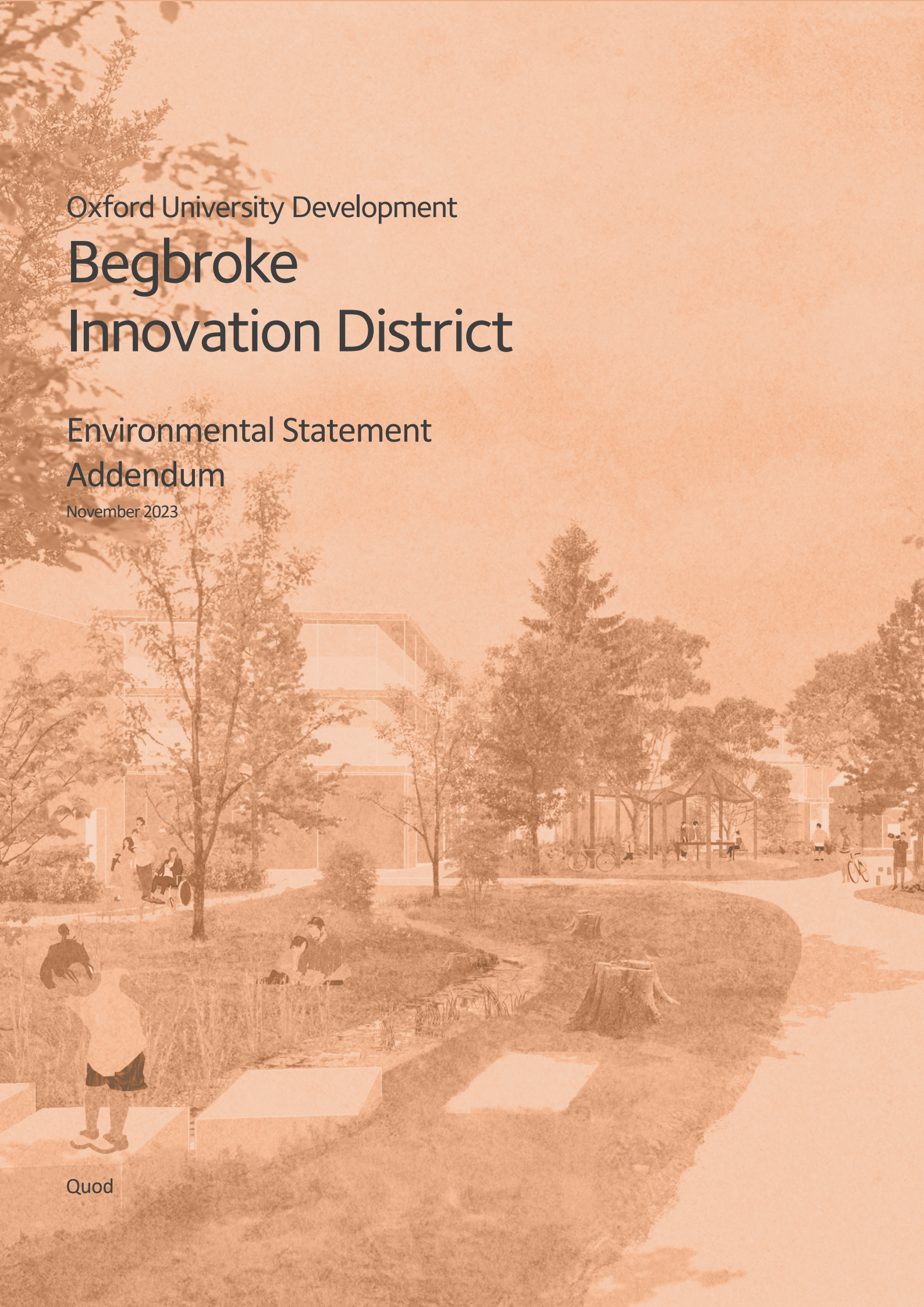


Oxford University Development

Begbroke Innovation District

Environmental Statement
Addendum

November 2023



Quod

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Annex 1: Relevant Consultation Responses

[New] Appendix 8.4(B): Phase 2 Floodplain Areas Interim Archaeological Evaluation Report

[Replacement] Appendix 10.3: Site Suitability

1 Introduction

Context of Report

- 1.1 This Environmental Statement ('ES') Addendum was prepared by Quod on behalf of Oxford University Development (the 'Applicant'). It supplements the ES submitted to Cherwell District Council ('CDC') in July 2023 ('2023 ES') for the submitted outline planning application for a mixed use development ('Submitted Scheme') at Begbroke Science Park ('Site') (ref: 23/02098/OUT).
- 1.2 The proposed development will provide up to 215,000 square metres (sqm) gross external area ('GEA') of residential floorspace, anticipated to deliver approximately 1,800 new homes (including affordable homes and houses in multiple occupation); up to 155,000 sqm GEA of flexible employment space associated with the expansion of Begbroke Science Park; and supporting retail, leisure, education and community/amenity uses. It will also include highway works, new cycle and pedestrian paths, safeguarded land for a rail halt and areas of landscape and public realm.
- 1.3 Minor revisions (the 'Revisions') have been made to the Submitted Scheme in response to consultation feedback to the outline planning application. The Revisions have resulted in minor revisions to the controlling documents that formed the basis of the EIA for the Submitted Scheme and were appended to the 2023 ES. Replacement versions of the relevant documents are therefore provided as part of this ES Addendum (See Section 5 of this report for further details).
- 1.4 In addition, this ES Addendum provides:
 - An assessment of implications of the Revisions to the Submitted Scheme on the mitigation measures and environmental effects stated in the 2023 ES;
 - Further baseline information relating to Chapter 8: Cultural Heritage, including a new Appendix 8.4(B): Phase 2 Floodplain Areas Interim Archaeological Evaluation Report; and
 - A replacement Appendix 10.4: Site Suitability, to reflect the Revisions.
- 1.5 Following CDC's review of the 2023 ES and receipt of responses from consultation bodies, CDC has not raised a request for further information pursuant to Regulation 25 of The Town and Country Planning (Environmental Impact Assessment) Regulations 2017ⁱ (as amended)ⁱⁱ ('EIA Regulations'). However, the Applicant has voluntarily prepared an ES Addendum to accompany the Revisions. This is because the Revisions resulted in minor changes to the parameters and principles on which the ES was based, and additional baseline heritage

ⁱ HMSO, 2017. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. The Stationary Office. April 2017.

ⁱⁱ HMSO, 2018. The Town and Country Planning and Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2018. The Stationary Office. October 2018.

information is provided to inform decision making. As such, this ES Addendum comprises “any other information”ⁱⁱⁱ under the EIA Regulations and will therefore be subject to consultation.

- 1.6 The ES Addendum should be read in conjunction with the 2023 ES. A replacement Non-Technical Summary (‘NTS’) accompanies the ES Addendum, which supersedes the NTS submitted with the 2023 ES.

Consultation Responses

- 1.7 **Annex 1** provides a table of consultation response of relevance to the 2023 ES, along with responses and/or actions taken which are relevant to environmental topics scoped into the ES.

ⁱⁱⁱ As defined by Regulation 2(1) of the EIA Regulations.

2 Site and Setting

2.1 No changes.

3 EIA Methodology

Approach to the ES Addendum

3.1 A review of the 2023 ES has been undertaken to establish whether the Revisions or other aspects necessitate additional environmental information and to confirm whether the assessments remain valid. A description of the Revisions is provided in Section 5.

Scope

3.2 A qualitative approach has been adopted, with the following stages of assessment applied for each technical topic:

- Review of the relevant legislation, policy and guidance for applicable updates with a view to whether the assessment methodology of the 2023 ES is valid;
- Review of assessment topic methodologies described in the technical 2023 ES chapters (7 – 16) and Volume II: LVIA of the 2023 ES;
- Review of the cumulative schemes (see Table 3.1 for further detail);
- Assessment of whether the environmental effects of the Proposed Development (as amended) remain valid or whether new or different environmental effects are likely; and
- Review of whether mitigation measures proposed for the Submitted Scheme remain valid, taking into account the above.

3.3 Table 3.1 provides reasoning why further assessment or updates are not required in relation to general aspects of the 2023 ES.

Table 3.1: Aspects Scoped Out of ES Addendum

Aspect	
Legislation, Planning Policy and Guidance	<p>Legislation: There has been no material change to legislation related to environmental topics scoped within the ES since the 2023 ES was prepared.</p> <p>National Planning Policy: The 2023 ES included commentary on the 2021 NPPF^{iv}. The NPPF was updated on 5 September 2023. Revisions to text were predominantly in relation to onshore wind renewable energy projects and not of relevance to this scheme so not discussed further in this ES Addendum.</p> <p>Local Planning Policy: CDC published the consultation draft of the Regulation 18 Draft Local Plan^v in September 2023. With the exception of Core Policy 14, which sets out proposals for a requirement of a natural capital assessment, the ambitions and requirements of these policies align with and build upon those in the Adopted Cherwell Local Plan 2011-2031, as</p>

^{iv} Secretary of State for the Department for Levelling Up, Housing and Communities, 2023. National Planning Policy Framework. Update September 2023 (previously 2021 adopted version in force)

^v Cherwell District Council, 2023. Cherwell Local Plan 2040 (V3) Regulation 18 Consultation. September 2023

Aspect	
	<p>considered within the 2023 ES. CDC would be required to consider the Proposed Development against current planning policy. Notwithstanding, there are no implications on assessment methodologies from the emerging Local Plan and the technical assessment presented in the 2023 ES remain valid.</p> <p>Guidance: There have been no material changes to adopted technical guidance since submission of the 2023 ES.</p>
General Assessment Approach and Methodology	<p>The EIA methodology described in the 2023 ES remains valid approach to the EIA process and the Revisions do not necessitate any changes. No further commentary is therefore provided on general assessment methodology in this ES Addendum.</p>
Baseline environmental information	<p>There have been no material changes to the Site or its surrounds since the 2023 ES was prepared and the existing and future baseline environmental information included remains valid for all topics. Further narrative to justify the validity of the baseline conditions is therefore not provided.</p> <p>Additional baseline information is provided for cultural heritage (Chapter 8: Cultural Heritage).</p> <p>For Air Quality, CDC published 2022 air quality monitoring data in their 2023 Annual Status Report^{vi} in June 2023, after air quality modelling had commenced for the Development. Whilst there is some uncertainty regarding the validity of using 2022 monitoring data, trends in ambient pollution concentrations generally show reductions in monitored concentrations year on year owing to measures aimed at improving air quality. Therefore, the use of 2019 as a baseline year in the 2023 ES represents a robust and worst-case approach in the 2023 ES. Baseline traffic data was also supplied for 2019, allowing robust verification of dispersion modelling against 2019 air quality monitoring. As 2019 is deemed to be a robust baseline year, no changes to the baseline conditions reported in the 2023 ES have been identified as a result of the Revisions.</p>
Construction assessment	<p>The Revisions do not alter affect any reasonable worst-case assumptions made in the ES which formed the basis of the construction stage assessment. As such, the construction stage assessments reported in the 2023 ES remain valid and are not considered further.</p>
Cumulative Assessment: Intra-project Effects ^{vii}	<p>Intra-project effects were assessed within 2023 ES Chapter 17: Effect Interactions) and inter-project effects were assessed within each technical chapter (Chapters 7 – 16 and Volume II). A review has been undertaken of the 2023 ES cumulative assessment and the potential for additional effects that</p>

^{vi} CDC. (2023). Air Quality Annual Status Report 2023. <https://www.cherwell.gov.uk/downloads/download/1069/air-quality-management>

^{vii} The combined effects of individual effects resultant from the proposed development upon a set of defined sensitive receptors, for example, noise, dust and visual effects.

Aspect	
	<p>may have come forward since this time. No changes to intra-project effects are expected.</p>
<p>Cumulative Effects: Inter- Project Effects</p>	<p>A review has been carried out to identify whether any new or amended cumulative schemes should be taken into account in the ES. This review applied the same search criteria as that defined in section 3.10 of Chapter 3: EIA Methodology.</p> <p>The planning application at OS Parcel 3673 Adjoining and West of 161 Rutten Lane, Yarnton, OX5 1LT (ref: 21/03522/OUT) was refused permission at planning committee on 2nd November 2023. This is now subject to a planning appeal (ref: 23/00102/REF). As the outcome of the planning appeal is unknown at this stage, consideration of this planning application is considered to represent a worst-case scenario, as presented in the 2023 ES. Therefore, it is not discounted from consideration in this ES Addendum.</p> <p>An EIA Screening Opinion request (Ref: 23/02735/SO) was made to CDC in September 2023 for retention of existing garden centre; provision of 28 no. dwellings accessed from Sandy Lane; provision of day nursery; provision of 106 no. units of retirement living accommodation; provision of two-tier decked car park to provide in excess of 250 no. car parking spaces; and creation of a new vehicular access from Begbroke Hill. This proposed scheme is adjacent to the Site boundary at Yarnton Home and Garden Sandy Lane, Yarnton, OX5 1PA and would introduce new sensitive receptors. However, at the time of writing, no further details of the scheme were available. As the EIA Regulations require an ES to consider only existing or approved projects, this scheme is not considered further.</p>

Technical EIA Review

3.4 Table 3.2 presents a review of the 2023 ES chapter topic assessments, providing an assessment against the Revisions to the Submitted Scheme, as detailed further in Section 5 of this ES Addendum.

