The Network Rail
(East West Rail Bicester to Bedford Improvements) Order

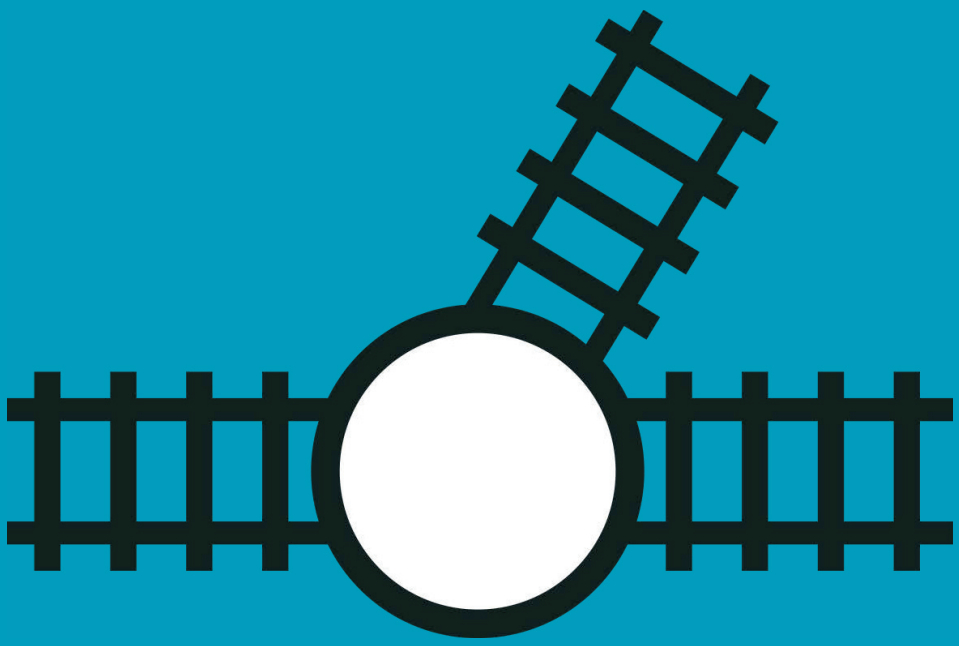
Transport and Works Act 1992

The Transport and Works
(Inquiries Procedure) Rules 2004

Proof of Evidence of Andrew Shuttleworth

Environment

NR48



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List of acronyms and abbreviations

Acronym or abbreviation	Definition
AVDC	Aylesbury Vale District Council
AVP	Aylesbury Vale Parkway
BBC	Bedford Borough Council
BBM	Bletchley to Bedford Midland ELR
BCC	Buckinghamshire County Council
BFO	Bletchley Flyover (Engineering Line Reference)
CBC	Central Bedfordshire Council
CDC	Cherwell District Council
CEMP	Construction Environmental Management Plan
CFSA	Compensatory Flood Storage Area
CoCP	Code of Construction Practice
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan
dB	Decibel (unit for measurement of noise)
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DNO	Distribution Network Operator
EA	Environment Agency
ECS	Ecological Compensation Site
EEHSA	England's Economic Heartlands Strategic Authority
EIA	Environmental Impact Assessment
ES	Environmental Statement
EWR	East West Rail
EWR2	East West Rail Western Section Phase 2
EWRC	East West Rail Consortium
EWRCo	EWR Company
FOC	Freight Operating Company
FRA	Flood Risk Assessment
GQRA	Generic Quantitative Risk Assessment
GRIP	Governance for Rail Investment Projects (the NR process to manage railway upgrades)
HGV	Heavy Goods Vehicle
LEP	Local Enterprise Partnerships
LGV	Light Goods Vehicle

Acronym or abbreviation	Definition
LiDAR	Light Detection And Ranging (a remote sensing topographic survey technique)
LLFA	Lead Local Flood Authority
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
MCJ	Marylebone to Claydon L&NE Junction
MKC	Milton Keynes Council
NPPF	National Planning Policy Framework
NPSE	Noise Policy Statement for England
NPSNN	National Policy Statement for National Networks
NR	Network Rail
OCC	Oxfordshire County Council
ORR	Office of Rail and Road
OXD	Oxford Branch (Oxford to Bletchley)
PAWG	Planning Ahead Working Group
PRA	Aylesbury Branch (Princes Risborough to Aylesbury)
PRoW	Public Right of Way
SOAEL	Significant Observed Adverse Effect Level
SoC	Statement of Case
Te	Tonnes
TOC	Train Operating Company
tph	trains per hour
TSS	Train Service Specifications
TWA	Transport and Works Act
TWAO	Transport and Works Act Order
VfM	Value for Money
WCML	West Coast Main Line
WFD	Water Framework Directive
WSI	Written Scheme of Investigation (for archaeological works)

Glossary

Term	Definition
Ballast	The material used to support and secure track, usually made up of granite stones. Also provides a drainage function.
Construction compound	An area used by the contractors during construction for civil engineering works, railway installation works and the storage of materials.
Construction Environmental Management Plan	The mechanism through which construction phase mitigation will be implemented.
Construction phase	The period when construction of EWR2 takes place.
Culvert	A structure that allows water to flow under a road, railway or similar obstruction from one side to the other side.
Department for Transport	The UK Government department responsible for the UK transport network and infrastructure.
Double track	A railway where one track runs in each direction, compared to a single-track railway where trains in both directions share the same track.
Embankment	Where the railway is raised up on a bank (generally soil or rock based) in relation to the surrounding ground level to avoid a change in level of the railway itself.
Environmental Impact Assessment	The process by which the anticipated impacts on the environment of a proposed development or project are measured.
Environmental Statement	The report setting out the process and findings of an Environmental Impact Assessment.
EWR	A programme of works which aims to establish a strategic railway connecting East Anglia with Central, Southern and Western England.
EWR Alliance	Collaborative partnership of project owner participant Network Rail along with three delivery partners: Atkins, Laing O'Rourke and VolkerRail to build EWR2.
EWR Consortium	A group of local authorities and strategic partners promoting the reinstatement of the strategic EWR route.
EWR Phase 1	Phase 1 of EWR Western Section works were completed between Oxford and Bicester and became operational in December 2016, as authorised by The Chiltern Railways (Bicester to Oxford Improvements) Order 2012.
EWR Western Section	The railway forming the western section of EWR between Oxford and Bedford, Milton Keynes and Aylesbury. The Western Section comprises EWR Phase 1 and EWR2.
EWR Phase 2 or EWR2	The second phase of the western section of EWR. Includes all elements of the Order Scheme, plus the operational railway between Bicester, Bedford, Bletchley and Aylesbury on which EWR2 train services operate, up to the points at which they join the main existing rail network
Existing railway corridor	The 48 miles (78km) of railway corridor that already exists between Bicester, Bletchley, Milton Keynes, Bedford and Aylesbury.
GSM-R masts	A Global System for Mobile Communications- Railway is an international wireless communications standard for railway communication and applications.
Haul road	A temporary road built to facilitate the movement of equipment and materials during project construction.

Term	Definition
HS2	Phase One of High Speed Two which is authorised under the High Speed Rail (London - West Midlands) Act 2017.
Level crossings	A place where a railway and a highway or right of way cross at the same level.
Mitigation measures	Mitigation represents any process or action designed to avoid, reduce or remedy significant adverse environmental effects likely to be caused by a development project.
Overbridge	A bridge crossing over the railway.
Permitted development rights	Elements for work qualifying under Part 18 Class A to Schedule 2 of the Town and Country Planning (General Permitted Development) Order 2015.
Rail	Linear steel support for train wheels. Two rails secured to sleepers make up the track.
Railway	General term referring to the rail transport system as whole and the corridor in which it sits.
Single track	A railway where trains travelling in either direction share the same section of track.
The Order	The Network Rail (East West Rail Bicester to Bedford Improvements) Order.
The Order Scheme	The works, compulsory purchase and temporary possession authorised under the Order and associated permitted development rights
Track	Rail system consisting of two rails, secured on sleepers, on which trains run.
TWA	Transport and Works Act 1992.
Underbridge	A bridge under the railway.

1 Introduction

1.1 Personal details

1.1.1 I am a Technical Director with Atkins, who are retained by Network Rail as part of the East West Rail Alliance. I am a Landscape Architect by profession with 33 years' experience. I have a BA in botany, a postgraduate Diploma in landscape design and am a chartered member of the Landscape Institute (CMLI).

1.1.2 I have been providing guidance for and review of environmental documentation produced in support of the Order Scheme TWAO since late 2016. I have provided general guidance to the environment team as required and have been involved in several aspects of EWR2:

- Contributing to the review of the 2016 draft Environmental Statement.
- Reviewing the general approach to environmental mitigation design.
- Reviewing various general and topic chapters to the final Environmental Statement (ES) at each review stage.
- Providing a draft report on the environmental consequences of and consents needed for the HS2 proposal to construct the HS2 earthworks between Quainton and the HS2 Interface Area as a combined earthwork with that required for EWR, known as the MCJ South combined earthworks.
- Advising on the scope of the environmental appraisal reports (EARs) provided for the advance compound construction applications in Route Sections 2A, 2B and 2C, plus reviewing the final reports.

1.2 Scope of evidence

1.2.1 My evidence provides an overview of the likely environmental impacts of constructing and operating the Order Scheme, with reference to:

- The likely environmental impacts of constructing and operating the project.
- Any measures to avoid, reduce or remedy any major or significant adverse environmental impacts.
- Whether and, if so, to what extent any adverse environmental impact would remain after the proposed mitigation.
- The anticipated environmental benefits of the project.

1.2.2 My evidence presents the key aspects of environmental design and construction management incorporated into the Order Scheme and outlines the residual environmental effects of the Order Scheme, by topic and, where appropriate, by Route Section.

1.2.3 I then consider the objections made to the TWAO that raise issues covered by the environmental topics in my evidence, starting with an overview of the principal themes arising from the objections, then addressing those objections with a Statement of Case and objections from local authorities and finishing by addressing the remaining objections. A tabular indication of the environmental topics raised in these objections is provided in Appendix A.

1.2.4 I provide evidence on the following topics:

- Environmental design
- Environmental management during construction
- Land use and agriculture
- Cultural heritage
- Air quality
- Noise and vibration
- Geology, soils and land contamination

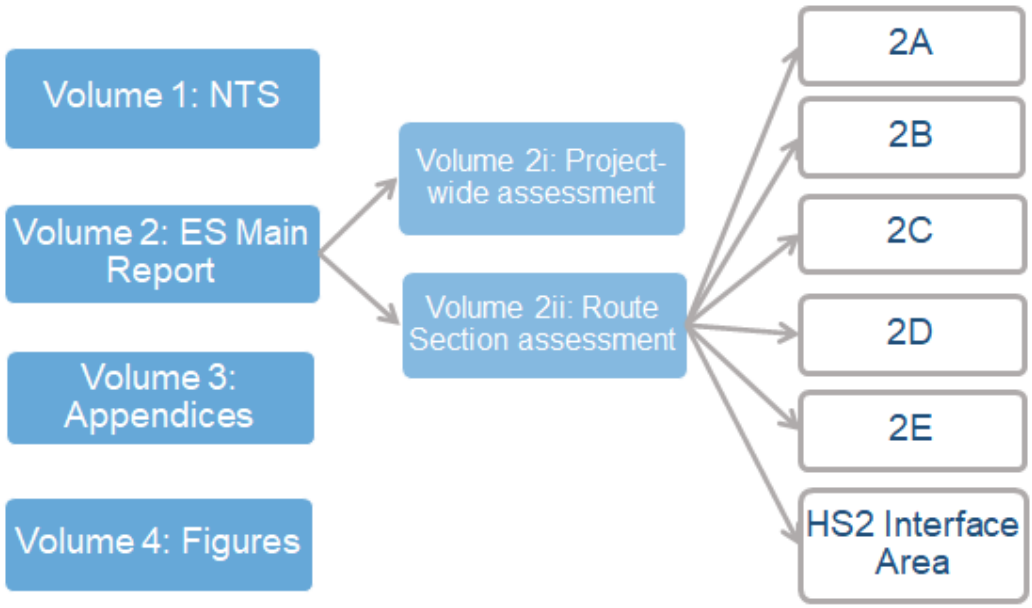
- Landscape and visual
- Water quality and flood risk

1.3 The environmental statement

1.3.1 The Order Scheme has been subject to an Environmental Impact Assessment (EIA), which is reported in the Environmental Statement (ES) (**NR16**). The ES comprises four volumes, as indicated on Insert 1.1:

- Volume 1 – non-technical summary
- Volume 2 – main report (in two parts)
  - Volume 2i – provides an introduction and description of the elements of EWR2, the construction methods, mitigation measures and EIA methodology, and an outline of the main alternatives considered and the project-wide assessment for each environmental topic, along with project-wide mitigation proposed
  - Volume 2ii – provides a description of the topic assessments, including proposed mitigation, divided into six individual Route Section reports
- Volume 3 – provides the appendices as needed relevant to each chapter or topic to accompany Volume 2i and the individual Volume 2ii Route Section reports
- Volume 4 – presents the scheme drawings, environmental design drawings and figures relevant to each chapter or topic to accompany Volume 2i and the individual Volume 2ii Route Section reports

Insert 1.1: Structure of the ES



1.3.2 EWR2 is fundamentally a railway reinstatement project, as the railway corridor already exists between Bicester, Bletchley, Milton Keynes, Bedford and Aylesbury. This is the context in which the Order Scheme design has been developed and the EIA undertaken:

- Route Section 2A is existing railway on which freight services currently operate
- Route Section 2B is an existing railway corridor that is “mothballed” and has not been open to rail traffic since 1993
- Route Section 2C is existing railway on which freight services currently operate
- Route Section 2D is existing railway on which passenger and freight services currently operate
- Route Section 2E is existing railway on which passenger and freight services currently operate (freight only north of Aylesbury Vale Parkway Station)

- The HS2 Interface Area is existing railway on which freight services currently operate

1.3.3 The track will be reinstated throughout all Route Sections, except for 2D and for 2E south of Aylesbury Vale Parkway Station, where the track will be maintained in its existing position.

1.3.4 Within the HS2 Interface Area, EWR2 already benefits from permission to construct and operate the railway infrastructure granted under the HS2 Act. Network Rail is not therefore seeking permission under the Order for these works, which have already been the subject of environmental assessment carried out for the HS2 Act. The exception is works to construct a bat mitigation structure; this has been authorised under the HS2 Act, but Network Rail is seeking to extend it over the MCJ line as part of the Order Scheme. As a result, the HS2 Interface Area section of the ES covers the operational impacts of EWR2 and the construction and operation of the extension to the bat mitigation structure.

1.3.5 The Order Scheme ES reports a conservative assessment of effects and allows for incorporated mitigation appropriately. EWR2 will facilitate an increase in capacity for passenger and freight services and the EIA assesses a timetable that allows for future growth and other funded railway schemes. The EIA assumes that all available railway paths are filled, therefore presenting a worst case in terms of the impacts of railway operations. Further details on the assessed train services can be found in the ES (NR16) Chapter 2 (Project description), Volume 2i Project-wide

1.3.6 In addition to the EIA reported in the ES, an assessment of land use has also been reported in the Planning Statement (**NR10**).

1.4 Environmental design

1.4.1 The design of the engineering aspects of the Order Scheme has sought to avoid, reduce and compensate for environmental impacts wherever possible. The Order Scheme has been designed using an iterative process with environmental and sustainability considerations at its core, which has been informed by the EIA and through consultation. This includes repositioning of infrastructure or temporary works to reduce impact on or avoid environmental constraints (such as aligning access tracks away from woodland edges to avoid disturbance) and use of modern engineering solutions that reduce environmental impacts (such as continuously welded rails, which reduce noise and vibration).

1.4.2 Some fundamental elements of the railway are fixed, such as its existing alignment and the locations of existing stations, but the designs for the many elements that need to be changed or added to this have been subjected to the Value for Money (VfM) system to determine the preferred outcomes. This includes multi-disciplinary workshops in which value is considered in its widest sense and encompasses: environment and sustainability; community and external stakeholders; internal stakeholders; constructability; safety; technical performance; cost including whole life cost; programme; and resources.

1.4.3 The VfM option selection process has been applied to a range of Order Scheme infrastructure, including bridges, roads, access tracks, footpaths, Winslow station, additional or extended station platforms, environmental works, footbridge materials, drainage, earthworks retaining structures and culverts.

1.4.4 Where it has not been possible to avoid adverse impacts, environmental features have been integrated into the design. The environmental design is integral to the overall design of the Order Scheme, and has been created using the design objectives, considerations and principles that are set out in the Environmental Design Statement, in Appendix 12.4 to Volume 3 of the ES (**NR16**). The design is illustrated on the Environmental Design Drawings in Volume 4 of the ES and is accompanied by an Environmental Design Schedule, in Appendix 2.3 to Volume 3 of the ES, which sets out the purpose and requirement for each element of mitigation.

1.4.5 Throughout the Order Scheme design process, the mitigation hierarchy, shown in Table 1.1 below, has been applied. This sets out the order in which mitigation actions have been considered, from most desirable to least desirable, to address significant adverse effects identified by the EIA.

1.4.6 Where likely significant effects have been predicted due to construction and/or operation of the Order Scheme, mitigation measures have been incorporated into the design to avoid, reduce or compensate for these impacts and effects. Measures can also be proposed to enhance predicted beneficial effects arising from a project.

1.4.7 In general terms, the environmental design covers landscape, ecology, noise and vibration, and flood storage, as set out in the following sections and in the ecology evidence. Further detail is provided in the ES (**NR16**) Volume 2i Project-wide, Chapter 2 Project description and Chapter 16 Summary of mitigation, and the mitigation sections in the relevant topic chapters in Volume 2i Project-wide: 9 Ecology, 10 Noise and vibration, 12 Landscape and visual, 13 Water quality and flood risk.

Table 1.1: Mitigation hierarchy

Mitigation action	Description	General examples
Avoid	Measure(s) taken to ensure an identified effect does not occur. This is the most preferable solution.	Design change to avoid land take; consultation with stakeholders to avoid impacts; management of emissions at source, e.g. dust control measures set out in the Code of Construction Practice; re-siting of the construction compound at Fleet Marston to avoid archaeological impacts; re-distribution of construction traffic to avoid Stratton Audley.
Minimise or reduce	Measure(s) taken to decrease the significance of an identified effect. Effects can either become not significant or remain significant, although to a lesser extent. Where effects cannot be avoided this is the next most preferable solution.	Use of continuously welded rails to reduce noise and vibration impacts; provision of noise insulation and barriers; reduction of construction compound (B3) area at Furze Lane; reducing vegetation removal requirements on Route Section 2E; implementation of landscape planting.
Restore or compensate	Where an effect cannot be avoided or reduced, it is proposed to rehabilitate affected areas, or provide alternative equivalent resource elsewhere (and preferably nearby).	Ecological compensation sites; landscape restoration and reinstatement of agricultural land condition after construction; implementation of compensatory flood storage areas.

1.4.8 Throughout the detailed design of EWR2, during the GRIP5 project stage, the environmental design proposals will be developed further to accommodate stakeholder considerations and the recent and emerging survey information.

1.4.9 At the end of construction, temporary works areas such as compounds will be removed and all working areas will be restored to existing, or similar, conditions. Soils beneath the construction footprint will be reinstated where appropriate and planted and seeded in line with Environmental Design Drawings in Volume 4 of the ES.

Land use and agriculture

1.4.10 The main impact of the Order Scheme with potential to result in significant effects on land use and agriculture arises from the temporary and permanent land take. The EWR Alliance has consulted with landowners and line side neighbours and has consequently reduced third party land take and severance impacts by optimising the design and/or the construction methodology. These discussions are continuing, to inform the future design development.

1.4.11 Haul roads have been included within the temporary works in seven locations where the permanent land take provides sufficient space to provide them for the period of most need. This has helped minimise the need for temporary land acquisition to five locations for the provision of other haul roads.

Landscape and ecology

1.4.12 The landscape and ecological proposals have always been considered as an interrelated aspect of the environmental design and so I consider them together here. They are an important component of the Order Scheme, as this will entail the removal of the existing lineside vegetation in Route Sections 2A, 2B and 2C and parts of 2D and 2E. This interrelated approach is set out in the ES (**NR16**) Volume 3 Appendix 12.4: Environmental Design Statement, which includes a series of typical cross-sections to illustrate the intentions. This Appendix also summarises the engagement that has informed the development of the environmental design, and the constraints that climate change, bio-security and Network Rail design and management requirements place on the proposals that can be included.

1.4.13 There will be landscape and ecological works implemented along most parts of the Order Scheme where clearance of existing vegetation and habitats is required. Landscape and ecological works will be undertaken using native species, unless there are location-specific reasons not to, and include:

- Hedgerow planting and hedgerow planting with trees – provided in most places along the new railway or highway boundaries or as integration planting to mask views of the new earthworks and structures, blend the proposals into the existing landscape pattern and provide habitat and visual connectivity.
- Woodland tree and shrub planting - in linear belts or acute field corners where a more substantial visual screen is justified, or by new overbridges.
- Intermittent scrub planting – provided on railway and highway embankment slopes where practicable or within the at-grade parts of the railway corridor.
- Grassland and species-rich grassland – provided where appropriate and where planting cannot be provided on new earthworks slopes.
- Protected species habitat creation - provided throughout the Order Scheme area and includes badger setts, bat roosts, otter holts and barn owl boxes.
- Vegetation retention and protection - where possible, vegetation such as important trees and hedgerows in the temporary land take required for construction will be protected to prevent damage and destruction during construction.
- Vegetation reinstatement in areas of temporary use - where it is not possible to retain vegetation and the land is required to be used for temporary construction purposes, the landscape type will be reinstated after construction.

