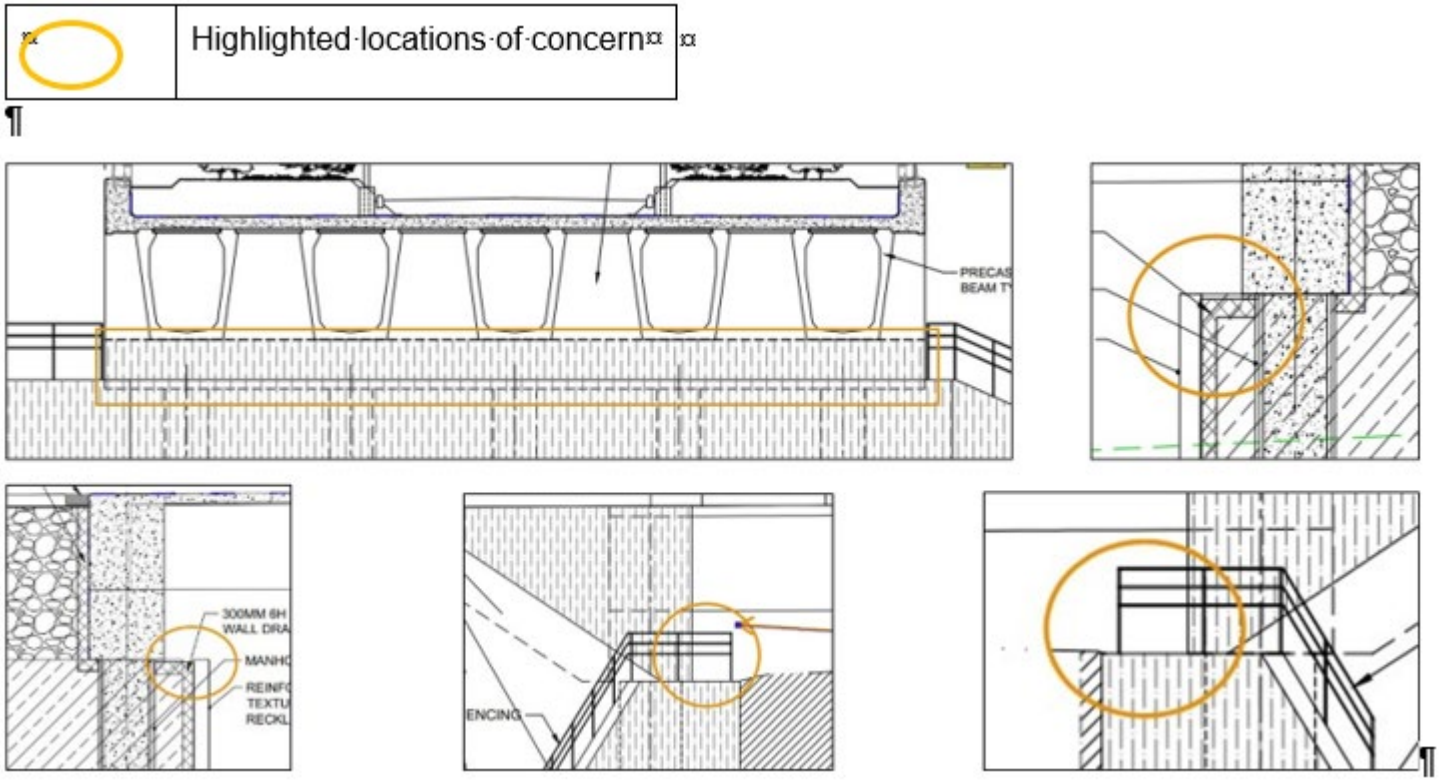


Figure 13: Abstracts from reviewed plan for green bridges with highlighted locations of concern

7.6.3 DRA of plans for Ringland Lane Bridge

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
1.	**Covered ledge providing shelter for pigeons**	HIGH	• Ledge area may be attractive to pigeons for nesting, loafing and roosting as sheltered from the elements, in particular central sections below the bridge 8m from either end. • Headroom <300m above ledges offers increased security and shelter thereby making them more attractive to feral pigeon. **Recommended Actions**: • Either create a 45° finish ledges during construction OR monitor on completion and vary feature if noted as an issue of concern.	During a site visit by Aviaire in October 2022 it was noted there are very low numbers of Feral pigeon on and surrounding the NWL site. It was assessed after the site visit it is unlikely Feral pigeon will establish colonies on the proposed bridges. Norwich Airport agreed on 31 Oct 2022 with this assessment.	**NEGLIGIBLE**	• Norwich Airport to undertake periodic monitoring of green bridges as part of their off-airport monitoring programme. • Norwich Airport to confirm to “Appropriate Authorities” when pigeons are contributing to “intolerable” air safety risk. • Appropriate authorities to undertake actions to implement recommended actions as necessary to mitigate pigeons as required.

Aspects of concern from provided project plans:

Below abstracts from reviewed plans with highlighted locations of concern

Key:

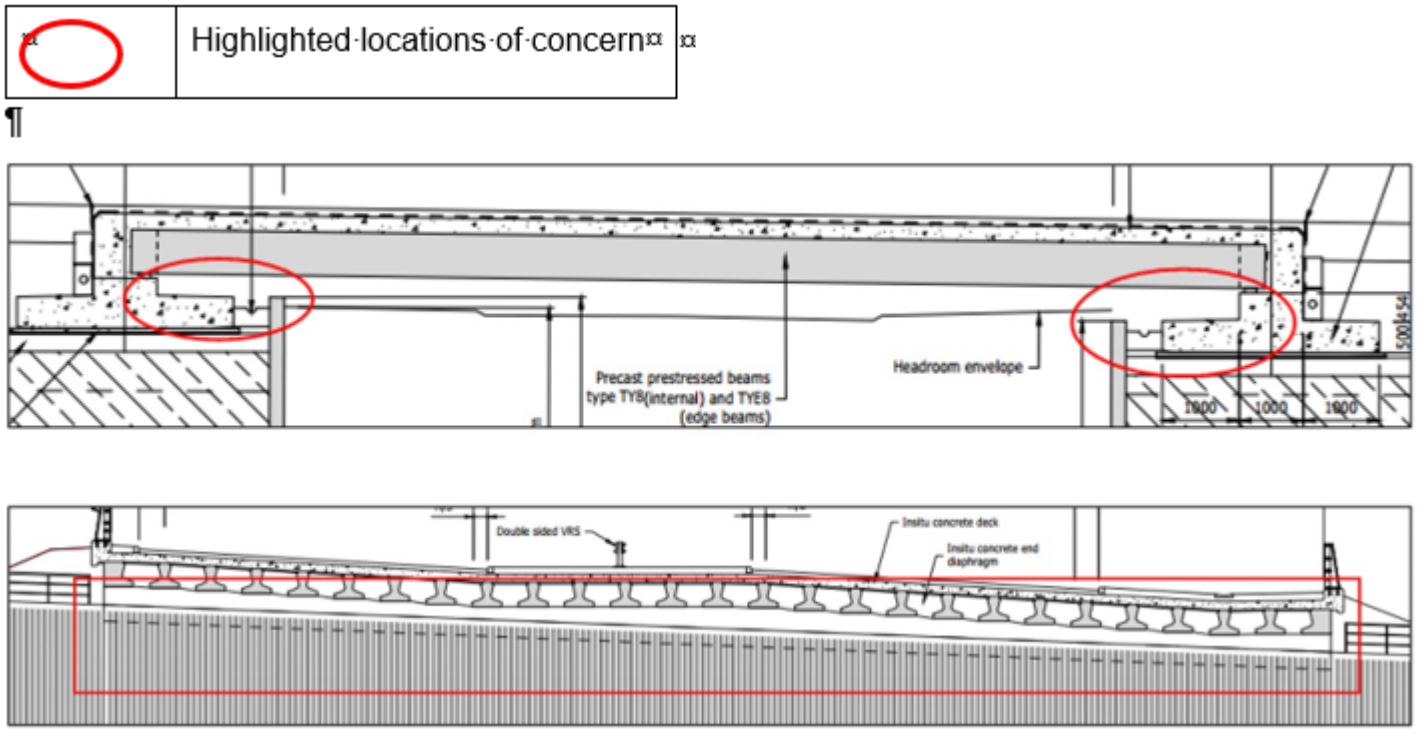


Figure 14: Abstracts from reviewed plans for Ringland Lane Bridge with highlighted locations of concern.