Table 3.2: Review of 2023 ES Topic Assessments

Topic assessed in the 2023 ES	Review of Likely Significant Effects and Mitigation Measures on 2023 ES Topic Chapters due to Revisions
Socio-economics	The Revisions do not alter the nature or mix of proposed land uses. As such, the stated socio-economic effects and mitigation measures reported in the 2023 ES remain valid.
Transport and Access	The Revisions do not alter the quantum, nature or mix of proposed land uses which are used to derive proposed trip generation and form the basis of transport modelling. As such, the stated transport and access effects and mitigation measures reported in the 2023 ES remain valid.
Noise and Vibration	<p>The Parameter Plans now include the area allocated for the 2FE Primary School in the southern part of the Submitted Scheme (Primary School 2) being located further east from the A44. This revision has been made in response to consultation comments from OCC to reduce noise exposure at the primary school site from the A44 and improve amenity. Residential uses are now located between the primary school and the A44.</p> <p>Section 10.9 of the Chapter 10: Noise and Vibration of the 2023 ES considered the suitability of the Site for residential development and the potential effects on future receptors, and was supported by Appendix 10.3: Site Suitability. The site suitability assessment presented in the 2023 ES was based on a worst-case approach in terms of the location of residential uses, assuming residential dwellings would be at the closest location to noise sources within a Development Zone. The site suitability conclusions and mitigation measures for residential uses are therefore unaffected by the Revisions.</p> <p>Replacement Appendix 10.3: Site Suitability illustrates the revised school location and associated noise contours using the same noise model and assumptions. The revised Primary School 2 location results in reduced noise exposure in the external playing fields which may be used for teaching compared to that of the location in the Submitted Scheme. At the most exposed areas of the Primary School 2 site noise levels have reduced from 55 – 60 dB with mitigation to noise levels across most of the school site not exceeding 45 – 50 dB $L_{Aeq,T}$, with the exception of the south west corner of the school boundary, where the predicted levels just exceed the 50 dB criterion set by OCC. Proposed mitigation, either in the form of acoustic boundary</p>

Topic assessed in the 2023 ES	Review of Likely Significant Effects and Mitigation Measures on 2023 ES Topic Chapters due to Revisions
	<p>treatment to the school site or along the A44 (as stated within the Development Specification) would achieve the small reduction required for the whole boundary to comply with the condition, if it was considered necessary to do so.</p> <p>Paragraph 10.10.5 of the 2023 ES is amended as follows [emphasis in bold outlining proposed changes to text]: <i>“With regard to the schools, a natural ventilation strategy should be feasible for all three schools from an acoustic perspective....Primary School 2 is located such that it benefits from the screening provided by intervening buildings and therefore low noise exposure. The Secondary School will experience higher levels of noise exposure due to the Cherwell Valley Rail Line. However, the modelling demonstrates that with appropriate mitigation measures, the levels in outdoor spaces at the school can be reduced such that a good proportion of the space is below the 50 dB $L_{Aeq,T}$ recommended by OCC at the boundary of school sites, but some of the outdoor space will exceed this level. However, the higher residual levels are generally between 50 – 55 dB $L_{Aeq,T}$ and therefore to a level which complies with the Acoustics of Schools Design Guide recommendations and would be suitable for outdoor teaching.”</i></p> <p>The Revisions do not affect the traffic data which informed the road traffic noise assessment.</p> <p>The assessment of effects and mitigation measures related to this topic in the 2023 ES therefore remain valid.</p>
Air Quality	<p>The 2023 ES concluded that air pollutant concentrations will comply with the UK Air Quality Objectives across the Development. The Revisions do not affect the traffic data which formed the basis of the Completed Development stage assessment included in the ES. The 2023 ES used air quality modelling used to confirm the suitability of the proposed school locations with regards to air quality. The assessment concluded that no significant effects were expected. The revised Primary School 2 location is situated approximately 100m further from the A44. The assessment of effects and mitigation measures related to this topic in the 2023 ES therefore remain valid.</p>
Climate Change and Greenhouse Gases	<p>The Revisions do not affect the road traffic data or other assumptions which formed the basis of the climate change and greenhouse gas assessment. The climate resilience measures identified for the Primary School 2 are therefore unaffected. The assessment of residual effects and mitigation measures related to this topic in the 2023 ES therefore remain valid.</p>
Ecology	<p>The ES concluded that the effects on Rushy Meadows SSSI during the construction and operation stages would be minor beneficial and negligible adverse respectively.</p>

Topic assessed in the 2023 ES	Review of Likely Significant Effects and Mitigation Measures on 2023 ES Topic Chapters due to Revisions
	<p>Following consultation feedback the Proposed Development now includes provision for an increased buffer of native vegetation with Rushy Meadows SSSI. This is secured through amended wording in the Development Specification and Outline LEMP. These updates are considered beneficial in terms of ecology, albeit they will not change the significance of effects or mitigation measures stated in the 2023 ES which remain valid.</p> <p>Additional badger protection is provided in the Outline Construction Environmental Management Plan (CEMP), with further details set out in Section 6 of this report. This does not change the significance of residual effects or mitigation measures stated in the 2023 ES which remain valid.</p> <p>The Revisions have no material implication on the submitted Biodiversity Net Gain (BNG) assessment, which remains valid.</p>
Agricultural Land and Soil Resources	The Revisions do not affect the reasonable worst case assumptions on which the assessment of agricultural land and soil resources were based. The assessment of effects and mitigation measures related to agricultural land and soil resources therefore remain valid.
Ground Conditions and Contamination	The Revisions do not affect the reasonable worst case assumptions on which the assessment of ground conditions and contamination were based. The assessment of effects and mitigation measures related to this topic in the 2023 ES therefore remain valid.
Water Resources and Flood Risk	The Revisions do not affect the reasonable worst case assumptions on which the assessment of water resources and flood risk were based. The assessment of residual effects and mitigation measures related to this topic in the 2023 ES therefore remain valid.
Landscape and Visual	The Revisions do not affect the reasonable worst case assumptions on which the assessment of landscape and visual impacts were based. The assessment of residual effects and mitigation measures related to this topic in the 2023 ES therefore remain valid.

4 Alternatives

- 4.1 In accordance with the EIA Regulations, the 2023 ES included a chapter (Chapter 4: Alternatives) which described the 'reasonable alternatives' to the Submitted Scheme studied by the Applicant, prior to the selection of the final design. The chapter also provided an indication of the main reasons for selection the final chose option, including a comparison of the environmental effects.
- 4.2 The Revisions are minor in nature and are unlikely to give rise to new or different environmental effects. The likely significant effects of the Proposed Development (as amended) are comparable to those of the Submitted Scheme. However, the Revisions result in the following improvements in terms of environmental effects compared to the Submitted Scheme:
- Improved buffer to the Rushy Meadows SSSI, which has been included to minimise risks of disturbance to the designated ecological site; and
 - Proposed location for Primary School 2 moved further east away from the A44 to reduce road traffic noise exposure and improved amenity.
- 4.3 Reasonable alternatives are not considered further and the 2023 ES Chapter: 4: Alternatives remains valid.

5 Description of the Proposed Development

5.1 Chapter 5 of the 2023 ES provides a description of Proposed Development. The Revisions to the Submitted Scheme are limited to the following aspects that are of relevance to the 2023 ES:

- **Appendix 5.1: Parameter Plans**

Only Parameter Plan 1: Development Areas and Land Use, Parameter Plan 3: Green Infrastructure and Parameter Plan 4: Access and Movement have been revised.

A revised location for Primary School 2 in the south of the Site to a proposed location approximately 100m further east, away from the A44. Residential land uses are introduced between the revised location of Primary School 2 and the A44 (in place of the former Primary School 2 location).

Provision is also added into Parameter Plan 4 for an additional indicative location of pedestrian and cycle access in the south east of the Site to the A44.

- **Appendix 5.2: Development Specification**

Text associated with Development Principle 14.3 is updated as follows [emphasis in bold outlining proposed changes to text]:

*“At least 29.2ha of land will be improved such that it is capable of being designated as a Local Nature Reserve. **The LNR will buffer the Rushy Meadows Site of Special Scientific Interest and Rowel Brook from developed areas, and increase ecological connectivity between these areas and the proposed Nature Conservation Area.**”*

- **Appendix 5.5: Outline Landscape Ecological Management Plan (‘OLEMP’)** - Text in paragraph 19 is updated as follows [emphasis in bold indicate the amended/new text] to provide an increased buffer between the Rushy Meadows Site of Special Scientific Interest (SSSI) and the proposed social farm in the north of the Site:

*With consideration of the SSSI, strategies to prevent the deterioration of the SSSI should be implemented, such as a ~~15m~~ **20m** buffer of native vegetation **that supports species of special interest** (such as wild flower grassland with scrub) bounding the perimeters of the Community Farm fringing the SSSI. **Public access to and within this buffer should be restricted.** In addition, the east of Rowel Brook Park shall be developed as a damp meadow to serve as an extension of the Rushy Meadow SSSI. This serves as a link parallel to the Oxford canal, linking the SSSI southwards to the Railway Marshes.*

- **Appendix 5.6: Framework Lighting Strategy** – Update to wording to alter the maximum colour of the maximum colour temperature of lighting on the primary vehicular routes from 3000K down to 2700K.

6 Construction

6.1 No changes are made to the ES chapter.

6.2 **Appendix 6.1: Outline Construction Environmental Management Plan** has been amended to include badger protection measures in response to consultation comments from the Oxfordshire Badger Group. A new paragraph is provided to Section 9, as follows:

'Protection measures for badgers during the construction process should be set out in the relevant detailed CEMP, and should include measures for:

- Ensuring that toolbox talks are carried out so that all workers are fully briefed concerning the potential presence of badgers on site;

- Securely covering any trenches or deep pits over night to prevent badgers becoming entrapped. Alternatively, a rough surfaced plank can be provided, at an angle no steeper than 45 degrees, to allow any badgers a suitable means of escape;

- Carrying out inspections of trenches/pits each morning and evening to ensure that no badgers have become trapped. Should a badger be found then formal ecological advice, and/or badger rescue service of Oxfordshire Badger Group must be sought before work commences for the day on that part of the site;

- Daily inspections of any topsoil or other 'soft' building materials that are stored on site to prevent them becoming adopted by badgers;

- Storing chemicals in such a way that they cannot be accessed or knocked over by any visiting badgers;

- Open pipework with a diameter of more than 120mm should be properly covered at the end of the workday to prevent badgers entering and becoming trapped. Should a badger become trapped then formal ecological advice and/or rescue services by Oxfordshire Badger Group must be sought before work commences for the day on that part of the site;

- Keeping litter to a minimum to avoid attracting badgers onto the site;

- Avoiding security lighting that would unreasonably disturb badgers or other sensitive ecological receptors on or near to the site.'

8 Cultural Heritage

Context

8.1 ES Chapter 8: Cultural Heritage of the 2023 ES provided assessment of the Proposed Development on archaeological and built heritage assets. This assessment identified residual effects as follows:

Construction

- Slight adverse effects on identified and unidentified buried heritage assets during construction phase due to removal / truncation during groundworks;
- Slight adverse effects on the setting of Bladon Camp Scheduled Monument;
- Neutral to slight adverse indirect effects on listed buildings on and in the vicinity of the Site;

Completed Development

- Slight adverse effects on the setting of listed buildings.

Consultation

8.2 Following submission of the planning application, relevant comments have been raised through consultation. A summary of the comments provided and a response to the comment is provided in Table 8.1.

Table 8.1: Consultee Comments and Responses

Consultee Comment	Response
<i>Historic England (17 August 2023)</i>	
Historic England provides advice when our engagement can add most value. In this case we are not offering advice. This should not be interpreted as comment on the merits of the application. We suggest that you seek the views of your specialist conservation and archaeological advisers. It is not necessary to consult us on this application again, unless there are material changes to the proposals.	The Revisions to the Proposed Development are not material.
<i>OCC Archaeology (14 August 2023)</i>	
The site lies in an area of considerable archaeological potential, as has been outlined in the submitted Archaeological Desk Based Assessment, geophysical survey and first phase of archaeological trial trenching which has been carried out on the site. A report for this first phase of evaluation has been agreed and submitted with this application. The geophysical survey and trenched evaluation has identified a range of archaeological features across the site including a number of clusters of dense Iron Age and Roman settlement of potential high significance as well as Bronze Age features.	Information provided within this ES Addendum provides a summary of the findings of the further phase of archaeological trial trenching undertaken at the Site following

Consultee Comment	Response
<p>This evaluation has only investigated part of the site however and a further phase of trial trenching will be required prior to the determination of this application, along the northern and eastern edges of the proposal area to establish the character, preservation and date of the features recorded in the geophysical survey to provide sufficient data for their significance to be appropriately assessed as set out in the NPPF paragraph 194. Oxford Archaeology are currently undertaking this further trenching in line with the agreed written scheme of investigation, and the approved report for this should be submitted with the application. Once the archaeological evaluation has been fully completed and the final report has been submitted, we can then provide further advice.</p>	<p>completion of the July 2023 ES.</p>

Scope of ES Addendum Chapter

- 8.3 The scope of this ES Addendum chapter is limited to consideration of archaeological resources following completion of additional baseline work. No additional discussion is provided on built heritage assets as the Revisions do not have any material implications on residual effects or mitigation measures stated in the 2023 ES chapter.

Legislation, Policy and Guidance

- 8.4 CDC published the consultation draft of the Regulation 18 Draft Local Plan in September 2023, which outlines the proposed emerging policies in the district until 2040. A number of Core Policies explicitly relate to cultural heritage. The most relevant include:
- Core Policy 57, Historic Environment and Archaeology;
 - Core Policy 58, Conservation Areas;
 - Core Policy 59, Listed Buildings;
 - Core Policy 60 & 61: The Oxford Canal; and
 - Core Policy 48, Public Rights of Way (PRoW).
- 8.5 As the ambitions and requirements of these policies align with and build upon those in the Adopted Cherwell Local Plan 2011-2031, as considered within the 2023 ES. No update to the assessment methodology or findings is therefore required.

Methodology

- 8.6 The 2023 included the findings of an archaeological trial trenching evaluation which comprised the Developable Areas of the Site. The findings were reported in the baseline section of the 2023 ES Chapter 8: Cultural Heritage and Appendix 8.4: The Developable Site Archaeological Evaluation Report. A second phase of archaeological trial trenching has been completed at the Site by Oxford Archaeology between July and November 2023 following submission of the 2023 ES. This phase was completed in accordance with a Written Scheme of Investigation agreed with the OCC Archaeological Advisor who also attended the Site during the evaluation works. The extent of the trial trenching evaluation is shown on Figure 1 of Appendix 8.4(B).