1.4.14 Where habitat loss is unavoidable, compensation will be provided in the form of 25 Ecological Compensation Sites (ECS) distributed along the length of the Order Scheme. Each ECS has been designed to incorporate a variety of habitats, including scrub, wildflower meadow, hedgerows, reptile hibernacula, wetland, riverine enhancement, species-rich grassland and ponds, based on the mitigation requirement in each location. The planting within each ECS will also contribute to the landscape setting of the Order Scheme. Where possible, the ECS will be created in advance of the construction of the Order Scheme to allow compensatory habitats to establish and five sites are already under construction. More detail on the ECS and on other ecological mitigation is provided in the ecology evidence.

1.4.15 Most parts of the Order Scheme in Route Sections 2A, 2B and 2E currently have the appearance of large hedgerows that obscure much of the railway and its earthworks, due to limited vegetation management being undertaken along the sections with low use and no vegetation management along the mothballed section. Even with the planting proposed, it is inevitable that there will be some change in the appearance the Order Scheme, as the railway earthworks will have been widened and the extent maintained as clear of woody vegetation will be substantially greater than it is now, to accord with full operational standards. This has been allowed for in the visual land landscape assessments in the ES.

1.4.16 In the HS2 Interface Area, HS2 will construct a bat mitigation structure over the HS2 tracks, to the west of Sheephouse Wood, to prevent bats being struck by HS2 trains. The assessment of operational impacts of EWR2 on bats in Chapter 9 (Ecology), Volume 2i Project-wide and Appendix 9.6, Volume 3 of the ES (NR16), concludes that the mitigation structure should also enclose the EWR2 tracks in this location. This mitigation for EWR2 will be constructed by HS2. More detail on the bat mitigation structure is provided in the ecology evidence. All other environmental works required in this Route Section will be provided by HS2 under the existing powers of the HS2 Act and the HS2 Greatmoor Sidings TWAO.

1.4.17 In some locations, to maintain continuity of vegetation used as flight lines by bats, compensatory planting will be provided approximately 12 months prior to removal of the existing vegetation and will include larger planting stock to provide height more quickly. Where such advance planting is not possible, alternative flights lines have been identified and will be managed and/or enhanced as needed.

1.4.18 Landscape and ecological works will be implemented throughout the construction programme. Where the environmental proposals and engineering works do not overlap, opportunities will be taken to implement the landscape and ecological works as early as possible, to allow them to establish sooner; this includes planting along the new boundaries as well as the above compensatory vegetation and ECS. Monitoring and maintenance of all the landscape and ecological works will ensure that planting has established and there is successful habitat creation.

Noise and vibration

1.4.19 Noise attenuation has been considered where the Order Scheme will be constructing new track or is moving the position of existing track relative to noise sensitive receptors. It has not been considered where no construction works are proposed to existing track (i.e. on Route Sections 2D and 2E south of Aylesbury Vale Parkway Station) and there is only a proposed intensification of rail services.

1.4.20 Noise attenuation will be provided in the form of 2.5m high acoustic barriers (measured from rail height) at four locations in Route Sections 2B and 2C where there are predicted to be significant adverse effects at groups of properties, as shown on the Order Scheme Drawings and Environmental Design Drawings in Volume 4 of the ES (NR16). These noise barriers are primarily intended for avoiding significant adverse effects, but they will also benefit some other nearby receptors exposed to adverse effects. All barriers will have a noise-absorptive finish on the track-facing side. All barrier heights are described relative to the height of the rail head on the nearest track.

1.4.21 The noise barriers are intended to be installed "…at the earliest available opportunity." (Chapter 2 of Volume 2i Project-wide of the ES, paragraph 2.5.87) and the proposed planning conditions will require that the appearance, size and location of noise barriers need to be approved by the local planning authority. The locations proposed are:

- North side of the railway at Steeple Claydon (approx. length 200m).
- South side of the railway at Verney Junction (approx. length 220m).
- South side of the railway at Winslow (approx. length 690m).
- North side of the railway at Bletchley (approx. length 1800m) – this barrier continues from Route Section 2B into Route Section 2C.

1.4.22 Noise insulation will be provided at 15 individual properties in Route Sections 2A, 2B and 2C, where there are predicted to be significant adverse effects and barriers are not considered appropriate, as shown on Figure 10.6, Volume 4 of the ES (**NR16**):

- Route Section 2A:
  - Station Cottage, Station Road, Launton, OX26 5EH.
  - The Old Station, Station Road, Marsh Gibbon, OX27 0AX.
  - Station House, Station Road, Marsh Gibbon, OX27 0AX.
- Route Section 2B:
  - Pear Tree House, Queen Catherine Road, Steeple Claydon, MK18 2ER.
  - 37 Buckingham Road, Winslow, MK18 3DX.
  - Clare Farm, Little Horwood Road, Winslow, MK18 3JW.
  - Station Fields, Station Road, Mursley, MK17 0PJ.
  - 122 to 132 (even numbers) Bletchley Road, Newton Longville, MK17 0AA (six dwellings).
  - Possible provision at 19 Comerford Way, Winslow, MK18 3FD.
- Route Section 2C:
  - 8 Duncombe Street, Milton Keynes, MK2 2LY.

1.4.23 Since publication of the ES, the noise insulation proposals have been extended to include a further five properties where major or moderate adverse impacts are predicted but the resulting noise levels will be below but within 3dB of the threshold for a significant adverse effect. These are all in Route Section 2B and are:

- The White House, Little Horwood (related to OBJ/106)
- The White Lodge, Little Horwood (related to OBJ/23)
- The Rustics, Little Horwood (related to OBJ/173)
- Littleworth Farm, Verney Junction (related to OBJ/223)
- Furzen Farm Cottage, Verney Junction (related to OBJ/184)

1.4.24 Where potentially significant ground-borne noise and vibration effects are identified, the feasibility of mitigation measures will be identified as part of the detailed design, following further investigations. Ground-borne noise and vibration levels depend on: the track and formation; local ground conditions; the type of property; and the structural interaction between the ground and the property. The current expectation is to provide measures like those used on EWR phase 1, which included geo-grids to alter the vibration transmission properties of the track bed. For Phase 2, vibration measurements will be undertaken on the Phase 1 work to determine the level of vibration attenuation achieved, and the existing ground conditions examined on Phase 2 to determine if this approach would be suitable. The scope for such mitigation measures will be considered for 13 properties in Route Sections 2A and 2B:

- Route Section 2A:
  - Station Cottage, Station Road, Launton, OX26 5EH.
  - The Old Station, Station Road, Marsh Gibbon, OX27 0AX.
- Route Section 2B:
  - The Ticket Office, Verney Road, Verney Junction, MK18 2JZ.
  - Rayside, Verney Road, Verney Junction, MK18 2JZ.
  - Verney House, Verney Road, Verney Junction, MK18 2JZ.
  - The Bungalow, Verney Road, Verney Junction, MK18 2JZ.
  - 19 Comerford Way, Winslow, MK18 3FD.
  - 1 Old Station Close, Winslow, MK18 3FH.
  - 3, 4, 10, 11 and 16 McLernon Way, Winslow, MK18 3FE.

1.4.25 The design of the Order Scheme includes general measures that also provide some reductions in the noise levels generated during operation:

- The railway track switches and crossings are located as far away from dwellings as possible, as these have an effect of increasing noise emissions by approximately 2.5dB.
- All new track comprises continuously welded rail; for comparison, jointed track generates noise levels which are approximately 2.5dB higher.
- The track is on ballast; for comparison, track on concrete slab generates noise levels which are approximately 2.0dB higher.
- The Order Scheme reduces the number of level crossings, which can provide local noise benefits by eliminating discontinuity and maintenance issues in the track, in the long term.

Water quality and flood risk

1.4.26 There are limited opportunities to avoid floodplain and sensitive water and environment features, as the Order Scheme is largely an upgrade of an existing railway alignment. The principal ways in which water environment issues have influenced the Order Scheme design are:

- Inclusion of Compensatory Flood Storage Areas (CFSAs) to compensate for EWR2 works encroaching on existing floodplains; there are 33 CFSAs proposed along the Order Scheme, mostly in Route Sections 2A and 2B. More detail on the design of the CFSAs is provided in Section 8.3 of this evidence.
- Where possible, adjustment of construction compound site boundaries and internal layouts to avoid or minimise works in areas at risk of flooding.
- Inclusion of space for localised watercourse realignments and backwater habitats to meet Water Framework Directive (WFD) requirements.
- Culvert rehabilitation and replacement works designed to minimise change in hydraulic behaviour and flood risk upstream and downstream.
- Design of track and platform drainage to maintain existing runoff rates.
- The use of existing or traditional track drainage through ballast and drains, which improves water quality of runoff before it enters the receiving water environment.

- Inclusion of basins and swales to attenuate increased runoff rates and mitigate potential pollution from new highway alignments.

1.5 Environmental management during construction

1.5.1 Construction activities will be managed in line with the Code of Construction Practice (CoCP) presented in Appendix 2.1, Volume 3 of the ES (**NR16**). The CoCP has been influenced by the findings of the EIA and developed using the construction expertise of the EWR Alliance. As is required by Network Rail Standard Contract Requirements (NR/L2/ENV/015), a Construction Environmental Management Plan (CEMP) will be produced in advance of and implemented during construction of the Order Scheme by the EWR Alliance. The CEMP will comply with the requirements of this CoCP and NR/L2/ENV/015 and will be approved by the relevant local authorities prior to the start of the main construction works.

1.5.2 The CoCP acts as an environmental management framework for construction. It sets out:

- the context and underlying principles of environment management for the EWR Alliance.
- the principal obligations on the EWR Alliance when undertaking the construction of the Order Scheme.
- the guidelines to be used during construction and how they will be mandated and applied by the contractual arrangements between Network Rail and the EWR Alliance.
- the details of, or references to, the construction phase mitigation measures and plans to be approved by the local authorities for each relevant environmental topic.

1.5.3 Construction access and traffic will be managed through a Framework Construction Traffic Management Plan (CTMP); a draft has been submitted with the draft Order in Appendix 2.2, Volume 4 of the ES (**NR16**). There will be a specific CTMP for each Route Section that will set out specific requirements for traffic management, such as traffic route signage, site access and egress, coordination of road closures and diversions, and timing or volume restrictions.

1.6 Planning conditions

1.6.1 Requirements for the CoCP and CTMP will form part of the planning conditions attached to the deemed planning consent. Conditions will also cover a wide range of environmental issues relevant to this evidence.

1.6.2 The submissions made by the local planning authorities contain proposals for the scope and wording of the planning conditions The range of the planning conditions and the response to these proposals is provided in the planning evidence of Jill Stephenson.

2 Land Use and Agriculture

2.1 Further information

2.1.1 Baseline information is provided in the ES (**NR16**) Volume 2i Project-wide, Chapter 6 (Land use and agriculture), Section 6.4 and each Volume 2ii, Chapter 6 (Land use and agriculture), Section 6.2. No further baseline survey has been undertaken

2.2 Approach to Assessment

2.2.1 There is no recognised, detailed guidance on the method for assessing the magnitude or sensitivity of land use, agricultural land quality or farm holdings for the purposes of carrying out EIA. Therefore, the methodology in the assessment has been developed using best practice taken from previously undertaken agricultural impact assessments for transport schemes. Large-scale field surveys were not practicable at a route-wide scale and, therefore, the emphasis was on the use of existing information and desk-based assessment methods, supported by information from interviews with affected farmers and/or landowners where available.

2.2.2 The sensitivity of land use receptors has been determined by reference to the levels of use of different land categories by human and community receptors, and the expected resilience of these land uses to change. The magnitude of impact on land use was based on the number of properties affected, the area of land take and the potential impact on the viability and/or quality of the resource.

2.2.3 The predictive agricultural land quality assessment was based on desk study and small areas were surveyed to a detailed level to check the provisional and predictive agricultural land classification (ALC) grading. The survey has been based on the classification system developed by the Ministry of Agriculture, Fisheries and Food (MAFF) in 'Agricultural Land Classification of England and Wales - Revised guidelines and criteria for grading the quality of agricultural land', which is the main guidance on ALC survey as confirmed in 'Guide to assessing development proposals on agricultural land', published 16 January 2018.

2.2.4 The sensitivity of agricultural land quality has been based on the ALC grades, particularly the presence of Best and Most Versatile (BMV) land and its prevalence in the region. The magnitude of impact on agricultural land quality depends on the area to be lost, but there is little current guidance on what area of loss is considered significant. The criteria for assessing the magnitude of impacts on agricultural land quality have therefore been established with reference to the threshold for consultation with Natural England, which is 20 ha.

2.2.5 The sensitivity of farm holdings has been determined by the extent to which they have the capacity to absorb or adapt to the impacts, depending on their size, type of operation, dependence on key infrastructure and type of tenancy. The magnitude of impacts on farm holdings was assessed in relation to land take, severance, loss or damage of infrastructure and nuisance impacts, as these are factors which can affect farm viability.

2.2.6 The assessment methodology and any identified limitations of the assessment are detailed in the ES (**NR16**) Chapter 6 (Land use and agriculture) in Volume 2i Project-wide, with further details provided in Appendices 6.1, 6.2 and 6.3 in Volume 3.

2.3 Mitigation

Construction

2.3.1 Construction works will be carried out in compliance with the CoCP in Appendix 2.1 in Volume 3 of the ES to reduce construction nuisance and disruption and control the spread of dust, contamination, invasive species, weeds and soil-borne, crop and animal diseases. Arrangements will be put in place to ensure access is maintained and to identify, protect or remediate utility services and land drainage.

2.3.2 A comprehensive Soil Management Plan will be developed and implemented to protect soils affected by construction and enable the reinstatement of land during the construction phase. Soil resource surveys were undertaken from 2018 through to early 2019 to support the production of the SMP, prior to the start of construction works.

2.3.3 The design of the Order Scheme has sought to reduce temporary and permanent land take; however, where land take cannot be avoided, compulsory land acquisition will be assessed in accordance with the

statutory Compensation Code. This is explained in Section 8 of the SoC. Consultation is ongoing with the affected parties.

2.3.4 The mitigation measures are detailed in the ES (NR16) Volume 2i Project-wide, Chapter 6 (Land use and agriculture), Section 6.6 and each Volume 2ii, Chapter 6 (Land use and agriculture), Section 6.4.

Operation

2.3.5 Financial compensation will be available where applicable for permanent loss of land or property, in accordance with the Compensation Code.

2.4 Significant residual effects

Route Section 2A

Construction

2.4.1 Significant adverse effects are predicted on residential land use due to the temporary land take from the grounds of one property (Folly Cottage, Station Road). Financial compensation will be available where applicable in accordance with the Compensation Code. However, although financial compensation may reduce impacts on the individual property owner, there will still be a loss of the land resource.

2.4.2 There will be significant adverse effects for the duration of the construction and land restoration period due to temporary land take of community land at Charbridge Lane allotments and Launton Sports and Social Club.

Operation

2.4.3 Following reinstatement of the allotment gardens used temporarily during the construction period, the effects are reduced from major adverse to moderate adverse, as there would still be a reduction in the quantity of allotment plots. Although financial compensation will be available to the allotment freeholder, there will still be a loss of that land resource for community use. Following reinstatement of the access and parking at the Launton Sports and Social Club, no significant adverse long-term effects are predicted on this community receptor.

2.4.4 Significant residual effects are predicted on three farm holdings due to permanent land take. Although, financial compensation will be available there is a finite supply of agricultural land and no guarantee that replacement land would be available to purchase; therefore, whilst individual landowners may be compensated, residual effects on agricultural interests may persist and are still considered to be significant.

2.4.5 No significant cumulative effects were identified within Route Section 2A, apart from one farm holding whose land extends into Route Section 2E and the HS2 Interface Area and will be subject to additional land take from HS2 and the HS2 Greatmoor Sidings.

Route Section 2B

Construction

2.4.6 Following reinstatement of temporary land take, no significant long-term adverse effects are predicted on land use and agricultural land quality due to temporary land take during construction.

2.4.7 Provided that alternative parking is provided for the loss of the Charbridge Lane allotments car parking spaces, there will be no significant long-term residual effects on community land use in Route Section 2B.

Operation

2.4.8 Significant residual effects are predicted due to the permanent land take from four residential properties: the demolition of one property (Swanbourne Old Station) and small land take from the gardens of three residential properties (Pear Tree House, Old Station Yard and White Lodge). Financial compensation will be available where applicable in accordance with the Compensation Code as may be payable under different acts. However, although this may reduce impacts on the individual property owner, there will still be a loss of the land resource. The residual effects are, therefore, still considered to be significant, which does not take into consideration financial compensation.

2.4.9 Significant residual effects are predicted on six farm holdings following mitigation, primarily due to permanent land take. Although, financial compensation will be available, there is a finite supply of agricultural land and no guarantee that replacement land would be available to purchase; therefore, whilst individual landowners may be compensated, residual impacts on agricultural interests may persist. The residual effects are still considered to be significant.

2.4.10 Significant cumulative effects were identified on agricultural land quality within Route Section 2B and on five farm holdings. However, the sale of land for residential or commercial developments represents a commercial choice by a landowner and, therefore, is arguably of lower impact than land take associated with EWR2, the majority of which will have the benefit of compulsory purchase powers if agreement cannot be reached with the landowner.

Route Section 2C

Construction

2.4.11 Significant effects are predicted for the duration of the construction and land restoration period due to the land take of the back yards of three residential properties on Duncombe Street in Bletchley. Following completion of construction activities, the back yards would be reinstated as part of the environmental works, but this is not expected to adversely affect the future amenity of those properties.

Operation

2.4.12 Significant residual effects are predicted on one farm holding due to land take. Although land temporarily taken during the construction phase will be reinstated and grazing could take place on the compensatory flood storage area, this may not be viable for continued farming, due to the distance to the main farm. Although financial compensation will be available for the permanent land take, there is a finite supply of agricultural land and no guarantee that replacement land would be available to purchase; therefore, whilst the individual landowner may be compensated, residual impacts on agricultural interests may persist. The residual effects are still considered to be significant.

2.4.13 No significant cumulative effects are identified within Route Section 2C.

Route Section 2D

Construction

2.4.14 There would be significant effects for the duration of the construction and land restoration period, due to temporary land take of community land use. However, following reinstatement of community land used temporarily during the construction period, there would be no significant long-term residual effects on community land use.

Operation

2.4.15 Significant residual effects are predicted due to the demolition of two residential properties (Chuffa Cottage, Marston Road and South View, Manor Road). Financial compensation will be available, where applicable, in accordance with the Compensation Code as may be payable under different acts. However, although this may reduce impacts on the individual property owner, there will still be a loss of the land resource. The residual effects are, therefore, still considered to be significant.

2.4.16 Significant cumulative effects are predicted on one farm holding due to cumulative permanent land take; however, the Order Scheme land take forms a very small portion of the cumulative land take. The sale of land for residential or commercial developments represents a commercial choice by a landowner and is arguably of lower impact than land take associated with EWR2, the majority of which may be purchased using the powers of compulsory purchase contained in the Order should agreement with affected landowners not be possible.

Route Section 2E

Construction

2.4.17 There will be significant effects for the duration of the construction and land restoration period due to temporary land take of the community land. However, following reinstatement of land used temporarily during the construction period, there will be no significant long-term residual effects on community land

use. Significant effects are also predicted on the commercial site (Buckinghamshire Railway Centre), due to combined land take from the overflow car parking field with HS2.

Operation

2.4.18 Significant residual effects are still predicted on one farm holding if the refurbished overbridge is not able to accommodate all modern farm machinery. Significant residual effects are anticipated from the combined land take of one farm holding from the Order Scheme and HS2. However, most of this impact will be due to the loss of farm infrastructure due to HS2, with negligible additional land take from the Order Scheme.

2.4.19 No likely significant cumulative effects are predicted on land use, agricultural land quality or farm holdings.

HS2 Interface Area

2.4.20 There will be no impacts or significant residual effects within the HS2 Interface Area.

3 Cultural heritage

3.1 Further information

3.1.1 Since the ES was published, the baseline understanding has been updated to incorporate findings from an ongoing programme of geophysical survey and archaeological evaluation trenching, designed in consultation with the local planning authorities' archaeological advisors. This work will be included in the Archaeological Fieldwork Strategy, which is specified within the CoCP and will be secured by a condition forming part of the deemed planning permission.

3.1.2 There has also been some targeted detailed desk-based assessment, where it has been agreed with the local authority archaeological advisors that this would be beneficial to predict the detail of the impacts early to help determine the detail of appropriate mitigation following consent, in accordance with the CoCP.

3.1.3 A detailed Desk Based Assessment of the site of a medieval windmill mound in Route Section 2A, 1.9km north east of Bicester Town centre and 1km north west of Launton (ES reference MOX5020), has been undertaken to inform the response to concerns raised by Oxfordshire County Council (**OBJ 221**). This identifies that there is likely to have been a medieval or early post-medieval windmill at this location, half of which remains beside the existing Charbridge Lane roundabout, along with associated contemporaneous and later features. The report notes that some remains to the southwest may indicate a possible second mill. The conclusion of this assessment broadly accords with that set out in the ES in that, in its surviving form, the mill mound site is an asset of medium significance. The mill mound site will be subject to further detailed investigative fieldwork before it is affected by construction.

