



Heidelberg Materials

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# **TYTHERINGTON QUARRY: 6 MILLION TONNE ADDITIONAL RESERVES**

Environmental Impact Assessment (EIA) Scoping  
Report





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Environmental Impact Assessment (EIA) Scoping Report

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# 1 INTRODUCTION

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## 1.1. OVERVIEW OF THE PROPOSED SCHEME

- 1.1.1. Heidelberg Materials (hereafter referred to as Heidelberg), previously known as Hanson UK plan to secure the continued extraction of all consented limestone reserves, and extraction of further unconsented reserves, within the existing footprint of Tytherington Quarry, near Thornbury, Bristol (hereafter referred to as ‘the Proposed Scheme’).
- 1.1.2. Heidelberg are seeking to submit a Section 73 planning application under the Town and Country Planning Act 1990, accompanied with an Environmental Impact Assessment (EIA). This is to enable a change to the existing working method at Tytherington Quarry to allow for the deepening of the Woodleaze area of the quarry to release an additional 3 million tonnes (mt) as well as enable the extraction of a further 3mt from the southern part of the quarry, beneath the existing soil storage area. This will increase the site’s overall mineral reserve and ensure that principles of sustainable mineral extraction are adhered to through ensuring that all workable deposits at the permitted site can be extracted.
- 1.1.3. The working of minerals at Tytherington Quarry is detailed within the extant principal planning consent NA/IDO/002/A dated 7 February 2006. The other relevant planning consent for the Proposed Scheme is P93/2645 dated 5 December 2002, which covers the soil storage area in the southern part of the quarry.
- 1.1.4. A site location plan is provided in **Figure 1.1**.
- 1.1.5. Further details of the Proposed Scheme can be found in Chapter 2: The Proposed Scheme.

## 1.2 APPLICANT AND PROJECT TEAM

- 1.2.1. This Scoping Report has been prepared on behalf of Heidelberg by WSP UK Ltd (hereafter referred to as WSP).
- 1.2.2. WSP is registered with the Institute of Environmental Management and Assessment (IEMA)’s Environmental Impact Assessment (EIA) Quality Mark scheme. The scheme allows organisations that lead the co-ordination of EIAs in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed.

## 1.3 PURPOSE OF THIS REPORT

- 1.3.1. This Scoping Report has been prepared as part of an EIA relating to the Proposed Scheme. An EIA is required because it is considered that the proposed release of additional minerals at Tytherington Quarry by means of deepening the Woodleaze area and the extraction of mineral from the consented soil storage area meets the criteria for EIA development under Schedule 1 of *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017*<sup>1</sup> (hereafter referred to as the ‘EIA Regulations’).

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<sup>1</sup> *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017* [online]. Available at: <http://www.legislation.gov.uk/uksi/2017/571/contents/made>

- 1.3.2. The Proposed Scheme requires EIA because it falls within the descriptions of development under paragraph 19 of Schedule 1, as it comprises “*Quarries and open-cast mining where the surface of the site exceeds 25 hectares, or peat extraction where the surface of the site exceeds 150 hectares*” and it is likely to have significant environmental effects.
- 1.3.3. This Scoping Report has been issued to South Gloucestershire Council (SGC) together with a discretionary request for a Scoping Opinion under the EIA Regulations. To inform this request, the following information is included in this report, as required under Regulation 15 of the EIA Regulations:
- A plan sufficient to identify the land;
  - A brief description of the nature and purpose of the development, including its location;
  - An explanation of the likely significant effects of the development on the environment; and
  - Such other information or representations as the person making the request may wish to provide or make.
- 1.3.4. Under the EIA Regulations, once a request for a Scoping Opinion has been issued to the determining authority, it is required to consult with the consultation bodies (as defined in the EIA Regulations) and to issue the developer with a pre-application opinion within five weeks of the date of receipt of the request. The opinion of SGC is being sought on the following:
- The environmental topics that should be assessed within the Environmental Statement (ES);
  - The likely significant effects of the Proposed Scheme;
  - Those effects that are not likely to be significant and do not need to be considered further;
  - The approach to defining the study areas for each environmental topic;
  - The data that has been gathered (and will be gathered);
  - The assessment methods that will be used to determine likely significant effects;
  - The approach to determining the environmental measures that could be incorporated into the Proposed Scheme to avoid, reduce or, as a last resort, compensate for significant effects; and
  - Developments that, together with the Proposed Scheme should be subject to cumulative assessment.

## 1.4 STRUCTURE OF THE REPORT

- 1.4.1. The remainder of this Scoping report is structured as follows:
- **Chapter 2: The Proposed Scheme** provides a description of the Proposed Scheme;
  - **Chapter 3: Legislation and planning policy overview** provides an overview of the legislation and policies that are relevant to the Proposed Scheme;
  - **Chapter 4: The Environmental Impact Assessment Process** explains the approach that has been taken to identify the scope of the EIA;
  - **Chapter 5: Scope of the Assessment** sets out the proposed scope and methodology for each technical topic where a significant environmental effect is likely to arise because of the Proposed Scheme. This chapter also identifies those effects that are scoped out of the EIA; and
  - **Chapter 6: Summary** provides a summary of the proposed content of the ES.

## 2 THE PROPOSED SCHEME

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### 2.1 OUTLINE DESCRIPTION OF THE PROPOSED DEVELOPMENT SITE

- 2.1.1. Tytherington Quarry is an operational limestone quarry, which is located adjacent to the west of the village of Tytherington. Other settlements in close proximity to Tytherington Quarry include the market town of Thornbury which is located approximately (~) 1.5 kilometres (km) north-west from the quarry; the village of Alveston which is located approximately 2.5km south-west from the quarry; and the village of Cromhall which is located approximately 3km north-east from the quarry. The quarry (including the plant area and areas where soils are stored etc.) covers a total area of ~42 hectares (ha).
- 2.1.2. The main approach route is from the west via Tytherington Road, which runs in a north-west/south-east direction and accessed from the A38. The quarry is adjacent to the M5, which forms the eastern site boundary. The Thornbury Branch Line is a dedicated freight rail line which passes the quarry sidings from Grovesend Overbridge. The route is a 12km branch of the Midland Railway and runs from Yate to Thornbury.
- 2.1.3. The proposed extension of the quarry out towards the soil storage falls outside the Red Line Boundary (RLB) of the extant principal planning consent for Tytherington Quarry (NA/IDO/002/A) but falls wholly within the RLB of the extant planning consent P93/2645 which is referenced in the principal consent. Therefore, any reference to the proposed extension of the quarry in this report, implies extension to the existing extraction limits. The proposed extension falls within an allocated Preferred Area for Mineral Working in the adopted South Gloucestershire Local Plan: Policies, Sites and Places Plan (2017).
- 2.1.4. The site location is illustrated in **Figure 2.1**.