Baseline

- 8.7 The second phase of archaeological trial trenching evaluation included to the non-developable, floodplain areas in the east of the Site, along the banks of the Rowel Brook and Oxford Canal. The evaluation comprised 86 trenches, of which 45 contained archaeological features.
- 8.8 An interim report setting out the findings of the second phase of archaeological evaluation is provided within (New) Appendix 8.4(B): Phase 2 Floodplain Areas Interim Archaeological Evaluation Report. A full Archaeological Evaluation Report will be shared with OCC in due course and shared with CDC. Whilst Appendix 8.4B provides an interim report of the findings, Oxford Archaeology has confirmed that the level of evaluation and analysis completed and reported is sufficient to identify the likely significant effects of the Proposed Development on archaeology.
- 8.9 Figure 1 in Appendix 8.4(B) shows the location of the trenches overlain on the geophysical survey, illustrating the location of potential archaeological anomalies. The majority of finds during this second phase of trenching works date to the Iron Age with limited evidence of preceding Bronze Age activity. One of the Iron Age settlements includes evidence for iron smithing. Late Iron Age and Roman period finds include the eastern extents of a complex farmstead previously investigated in the Phase 1 trenching. A group of rectilinear settlement features on the geophysical survey plot may be of Anglo-Saxon date but were not securely dated. No evidence of archaeological features or significant geoarchaeological deposits from later periods (medieval or post-medieval) was uncovered during the trenching works. The archaeological receptors are considered to range from negligible to medium sensitivity.

Assessment of Effects – Construction Phase

Assessment

- 8.10 The assessment presented in Chapter 8: Cultural Heritage of the 2023 ES assessed potential impacts on buried heritage assets in the developable area of the Site, i.e., west of the railway line. The area of the Site that has been subject to the second phase of archaeological trial trenching and evaluation is to the east of the railway line and is proposed for nature reserves, a sports and recreation area, and public access routes within the Proposed Development. No buildings or structures are permitted in this location except for those that are ancillary to open space or recreational uses. Consequently, associated construction activities in this area of the Proposed Development are not likely to involve significant groundworks (e.g. foundations, trenches or piling). However, there remains potential that ground works associated with the construction phase could remove or truncate some of these archaeological features in this area.
- 8.11 The second phase of trial trenching evaluation has identified the potential presence of archaeological finds dating predominantly from the Iron Age, Roman and Anglo-Saxon periods, ranging from negligible to medium sensitivity. As for the 2023 ES, the impact upon the deposits have been categorised based on worst case scenario, deposits of medium sensitivity. The magnitude of the impact will be up to major adverse on the medium sensitivity receptor. The significance of potential effect is considered to be large adverse. This is the same as reported in the 2023 ES chapter.

Mitigation, Monitoring and Residual Effects

- 8.12 Chapter 8: Cultural Heritage of the 2023 ES set out that an archaeological mitigation plan will be developed at subsequent stages of consent which encompasses both the developable and non-developable areas of the Site. With an agreed mitigation strategy in place, to be secured by planning condition, the residual effects are considered to be no higher than slight adverse (not significant) for all archaeological assets taking into consideration the completion of this further baseline work. This is the same residual effect as reported in Chapter 8 of the 2023 ES.

Annex 1: Relevant Consultation Responses

Table 1: EIA Comments and Responses

Comment	Response
<p><i>CDC Environmental Health (31 October 2023)</i></p> <p>Environmental Management during construction phase: Prior to the commencement of the development, a Construction Environment Management Plan (CEMP), which shall include details of the measures to be taken to ensure construction works do not adversely affect residential properties on, adjacent to or surrounding the site together with details of the consultation and communication to be carried out with local residents shall be submitted to and approved in writing by the Local Planning Authority. Thereafter the development shall be carried out in accordance with approved CEMP.</p>	<p>It is the intention that a planning condition will secure the commitment to submission and agreement of a CEMP prior to commencement of development. These will be based on the principles set out in the Outline CEMP (Appendix 6.1 of the 2023 ES)</p>
<p>Noise: Having read the noise report chapter of the ES I am satisfied with the contents and findings. I agree that care should be taken with the detailed design to ensure suitable noise environments for residential and school developments near to the A44 and Railway. Therefore once detailed design has taken place a further noise report should be submitted to and approved by the LPA to indicate the noise levels in those areas and what mitigation will be required, therefore I would recommend that the following condition be placed on any permission granted:</p> <p>Prior to the development commencing a report shall be provided and approved in writing by the local planning authority that shows that all habitable rooms within the dwelling and external areas will achieve the noise levels specified in BS8233:2014 (Guidance on sound insulation and noise reduction for buildings) for indoor and external noise levels (if required then the methods for rating the noise in BS4142:2014 should be used, such as for noise from industrial sources). Thereafter, and prior to the first occupation of the dwellings affected by this condition, the dwellings shall be insulated and maintained in accordance with the approved details. If alternative means of ventilation are required then an overheating assessment should be carried out.</p>	<p>Noted. A planning condition is accepted for this purpose.</p>

Comment	Response
<p>Contaminated Land: Having studied the reports provided I am satisfied with the contents and agree with the findings. I also am satisfied with the proposed mitigation strategy and the below condition should be applied to any permission granted:</p> <p>A verification report that demonstrates the effectiveness of the remediation laid out in the Hydrock Remediation Strategy and Verification Plan (ref: 19114-HYD-XX-XX-RP-GE-01004-S2-P04 dated 27/06/2023) must be submitted to and approved in writing by the Local Planning Authority. Any change to the proposed remediation strategy must be submitted to and approved by the LPA prior to works commencing.</p>	<p>Noted. A proposed planning condition is accepted for this purpose.</p>
<p>Air Quality: Having read the Air Quality chapter of the ES I am satisfied with contents and findings and have no further comments.</p>	<p>Noted.</p>
<p><i>CDC Environmental Health (14 August 2023)</i></p>	
<p>Flood Risk: The applicant acknowledges that there are areas of fluvial risk along the development site boundaries and within the site. No built development is proposed within these areas. The applicant also acknowledges the risk of flooding from the overtopping of the Canal and treats this in the same way as fluvial risk. Therefore, no comment at this stage.</p> <p>Parts of the site are also indicated to be at risk of surface water flooding. This is where there may be temporary non-fluvial overland flow paths following severe rainfall and where ponding is possible due to localised topographical conditions. This is also acknowledged in the drainage strategy and appropriate infrastructure is proposed to mitigate this which is acceptable at this outline stage. Therefore, no further comment at this stage.</p>	<p>Noted.</p>
<p>Surface Water Drainage Strategy: The principles of surface water drainage have been agreed with the LLFA. It is acknowledged through ground testing that infiltration is not feasible. Therefore the drainage strategy is based entirely on positive attenuated discharges to watercourses with site specific SuDS such as rain-gardens and blue/green roofs wherever appropriate. It is agreed that the attenuated discharge rates will be capped to the QBAR rate which will give some downstream protection against discharges arising from rainfall events exceeding the mean annual maximum. The indicative surface water management plan shows series of connected swales which is in accordance with the LLFA's policy of avoiding concentrated locations of attenuation. However,</p>	<p>Noted.</p>

Comment	Response
<p>although indicative, the master-plan does not show clearly any maintenance corridors on each side of the linear series of swales. These will be required to be of minimum width 5 metres.</p>	
<p><i>Natural England (27 October 2023)</i></p>	
<p>Designated Sites: As submitted, the application could have potential significant effects on Rushy Meadows SSSI. Natural England requires further information in order to determine the significance of these impacts and the scope for mitigation. The following information is required:</p> <ul style="list-style-type: none"> ▪ Further information regarding the proposed buffer strip adjacent to the SSSI; and ▪ Further information regarding the proposed Local Nature Reserve (LNR) designation. 	<p>The proposed buffer strip to Rushy Meadows SSSI has been strengthened, with further details set out in Section 2 of this report. Further details on the proposed LNR are also set out in Section 2. Potential implications on ecology are considered in Section 4 of this ES Addendum.</p>
<p>Construction impacts on Rushy Meadows SSSI: Natural England advises a CEMP should be submitted to and approved in writing by the district ecologist/biodiversity officer that identifies the steps and procedures that will be implemented to avoid or mitigate constructional impacts on Rushy Meadows SSSI, its species and habitats. The CEMP should address the following impacts:</p> <ul style="list-style-type: none"> ▪ Storage of construction materials/ chemicals and equipment; ▪ Dust suppression ▪ Chemical and/or fuel run-off from construction into the nearby Rowel Brook ▪ Waste disposal ▪ Noise/visual/vibrational impacts ▪ Measures to ensure no materials, machinery, vehicles or works will encroach on the designated site ▪ Mammal ramps for open excavations ▪ Lighting measures to ensure boundary habitats are not luminated. <p>The approved CEMP should be secured via an appropriately worded condition attached to any planning consent and shall be adhered to at all times, unless otherwise first agreed in writing with the Local Planning Authority.</p>	<p>See response above to CDC Environmental Health.</p>

Comment	Response
<p>Best and Most Versatile Land: Should the development proceed, we advise that the developer uses an appropriately experienced soil specialist to advise on, and supervise soil handling, including identifying when soils are dry enough to be handled and how to make the best use of soils on site.</p>	<p>Appendix 14.2 of the 2023 ES provided a Framework Soil Management Plan that provided details of mitigation to safeguard soil resources. A planning condition would ensure that detailed Construction Phase Soil Management Plans would be prepared by a competent authority and agreed with CDC in advance of commencement of works.</p>
<p><i>OCC Archaeology (14 August 2023)</i></p>	
<p>This evaluation has only investigated part of the site however and a further phase of trial trenching will be required prior to the determination of this application, along the northern and eastern edges of the proposal area to establish the character, preservation and date of the features recorded in the geophysical survey to provide sufficient data for their significance to be appropriately assessed as set out in the NPPF paragraph 194. Once the archaeological evaluation has been fully completed and the final report has been submitted, we can then provide further advice</p>	<p>This trenching work has now been completed. An assessment is provided in Section 4 of this ES Addendum, with an Interim Trial Trenching Report provided as new Appendix 8.4(B) in this report.</p>
<p><i>OCC Local Lead Flood Authority (29 August 2023)</i></p>	
<p>Please provide: surface water catchment plan; phasing plan; agreed points of surface water discharge; calculations for the proposed SuDS to ensure attenuation volumes can be achieved; infiltrating testing [within its location plan]; and outfall location on Woodstock Road.</p>	<p>Buro Happold have prepared a Design Note (dated 26th October 2023) to respond to these requests and direct OCC to the relevant sections of the 2023 ES, as relevant. This is appended to the Guide to the Application.</p>
<p><i>OCC Property – Schools Sites (11 September 2023)</i></p>	
<p>The location shown for the 2nd Primary school does not meet the Design Criteria for Primary Schools [in respect of noise].</p>	<p>The proposed boundary of the 2FE primary school has been adjusted within the Proposed Development, locating it further east within the Site and away</p>

Comment	Response
	<p>from the A44. This location is demonstrated within the revised Parameter Plans (Appendix 5.1). The potential noise effects of this relocation have been assessed in Section 4 of this ES Addendum, with a revised Appendix 10.4: Site Suitability also provided.</p>
<p>Primary School 1 and Secondary School: The school and playing fields need to be situated in a quiet part of the development. The noise levels on unoccupied playing fields used for teaching sport shall not exceed 50dB $L_{Aeq,30min}$, therefore this level is required at the boundary of the school site.</p>	<p>Noted. Appropriate mitigation will be implemented during detailed design, with the details of this secured by a way of an appropriately worded obligation in the section 106 agreement.</p>
<p><i>OCC Public Health (11 September 2023)</i></p>	
<p>Chapter 11: Air Quality doesn't appear to have taken into account those walking and cycling along the towpath, as well as those using other PRow in the vicinity of the site.</p>	<p>As noted, the assessment provided in Chapter 11: Air Quality of the 2023 ES considered occupants of moored boats as sensitive receptors during the construction phase. Users of PRow and the towpath (i.e., walkers and cyclists) are transient users so not likely to experience significant effects from air quality (e.g. dust arisings) during the construction phase. Mitigation measures would also be in place to control dust emissions through the detailed CEMP.</p>
<p>A detailed noise impact assessment is required to assess the impact of noise from the main line railway on the proposed new secondary school.</p>	<p>Agreed. This will be carried out at the detailed design stage and secured by planning condition.</p>

[New] Appendix 8.4(B): Phase 2 Floodplain Areas Interim Archaeological Evaluation Report



Begbroke Innovation District, Oxfordshire

Phase 2 Floodplain Areas Interim Archaeological Evaluation Report

November 2023

Client: Oxford University Developments

Issue No: 1

OA Reference No: 8345

NGR: 448596, 213539



Client Name: Begbroke Innovation District, Oxfordshire
Document Title: Phase 2 Floodplain Areas
Document Type: Interim Archaeological Evaluation Report
Report No.: 8345
Grid Reference: 448596E, 213539N
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Issue No: V1
Date: 23/11/2023
Prepared by: David Kay (Project Officer)
Checked by: Stuart Foreman (Senior Project Manager)
Approved for Issue by: Dave Score (Head of Fieldwork)
Signature:



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OA South

Janus House
Osney Mead
Oxford
OX2 0ES

t. +44 (0)1865 263 800

OA East

15 Trafalgar Way
Bar Hill
Cambridge
CB23 8SQ

t. +44 (0)1223 850 500

OA North

Mill 3
Moor Lane Mills
Moor Lane
Lancaster
LA1 1QD

t. +44 (0)1524 880 250

e. info@oxfordarch.co.uk

w. oxfordarchaeology.com

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Begbroke Innovation District, Oxfordshire

Phase 2 Floodplain Areas

Interim Archaeological Evaluation Report

Written by David Kay and edited by Stuart Foreman

Oxford Archaeology was commissioned by Oxford University Developments to undertake a second phase of archaeological trial trenching at the site of the Begbroke Innovation District, a proposed expansion of the existing Begbroke Science Park, Oxfordshire. The work was undertaken to inform an updated Environmental Impact Assessment, following the submission of an outline planning application in July 2023 (23/02098/OUT). This is an interim report, issued pending completion of the full report with specialist appendices, which is forthcoming and will be submitted once approved.