3.2 Approach to assessment

3.2.1 The assessment has been undertaken in accordance with current policy and best practice. The methodology is based on the DMRB, which is the accepted methodology used to assess cultural heritage impacts on linear transport infrastructure schemes, where the heritage value (heritage significance) of a heritage asset is measured against the degree of impact to determine the significance of effect. The assessment has also been undertaken in accordance with current best practice, as set out in the guidance and standards from Historic England and the Chartered Institute for Archaeologists. (for refences see ES Volume 2i, Chapter 7)

3.2.2 In accordance with the 2012 NPPF (**NR117**) Chapter 16, the baseline was identified primarily through a Historic Environment Record Search (the minimum NPPF requirement). This has also been augmented by historical research, including historic mapping analysis, and by geophysical survey and other field evaluation surveys, as well as through the study of the results of archaeological investigations from other schemes and information from local planning documents, such as Conservation Area Appraisals and statements. The assessment of settings to heritage assets has also been informed by site visits and walkover surveys.

3.2.3 In accordance with the 2012 NPPF, the assessment describes the significance of the heritage assets and the contribution of their settings to their significance, in a proportionate manner. Significance of assets and the character and appearance of conservation areas are summarised in the ES (**NR16**) in Chapter 7 of each Volume 2ii and described in more detail in the Desk Based Assessment in Volume 3, Appendix 7.2 of the ES. The contribution of setting to significance is set out within the same appendix.

3.3 Mitigation

3.3.1 The mitigation works are largely aimed at identifying unknown and known archaeological assets that would be removed or altered by the construction of the Order Scheme, through further archaeological investigation and, if found, being recorded archaeologically to achieve preservation by record. Although this will not entirely mitigate the loss of the heritage assets affected, it will compensate for the loss of significance by delivering the benefits of addressing current research questions and enhancing our understanding of the cultural heritage, through the appropriate dissemination of results and ensuring public appreciation through interpretation. The archaeological mitigation designs will be developed in consultation with the local authority archaeological advisers and included within the Archaeological Fieldwork Strategy, as specified within the CoCP.

3.3.2 There will be specific measures for four non-designated heritage assets: level 2 Historic Building Recording prior to demolition of Winslow Footbridge No. 6, the 19th to 20th century station at Swanbourne

and Chuffa Cottage / Crossing Keeper's Cottage; and the 18th or 19th century milestone on the A413 will be carefully identified, removed and stored, so that it can be re-sited as close as possible to its original location after construction. Existing overbridges or other former railway structures or elements proposed for demolition or removal will be eligible for level 1 Historic Building Recording.

3.3.3 Replacement planting within the design of the Order Scheme will also help to ensure that significant effects from long-term changes to setting are avoided.

3.3.4 The mitigation is relevant across Route Sections 2A to 2E; mitigation within the HS2 Interface Area will be undertaken by HS2.

3.4 Significant residual effects

3.4.1 Significant adverse residual effects will arise from construction, rather than operation. These effects relate mostly to the demolition and alteration of buildings and the loss or partial loss of known and unknown archaeological assets in Route Sections 2A, 2B, 2D and 2E. There will be no significant adverse residual effects in Route Section 2C or the HS2 Interface Area.

3.4.2 In Route Section 2A, there will be significant adverse residual effects to two known non-designated archaeological assets: the windmill mound 1.9 km north east of Bicester (MOX5020) and an area in which there are Iron Age / Romano British features (MOX12267), as parts of these assets will be removed during groundworks for EWR2.

3.4.3 In Route Section 2B, there will be a significant adverse residual effect on the designated Archaeological Notification Area containing possible small Romano-British settlement or farmstead indicated by geophysical surveys and surface finds (MBC22400). There will be significant adverse residual effects resulting from demolition, alteration or loss of seven known non-designated heritage assets:

- Remains of a 19th to 20th century railway station at Steeple Claydon, closed in 1964 (MBC33283).
- Remains of Verney Junction Station (MBC14925)
- Winslow No. 6 Footbridge (OXD/19)
- World War II approach guides for Little Horwood airfield (MBC23065)
- Partially surviving nineteenth to twentieth century railway station at Winslow, built in 1850, closed in 1967 and demolished in 1993 (MBC12888).
- Late Iron Age rectangular ditched enclosures, pits and field boundaries found by geophysical survey and confirmed by evaluation trial trenching.
- 19th to 20th century railway station at Swanbourne, closed in 1964 (MBC25532).

3.4.4 It is also possible that an Archaeological Notification Area containing sherds of Roman and undated pottery found on surface of field and possible ditched field or settlement boundaries found by geophysical survey (MBC21613) may be subject to cumulative significant adverse effects, where the Order Scheme combined with other development may elevate a minor adverse effect to a major adverse effect.

3.4.5 In Route Section 2D, there will be a significant moderate adverse residual effect resulting from the demolition of the non-designated Chuffa Cottage / Crossing Keeper's Cottage (MBD18252).

3.4.6 In Route Section 2E, there will be a significant moderate adverse residual effect from the loss of the non-designated possible Romano-British ditched enclosures and pits, the presence of which are suggested by geophysical surveys and evaluation trial trenching (MBC26477). There will be a moderate adverse effect from changes in the setting of the non-designated St Mary's Church, Fleet Marston (1117838).

3.4.7 If currently unknown archaeological heritage assets are encountered within the Order scheme works, they will be subject to archaeological investigation in consultation with the local authority archaeological advisors. Depending on the level of impacts and the assets' significance, there may be resulting significant adverse residual effects. However, they will be subject to preservation by record.

3.4.8 In relation to the loss or partial removal of known and unknown archaeological assets, there will be some compensation from the benefits of archaeological recording and the dissemination of the results.

4 Air Quality

4.1 Further information

Monitoring data

4.1.1 Since the ES was published, the results of monitoring undertaken by local authorities during 2017 have become available for most of the ES study area. These data have been used to update the baseline information (as provided in Appendix B to this proof, which updates Tables 1.5 to 1.7 in Appendix 8.4 of the ES Volume 3). Based on the available data for 2017, the assumptions regarding baseline conditions made in the ES are sound and there are no changes to the conclusions in the ES regarding the impacts of the Order Scheme on local air quality, during either construction or operation.

4.1.2 A follow-up baseline air quality survey was undertaken by the EWR Alliance to confirm baseline conditions in key areas with high existing roadside concentrations (Aylesbury, Bicester and Bedford) and in certain areas near to the railway line or stations where assumptions were made for the ES. Eight diffusion tube monitoring locations were set up in triplicate (i.e. three tubes at each location, in line with good practice for short term surveys). The average concentrations at each location for the three-month monitoring period September to November 2018 are shown in Table 4.1.

Table 4.1: Air Quality survey results, 2018 - NO_2 three-month average

ID	Location	Easting	Northing	NO_2 (µg/m^3)
1	1-3 Ashburnham Road, Bedford	504276	249720	38.1
2	85 St Leonards Street, Bedford	505073	248955	24.1
3	51 Friarage Road, Aylesbury	481608	213717	53.7
4	75 Oxford Road, Aylesbury	481406	213841	26.9
5	87 Friarage Road, Aylesbury	481521	213832	43.9
6	23 Kings End, Bicester	458035	222465	40.9
7	33 Kings End, Bicester	458018	222433	44.5
8	33 London Road, Bicester	458730	222096	25.4

4.1.3 No adjustments for laboratory bias or seasonal conditions have been made for this indicative three-month survey. These unadjusted results are considered to be reasonable indicators of annual mean concentrations in 2018.

4.1.4 The monitoring data confirm high annual mean concentrations within the AQMAs in Bedford, Aylesbury and Bicester (sites 1,3, 5, 6 and 7), close to or above the objective of 40 µg/m3. They also show relatively low concentrations (less than 75% of the objective) at suburban locations near to the railway line (sites 2 and 8). Based on the data gathered to date, the assumptions regarding baseline conditions made in the ES are sound and there are no changes to the conclusions in the ES regarding the impact of the Project on local air quality, either during construction or operation.

Updated guidance

4.1.5 The ES referenced relevant the guidance documents extant at the time of writing. Since publication of the ES, some guidance documents have been revised, as detailed below. The changes do not affect the approach to or the outcome of the air quality assessment as presented in the ES, or the mitigation measures set out in the CoCP (ES Volume 3 Appendix 2.1).

- Institute of Air Quality Management, Guidance on Monitoring in the Vicinity of Demolition and Construction Sites (v1.1, October 2018)
- DEFRA draft Clean Air Strategy. Consultation was held between 22 May 2018 to 14 August 2018.

Assessment of operational rail particulate emissions

4.1.6 An assessment of particulate matter emissions from rail was not provided in the ES as there is no $PM_{2.5}$ or PM_{10} emission factor provided in the DfT webTAG guidance. An indicative assessment has been undertaken using the relative contribution of rail emissions to the national total emissions of NOx and particulates to estimate the impact of the Project for this pollutant in response to concerns raised during the objection period.

4.1.7 Particulate emissions from rail are, nationally, approximately 3% of NOx emissions from rail. On this basis, the increase in particulate matter concentrations associated with the Order Scheme rail emissions, at a distance of 10 m from the track, will be 0.4 µg/m^3 and at 50 m from the track will be just 0.1 µg/m^3 (based on the results presented in ES Vol 3 Appendix 8.5 Table 1.16, which used conservative assumptions for the number of rail locomotive movements in the year 2035).

4.1.8 Baseline monitoring for particulate matter was undertaken at three locations, Bedford, Bletchley and Winslow (ES Vol 2i, paragraph 8.4.43). The highest measured concentrations of PM_{10} and $PM_{2.5}$ were 9.8 µg/m^3 and 9.1 µg/m^3 respectively. The national air quality objectives for annual mean concentrations of these pollutants are 40 µg/m^3 and 25 µg/m^3 respectively. Therefore, total concentrations will remain well below these health-based criteria, now and in the future, with or without the Order Scheme. The concentrations are also expected to remain at or below the WHO guideline of 10 µg/m^3 (as referenced in DEFRA's draft Clean Air Strategy 2018).

4.2 Approach to assessment

4.2.1 The legislative context, local and national policy and the air quality criteria relevant to the assessment are set out in the ES (**NR16**), Volume 2i, Section 8.2. The assessment methodology is described in full in ES Vol. 2i, Section 8.3. Key guidance documents used to determine the study areas for air quality assessment are summarised in the ES, Volume 2i, Table 8.3. The assessment addressed the key air pollutants nitrogen dioxide (NO2) and particulate matter (PM10 and PM2.5), and construction dust. The approach was shaped in response to comments made by the consultees, as set out in the ES Volume 3, Appendix 8.1.

Construction

4.2.2 The construction dust assessment methodology followed the Institute of Air Quality Management (IAQM) guidance, as described in the ES Volume 2i, Chapter 8 paragraphs 8.5.1 to 8.5.22. The assessment considers the magnitude of the dust source, the distance between source and receptor and the sensitivity of the receptor and is in line with good practice.

4.2.3 An initial, high level assessment identified the potential for adverse effects of construction dust over the full Project Area on a conservative basis using the total areas of each Route Section and combined traffic flows to derive the source magnitude. The findings are summarised in the ES, Volume 2i, Table 8.9. Despite this conservative approach, the risk of significant dust effects was typically low or negligible. Mitigation measures appropriate for low dust risks are set out in the CoCP (ES Volume 3, Appendix 2.1) and are intended to be applied across the whole of the Project Area.

4.2.4 Where the potential for medium or high-risk dust effects could not be excluded on this conservative basis, detailed assessments were carried out for each Route Section (ES Volume 2ii), to obtain a more precise estimate of the dust risk from each construction activity (demolition, earthworks, construction, trackout). The subsequent activities with medium or high risks of dust effects comprised the larger construction compounds, substantial construction and earthwork activities. In addition, medium or high risks of trackout of dust onto the local road network were identified on some Construction Access Routes. For these activities, additional mitigation was incorporated in the CoCP.

4.2.5 The IAQM construction dust guidance states that, based on experience and in most cases, the implementation of effective site-specific mitigation measures will ensure that the residual effect will not be significant.

4.2.6 The construction traffic emissions assessment methodology followed IAQM, DEFRA and Environmental Protection UK guidance, as described in the ES (**NR16**) Volume 2i, Chapter 8 paragraphs 8.5.1 to 8.5.22 and Appendix 8.5 in Volume 3.

4.2.7 The changes in concentrations of local air pollutants due to Project construction traffic were calculated at sensitive receptors using a detailed dispersion model. The assessment focused on worst-case exposure (ES Volume 3, Table 1.17, Appendix 8.5 and ES Volume 4 Figure 8.3) at locations closest to the routes

that will be used by construction traffic accessing the Project using robust assumptions for the projected traffic flows.

4.2.8 The modelled concentrations of air pollutants were assessed (ES Volume 2i, Section 8.5) against national air quality objectives (shown in ES Volume 2i, Table 8.2). No exceedences of national air quality objectives are anticipated during construction (ES Volume 2i, Table 8.11) therefore the effect of the Order Scheme construction traffic emissions on local air quality was assessed as not significant.

Operation

4.2.9 A detailed assessment of operational road and rail emissions was undertaken on a conservative basis including worst-case assumptions for the number of operational road and rail movements. A detailed dispersion model was used to calculate changes at sensitive receptors closest to the roads with increases in vehicle movements. The modelled changes were found to be negligible.

4.2.10 Rail emission factors in DfT guidance were used to estimate operational rail emissions. Conservative assumptions were applied, as described in the ES Volume 2i, para 8.3.69, including 2035 high-growth scenario movements. Although the predicted changes were up to large in magnitude, no air quality objectives would be exceeded (ES Volume 2i, Section 8.5 and Table 8.12) and, therefore, the effects were concluded not to be significant.

Cumulative

4.2.11 The cumulative effects of construction dust emissions from other nearby developments were considered in combination with those of the Order Scheme. In some cases, additional dust mitigation commensurate to the higher cumulative risk was incorporated in the CoCP for the area in question. The residual cumulative effects of construction dust were assessed as not significant with application of appropriate mitigation.

4.2.12 The cumulative impacts on local air quality of construction and operational traffic flows from other nearby developments in combination with that of the Order Scheme were considered. Where changes in flow increased, this was in areas with low existing background concentrations thus no new risk of adverse effects on sensitive receptors was identified and the cumulative effects were assessed as not significant.

4.3 Mitigation

4.3.1 The IAQM assessment methodology was used to determine appropriate mitigation for construction dust. For all areas of the Order Scheme, mitigation and monitoring measures for low risks will be applied. These are set out in ES (**NR16**) Volume 3 Appendix 8.2 and they have been incorporated within the CoCP (ES Volume 3 Appendix 2.1). For most of the Order Scheme, these measures to minimise dust impacts during construction will ensure that the residual risk will be not significant.

4.3.2 In addition to the low risk measures, the detailed dust risk assessments for each Route Section (ES Volume 2i, Chapter 8, Table 8.10) also identified the need for dust management and monitoring commensurate with a higher risk of dust impacts in specific work areas. These measures are described in the ES Volume 2ii Chapter 8 (Air quality) Route Section Assessments and have also been incorporated into the CoCP.

4.3.3 The Framework CTMP includes measures to manage construction traffic flows and trackout of dust from construction sites. No significant adverse effects on local air quality were identified for construction traffic emissions and, therefore, no air quality specific mitigation measures are required.

4.3.4 Assessment of operational air quality effects due to the Order Scheme was undertaken in accordance with best practice methodologies. No significant adverse effects on local air quality are expected from road traffic or rail locomotive emissions during operation, including any permanent changes to structures and road alignments with the Order Scheme. On this basis no air quality specific mitigation measures are required.

4.4 Significant residual effects

Construction

4.4.1 There are not expected to be any significant residual effects from construction dust following application of the CoCP measures and with the support of an appropriate management and monitoring system.

4.4.2 No significant residual effects are expected from road and/or rail emissions during construction of the Order Scheme.

Operation

4.4.3 No significant residual effects are expected from road and/or rail emissions during operation of EWR2, or from road traffic due to changes to structures and road alignments with EWR2.

5 Noise and vibration

5.1 Further information

5.1.1 The Statement of Case in its Table 4.2 incudes the information that for freight trains there will be "Paths for one train in either direction per hour". Paragraph 6.2.8 states: "The May 2017 Cost Challenge resulted in the amendment of the EWR2 Core TSS to remove a specified hourly freight path in each direction between Oxford and the West Coast Main Line (i.e. specifying an hourly level of capacity); in favour of only specifying the necessary physical capability and characteristics of the route in terms of route availability and gauge." But finishes with the statement "The assessment concluded that the frequency of freight trains running over the OXD Line will not exceed more than one train per hour in either direction."

5.1.2 The Statement of Case could, therefore, infer that EWR2 can provide capacity for 24 freight paths per direction, giving 48 freight trains past any point in any 24-hour period on the OXD line (i.e. Route Sections 2A and 2B). However, this will not be the case and the noise assessment has instead used 100% of the freight paths that EWR2 will provide, which will be significantly less than 48.

5.1.3 In Appendix 10.7 of the ES (in Volume 3) (NR16), in paragraph 1.7.3 it is assumed that all the available freight paths will be utilised in full. Table 5.1 shows the number of available services.

Table 5.1: Potential freight service frequency

Route Section	Day freight	Night freight	Total freight
2A	12	8	20
2B	12	8	20
2C	12	8	20
2D	3	3	6
2E	7	3	10
HS2	7	3	10

5.1.4 The tables in Appendix 10.7 match the freight services listed in Table 2.15 in Chapter 2 of Volume 2i of the ES (**NR16**).

5.1.5 The Alliance is currently planning to undertake vibration measurements to determine the effectiveness of the vibration mitigation measures put in EWR phase 1 and, if these show the expected benefits, then the same design measures can be adopted in the Order Scheme, if and where appropriate. However, there are potential differences in ground condition between phase 1 and the relevant locations in phase 2, which may necessitate different solutions.

5.2 Approach to assessment

5.2.1 The technical guidance upon which the methodology for the noise and vibration assessments are based is described in Chapter 10, paragraphs 10.2.28 to 10.2.74 of Volume 2i of the ES (**NR16**). The assessment is set in the context of national policy, legislation and local policy as detailed in Chapter 10, paragraphs 10.2.2 to 10.2.27 of Volume 2i of the ES.

5.2.2 Separate assessments have been undertaken for construction noise, construction vibration, operational noise and operational vibration; the operational assessments cover both train noise and road traffic noise. The methodology is described in Chapter 10, paragraphs 10.3.16 to 10.3.34 in Volume 2i of the ES. In each case an appropriate study area has been set, appropriate significance criteria have been set and thresholds for mitigation defined, as described in Chapter 10, paragraphs 10.3.35 to 10.3.83 of Volume 2i. The approach to setting study areas, significance criteria and mitigation thresholds are best practice because they are in alignment with national policy and are consistent with other similar infrastructure schemes. The overall approach has also been subject to consultation with the Local Planning Authorities, as described in Chapter 10, paragraphs 10.3.84 to 10.3.98 in Volume 2i of the ES.

5.2.3 To undertake each assessment, it has also been necessary to obtain appropriate data and make appropriate assumptions about each activity. The data sources are described in Chapter 10, paragraph

10.3.12 in Volume 2i of the ES, which identifies the types of data used and the relevant ES appendices for each assessment.

5.3 Mitigation

Construction

5.3.1 The key controls are the Section 61 application process to the local authorities and the control of working hours. The Section 61 sets out the agreed expected noise and vibration levels and sets upper limits. Integral to this are the changing significance thresholds with time of day; where works are required outside normal working hours there will be tighter noise limits in place to minimise disturbance.

5.3.2 To minimise noise and vibration impacts during construction, the mitigation measures set out in the CoCP (ES Volume 3 Appendix 2.1) (**NR16**) will be implemented. Construction traffic will be managed through the Framework CTMP. This mitigation is relevant across all Route Sections.

5.3.3 Mitigation to prevent significant construction effects will be implemented early in the construction programme, so that, where practicable, the mitigation is in place prior to the start of the works.

Operation

5.3.4 Section 1.4 of this evidence includes details of the measures proposed to mitigate for the impacts of the operational railway. Noise and vibration attenuation is only considered where the Order Scheme will be constructing new track or moving the position of existing track relative to noise sensitive receptors.

5.3.5 Where significant adverse effects are predicted at groups of properties, noise attenuation will be provided in the form of acoustic barriers, with an approximate combined total length 2.9 km. All barriers will have a noise-absorptive finish on the track-facing side.

5.3.6 Noise insulation will be provided for 15 individual properties where significant adverse effects are predicted, but barriers are not considered appropriate. Barrier locations are shown on the Order Scheme Drawings and Environmental Design Drawings in Volume 4 of the ES (**NR16**). The properties identified for potential noise insulation are shown on Figure 10.6, Volume 4 of the ES (**NR16**). Noise insulation will be provided at a further five properties where major or moderate adverse impacts are predicted and the resulting noise levels are below but within 3 dB of the threshold for a significant adverse effect.

5.3.7 Where potentially significant ground-borne noise and vibration effects have been identified, the feasibility of mitigation measures will be identified as part of the detailed design, following further investigations near two properties in Route Section 2A and eleven properties in Route Section 2B.

5.4 Significant residual effects

Construction

5.4.1 With the application of the mitigation measures in the CoCP, no significant residual adverse noise and vibration effects are predicted from the construction, including those from construction traffic.

Operation

5.4.2 The implementation of noise mitigation measures means that there will not be any significant residual adverse airborne noise effects within Route Sections 2A, 2B, 2C, 2E or the HS2 Interface Area. There will be significant residual airborne noise effects due to the increased frequency and speed of trains at 19 receptors in Route Section 2D; these are spread throughout the Route Section and are generally those properties closest to the railway in Bletchley, Milton Keynes, Woburn Sands, Aspley Guise, Lidlington, Millbrook, Elstow and Bedford.