### 2.2 BACKGROUND TO THE DEVELOPMENT

- 2.2.1. Tytherington is widely known for its limestone quarries, and has provided high-quality stone including Carboniferous limestone, Blue Pennant sandstone, red sandstone, and oolitic limestone to the village for over 150 years. The Thornbury Branch Line has served Tytherington Quarry since the quarry's opening in 1872. Demand for stone increased considerably during the 1870s as farming began to decline and quarrying provided a valuable source of income and employment, sustaining the local economy.
- 2.2.2. Tytherington Quarry comprises two historic quarries. Grovesend Quarry was the initial quarry to the north of Itchington Road and comprises the main quarry offices, weighbridge, processing plant and quarry railway sidings. Woodleaze Quarry is located to the south of Itchington Road but is only accessible from Grovesend Quarry via a tunnel underneath the road. All ongoing mineral extraction is currently taking place from within Woodleaze Quarry.
- 2.2.3. During operations in the early 2000s, Itchington Road was moved further south to extend the Woodleaze Quarry. Mineral extraction ceased between 2013 and 2017 during which time Tytherington Quarry was mothballed. Following a two-year period to dewater the quarry, Tytherington was reopened in Autumn 2018, initially extracting approximately (~) 1.5 million tonnes per annum (mtpa).

- 2.2.4. Today, Tytherington Quarry is operated by Heidelberg and is being worked at a capacity of ~2mtpa. Heidelberg employs 14 full-time employees at the quarry, plus many more in their supply chain of contractors and support staff. Heidelberg is committed to being a good neighbour and actively supports local initiatives and programmes which benefit the community and environment. They also work in close partnership with a number of conservation bodies to protect and enhance biodiversity at the site and regularly host school and college visits.
- 2.2.5. Heidelberg have recently sought to develop a scheme to replace the existing mobile processing plant with fixed processing plant in Grovesend, the permission for which was granted in planning application reference DOC21/00278 and will see a multi-million pound replant to support the future of the quarry in the coming years.

## **2.3 REASONS FOR THE PROPOSED SCHEME**

- 2.3.1. Tytherington is one of Heidelberg's flagship sites. Its rail link means that this quarry is only one of a handful across England that has the capacity to supply wider UK markets – and most notably those markets in London and the southeast of England, where geology dictates that the majority of crushed rock requirements must be met by imports of material from other English regions.
- 2.3.2. The limestone is considered a nationally significant resource and is used to make ready-mixed and precast concrete products, as well as asphalt for use in road construction and maintenance. Tytherington Quarry is also one of the main suppliers of aggregates for nationally significant infrastructure projects such as, Hinkley Point C and cross rail networks, including HS2 until recently. It is envisaged Tytherington will continue to supply material for the likes of Hinckley Point C as well as serve local and regional markets, notably hundreds of settlements across Cheltenham including the proposed Buckover garden village to the east of Thornbury and potentially the Sizewell C development in east Suffolk.
- 2.3.3. Some 11mt of limestone reserve remains within Grovesend Quarry and although this is constrained by the plant site, it is envisaged this would be extracted towards the end of the quarry life once all other reserves have been exhausted. With the quarry currently operating at a capacity of 2mtpa, it is estimated there are only 5.5 years of reserves left at the quarry.
- 2.3.4. To secure the continuity of mineral supply and operations at Tytherington in the short to medium term, as well as sustainable minerals extraction, Heidelberg are seeking an amendment to the extraction limits and working scheme at Tytherington Quarry to allow for the deepening of the Woodleaze area and extension into the consented soil storage area (covered by extant consent P93/2645) in the southern part of the quarry. This will increase the site's overall mineral reserve and ensure that principles of sustainable mineral extraction are adhered to through ensuring that all workable deposits at the permitted site are extracted and help secure the continuity of limestone provision locally and regionally.
- 2.3.5. The area of the current soil storage, which Heidelberg wish to extract limestone from, falls within an allocated Preferred Area for mineral extraction in the adopted South Gloucestershire Local Plan (SGLP) 2017. It is estimated that the 6mt from the soil storage area and deepening of the Woodleaze area will provide Tytherington Quarry an extra 3 years of reserves based on current output rates.



- 2.3.6. As well as providing continuity of supply and operations at the quarry, the proposed extension into the consented soil storage area and deepening of the Woodleaze area will provide Heidelberg additional time to formulate their plans to make best use of the remaining mineral reserves within the allocated SGLP Preferred Area as well as the representations made by Heidelberg seeking to expand this area to include additional mineral reserves in the emerging new Local Plan.

## 2.4 PROPOSED PLANNING APPROACH

- 2.4.1. The working of minerals at Tytherington Quarry is detailed within the extant principal planning consent NA/IDO/002/A dated 7 February 2006. The other relevant planning consent for the Proposed Scheme is P93/2645 dated 5 December 2002, which permits a soil and overburden storage area in the southern part of the quarry. As the two extant planning consents are separate, yet inextricably linked, Heidelberg are seeking to vary a number of conditions to enable the extraction of additional mineral reserves from the 'soil storage area' and deepening of the Woodleaze area. Therefore, the proposed approach to achieving the requisite consent would be to submit two Section 73 planning applications accompanied by one overarching EIA.
- 2.4.2. This approach is subject to further detailed discussion and agreement with the Minerals Planning Authority - South Gloucestershire Council (SGC).