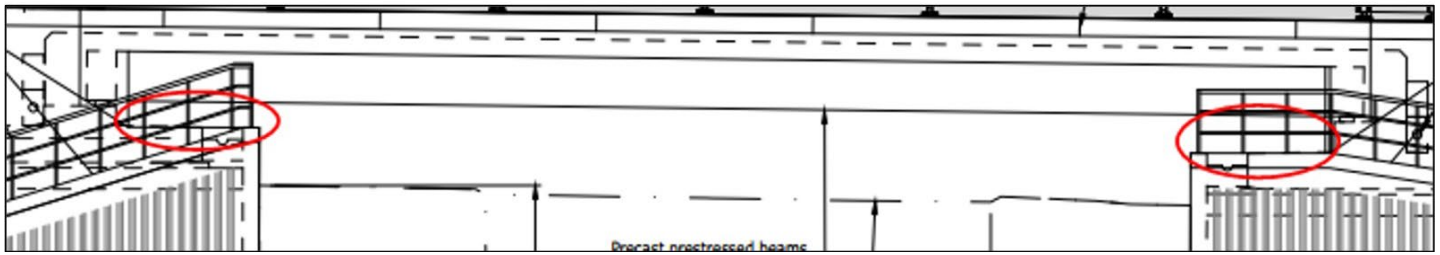


Figure 15: Additional abstract from reviewed plans for Ringland Lane Bridge with highlighted locations of concern

7.6.4 DRA of plans for River Wensum Viaduct

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard & Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
1.	**Covered ledge providing shelter for pigeons**	**MEDIUM**	**Hazard** • Ledge areas >100mm within the bearing installation and not protected by steel mesh bird screen may attract to feral pigeons for nesting, loafing and roosting as it will be sheltered from the elements. **Recommended Action(s)**: • Either introduce steel mesh bird screen OR monitor on completion and vary feature if noted as an issue of concern.	During a site visit by Aviaire in October 2022 it was noted there are very low numbers of Feral pigeon on and surrounding the NWL site. It was assessed after the site visit it is unlikely Feral pigeon will establish colonies on the proposed bridges. Norwich Airport agreed on 31 Oct 2022 with this assessment	**NEGLIGIBLE**	• Norwich Airport to undertake periodic monitoring of green bridges as part of their off-airport monitoring programme. • Norwich Airport to confirm to the Appropriate Authorities" when pigeons are contributing to an "intolerable" air safety risk. • Appropriate Authorities to undertake actions to implement the recommended actions as necessary to mitigate pigeons from nesting, loafing and roosting.

Aspects of concern from provided project plans:

Below abstracts from reviewed plans with highlighted locations of concern

Key:

	Highlighted locations of concern

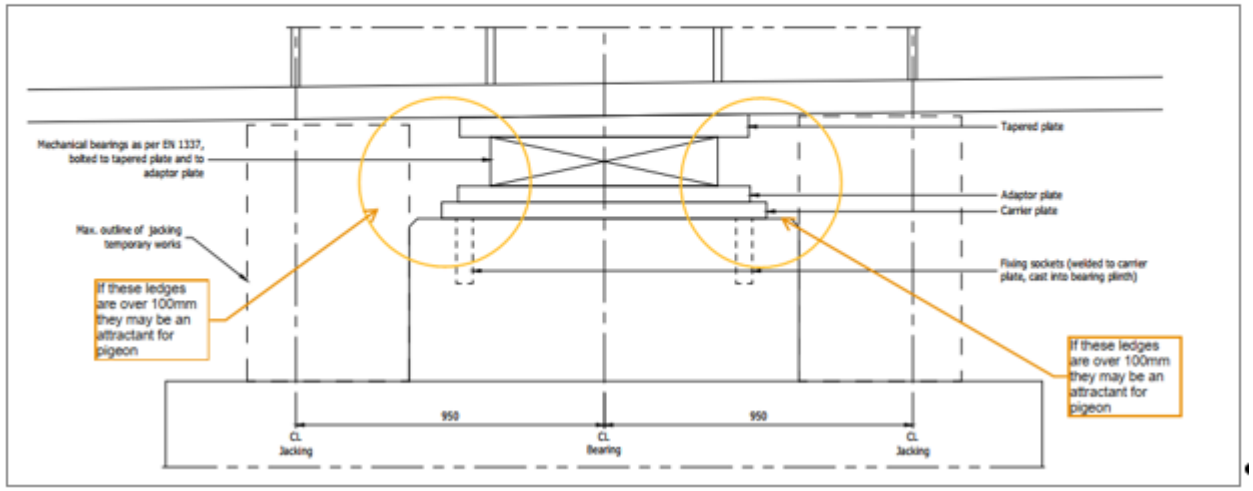


Figure 16: Abstract from reviewed plans for River Wensum Viaduct with highlighted locations of concern

7.6.5 DRA of plans for Drainage Strategy and Landscape Layout

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
1.	**Creation of wetland areas**	**MEDIUM**	**Hazard** • Large areas of open standing water or prolonged standing water are potential attractions for waterfowl for breeding, feeding and loafing and should be avoided to not (cumulatively) add to existing temporary or permanent areas of open standing water. **Recommended Action(s)**: • Design not to include new, large areas of open standing water to avoid increased numbers of waterfowl. • Sediment forebays must be planted to ensure attraction for waterfowl is minimised.	• There are no planned additional large areas of standing water. • Forebays will be small and planted up to minimise any additional attraction for waterfowl. • The proposed plant specification (see details at end) are deemed to be acceptable	**NEGLIGIBLE**	• All newly created wetland areas must be monitored and managed in a manner that ensure continued minimised additional attraction for waterfowl.

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
2.	Creation of species rich grassland	**MEDIUM**	**Hazard** • Creation of new, additional cover and food sources for voles and rabbits that can be preyed upon by Common Buzzards and Kestrels. **Recommended Action(s)**: • Ensure areas of species rich grassland do not become overgrown with shrubs such as Bramble (Rubus) which will provide new additional cover and food sources for voles and rabbits. • A landscape maintenance plan to clear new additional cover and food sources for voles and rabbits	• Areas of species rich grassland will not become overgrown with shrubs such as Bramble (Rubus) which will provide new additional cover and food sources for voles and rabbits. • A landscape maintenance plan to clear new additional cover and food sources for voles and rabbits	**NEGLIGIBLE**	• A landscape maintenance plan to clear new additional cover and food sources for voles and rabbits.

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
3.	Creation of woodland	**MEDIUM**	**Hazard** • Creation of new additional habitat for Corvids through the introduction of species suitable for increased levels of nesting and roosting. **Recommended Action(s)**: If the planting pallet is to include either Scots Pine (*Pinus sylvestris*) or English Oak (*Quercus robur*), these should be planted on a ratio corresponding to the amount of existing pine and oak that have been removed during enabling and construction works.	• If the planting pallet is to include either Scots Pine (Pinus sylvestris) or English Oak (Quercus robur), these must be planted on a ratio corresponding to the existing number of pine and oak removed during enabling and construction works. • A tree maintenance plan to maintain a minimised canopy density.	**NEGLIGIBLE**	• A tree maintenance plan to maintain a minimised canopy density.