5.4.3 There will be potentially significant residual adverse ground-borne noise and vibration effects at two properties in Route Section 2A and eleven properties in Route Section 2B, for which the scope for potential mitigation measures will be investigated in the detailed design, as described in section 1.4 of this evidence:

- Route Section 2A:
  - Station Cottage, Station Road, Launton, OX26 5EH;

- The Old Station, Station Road, Marsh Gibbon, OX27 0AX.

- Route Section 2B:
  - The Ticket Office, Verney Road, Verney Junction, MK18 2JZ;
  - Rayside, Verney Road, Verney Junction, MK18 2JZ;
  - Verney House, Verney Road, Verney Junction, MK18 2JZ;
  - The Bungalow, Verney Road, Verney Junction, MK18 2JZ;
  - 19 Comerford Way, Winslow, MK18 3FD;
  - 1 Old Station Close, Winslow, MK18 3FH;
  - 3, 4, 10, 11 and 16 McLernon Way, Winslow, MK18 3FE.

6 Geology, soils and land contamination

6.1 Further information

6.1.1 The ES (**NR16**) includes assessment of desk-based information and previous ground investigation (GI) data, plus the findings of GI undertaken along the Order Scheme in 2015 and 2016, predominantly undertaken for geotechnical purposes, with limited contamination testing and no gas or groundwater monitoring.

6.1.2 Additional GI has been undertaken by the EWR2 Alliance between July 2017 and October 2018, including three rounds of groundwater and surface water sampling and ground gas monitoring. The findings of this GI and the GI undertaken between 2015 and 2016 will be reported in accordance with the guidance in Contaminated Land Report 11 (CLR11), including a generic quantitative risk assessment (GQRA) considering the risk to humans, property and environment and a conceptual site model (CSM). It is envisaged that the GQRA reports for Route Sections 2A to 2E will be published January 2019.

6.1.3 Further GI is being undertaken along the route starting November 2018 and extending into 2019; the results will be available later in 2019 and will inform the design development.

6.2 Approach to assessment

6.2.1 The following approach was taken for the geology, soils and land contamination assessment:

- Establish the baseline conditions for the Study Area with respect to geology, mineral resources, ground stability, soils, hydrology, hydrogeology, contaminated land (including the potential for unexploded ordnance and ground gases) and historical uses. Supplemented in some areas by intrusive investigation.
- Identify potential impacts on identified resources and receptors from the construction and operation of the Order Scheme.
- Assess the significance of likely effects from the Order Scheme.
- Identify any residual effects.

6.2.2 The assessment methodology and proposed mitigation were developed in accordance with relevant guidance and standards, as detailed in the ES (NR16) Volume 2i Chapter 11.

6.2.3 The assessment was undertaken using available data such as historical mapping, British Geological Society (BGS) geology records and historic GI data. The assessment identified areas where further work will be required to develop the design and mitigation measures as part of detailed design. The geology, soils and land contamination assessment and ES chapters were developed in consultation with the relevant regulators, including the Environment Agency and local authority Contaminated Land Officers.

6.2.4 The assessment of the potential impacts of the Order Scheme on land contamination, soils re-use and soil waste was undertaken in two stages: a land contamination risk assessment including a CSM; and an impact assessment.

6.3 Mitigation

Construction

6.3.1 Mitigation measures will be incorporated into the construction of the Order Scheme through the CoCP and an appropriate Soils Management Plan, Materials Management Plan and Site Waste Management Plan. Mitigation measures will include: the adoption of working methods appropriate to manage soil erosion and compaction, surface water runoff and groundwater; implementation of appropriate pollution incident control; implementation of appropriate and safe storage of fuel, oils and equipment during construction; and use of health and safety risk assessments, method statements and appropriate personal protective equipment.

6.3.2 Excavated soils will be managed suitably and reused and recycled on site and local material sourced as far as practicable to reduce waste generated during construction, reduce transportation of materials on and off site and minimise impacts to identified mineral resources.

Operation

6.3.3 EWR2 will be operated in accordance with the relevant regulations and best practice guidance to apply Best Available Techniques and pollution prevention to ensure that effects during operation are minimised.

6.4 Significant residual effects

6.4.1 The following is relevant across all Route Sections.

Construction

6.4.2 Following the implementation of mitigation, no significant adverse residual effects are identified.

Operation

6.4.3 Following the implementation of mitigation, no significant adverse residual effects are identified.

7 Landscape and visual impact

7.1 Further information

7.1.1 Baseline information is provided in the ES (**NR16**) Volume 2i Project-wide, Chapter 12 (Landscape and visual impact assessment), Section 12.4 and each Volume 2ii, Chapter 12 (Landscape and visual impact assessment), Section 12.2. Limited further baseline survey has been undertaken in connection with the applications for the proposed advance construction compounds, including arboricultural survey of trees in the sites for compounds A4, B2, B4, B6 & C1.

7.1.2 Further tree surveys are planned to inform more detailed design development to help identify opportunities to avoid the loss of existing trees that have been assumed to be removed for the Scheme within the ES.

7.2 Approach to assessment

7.2.1 The methodology used for the Landscape and Visual Impact Assessment has been developed with reference to the Guidelines for Landscape and Visual Impact Assessment, Third Edition, 2013 (GLVIA) published by the Landscape Institute and Institute of Environmental Management and Assessment and Landscape Institute Advice Note 01/11 (2011): Photography and photomontage in landscape and visual impact assessment.

7.2.2 These documents provide best practice guidance for the landscape profession and our assessment has been carried out and reviewed by Chartered Members of the Landscape Institute who are experienced in the assessment of transport infrastructure projects. A full description of the methodology is presented in ES Volume 3, Appendix 12.3.

7.3 Mitigation

Construction

7.3.1 Civil engineering construction work and operations can be obtrusive and uncharacteristic within a largely rural baseline. Good practice construction methods, as set out on the CoCP (ES Volume 3 Appendix 2.1) (**NR16**), will be followed to reduce adverse effects on landscape and visual amenity. The proposed haul roads, construction access routes, compounds and working areas have all been located to limit adverse effects.

Operation

7.3.2 There will be landscape planting implemented along most parts of the Order Scheme, where the engineering works require clearance of existing vegetation and habitats, as follows:

- Hedgerow planting and hedgerow planting with scattered trees will be provided in most places along the new railway or highway boundaries, or as integration planting, to mask views of the new earthworks and structures, blend the proposals into the existing landscape pattern and provide visual and habitat connectivity.
- Woodland tree and shrub planting will be provided in linear belts or acute field corners where a more substantial visual screen is justified, or beside new overbridges.
- Intermittent scrub planting will be provided on railway and highway embankment slopes, where practicable, or within the at-grade railway corridor.
- Vegetation retention or reinstatement – where possible, vegetation such as important trees and hedgerows in the temporary land take required for construction will be protected to prevent damage and destruction during construction. Where it is not possible to retain vegetation and the land is required to be used for temporary construction purposes, the landscape type will be reinstated after construction.

7.3.3 The landscape design has been developed within the constraints of Network Rail's operational restrictions and standards. The landscape planting is shown on the Environmental Design Drawings in Volume 4 of the ES **(NR16)**.

7.4 Significant residual effects

Route Section 2A

Construction

7.4.1 Five local landscape character areas will experience likely significant effects from the construction of Route Section 2A of the Order Scheme: Otmoor Lowlands – Rural Areas; Oxfordshire Estate Farmlands; Marsh Gibbon Vale; Poundon-Charndon Settled Hills, and; Twyford Vale (western area). Visual receptors associated with 14 viewpoints will experience likely significant visual effects during construction, as reported in Table 12.3 of Chapter 12 (Landscape and visual impact assessment) Volume 2ii Route Section 2A of the ES (**NR16**).

7.4.2 The construction phase will introduce prominent new elements, which will often appear as uncharacteristic and detracting. The removal of lineside vegetation will increase visibility of the works, but intervening elements, such as buildings, hedges and tree belts or HS2 will frequently limit effects to areas close to the railway corridor or the few elevated viewpoints.

Operation

7.4.3 During operation year 1 there will be more frequent train movements and new urbanising elements within the landscape such as bridges, masts and signalling. The proposed mitigation will be immature and would not reduce the effects of the Order Scheme to any measurable degree. The landscape effects will extend over a similar area to those of the construction phase, but the visual effects will be less extensive, due to absence of construction compounds and activity within the view.

7.4.4 By year 15, the planting will reduce adverse effects of the Order Scheme and will replace characteristic elements, screen detracting elements and restore a sense of enclosure and tranquillity, with the trains appearing only intermittently as detracting elements. No significant effects are predicted for the landscape resource. Significant visual effects will remain at one viewpoint, 2A17.

Route Section 2B

Construction

7.4.5 Ten local landscape character areas will experience likely significant effects from the construction of Route Section 2B of the Order Scheme: Claydon Bowl; Twyford Vale (eastern area); Claydon Valley; Winslow Ridge; Winslow Townscape; Claydon Tributary; Mursley – Soulbury Claylands; Horwood Claylands; Newton Longville – Stoke Hammond Claylands, and; West Bletchley residential district. Visual receptors associated with 27 viewpoints will experience likely significant visual effects during construction, as reported in Table 12.3 of Chapter 12 (Landscape and visual impact assessment) Volume 2ii Route Section 2B of the ES (**NR16**).

7.4.6 The construction phase will introduce prominent new elements, which will often appear as uncharacteristic and detracting. The removal of lineside vegetation will increase visibility of the works, but intervening elements, such as buildings, hedges and tree belts or HS2 will frequently limit effects to areas close to the railway corridor or the few elevated viewpoints.

Operation

7.4.7 During operation year 1 there will be more frequent train movements and new urbanising elements within the landscape such as bridges, masts and signalling. The proposed mitigation will be immature and would not reduce the effects of the Order Scheme to any measurable degree. The landscape effects will extend over a similar area to those of the construction phase, but the visual effects will be less extensive due to absence of construction activity within the view.

7.4.8 By year 15, the planting will reduce adverse effects of the Order Scheme and will replace characteristic elements, screen detracting elements and restore a sense of enclosure and tranquillity, with the trains appearing only intermittently detracting elements. No likely significant effects are predicted for most of the landscape resource. Likely significant visual effects will remain at 14 viewpoints.

Route Section 2C

Construction

7.4.9 There will be no significant effects on the landscape/townscape resource of the Study Area from the construction of Route Section 2C.

7.4.10 Visual receptors associated with two viewpoints are predicted to experience significant visual effects during construction, as reported in Table 12.2 of Chapter 12 (Landscape and visual impact assessment) Volume 2ii Route Section 2C of the ES (**NR16**). The construction phase will result in notable changes to the visual context due to vegetation removal changing baseline views accompanied by the presence of construction activity.

Operation

7.4.11 During operation year 1, visual receptors associated with both viewpoints will experience significant visual effects from passing trains on a previously disused section of track, and views towards existing infrastructure available due to vegetation clearance during construction.

7.4.12 By year 15 there will be no significant effects for visual receptors in this location, as planting will have established to restore the baseline nature of the views from identified receptors.

Route Section 2D

Construction

7.4.13 There will be no likely significant effects on the landscape resource of the Study Area from the construction of Route Section 2D.

7.4.14 Visual receptors associated with seven viewpoints are predicted to experience likely significant visual effects during construction, as reported in Table 12.2 of Chapter 12 (Landscape and visual impact assessment) Volume 2ii Route Section 2D of the ES (**NR16**). The construction phase will result in notable changes to the visual context due to vegetation removal changing baseline views accompanied by the presence of construction activity.

Operation

7.4.15 During operation year 1, visual receptors associated with viewpoints 2D07, 2D14 and 2D16 will continue to experience likely significant visual effects due to views towards proposed overbridges and vegetation removal revealing the existing railway corridor.

7.4.16 By year 15 there will be no likely significant effects for visual receptors in this location, as planting would have established to restore the baseline nature of the views from identified receptors

Route Section 2E

Construction

7.4.17 Two local landscape character areas will experience likely significant effects from the construction of Route Section 2E: Westcott Claylands LCA, and; 8.5 Northern Vale LCA. Visual receptors associated with six viewpoints are predicted to experience likely significant visual effects during construction, as reported in Table 12.3 of Chapter 12 (Landscape and visual impact assessment) Volume 2ii Route Section 2E of the ES (NR16).

7.4.18 The construction phase will introduce prominent new elements, which will often appear as uncharacteristic and detracting. The removal of lineside vegetation will increase visibility of the works, but intervening elements, such as buildings, hedges and tree belts or HS2 will frequently limit effects to areas close to the railway corridor or the few elevated viewpoints.

Operation

7.4.19 During operation year 1 there will be more frequent train movements and new urbanising elements within the landscape such as bridges, masts and signalling infrastructure. The proposed mitigation will be immature and will not reduce the effects of the Order Scheme to any measurable degree. The landscape effects will extend over a similar area to those of the construction phase, but the visual effects will be less extensive, due to absence of construction compounds and activity within the view.

7.4.20 By year 15, the planting will reduce adverse effects of the Order Scheme and will replace characteristic elements, screen detracting elements and restore a sense of enclosure and tranquillity with the trains appearing only intermittently as detracting elements. No likely significant effects are predicted for the landscape and visual resource.

HS2 Interface Area

7.4.21 There are not predicted to be any significant landscape or visual effects arising from the Order Scheme within the HS2 Interface Area.

8 Water quality and flood risk

1.1 Further information

8.1.1 Further hydrological and hydraulic modelling is being undertaken to inform the design of mitigation measures as an initial part of the detailed design phase, as set out in the Chapter 13 of the ES (**NR16**) Volume 2i and the Flood Risk Assessment (FRA) in Appendix 13.1 in Volume 3 of the ES. This will be based on topographic survey of the watercourse channels, floodplains and key structures, which is currently underway. To inform responses to objections, indicative hydrological and hydraulic modelling has been undertaken across Route Section 2A to 2E, based on available topographic survey and LiDAR data. These models will be updated once detailed topographic survey is available.

8.1.2 The principal design and assessment criteria to be applied in the development of the detailed design of culverts have been defined.

8.2 Approach to assessment

8.2.1 The assessment methodology and proposed mitigation were developed in accordance with the relevant guidance and standards as described in the ES Volume 2i Chapter 13 (Water quality and flood risk) (**NR16**) and the 2012 NPPF, taking into account the potential impacts of climate change.

8.2.2 The water environment assessment methodology considered the following factors:

- Levels and effects of emissions to water from the development;
- Abstractions from or effects on surface or groundwater resources;
- Effects of development on drainage or runoff;
- Changes to other hydrographic characteristics e.g. groundwater level, watercourses;
- Effects on fluvial hydrology;
- Effects of pollutants, waste, etc. on water quality; and
- Effects on fisheries resources.

8.2.3 The FRA and ES made best use of the available data and identified areas where further work was required to develop the design and mitigation measures as part of detailed design during GRIP5. The FRA and ES were developed in consultation with the regulators - the Environment Agency, the Lead Local Flood Authority and Internal Drainage Boards.

8.2.4 The Water Framework Directive (WFD) assessment follows guidance produced by the Planning Inspectorate in Advice Note 18 on The Water Framework Directive in June 2017. This guidance includes three phases of work: i) Screening assessment, ii) Scoping assessment and iii) Impact assessment.

8.3 Mitigation

Construction

8.3.1 The CoCP includes measures that will mitigate and manage the risk of pollution to surface and groundwater. Flood Management Plans will be prepared (as part of the CEMP) where parts of construction compounds are shown to be within Environment Agency flood outlines, using further hydrological and hydraulic modelling in detailed design to for the compounds to ensure they can operate safely.

Operation

8.3.2 Where the Order Scheme design could not be amended to avoid or minimise potential impacts on the water environment, the following mitigation measures have been included.

8.3.3 Compensatory Flood Storage Areas (CFSAs) will be provided to compensate for the Order Scheme encroaching on existing floodplains. The proposed surface water drainage measures will mitigate surface water flood risks elsewhere. CFSAs will reflect the existing topography where possible and will extend the natural floodplain by reducing adjacent ground levels to restore the necessary flood storage capacity.

They are designed to mitigate for events up to the 1% annual chance flood event (including an allowance for climate change). These will be implemented in a phased manner in line with the construction phases, with the CFSA installed where possible in advance of the works requiring mitigation.

8.3.4 The CFSAs will be outside the existing floodplains but as close to the loss of floodplain as feasible, whilst avoiding existing utilities and exclusion zones. The CFSAs will be refined during detailed design, following topographical survey and further hydrological and hydraulic modelling. Where practicable, this will reduce the area and depth of land required, whilst still being able to gain approval from the Environment Agency, Lead Local Flood Authority and Bedford Group of Internal Drainage Boards. The topsoil will be removed and retained, the existing topography excavated to the required levels and the topsoil then replaced, so that the land will return to its former use whilst ensuring the implemented flood storage capacity is maintained. Therefore, whilst the land required for each CFSA is to be acquired permanently, following completion of construction of the CFSA, Network Rail would be willing to return this land to the original owner, subject to agreement of an appropriate maintenance regime for the CFSA.

8.3.5 Culvert replacement will be on a like for like basis and designed to minimise any change in hydraulic behaviour. Hydrological and hydraulic modelling will be used to demonstrate that the proposals will not increase flood risk to the local area, either upstream or downstream, allowing for climate change where possible.

8.3.6 Track drainage will reflect the existing arrangements and the existing runoff rates will be maintained in all areas. Track drainage through the ballast and trackside drains will improve water quality before discharge to the receiving water environment.

8.3.7 Platform drainage for all station modifications will reflect the existing arrangement where the scope is limited to platform extensions. A new station will be constructed at Winslow and a combination of permeable paving and underground tanks is being considered at this stage, with an outfall to an existing highway ditch on Buckingham Road.

8.3.8 Highway drainage will be accommodated within the existing pattern of drainage catchments through use of attenuation basins and swales. These features also allow some improvement to water quality.

8.3.9 Water Quality will be maintained during operation by providing sufficient treatment for track bed run-off before discharge to the receiving water environment, by using sustainable drainage features, where appropriate, in conjunction with railway ballast and filter material within the collector drains.

8.3.10 Water Framework Directive requirements will be satisfied by the Order Scheme, which includes naturalistic channel design in any river realignments and creation of backwaters.

8.3.11 These mitigation measures will be developed in consultation with the regulators - the Environment Agency, the Lead Local Flood Authority and the Internal Drainage Boards.

8.4 Significant residual effects

Construction

8.4.1 Through application of the CoCP and provision of the CFSAs there will be no likely residual significant effects on surface water quality or flood risk during construction within the Order Scheme.

Operation

8.4.2 The mitigation measures will provide sufficient treatment for and control of track bed, station and highway run-off; therefore, there will be no permanent likely residual significant effects on surface water quality due to the Order Scheme.

8.4.3 With the proposed incorporated mitigation measures, negligible effects are generally predicted to flood risk.

9 Objections and representations

9.1 Introduction

9.1.1 Objections and representations have been made to the EWR2 TWAO application. A proportion of the objections received include environmental issues. Appendix A provides a tabular indication of which environmental topics are raised in each of these objections.

9.1.2 In this section I address the environmental issues raised in objections and representations that fall within the scope of my evidence; issues raised in relation to planning, ecology and transport are covered in the evidence of Jill Stephenson, Stephanie Wray and Tim Colles, respectively.

9.1.3 I start by considering the key environmental themes raised and the general responses to them, to reduce the need for repetition of information in the individual objection responses. I then consider each relevant objection or representation, starting with the local authorities, followed by others that have presented a Statement of Case and finally other statutory objections.

9.1.4 Where the issues raised in the objections and/or the Statements of Case relate to detailed clarifications or to proposed planning conditions, these have already been addressed in written responses or have been considered in the wording of the proposed conditions and I have not covered them here. Some of the issues raised have been subsequently resolved through continued liaison with the objector; my evidence is principally in response to the environmental issues that have not been resolved.

9.2 Key environmental themes raised within objections

Control of construction

9.2.1 Many objections raise concerns about the control of site activities and the levels of nuisance created, such as noise, vibration, light, dust, pollution and mud on the roads.

9.2.2 To mitigate for potential adverse effects of construction, construction activities will be managed in line with the CoCP, which is the subject of a planning condition and will be agreed with the relevant local authorities prior to commencement of work (a draft CoCP is provided in the ES (**NR16**) Volume 3, Appendix 2.1). The draft CoCP sets out Network Rail's commitments to managing potential nuisances, such as noise, vibration, light, dust and mud on the roads, as well as controls for water and soil pollution prevention and for monitoring.

9.2.3 Section 2.1 of the CoCP also commits to providing a Community Liaison Officer and a 24-hour means to make contact, should there be any problems or queries.

Land acquisition for environmental works

9.2.4 Many of the objections that raise environmental issues include the use of land for environmental works, on the basis that the land area is too large, that it could be somewhere else or that it does not need to be acquired in perpetuity. These issues are addressed under the topic or topics to which the environmental works relate.

Land use and agriculture

9.2.5 Several objections raise issues regarding the effects on agricultural land arising from re-routed rights of way, access tracks or roads.

9.2.6 In most cases, there is good reason for the routes chosen, usually related to existing constraints such as utilities or environmental designations, meaning that the route can't be placed where the objector would prefer. In some cases, the need for the new route has changed or the route can be amended, as discussed under individual responses.

9.2.7 Some objections raise issues regarding the unrestricted powers sought by the Order Scheme to acquire land needed for environmental mitigation.

9.2.8 To mitigate the potential impacts of the Order Scheme sufficiently, these environmental design measures need to be maintained in perpetuity; therefore, the land needed for these environmental measures is being acquired permanently. However, once construction and planting has been completed, Network Rail

would be willing to return this land to the original landowner subject to agreement of an appropriate maintenance regime.

