

Conditions 31 and 32: Air Quality Monitoring and Mitigation Report in relation to Oxford Meadows SAC and Hook Meadow and Trap Grounds SSSI

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Conditions 31 and 32: Air Quality Monitoring and Mitigation Report in relation to Oxford Meadows SAC and Hook Meadow and Trap Grounds SSSI

October 2015

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For and on behalf of
Environmental Resources Management

Approved by: Ian Gilder

Signed: 
Position: Technical Director

Head of Planning

Date: 1st October 2015

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1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This document sets out the information required to partially discharge Condition 31 (sections (ii), (iv), (vi), (vii) and (viii)) in relation to Oxford Meadows SAC and Condition 32 (sections (iii) (v), (vi) and (vii)) in relation to the Hook Meadow and Trap Grounds SSSI, as set out in the deemed planning permission for the Chiltern Railways Bicester to Oxford improvements TWA Order. These sections of the conditions deal with:

- a methodology and programme for monitoring rates of exposure to oxides of nitrogen;
- a methodology for attributing the relevant proportions of the recorded exposures to oxides of nitrogen to elements of the Scheme;
- criteria and thresholds for the inferred nitrogen deposition from oxides of nitrogen designed to protect Oxford Meadows SAC and the Hook Meadow and Trap Grounds SSSI;
- proposed means of mitigation in the event that the criteria or thresholds are not met, or are exceeded; and
- arrangements for reporting the proposed monitoring and mitigation.

This is a requirement of Conditions 31 and 32 in that these form part of the 'Scheme of Further Assessment'. Condition 31 (sections (i), (v) and reporting elements of section (viii)) and Condition 32 (sections (i), (ii) and reporting elements of section (vii)), in respect of establishing the baseline conditions of the designated sites in the absence of the Scheme, have already been discharged.

The Baseline Monitoring Report was submitted in August 2015. It has been approved by Oxford City Council (OCC) and is awaiting approval by Cherwell District Council (CDC).

Full details of the requirements contained in Conditions 31 and 32 are provided in *Annex A*.

1.2 BACKGROUND TO THE SCHEME

The Chiltern Railway Company Limited (CRCL) was granted a Transport and Works Act Order by the Secretary of State for Transport on 23 October 2012 for improvements works to the Oxford to Bicester rail line in accordance with the Order. The Scheme is to construct improvements to the existing railway line between Bicester and Oxford, including a new track alongside the existing

mainline between Oxford North Junction and Oxford Station, and a new station at Water Eaton.

The environmental effects of the Scheme were reported in an Environmental Statement (ES) (December 2009) prepared by Environmental Resources Management (ERM), and submitted with the Transport and Works Act Order application in January 2010. Post-application information on the effects of air emissions due to the proposed Scheme on the Oxford Meadows SAC and the Hook Meadow and Trap Grounds SSSI was submitted as part of the Transport and Works Act (TWA) Inquiry in November 2010, and the subsequent re-opened TWA Inquiry in May 2012.

The wording of Conditions 31 and 32 was agreed with Natural England (NE) during the course of the re-opened TWA Inquiry and imposed by the Secretary of State on the deemed planning permission.

The Secretary of State, in his decision, concluded that the development of such a Scheme of Further Assessment would be sufficient to ensure that the operation of the new railway, including the associated road traffic effects, would not be likely to harm the qualifying interests or species for which the SAC and SSSI were designated.