7.6.6 DRA of plans for General Arrangement

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
1.	**Site Management**	RED	**Hazard(s)** • As largely speculative creatures, birds will be attracted to enabling and construction works for infrastructure projects. **Recommended Action(s)**: • Close observation of the project's wildlife hazard management plan for enabling and construction works by the Site Manager. This will include but not be limited to: • Site management and site personnel inductions must both include a section on wildlife hazard management • Contractor RAMS must reflect the need to support site wildlife hazard management. • Continuous monitoring and site records should be maintained by the Site Manager throughout enabling and construction works to evidence good practice in wildlife hazard management was in place. • Skips must always be fitted with lids	• All recommended action to be followed	NEGLIGIBLE	• None

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
1.	**Site Management (continued)**	**RED**	**Recommended Action(s) Continued**: or covers at all times. • Recycling materials must be contained within compounds that prevent access by wildlife • Waste disposal collected at adequate intervals Implement campaigns and signage informing site personnel of wildlife hazards	• All recommended action to be followed	**NEGLIGIBLE**	• None
2.	**Disturbed areas of ground during construction**	**RED**	**Hazard(s)** • Birds will be attracted to freshly opened ground, vehicle ruts and soil movement seeking to feed on uncovered invertebrates and/or to drink from pooled water after rain. **Recommended Action(s)**: • Birds should be discouraged from speculatively gathering by using recommended dispersal techniques and products. Products such as hawk kites and bioacoustics can be placed throughout areas where monitoring has observed build-ups of bird activity	• All recommended action to be followed	**NEGLIGIBLE**	• None

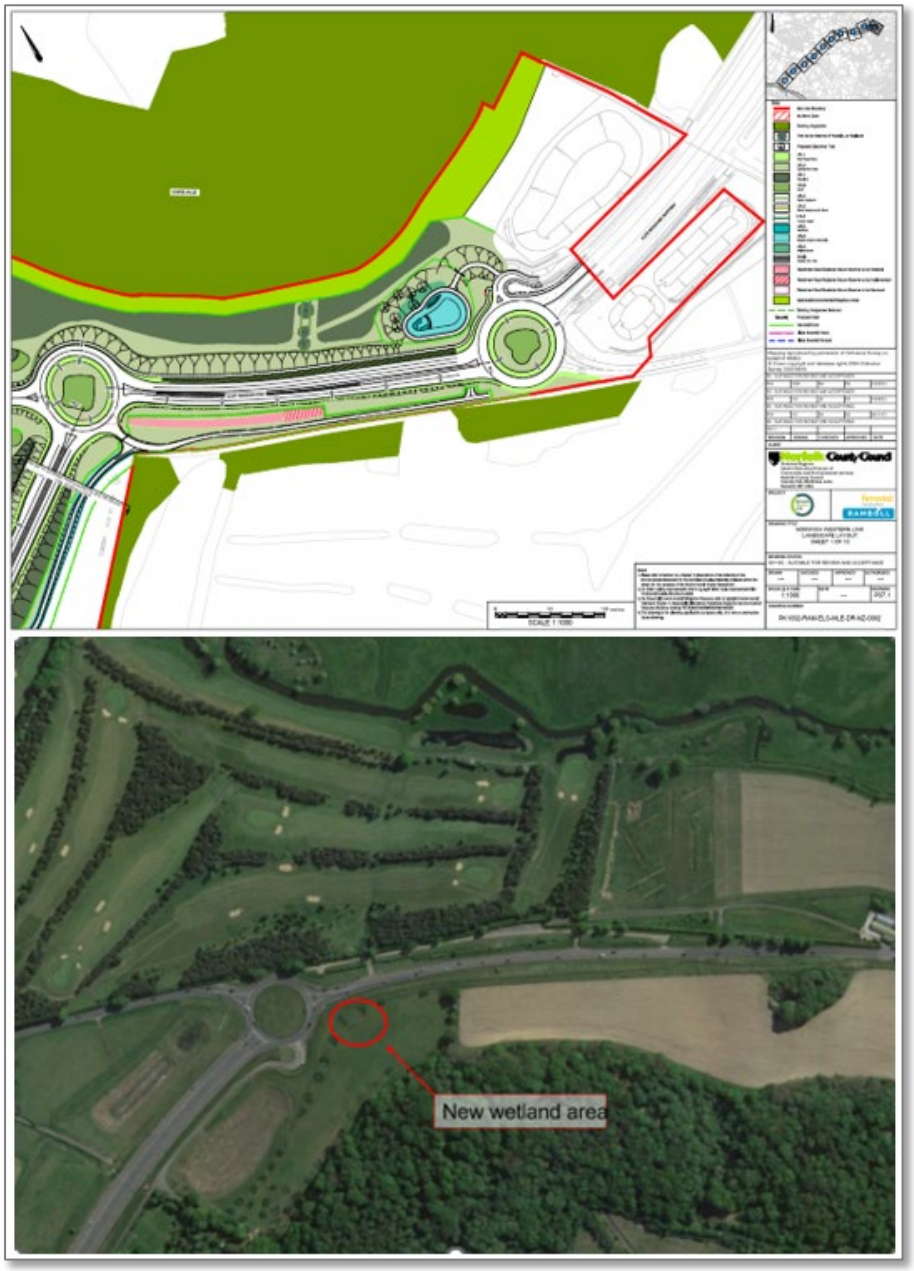
Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
2.	**Disturbed areas of ground during construction (cont)**	**RED**	• Methods of bird deterring should be in place during site actively AND inactivity when birds will feel even more secure to visit the site.	• All recommended action to be followed	**NEGLIGIBLE**	• None
3.	**Creation of soil storage areas**	**HIGH**	**Hazard(s)** • Soil that has been stored in mounds can attract birds for staging, loafing, and foraging for food. • Soil left in situ for long periods before utilised can harbour self-seeded weeds that provide a food supply for birds. • Soil mounds must be adequately protected from foraging birds by either being contained and covered, compacted or seeded to establish a layer of grass to reduce ability of birds to forage in loose soil. • Birds should be discouraged from speculatively gathering by using recommended dispersal techniques and	• All recommended action to be followed	**NEGLIGIBLE**	• None

Ref No.	Potential Catalyst(s)	Initial Risk Rating	Assessed Potential Hazard and Recommended Actions	Agreement	Residual Risk Rating	Agreed Residual Required Actions
3.	**Creation of soil storage areas (cont)**	**HIGH**	products. Hawk kites and bioacoustics to be placed in locations here monitoring has observed build-ups of bird activity • Methods of bird deterring should occur during operational AND non-operational hours to continually deter birds from site.	• All recommended action to be followed	**NEGLIGIBLE**	• None