9.2.9 Some objections raise concerns about the provision and maintenance of suitable fencing around the construction site and alongside the completed railway, particularly where the objector owns adjacent land on which animals are kept.

9.2.10 The CoCP requires that fencing will be provided along the construction site boundary to ensure the works are secure and that public safety is maintained. The fencing design will be appropriate to the location and will be suitable for any farm or other animals kept in adjacent land. At the start of construction, land take will be marked out and a temporary site fence will be installed, which will prevent unauthorised access and will control access by animals. Permanent fencing will be provided along the new railway and highway boundaries and will be appropriate to the location and suitable for any farm or other animals kept in adjacent land.

Cultural heritage

9.2.11 Some objections raise issues regarding cultural heritage during construction.

9.2.12 Concern is expressed that the desk-based assessment (DBA) has not been adequate to determine the potential for discovering remains from the Mesolithic and Neolithic periods and underplays the significance of such remains were they to be encountered. The DBA in the ES Volume 2i Chapter 4 notes that no evidence for these periods has to date been identified within the study area or for EWR in Oxfordshire and discusses in paragraphs 4.2.15 to 4.2.27 the ephemeral nature of evidence of this date and the typical types and characters of site/find that might be encountered, including typical topographic locations. Nonetheless, the DBA recognises that potential still exists and that, if structured deposits are found in situ, these would be of at least medium significance.

9.2.13 Concern is expressed that the site of a former windmill between Bicester and Launton (MOX5020) will be adversely affected by temporary works and that this asset is undervalued in the ES. As stated in Section 3.1 of this evidence, a detailed DBA of this site has been undertaken that identifies that there is likely to have been a medieval or early post-medieval windmill at this location, with associated contemporaneous and later features and a possible second windmill, and agrees broadly with the ES attribution of medium significance for this asset.

9.2.14 The Order Scheme will entail the loss of some areas of ridge and furrow. If the area of ridge and furrow is not part of a coherent surviving local pattern of ridge and furrow, excellent examples of which are present in other parts of Oxfordshire and across much of the central Midlands, then it is a heritage asset of limited significance and often only a portion of it will be lost to due to construction. The impact will not result in any change to the understanding or appreciation of this form of heritage asset type and its partial removal will result in a negligible loss of overall heritage significance to this asset type.

9.2.15 Concerns have been raised over the level of detail provided for archaeological mitigation. Mitigation of impacts on archaeological remains will be undertaken as part of the Order Scheme. This mitigation is not defined within the ES (except for historic building recording), but instead will be detailed in the heritage strategy document that will act as a Written Scheme of Investigation (WSI) for the archaeological evaluation of the Order Scheme. Where appropriate, this will provide details of proposed mitigation; where not, other mitigation strategies will be evaluation dependant and the intention is that this document will confirm that mitigation will be undertaken, but the detail will be determined following evaluation results and in consultation with the local planning authority archaeological advisor.

Air quality

9.2.16 Some objections raised concerns regarding the control of emissions and dust from construction activity, including OBJs 15, 23, 148, 194, 210, 215, 223, 232.

9.2.17 The ES provides a robust assessment of construction dust, as well as construction road traffic emissions. A detailed assessment of construction traffic emissions was undertaken using dispersion modelling software, which concluded that, even during peak construction conditions in an assessment year of 2019, there would be negligible changes in concentrations of NO2, PM_{10} and $PM_{2.5}$ at sensitive receptors. The effects of construction dust were assessed in accordance with best practice guidance from the IAQM.

9.2.18 Mitigation measures specific to air quality are not required as no significant effects were identified. Construction traffic will be managed through the application of the Framework CTMP, provided in the ES Appendix 2.2, Volume 3. Construction activities will be managed in line with the CoCP in the ES Volume 3, Appendix 2.1, which includes control of dust generation and emissions from vehicles and plant and

measures for the control of mud trackout onto the public highway and a commitment to avoid site runoff of water or mud. The correct application of the recommended dust management and monitoring measures will ensure that residual effects of dust will not be significant.

9.2.19 Some objections raised concerns regarding air quality during operation, including impacts on the air quality of the area in general, related to the use of diesel trains instead of the earlier proposals to use electric trains (for passenger services), including OBJs 23, 106, 148, 173, 194, 210, 223.

9.2.20 The ES includes a robust assessment of emissions from diesel trains during the operation of the Order Scheme (as well as construction and operational road traffic emissions), which was undertaken on a conservative basis using the highest growth scenario movements in future year 2031 and assuming no improvement in baseline air quality from that in 2016.

9.2.21 The review of air quality survey data in Appendix 8.4 of the ES Vol.3 shows that rural background NO2 concentrations along the route of the Scheme are very low, less than half the annual mean objective of 40 µg/m3; for example, concentrations around The White Lodge near Winslow were between 10 and 14 µg/m3. In contrast, existing concentrations in the local town centres, where road traffic flows are heavy and subject to congestion, were over 40 µg/m3.

9.2.22 The results for the rail emissions assessment are presented in Table 1.16 in Appendix 8.5 of the ES Volume 3 and discussed in the ES Volume 2ii for each Route Section. The assessment for Route Section 2B (receptors R1 to R16, illustrated in Figure 8.3D) shows that concentrations associated with rail emissions decrease rapidly with increasing distance from the source, such that, within 200 m of the line, there is a reduction of an order of magnitude. The assessment identified a slight increase in NO2 concentrations of 4 µg/m3 with the Order Scheme, at 50 m north of the track, which is representative of many of the objectors' properties. The total concentration estimated in the future year was around 18 µg/m3, or less than half the value of the NO2 objective.

9.2.23 The total estimated concentration of NO2 at 10 m from the track with the Order Scheme is around 26 µg/m3, which is the same as a roadside location in Winslow in 2016 (2B-22, Table 1.8 of Appendix 8.4 in Volume 3 of the ES). This conservative assessment indicates that there is no risk of the air quality objective for NO2 being exceeded at any rural location along the Scheme, even for receptors closest to the track. At a distance equivalent to that of the Sir Thomas Freemantle School, for example, over 100 m north of the track, the impact on air quality will be negligible.

9.2.24 As discussed in Section 4.1 of this evidence, the total concentrations of particulates will remain well below the relevant health-based criteria, now and in the future, with or without the Order Scheme.

9.2.25 Based on the air quality assessment, there will be no significant impacts on air quality that would require mitigation.

Noise and vibration

Construction noise

9.2.26 Some objections raised concerns regarding construction noise and vibration levels.

9.2.27 The draft CoCP, as provided in the ES Volume 3 Appendix 2.1, includes measures to control noise and vibration levels to ensure, so far as is reasonably practicable, that residential properties and all other sensitive receptors are protected from excessive noise and vibration levels arising from the construction activities.

Operational noise – general

9.2.28 Some objections consider that the noise effects are not sufficiently considered in the ES, as only night time effects are assessed, because the future phases of East West Rail will introduce additional train services and because not all road proposals are included.

9.2.29 The approach used for the noise and vibration assessment in the ES is a worst-case assessment. The noise impacts are presented in Appendix 10.5 and 10.6 in Volume 3 of the ES for the night time only. This is because the thresholds for adverse and significant impacts are lower at night than they are during the day; therefore, the assessment shows that there will be more properties with minor, moderate and major impacts at night than there will be minor, moderate and major impacts during the day. The level of train operation assumed for the 2035 operational year in the noise assessment includes trains operating though to Cambridge on the later phases of the EWR programme.

9.2.30 The noise assessment has incorporated the noise generated by vehicles using the road network, as described in Section 10.5 of Chapter 10 in Volume 2i Project-wide. This, therefore, includes traffic on the

roads leading to the new station at Winslow, for which changes in noise are shown to be negligible in the long term. The assessment has not included highways proposals for which there is no confirmed or consented route, such as the Oxford – Cambridge expressway.

9.2.31 Some objections consider that diesel-powered trains will be noisier than electric-powered trains.

9.2.32 For moving trains, the dominant noise source is rolling noise, which arises from the interaction of the wheels on the rails. The motive power source is less important. Further detail on the expected noise levels from trains is provided in Appendix 10.6 in Volume 3 of the ES.

9.2.33 The train services assumed are described in Appendix 10.7 in Volume 3 of the ES, which indicates that the future services will be all four-car multiple-unit trains. For diesel trains, each carriage has a source correction of +7.6dB(A) for the source noise level. Most electric motor units have the same noise level as diesel trains, but certain motor units have higher correction of +8.7dB(A). The trailer (non-motor) units of electric multiple unit trains are quieter than the motor units, with source corrections of +6.0dB(A). Two configurations could be used for electric trains, one with two motor units (M) and two trailer units (T), and another with three motor units and one trailer unit. The diesel trains would be all motor units. The following table shows the noise level difference between these combinations, using both options for the electric motor units.

Table 9.1: Noise level comparison - diesel vs electric trains

	Diesel	Electric	Electric	Electric	Electric
Arrangement	MMMM	MTTM	MMTM	MTTM	MMTM
Car 1	7.6	7.6	7.6	8.7	8.7
Car 2	7.6	6.0	7.6	6.0	8.7
Car 3	7.6	6.0	6.0	6.0	6.0
Car 4	7.6	7.6	7.6	8.7	8.7
Total	13.6	12.8	13.3	13.6	14.2
Difference to diesel		-0.7	-0.3	0.0	0.6

9.2.34 This table shows that electric trains are less than 1dB(A) quieter or noisier than diesel trains. The implications for the Order Scheme noise assessment of using electric trains instead of diesel trains would generally be negligible.

9.2.35 Some objections raise the point that there is less noise mitigation than was indicated in the 2016 draft ES.

9.2.36 This is because the draft ES was based on a level of service that included more frequent and longer trains and, on some sections, assumed higher speeds than the current proposal, which is included in the project description in the ES (**NR16**) Volume 2i Chapter 2. These changes in level of service mean that fewer locations are eligible for the provision of noise mitigation than was the case in the draft ES. Table 9.2 summarises the differences in the level of service between the draft ES and the published ES.

Table 9.2: Levels of service: draft ES vs published ES

Issue	Draft ES – Chapter 10 of Volume 2	Published ES – Appendix 10.7 of Volume 3	Effect on assessment
Passenger train length	Assumes 5 car trains (table 10.15)	Assumes 4 car trains (para 1.8.1)	Published ES has lower noise levels
Passenger train service	Assumes between 2 and 6 services per hour per direction (table 10.16)	Assumes between 1 and 5 services per hour per direction (paragraphs 1.7.4, 1.7.6, 1.7.7, 1.7.9, 1.7.12 and 1.7.14).	Published ES has lower noise levels
Freight train service	Assumes hourly service on a 24-hour basis (para 10.6.39), either 1 or 2 freight services per direction per hour (i.e. 48 or 96 services	Assumes 6, 10 or 20 freight services per 24 hours depending on route section (Tables 1.2 to 1.6)	Published ES has lower noise levels

Issue	Draft ES – Chapter 10 of Volume 2	Published ES – Appendix 10.7 of Volume 3	Effect on assessment
	per 24hrs – table 10.16)		
Freight train speeds	Assumes maximum speeds of 75mph/120kph on all sections (table 10.16)	Assumes maximum speed varies with route section between 48 and 120kph (table 1.1)	Published ES has lower noise levels in certain route sections
All train speeds	Assumes trains travel at maximum line speed	Assumes trains travel at attainable speeds on the line.	Published ES has lower noise levels in certain areas

Operational noise - Route Sections 2A, 2B and 2C

9.2.37 Various objections raised concerns regarding operational noise and vibration levels of EWR2 trains, particularly along Route Sections 2A, 2B and 2C, where there is little or no train movement currently. Once the EWR2 is operational, there will be some noise and vibration effects for residential properties close to or adjacent to the railway. The mitigation measures summarised here and described in section 1.4 of this evidence are proposed to minimise adverse effects. Consequently, significant adverse noise effects will be avoided at most of the noise-sensitive receptors.

9.2.38 Where the noise assessment in the ES predicts significant adverse effects at a group of properties, these will be eligible for noise barrier fences, which will be provided alongside the EWR2 track in four locations – Steeple Claydon, Verney Junction, Winslow and Bletchley. The noise barriers will also provide some reduction in operational noise levels at other properties further from the track that would not be otherwise eligible for noise mitigation measures, particularly at Winslow and Bletchley.

9.2.39 Where the noise assessment in the ES predicts significant adverse effects at individual properties and barriers are not considered appropriate, these will be eligible for noise insulation, which will be provided at 15 individual properties in Route Sections 2A, 2B and 2C. Noise insulation will also be provided at five properties in Route Section 2B that have predicted moderate or major adverse noise impacts, but would not be otherwise eligible for mitigation, where the resultant noise levels will be below but within 3dB of the significant effect thresholds. Network Rail is willing to implement the property insulation early if practicable, before the start of construction of nearby Order Scheme elements, to also help reduce construction noise levels at those properties.

9.2.40 Where the noise assessment presented in the ES identifies a property as being subject to potentially significant vibration effects, mitigation will be considered in the detailed design of the railway track bed to reduce the level of vibration transmission, based on work previously undertaken on EWR Phase 1.

9.2.41 The operational noise and vibration assessment is based on a worst-case approach that assumes all the available train paths will be used; it is likely that this will not be the case, particularly in the early years and during the night, meaning that actual noise and vibration levels arising from EWR2 could be lower than predicted.

Operational noise - Route Sections 2D and 2E

9.2.42 Construction and/or operational noise levels are cited in various objections as one of the reasons why the Order Scheme will make life worse for residents close to the railway, often as an influence on the value or saleability of the property. I address the detail of the predicted noise effects in each case, but the effects on property value are covered in the evidence of Jonathan Smith.

9.2.43 Several objections raised concerns regarding the noise impacts due to the increases in service frequency and train speed along the existing track in Route Section 2D, in locations where no noise mitigation will be provided. There are 19 properties identified as being adversely affected in the ES (**NR16**) Volume 2ii, Route Section 2D, Chapter 10, which are spread throughout route section 2D and are generally those properties closest to the railway in Bletchley, Milton Keynes, Woburn Sands, Aspley Guise, Lidlington, Millbrook, Elstow and Bedford.

9.2.44 Paragraph 10.3.15 of the ES chapter notes that the largest changes in noise in Route Section 2D will be minor, but that the changes in noise will result in an additional 19 properties exceeding the night time significant observed adverse effect level (SOAEL). The night time noise levels will be dominated by the contribution from freight trains running on the network. Whilst the assessment of the Order Scheme allows some growth in freight trains, the principal purpose of EWR2 is to allow additional passenger services.

9.2.45 There are no properties in Route Section 2D that will exceed the daytime SOAEL. The change in night time noise due to the Order Scheme at these 19 receptors is approximately 3dB; one receptor will have a change of 3.0dB and the remaining 18 will be just below 3dB. 3dB is the upper threshold for negligible changes in noise, and, therefore, in most cases the change in noise is assessed as negligible. Paragraph 10.3.16 of Chapter 10, in Volume 2ii, Route Section 2D of the ES, notes that the project would not cause a change in the maximum noise levels at these 19 receptors, since there are existing night time freight services running on the line.

9.2.46 Paragraph 10.4.5 of this ES chapter notes that Network Rail is entitled to intensify services on existing routes without the legal obligation to mitigate impacts. This approach is in line with the National Policy Statement for National Networks (NPSNN), in which the relevant paragraphs are 5.190 and 5.195.

Geology, soils and land contamination

9.2.47 Two objections raised concerns regarding geology, soils and land contamination during construction.

9.2.48 BCC raises concerns that the land to the south west of Bletchley is designated as a Local Wildlife Site and is therefore in need of retaining good water quality. BCC considers this site is at risk from soils and other pollution/contaminants arising from the Order Scheme construction and operation. This site is indeed a LWS. As outlined in Section 11.6 of EWR ES (**NR16**) Volume 2i: Project-wide Assessment, mitigation measures will be incorporated into the construction and operation of the Project and CoCP to manage risks to receptors from soils and other pollution/contaminants.

9.2.49 The EA raise the need to include gas risk in the further ground investigation work to be undertaken at the Bletchley LWS. Ground gas monitoring has been included in the recent additional GI work that will be reported in the generic quantitative risk assessments (GQRA) in January 2019.

9.2.50 BCC also queries the beneficial effects reported in the ES on ground stability along the route.

Landscape and visual

9.2.51 Some objections raise concerns regarding landscape and visual impacts during construction. There are several locations along the Order Scheme where the TWAO boundary implies that vegetation will be lost from within residential land holdings. Since TWAO publication, further work has been undertaken on the construction activities required, which has clarified that existing vegetation does not need to be removed in some of these locations.

9.2.52 Some objections raise concerns regarding landscape and visual impact during operation, including the effects of lights on vehicles using the new overbridges. The Order Scheme will implement landscape planting, such as hedgerows with trees, between nearby properties and the amended or additional rail and road elements. This planting will screen or filter views of the Order Scheme from nearby properties, where sufficient space is available. As the planting matures over time the level of screening will improve. Network Rail are also working closely with HS2 to design and implement an integrated landscape design for parts of Route Sections 2A, 2B and 2E. The detail of the landscape design for the Order Scheme will be subject to approval by the relevant local authority.

9.2.53 The impact of lighting on the Order Scheme is mentioned in some objections. There is only limited operational lighting proposed as part of the Order Scheme; the potential impacts of this are assessed within the landscape visual impact assessment (Chapter 12, Volume 2i Project-wide). This has identified no significant adverse effects in relation to operational lighting and, therefore, no permanent mitigation measures are required.

9.2.54 The ability to maintain vegetation on the side slopes of the overbridge approach embankments is queried. The side slopes proposed for the embankments of approaches to the new overbridges will generally be at 1 in 2 gradients. Where hedgerow planting is proposed for these embankments, then level ground has been included to provide space. Some of the embankments will include native species scrub planting on the side slopes to help assimilation into the local landscape character; this will require only limited maintenance and gaps will be maintained in the planting to enable access to inspect the embankment condition, whilst retaining a naturalistic appearance. The side slope gradient was selected principally because it minimised cost, land requirement and the volume of fill needed to be moved for construction. Network Rail will undertake maintenance of the vegetation on the side slopes of these overbridge approaches.

Water quality and flood risk

9.2.55 Fourteen objections raised concerns regarding the location and/or extent of the proposed CFSAs, as listed in Table 9.3 below.

9.2.56 The design of each CFSA is closely related to the shape of the existing terrain and its relationship to the loss of existing floodplain and the watercourse that will receive the floodwater. Therefore, there is often little or no scope to provide a reasonable CFSA in a different location. However, further modelling has been undertaken on some of the locations and further work has been done on developing the detail of the construction compound intentions, such that amended proposals have been put forward in response to many of these objections and some have been accepted by the relevant objector. Detailed modelling of all proposed CFSAs will be undertaken in the next stage of design, based on topographic survey data, and it is expected that there will be reductions in the capacity and/or the footprint of the CFSA in some locations, which will enable the extent of construction work to be less than allowed for in the Order Scheme.

9.2.57 Table 9.3 Below summarises the work and/or discussions undertaken since TWAO publication for each of these objections.

Table 9.3: Summary of responses to objections regarding CFSAs.

OBJ	Objector	Plot No	CFSA ref	Outcome or current position
12	David Calcutt, Berryfield Farm	1491	2E0183/ 5.2/FH	About half of the plot will not be affected by lowering, so temporary loss of use will be smaller than indicated.
22	Kier Group	986	2b1510/ 5.2/FH	About 70% of the plot will not be affected by general lowering, so temporary loss of use will be smaller than indicated. Needed to compensate for railway earthworks and some of compound B6 (one of two sites for B6).
87	Lower Blackgrove Farm	1447 1449	2E0113/ 5.2/FH	If the accommodation overbridge is not provided, the CFSA can be reduced by about the 25% needed for overbridge. There is scope to move rest of CFSA further west within the landholding, which would be closer to the loss for railway earthworks, if this is preferable to the landowner.
114	Woburn Estates	1194 1195	2D0045/ 5.2/FH	Will use compound D1 area without raising land levels or storing non-moveable assets/infrastructure within existing floodplain, so no need to construct CFSA.
121	Barrett's of Aspley Ltd DPS	1152	2D0037/ 5.2/FH	About half of the plot will not be affected by lowering, so temporary loss of use will be smaller than indicated.
129	Knight Frank - W Lamb Ltd	1185 1188 1189 1190 1192	2D0045/ 5.2/FH	Related to OBJ 114 – plots only needed to access CFSA on plot 1195 – so these five plots also not needed for construction access if don't need CFSA.
135	David Tomkins (owned by O&H)	1255	2D0048/ 5.2/FH	O&H have accepted this location, as they can use the plot for a wet woodland site in green space proposals for their Marston Valley development at Lidlington.
147	Hunters, Fleet Marsden Farm	1465	2E0208/ 5.2/FH	Landowner has suggested an alternative CFSA location closer to the field edges, which has been accepted by Network Rail.
156	O & H / Kathryn Jump	1033	2B1563/ 5.2/FH	O&H have accepted this location, if Network Rail undertake to acquire the whole land parcel. Required for compound B6; now that the compound layout has been confirmed, detailed hydraulic modelling may reduce the required size of the CFSA area.
156	O & H / Kathryn Jump	1121	2D0023/ 5.2/FH	Required because of the earthworks for the accommodation bridge at Woodleys Farm, Woburn Sands. Modelling should allow for this CFSA to be

OBJ	Objector	Plot No	CFSA ref	Outcome or current position
				substantially smaller. There is also potential to provide lowering near the proposed bridge embankments instead, which would reduce the need for development area land.
156	O & H / Kathryn Jump	1300	2D0084/ 5.2/FH	O&H have accepted this location near Kempston Hardwick station, if Network Rail lease rather than purchase. This CFSA is required to mitigate for the proposed highway embankment and modelling should allow for it to be substantially smaller.
164	Edward Anthony Townsend Roscoe	332	2A/0324/ 5.2/FH	About half of the plot will not be affected by general lowering, so temporary loss of use will be smaller than indicated. This CFSA could be moved slightly into field corner or moved into the field on the west side of the watercourse. This CFSA is required to mitigate for railway embankment widening.
165	John Busby	0217 0223	2A0326 /52/FH	About half of the plot will not be affected by general lowering, so temporary loss of use will be smaller than indicated. Modelling has confirmed that the CFSA area can be reduced; intention is to also model the alternative site (different owner). This CFSA is required for highway and railway embankments.
206	Oxford Diocesan Board of Finance	526	2B/0332/ 5.2/FH	About 60% of the plot will not be affected by general lowering, so temporary loss of use will be smaller than indicated. Network Rail will also look at providing some or all of capacity in edge of field adjacent to South Lake in Addington Park.
220	Andrew Chandler	0217 0223	2A0326/ 52/FH	Same as OBJ 165
229	Gladman Developments	681	2B0331/ 5.2/FH	About 60% of the plot will not be affected by significant lowering, so temporary loss of use will be smaller than indicated. Modelling has confirmed that the floodplain extent is about right.
231	G W Fox Ltd	681	2B0331/ 5.2/FH	Same as OBJ 229

9.3 Local authority objections

OBJ 109 – Winslow Town Council

9.3.1 The environmental issues raised in the objection concern loss of land from and/or access to land north of The Spinney (parts of plots 0682 and 0684), which is used as a Local Green Space by consent of the landowner. The objection also raises the perceived need to widen Furze Lane, which will remove existing vegetation along the west side and increase impacts on local property.