1.3

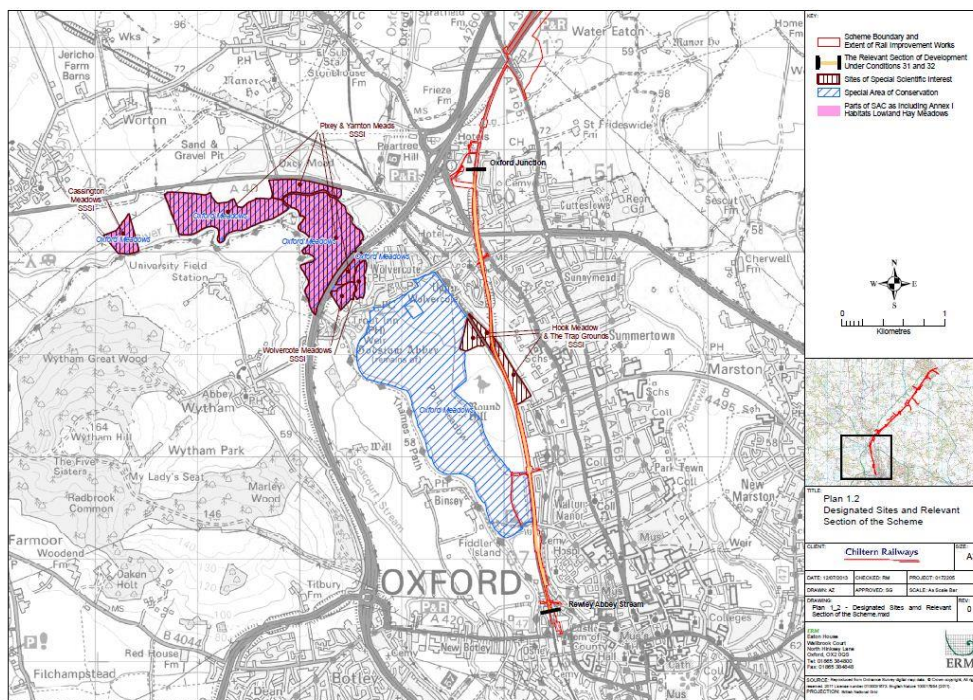
BACKGROUND TO THE SCHEME OF FURTHER ASSESSMENT OF AIR QUALITY

The Scheme as proposed will result in changes to air quality through exhaust emissions from the increased number and frequency of the trains following the improvements. Increases in exhaust emissions may also occur from changes in road traffic, with increases in traffic along the A40 from rail users travelling to the proposed new station at Water Eaton, and decreases in traffic along the A34(T), mainly due to rail users transferring from Oxford station to the new station at Water Eaton. The key change will be in terms of emissions of oxides of nitrogen (NO_x), and the resulting nitrogen deposition.

Such emissions can have an effect on semi-natural ecosystems that are adapted to low nitrogen availability, specifically in this situation relating to changes in plant species diversity, species composition and species numbers.

Conditions 31 and 32 contain measures to protect the Oxford Meadows SAC and the Hook Meadow and Trap Grounds SSSI. The location of these in relation to the Scheme is shown in *Figure 1.1*.

Figure 1.1 Relationship of the Scheme to Oxford Meadows SAC and the Hook Meadow and Trap Grounds SSSI



1.4 REPORT STRUCTURE

The remainder of this Report is structured as:

- Section 2 Monitoring Programme;
- Section 3 Attributing Airborne Oxides of Nitrogen to the Scheme;
- Section 4 Setting Criteria and Thresholds for Mitigation;
- Section 5 Potential Mitigation Measures; and
- Section 6 Reporting of Monitoring and Mitigation.

2 MONITORING PROGRAMME

2.1 INTRODUCTION

The monitoring seeks to identify any unfavourable changes on the designated site(s), attributable to air emissions from the Scheme, and whether those changes necessitate mitigation measures to be implemented by CRCL/Network Rail (NR).

All findings from the monitoring will be reported as set out in *Section 6*.

2.2 MONITORING PROGRAMME

2.2.1 Year One

Surveys

The baseline surveys, excepting the Site Condition Assessment (SCA) and National Vegetation Classification (NVC) surveys, will be repeated in full in Year One (that is the first year after opening, with services assumed to commence in June 2016). These comprise:

- air quality (diffusion tubes);
- plant tissue collection;
- lichen transplant bio-monitoring;
- soil analyses; and
- traffic flows (including passenger surveys).

There is no merit in undertaking the SCA and NVC surveys in Year One. Influences on plant communities are unlikely to be evident during this first monitoring year, as the effects may take time to show (eg. five years) as identified by numerous field and mesocosm ⁽¹⁾ experiments. Hence these habitat surveys are not considered necessary until the later monitoring years.

It will be important to understand the operational traffic flows and train movements that are directly related to the operation of the Scheme; the gaseous emissions from the operations, and any changes that result to soil conditions, plant and/or lichen tissue concentrations. Analyses of the δ^{15} Nitrogen (N) levels will be undertaken to see if any changes recorded can be attributed to airborne nitrogen, as opposed to nitrogen taken up through the soils.