## 2.5 DESCRIPTION OF THE PROPOSED SCHEME

### MINERAL EXTRACTION

- 2.5.1. The development seeks to vary conditions from both extant permissions under Section 73 of the Town and Country Planning Act 1990. This is to allow an amendment to the extraction limits and approved working scheme at Tytherington Quarry to allow for the deepening of the Woodleaze area and extension into the consented soil storage area (covered by extant consent P93/2645).
- 2.5.2. The consenting of this additional limestone resource will ensure continuity of supply to important rail-based markets and the importance of safeguarding the regionally significant quarry operations at Tytherington.
- 2.5.3. Permitted extraction techniques and output rates would remain unchanged as per the principal consent NA/IDO/002/A and mineral would continue to be processed at the site's mobile / fixed processing plant located within Woodleaze / Grovesend. Existing access arrangements into and out of the site would also remain unchanged.
- 2.5.4. The extant planning consent boundaries and wider land ownership is illustrated on **Figure 2.1**.

### OPERATING HOURS

- 2.5.5. It is proposed that the operating hours in the extant permission for Tytherington Quarry (NA/IDO/002/A – Condition 3) remain unaltered, as follows:

*"No mineral extraction, crushing and screening of stone or any other ancillary operations involving aggregate processing (other than the production of coated roadstone, water pumping, servicing, environmental monitoring, maintenance and testing of plant or other similar work) shall be carried out on the site except between the following times:*

*6.00am to 9.00pm Mondays to Fridays; and*

*7.00am to 1.00pm on Saturdays*



*No servicing, maintenance and testing of plant shall be carried out between 10.00pm and 4.30am;*

*Operations for the stripping of soils and removal of overburden and the formation and subsequent removal of material from any environmental bank or soil storage are shall not be carried out except between the following times unless otherwise agreed in writing by the Local Planning Authority:*

*8.00am to 6.00pm Mondays to Fridays; and*

*8.00am to 1.00pm on Saturdays*

*No operations or activities (other than the produce of coated roadstone and environmental monitoring and water pumping) shall take place on Sundays, Bank Holidays and National Holidays.”*

## **RESTORATION STRATEGY**

- 2.5.6. A revised restoration scheme that takes account of the proposed extension and amendments to the soil bund storage footprint designs will be submitted.
- 2.5.7. The ES will contain plans and accompanying text to describe the restoration proposals and approach being taken. The plans will clearly show the proposed final landform and the types of land cover and habitats proposed.
- 2.5.8. These amendments will not depart from the overall and approved restoration scheme (as detailed in planning consent NA/IDO/002/A dated 7 February 2006), where the quarry will be restored to a deep water body with upper benches and a mix of woodland and grassland habitat.

## 3 LEGISLATION AND PLANNING POLICY REVIEW

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### 3.1 INTRODUCTION

- 3.1.1. This section sets out the legislation and planning policy context for the Proposed Scheme.
- 3.1.2. Each topic chapter in the Scoping Report (**Chapter 5**) includes topic specific legislation and a summary of the relevant planning policies where pertinent to the assessment. Legislation and planning policy will be used to guide the scope of the assessment and to inform the value ascribed to receptors.
- 3.1.3. The Environmental Statement (ES) will identify all the legislation and relevant policies which will be used to inform the scope and assessment of each environmental topic.

### 3.2 LEGISLATIVE CONTEXT

- 3.2.1. As discussed in **Chapter 1: Introduction**, the Proposed Scheme is to be assessed under the EIA Regulations, specifically *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017<sup>2</sup>*.
- 3.2.2. Other legislation of relevance to this EIA is that which relates specifically to the need to review old mineral planning consents, i.e. *The Planning and Compensation Act 1991* and *The Environment Act 1995* – the former setting out the statutory provision for IDO permissions and the latter for ROMPs.
- 3.2.3. Any topic specific legislation is discussed within **Chapter 5** and **Chapter 6**.

### 3.3 NATIONAL PLANNING POLICY

- 3.3.1. The application for Tytherington Quarry must be assessed in the context of planning policy contained particularly within:
  - The National Planning Policy Framework (NPPF) (September 2023); and
  - Supporting technical guidance as set out in the National Planning Practice Guidance (NPPG).
- 3.3.2. In terms of the former, particular consideration will be given to the policy set out in the following sections:
  - Facilitating the Sustainable Use of Minerals;
  - Conserving or Enhancing the Natural Environment;
  - Promoting Sustainable Transport;
  - Meeting the Challenge of Climate Change, Flooding and Coastal Change; and
  - Supporting a Prosperous Rural Economy.
- 3.3.3. Consideration will also be given to the supporting technical guidance as set out in the NPPG. This will include reference to the following topics:
  - Minerals;

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<sup>2</sup> The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [online]. Available at: <http://www.legislation.gov.uk/uksi/2017/571/contents/made>

- Air Quality;
- Environmental Impact Assessment;
- Natural Environment; and
- Water Quality.

### 3.4 LOCAL PLANNING POLICY

- 3.4.1. Section 38 of the Planning and Compulsory Purchase Act 2004 requires decisions on planning applications to be made in accordance with development plan policy unless material considerations indicate otherwise.
- 3.4.2. The Development Plan for the site comprises:
- South Gloucestershire Local Plan: Core Strategy 2006-2027 (adopted 2013)<sup>3</sup> and
  - South Gloucestershire Local Plan: The Policies, Sites and Places Plan (adopted 2017).
- 3.4.3. A new Local Plan for South Gloucestershire is being developed. This will include a new strategy and policies to guide and manage growth and change in the area over the next 15 years at least. No amendments to the current mineral working policies contained in the development plan are proposed.
- 3.4.4. **Table 3.1** seeks to summarise the provisions of the **key** policies (please note, this table is not an exhaustive list of all relevant policies, simply a summary of those key policies as being of particularly relevant to Tytherington Quarry).