9.3.2 Plot 0682 of the land required from the open space at The Spinney is for provision of widened railway earthworks and associated drainage works, plus provision of the hedgerow with trees to reinstate the vegetated appearance of the railway corridor along the north side of this open area. Plot 0684 is for temporary access to plant the hedgerow. Network Rail has reviewed the scheme design in this area prior to detailed design to see if the land requirement can be reduced. The Order Scheme should not affect the ability of the public to access the remaining part of the open area from Lake Close and the footpath along the south edge of the open space will not be affected. The areas required temporarily (Plots 684, 692 and 0700) will be reinstated to their existing condition as open space.

9.3.3 Further work has been undertaken on the detail of access arrangements to Compound B3 and the space required to construct the earthworks for the temporary widening of Furze Lane; this has identified that plot 0633a could be reduced in width by approximately half. Whilst the loss of boundary vegetation and the

visual impact on the adjacent property would be the same as for the Order Scheme, the temporary loss of land from the holding would be about half that required for the Order Scheme, which would reduce the adverse impact on the garden centre business. Network Rail will undertake to design and implement the temporary highways works in this location so that the width of land required from the adjacent landholdings is kept to a practical minimum.

9.3.4 This objection includes the issue of providing a wider bridge to carry Furze Lane over the railway. Such a proposal would need its own justification, assessment and consent, as a replacement bridge is not required for the Order Scheme and would cause additional impacts on residential property, agricultural land and vegetation to the west of the existing road, some of which could be significant.

OBJ 214 – Bedford Borough Council

9.3.5 The environmental issues raised in the objection are: the gradient of proposed highway embankments and whether these can be maintained safely; the level of detail provided for the landscape proposals; and the lack of noise mitigation for lengths of Route Sections 2D and 2E of the Order Scheme where no engineering works are proposed but the level of service will substantially increase.

9.3.6 The side slopes proposed for the embankments of approaches to the new overbridges will generally be at 1 in 2 gradients. Where hedgerow planting is proposed for these embankments, then level ground has been included to provide space. Some of the embankments will include native species scrub planting on the side slopes to help assimilation into the local landscape character; this will require only limited maintenance and gaps will be maintained in the planting to enable access to inspect the embankment condition. The side slope gradient was selected principally because it minimised cost, land requirements and the volumes of fill needed to be moved for construction. Network Rail will undertake maintenance of the vegetation on the side slopes of these overbridge approaches.

9.3.7 More details on the proposed landscape and planting within the areas of development have been provided as part of the ES. The approach to environmental design of the Order Scheme and spatial design principles are described in the Environmental Design Statement (ES Volume 2, Appendix 12.4) and individual topic chapters. The Environmental Design Drawings (ES Volume 4) illustrate the type, location and primary function of proposed environmental mitigation measures with further detail provided in the Environmental Design Schedule (ES Volume 2, Appendix 2.3).

9.3.8 The details of the landscape and associated ecology proposals will be subject to agreement by the local planning authority in the usual manner under the deemed consent provided by the Order and in accordance with the agreed conditions.

9.3.9 The issue of operational noise increases without provision of noise mitigation in Route Sections 2D and 2E is discussed in Section 9.2 of this evidence.

OBJ 221 – Oxfordshire County Council and Cherwell District Council

9.3.10 The environmental issues raised in the objection concern the assessment of construction impacts on cultural heritage and the air quality impacts from extending the periods of gate closure at the London Road level crossing in Bicester.

9.3.11 The London Road Level Crossing falls outside the boundary of the TWAO application. A separate study on the implications of increased rail movements due to EWR2 at this location is presented in ES Volume 3, Appendix 14.6: London Road Level Crossing Analysis Report. Appendix E to that report presents a screening assessment of potential air quality and noise effects associated with changes in traffic at the London Road Level Crossing with EWR2. The findings of the screening assessment concluded that the effect of barrier down time would have no significant residual effects for either air quality or noise at relevant receptor locations.

9.3.12 I have covered the concerns raised regarding the heritage impact assessment in the ES and the assessment of impacts on the site of a former windmill near Bicester in Sections 3.1 and 9.2 of this evidence.

OBJ 232 – Buckinghamshire County Council

9.3.13 The environmental issues raised in the objection include construction effects on cultural heritage, air quality, geology, soils and land contamination, and water and flood risk. However, most of these issues were raised as comments or questions requiring clarifications, with any related holding objections since

being withdrawn. Many of the issues raised will be covered by the planning conditions. Dialogue is continuing with the council on the programme for future work related to these issues as the design is progressed, including the potential for including more sustainable drainage solutions (SuDS), where practicable.

OBJ 233 – Milton Keynes Council

9.3.14 The environmental issues raised in the objection are the design of CFSA location 2D0023/5.2/FH at Woodley's Farm and the accuracy of mapping of the ordinary watercourses in the Lidlington area.

9.3.15 This CFSA proposal is within the O&H landholding and is discussed under OBJ 156. More detail on the design of the CFSA and the function of the local network of watercourses and ditches will be provided following detailed modelling of the catchments during detailed design, based on topographic survey data. If practicable, the area and/or depth of the CSFA will be reduced, whilst still meeting the obligations to the EA and MKC, ensuring flood risk is not increased in the wider area. The hydraulic modelling and design of the CFSA will be subject to approval from the EA and MKC.

OBJ241 – Central Bedfordshire Council

9.3.16 The environmental issues raised in the objection are visual impact at Viewpoint 2D14 and the lack of noise mitigation for Route Sections 2D and 2E of the Order Scheme where no engineering works are proposed but the level of service will substantially increase. They also raise concerns that two emerging development proposals – SA2 and SE2 - have not been adequately reflected in the ES cumulative impact assessment.

9.3.17 At Viewpoint 2D14, an area of recent existing planting between the properties and the proposed bridge would be retained and filter potential views towards it. The baseline view from the properties includes passing traffic on Marston Road. Therefore, from nearby properties, views towards the bridge would be partially filtered by intervening vegetation and would include a new feature that may be highly visible, but is largely characteristic of the existing view from the receptor. This aligns with the definition of Medium Adverse magnitude in ES Volume 2, Appendix 12.2, LVIA Methodology and, following review, Network Rail stand by the assessment as reported in the ES for this receptor. The adjacent Compound D1 would only be acquired temporarily and therefore it will not be possible to thicken these hedgerows as part of the Scheme.

9.3.18 The issue of operational noise increases in Route Sections 2D and 2E is discussed in Section 9.2 of this evidence.

9.3.19 The issues related to the development areas referred to as SA2 and SE2 are covered in the evidence of Jill Stephenson.

9.4 Other objections with Statements of Case

OBJ 015 – Mr and Mrs Blake

9.4.1 The environmental issues raised in the objection are construction and operational effects of noise and vibration, air quality and visual impact. Negotiations with these objectors is at an advanced stage and terms have been agreed. If, however, the objection remains, I shall provide a response on environmental issues in supplementary evidence.

OBJ 023 – Elizabeth and David Howell

9.4.2 The environmental issues raised in the objection are construction and operational noise, operational air quality generally and at The White Lodge, Little Horwood Road, east of Winslow; also loss part of the garden at The White Lodge.

Noise issues

9.4.3 The level of service assumed for the published ES differs in several respects to that assumed for the 2016 draft ES, as described in Section 9.2 of this evidence. Therefore, the operational noise assessment is predicting lower levels of operational noise, meaning that more locations, including this one, remain below the threshold levels at which noise barrier fences or noise insulation would usually be provided. However, noise insulation is now being proposed for five additional properties, including The White Lodge, that have

predicted moderate or major adverse noise impacts, but would not be otherwise eligible for mitigation, where the resultant noise levels will remain below but within 3dB of the significant effect thresholds.

Landscape and visual issues

9.4.4 Network Rail does not now propose to remove any vegetation along the north side of Little Horwood Road, east of overbridge OXD/16, therefore the reinstatement indicated in mitigation plot IDs 2B0313/8.1/FB and 2B0314/8.1/FB on sheet 31 of the Environmental Design Drawings in Volume 4 of the ES relates only to grass seeding along the road verge. The existing mature trees on the north side of the railway embankment, south of the road, are anticipated to be removed, but a section of this vegetation will be retained or, if required to be removed during construction, will be reinstated, to maintain screening (mitigation plot ID 2B0259/8.1/FB)., Network Rail will provide scrub planting on the embankment, where practicable, and plant a hedgerow with trees along the boundary of the rail corridor to the west of Little Horwood Road, overbridge OXD/16 (mitigation plot ID 2B0255/4.2/FD). This will screen views of part of the railway corridor from residential receptors along Little Horwood Road, blend the proposals into the existing landscape pattern and provide visual and habitat connectivity.

9.4.5 Viewpoint 2B18 in the ES Chapter 12 is taken from Little Horwood Road close to The White Lodge and the visual impact assessment (ES Appendix 12.8) is for Moderate Adverse (significant) effect at this viewpoint, at opening year 1 and operation year 15. The Environmental Design Statement (ES Appendix 12.4) sets out the limitations for planting on railway embankments (Insert 3), in accordance with Network Rail Standards: no planting within the top half of a slope or 5m of the outer rail, whichever is the greater.

9.4.6 The extent of land required to implement and maintain the widened railway earthworks and associated drainage features has been looked at in more detail to the west of Bridge OXD/19 and Network Rail will give an undertaking not to exercise its powers to use the eastern ends of plots 0698 and 0699 that are within the garden of The White Lodge. Therefore, the existing garden vegetation alongside the railway boundary to the garden and along the western boundary of the garden will remain.

Air quality issues

9.4.7 As described in Section 9.2 of this evidence, EWR2 will improve public transport connectivity through rail Links between Oxford, Bicester, Bletchley and Bedford/Milton Keynes, and between Aylesbury, Bletchley and Milton Keynes; therefore, a proportion of journeys made by road vehicle are expected to be converted to rail, both for freight and passenger movements. Nevertheless, it is recognised that EWR2 represents a new source of pollution and, therefore, the ES includes a complete assessment of emissions from diesel trains during the operation of the Project, undertaken on a conservative basis (as well as assessment of construction and operational road traffic emissions).

9.4.8 The review of air quality survey data in Appendix 8.4 of the ES Vol.3 shows that rural background NO2 concentrations along the route of the Scheme are very low, less than half the annual mean objective of 40 µg/m3. Concentrations around The White Lodge were between 10 and 14 µg/m3. Existing concentrations in town centres, where road traffic flows are heavy and subject to congestion, were, in contrast, over 40 µg/m3.

9.4.9 The results for the rail emissions assessment are presented in Table 1.16 in Appendix 8.5 of the ES Vol 3 and discussed in paragraphs 8.3.22 – 8.3.25 of ES Vol 2ii (Route Section 2B). The assessment for Route Section 2B (receptors R1 to R16, illustrated in Figure 8.3D) shows that concentrations associated with rail emissions decrease rapidly with increasing distance from the source such that within 200 m of the line, there is a reduction of an order of magnitude. The total estimated concentration of NO2 at 10 m from the track is around 26 µg/m3 which is the same as a roadside location in Winslow in 2016 (2B-22, Table 1.8 of Appendix 8.4). This conservative assessment indicates that there is no risk of the air quality objective for NO2 being exceeded at any location along the Order Scheme, even at those closest to the track. At a distance equivalent to that of the Sir Thomas Freemantle School, over 100 m north of the track, the impact on air quality will be negligible.

9.4.10 The assessment identified a slight increase in NO2 concentrations of 6 µg/m3 with the Order Scheme at 30 m north of the track, which is representative of The White Lodge. The total concentration estimated in the future year at this distance was around half the value of the NO2 objective.

9.4.11 Particulate emissions are, nationally, approximately 3% of the NOx emissions; on this basis, the increase from rail emissions with the Project at the approximate location of The White Lodge will be just 0.2 µg/m3. The average measured concentrations south of the track near The White Lodge (recorded by instrument PM3, see ES Vol 3, Appendix 8.4, Table 1.10), were 9.6 µg/m3 and 9.1 µg/m3 for PM10 and PM2.5 respectively. The national annual mean objectives for these pollutants are 40 µg/m3 and 25 µg/m3 respectively, therefore the concentrations with the Order Scheme will remain well below these criteria,

now and in the future, with and without EWR2. The concentrations will also be below the very challenging WHO guideline of 10 µg/m3 (referenced in Defra's draft Clean Air Strategy 2018).

9.4.12 Based on the air quality assessment, there will be no significant impacts on air quality that would require mitigation.

OBJ 087 – Lower Blackgrove Farm Ltd

9.4.13 The environmental issues raised in the objection are the location and extent of a CFSA. The area shown in the Order Scheme includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 50% of the plan area of the CFSA will be subjected to general lowering of ground levels.

9.4.14 As described in Section 8.3 of this evidence, the location and capacity of CFSAs is heavily constrained by site conditions and the impact of the Order Scheme on the existing flood storage. Further modelling work has been undertaken on the rationale for this CFSA and has confirmed the suitability of the extent and size of the proposals in the draft TWAO. However, if agreement can be reached with the landowner that the proposed accommodation overbridge is not provided, then the CFSA extent can be reduced by about 25%. There also appears to be potential to relocate the CFSA further west within the landholding, which would be closer to the loss for railway earthworks, if this is preferable to the landowner.

9.4.15 Network Rail will undertake to design and implement the CFSA in this location so that the extent of land required from the objectors is kept to a practical minimum. The topsoil will be removed and retained, the existing topography excavated to the required levels and the topsoil then replaced, so that the land will return to its former use whilst ensuring the implemented flood storage capacity is maintained. Therefore, whilst the land required for each CFSA is to be acquired permanently, following completion of construction of the CFSA, Network Rail would be willing to return this land to the original owner, subject to agreement of an appropriate maintenance regime for the CFSA.

OBJ 088 – Mr Q A Craker and OBJ 089 – Ms C A Craker

9.4.16 The environmental issue raised in these objections is the adverse impact of the Order Scheme on the agricultural land at Lower Salden Farm, particularly the use of plots 0930, 0885 and 0915.

9.4.17 Plot 0930 is considered by the objector to create access problems for farming. The Order Scheme proposes to enhance this plot with mature and semi-mature planting to provide a hedgerow to compensate for the loss of woodland and scrub habitat along the existing railway, as this is used by bats to commute between Salden Wood and other woodlands and hedgerows to the east. It is not the intention to sever these plots of farmland; with the agreement of the landowner, Network Rail will provide permanent access gates at suitable locations within the new hedgerow to allow continued use of the fields to the north and south of the hedgerow.

9.4.18 Plots 0885 and 0915 are considered excessive in extent by the objector. These plots include space to plant hedgerows to screen views of the railway from residential receptors to the north, blend the proposals into the existing landscape pattern and provide visual and habitat connectivity. Part of Plot 0885 is required to widen the railway cutting and provide a cut-off drainage ditch along the top of the cutting to intercept surface water flows. Part of Plot 0915 is required for the provision of a GSM-R mast and access track. The land required for environmental mitigation in these plots is to be acquired permanently under the Order; however, following completion of construction and planting, Network Rail would be willing to return this environmental mitigation land to the original owner, subject to agreement of an appropriate maintenance regime for the area.

OBJ 113 – John and Jane Halsey (Lakers)

9.4.19 The environmental issues raised in the objection concern the extent of land required in plot 633a for the temporary highways works along Furze Lane for access to Compound B3, and the consequent adverse impacts on the property and garden centre at Lakers, Furze Lane, Winslow.

9.4.20 Further work has been undertaken on the detail of access arrangements to Compound B3 and the space required to construct the earthworks for the temporary road widening; this has identified that plot 0633a could be reduced in width by approximately half. Whilst the loss of boundary vegetation and the visual impact on the property would be the same as for the Order Scheme, the temporary loss of land from the holding would be about half that required for the Order Scheme, which would reduce the adverse impact on the garden centre business. Network Rail will undertake to design and implement the temporary

highways works in this location so that the width of land required from the objectors is kept to a practical minimum.

OBJ 114 – Trustees of Woburn Estates

9.4.21 The environmental issue raised in the objection is the extent of land required to provide a CFSA on plot 1195 with an associated access on plot 1194.

9.4.22 Further work has been undertaken on the detail of the proposed layout for works compound D1 to which this CFSA relates, which has enabled the extent of land used for topsoil storage / laydown areas to be kept outside of the floodplain, with only moveable assets within the floodplain area. Therefore, Network Rail no longer requires this CFSA and will give an undertaking not to exercise its powers to use plots 1194 and 1195.

OBJ 120 – Bloor Homes

9.4.23 This objection includes the issue of providing a wider bridge to carry Furze Lane over the railway. Such a proposal would need its own justification, assessment and consent, as a replacement bridge is not required for the Order Scheme and would cause additional impacts on residential property, agricultural land and vegetation to the west of the existing road, some of which could be significant.

OBJ 129 – W Lamb Ltd

9.4.24 The environmental issue raised in the objection is the extent of land required to provide a construction access through the objector's business estate for the CFSA within Woburn Estates land, on plots 1185, 1188, 1189, 1190 and 1192.

9.4.25 Further work has been undertaken on the detail of the proposed layout for works compound D1 to which this CFSA relates, which has enabled the extent of land used for topsoil storage / laydown areas to be kept outside of the floodplain, with only moveable assets within the floodplain area. Therefore, Network Rail no longer requires to construct this CFSA and will give an undertaking not to exercise its powers to use plots 1185, 1188, 1189, 1190 and 1192 for a construction access.

OBJ 147 – W & JA Hunter Partnership and LaSalle

9.4.26 The environmental issues raised in the objection include the extent and location of land required for a CFSA at Fleet Marston Farm. The adequacy of an access track for the vehicles used has been questioned and provision of a wider access track and bridge could lead to additional environmental impacts.

9.4.27 An alternative location for the CFSA has been proposed, still within their landholding, which is acceptable to Network Rail, subject to planning approval and LLFA confirmation that this will not affect the farm boundary plantation and lies outside the extent of the HS2 Act.

9.4.28 Network Rail has undertaken further study of the adequacy of the track for the vehicles expected to use it and has found that only minor improvements will be required to the track as it approaches the bridge, which will not lead to additional environmental impacts.

OBJ 156 – O&H Ltd

9.4.29 The environmental issues raised in the objection are the locations and sizes of four CFSAs. Discussions have been held with O&H and the proposals for three of the CFSAs - at plots 1033 (Bletchley Brickworks site), 1255 (Marston Valley) and 1300 (Kempston Hardwick) - are now broadly accepted by them. Their objection remains in respect of the CFSA at plot 1121, Woodleys Farm.

9.4.30 As described in Section 8.3 of this evidence, the location and capacity of CFSAs is heavily constrained by site conditions and the impact of the Order Scheme on the existing flood storage. Further modelling work on the rationale for this CFSA could allow the size of this CFSA to be reduced. There is also potential for some or all the storage capacity required to be provided by localised ground lowering alongside or close to the proposed overbridge embankments, which may be more acceptable to O&H as it could be incorporated into planting areas associated with the envisaged development.

9.4.31 Network Rail will undertake to design and implement the CFSA in this location so that the extent of land required from the objectors is kept to a practical minimum. The topsoil will be removed and retained, the existing topography excavated to the required levels and the topsoil then replaced, so that the land will

return to its former use whilst ensuring the implemented flood storage capacity is maintained. Therefore, whilst the land required for each CFSA is to be acquired permanently, following completion of construction of the CFSA, Network Rail would be willing to return this land to the original owner, subject to agreement of an appropriate maintenance regime for the CFSA.

9.4.32 O&H wish to use one or more of these CFSAs for the provision of wet woodland as part of their planting proposals associated with the envisaged development of these locations. In principle this may be acceptable to the regulators, subject to confirmation through modelling and to agreement of a set of parameters that would underpin the maintenance regime.

9.4.33 The replacement agricultural access off Manor Road to the adjacent field north of the railway (Kempston Hardwick item 3 in the objection) will be provided in location that suits safe highways design, which will be further north than at present.