The level to which the data are analysed will depend on the survey findings. Focus will be given to the air monitoring surveys (ie. diffusion tubes and

⁽¹⁾ A biological system that contains the physical features and organisms of an ecosystem but is restricted in size or scope for use in conducting scientific experiments.

lichen samples), which will record airborne nitrogen emissions directly from the Scheme.

The findings of the diffusion tube monitoring will be compared with the baseline findings and the Critical Levels for NO_x (30 µg m⁻³ as an annual mean). Standard conversions will be used to determine the contribution that this makes to deposited nitrogen, and the Critical Load (range of 20-30 kg N ha⁻¹ yr⁻¹ for nutrient nitrogen as reported through the APIS) for low and medium altitude hay meadows. The importance of any changes recorded will be based on the approaches described in *Sections 3 and 4*.

Particular attention will be given to the findings at sampling locations where the baseline surveys in 2014 - 15 found Critical Levels of NO_x were already being exceeded. For example Transects T3 and T4, where the baseline surveys found all sampling locations up to 100 m from the A34(T) already exceed the Critical Level. However, it is predicted that traffic flows on the A34(T) will decrease as a result of the Scheme, so the resultant nitrogen addition from the A34(T) should be insignificant.

2.2.2 *Years Four and Six*

Whilst changes in habitats may not be apparent for at least five years, the aim of the monitoring is to identify signs of change attributable to the Scheme prior to a significant effect resulting. If any changes are recorded then mitigation measures will be implemented to avoid a significant effect occurring.

A full survey programme will be undertaken in Year Four after opening, to confirm whether the airborne emission levels (and also the Scheme's inferred contribution to deposited nitrogen loads) remain similar to Year One. Whilst air quality can vary in the short term on a year by year basis, primarily due to changes in meteorology, longer term trends are characterised by more gradual but consistent changes. These monitoring intervals are appropriate to detect any gradual changes in air quality.

The findings of the SCA and NVC surveys, and the calculated Ellenberg N Indices, will be compared with the baseline surveys in 2014 - 15, to identify any changes in the vegetation communities present and soil fertility, which can be attributed to the Scheme. In particular, the targets in the SCA will be used to determine whether the site has started to show any decline in condition (eg. extent, grass/herb ratio, frequency and number of positive and negative indicator species), or there has been an increase in eutrophication (eg. increased Ellenberg N values), and any changes in the δ¹⁵ N values.

The extent of the monitoring undertaken in Year Six will depend on the findings from Year Four. If the Year Four findings are insignificant, then it may be only necessary to undertake some further airborne NO_x monitoring. However, if there are effects in Year Four, which require mitigation to be implemented, or a general worsening of condition which may result in

mitigation being required subsequently, a more extensive survey may be required. The exact requirements will be determined in discussion with NE, OCC and CDC.

2.3 *RELATIONSHIP OF THE MONITORING TO THE TEN YEAR AIR QUALITY MODEL PREDICTIONS*

Baseline data from the 2014-15 surveys is being used in the Atmospheric Dispersion Modelling System (ADMS) model, which is being used to predict the rates of exposure of habitats to oxides of nitrogen (NO_x) (and inferred nitrogen deposition) from the Scheme for a 10 year period as required under Condition 31 (iii) and Condition 32 (iv).

The draft methodology for this modelling has been provided separately to OCC and CDC for review and the modelling results will be the subject of a separate submission. These predictions provide a general indication of the likely change in air quality, but are based on predicted rather than actual road and rail traffic arising from the Scheme.

It is, therefore, intended that the findings of the modelling described above, will be reviewed against the Year One air quality monitoring and road and rail traffic survey results. If these results cast doubt on the modelled predictions, the model will then be re-run for the period and the proposed future years taking account of the findings of this validation process.

The validated modelling will be used to determine if future emissions from the Scheme will cause the Critical Levels and Critical Loads (based on the inferred levels of nitrogen deposition calculated) to be exceeded due to the change in road and rail traffic for up to and including 10 years after the first year of operation. If likely exceedances are predicted, the modelled data will be extrapolated to give an indication of what year these exceedances are likely to take place.

The findings from the proposed air quality modelling of future scenarios will be reviewed and discussed with NE/OCC/CDC, to determine if there needs to be any change either to the remaining elements of the proposed monitoring regime, or to the likely need for any mitigation measures. If necessary, the model will be re-run taking account of the findings of subsequent monitoring (after Years Four and Six).