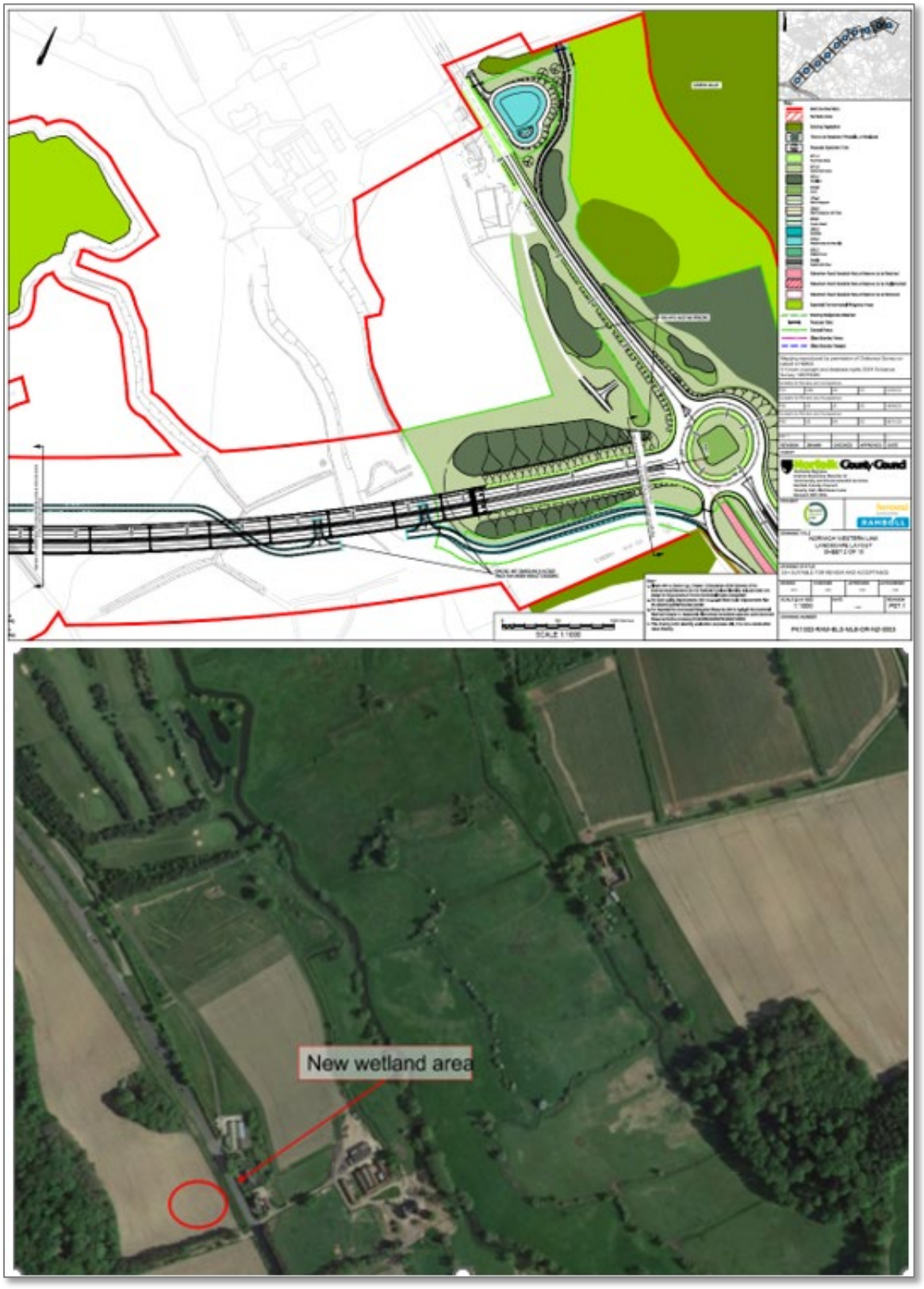
7.7 Appendix G - Comparison between Satellite Images and Proposed Scheme Layout Plans

The following comparisons were undertaken during the DRA process to aid assessment of proposed changes in landscape by subject matter experts. Added for the benefit of the Airport to better understand the exact location of proposed changes by a party unfamiliar with reading scheme layout plans.

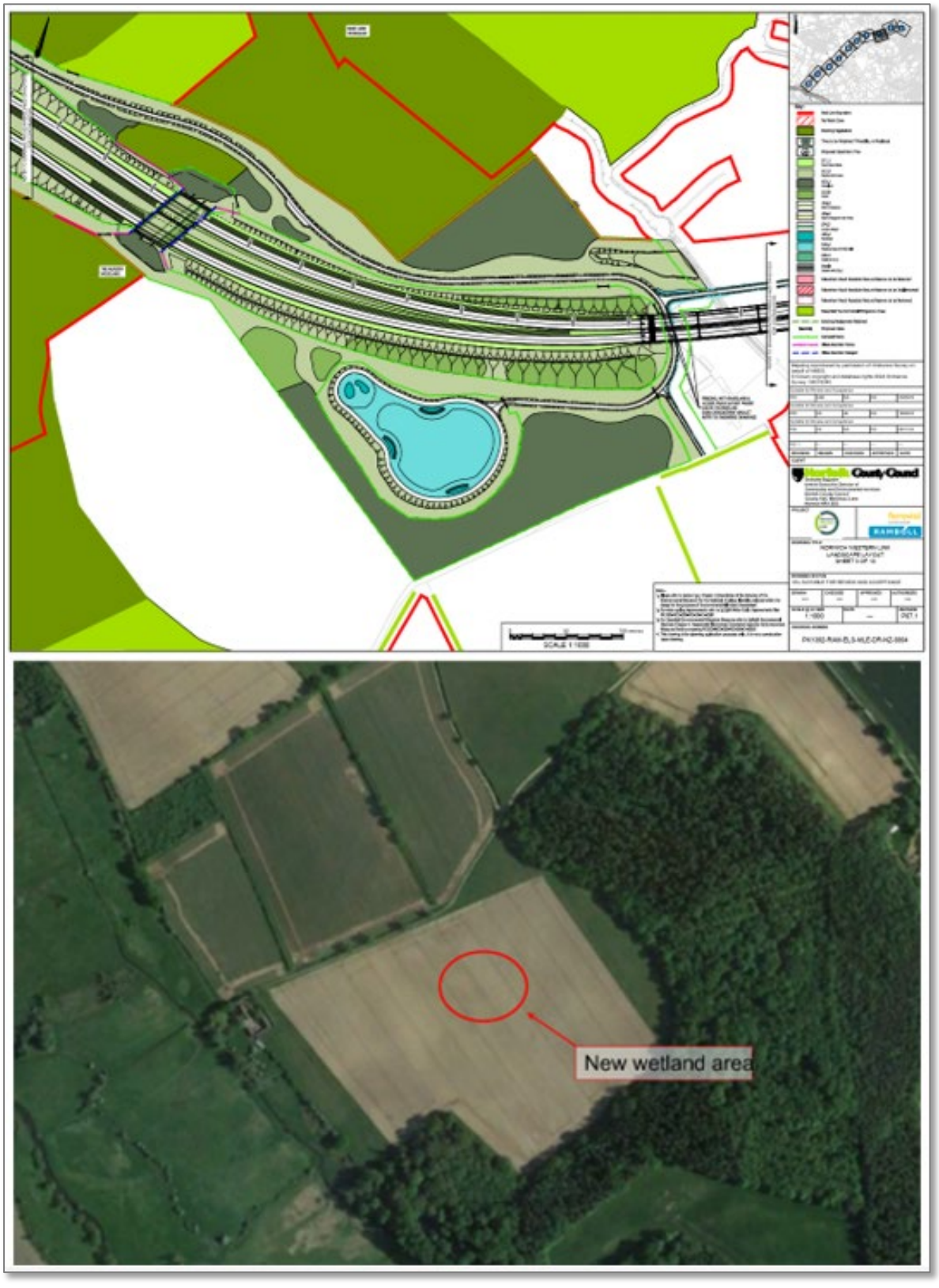
7.7.1 PK1002-RAM-ELS-MLE-DR-NZ-0002 Road Alignment Refinement Landscape Layout