OBJ 163 – Simon Orpin

9.4.34 The environmental issues raised in the objection are the extent of land in the Order scheme for landscape planting at Old Brickyard Farm, Winslow and the lack of noise mitigation provided for the potential future development of housing on this site.

9.4.35 The development site at Old Brickyard Farm has been considered as a potential receptor in the Cumulative Effects assessment for the Project, with the potential noise impact reported in paragraph 15.7.91 in Chapter 15 of Volume 2i of the ES and Table 2.1 in Appendix 10.10 of Volume 3 of the ES (**NR16**). The site is in the list of reasonably foreseeable future projects (RFFPs) as site PA3.

9.4.36 The design of the housing proposed for the site is not yet known and the site does not yet have planning approval. Therefore, it would be the developer, in agreement with the local planning authority, that would determine and implement noise control measures to ensure that noise impacts from the railway were suitably mitigated

9.4.37 If any measures are included in the design of the railway earthworks to mitigate for potential vibration impacts at adjacent properties, as set out in Section 1.4 of this evidence, then these would also be effective in the same way for any adjacent housing proposed on the Old Brickyard Farm site. However, groundborne vibration is only likely to affect properties within 20m of the track, so any emerging design for the housing development should be able to allow for this.

OBJ 178 – Environment Agency

9.4.38 The Environment Agency has no in-principle objections to the Order Scheme, but does raise various concerns regarding the planning conditions, the CoCP, the flood risk assessment and other matters. The environmental issues raised in the objection include construction and operational effects on geology, water quality and flood risk.

9.4.39 In their points 17, 44 and 47, the EA asserts that the ES has not included an assessment of landfill gas risks or landfill stability The Geology, soils and land contamination assessment in Chapter 11, Volume 2i of the ES (**NR16**) has included an assessment of ground gas, including landfills as a potential source of contamination. The term ground gas has been used to encompass all sources of gas including landfills. Network Rail will take the steps necessary to avoid affecting the existing monitoring boreholes at the Bletchley landfill site, so that the site operators (FCC Waste) will still have access to them as required. The EA landfill stability concerns relate to additional ground pressure from extensions to earthworks slopes affecting adjacent landfill sites; this is principally an issue for the Calvert landfill site and is, therefore, related to the construction of HS2 and not of the Order Scheme. In discussions, the EA have agreed that there is only a low risk of landfill sites being affected by the Order Scheme works, due to the distance between the Scheme earthworks and the landfill areas.

9.4.40 In their points 18 and 61-66, the EA raise concerns over the modelling approach used to determine the requirements for the CFSAs and how the capacity provided relates to the capacity lost, particularly where ground levels differ, or the locations of impact and compensation are separated by a culvert. The EA preferred solution of providing ‘absolute level-for-level’ compensation (ie, the same volumes of floodwater at the same levels in the same part of the floodplain) is not practicable for most of the affected floodplains along the Order Scheme. In these cases, Network Rail has adopted the CIRIA approach of ‘direct level-for-level’ compensation (ie losses at defined flood return periods are compensated elsewhere on the same watercourse at the respective flood return periods), to ensure that flooding issues are not made worse. The CFSA provisions for construction compounds are precautionary and will be at least sufficient for the extent of ground level changes expected within any floodplain in a compound area. The CFSA

proposals will be tested by detailed hydraulic modelling. This general approach to CFSA provision was discussed and agreed with the EA in October 2018.

OBJ 215 Lidington Parish Council

9.4.41 The environmental issue raised in these objections concerns the exposure of pedestrians to vehicle emissions during barrier down time at the Station Road level crossing in Lidlington.

9.4.42 The annual mean concentrations in this area are less than half the NO_2 objective of 40 µg/m^3. While there will be an increase in the frequency that the barriers are down each hour, there will not be an increase in the duration that the level crossing barrier is down for each passing train when the Project is operation. The effect of the Project on pedestrians waiting at the level crossing will, therefore, be negligible, as the period of exposure will not change and NO_2 concentrations will be well below the objective.

OBJ 228, 229, 230 and 231 – Mark and David Spooner, Gladman Developments, Jane Elizabeth Spooner and GW Fox Ltd

9.4.43 The environmental issues raised in these objections concern the location of a CFSA on plot 0681 and the need to provide a wider Furze Lane bridge.

9.4.44 The area of plot 0681 shown in the Order Scheme includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 40% of the plan area of the CFSA will be subjected to general lowering of ground levels.

9.4.45 As described in Section 8.3 of this evidence, the location and capacity of CFSAs is heavily constrained by site conditions, the impact of the Order Scheme on the existing flood storage and the need to provide the compensatory capacity in the same section of the floodplain. Further modelling has been undertaken on the Horwood Brook and its floodplain, to which this CFSA relates; this confirms that the proposed extent and location of the CFSA is suitable. Alternative locations have been looked at for this CFSA but were rejected due to utility conflicts, insufficient area within which to provide the storage, and excessive distance from the floodplain loss location.

9.4.46 Network Rail will undertake to design and implement the CFSA in this location so that the extent of land required from the objectors is kept to a practical minimum, whilst still meeting its obligations to the Lead Local Flood Authority, Environment Agency and Internal Drainage Board, ensuring that we don't increase flood risk in the wider area.

9.4.47 The topsoil will be removed and retained, the existing topography excavated to the required levels and the topsoil then replaced, so that the land will return to its former use whilst ensuring the implemented flood storage capacity is maintained. Therefore, whilst the land in this plot is to be acquired permanently, following completion of the CFSA, Network Rail would be willing to return this land to the original landowner, subject to agreement of an appropriate maintenance regime for the CFSA.

9.4.48 This group of objections includes the issue of providing a wider bridge to carry Furze Lane over the railway. Such a proposal would need its own justification, assessment and consent, as a replacement bridge is not required for the Order Scheme and would cause additional impacts on residential property, agricultural land and vegetation to the west of the existing road, some of which could be significant.

9.5 Other statutory objections with environmental concerns

OBJ 006 – David Taylor

9.5.1 The environmental issue raised in the objection is the loss of three oak trees to enable temporary widening of the A4421 to provide a right turn lane at the adjacent junction.

9.5.2 At this stage, it appears unlikely that removal of these three trees can be avoided, due to the space needed to implement the temporary highway works; therefore, Network Rail are unable to give an undertaking that any will be retained. However, as with any location where mature trees will be lost to the Order Scheme, the detailed design will endeavour, where practicable, to refine the design and/or the construction method to reduce such loss, which might be possible with the tree set in the field boundary and slightly away from the roadside.

OBJ 007 – Denise Richardson

9.5.3 The environmental issues raised in the objection concern fencing during construction, construction noise, construction air quality and construction and operational visual impacts at Pear Tree House, Steeple Claydon.

9.5.4 Construction activities will be managed in line with the CoCP, which must be approved by Aylesbury Vale District Council prior to commencement of work and will be secured through a planning condition (a draft CoCP is provided in ES Volume 3, Appendix 2.1). The CoCP sets out the commitments to managing potential nuisances such as construction noise, vibration, light, pollutants, dust and mud on the roads.

9.5.5 The CoCP includes measures to ensure, so far as is reasonably practicable, that residential properties and other sensitive receptors are protected from excessive noise and vibration levels arising from the construction activities. The noise assessment presented in the ES identifies Pear Tree House as being eligible for noise insulation to reduce operational impacts. Network Rail is willing to implement this insulation early, before start of construction of the new road and overbridge, to reduce the construction noise levels further.

9.5.6 The CoCP requires that fencing will be provided along the construction site boundary to ensure the works are secure and that public safety is maintained. The fencing design will be appropriate to the location and will be suitable for any farm or other animals kept in adjacent land. At the start of construction, land take will be marked out and a temporary site fence will be installed, which will prevent unauthorised access and will control access by animals. Permanent fencing will be provided along the new railway and highway boundaries and will be appropriate to the location and suitable for any farm or other animals kept in adjacent land.

9.5.7 Pear Tree House is north of the OXD line, in the angle between the railway and Queen Catherine Road, in a location that will also be affected by the construction of HS2. The HS2 works include the widening of the railway cutting as far as the existing level crossing, which will entail removal of railway vegetation and some of the planting within the grounds of the house along the south side of the property. HS2 will also construct their maintenance depot to the west of the proposed alignment for Queen Catherine Road and north of the railway.

9.5.8 The Order Scheme will close the existing level crossing and realign Queen Catherine Road onto a new overbridge to the west of the house, where the railway is in cutting that allows the new road to be constructed on only a low embankment to the north. The existing road north of the railway will remain in use to provide access to the house and to Railway Cottages opposite. Construction of the Order scheme will entail removal of existing field boundary vegetation along the new alignment for Queen Catherine Road and its junction with the existing alignment.

9.5.9 The Order Scheme includes the planting of a hedgerow with trees between Pear Tree House and the new road alignment and overbridge. This will provide screening to views of the road from the house, improving over time as the planting matures, which will also add to the screening for the HS2 depot beyond. Network Rail is also working closely with HS2 to design and implement an integrated landscape design along the railway and the road behind this property. The landscape designs will be subject to approval by the local authority.

OBJ 012 – David Aubrey Calcutt

9.5.10 The environmental issues raised in the objection concern the extent of land required for a CFSA on development land at Berryfield Farm.

9.5.11 The area shown in the Order Scheme includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 50% of the plan area of the CFSA will be subjected to general lowering of ground levels.

9.5.12 As described in Section 8.3 of this evidence, the location and capacity of CFSAs is heavily constrained by site conditions and the impact of the Order Scheme on the existing flood storage. Further modelling work has been undertaken on the rationale for this CFSA and has confirmed the suitability of the extent and size of the proposals in the draft TWAO.

9.5.13 Network Rail will undertake to design and implement the CFSA in this location so that the extent of land required from the objectors is kept to a practical minimum. The topsoil will be removed and retained, the existing topography excavated to the required levels and the topsoil then replaced, so that the land will return to its former use whilst ensuring the implemented flood storage capacity is maintained. Therefore, whilst the land required for each CFSA is to be acquired permanently, following completion of construction

of the CFSA, Network Rail would be willing to return this land to the original owner, subject to agreement of an appropriate maintenance regime for the CFSA.

OBJ 022 – Victoria Squibb (Kier Group plc)

9.5.14 The environmental issues raised in the objection concern the extent of land required for a CFSA and environmental works affecting development land.

9.5.15 The area shown in the Order Scheme includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 70% of the plan area of the CFSA will be subjected to general lowering of ground levels.

9.5.16 As described in Section 8.3 of this evidence, the location and capacity of CFSAs is heavily constrained by site conditions and the impact of the Order Scheme on the existing flood storage. Network Rail will undertake to design and implement the CFSA in this location so that the extent of land required from the objectors is kept to a practical minimum. The topsoil will be removed and retained, the existing topography excavated to the required levels and the topsoil then replaced, so that the land will return to its former use whilst ensuring the implemented flood storage capacity is maintained. Therefore, whilst the land required for each CFSA is to be acquired permanently, following completion of construction of the CFSA, Network Rail would be willing to return this land to the original owner, subject to agreement of an appropriate maintenance regime for the CFSA.

OBJ 028 – Richard White

9.5.17 The environmental issues raised in the objection concern the extent of land required, which will be used for environmental planting after completion of the railway upgrade works.

9.5.18 After completion of installation of the new railway earthworks, track bed and drainage, parts of plots 785, 790 and 792 will be used for scrub planting to restore some of the screening vegetation between the property and the railway, with part of plot 792 being reinstated to its current condition. The land needed for these environmental measures is being acquired permanently; however, once construction and planting has been completed, Network Rail would be willing to return this environmental mitigation land to the original landowner subject to agreement of an appropriate maintenance regime.

OBJ 086 – Robert Wilson - Lower Salden Farm

9.5.19 The environmental issues raised in the objection concern the extent of land required for the Scheme from Lower Salden Farm in plots 0885 and 0915.

9.5.20 Most of plot 0885 is required permanently for engineering purposes to provide a new highway, with associated earthworks and drainage. To the west of the OXD line, in the north of the plot, the land is required to plant a hedgerow including trees, which will screen views of the railway from residential receptors to the north, blend the proposals into the existing landscape pattern and provide habitat and visual connectivity.

9.5.21 Most of plot 0915 is required permanently for engineering purposes to provide a new GSM-R mast and access road. The remaining area, in the north of the plot, is required to plant a hedgerow, which will screen views of the railway from residential receptors to the north, blend the proposals into the existing landscape pattern and provide habitat and visual connectivity.

9.5.22 The land required for environmental mitigation in these plots is to be acquired permanently; however, following completion of construction and planting, Network Rail would be willing to return this environmental mitigation land to the original owner, subject to agreement of an appropriate maintenance regime for the area.

OBJ 106 – Mr and Mrs R P G Curtis

9.5.23 The environmental issues raised in the objection are operational noise and the need to provide noise mitigation, operational air quality, loss of existing vegetation, and construction and operational visual effects; on the area in general and at The White House, Little Horwood Road, Winslow. Many of these issues also relate to the (non-statutory) objection made by Mr and Mrs M Curtis of the adjacent property, The Rustics (**OBJ 173**).

Noise issues

9.5.24 The level of service assumed for the published ES differs in several respects to that assumed for the 2016 draft ES, as described in Section 9.2 of this evidence. Therefore, the operational noise assessment is predicting lower levels of operational noise, meaning that more locations, including this one, remain below the threshold level at which noise barrier fences or noise insulation would normally be provided. However, noise insulation is now being proposed for five additional properties, including The White House and The Rustics, that have predicted moderate or major adverse noise impacts, but would not otherwise be eligible for mitigation, where the resultant noise levels remain below but within 3dB of the significant effect thresholds.

9.5.25 The objection assumes that diesel trains are substantially more noisy than electric trains. Once trains are moving, the dominant noise source is rolling noise, which arises from the interaction of the wheels on the rails. The type of motor in the train is less important, as described in Section 9.2 of this evidence, which shows that, for EWR2, electric trains will be less than 1dB(A) quieter or noisier than diesel trains. The outcome for the noise assessment of using electric trains over diesel trains would generally be negligible.

9.5.26 The current noise climate at The White House is not dominated by railway noise. The existing noise levels have used a façade night time baseline level of 47dB LAeq and a daytime façade baseline level of 50dB LAeq, based on measurements undertaken in Winslow. The future (2035) noise levels at The White House are calculated to be 56dB LAeq at night and 57dB LAeq during the day; increases of about 9dB and 7dB respectively. Therefore, the White House is shown on sheets 3 and 4 of Figure 10.6 in Volume 4 of the ES to have a moderate adverse noise impact – i.e. the change in noise will be between 5.0dB and 9.9dB when comparing the current situation in the opening year (2024) to the Order Scheme in the future year (2035).

Landscape and visual issues

9.5.27 Network Rail does not now propose to remove any vegetation along the north side of Little Horwood Road, east of overbridge OXD/16, therefore the reinstatement indicated in mitigation plot IDs 2B0313/8.1/FB and 2B0314/8.1/FB on sheet 31 of the Environmental Design Drawings in Volume 4 of the ES relates only to grass seeding along the road verge. The existing mature trees on the north side of the railway embankment, south of the road, are anticipated to be removed, but a section of this vegetation will be retained or, if required to be removed during construction, will be reinstated, to maintain screening (mitigation plot ID 2B0259/8.1/FB)., Network Rail will provide scrub planting on the embankment, where practicable, and plant a hedgerow with trees along the boundary of the rail corridor to the west of Little Horwood Road, overbridge OXD/16 (mitigation plot ID 2B0255/4.2/FD). This will screen views of part of the railway corridor from residential receptors along Little Horwood Road, blend the proposals into the existing landscape pattern and provide visual and habitat connectivity.

9.5.28 Viewpoint 2B18 in the ES Chapter 12 is taken from Little Horwoood Road close to the White House and the visual impact assessment (ES Appendix 12.8) is for Moderate Adverse (significant) effect at this viewpoint, at opening year 1 and operation year 15. The Environmental Design Statement (ES Appendix 12.4) sets out the limitations for planting on railway embankments (Insert 3), in accordance with Network Rail Standards: no planting within the top half of a slope or 5m of the outer rail, whichever is the greater.

Air quality issues

9.5.29 As described in Section 9.2 of this evidence, EWR2 will improve public transport connectivity through rail Links between Oxford, Bicester, Bletchley and Bedford/Milton Keynes, and between Aylesbury, Bletchley and Milton Keynes; therefore, a proportion of journeys made by road vehicle are expected to be converted to rail, both for freight and passenger movements. Nevertheless, it is recognised that EWR2 represents a new source of pollution and, therefore, the ES includes a complete assessment of emissions from diesel trains during the operation of the Project, undertaken on a conservative basis (as well as assessment of construction and operational road traffic emissions).

9.5.30 The review of air quality survey data in Appendix 8.4 of the ES Vol.3 shows that rural background NO2 concentrations along the route of the Scheme are very low, less than half the annual mean objective of 40 µg/m3. Concentrations around White Lodge were between 10 and 14 µg/m3. Existing concentrations in town centres, where road traffic flows are heavy and subject to congestion, were, in contrast, over 40 µg/m3.

9.5.31 The results for the rail emissions assessment are presented in Table 1.16 in Appendix 8.5 of the ES Vol 3 and discussed in paragraphs 8.3.22 – 8.3.25 of ES Vol 2ii (Route Section 2B). The assessment for Route Section 2B (receptors R1 to R16, illustrated in Figure 8.3D) shows that concentrations associated with rail emissions decrease rapidly with increasing distance from the source such that within 200 m of the line,

there is a reduction of an order of magnitude. The total estimated concentration of NO2 at 10 m from the track is around 26 µg/m3 which is the same as a roadside location in Winslow in 2016 (2B-22, Table 1.8 of Appendix 8.4). This conservative assessment indicates that there is no risk of the air quality objective for NO2 being exceeded at any location along the Scheme, even at those closest to the track. At a distance equivalent to that of the Sir Thomas Freemantle School, over 100 m north of the track, the impact on air quality will be negligible. There are fewer than 2,000 existing properties across the length of the Scheme that are within 100 metres of the Scheme boundary and only about 200 are within 20 metres.

9.5.32 The assessment identified a slight increase in NO2 concentrations of 4 µg/m3 with the Project, at 50 m north of the track, which is representative of The White House. The total concentration estimated in the future year was around 18 µg/m3, or less than half the value of the NO2 objective.

9.5.33 Particulate emissions are, nationally, approximately 3% of the NOx emissions; on this basis, the increase from rail emissions with the Project at the approximate location of The White House will be just 0.1 µg/m3. The average measured concentrations south of the track near The White House (recorded by instrument PM3, see ES Vol 3, Appendix 8.4, Table 1.10), were 9.6 µg/m3 and 9.1 µg/m3 for PM10 and PM2.5 respectively. The national annual mean objectives for these pollutants are 40 µg/m3 and 25 µg/m3 respectively, therefore the concentrations with the Order Scheme will remain well below these criteria, now and in the future, with and without EWR2. The concentrations will also be below the very challenging WHO guideline of 10 µg/m3 (referenced in Defra's draft Clean Air Strategy 2018) and any health effects will be negligible.

9.5.34 Based on the air quality assessment, there will be no significant impacts on air quality that would require mitigation.

OBJ 121 – Barretts of Aspley Limited Directors Pension Scheme and Simon George Cooper Hill

9.5.35 The environmental issues raised in the objection concern the extent of land required for the provision of a CFSA on plot 1152 and hedgerow and tree planting on plot 0882.

9.5.36 The area shown in the Order Scheme for plot 1152 includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 50% of the plan area of the CFSA will be subjected to general lowering of ground levels. The CFSA will drain back into a tributary of the River Ouzel.

9.5.37 As described in Section 8.3 of this evidence, the location and capacity of CFSAs is heavily constrained by site conditions and the impact of the Order Scheme on the existing flood storage. Network Rail will undertake to design and implement the CFSA in this location so that the extent of land required from the objectors is kept to a practical minimum. The topsoil will be removed and retained, the existing topography excavated to the required levels and the topsoil then replaced, so that the land will return to its former use whilst ensuring the implemented flood storage capacity is maintained. Therefore, whilst the land required for each CFSA is to be acquired permanently, following completion of construction of the CFSA, Network Rail would be willing to return this land to the original owner, subject to agreement of an appropriate maintenance regime for the CFSA.

9.5.38 The land take in land plot 0882 is for planting a hedgerow with trees to screen views of part of the railway corridor from residential receptors along Salden Lane, blend the proposals into the existing landscape pattern and provide visual and habitat connectivity. The location of an existing high-pressure gas main alongside the railway means that this planting needs to be set away from the railway, leaving the gas main wayleave unplanted. The land in this plot is to be acquired permanently; however, following completion of construction and planting, Network Rail would be willing to return this environmental mitigation land to the previous owner, subject to agreement of an appropriate maintenance regime for the hedgerow.

OBJ 125 – Crevichon Properties Ltd - Kevin Mimms

9.5.39 The environmental issue raised in the objection is the extent of land required for hedgerow and tree planting in plot 0643 at Winslow.

9.5.40 This land alongside the top of the railway cutting slope is required for a secondary means of escape from the proposed Winslow Station and planting of a hedgerow with trees. The hedgerow will provide partial compensation for vegetation in the cutting that will be lost during construction and will screen views of the railway from existing and future development to the north.

9.5.41 While the land in this plot required for environmental mitigation is to be acquired permanently, following completion of construction and planting of the hedgerow, Network Rail would be willing to return this environmental mitigation land to the original landowner subject to agreement of an appropriate maintenance regime for the hedge.