This section sets out the methodology for attributing the relevant proportion of measured NO_x levels to the operation of the Scheme

In the Baseline survey in 2014-15, a total of eight diffusion tube transects (up to 200 m in length in some cases) have been used across Oxford Meadows SAC and the Hook Meadow and Trap Grounds SSSI to record baseline air quality. This arrangement will be replicated for any future monitoring, including that which is carried out in Year One.

Each monitoring transect is perpendicular (as far as practical) to the railway line and/or roads to allow any reductions in the levels of air pollutants with increasing distance from the railway and A40/A34(T) to be determined.

In order to calculate the proportion of the atmospheric concentration of NO_x that can be attributed to the Scheme, three sets of data and assumptions are required. These are:

- (i) Recorded NO_x Levels. These will be taken from the 2014-15 Baseline diffusion tube survey and the subsequent surveys;
- (ii) Recorded Road Traffic and Train Information. Rail passenger surveys and traffic counts from the A34 and A40, using the same techniques as in 2014-15, will be used to identify the proportions of the total traffic flows on these roads that can be attributed to operation of the Scheme. For rail movements, there is no comprehensive source of data. For train operations on the Scheme (ie the Bicester to Oxford line), sufficient information can be derived from passenger train timetables and available information about freight train movements and the types of train used for each. Similar information is not available for train operations on the Oxford to Banbury mainline. The 2014-15 Baseline survey suggests that such information is not essential and that emissions from mainline train operations can be considered part of the background air quality. Unless radical changes to mainline train operations occur (for example from electrification or major timetable changes) this assumption will be maintained for each of the future years of monitoring;
- (iii) Background NO_x Assumptions. The methodology for these is described in more detail below.

In terms of the assessment of the A34 and A40, the findings from the air quality survey in 2014-15 indicate that at 200m from the roadside, emissions from the A40 and the A34 have a negligible impact on air quality. These sites are also not close to other sources of emissions. It is reasonable to assume therefore that NO_x concentrations at this distance are representative of the background across the habitat site for the period sampling took place. In order to derive representative future year baseline from the monitoring data collected in 2014-15, future year atmospheric concentrations and NO_x deposition will be determined by applying a factor which will be calculated using projected DEFRA background

mapping. This data estimates the proportion of the projected NO_x baseline which can be attributed to specific source sectors including transport, industry and commercial from 2011 to 2030. Projections are based on road transport forecasts, assumptions on diesel car penetration, vehicle sale projections and the introduction of standards up to Euro 6/VI and as a result baseline NO_x concentrations are predicted to decrease. With regards to nitrogen deposition, this is a product of atmospheric concentrations of both NO_x and ammonia (NH₃). The factor will only be applied to the NO_x proportion. In this instance, NH₃ is assumed to remain constant for all future years as there is no reliable method which can be used to justify any different assumption.

In the case of the survey results at Hook Meadow and Trap Grounds SSSI, adjacent to the rail line, no distinctive dispersion curve away from the main railway line is evident and the recorded levels are comparable with those recorded at 200m from the roads at Oxford Meadows. This suggests that contribution to ambient levels of NO_x from the trains that ran in 2014-15 is small as a proportion of the total background. Given the geographical position of the monitoring points relative to any sources of NO_x other than the railways, it is reasonable to assume that concentrations along the transect points are representative of baseline conditions across the habitat.

The road traffic data and passenger surveys can be used with reasonable confidence to determine the overall changes in road traffic levels between the baseline and future year due to the scheme. Air quality modelling can be used to indicate the proportion of NO_x at Oxford Meadows that could be directly attributable to the Scheme.

At Hook Meadow and Trap Grounds, the working assumption that will be made is that any changes in measured levels at sample points close to the Bicester to Oxford line will be attributable to trains operating on that line and not to other causes, including any changes to train operations on the mainline. In reality, all of the measured levels in Year One at this site will need to be examined carefully and compared with those from the 2014-15 baseline surveys to confirm whether this assumption is likely to be reliable or whether it needs to be adjusted.

4.1.1 *Introduction*

The overall approach to dealing with the potential impacts of emissions attributable to the Scheme was discussed and agreed with NE at the TWA Inquiry and is being implemented through planning conditions 31 and 32. The purpose of these conditions is clearly set out in the reasons for these conditions as being precautionary, to avoid any adverse significant effects on the SAC and SSSI.