**Table 3.1 - Relevant Key Local Planning Policies and Their implications**

Policy Reference	Commentary
<b>South Gloucestershire Local Plan: Core Strategy 2006-2027 (2013)</b>	
Policy CS10 - Minerals	<p>This policy seeks the provision 58 million tonnes of crushed rock between 2008 and 2026 (which represents 60% of the West of England's sub-regional apportionment) by maintaining a landbank of at least 10 years. In order to maintain this landbank, the existing Preferred Areas in the South Gloucestershire Minerals and Waste Local Plan will be rolled forward and any further resource requirement will be identified in the Policies, Sites and Places Development Plan Document.</p> <p>This policy seeks to safeguard mineral resources from sterilisation through the identification of Mineral Safeguarding Areas.</p>
<b>South Gloucestershire Local Plan: Policies, Sites and Places Plan (2017)</b>	
Policy PSP23 -Mineral Working and Restoration	<p>This policy requires a landbank of 10 years of crushed rock. Although the southwest of Tytherington Quarry is identified as a preferred area, workings of a new site would need to demonstrate need for the mineral and that sufficient mineral is available to meet requirements,</p>

<sup>3</sup> South Gloucestershire Council. (2006). South Gloucestershire Local Plan Core Strategy 2006-2007. [Online]. Available at: <https://beta.southglos.gov.uk/development-plan>

Policy Reference	Commentary
	<p>whilst demonstrating there are no unacceptable adverse impacts on the local environment as a result of the development.</p> <p>Proposals for working the site would also need to demonstrate compliance with other development plan policies.</p>
Policy PSP24 – Mineral Safeguarding Areas	<p>MSA are defined areas on the South Gloucestershire Local Plan Policies Map for limestone and other aggregate resources. Within these areas, proposals for non-mineral development will only be accepted provided development does not sterile or restrict the future extraction of mineral deposits. This policy also stipulates where development would be acceptable.</p>
PSP47 – Site Allocations and Safeguarding	<p>This policy identifies a number of sites which are shown on the Policies Map that are to be safeguarded and developed for their uses in accordance with other relevant development plan policies. This policy identifies the southwest of Tytherington Quarry as a Preferred Area and safeguard for a mineral development.</p>

## 3.5 OTHER CONSENTS REQUIRED

- 3.5.1. The proposals at Tytherington Quarry may require other consents, licences, permits, etc. These will be identified during the course of the EIA and appropriate will take place with organisations such as the local planning and highway authorities, Civil Aviation Authority, Natural England, the Environment Agency and others as appropriate.

## 4 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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### 4.1 OVERVIEW

- 4.1.1. Environmental Impact Assessment (EIA) is a systematic process that must be followed for certain categories of project before they can receive development consent. It aims to identify a project's likely significant effects through the scoping process, and then assess those effects in an Environmental Statement (ES).
- 4.1.2. The EIA process should be systematic, analytical, impartial, consultative and iterative allowing opportunities for environmental concerns to be addressed in the design of a project. Typically, a number of design iterations take place in response to environmental constraints identified during the EIA process prior to the final design being reached.
- 4.1.3. The EIA process will identify the different methodologies used for the assessment and these should be based on recognised good practice and guidelines specific to each technical area as set out in **Chapter 5**.

### 4.2 EIA TERMINOLOGY

#### IMPACTS AND EFFECTS

- 4.2.1. The terms *impact* and *effect* are often used synonymously, and this can lead to confusion. For clarity, a cause and effect logic will be applied to the EIA of the Proposed Scheme, whereby impacts are the changes that arise because of the Proposed Scheme (e.g. changes in drainage pattern) and effects are the consequences of those changes (e.g. habitat becomes degraded by in the altered drainage pattern).

#### TYPES OF EFFECTS

- 4.2.2. Paragraph 5 of Schedule 4 of the EIA Regulations states that the *"The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development"*. The ES will consider these types of effects, as may be appropriate, in the environmental topic chapters, in so far that individual topics are so affected. However, whilst some terms are self-explanatory, to assist we have provided a definition of most types of effects here to confirm how these terms will be applied throughout the ES, with cumulative effects being dealt with separately.

#### Direct Effects

- 4.2.3. Direct effects are those that result directly from the Proposed Scheme.

#### Indirect and Secondary Effects

- 4.2.4. Indirect and secondary effects are those that result from consequential change caused by the Proposed Scheme. As such they would normally occur later in time or at locations farther away than direct effects. An example would be where water or gas pipes are damaged because of the Proposed Scheme, and the consequence of that damage is fire or flood risk to other receptors.

## Transboundary Effects

- 4.2.5. Transboundary effects are those effects that would affect the environment in another state within the European Economic Area (EEA).

## SPATIAL AND TEMPORAL SCOPE

- 4.2.6. Spatial scope is the area over which changes to the environment are predicted to occur because of the Proposed Scheme. In practice, an EIA should focus on those areas where these effects are likely to be significant.
- 4.2.7. The spatial scope will vary between environmental topics and has been described with relation to each topic based on the information currently available. For example, the spatial effects of a development on landscape and visual amenity will likely cover a much greater area than that affected by noise. The spatial scope of each assessment may be refined for the ES in response to comments from consultees or further assessment work.
- 4.2.8. The temporal scope covers the time period over which changes to the environment and the resultant effects are predicted to occur and are typically defined as either being temporary or permanent.
- 4.2.9. The temporal scope for construction effects will be determined by the construction period of the Proposed Scheme; this varies for each of the proposed waste facilities. For operational effects, the temporal scope will be determined by the anticipated operational life of the Proposed Scheme (see **Chapter 2: The Proposed Scheme**).

## 4.3 EIA SCOPING

- 4.3.1. The results of the EIA process are reported in an ES and Schedule 4(4) of the EIA Regulations specifies that the ES should describe those:

*“...factors...likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.”*

- 4.3.2. Regulation 4(2) of the EIA Regulations requires the interaction between these factors to be considered. In addition, Regulation 4(4) requires ESs to consider:

*“...the expected significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development.”*

- 4.3.3. Establishing which aspects of the environment are likely to be significantly affected by a particular project is captured in the EIA scoping process. Scoping involves identifying the following:

- The people and environmental resources (collectively known as 'receptors') that could be significantly affected by the Proposed Scheme; and
- The work required to take forward the assessment of these potentially significant effects.