OBJ 127 – Jonathan Perks - Andrew Preston

9.5.42 The environmental issues raised in the objection concern the extent of land required for environmental mitigation in plots 0911 and 0917 near Salden Wood, and construction and operational visual effects at Springfield Farm, Little Horwood.

9.5.43 Plot 0911 is required permanently for the planting of scrub and plot 0917 is required permanently for the planting of scrub and woodland. This planting is intended to provide a permanent buffer zone between the ancient woodland habitat in Salden Wood Local Wildlife Site and the permanent access road. This land is to be acquired permanently; however, following completion of construction and planting, Network Rail would be willing to return this environmental mitigation land to the original landowner, subject to agreement of an appropriate maintenance regime for the area.

9.5.44 The likely effects of any proposed lighting for the Order Scheme have been considered in the Landscape and visual impact assessment of the ES (Chapter 12, Volume 2i Project-wide). Springfield Farm was included within this assessment as viewpoint number 2B28. The assessment considered likely visual impacts at the property during construction, 1 year after the railway becomes operational and 15 years after. During construction of the Order Scheme (including OXD/10AA Salden Overbridge), a slight adverse visual effect is reported for viewpoint 2B28. During operation (including traffic using OXD/10AA Salden Overbridge), neutral visual effects are reported for viewpoint 2B28, for both year 1 and year 15.

9.5.45 Significant adverse visual effects from traffic crossing OXD/10AA Salden Overbridge are not anticipated at Springfield Farm because: OXD/10AA Salden Overbridge will only provide access to Lower Salden Farm and vehicle movements will be infrequent; the bridge will be at a lower elevation than Springfield Farm; the bridge will be set away from the property; and the intervening vegetation will be retained to continue to provide visual screening.

OBJ 135 – David Tomkins

9.5.46 The objection queries the proposed uses for three of the land plots required at South Pillinge Farm, Millbrook – 1243, 1278 and 1255 - due to their effect on farm management.

9.5.47 In plot 1243, Network Rail has proposed a field edge route rather than a cross-field route to reduce the impact of the footpath on use of the field; Network Rail will undertake to fence off the footpath diversion so that livestock in the field are not adversely affected by footpath users. To prevent livestock escaping, NR proposed to install gates known as “kissing gates” in accordance with BS 5709, where the path will pass through the existing field boundaries.

9.5.48 For plot 1278, a new access into the same field will be provided from the realigned Marston Road to replace that closed near the level crossing. Use of the new access will entail only a small diversion for farm vehicles coming over the new bridge and there will be no delays caused by level crossing gate closures.

9.5.49 The use of plot 1255 to provide a CFSA will require only a temporary loss of use of this part of the field, as the intention is that the existing use can be reinstated after construction is complete, albeit with an increased extent of the Greatmoor Ditch floodplain. The design of CFSAs will be refined during detailed design, based on topographic survey and further hydrological and hydraulic modelling. If practicable, this will reduce the area and excavation depth of the land-take required, whilst still meeting the obligations to the Lead Local Flood Authority. Whilst the land in this plot is to be acquired permanently, following completion of the CFSA, Network Rail would be willing to return this land to the original landowner subject to agreement of an appropriate maintenance regime for the CFSA. The Order Scheme will close the cross-field route of the footpath, removing an existing constraint to the usability of this field.

9.5.50 This plot is also raised in **OBJ 156** by the landowner, O&H. they are content with provision of a CFSA in this location, as it will not prevent use of the land for wet woodland as part of the green space in their development proposals.

OBJ 148 – Russell and Melanie Read

9.5.51 The environmental issues raised in the objection are: no permanent provisions for reducing permanent impacts; no provisions for reducing construction impacts; no provision of temporary stock-proof fencing;

and no provision of permanent stock-proof or security fencing. Their land interests are in plots 1451, 1457 and 1458 near Fleet Marston.

9.5.52 During operation, there will be some noise and possibly some vibration impacts on residential properties close to or adjacent to the railway. Mitigation measures, including noise barriers and noise insulation, are identified in the Environmental Statement (ES), which are proposed to minimise adverse effects in line with the Noise Policy Statement for England (2010); therefore, significant adverse effects will be avoided at most of the sensitive receptors in Route Sections 2A, 2B and 2C. In Route Sections 2D and 2E, the Order Scheme will enable increases in train speed and frequency along lines already in use, therefore no additional noise mitigation needs to be provided.

9.5.53 The ES includes an assessment of the operational emissions to air from trains and road traffic making journeys to and from the railway stations (see Chapter 8, ES Volume 2i Project-wide). This has identified no significant adverse effects on air quality and, therefore, no mitigation measures are required. There will be limited operational lighting in the Order scheme and the potential impacts are assessed within the landscape and visual impact assessment (Chapter 12, ES Volume 2i Project-wide). This has identified no significant adverse effects in relation to operational lighting and, therefore, no mitigation measures are required.

9.5.54 To mitigate the potential adverse effects of construction, construction activities will be managed in line with the CoCP (Appendix 2.1, Volume 3 of the ES), which sets out Network Rail's commitments to managing potential nuisances such as noise, vibration, light, dust and mud on the roads, as well as controls for water and soils pollution prevention and monitoring. The CoCP includes measures to control and limit noise and vibration levels to ensure that residential properties and all other sensitive receptors are protected from excessive noise and vibration levels arising from the construction activities. The CoCP also commits to providing a Community Liaison Officer and a 24-hour means of contact, should there be any problems or queries.

9.5.55 The CoCP requires that fencing will be provided along the construction site boundary to ensure the works are secure and that public safety is maintained. The fencing design will be appropriate to the location and will be suitable for any farm or other animals kept in adjacent land. At the start of construction, land take will be marked out and a temporary site fence will be installed, which will prevent unauthorised access and be appropriate for the uses of the adjacent land including livestock.

9.5.56 For safety and security reasons, permanent fencing is proposed along the operational boundary of the railway to prevent unauthorised access and control access by animals. Adjacent to the objector's land at plots 1451, 1457 and 1458, fencing will consist of post and rail or post and wire, as appropriate for the uses of the adjacent land including livestock.

9.5.57 A hedgerow is proposed within plot 1458 to screen views of the railway from receptors to the east, blend the proposals into the existing landscape pattern, provide security and provide habitat and visual connectivity. Additional fencing will be provided to protect this planting , which will be post and rail or similar, as shown on the Environmental Design Drawings in Volume 4 of the ES.

OBJ 161 – Angela Darbishire and Frances Younghusband

9.5.58 The environmental issues raised in the objection concern the permanent acquisition of farmland, with adverse effects on the shape of a field and on an area of ridge and furrow. The relevant plots are 0190 and 0192 near Launton.

9.5.59 Plot 0190 is a good surviving example of ridge and furrow, but is a discrete area that does not form part of a wider medieval and post-medieval agricultural landscape. Much more complete and coherent areas of ridge and furrow, with associated settlement and agricultural remains, can be found across much of the south Midlands, and it is considered that the partial loss of a small part of this particular area would have a minimal impact on our ability to understand and appreciate it.

9.5.60 The northern section of Plot 0190 is required permanently for construction and operation of the railway. The southern section of Plot 0190 is required for provision of tree and shrub planting to screen views of the railway from receptors to the south, blend the scheme into the existing landscape pattern and provide habitat and visual connectivity. These environmental measures need to be maintained in perpetuity, therefore the land required is being acquired permanently. However, once construction and planting has been completed, Network Rail would be willing to return this land to the original landowner, subject to agreement of an appropriate maintenance regime for the area.

9.5.61 Plot 0192 is required permanently for the construction and operation of the Order Scheme. However, after further development and review of the scheme design, in this location Network Rail can commit to reinstating the land to its previous condition and returning it to the land owner.

OBJ 164 – Edward Antony Townsend Roscoe

9.5.62 The environmental issues raised in the objection concern the extent of land required for provision of proposed planting and a CFSA on plot 0332.

9.5.63 The woodland planting is considered an essential part of the environmental design, as it will reinstate the linear connected habitat and visual screen along the north side of the railway and reinstate the wooded appearance of the railway corridor.

9.5.64 For the CFSA, the area shown in the Order Scheme includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 50% of the plan area of the CFSA will be subjected to general lowering of ground levels.

9.5.65 As described in Section 8.3 of this evidence, the location and capacity of CFSAs is heavily constrained by site conditions and the impact of the Order Scheme on the existing flood storage. Further modelling work has been undertaken on the rationale for this CFSA and has confirmed the suitability of the extent and size of the proposals in the draft TWAO. However, there is opportunity to reshape the CSFA slightly, to move it more into the field corner, or to relocate the CSFA into a smaller field on the west side of the watercourse, if this would be preferable to the landowner.

9.5.66 Network Rail will undertake to design and implement the CFSA in this location so that the extent of land required from the objectors is kept to a practical minimum. The topsoil will be removed and retained, the existing topography excavated to the required levels and the topsoil then replaced, so that the land will return to its former use whilst ensuring the implemented flood storage capacity is maintained. Therefore, whilst the land required for each CFSA is to be acquired permanently, following completion of construction of the CFSA, Network Rail would be willing to return this land to the original owner, subject to agreement of an appropriate maintenance regime for the CFSA.

OBJ 165 – John Busby

9.5.67 The environmental issues raised in the objection concern the extent of land required for a CFSA on plots 0217 and 0223 and construction impact on heritage. This relates to the same location as OBJ 220.

9.5.68 Plots 0217 and 0223 are to provide a CFSA to extend the natural floodplain of Launton Brook by reducing ground levels in the area adjacent to existing floodplain, so enabling them to flood. It has been designed to mitigate for events up to the 1% annual chance event (including an allowance for future climate change). This CFSA is required to mitigate for the loss of floodplain capacity caused by the proposed highway embankment and overbridge earthworks and has been sited to be as close to this loss as feasible, while avoiding existing utilities and other exclusion zones. This CFSA will drain into Launton Brook as a reprofiled pasture that accepts a wider floodplain.

9.5.69 The area shown in the Order Scheme includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 50% of the plan area of the CFSA will be subjected to general lowering of ground levels. Modelling has confirmed that this CFSA can be reduced in extent.

9.5.70 The design of the CFSAs will be refined during detailed design, based on topographic survey and further hydrological and hydraulic modelling. If practicable, Network Rail will reduce the area and/or excavation depth required, whilst still meeting the obligations to the Environment Agency and Lead Local Flood Authority, ensuring that we don't increase flood risk in the wider area. Appendix E of the Flood Risk Assessment (Volume 3 of the ES, Appendices) contains more information on the requirement for this CFSA.

9.5.71 Whilst the land in these plots is to be acquired permanently, following completion of the CFSA, Network Rail would be willing to return this land to the original landowner, subject to agreement of an appropriate maintenance regime for the CFSA.

9.5.72 The ridge and furrow within parcels 0217 and 0223 is not recorded as being part of a priority township, is not part of a larger and easily understood system of ridge and furrow and is not associated with any earthworks relating to domestic settlement activity. Far more extensive and coherent areas of ridge and furrow, often associated with settlement earthworks, can be found across much of the south Midlands. Partial or total loss of this area of non-designated ridge and furrow will have a minimal impact on the understanding and appreciation of this form of medieval agricultural feature.

OBJ 184 – George Browns Limited

9.5.73 The environmental issues raised in the objection concern operational noise at Furzen Farm, Furzen Farm Cottage and Littleworth Farm Cottage at Verney Junction, and the use of plot 0532 for landscape planting.

9.5.74 The current noise climate for the opening year (2024) has used night time façade baseline level of 41dB L_{Aeq} and a daytime façade baseline level of 45dB L_{Aeq}, based on the lowest representative free-field baseline measurements undertaken in the area, as reported in Section 3.2 of Appendix 10.2 in Volume 3 of the ES.

9.5.75 The future year (2035) railway and overall noise levels with the Scheme at these properties are calculated to be:

	Night-time				Daytime			
Receptor	Baseline	Railway noise	Future noise	Impact	Baseline	Railway noise	Future noise	Impact
Furzen Farm	41	45	46	+5	45	47	49	+4
Furzen Farm Cottage	41	56	56	+15	45	58	58	+13
Littleworth Farm Cottage	41	49	50	+9	45	51	52	+7

9.5.76 The current daytime and night time noise levels at all properties are below the thresholds for adverse effects as described in Table 10.13 in Chapter 10 of Volume 2i of the ES. The future daytime noise levels at Furzen farm and Littleworth Farm Cottage with the Scheme will remain below the threshold for an adverse effect, whereas all other future levels will be above the threshold for adverse effects. Using the night time impacts as a worst-case, adverse noise effects are shown at all three properties in the ES:

- Furzen Farm will have a moderate adverse impact.
- Furzen Farm Cottage will have a major adverse impact.
- Littleworth Farm Cottage will have a moderate adverse impact.

9.5.77 Mitigation is not proposed in the Order Scheme because the resultant noise levels will be below the significant effect thresholds of 58dB at night and 68dB during the day. However, Furzen Farm Cottage has now been included on the list for noise insulation as it is predicted to have a major adverse noise impact where the resultant noise levels will be below but within 3dB of the significant effect thresholds.

9.5.78 Furzen Farm Cottage is approximately 45m from the Scheme boundary and, therefore, is identified in the ES as potentially receiving an adverse noise effect from the construction works along the railway. The other two properties are too far away from the Scheme to receive adverse construction noise effects. Network Rail is willing to implement the proposed noise insulation early if practicable, before the start of construction of nearby Order Scheme elements, to also help reduce construction noise levels at this property.

9.5.79 These additional noise mitigation proposals also relate to the adjacent property of Littleworth Farm, which is the subject of non-statutory objection 223 by Edward West (**OBJ 223**).

9.5.80 Network Rail will review the need for permanent acquisition of that part of plot 0532 that is not being retained for a permanent maintenance access to the railway and I will provide the outcome of this review in supplementary evidence.

OBJ 206 – Oxford Diocesan Board of Finance

9.5.81 The environmental issues raised in the objection concern the location of a CFSA within the Addington Manor estate and the objector has suggested an alternative location that is on land not in productive arable use, by extending the existing South Lake within the estate.

9.5.82 Plot 0526 is for the provision of a CFSA to extend the natural floodplain of the Claydon Brook by reducing ground levels in the area adjacent to the existing floodplain and as close to the loss of floodplain as feasible, while avoiding existing utilities and other exclusion zones. CFSAs are designed to mitigate for events up to the 1% annual chance event (including an allowance for future climate change). Appendix E of the Flood Risk Assessment (Volume 3 of the ES, Appendices) contains more information on the requirement for this CFSA.

9.5.83 The area shown in the Order Scheme includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 40% of the plan area of the CFSA will be subjected to general lowering of ground levels.

9.5.84 The option proposed at South Lake was not considered as a location for the entire CFSA as the ecological impacts of excavation through some of the woodland to reduce ground levels adjacent to the lake are likely to be significant. There is also an archaeological designation in this area, due to a Roman Road between Thornborough and Akeman Street at Fleet Marston, which passes through the permanent pasture identified. However, it might be possible to provide some of the required floodplain capacity adjacent to the lake.

9.5.85 The design of CFSAs will be refined during detailed design, based on topographic survey and further hydrological and hydraulic modelling. If practicable Network Rail will reduce the area and/or excavation depth of the CFSA, whilst still meeting the obligations to the Environment Agency, ensuring that we don't increase flood risk in the wider area. It is intended that the land will return to its former use, albeit accommodating more floodwater during extreme events. Whilst the land in this plot is to be acquired permanently, following completion of the CFSA, Network Rail would be willing to return this land to the original landowner, subject to agreement of an appropriate maintenance regime for the CFSA.

OBJ 207 – R H Maycock and Sons

9.5.86 The environmental issues raised in the objection are the extent of land included in the Order Scheme for environmental mitigation in plots 0954, 0959 and 0983.

9.5.87 Plot 0954 is required for a maintenance access to the hedgerow and ditch along the north side of the railway east of Whaddon Road.

9.5.88 Plot 0959 is required permanently to plant a hedgerow. This will screen views of the railway from future residential receptors to the north, blend the proposals into the existing landscape pattern and provide habitat and visual connectivity.

9.5.89 Plot 0983 is mostly required for permanent engineering works. The remaining area, along the north edge of the plot, is required to plant a hedgerow. This will screen views of the railway from future residential receptors to the north, blend the proposals into the existing landscape pattern and provide habitat and visual connectivity.

9.5.90 These environmental measures need to be maintained in perpetuity, therefore the land required is being acquired permanently. However, once construction and planting has been completed, Network Rail would be willing to return this environmental mitigation land to the original landowner, subject to agreement of an appropriate maintenance regime for the areas.

OBJ 210 Graham Peter Freshwater

9.5.91 The environmental issues raised in the objection are: no permanent provisions for reducing permanent impacts; no provisions for reducing construction impacts; no provision of temporary stock-proof fencing; no provision of permanent stock-proof or security fencing; and the extent of plot 0599.

9.5.92 During operation, there will be some noise and possibly some vibration impacts on residential properties close to or adjacent to the railway. Mitigation measures, including noise barriers and noise insulation, are identified in the Environmental Statement (ES), which are proposed to minimise adverse effects in line with the Noise Policy Statement for England (2010); therefore, significant adverse effects will be avoided at most of the sensitive receptors in Route Sections 2A, 2B and 2C. In Route Sections 2D and 2E, the Order Scheme will enable increases in train speed and frequency along lines already in use, therefore no additional noise mitigation needs to be provided.

9.5.93 The ES includes an assessment of the operational emissions to air from trains and road traffic making journeys to and from the railway stations (see Chapter 8, ES Volume 2i Project-wide). This has identified no significant adverse effects on air quality and, therefore, no mitigation measures are required. There will be limited operational lighting in the Order scheme and the potential impacts are assessed within the landscape and visual impact assessment (Chapter 12, ES Volume 2i Project-wide). This has identified no significant adverse effects in relation to operational lighting and, therefore, no mitigation measures are required.

9.5.94 To mitigate the potential adverse effects of construction, construction activities will be managed in line with the CoCP (Appendix 2.1, Volume 3 of the ES), which sets out Network Rail's commitments to managing potential nuisances such as noise, vibration, light, dust and mud on the roads, as well as controls for

water and soils pollution prevention and monitoring. The CoCP includes measures to control and limit noise and vibration levels to ensure that residential properties and all other sensitive receptors are protected from excessive noise and vibration levels arising from the construction activities. The CoCP also commits to providing a Community Liaison Officer and a 24-hour means of contact, should there be any problems or queries.

9.5.95 The CoCP requires that fencing will be provided along the construction site boundary to ensure the works are secure and that public safety is maintained. The fencing design will be appropriate to the location and will be suitable for any farm or other animals kept in adjacent land. At the start of construction, land take will be marked out and a temporary site fence will be installed, which will prevent unauthorised access and be appropriate for the uses of the adjacent land including livestock.

9.5.96 For safety and security reasons, permanent fencing is proposed along the operational boundary of the railway to prevent unauthorised access and control access by animals. Adjacent to the objector's land at plots 0594, 0599, 0600 and 0601, west of Winslow, fencing will consist of post and rail or post and wire, as appropriate for the uses of the adjacent land including livestock.

9.5.97 The objector considers the extent of plot 0599 to be excessive. This plot is wider to the west of OXD/21 Cattle Arch underbridge, as it includes space for the provision of a hedgerow, which will reinstate the visual character of the reinstated railway corridor when viewed from Verney Road and provide habitat connectivity. These environmental measures need to be maintained in perpetuity, therefore the land required is being acquired permanently. However, once construction and planting has been completed, Network Rail would be willing to return this environmental mitigation land to the original landowner, subject to agreement of an appropriate maintenance regime for the area.

OBJ 220 – Peter Arthur Cox and Avril Jeanette Cox

9.5.98 The environmental issues raised in the objection concern the use of plots 0217 and 0223 for provision of a CFSA near Launton. This relates to the same location as OBJ 165.

9.5.99 Plots 0217 and 0223 are to provide a CFSA to extend the natural floodplain of Launton Brook by reducing ground levels in the area adjacent to existing floodplain, so enabling them to flood. It has been designed to mitigate for events up to the 1% annual chance event (including an allowance for future climate change). This CFSA is required to mitigate for the loss of floodplain capacity caused by the proposed highway embankment and overbridge earthworks and has been sited to be as close to this loss as feasible, while avoiding existing utilities and other exclusion zones. This CFSA will drain into Launton Brook as a reprofiled pasture that accepts a wider floodplain.

9.5.100 The area shown in the Order Scheme includes some of the existing floodplain with which continuity of flood storage is required. It is expected that only localised ground lowering will be needed in this part to avoid ponding of water, meaning that only about 50% of the plan area of the CFSA will be subjected to general lowering of ground levels. Modelling has confirmed that this CFSA can be reduced in extent.

9.5.101 The design of the CFSAs will be refined during detailed design, based on topographic survey and further hydrological and hydraulic modelling. If practicable, Network Rail will reduce the area and/or excavation depth required, whilst still meeting the obligations to the Environment Agency and Lead Local Flood Authority, ensuring that we don't increase flood risk in the wider area. Appendix E of the Flood Risk Assessment (Volume 3 of the ES, Appendices) contains more information on the requirement for this CFSA.

9.5.102 Whilst the land in these plots is to be acquired permanently, following completion of the CFSA, Network Rail would be willing to return this land to the original landowner, subject to agreement of an appropriate maintenance regime for the CFSA.

10 Declarations

10.1.1 I hereby declare as follows:

(i) This proof of evidence includes all facts which I regard as being relevant to the opinions that I have expressed and that the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion.

(ii) I believe the facts that I have stated in this proof of evidence are true and that the opinions expressed are correct.

(iii) I understand my duty to the Inquiry to help it with matters within my expertise and I have complied with that duty.