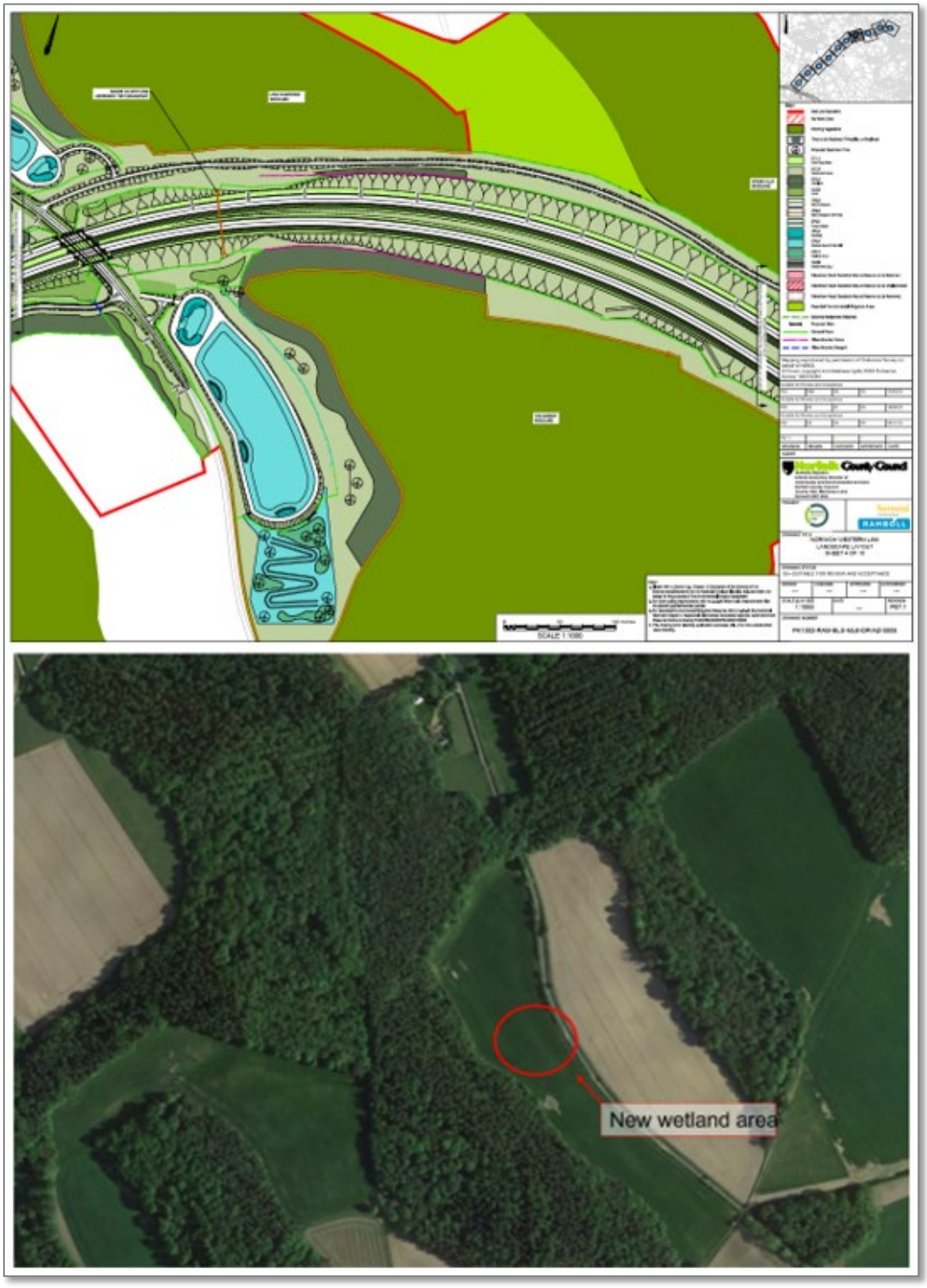
7.7.2 PK1002-RAM-ELS-MLE-DR-NZ-0003 Road Alignment Refinement Landscape Layout



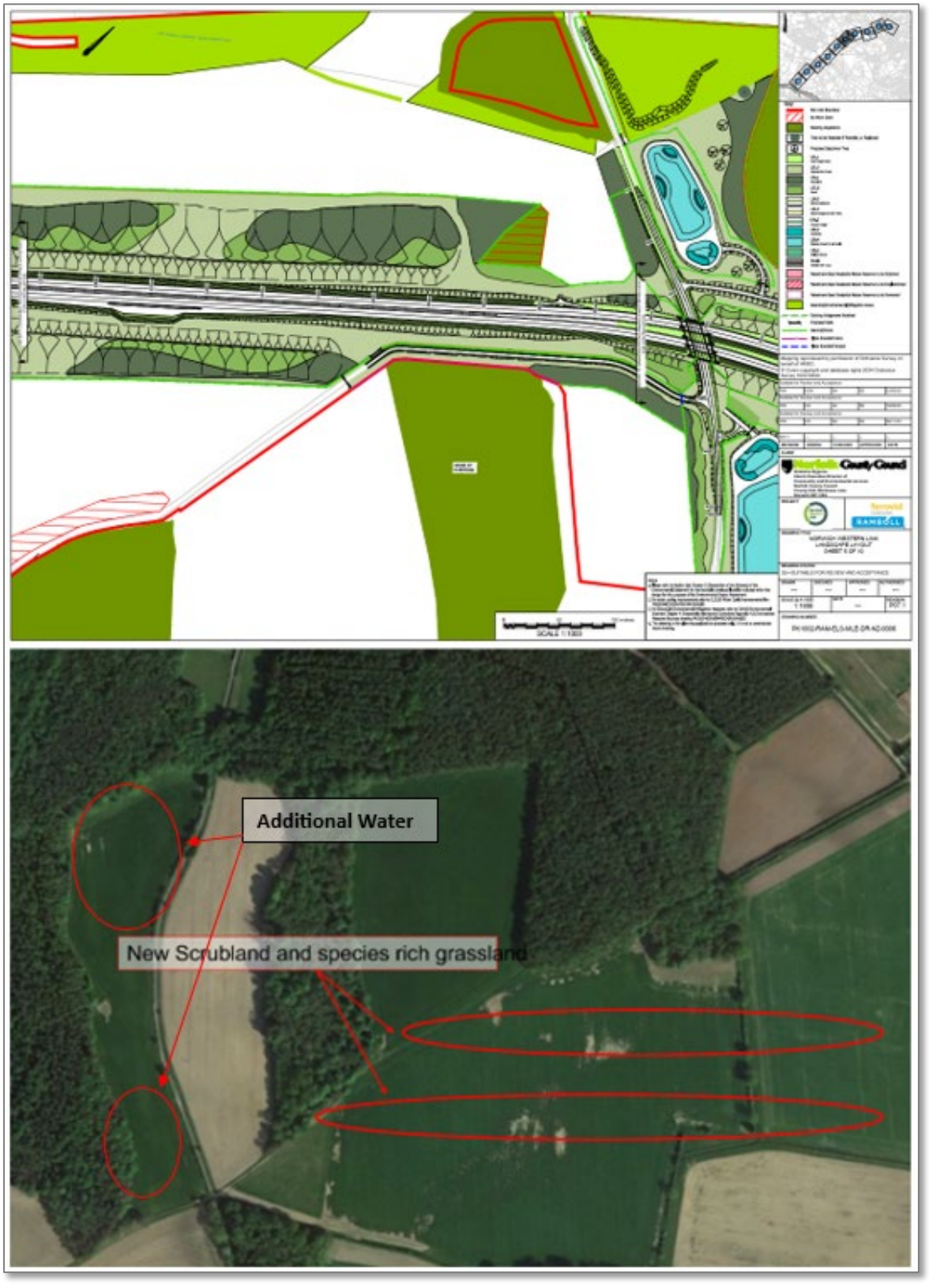
7.7.3 PK1002-RAM-ELS-MLE-DR-NZ-0004 Road Alignment Refinement Landscape Layout