The methodologies being applied are derived from the application of professional judgments, in the absence of any directly comparable studies. For this reason, ERM has always anticipated that the discharge of these conditions would need review and possible refinement of the methodology at each stage of the study. In particular, until the Year One monitoring has been completed and the results compared with the Baseline surveys, the approach and methodology remain essentially untested.

The discussion below needs to be read in that context and represents ERM's best professional judgements at this stage. The criteria and thresholds set out below may need to be refined, in consultation with NE, after the Year One surveys.

4.1.2 *Air Quality*

Critical Levels of air pollutants (such as gaseous concentrations of NO_x for the protection of vegetation and ecosystems have been set in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland ⁽¹⁾. The Critical Load values for nitrogen deposition from all sources of nitrogen (eg. nitrogen oxides and ammonia) are those assigned to the most appropriate habitat class of the European Nature Information System (EUNIS) that best matches the interest features of the designated sites. For both Oxford Meadow SAC and Hook Meadow and The Trap Grounds SSSI (Site Relevant Critical Loads) this is for EUNIS habitat class E2.2 (Low and medium altitude hay meadows).

The findings of the diffusion tube monitoring will be compared with the Critical Levels for NO_x (30 µg m⁻³ as an annual mean), and the Critical Load range of 20-30 kg N ha⁻¹ yr⁻¹ for nutrient nitrogen (as reported through APIS) for low and medium altitude hay meadows.

Generally, the proposed approach is that, if, once the Scheme is operational, the changes in NO_x and deposited nitrogen <1 % of the Critical Level/Load, or >1 %, but <70% as a total concentration, and there is little change to the

⁽¹⁾ Defra (2011), Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

baseline findings of the lichen analyses, then the changes can be deemed to be insignificant, and no mitigation is likely to be needed.

At the conclusion of the Year One monitoring (and after each subsequent year of monitoring), the results will be reported and discussed with NE and the LPAs. At this stage, ERM suggest that the criteria for further action should be the following:

- if the recorded levels/loads are ≥ 1 % of the Critical Level/Load and ≥ 70 % of the total concentrations;
- if the percentage changes in the levels from the lichen samples exceed those from the control samples and where they appear much larger than other samples and / or the baseline survey findings; and
- if there are increased levels of NO_x , which can be linked to the Scheme, that are clearly evident at these sampling locations.

Exceedances of these percentages alone do not mean that significant effects have occurred, or will occur, rather it triggers the need for further investigation, including of the sampled parameters in soils and plant tissues (see below).

The results will also be compared to those derived from the Concentration Based Estimated Deposition (CBED) model reported in APIS for Low and medium altitude hay meadows currently reporting a maximum total nitrogen deposition of $18.62 \text{ kg N ha}^{-1} \text{ yr}^{-1}$ for Oxford Meadows SAC and the Hook Meadow and Trap Grounds SSSI.

The findings will then determine if there is a need for mitigation to be implemented, or for the subsequent monitoring programme to be adjusted.

4.1.3

Soil and Habitats

A comparison of the total nitrogen levels and $\delta^{15}\text{N}$ levels within the plant tissue samples will be compared to the recorded baseline levels to help establish if there has been a change in the sources contributing to nitrogen deposition. An increase in the $\delta^{15}\text{N}$ +ve will indicate an increased contribution from transport sources, whilst an increase in ^{15}N -ve will indicate increases from agricultural processes.

The results of the lichen tissue analyses ($\delta^{15}\text{N}$ and total tissue nitrogen) undertaken in Year One, Year Four and Year Six will be compared with the recorded baseline to identify any changes in the source of nitrogen, and in the total uptake of nitrogen by the lichen samples.

There are no current thresholds against which a build-up of nitrogen in soil and plant tissues (including lichen) can be assessed, and which could be used as a trigger to show the need for mitigation. Focus will be given to those sample locations where the largest percentage increases are recorded, and those which have increased beyond the ranges found in the baseline surveys, and at the control sample sites.

The SCA and NVC findings in Year Four will be compared with the baseline to identify any changes in the vegetation community present, and in the Ellenberg Indices. Potentially unfavourable botanical change within each designated site will be identified by:

- early signs of a shift in vegetation community away from the original NVC type recorded during the baseline, and the vegetation type for which the site has been designated;
- the presence of undesirable plant species, such as nitrogen favouring species (ie an increase in grass species) above the baseline level;
- a reduction in the species richness ratio based on NVC quadrat data;
- a decrease in species diversity; and/or
- a general increase in the Ellenberg Indices for each designated site (>20% change from the baseline).