The trenching reported here covers the non-developable, floodplain parts of the application site (Phase 2), which are proposed to be used as nature reserves, allotments, sports facilities and public access routes. The magnetometer and electromagnetic (EM) geophysical surveys carried out before the trenching covered both this zone and the previously reported 'developable' area of the site, i.e. Phase 1 trenching (see July 2023 ES Appendix 8.4; OA 2023a).

Of the 86 trenches opened in the Phase 2 zone, 45 contained archaeological features. Very limited evidence for early prehistoric activity was found within the Phase 2 trenches, comprising a very small assemblage of worked flints that was widely scattered and mostly residual in later contexts. Evidence for Bronze Age activity was likewise scarce, restricted to a few possible potsherds within basal contexts associated with the spread of Iron Age settlement across the north-eastern part of Area D (see Figure 1). Two adjacent ring-ditches to the north of the Rowel Brook could also mark Bronze Age barrows. The larger of the two contained a central pit. However, neither structure produced any dateable artefacts or evidence of human burials. As such, they could alternatively comprise Iron Age roundhouses, or other such circular structures, and are here designated simply as 'prehistoric ring-ditches' (Figure 1).

The most extensive evidence for past human activity was dated to the Iron Age. In the centre of Area D, to the south of the Rowel Brook and north-west of the current Science Park, several trenches (covering c 0.5ha) contained features marking an extension of the dispersed settlement previously investigated within the Phase 1 site (Figure 1). Pottery from these features was predominantly diagnostic of the middle Iron Age. Further to the east, a second, larger (c 3.5ha) area of Iron Age settlement and enclosure systems was found overlooking the Rowel Brook. This site location produced pottery indicative of occupation throughout the Iron Age, possibly extending into the early Roman period. A

preceding Bronze Age presence is also tentatively suggested by a few scattered pottery sherds. A few late Bronze Age pit features were found to the immediate south-west, within Area B, during the Phase 1 evaluation trenching (OA 2023a).

The largest area of Iron Age settlement was located along the eastern side of Area E (see Figure 1). It covered c 7.5ha, with activity concentrated across its northern extent. The majority of pottery evidence dated from the middle Iron Age, with the site appearing to have been largely abandoned by the Roman period. Several features produced evidence for iron smithing in the form of slag and other industrial waste deposits, mostly scattered across the northern part of the settlement. In Trench 362 these included the very rare find of a fragmented block tuyere, of which only four others are known in the UK. Geoarchaeological evidence suggests that this area of settlement, whilst located within a larger floodplain, may have occupied a drier, slightly better-drained, relative topographic high, flanked by lower lying wetter ground to the west and a more substantial watercourse to the east. The latter was channeled into the Oxford Canal when it was built in the 18th century.

In the northernmost part of Area E, to the immediate east of the Cherwell Valley railway line, c 1.5ha of older floodplain deposits were cut by an interconnected series of infilled ditches, which from pottery evidence appear to be Roman in date. These ditches align with features on the other side of the railway within Area B and are highly likely to form an eastern extension of the same late Iron Age–Roman ‘complex farmstead’ (Figure 1; cf OA 2023a). The presence of palaeochannels in Trenches 341 and 343 (and Trench 66 from Phase 1) suggest that the Rowel Brook once followed a more southerly course than it does today, more-or-less along the line of the modern railway, and may even have passed through the Area B ‘complex farmstead’ (though this channel may also be of a different date to the settlement itself). Whilst geoarchaeological evidence of relatively constrained riparian floodplains flanking this prior channel was uncovered during evaluation trenching, it appears that much of the wider floodplain extending across Area E is likely to be earlier Holocene in date.

A group of rectilinear structures in the southern part of the main Area E Iron Age settlement is hypothesised to be of Anglo-Saxon date, based on morphological differences from the surrounding features and similarities with Anglo-Saxon structures uncovered in the nearby Yarnton excavations (Hey 2004; OA 2023b). The lack of firm dating evidence recovered from the Phase 2 evaluation trenching requires that this interpretation remains highly tentative, pending further investigation. Four probable Iron Age sherds were recovered from this group of features, but such a small quantity could easily be residual material.

In accordance with the results from Phase 1 (OA 2023a), evaluation trenching of Area D returned further evidence for extensive buried soil horizons preserved within the overarching sediment sequence. These were best preserved and most clearly associated with archaeological features within the Iron Age settlement across the north-eastern part of Area D (Figure 1). Further laboratory

research into these soils could assist in building interpretations of local land-use changes from prehistory through to more recent centuries.

No evidence for archaeological features or significant geoarchaeological deposits from later periods (medieval or post-medieval) was uncovered during the Phase 2 evaluation trenching.

Oxford Archaeology will now develop a mitigation plan for the non-developable Phase 2 zone, for agreement with Oxfordshire County Council, to take place following the granting of planning permission. It is envisaged that mitigation will take the form of a series of open area excavations, focused on key archaeological sites. In order to minimise the movement of spoil it is expected that the archaeological excavations will be integrated as closely as possible with construction earthworks. The excavations will be targeted on parts of the site that a) are to be affected by substantive groundworks, and b) have proven potential to contain significant archaeological remains, as demonstrated by geophysical survey and/or trial trenching.

References

Hey, G, 2004 Yarnton: Saxon and Medieval Settlement and Landscape, Thames Valley Landscapes Monograph 20, Oxford

OA, 2023a Begbroke Innovation District, Oxfordshire: The Developable Site: Archaeological Evaluation Report. Oxford Archaeology

OA, 2023b Begbroke Innovation District: Written Scheme of Investigation: Archaeological Evaluation. Oxford Archaeology

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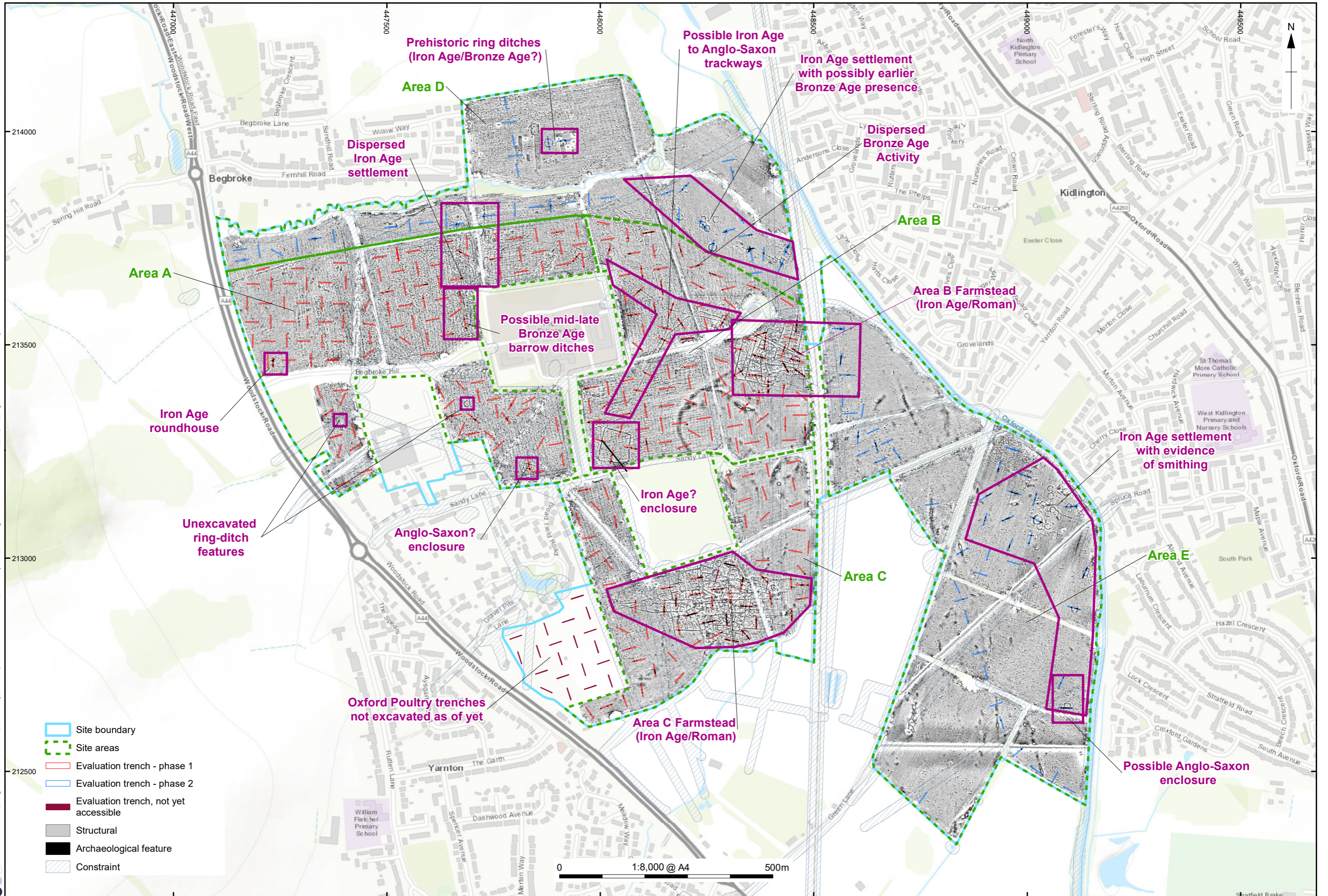


Figure 1: Overall trench plan overlying magnetometer results, summary view



Plate 1: Area E, Trench 344, opened trench



Plate 2: Area D, Trench 334, Section 33400, Iron Age ring-ditch 33403

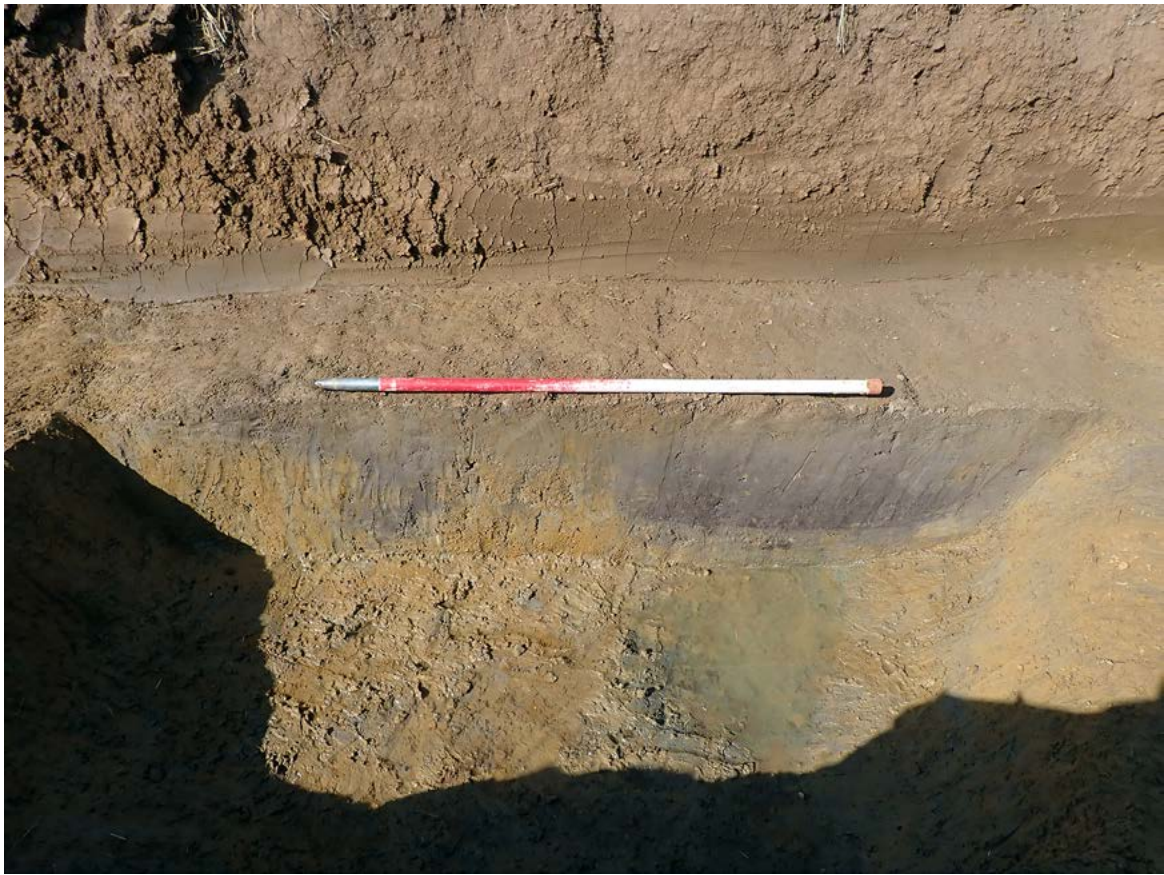


Plate 3: Area D, Trench 337, Section 33701, Roman ditches 33709, 33711 and 33714



Plate 4: Area E, Trench 363, Section 36302, Iron Age ring-ditches 36309 and 36313



Plate 5: Area E, Trench 383, Section 38304, undated (possible Anglo-Saxon) ditches 38315



Plate 6: Area D, Trench 338, Section 33803, showing buried soil horizon 33810/33811



**Head Office/Registered Office/
OA South**

Janus House
Osney Mead
Oxford OX2 0ES

t: +44 (0) 1865 263 800
f: +44 (0) 1865 793 496
e: info@oxfordarchaeology.com
w: <http://oxfordarchaeology.com>

OA North

Mill 3
Moor Lane
Lancaster LA1 1QD

t: +44 (0) 1524 541 000
f: +44 (0) 1524 848 606
e: [oanorth@oxfordarchaeology.com](mailto: oanorth@oxfordarchaeology.com)
w: <http://oxfordarchaeology.com>

OA East

15 Trafalgar Way
Bar Hill
Cambridgeshire
CB23 8SQ

t: +44 (0) 1223 850500
e: [oaeast@oxfordarchaeology.com](mailto: oaeast@oxfordarchaeology.com)
w: <http://oxfordarchaeology.com>



Chief Executive Officer
Ken Welsh, BSc, MCIFA
Oxford Archaeology Ltd is a
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[Replacement] Appendix 10.3: Site Suitability

Noise & Vibration Appendix 10.3 Site Suitability – Outline

Introduction

This appendix provides an initial assessment of the noise and vibration constraints presented by the existing environment and how these are likely to affect the sensitive uses that form part of the Proposed Development. These primarily include the schools and residential dwellings. This is an updated assessment from that provided in the July 2023 ES, with a revised assessment of the proposed new location of Primary School 2.