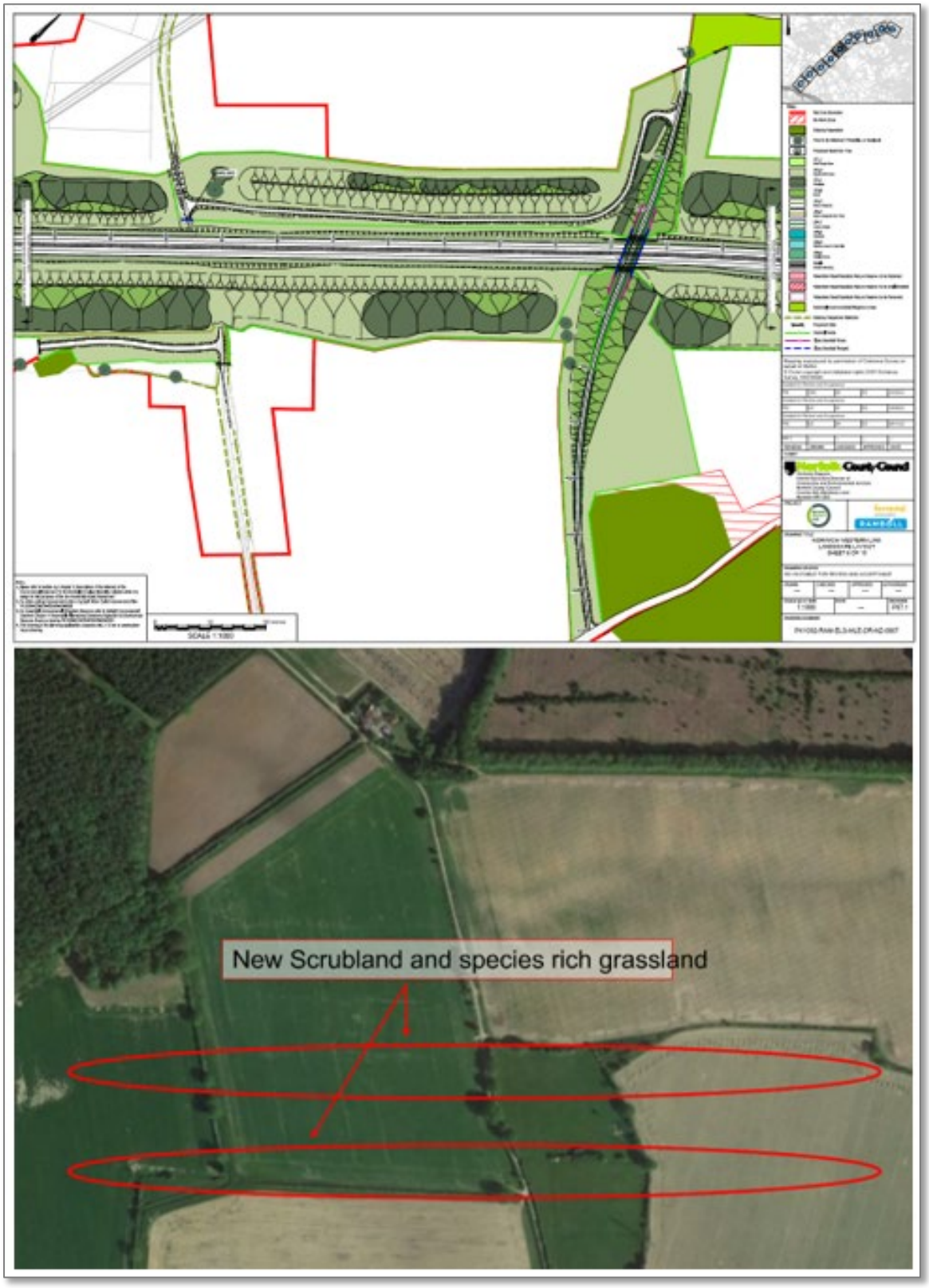
7.7.4 PK1002-RAM-ELS-MLE-DR-NZ-0005 Road Alignment Refinement Landscape Layout



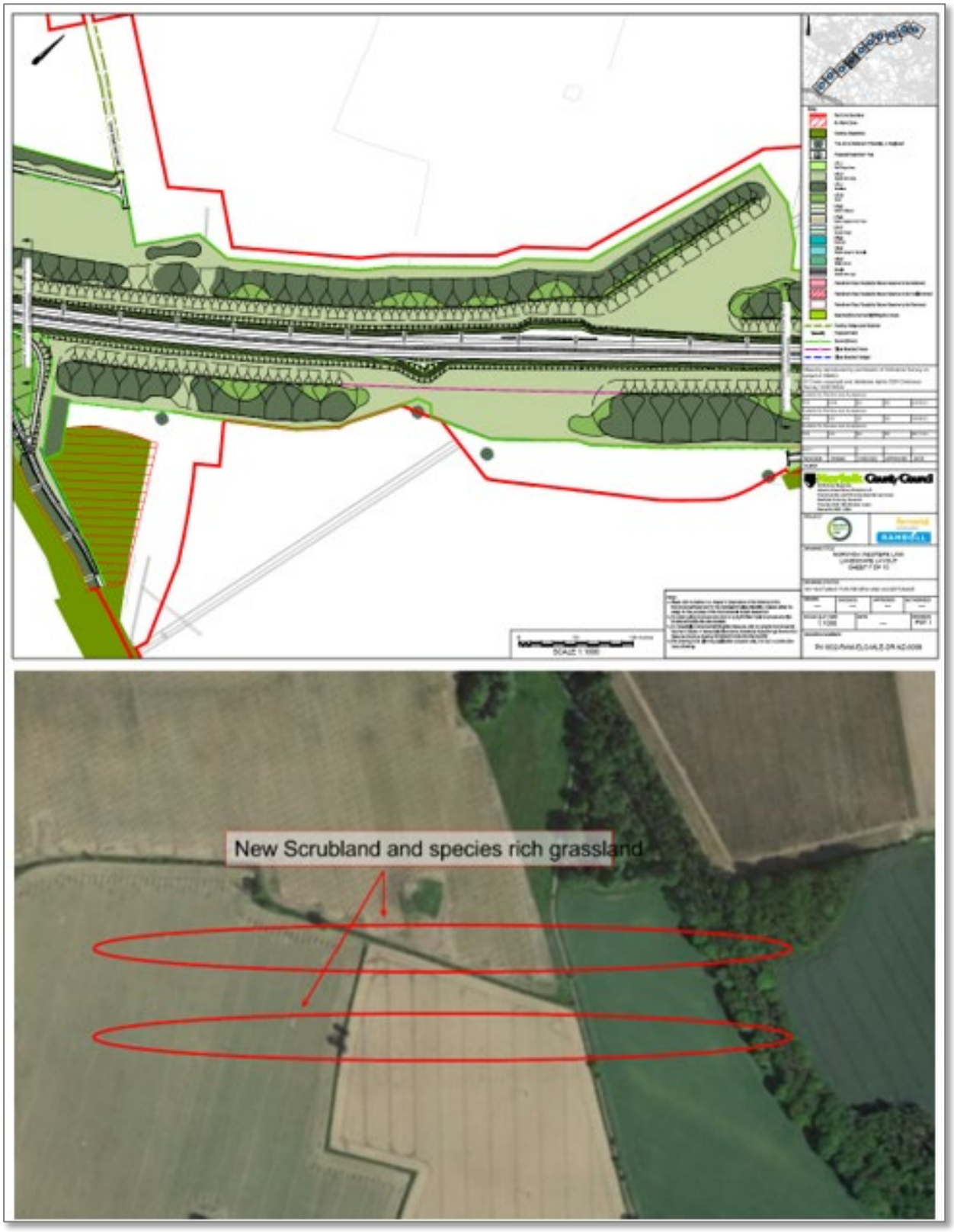
7.7.5 PK1002-RAM-ELS-MLE-DR-NZ-0006 Road Alignment Refinement Landscape Layout