The soil analyses findings will indicate if there has been a decrease in soil pH indicating acidification, possibly as a result of additional nitrogen. PRS Probes will provide data concerning the levels of plant available nutrients which will be compared with the baseline survey findings across the sampling locations.

5.1 INTRODUCTION

The monitoring seeks to identify any unfavourable changes on the designated site(s), attributable to air emissions from the Scheme. It also seeks to do this before they become significant, and allow mitigation measures to be implemented so as to prevent any adverse effects on the integrity of the designated sites. CRCL/NR will only implement mitigation for any changes which are linked to the operation of the Scheme, as opposed to measures to redress any existing unfavourable site condition (unless both can be addressed by the same measure), or effects from some other source.

The options available, should impacts on the site(s) occur, were discussed at the TWA Inquiry in 2010/2011 and the Re-opened Inquiry in 2012. It was concluded that the only practicable measures involve changes to the management regimes for the relevant parts of the SAC/SSSI, to reduce the levels of nitrogen. There are no practicable means of reducing the emissions at source (eg. through increasing separation distances from the designated sites, decreasing speeds, or by reducing emissions from the engines).

This section summarises some of the mitigation options which are likely to be available if required, to avoid significant effects on the designated sites from the Scheme. The methods have been discussed with specialists at the Centre for Ecology and Hydrology (CEH), and taken into account the findings of a review of onsite habitat management to reduce atmospheric nitrogen impacts on terrestrial habitats that was delivered at the Committee on Air Pollution Effects Research (CAPER) Annual Meeting in 2013.

Both the Oxford Meadows SAC and the Hook Meadow and Trap Grounds SSSI support a hay meadow habitat that continues to exist because of on-going land management. The findings of the baseline air emission surveys showed that general background sources contributed more nitrogen than the emissions from the road or rail traffic.

If, however, monitoring and analysis demonstrate that the Scheme is making a substantive contribution to deposited nitrogen and there is clear evidence that this is, or is likely to adversely affect the designated features, this may necessitate changes to land management to address this impact.

These measures are likely to be necessarily based on changing the nitrogen deposition loads by altering grazing regimes and/or changing cutting regimes. Both types of measure form the basis to the existing land management agreements, under the Wildlife and Countryside Act, that NE already has in place with individual landowners and occupiers of these sites. If amendments are thought to be required the aim will be to achieve them

through discussions and agreement with the landowners, led by NR/CRCL, with assistance from NE.

NE has the necessary powers to require the owners and occupiers of land within the SSSIs to implement changes in land management in order to maintain or restore a designated site to favourable condition ⁽¹⁾. This will ensure that any monitoring and mitigation measures required in accordance with conditions 31 and 32 can be implemented with certainty, even if an agreement with the owners and/or occupiers cannot be reached. However, at this stage, this must be seen as the option of last resort.

If the monitoring finds that there are unfavourable changes taking place across the site(s) due to on-going and generally inappropriate management, or for other reasons unrelated to the Scheme, then it is assumed that NE will want to enter into separate discussions with landowners and occupiers, or those causing the unfavourable changes, to bring about improvements. For example, surveys in 2015 found Unit 1 of the Hook Meadow and Trap Grounds SSSI to be unmanaged, and hence the future baseline will almost certainly continue to change from that described in Scheme of Future Assessment Baseline Report, unless active management is introduced.

5.2

MITIGATION OF ATTRIBUTABLE IMPACTS FROM THE SCHEME

The exact measures will depend on the impacts identified and the type of management currently undertaken on the designated sites, which will be documented as part of the baseline reporting. Examples of measures that may be appropriate are provided in *Tables 5.1* and *5.2*.

(1) Under S28(J) and S28(K) respectively of the *Wildlife and Countryside Act 1981* (as amended).