The dominant types of noise affecting the Site are road traffic noise from the A44, plant noise from the existing buildings at Begbroke Science Park, railway noise and some contributions from aircraft noise.

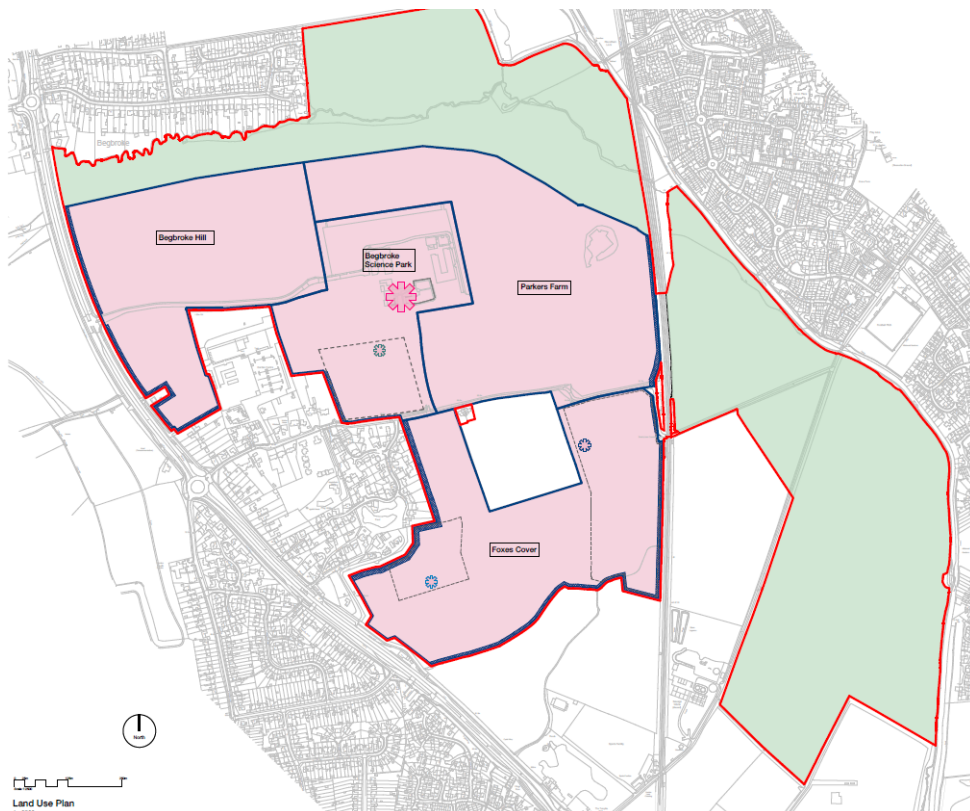
As indicated on the Land Use and Development Zones Parameter Plan (see Appendix 5.1), the Site has been split into 4 zones:

- Begbroke Hill;
- Begbroke Science Park;
- Parkers Farm; and
- Foxes Cover.

Within these development zones (identified in Figure 1), the parcels of land where the three proposed schools will be located are described as follows:

- Primary school 1 is proposed at the centre of the Site as part of the Begbroke Science Park development zone;
- Primary School 2 is proposed in the south-west part of the Site within the Foxes Cover development zone; and
- Secondary School is proposed in the south east section of the Site within the Foxes Cover development zone.

Figure 1 Development Zones



Noise & Vibration Appendix 10.3 Site Suitability – Outline

Policy and guidance

Appendix 10.2 contains a review of the relevant noise policy and some guidance including;

- National Planning Policy Framework (2021)
- Noise Policy Statement for England (2010)
- National Planning Practice Guidance (2019)
- The Cherwell Local Plan (2011-2031)
- Cherwell Local Plan 1996 Saved Policies (CLP 1996)
- Cherwell Local Plan 2011 – 2031 (Part 1) Partial Review – Oxford’s Unmet Housing Need (PR2020)
- The Cherwell Planning and Noise Guidance (undated).

Please refer to Appendix 10.2 for an overview of these documents. The rest of this section provides an overview of other guidance relating to residential dwellings and schools which should be considered as part of the acoustic strategy for the Site.

Begbroke Development Specification

The Development Specification contains development principles to inform the preparation of subsequent reserved matters applications, Area Briefs and Design Guides. The principles of relevance to noise and vibration are set out in the Table below.

Table 1 Development Principles Relating to Noise

DP Number	Principles
<i>DP5 Primary and secondary education provision</i>	
DP5.2	School buildings and playing fields will be sited and designed to provide a suitable noise environment and will seek to allow for natural ventilation of buildings where possible.
<i>DP18 Noise</i>	
DP18.1	Noise attenuation in the form of acoustic fencing and/or bunding will be delivered adjacent to the A44 and the railway to achieve approximately a 10dB reduction in Site noise levels where this is needed to create an acceptable noise environment.
DP18.2	Any noise generating uses (where such noise cannot be sufficiently reduced) or uses which generate a higher degree of servicing or vehicular traffic, will be located away from uses that are considered sensitive, such as residential dwellings or social infrastructure uses.

Residential Guidance

ProPG: Planning & Noise. Professional Practice Guidance on Planning & Noise – New Residential Developmentⁱ

The ProPG guidance was published in May 2017 and provides a recommended approach to the management of noise within the UK planning system for new residential development. The document

Noise & Vibration Appendix 10.3 Site Suitability – Outline

advocates a 2-staged approach.

At stage 1, an initial noise risk assessment of the proposed development site is conducted, based on the existing levels of noise at the site. Baseline ambient noise levels at the site are reviewed, and an assessment of the likely risk of adverse effects from noise is undertaken to indicate whether the proposed site is considered to pose a negligible, low, medium or high risk from a noise perspective. Table 2, as derived from the ProPG guidance document, gives indicative guidance on how various levels of ambient noise should be evaluated in terms of risk.

Table 2 Guidance for Stage 1, Initial Site Noise Risk Assessment

Period	Ambient Noise Level	Initial Risk Indication	Pre-app. Planning Advice
Day (07:00 -23:00)	< 50 dB, $L_{Aeq, 16hr}$	Negligible	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.
Night (23:00 – 07:00)	< 40 dB, $L_{Aeq, 8hr}$		
Day (07:00 -23:00)	50 – 60 dB, $L_{Aeq, 16hr}$	Low	At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an Acoustic Design Statement (ADS) which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
Night (23:00 – 07:00)	40 – 50 dB, $L_{Aeq, 8hr}$		
Day (07:00 -23:00)	60 – 70 dB, $L_{Aeq, 16hr}$	Medium	As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
Night (23:00 – 07:00)	50 – 60 dB, $L_{Aeq, 8hr}$		
Day (07:00 -23:00)	> 70 dB, $L_{Aeq, 16hr}$	High	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.
Night (23:00 – 07:00)	> 60 dB, $L_{Aeq, 8hr}$		

The ProPG guidance states that the noise levels quoted above are free-field and should be assessed without inclusion of noise mitigation measures. It is further noted that the night-time L_{Amax} façade noise levels should also be considered; where there may be more than 10 noise events at night that exceed 60 dB, $L_{Amax,F}$, the site should not be regarded as a negligible risk.

Noise & Vibration Appendix 10.3 Site Suitability – Outline

Stage 2 of the process involves the parallel consideration of key four elements, viz:

- Demonstration of a good acoustic design process,
- Consideration of internal noise level guidelines;
- Consideration of external noise levels in amenity areas; and
- Assessment of other relevant issues

In discussing “good acoustic design”, the ProPG guidance states the following:

“A good acoustic design process takes a multi-faceted and integrated approach to achieve optimal acoustic conditions, both internally (inside noise-sensitive parts of the building(s)) and externally (in spaces to be used for amenity purposes).

Good acoustic design should avoid “unreasonable” acoustic conditions and prevent “unacceptable” acoustic conditions (these terms are defined in Element 2). Good acoustic design does not mean overdesign or gold plating of all new development but seeking to deliver the optimum acoustic outcome for a particular site”.

In considering internal noise levels, and external amenity, reference is made to the guideline noise levels given BS 8233 and the WHO Guidelines for Community Noise, both of which are discussed further below.

BS 8233:2014 Guidance on sound insulation and noise reduction for buildingsⁱⁱ

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings provides information on the design of buildings in order that the internal acoustic environment is appropriate to the required function(s) of the space. Section 7 of the document contains the following guidance regarding desirable internal ambient noise levels for dwellings:

Table 3 BS 8233:2014 Desirable indoor ambient noise levels for dwellings

Activity	Location	Period	
		Day (07:00-23:00)	Night (23:00-07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$
External noise	Amenity spaces	50 – 55 dB $L_{Aeq,16hr}$	

The table is appended with several notes. Most relevant are the following:

“NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values.”

It should be noted that the consideration of night-time internal noise levels based on external L_{Amax} noise levels, which represent short noise “events”, is often the primary factor in the specification of

Noise & Vibration Appendix 10.3 Site Suitability – Outline

suitable façade constructions or glazing types, rather than the $L_{Aeq,8hr}$ night-time value given in Table 2 above, which can be considered similar to an average noise level over the full night-time period.

“NOTE 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the facade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.”

Ventilation typically refers to whole dwelling ventilation for the supply of fresh air to habitable rooms as defined in the Building Regulations guidance document Approved Document F. It is not intended to provide purge ventilation for the removal of pollutants such as smoke, or mitigation of overheating, for which alternative means should be considered to enhance the comfort of any future occupants.

“NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

(The ProPG reflects the guidance given in Note 7 of BS 8233 by stating that if internal noise levels exceed the desirable indoor ambient noise levels in Table 2 by more than 5 dB, they may be considered “unreasonable”.)

Section 7 also contains the following regarding design criteria for external noise:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

As stated above, the ProPG refers to BS 8233:2014 both in terms of internal and external noise criteria.

Cherwell Planning and Noise Guidance (undated) ⁱⁱⁱ

This guidance states that any industrial or commercial development must not cause an increase in background noise levels at the nearest noise sensitive property, or at the boundary of the property.

Noise & Vibration Appendix 10.3 Site Suitability – Outline

The guidance generally recommends that noise levels within residential properties should not exceed the World Health Organisation values where practicable. It sets out the following criteria for internal and external spaces:

Table 4 Cherwell Noise Guidance

Space	Time Period	Target Level
Bedrooms	night time (23:00 to 07:00)^	30 dB LAeq
Living Rooms	day time (07:00 to 23:00)	40 dB LAeq
Gardens and Terraces	day time*(07:00 to 23:00)	55 dB LAeq
Notes: ^Individual noise events should not exceed 45dB LAMAX at night (BS 8233. 1999) *not in town centre or near main roads		

It is noted that the guidance is not dated but does refer to the previous (1999) version of BS 8233 which was subsequently updated in 2014.

WHO: Guidelines for Community Noise^{iv}

The WHO Guidelines present various guideline values for community noise in specific environments. Regarding L_{Amax} noise levels, the guidelines state that, for good sleep, indoor sound pressure levels should not exceed around 45 dB L_{Amax} more than 10–15 times during the 8-hour night-time period. This is equated to a level at the outside façade of 60 dB L_{Amax} with a partially open window. This is consistent with ProPG.

ANC & IOA: Acoustics Ventilation and Overheating - Residential Design Guide^v

The guidance provides useful information regarding the potential assessment of overheating, which has become increasingly important in recent years where it has been identified that guideline internal noise level criteria may only be achieved by keeping windows closed.

Building Regulations Overheating: Approved Document O (ADO)^{vi}

This regulation aims to protect the health and welfare of building occupants by reducing the occurrence of high indoor temperature through limiting unwanted solar gain and provision of adequate means to remove excess heat from indoors. Target noise criteria is presented which indicates that where external noise may be an issue the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours. Windows are likely to be closed during these hours where target noise levels are exceeded:

- 40 dB LAeq, 8 hours (between 23:00 -07:00)
- 55 dB LAFmax, more than 10 times a night (between 23:00 – 07:00)

It is noted that as this is a Building Regulation it would be addressed during detailed design. It is referenced here because it is prudent for the design team to be aware at an early stage of the potential constraints that this regulation may impose.

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Schools

Building Bulletin 93 – Acoustic design of schools: performance standards^{vii}

Building Bulletin 93 (BB93) provides minimum performance standards for the acoustics of school buildings, and describes the normal means of demonstrating compliance with the relevant Regulations¹ pertaining to education spaces.

Section 1 of the document sets out minimum requirements for a range of acoustic performance standards that existing and new build schools should adhere to, including appropriate indoor ambient noise levels (IANL), sound insulation, and reverberation times.

In discussing appropriate IANLs, the document presents a series of upper limits in terms of $L_{Aeq, 30 mins}$, for various spaces found within schools, based on whether the building under consideration is newly built, or is a refurbishment of an existing building.

The most stringent of the IANL limits that apply to areas commonly found within schools apply to classrooms, general teaching areas, seminar rooms, tutorial rooms, and language laboratories, for which an upper limit of 35 dB $L_{Aeq, 30 mins}$ is specified. If the space will be naturally ventilated, an uplift of 5 dB on the IANL requirement is applied. But if the indoor ambient noise level target is 45 dB or above, then no uplift for natural ventilation is applied.

A more onerous IANL upper limit of 30 dB $L_{Aeq, 30 mins}$ is specified for specialist areas such recording studios, and teaching spaces intended specifically for students with special hearing and communication needs.