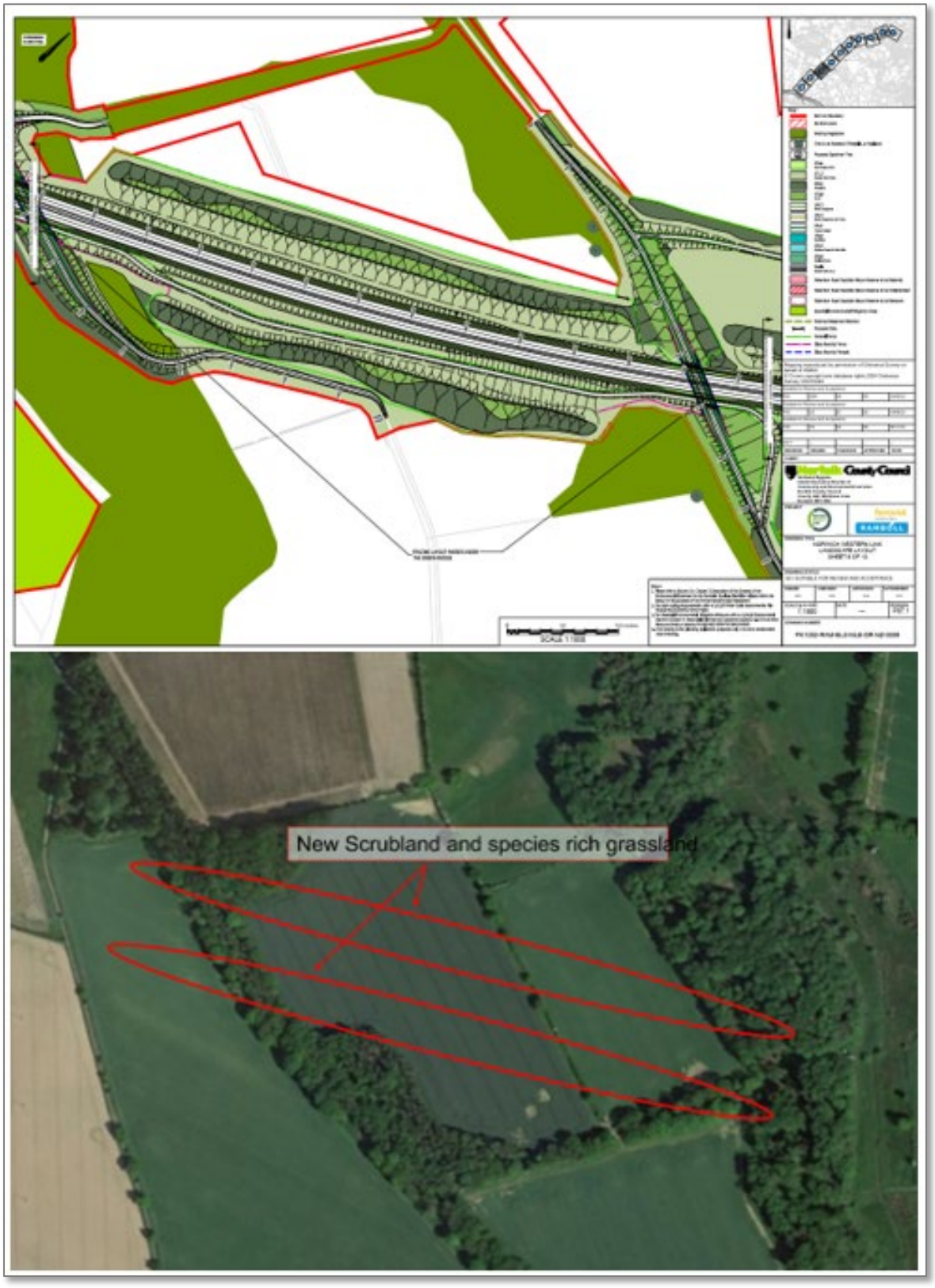
7.7.6 PK1002-RAM-ELS-MLE-DR-NZ-0007 Road Alignment Refinement Landscape Layout



7.7.7 PK1002-RAM-ELS-MLE-DR-NZ-0008 Road Alignment Refinement Landscape Layout



7.7.8 PK1002-RAM-ELS-MLE-DR-NZ-0009 Road Alignment Refinement Landscape Layout



7.7.9 PK1002-RAM-ELS-MLE-DR-NZ-0010 Road Alignment Refinement Landscape Layout

7.7.10 PK1002-RAM-ELS-MLE-DR-NZ-0011 Road Alignment Refinement Landscape Layout

7.8 Appendix H – Full Record of Engagement with Norwich Airport and Associated Agreements

Key:

FC Francisco Quesada Colmenero

Airport Norwich Airport

NWL Norwich Western Link (i.e. The Proposed Scheme)

NCA Norwich City Airport

Date	Form of Correspondence	Key Topics / Outcomes (if any)
06/09/22	Email (FC to Aviaire)	**Topic:** Contact details for Safeguarding Officer at Norwich Airport
06/09/22	Telephone call (Aviaire to Airport)	**Topic:** Courtesy first contact and introduction from Aviaire to Airport **Outcome:** Positive relationship established and agreement for receipt of relevant wildlife hazard information from Airport
09/09/22	Email (Airport to Aviaire)	**Topic:** Project relevant information **Outcome:** Receipt of relevant wildlife hazard KMZ files from Airport
27/09/22	Email (Aviaire to Airport)	**Topic:** Email to scope out potential level of objection from Airport to current proposals in NWL project
30/09/2022	Email (Aviaire, NCA)	**Topic:** Proposal for 1st safeguarding meeting to discuss NWL project and current wildlife hazards for airport
04/10/22	Teams Meeting (Aviaire, NCA)	**Topic**: 1st safeguarding meeting to discuss NWL project and current wildlife hazards for airport
04/10/22	Email (Aviaire to Airport)	**Topic:** Key notes from 1st safeguarding meeting on 04/10/22

Date	Form of Correspondence	Key Topics / Outcomes (if any)
05/10/22	Email (Aviaire to Airport)	**Topic:** Proposal for 2nd safeguarding meeting. Agenda to cover all aspects of airport safeguarding: • Technical safeguarding • Physical safeguarding • Wildlife Hazard Safeguarding
06/10/22	Emails (Airport to Aviaire)	**Topic:** Bridge and drainage observations. **Outcome:** Approval from airport for 1st safeguarding meeting and receipt of airport observations on local bridges regarding bridge features of concern and observed presence of feral pigeons
06/10/22 - 07/10/22	Emails (FC, Airport & Aviaire)	**Topic:** Scheduling of 2nd Safeguarding Meeting.
10/10/2022	Teams Meeting (Aviaire, FC, NCA)	**Topic:** 2nd Safeguarding Meeting – Update on NWL Project and requirement for a Wildlife Hazard Risk Assessment. **Outcome:** Norwich Airport Safeguarding Manager is familiar with the project and scope of WHRA and WHMP are agreed. Minutes of the meeting sent the day after
17/10/22	Email (Aviaire, FC & Airport)	**Topic:** Scheduling of NWL site visit by Aviaire and Airport

Date	Form of Correspondence	Key Topics / Outcomes (if any)
20/10/2022 to 27/10/2022	Email (Aviaire, FC, NCA)	**Topic:** Site visits information exchange to assess presence of bird species of concern both in the surroundings of NWL scheme and similar developments. **Outcome:** No presence of feral pigeons on the surroundings of the scheme/similar structures in the surroundings
27/10/22	Telephone call and Emails (Aviaire – Airport)	**Topic.** Bridges, feral pigeon risks, mitigation liabilities and costs **Outcome**: Verbal agreements in principle from Airport to be formally confirmed at planned safeguarding meeting on 31/10/22
27/10/22 to 28/10/22	Emails (Aviaire, FC & Airport)	**Topic:** Scheduling of 3rd safeguarding meeting.
31/10/2022	Teams Meeting (Aviaire, FC, NCA)	**Topic: 3rd** Safeguarding meeting ref. WHRA and WHMP submission and explanation to NCA. Discussion over site visit data. **Outcome:** Airport agrees on the mitigation measures proposed by FC with regards to wildlife risks against the NCA operations Minutes of the meeting sent the day after
01/11/22	Email (Airport to FC & Aviaire)	**Topic:** NWL - MoM RE: NWL - Minutes of 3rd Safeguarding meeting **Outcome:** Agreement to MoM from Airport and Aviaire

Date	Form of Correspondence	Key Topics / Outcomes (if any)
16/1/23	Telephone call (Aviaire to Airport)	**Topic:** To scope available dates for 4th Safeguarding meeting to discuss Landscape Plan Tree Planting issues found out and the potential impact to the WHRA.
16/01/2022 to 19/01/23	Telephone call and Emails (Aviaire, FC, NCA)	**Topic:** Scheduling of 4th Safeguarding meeting to discuss Landscape Plan Tree Planting issues found out and the potential impact to the WHRA. **Outcome:** Meeting arranged for the 23/01/2023
23/01/2023	Teams Meeting (Aviaire, FC, NCA)	**Topic:** 4th Safeguarding meeting to discuss Landscape Plan Tree Planting issues found out and the potential impact to the WHRA. **Outcome:** Mitigation Measures were proposed and agreed between FC and NCA. Minutes of the meeting sent the day after
23/01/23	Email (Airport to Aviaire & FC)	**Topic:** Latest Airport 13km Survey results. **Outcome:** Receipt of Airport observations on current rookeries around the airport
02/02/23	Email (Airport to FC & Aviaire)	**Topic:** MoM for 4th Safeguarding meeting on 23/01/23 **Outcome:** Agreement to MoM from Airport and Aviaire

On October and November 2022 there were agreements made between the Applicant and Norwich Airport in respect of the approach to feral pigeons (item 1.1. below):

[redacted]

From: [redacted]
Sent: 01 November 2022 11:25
To: [redacted]
Cc:
Subject: RE: NWL - Minutes of the meeting Airport Safeguarding

Morning Rodrigo,

Thanks for sending the minutes, with which I'm happy.