Table 5.1 Example Mitigation Measures - Oxford Meadows SAC

<i>Potential Unfavourable Impact</i>	<i>Possible Mitigation ⁽¹⁾</i>
Widespread changes in species composition across the site(s).	Review existing management regimes (hay cut and aftermath grazing): <ul style="list-style-type: none"> • increase/decrease stock densities and timings; • change the types of grazing animals; • increase the number of hay cuts; • remove cut hay from site; and/or • consider liming of soil (low levels) if soil pH becomes too acidic. This can lead to P immobilisation and may restrict competitive effects on plant species.
Increase in unfavourable species	Hand removal/spot spraying of unfavourable species, or localised increase in livestock.

Table 5.2 Example Mitigation Measures - Hook Meadow and Trap Grounds SSSI

<i>Potential Unfavourable Impact</i>	<i>Possible Mitigation ⁽¹⁾</i>
Widespread changes in species composition across the site(s).	Review existing management regimes (negligible current active habitat management): <ul style="list-style-type: none"> • introduce grazing into parts of the site; • introduce regular hay cuts; • alter land drainage and/or • remove cut hay from site.
Increase in unfavourable species	Hand removal/spot spraying of unfavourable species, or localised increase in livestock.

Monitoring reports will be produced upon completion of the monitoring surveys in Years One, Four and Six. Each report will follow the same structure and will contain:

- Introduction;
- Surveys and Methods (including any limitations);
- Survey Findings;
- Assessment of Findings (including against thresholds / criteria described above, comparison with baseline survey findings and any previous monitoring undertaken, and survey findings published for the wider area); and
- Summary and Recommendations (including the need for any mitigation, changes to survey approach, if required).

A draft monitoring report will be completed within eight weeks of the successful completion of each 12 month period of sampling and the subsequent analysis of samples. The draft will be submitted to NE, OCC and CDC prior to a meeting to discuss the findings, any mitigation required, and/or changes to the monitoring approach going forward. An agreed final version of each monitoring report will be produced after those meetings.

Annex A

The Chiltern Railways
(Bicester to Oxford
Improvements) Order 2012

Planning Conditions 31 and
32

Condition 31

Measures for the protection of the lowland hay meadow habitat at the Oxford Meadows Special Area of Conservation ("SAC")

Development shall not commence on the Individual Section or Sections between Oxford North Junction and Rewley Abbey Stream ("the relevant sections") until a Scheme of Further Assessment of Air Quality in relation to the Cassington Meadows SSSI, the Pixey and Yarnton Meads SSSI and the Wolvercote Meadows SSSI that are co-terminous with part of the Oxford Meadows SAC ("the relevant parts of the SAC") has been submitted to and approved in writing by the local planning authority for the relevant parts of the SAC (in consultation with Natural England).

The Scheme of Further Assessment shall include the following:

- i) a methodology and programme for assessing the baseline exposure to oxides of nitrogen and inferring nitrogen deposition of the relevant parts of the SAC, including appropriate field observations of nitrogen oxide concentrations;
- ii) a methodology and programme for monitoring the rates of exposure to oxides of nitrogen (and inferring nitrogen deposition) of the relevant part of the SAC that may be emitted from such additional road traffic, which is using the A34(T) and A40 close to the relevant parts of the SAC, and such additional trains as are attributable to the opening of the relevant sections of the development to passenger rail traffic;
- iii) predictions, based on the air quality monitoring, for a period of 10 years after opening of the relevant sections of the development to passenger rail traffic, of the likely additional rates of exposure to oxides of nitrogen (and inferred nitrogen deposition) of the relevant parts of the SAC, that are likely to arise as a consequence of the opening of the relevant sections of the development to passenger rail traffic and the development's associated road traffic;
- iv) a methodology for attributing the relevant proportions of the recorded exposures to oxides of nitrogen of the relevant sections of the development once opened for passenger rail traffic based on road traffic counts, railway operations data and surveys of modes of transport and routes used by users of the development;
- v) a methodology and programme for a baseline vegetation survey and evaluation of the designated Annex 1 lowland hay meadow habitat situated on the relevant parts of the SAC and for subsequent vegetation surveys, if such are demonstrated to be necessary following steps (i) to (iv);
- vi) criteria and thresholds for determining the inferred nitrogen deposition from oxides of nitrogen which can be attributed to the opening of the

development to passenger rail traffic that are designed to protect the designated Annex 1 lowland hay meadow habitat in the relevant parts of the SAC;

vii) the proposed means of mitigation (which is likely to include changes to the management regimes for the relevant parts of the SAC) in the event that the criteria or thresholds referred to in (vi) are not met or are exceeded; and,

viii) the arrangements for the reporting and mitigation to be undertaken in accordance with the Scheme of Further Assessment.