Acoustics of Schools: a design guide - Institute of Acoustics & Association of Noise Consultants – Nov 2015^{viii}

The document provides good practice guidance for outdoor noise levels at schools primarily with regard to spaces used for outdoor teaching and recreation. The guidance indicates that for new schools;

- 60 dB $L_{Aeq, 30 min}$ should be regarded as an upper limit for external noise at the boundary of external areas used for formal and informal outdoor teaching and recreation.
- Where used for teaching noise levels in playing fields and other outdoor areas should not exceed 55 dB $L_{Aeq, 30 min}$.
- There should be at least one area suitable for outdoor teaching where noise levels are below 50 dB $L_{Aeq, 30 mins}$. Where this cannot be achieved, screening should be used to attenuate the noise levels as much as practicable.

It recognises that playgrounds, outdoor recreation areas and playing fields generally have a low sensitivity to noise and playing fields may be used as buffer zones between schools and busy roads. However, where used for teaching, external noise levels can have a detrimental effect on communication.

Oxfordshire County Council (OCC) Design Guide for Primary and Secondary Schools (October

¹ Requirement E4 of The Building Regulations, the School Premises Regulations and the Independent School Standards.

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2020)^{ix}

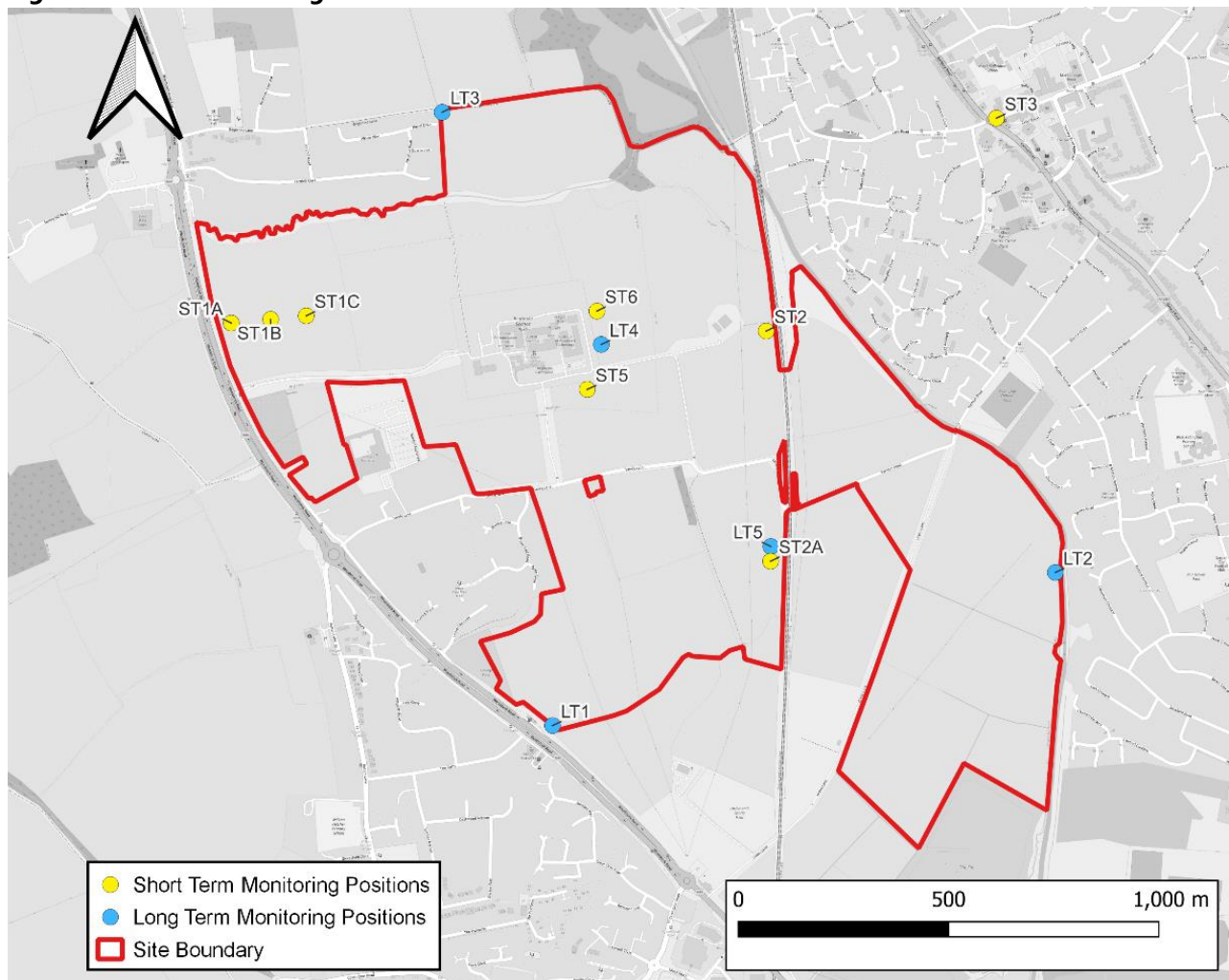
With regard to acoustics, the guide indicates that the school and playing fields needs to be situated in a quiet part of the development. The noise levels on unoccupied playing fields used for teaching sport shall not exceed 50 dB $L_{Aeq,30min}$, therefore this level is required at the boundary of the school site.

BASELINE CONDITIONS & EVOLUTION

Further details of the baseline survey are contained within the Chapter and Appendix 10.4. The noise monitoring locations are identified in Figure 2. It can be seen that these broadly cover the boundaries of the Site and the plant noise sources associated with Begbroke Science Park within the Site.

It is noted that there is a Noise Action Plan Important Area on the A44 at Yarnton and three smaller areas located on the A44 north of the site access.

Figure 2 Noise Monitoring Locations



The data recorded at LT1 is generally considered to represent the noise exposure along the boundary of the Site with the A44. Position LT3 reflects the northern boundary of the Site, where the exposure to

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road and rail noise is generally lower. LT5 is reflective of the boundary of the Site which borders the Cherwell Valley Railway and LT4 reflects the noise emission from the existing Science Park equipment.

As the application is in outline, there is flexibility in where the residential and commercial uses on the Site may be located. Therefore, the site suitability assessment focuses on the high-level constraints at what are considered to be the most exposed locations in terms of contributions from existing internal noise levels, and on the assumption that these could be residential receptors with the highest sensitivity.

The average ambient ($L_{Aeq,T}$) noise levels at each long term measurement position for the day (07:00–23:00) and night-time (23:00 – 07:00) periods are summarised in Table 5. Also included in the Table are the $L_{Amax,F}$ noise levels measured during the night time period. With regard to $L_{Amax,F}$ noise levels, these are the maximum noise level measured over a given interval period. This means they could be caused by one off events, occurring only once during the baseline survey period, and therefore the highest recorded may not be a reliable indicator of the noise risk present at the Site. As such the highest $L_{Amax,F}$ noise levels used in the assessment are the 10th highest $L_{Amax, 1 \text{ minute}}$ levels recorded during the night time period (23:00 – 07:00) which is considered to be more representative and is line with the WHO Guidelines and ProPG.

The short term measurements are summarised in Table 6.

Table 5 Average Levels from Longer Term Positions

Location	Time (T)	Average $L_{Aeq,T}$	Average $L_{A90,T}$ (dB)	Average $L_{A10,T}$ (dB)	Representative $L_{Amax,T}$ (dB)
LT1	Day (07:00 – 23:00)	57	49	60	N/A
	Night (23:00 – 07:00)	53	35	57	68
LT2	Day (07:00 – 23:00)	53	46	50	N/A
	Night (23:00 – 07:00)	49	39	54	69
LT3	Day (07:00 – 23:00)	51	42	52	N/A
	Night (23:00 – 07:00)	44	35	46	62
LT4	Day (07:00 – 23:00)	49	43	50	N/A
	Night (23:00 – 07:00)	46	42	45	63
LT5	Day (07:00 – 23:00)	64	48	57	N/A
	Night (23:00 – 07:00)	64	43	56	88

Table 6 Summary of Short Term Positions

Location	Date	Time (T)	Duration	Average $L_{Aeq,T}$ (dB)	Average $L_{A90,T, 15 \text{ mins}}$ (dB)	Average $L_{A10,T}$ (dB)	Maximum $L_{Amax,T}$ (dB)
ST1A	21/09/22	11:51-12:06	15:00	59	49	59	69
	22/09/22	14:03-14:18	15:00	65	53	64	76
ST1B	21/09/22	12:07-12:22	15:00	57	46	57	68
	22/09/22	14:20-14:35	15:00	64	52	62	75
ST1C	21/09/22	12:26-12:41	15:00	60	47	58	75
	22/09/22	14:36-14:51	15:00	61	52	59	75
ST2	21/09/22	09:07-10:16	69:00	73	45	55	101

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Location	Date	Time (T)	Duration	Average L _{Aeq,T} (dB)	Average L _{A90,T, 15 mins} (dB)	Average L _{A10,T} (dB)	Maximum L _{Amax,T} (dB)
	21/09/22	10:17-11:03	46:00	51	37	49	70
ST2a	02/02/23	12:30–12:45	15:00	61	53	65	74
	02/02/23	12:45–13:00	15:00	66	50	62	89
	02/02/23	13:00–13:15	15:00	69	52	66	91
	02/02/23	13:15–13:30	15:00	63	52	64	89
	02/02/23	13:30–13:45	15:00	58	50	61	70
	02/02/23	13:45–14:00	15:00	68	50	61	89
	02/02/23	14:00–14:15	15:00	64	48	57	88
	02/02/23	14:15–14:30	15:00	70	49	60	93
	02/02/23	14:30–14:45	15:00	68	50	62	92
ST3	21/09/22	14:32-14:47	15:00	69	54	69	77
	22/09/22	10:09-10:24	15:00	73	54	69	90
	22/09/22	12:14-12:29	15:00	77	55	69	97
	22/09/22	15:59-16:14	15:00	68	55	68	80
ST4	21/09/22	13:51-14:06	15:00	81	66	78	93
	22/09/22	10:43-10:58	15:00	81	67	78	91
	22/09/22	11:32-11:47	15:00	82	66	78	93
	22/09/22	15:20-15:35	15:00	82	67	79	91
ST5	20/09/22	16:09-16:26	15:00	51	49	51	57
ST6	20/09/22	16:34-16:49 [^]	15:00	52	45	54	56
	22/09/22	09:32-09:47 [*]	15:00	63	59	61	78
Notes: [^] plant off, [*] plant on							

AIRCRAFT NOISE

As discussed in the chapter, the Site is affected by aircraft noise from Oxford Airport located approximately 1km north of the Site with runways that run south towards the Site. Publicly available data suggests the airport typically has around 11 arrivals and 12 departures on an average weekday^x.

The Section 106 Agreement between the airport and CDC requires that:

- No movements between midnight and 06:00 unless for emergencies;
- No training circuits before 07:00 hours and after 23:00 on any day;
- No more than 160,000 movements per year (excluding emergency flights); and
- Restrictions on location of, time and duration static engine testing for jet aircraft (no more than 6 hours at weekend and 3 hours at weekends and not before 07:00 or after 19:00 on any day).

Therefore, whilst some aircraft activity prior to 07:00 hours is permitted, this is restricted to a 1-hour window between 06:00 – 07:00. Looking at the aircraft patterns² this appears to be no more than 2 aircraft (one arrival and one departure), on around two days each week.

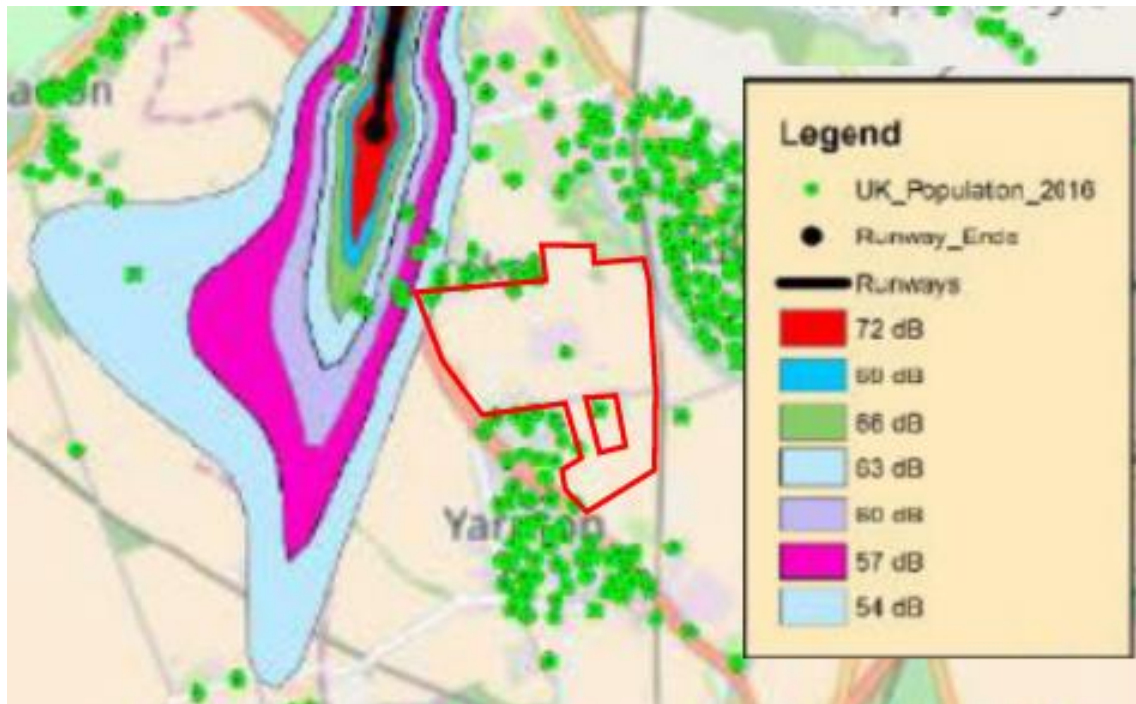
The aircraft contours available in the public domain together with the approximate boundary of the

² available <https://www.flightradar24.com/>

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residential elements of the development Site are presented in Figure 3. A relatively small area of the north west corner of the Site is anticipated to fall within the 54 dB $L_{Aeq,16\text{ hour}}$ contour. When factoring in that a landscaping zone has been allowed for along the northern boundary of the Site, it could be that any dwellings would fall outside of this contour.