Regards

[redacted]
Airfield Manager
(Airfield Safeguarding/Airfield Operations/Airfield Maintenance)
Tel: [redacted]
Mobile: [redacted]
Email: [redacted]
Safeguarding: [redacted]

NorwichAirport
Part of Regional & City Airports

Norwich Airport
Amsterdam Way
Norwich Norfolk
NR6 6JA
T: +44 (0)1603 411923
www.norwichairport.co.uk

NETZERO 2050

From: [redacted]
Sent: 01 November 2022 10:45
[redacted]
Subject: NWL - Minutes of the meeting Airport Safeguarding

Hi all,

Please find attached the minutes of the meeting we had yesterday. Please confirm you are ok with them and I'll push them forward.

Thanks,

Kind regards,

[redacted]
Senior Environmental Design Lead
Norwich Western Link
[redacted]

1

Figure 17: Copy of email confirming approval between the Applicant and Norwich Airport for minutes of meeting in October 2022

ferrovial construction

NORWICH WESTERN LINK
TEMPLATE

Doc. Ref: NCCT41793-FER-XXX-XXX-MI-YZ-0001
Rev: P01 Page: 1 of 2

AGENDA & MEETING NOTES

PROJECT NUMBER	NCCT41793	**MEETING DATE**	31/10/2022
PROJECT NAME	Norwich Western Link	**VENUE**	Teams
CLIENT	Norfolk County Council	**RECORDED BY**	Rodrigo Mata
MEETING SUBJECT	Norwich Western Link Airport Safeguarding – Wildlife Hazard Assessment		

PRESENT	Rodrigo Mata (RM) – Ferrovial Construction Environmental Design Lead Cerian Henshaw (CH) – Aviaire Director of Operations Alex Moffat (AM) – Aviaire Technical Director Anthony "Tony" Isherwood (TI) – Norwich Airport Safeguarding Managermm
APOLOGIES	Francisco Quesada – FER Engineering Manager
DISTRIBUTION	As above
CONFIDENTIALITY	

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Template Rev: 1.0
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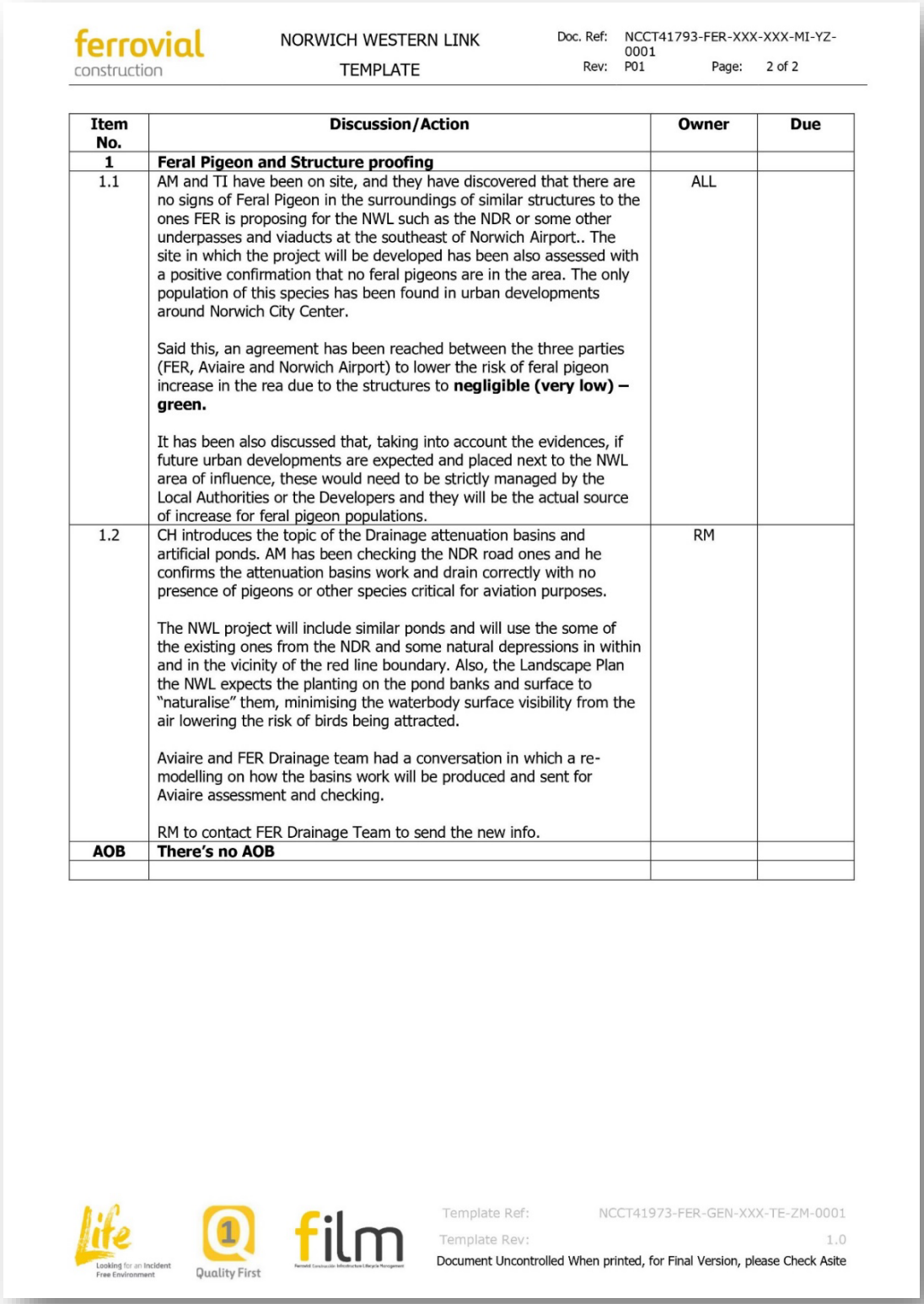
Figure 18: Minutes of meeting between Applicant and Norwich Airport in Oct 22 (Page 1).



ferrovial construction

NORWICH WESTERN LINK
TEMPLATE

Doc. Ref: NCCT41793-FER-XXX-XXX-MI-YZ-0001
Rev: P01 Page: 2 of 2

Item No.	Discussion/Action	Owner	Due
1	**Feral Pigeon and Structure proofing**		
1.1	AM and TI have been on site, and they have discovered that there are no signs of Feral Pigeon in the surroundings of similar structures to the ones FER is proposing for the NWL such as the NDR or some other underpasses and viaducts at the southeast of Norwich Airport.. The site in which the project will be developed has been also assessed with a positive confirmation that no feral pigeons are in the area. The only population of this species has been found in urban developments around Norwich City Center. Said this, an agreement has been reached between the three parties (FER, Aviaire and Norwich Airport) to lower the risk of feral pigeon increase in the rea due to the structures to **negligible (very low) – green.** It has been also discussed that, taking into account the evidences, if future urban developments are expected and placed next to the NWL area of influence, these would need to be strictly managed by the Local Authorities or the Developers and they will be the actual source of increase for feral pigeon populations.	ALL	
1.2	CH introduces the topic of the Drainage attenuation basins and artificial ponds. AM has been checking the NDR road ones and he confirms the attenuation basins work and drain correctly with no presence of pigeons or other species critical for aviation purposes. The NWL project will include similar ponds and will use the some of the existing ones from the NDR and some natural depressions in within and in the vicinity of the red line boundary. Also, the Landscape Plan the NWL expects the planting on the pond banks and surface to "naturalise" them, minimising the waterbody surface visibility from the air lowering the risk of birds being attracted. Aviaire and FER Drainage team had a conversation in which a re-modelling on how the basins work will be produced and sent for Aviaire assessment and checking. RM to contact FER Drainage Team to send the new info.	RM	
AOB	**There's no AOB**		

Life Looking for an Incident Free Environment
Quality First
film

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Template Rev: 1.0
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Figure 19: Minutes of meeting between Applicant and Norwich Airport in Oct 22 (Page 2).