- 4.3.4. Our approach involves scoping being started at the outset of our work on the EIA, with the initial conclusions about the likely significant effects of the Proposed Scheme being set out in this Scoping Report.



- 4.3.5. The preparation of this Scoping Report has been informed by information about the legislative and policy context relevant to the Proposed Scheme. It has also been informed by the simple rule that, to be significant, an effect must be of sufficient importance that it could influence the process of decision-making for the Proposed Scheme or an element of it (the 'significance test').
- 4.3.6. The conclusion that is made using the significance test is based upon professional judgement, with reference to the Proposed Scheme description, and available information about:
- The magnitude and other characteristics of the potential changes that are expected to be caused by the Proposed Scheme;
  - The sensitivity of receptors to these changes;
  - The effects of these changes on relevant receptors; and (where relevant); and
  - The value of receptors.
- 4.3.7. If the information that is available at this stage does not enable a robust conclusion to be reached that a potential effect is not likely to be significant, the effect is then taken forward for further assessment<sup>4</sup>.
- 4.3.8. After the issue of this Scoping Report, the scope of the assessment may be progressively refined in response to comments from the determining authority and from consultees, together with environmental information resulting from survey or assessment work carried out in relation to the EIA, and the evolution of the project proposals. Any changes to the scope of the assessment will be detailed within the ES.
- 4.3.9. If necessary, changes to the Scoping Opinion will be agreed through consultation with South Gloucestershire Council.

## **OVERVIEW OF SIGNIFICANT EVALUATION METHODOLOGY**

- 4.3.10. The receptors that could be significantly affected, and therefore be taken forward for consideration in further detailed assessment in the ES, are identified within each topic chapter. The approach that has been adopted to determine whether the effects on these receptors are significant is to apply a combination of professional judgement and a topic-specific significance evaluation methodology.
- 4.3.11. In applying this approach to significance evaluation, it is necessary to ensure that there is consistency between each environmental topic in the level at which effects are considered to be significant. Thus, it is inappropriate for the assessment of one topic to conclude that minor effects are significant, when, for another topic, only comparatively major effects are significant.
- 4.3.12. In order to achieve the desired level of consistency, the specialists responsible for writing each of the technical chapters in this Scoping Report have considered the 'significance test' to inform their decision on whether effects are likely to be significant or not and therefore require further consideration in the ES, as well as the relevant topic-specific significance evaluation methodology. This approach will also be adopted for the technical assessments to be included in the ES.

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<sup>4</sup> Where an effect cannot be confirmed as being 'not significant' these will be 'scoped in' to the assessment.

- 4.3.13. For some of the topics to be assessed in the ES, there is published guidance available about significance evaluation. Where such guidance exists, even if in draft, it will be used to inform the development of the significance evaluation methodologies to be used in the ES. For other topics, it will be necessary to develop methodologies without the benefit of guidance. This will involve technical specialists drawing on their previous experience of significance evaluation in EIA.

#### **Evaluation Matrices**

- 4.3.14. Significance evaluation involves combining information about the sensitivity or value of a receptor, and the magnitude and other characteristics of the changes that affect the receptor. The approach to using this information for significance evaluation is outlined below.

#### **Receptor Sensitivity of Value**

- 4.3.15. The sensitivity or value of a receptor is largely a product of the importance of an asset, as informed by legislation and policy, and as qualified by professional judgement. For example, receptors for landscape, biodiversity or the historic environment may be defined as being of international or national importance; lower value resources may be designated as being sensitive or important at a county or district level.
- 4.3.16. The use of a receptor would also play a part in its classification. For example, when considering effects on the amenity of a human population, a receptor used for recreational purposes may be valued more than a place of work as the environmental quality of the recreational receptor is more likely to be an important part of that receptor's use.

#### **Magnitude of Change**

- 4.3.17. The magnitude of change affecting a receptor that would result from the Proposed Scheme would be identified on a scale from minor alterations of change, up to major changes or the total or substantial loss of the receptor. For certain topics, the magnitude of change would be related to guidance on levels of acceptability (e.g., for air quality or noise), and be based on numerical parameters, whilst for others it will be a matter of professional judgement to determine the magnitude of change, using descriptive terminology.

#### **Determination of Significance**

- 4.3.18. The determination of significance is derived with reference to information about the nature of the development, the receptors that could be significantly affected and their sensitivity or value, together with the magnitudes of change that are likely to occur.
- 4.3.19. Other than for environmental topics for which significance evaluation does not involve the use of matrices, sensitivity/value and the characteristics of environmental changes can be combined using a matrix (see **Table 4.1**). In addition, professional judgement is applied because, for certain environmental topics, the lines between the sensitivities or magnitudes of change may not be clearly defined and the resulting assessment conclusions may need clarifying.
- 4.3.20. Variations to this approach, which may be applicable to specific environmental topics, will be detailed in the relevant 'assessment methodology' sub-section contained in each environmental topic chapter.

4.3.21. Definitions of how the categories that are used in the matrix are derived for each topic are also set out in each environmental topic chapter, along with the relevant explanation and descriptions of receptor sensitivity, magnitude of change and levels of effect that are considered significant in terms of the EIA Regulations.

4.3.22. Within the matrix, reference is made to:

- Major effects, which will always be determined as being significant in EIA terms;
- Moderate effects that may be significant, although there may also be circumstances where such effects are considered 'not significant' based on specific scenarios and professional judgement; and
- Minor or negligible effects, which will always be determined as 'not significant'.

**Table 4.1 - Example significance evaluation matrix**

		Magnitude of Change				
		Very High	High	Medium	Low	Very Low
Sensitivity / Importance / Value	Very High	Major (Significant)	Major (Significant)	Major (Significant)	Major (Significant)	Moderate (Potentially significant)
	High	Major (Significant)	Major (Significant)	Major (Significant)	Moderate (Potentially significant)	Minor (Not significant)
	Medium	Major (Significant)	Major (Significant)	Moderate (Potentially significant)	Minor (Not significant)	Minor (Not significant)
	Low	Major (Significant)	Moderate (Potentially significant)	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)
	Very Low	Moderate (Potentially significant)	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)

Note: Significant effects are those identified as 'Major'. 'Moderate' effects have the potential to be significant, however there may be some exceptions, depending on the environmental topic and the application of professional judgment.