Figure 3 Oxford Airport Aircraft Contours and indicative boundary of residential uses



EVOLUTION OF BASELINE NOISE ENVIRONMENT

The future baseline is discussed in the Chapter and the relevant points are summarised here;

Aircraft Noise: it is estimated that the level of growth between 2022 and 2040 is likely to be 21% as a worst-case scenario. On this basis it is not expected that the growth in aviation would materially change the baseline noise conditions from those measured during the surveys, especially given the sectors drive towards more environmentally friendly and quieter aircraft engines and the replacement of older noisier aircraft with newer quieter counterparts.

Rail Noise: as part of the emerging proposals for National Rail upgrades to line, information provided to the traffic consultant by Network Rail has indicated the number of train paths per hour could double. At this stage, it is unclear whether this is likely to be the case for every hour, however this has been assumed as a robust worst-case scenario. Therefore a 3 dB uplift in railway noise compared to the levels measured during the baseline noise survey has been assumed.

Road Traffic Noise: The screening exercise undertaken for operational road traffic indicated that, where increases in road traffic noise were predicted as a result of the Proposed Development and reassignment of traffic on the network, these would be so negligible that a detailed assessment of road traffic was not required. This is primarily due to OCC's transport strategy promoting sustainable methods of transport

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at preventing growth in background traffic. On this basis is it not anticipated that there would be any material increase in traffic noise on the surrounding road network in the future. On some links a decrease is predicted, however as a worst-case scenario it will be assumed that the existing level of traffic noise prevails.

Overall, in terms of site suitability and how the noise environment could evolve the following assumptions have been made;

- Aircraft noise – no material change from that recorded during baseline survey;
- Rail noise – worst case assumptions that paths double every hour and therefore 3 dB uplift assumed; and
- Road traffic noise on surrounding road network – no material change from that recorded during baseline survey.

VIBRATION

To characterise and quantify the existing levels of vibration resulting from the Cherwell Valley Rail Line which is frequently used by both passenger and freight trains, Vibration Dose Value (VDV) measurements of train passes were undertaken at ST2a (shown on **Error! Reference source not found.**). The measurements were carried out following the principles of BS 6472-1:2008³.

Measurements were undertaken using a transducer mounted on top of a ground spike which was pushed into soft ground approximately 15 m from the railway line.

A measurement was started as a train approached the monitoring position and was stopped as it moved away. The measurements indicated that the weighted acceleration in the vertical axis was the dominant direction of vibration. In accordance with BS 6472-1:2008, only this axis has been considered further.

The number and type of measured train passes together with the average and maximum VDV_b results for each train type are summarised in Table 7.

Table 7: Summary of Measured Vibration Dose Values for train passes

Train Type	No of passes	Average VDV _b m·s ^{-1.75} (z axis)	Max VDV _b m·s ^{-1.75} (z axis)
Passenger	6	0.014	0.020
Freight	4	0.021	0.022

The observation of the surveyors was that vibration from the trains was not perceptible at the measurement locations. The relatively low levels of recorded vibration support this observation.

IMPACT AT RESIDENTIAL DWELLINGS

INITIAL RISK ASSESSMENT

The guidance given in ProPG is intended for use by practitioners on a recommended approach to the

³ BS6472-1:2008 Guidance to evaluation of human exposure to vibration in buildings. Part 1:Vibration sources other than blasting.

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management of noise for new residential developments. The following sections assess the residential aspects of the development, following the principles given in that guidance document. Since school buildings are outside the scope of the ProPG guidance, the school plot has been assessed separately.

An initial risk assessment of the three residential plots has undertaken in reference to guideline levels given in Table 2 of this document, as derived from the ProPG guidance. Table 8 presents the outcome of the assessment, based on measured ambient noise levels.

Table 8 – Initial risk assessment based on ambient noise levels

Location	Period, T	Ambient Noise Level, dB L _{Aeq,T}	Initial Risk Indication	ProPG Pre-app. Planning Advice*
LT1	Day (07:00 - 23:00)	57	Low 50 - 60 dB, L _{Aeq, 16hr}	As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an Acoustic Design Statement (ADS) which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
	Night (23:00 - 07:00)	53	Medium 50 - 60 dB, L _{Aeq, 8hr}	
LT3	Day (07:00 - 23:00)	51	Low 50 - 60 dB, L _{Aeq, 16hr}	At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	Night (23:00 - 07:00)	44	Low 40 - 50 dB, L _{Aeq, 8hr}	
LT4	Day (07:00 - 23:00)	49	Negligible < 50 dB, L _{Aeq, 16hr}	At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	Night (23:00 - 07:00)	46	Low 40 - 50 dB, L _{Aeq, 8hr}	
LT5	Day (07:00 - 23:00)	67 [^]	Medium 60 - 70 dB, L _{Aeq, 16hr}	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.
	Night (23:00 - 07:00)	67 [^]	High >60 dB, L _{Aeq, 8hr}	
Notes: [^] This includes the 3 dB uplift for doubling the number of train pass bys in line with information received from Network Rail. *where initial risk indication is different for day and night – the advice presented is for the highest level of risk that is identified.				

The initial risk assessment carried out in relation to the Site, based on ambient noise levels indicates that the monitoring positions are generally low risk during both day and night-time periods, with the exception of LT5 which is adjacent to the rail line. At this location the ambient noise levels would be considered in the “high” risk category at night and “medium” risk during the day. Although the Site layout is unconfirmed, properties set back further back from the railway are likely to be at least partially

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screened from rail noise by intervening buildings.

As noted in ProPG, in reality the defined risk categories are essentially a sliding scale with risk increasing with the noise level. Table 5 indicates the ranges of each category, so for example LT1 during the day is approaching the upper end of the low risk range and is classified as medium at night and LT 4 is only just within the negligible banding during the day time period.

Finally, the initial risk assessment has considered the maximum noise levels arising from single events which affect the monitoring positions, as presented in Table 9.

Table 9 – Initial review of LAmax Levels

Monitoring Location	Equivalent Façade Level for Representative LA_{max,T} (dB)	Comparison to Target Criterion (60 dB LA_{max} at the Façade)
LT1	71	+11
LT3	65	+5
LT4	66	+6
LT5	88	+28

At LT3 and LT4 the representative LA_{max}'s are 5 to 6 dB above the 60 dBA criteria recommended in the WHO's Guidelines for Community Noise. The levels at LT1 exceed the threshold by 11 dB due to road traffic sources and those at LT5 exceed the threshold by 28 dB due to the impact from train passes at this location.

The impact of traffic noise from vehicles travelling along Begbroke Hill and other internal site access roads will need to be considered as the detailed design progresses and information becomes available about the level of traffic which would travel along each link within the red line boundary. The traffic data supplied to date indicates that the total flow of vehicles entering and exiting Begbroke Hill with the proposed development would result in noise levels of 67 dB LA₁₀ 18 hour during the day at 10m from the road centreline (equating to an LA_{eq,16} hours of around 65 dB). It is noted that the level of noise at the same distance from the centreline of the A44 would be 7dB higher (74 dB LA₁₀, 18 hours).

In summary, generally the initial risk assessment indicates that the majority of the Site would fall in the low risk category, indicating that the Site is likely to be considered suitable for residential development from noise perspective, provided that a good acoustic design process is demonstrated to ensure any adverse impacts of noise are properly mitigated. As would be expected the parts of the Site that would be most affected by high noise levels are LT1 close to the A44 and LT5 adjacent to the rail line. Good acoustic design principles should be followed to minimise the exposure to high noise levels.

INTERNAL NOISE LEVELS

When considering noise break in from the external environment, there are two main elements to consider from an acoustic perspective:

- The internal ambient noise level requirements for the day and night-time period in accordance with the guidance in BS 8233:2014; and
- The maximum (LA_{max}) noise levels at night (23:00 – 07:00) and what effect these might have on sleep in accordance with the World Health Organisation Guidelines for Community Noise.

In addition to this, there is also the need to achieve required ventilation rates as set out in Part F of the

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Building Regulations and the requirements of Approved Document O under the overheating condition. This will need to be confirmed during detailed design.

It is generally accepted that for a room in which the window is open, the internal noise level would be around 12 dB lower than the simultaneously occurring level outside of the window. Therefore, in Table 8 consideration has been given to the internal noise levels based on this level of reduction through a partially open window.

Table 10 – Internal Ambient and LAmax Levels based on partially open window

Location	Period, T	Internal Ambient Level dB LAeq,T	Internal LAmax level dB
LT1	Day (07:00 -23:00)	45	-
	Night (23:00 - 07:00)	41	56
LT3	Day (07:00 -23:00)	39	-
	Night (23:00 - 07:00)	32	50
LT4	Day (07:00 -23:00)	37	-
	Night (23:00 - 07:00)	34	51
LT5	Day (07:00 -23:00)	55	-
	Night (23:00 - 07:00)	55	73

Given the outline nature of the application, the levels presented in Table 10 represent a “worst-case”, since they assume that all proposed dwellings will be directly exposed to the local noise sources (predominantly that from the local road and rail networks). In reality, when the development buildings are in place, a substantial number of the façades will be at least partially screened from road and rail noise. The following discussion is therefore likely to relate primarily to those properties on the outer extents of the respective plots, which face toward the road. It is noted that one of the sources affecting the Site, more so during the daytime period, is aircraft noise associated with the operation of Oxford Airport which would not benefit from any screening from intervening buildings.

It can be seen from Table 10 that the external ambient levels indicate that at every monitoring position the internal ambient levels exceed the relevant criteria. In the case of LT3 and LT4, this exceedance is relatively small. However, it shows that at these most exposed properties, mitigation would still be required in order to achieve the required internal levels. The types of mitigation this would involve would typically be acoustic trickle vent or attenuated window openings. The approach would be finalised as part of the detailed design process confirming that appropriate ventilation rates could be achieved within the dwellings.

For locations LT5 and LT1 and any residential development located along Begbroke Hill, the higher noise levels from the Cherwell Valley Railway, the A44 and Begbroke Hill result in elevated levels and therefore a greater level of mitigation will be needed to meet the target noise levels. It is likely that a natural ventilation strategy will not be feasible if dwellings are constructed close to these sources. Good acoustic design principles should be followed across the Site to maximise the acoustic benefits, including location of non-habitable rooms on elevations overlooking the primary sources of noise, and using

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screening that can be provided by the development itself.

It is recommended that as part of the detailed design development of the Site, careful consideration is given to the layout of the proposed development buildings with a view to maximising the number of properties where internal ambient and maximum noise levels can be achieved without additional mitigation measures. It is also recommended that attended measurements are undertaken at LT3 and LT4 to confirm the source of the L_{Amax} levels, i.e., whether they are due to aircraft noise or road/rail sources which would be mitigated by intervening buildings. It should also be established if any of the mechanical plant associated with the science park has been replaced and corrections for acoustic features, where these would be present at the dwellings.

PREDICTED NOISE LEVELS IN EXTERNAL AMENITY AREAS

Based on the measurements for the 16-hour daytime period (Table 5), the external noise levels do not exceed the upper threshold of the BS 8233 desirable guideline values for amenity spaces of 50 -55 dB $L_{Aeq,T}$ at LT3 or LT2. At LT1 the threshold upper threshold is exceeded by 2 dB; however, this monitoring location is in proximity to the road so if good acoustic design principles were followed and there was some screening via a boundary fence, the noise levels in amenity spaces on the vicinity of the monitoring position would feasibly be able to reduce to 55 dB $L_{Aeq,T}$.

It is also noted that CDC's guidance advocates levels of 55 dB but indicates that this is not applicable in Town Centres and near busy roads. It is therefore considered that, for the great majority of the Site, the acoustic environment is conducive to provide suitable levels of amenity in outdoor spaces (private gardens), and in some areas with exposure to higher noise sources like the A44 some additional mitigation may be required, but typically this could be achieved through boundary fencing.

The area of the Site which is most challenging in the context of amenity spaces is in proximity to LT5, adjacent to the railway, where the ambient noise levels are substantially above the 55 dB $L_{Aeq,T}$ upper threshold. From a good acoustic design perspective, these parts of the Site would be most suited to less sensitive uses such as the proposed commercial uses. Therefore, if dwellings and associated amenity spaces are located in proximity to the railway, a greater level of mitigation would be required to achieve reasonable levels in these spaces.

However, a 12 dB reduction (from 67 dB) to get down to levels of 55 dB in amenity spaces is feasible with a combination of distance, fencing and good acoustic design. For example, either fencing could be used to provide the reduction, or the dwellings could be designed with the fronts of the houses facing the railway line and the amenity space at the rear so the garden benefits from screening provided by the building. Beyond the first row of houses between the rail and the amenity spaces it is unlikely much mitigation would be required to achieve levels of 55 dB or below. It is also recognised that the CDC guidance indicates that higher levels may be acceptable in noisier environments which is consistent with the guidance in BS 8233:2014.

OTHER RELEVANT ISSUES - SCHOOL PLAYGROUNDS AND RECREATIONAL SPORTS PITCHES

The areas where the schools are located are likely to be bordered by new residential dwellings which will experience noise from the school playground and pitches. Whilst the Site layout is not fixed, indicative predictions undertaken for the ES indicate that new receptors in proximity to the schools could experience noise levels from these sources exceeding the recommended guideline values of 50 – 55 dB. Given that the character of the noise is also likely to cause some disturbance (compared against to the character of the existing noise environment), appropriate mitigation of the school Site and

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surrounding residents will be required. It is anticipated that this could be achieved through barriers along the boundary of the school or at the receptors. As the detailed design progresses, there should be careful consideration of noise from these sources in the design, orientation and layout of the school, sports pitches and closest introduced receptors. There should be sufficient opportunity to ensure reasonable acoustic conditions can be achieved.