The approved Scheme of Further Assessment shall be implemented as approved.

The development shall not be opened to passenger rail traffic, nor shall the car park or station at Water Eaton Parkway be opened for public use, until the approved assessment of baseline conditions referred to in i) above has been completed as approved and reported to the local planning authority for the relevant parts of the SAC, and any other reports made in accordance with viii) above, and the local planning authority has issued written acceptance that the report complies with the approved Scheme.

Reason: to ensure that the development does not have a likely significant effect on the designated lowland hay meadow habitat of the SAC by virtue of deposition of nitrogen from emitted oxides of nitrogen.

Condition 32

Measures for the protection of the Hook Meadow and Trap Ground SSSI

Development shall not commence on the Individual Section or Sections between Oxford North Junction and Rewley Abbey Stream (“the relevant sections”) until a Scheme of Further Assessment of air quality in relation to the Hook Meadow and Trap Grounds SSSI (“the SSSI”) has been submitted to and approved by the local planning authority (in consultation with Natural England).

The Scheme of Further Assessment (“the Scheme”) shall include the following:

i) a methodology and programme for assessing the baseline rates of exposure to oxides of nitrogen and inferring nitrogen deposition on those parts of the SSSI that are identified to be assessed at the date of assessment, including appropriate field observations of nitrogen oxide concentrations;

ii) a methodology and programme for a baseline vegetation survey;

iii) a methodology and programme for monitoring the rates of exposure to oxides of nitrogen (and inferring nitrogen deposition) that may arise from emissions from such additional train operations as are attributable to the use

of the relevant sections of the development by passenger rail traffic (“the additional train operations”);

iv) predictions, based on the air quality monitoring, railway operations and other data, for a period of 10 years after opening of the relevant sections of the development to passenger rail traffic, of the likely additional rates of exposure to oxides of nitrogen (and inferred nitrogen deposition) of the SSSI, that can be attributed to the opening and use of the relevant sections of the development for passenger rail traffic;

v) criteria and thresholds, designed to protect the SSSI, for determining the rates of exposure to oxides of nitrogen (and inferred nitrogen deposition) which can be attributed to the use of the development by passenger rail traffic;

vi) the proposed means of mitigation in the event that the criteria or thresholds referred to in v) are not met or are exceeded; and

vii) the arrangements for the reporting of the monitoring and mitigation to be undertaken in accordance with the Scheme.

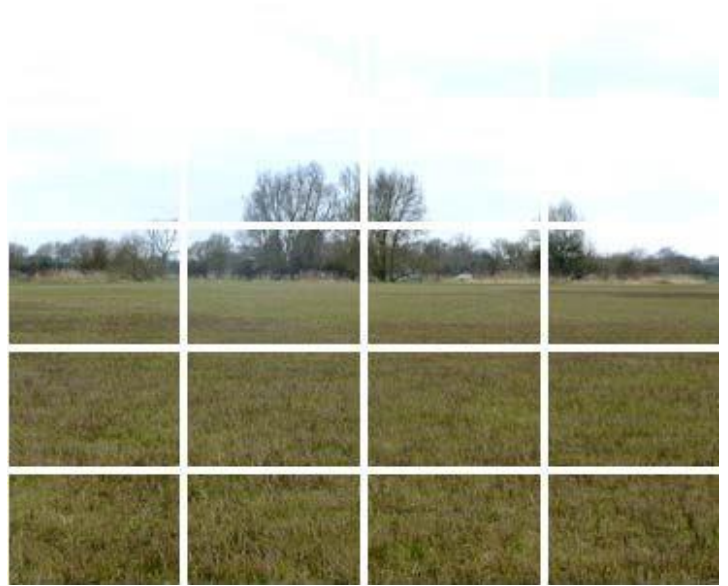
The approved Scheme shall be implemented as approved.

The development shall not be opened to passenger rail traffic until the approved assessment of baseline conditions referred to in i) above has been completed as approved and reported to the local planning authority, and any other reports made in accordance with viii) above, and the local planning authority has issued written acceptance that the report complies with the approved Scheme.

***Reason:** to ensure that the development does not cause harm or prevent restoration of the designated features of the SSSI by virtue of nitrogen deposition from emitted oxides of nitrogen on the SSSI.*

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