## 4.4 ENVIRONMENTAL MEASURES

- 4.4.1. The EIA Regulations require an assessment to be undertaken of 'the development' – not of the Proposed Scheme with and without mitigation. To meet this requirement, the assessments in the ES will consider "any 'environmental measures' identified for adoption during the scheme design process "...to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment" (see Schedule 4(7)) as inherent to the Proposed Scheme and will therefore be an assessment of residual effects. The Proposed Scheme will also incorporate, where possible, relevant good practice and enhancement measures.

## 4.5 ASSESSMENT OF CUMULATIVE EFFECTS

### INTRODUCTION

- 4.5.1. Paragraph 5(e) of Schedule 4 of the EIA Regulations refers to the need to consider "the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources".
- 4.5.2. The requirement to consider 'existing and/or approved' development is echoed within Planning Practice Guidance (PPG), which notes:

*"There are occasions, however, when other existing or approved development may be relevant in determining whether significant effects are likely as a consequence of a proposed development. The local planning authorities should always have regard to the possible cumulative effects arising from any existing or approved development."*

- 4.5.3. Two types of cumulative effects assessment (CEA) will be considered in the ES, as set out below.

### INTER-PROJECT EFFECTS

- For each environmental topic to be considered in the ES, an assessment will be undertaken of how the environmental effects resulting from the Proposed Scheme could combine with similar topic-related effects generated by other existing or approved developments that affect a common receptor.
- The starting point for this is to determine the Zone of Influence (Zoi) from the Proposed Scheme for each receptor that could be likely to be significantly affected under each environmental topic.
- Other existing or approved developments, where they are located within the Zoi for a given environmental topic, should be subject to CEA. The Zoi and scope of the CEA will be discussed and agreed with the relevant stakeholders before undertaking the assessment.
- Further details on the CEA methodology and the developments proposed to be scoped into the CEA are included within **Chapter 5**.

## **INTRA-PROJECT EFFECTS**

- 4.5.4. The second type of CEA involves assessing whether any of the individual environmental topic effects resulting from the Proposed Scheme could combine to create effects that are greater than the sum of the individual effects on a given receptor.
- 4.5.5. The first step will be to identify the environmental topics that have common receptors, and then to consider whether the topic effects on any common receptors are likely to combine.
- 4.5.6. Because this combined assessment involves different environmental topic assessments that cannot robustly be combined, the outcome of this CEA in the ES will be reliant on the application of professional judgement from, potentially, several different technical specialists.

## 5 SCOPE OF THE ASSESSMENT

### 5.1 CONTEXT OF THE ENVIRONMENTAL STATEMENT

- 5.1.1. In accordance with the EIA Regulations and good practice, the Environmental Statement (ES) will contain:
- A non-technical summary (which will be available as a standalone document);
  - A description of the proposed scheme comprising information on the need for the development, alternatives that have been considered and a description of the development;
  - Information about the consents required if the development is to proceed and the policy context to the development;
  - A definition of the EIA process, including the various steps in the EIA process, terminology, and the assessment methodology;
  - Separate chapters setting out the assessment relating to each environmental topic, including:
    - A description of baseline conditions, including information about how these might change during the course of the development;
    - A description of any measures that have been incorporated into the proposed development with a view to delivering environmental benefits;
    - The scope of the assessment and the methodologies adopted;
    - Assessments and evaluations of significance of predicted effects - dealing, in turn, with each receptor/resource that has been assessed in detail. A clear distinction will be made between the assessment of the full planning application and that for the outstanding ROMP submission;
    - A summary of the evaluations of significance; and
    - Proposals for implementing environmental and mitigation measures.
  - An assessment of cumulative effects; and
  - An appraisal of the effects of the scheme against relevant planning and environmental policies.
- 5.1.2. **Table 5.1** summarises the environmental topics that are scoped in and scoped out for the Proposed Development.

**Table 5.1 - EIA Scope for the Proposed Development**

EIA Topic	EIA Scope
Landscape and Visual	Scoped in
Noise	Scoped in
Vibration	Scoped in
The Water Environment	Scoped in
Biodiversity	Scoped in

EIA Topic	EIA Scope
Traffic and Transport	Scoped out
Air Quality	Scoped out
Socioeconomics	Scoped in
Climate Change: GHG	Scoped in
Climate Change: Resilience	Scoped in
Cumulative Effects	Scoped in
Cultural Heritage	Scoped out
Land and Soils (including agriculture)	Scoped out
Major Accidents and Disasters	Scoped out

## 5.2 LANDSCAPE AND VISUAL

### RELEVANT POLICIES AND THEIR IMPLICATIONS FOR SCOPING

- 5.2.1. **Table 5.2** lists the planning policy guidance and policies that are relevant to landscape and visual amenity and sets out the implications of the guidance and policies for the scope of the EIA.

**Table 5.2 - Relevant Policies and Their Implications (Landscape and Visual)**

Policy Reference	Implications
<b>National Policy:</b>	
<b>National Planning Policy Framework (NPPF)<sup>5</sup> Paragraph 174</b>	Section 15. Conserving and enhancing the natural environment: This requires planning policies and decisions to contribute to and enhance the natural and local environment by (amongst other criteria): a) protecting and enhancing valued landscapes, (in a manner commensurate with their statutory status or identified quality in the development plan) and b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services.
<b>National Planning Practice Guidance (NPPG) Minerals<sup>6</sup> Paragraph 205</b>	This notes specific regard to mineral developments and states that when determining planning applications, local planning authorities should (amongst other criteria) ensure that there are no unacceptable adverse impacts on the natural environment and that the cumulative effect of multiple impacts from individual sites and/or from a number of sites in a locality are taken into account.