Use of both the school and the sports pitches will be limited to the daytime period, and so potential for adverse effects is largely limited to loss of amenity in garden areas.

VIBRATION AT PROPOSED DWELLINGS

The measurements undertaken at a position 15m from the railway indicate that the levels of vibration are quite low. Taking the highest recorded vibration level (from a freight train pass by) and multiplying it up by the number of train passes expected from the timetable (138 trains during the day and 59 at night) the estimated vibration dose value (VDV), over a full 16 hour day and 8 hour night time period is presented in Table 9 below. This has been calculated using the methodology set out in BS 6472-1:2008.

Table 9 – Estimated VDV based on measured vibration levels

Time Period	Existing Estimated VDV m·s ^{-1.75} ¹	Future Estimated VDV m·s ^{-1.75} ²	Probability of adverse comment
Day	0.07	0.09	Below the level at which a low probability of adverse comment would be expected (0.2 to 0.4 m·s ^{-1.75}).
Night	0.06	0.07	Below the level at which a low probability of adverse comment would be expected (0.1 to 0.2 m·s ^{-1.75}).
Notes:			
¹ This is based on current levels of rail traffic identified from timetabling information.			
² This is based on future levels of rail traffic assuming that the number of train paths per hour is doubled and there are twice the number of events during the day and night time periods compared to the existing situation.			

It can be seen from the table that both the estimated existing and future vibration levels are below the level at which a low probability of adverse comment would be expected. This is based on measurements taken near the rail line; it is expected that at greater distances from the line, lower levels would be expected. It is therefore anticipated that there would be no material effects from vibration and no mitigation measures are required.

SCHOOLS

The proposed locations of the two primary schools and one secondary school which are intended to form part of the development are illustrated Figure 1. The figure identifies the plots where it is anticipated each school will be located. There is not yet a fixed location for the school buildings and their associated playgrounds/pitches. However, Development Principle 'DP5.2' from the development Specification indicates that '*school buildings and playing fields will be sited and designed to provide a suitable noise environment and will seek to allow for natural ventilation of buildings where possible*'. Initial discussions have been held with OCC and some outline assumptions have been made to look at the

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suitability of these Sites.

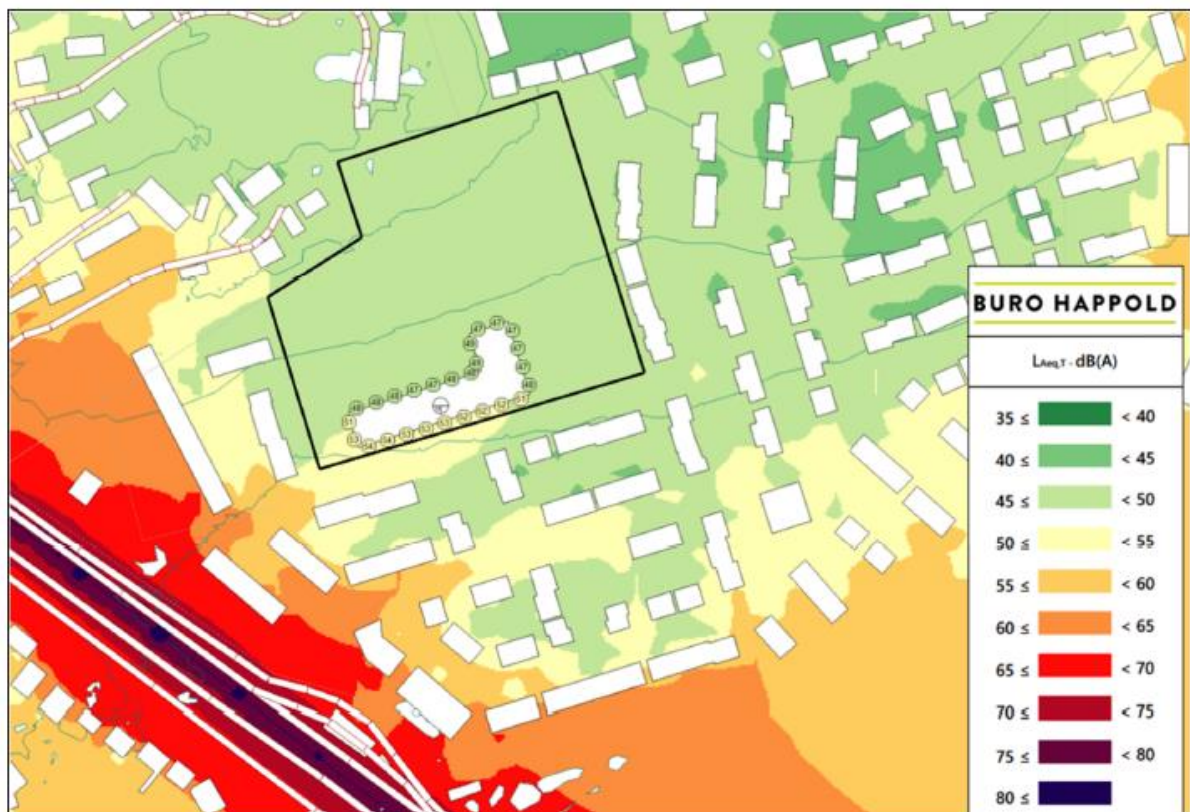
Primary School 1

Given the location of this plot within the centre of the Site and the screening from the main noise sources, it is not anticipated that there would be any challenges with achieving the recommended ambient levels in playgrounds, recreation areas and outdoor spaces used for teaching in the Acoustics of Schools Design Guide and it is likely that the OCC criteria of 50 dB $L_{Aeq,30 \text{ minutes}}$ would also be met. These relatively low noise levels would also indicate that from an acoustic perspective the school could be naturally ventilated.

Primary School 2

Figure 4 shows the indicative noise contours for the 16 hour day in proximity to Primary School 2 (in its revised location), with the dominant noise source being the A44. It is noted that without mitigation, most of the external areas of the school would experience noise levels which do not exceed 50 dB $L_{Aeq,T}$, with the exception of the south west corner of the school boundary where the predicted levels just exceed the 50 dB criterion set by OCC. Therefore, the school playing fields would comply with the outdoor levels recommended in the OCC guidance without additional mitigation. From an acoustic perspective the school could be naturally ventilated.

Figure 4 – Primary 2 - No mitigation



Mitigation – either in the form of acoustic boundary treatment to the school site or along the A44 (as stated within the Development Specification) would achieve the small reduction required for the whole boundary to comply with the condition, if it was considered necessary to do so (given the exceedance of the criterion is restricted to such a small area. It is considered that in the revised

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location, the levels in external spaces at the school would be within the Acoustics of Schools Design Guide recommendations for external play areas and generally comply with OCC's criteria. and thus would provide a suitable external environment.

Secondary School

Figure 6 shows the indicative noise contours for the 16 hour day in proximity to the proposed Secondary School, with the dominant noise source being the Cherwell Valley Railway. The majority of the playing fields are generally between 50-60 dB $L_{Aeq,T}$. A natural ventilation strategy is likely to be feasible due to distance from rail to the proposed buildings.

Mitigation in the form of a 2.5m high barrier as shown in blue in Figure 7 would reduce the noise levels in the majority of the outdoor spaces to below 55 dB $L_{Aeq,T}$ and increase the extent of the school grounds that falls within the 45-50 dB $L_{Aeq,T}$ contour. This would mean that whilst some of the outdoor space would not comply with the requirements of OCC, these spaces would still be within the Acoustics of Schools Design Guide recommendations for external play areas and thus would provide a suitable external environment. While increasing the barrier height to 4m does slightly increase the area which is in the 45-50 dB $L_{Aeq,T}$ contour, it does not mean that all of the space is compliant and is not considered to have sufficient benefit to outweigh the economic and sustainability implications. It is considered that with the proposed 2.5m high barrier mitigation, the levels in external spaces would be within the Acoustics of Schools Design Guide recommendations for external play areas and thus would provide a suitable external environment.

Figure 6 – Proposed Secondary School with no mitigation

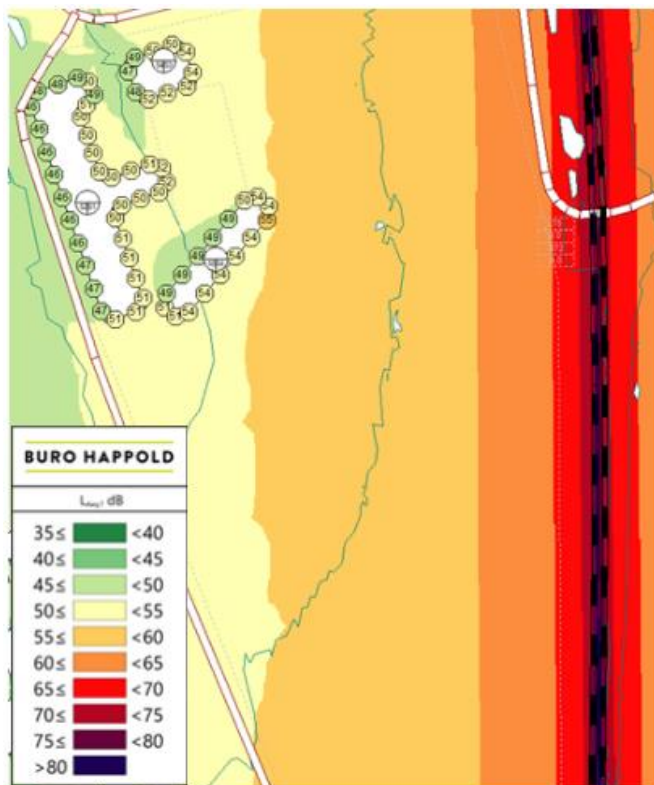
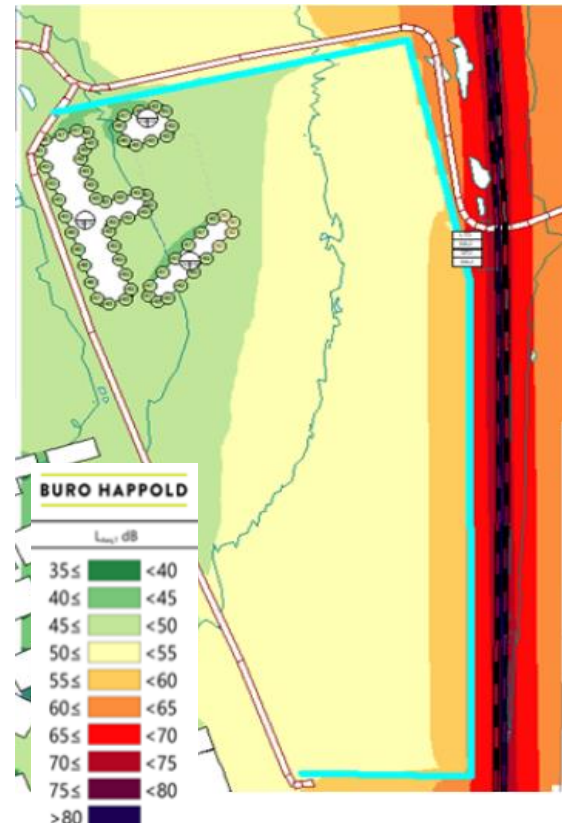


Figure 7 – Proposed Secondary School



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with mitigation (2.5m high barrier shown in blue)

SUMMARY OF FINDINGS

Following a review of the noise levels affecting the development Site, it is considered that the Site is suitable for residential development from a noise and vibration perspective. The parts of the Site bordering the A44 and the rail line are affected by higher noise levels and will require more substantive mitigation, which is likely to include alternative forms of ventilation. The acoustic performance requirements of the dwellings and layout of the Site should continue to be reviewed as the design of the scheme developments. It is also recommended that additional measurements are undertaken to determine the source of the L_{Amax} levels at positions away from the dominant sources on the ground (i.e., away from the railway and roads).

The levels of vibration recorded in proximity to the railway indicates that when factored for the number of trains during the day and the night, and the likely future growth, the resultant estimated vibration is below the level at which a low probability of adverse comment would be expected.

With regard to the schools, a natural ventilation strategy should be feasible for all three schools from an acoustic perspective. Primary school 1 is located in an area of low noise exposure in the middle of the Site. Primary School 2 and the Secondary School would experience higher levels of noise exposure, due to the A44 and the Cherwell Valley Rail Line. However, the modelling demonstrates that with appropriate mitigation, the levels in outdoor spaces at the school can be reduced such that a good proportion of the space is below the 50 dB $L_{Aeq,T}$ recommended by OCC at the boundary of school sites, but some of the outdoor space will exceed this level. However, the higher residual levels are generally between 50 – 55 dB $L_{Aeq,T}$ and therefore to a level which complies with the Acoustics of Schools Design Guide recommendations and would be suitable for outdoor teaching.

ⁱ ANC, IoA, CIEH (2017) Professional Planning Practice Guidance on Planning and Noise (ProPG) New Residential Development

ⁱⁱ British Standards Institution. (2014). BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings.

ⁱⁱⁱ Cherwell District Council (undated), Planning and noise guidance, <https://www.cherwell.gov.uk/info/69/pollution/480/planning-and-noise-guidance/2>

^{iv} Guidelines for Community Noise. World Health Organisation. 1999

^v Acoustics Ventilation and Overheating - Residential Design Guide, Association of Noise Consultants. 2020

^{vi} HM Government, (2021) Building Regulations 2010 Approved Document O, 2021 Edition ADO Overheating

^{vii} Building Bulletin 93 - Acoustic design of schools: performance standards. UK Department for Education. 2015.

^{viii} Institute of Acoustics and Association of Noise Consultants (2015), Acoustics of Schools: a design

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guide

^{ix} Oxfordshire County Council (2020) Key Design Criteria for Primary School Sites, and Oxfordshire County Council (2020) Key Design Criteria for Secondary School Sites.

^x Taken from arrival and departure information for 16th and 17th November 2022

Contact

Tom Clarke

Hello@oud.co.uk

Oxford University Development Ltd, Suite B,
6 Worcester Street, Oxford OX1 2BX

+44 (0) 1865 346995



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