<sup>5</sup> National Planning Policy Framework (September 2023). [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1182995/NPPF\\_Sep\\_t\\_23.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1182995/NPPF_Sep_t_23.pdf) Last accessed 14/09/2023.

<sup>6</sup> National Planning Practice Guidance Minerals (2014). [online]. Available at: <https://www.gov.uk/guidance/minerals> Last accessed 14/09/2023.



Policy Reference	Implications
<b>Paragraph 013</b>	The principal issues that mineral planning authorities should address include (amongst other criteria) visual impact on the local and wider landscape and landscape character.
<b>Paragraph 039</b>	The requires planning applications to include details of the proposals for land restoration and aftercare.
<b>Paragraph 040</b>	This paragraph deals with the level of detail required on restoration and aftercare and the paragraph states that this is dependent on the circumstances of each specific site including the expected duration of operations on the site. It must be sufficient to clearly demonstrate that the overall objectives of the scheme are practically achievable.
<b>Local Policy:</b>	
<b>South Gloucestershire Local Plan Core Strategy 2006-2027<sup>7</sup> Policy CS9 – Managing the Environment and Heritage</b>	This policy states that new development will be expected to (amongst other criteria) “ <i>conserve and enhance the character, quality, distinctiveness and amenity of the landscape.</i> ”
<b>South Gloucestershire Local Plan: Policies, Site and Places Policy PSP2 - Landscape<sup>8</sup></b>	This policy seeks the protection and enhancement of the natural landscape. It supports proposals where they conserve and enhance the quality, amenity, distinctiveness and special character of the landscape (defined by the Landscape Character Assessment) and includes landscape features, typography and landforms.

## LEGISLATION

5.2.2. The following legislation is relevant to the assessment of the effects on landscape and visual receptors:

- The European Landscape Convention (ELC<sup>9</sup>) is a Council of Europe initiative that provides a broad framework for landscape planning and management across all member states including the UK, which ratified the ELC in 2007. The ELC defines landscape as, “*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*” and is committed to several core principles and actions. These commitments are implemented by existing domestic policy and legislation rather than through any ELC-specific framework; and
- Hedgerows are protected in England and Wales under the Hedgerow Regulations 1997<sup>10</sup>.

<sup>7</sup> South Gloucestershire Local Plan: Core Strategy 2006-2027 (adopted 2013). [Online]. Available at <https://beta.southglos.gov.uk/static/2d94cc7df5f44948d9203e439cec8cd7/South-Gloucestershire-Core-Strategy-2006-2027.pdf> Last accessed 14/09/2023.

<sup>8</sup> South Gloucestershire Local Plan: Policies, Sites and Places Plan (adopted 2017). [Online]. Available at <https://beta.southglos.gov.uk/static/90efa5d673f208a3109ed111ba963a01/PSP-Plan-Nov2017.pdf> Last accessed 14/09/2023.

<sup>9</sup> Council of Europe. (2000). European Landscape Convention. [online]. [Online]. Available at: <https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=09000016802f80c6> Last accessed 14/08/2023.

<sup>10</sup> UK Government. (1997) Statutory Instrument 1997 No. 1160 The Hedgerows Regulations 1997. [online]. Available at: <http://www.legislation.gov.uk/ukSI/1997/1160/made> Last accessed 14/08/2023.

## TECHNICAL GUIDANCE

- 5.2.3. The technical guidance set out in **Table 5.3** is relevant to the assessment of effects on landscape and visual receptors.

**Table 5.3 - Technical Guidance Relevant to Landscape and Visual**

Technical Guidance	Summary
<b>Guidelines for Landscape and Visual Impact Assessment (Third Edition)<sup>11</sup></b>	The third edition of this guidance (known as 'GLVIA3'), produced by the Landscape Institute and Institute of Environmental Assessment, is widely regarded by landscape and planning professions as the 'industry standard' together with best practice and professional experience.
<b>Technical Guidance Note 06/19 Visual Representation of Development Proposals<sup>12</sup></b>	Provides supplementary guidance to GLVIA3 as to appropriate techniques to capture site photography and the selection, production and presentation of types of visualisations appropriate to the circumstances in which they will be used.
<b>Technical Information Note 01/2017 (Revised). Tranquillity – an overview<sup>13</sup></b>	Provides an overview of what is understood by the term 'tranquillity' within the landscape profession.
<b>Technical Guidance Note 02/21 Assessing landscape value outside national designations<sup>14</sup></b>	Provides information and guidance to landscape professionals and others who need to make judgments about the value of a landscape (outside national landscape designations) in the context of the UK Town and Country Planning system.
<b>Draft Technical Guidance Note 05/23 Notes and Clarifications on aspects of the 3rd Edition Guidelines on Landscape and Visual Impact Assessment (GLVIA3)<sup>15</sup></b>	Draft version for consultation. Provides a compilation of clarifications on GLVIA3 and produced to help interpret aspects of the guidance. It should be read alongside GLVIA3.

<sup>11</sup> Landscape Institute and the Institute of Environmental Management and Assessment, (2013). Guidelines for Landscape and Visual Impact Assessment. 3rd edition. London. Routledge.

<sup>12</sup> Landscape Institute. (2019). Technical Guidance Note 06/19 Visual Representation of Development Proposals. [online]. Available at: <https://www.landscapeinstitute.org/visualisation/> Last accessed 14/08/2023.

<sup>13</sup> Landscape Institute (2017). Technical Information Note 01/2017 revised. Tranquillity – an overview. [online]. Available at: <https://www.landscapeinstitute.org/technical-resource/tranquillity/> Last accessed 14/08/2023.

<sup>14</sup> Landscape Institute (2021). Technical Guidance Note 02/21 Assessing landscape value outside national designations. [online]. Available at: <https://www.landscapeinstitute.org/news/new-guidance-assessing-landscape-value-outside-national-designations/> Last accessed 14/08/2023.

<sup>15</sup> Landscape Institute (2023). Draft Technical Guidance Note 05/23 Notes and Clarifications on aspects of the 3rd Edition Guidelines on Landscape and Visual Impact Assessment (GLVIA3). (online). Available at: <https://www.landscapeinstitute.org/technical-resource/notes-and-clarifications-on-aspects-of-the-3rd-edition-guidelines-on-landscape-and-visual-impact-assessment-glvia3-consultation/> Last accessed 14/08/2023.

## BASELINE CONDITIONS

### Data Sources

- 5.2.4. The EIA scoping exercise has been undertaken with reference to Chapter 2, supported by a review of relevant data sources. The principal data sources used to inform the assessment of potential effects are as follows:
- National Character Areas (GIS dataset and Profiles);
  - Local (District-level) Landscape Character Assessment;
  - Ordnance Survey (OS) 1:25,000 scale mapping;
  - South Gloucestershire Public Rights of Way mapping<sup>16</sup>; and
  - Google Earth Pro (aerial and Street View imagery).

### Summary of Baseline Conditions

#### Landscape context

##### Topography and drainage

- 5.2.5. Tytherington Quarry is located on a broad linear ridgeline, which runs on a north-east to south-west axis at an elevation of ~100m Above Ordnance Datum (AOD). Descending, gently rolling, south-east facing slopes fall towards and contain the Tytherington Plain and Earthcott Vale to the east, which lie between ~50-65m AOD. A small bluff forming Tytherington Hill lies between the settlement of Tytherington and the M5 motorway.
- 5.2.6. To the north-west of the Site, the landform rises to a maximum elevation of 109m AOD close to the A38 and hillfort at Little Abbey, Alveston.
- 5.2.7. There are no watercourses within the proposed LVIA Study Area.

##### Land use and vegetation patterns

- 5.2.8. Tytherington Quarry, comprising Woodleaze Pit, Grovesend Pit and the exhausted North Face Pit, occupies the northern part of the proposed LVIA Study Area. Beyond this, the landscape is predominantly pastoral with regular, medium sized fields typically bound by thick, clipped hedgerows. There are occasional mature hedgerow trees and small regular shaped copses of deciduous woodland to the west of the Site, with the area around Itchington Common also featuring woodland cover. Further woodland is present along the northern and north-western fringes of Tytherington, whilst tree belts also line sections of the M5 motorway and the perimeter of Tytherington Quarry.

##### Settlement patterns

- 5.2.9. Three villages are present within the proposed LVIA Study Area; Tytherington, which lies to the east of the Site beyond the M5 motorway, the smaller settlement of Gravesend, located on the outskirts of Thornbury to the north of the Site and Itchington, to the south of the Site. Beyond the settlements, the landscape is sparsely populated with a small number of farmsteads and isolated properties.

<sup>16</sup> South Gloucestershire Public Rights of Way mapping. [Online]. Available at <https://rightsofway-southglos.esdm.co.uk/mainapp> Last accessed 14/08/2023.

### Transportation network

- 5.2.10. The principal transport routes within the proposed LVIA Study Area include the M5 motorway which passes on a south-west to north-east alignment adjacent to the south-eastern edge of Tytherington Quarry. To the north, the A38 follows a broadly parallel alignment to the M5 between the quarry and the town of Thornbury.
- 5.2.11. Beyond the principal roads, a series of minor roads and lanes cross the landscape connecting the settlements to the A38. This includes Itchington Road, which passes immediately adjacent to the south-western boundary of the Site.
- 5.2.12. The Thornbury Branch Line is a dedicated freight rail line with sidings within the quarry. The route is a 12km branch of the Midland Railway and runs from Yate to Thornbury (Grovesend Overbridge).

### Recreational routes

#### National and regional routes

- 5.2.13. There are no National Trails or Sustrans National Cycle Routes within 1km of the Site. However, three regional promoted walks have sections of their routes which pass close to Tytherington Quarry as follows:
  - Jubilee Way: a 27km long route which links Aust, at the south side of the Severn Bridge, with Old Sodbury at the base of the Cotswold Hills. The route follows a north-south alignment through the proposed LVIA Study Area, passing withing ~170m of the Proposed Scheme at its closest point.
  - Celtic Way: a 116km long route through South Wales and the South-West peninsula. This route coincides with the Jubilee Way through the proposed LVIA Study Area and therefore passes ~170m to the west of the Proposed Scheme at its closest point.
  - Hobblers Way (Coast to Coast - Wash to Severn): a 311km long promoted route running diagonally across the country from the River Nene in the east to the Seven Bridge in the west. Within the proposed LVIA Study Area, the route follows the A38 at a minimum distance of ~890m to the north-west of the Site.

#### Local Public Rights of Way network

- 5.2.14. The local Public Right of Way (PRoW) network predominantly extents to the west of the Site where a moderately high level of provision is present linking minor roads and settlements via a network of footpaths and bridleways which cross the agricultural landscape. Further footpaths and bridleways extend to the south-east of the M5 motorway where they link the two settlements of Itchington and Tytherington.

## Landscape Character

### National Level

- 5.2.15. At a national scale, Tytherington Quarry lies within the Bristol, Avon Valley and Bridges National Character Area (NCA), as defined in the National Character Area Profile 118<sup>17</sup>. The summary description of this NCA notes:

*“The area is characterised by alternating ridges and broad valleys, with some steep, wooded slopes and open rolling farmland. It is flanked by ... the Cotswolds to the east and the Severn and Avon vales to the west, which largely separates it from the Severn Estuary except for a small stretch of coastline between Clevedon and Portishead.”*

*“It has a complex geology, being rich in geomorphological features such as the dramatic Avon Gorge, and there are many designated exposures and rich fossil beds. The varied settlement pattern has been influenced by the geology and geomorphology and the expansion of the City of Bristol at its centre.”*

*“The M5 motorway runs up the western edge and the M4 skirts across the north of Bristol, with Bristol Airport to the south. Although the urban area covering this NCA is significant at over 21 per cent, much of the surrounding rural landscape is farmed.”*

- 5.2.16. The supporting description states the NCA has several modern quarries, including Tytherington and notes that: *“The impact of quarrying on the character of the area is minimal”*.

### District Level

- 5.2.17. At a more detailed scale, South Gloucestershire Council has undertaken a district wide Landscape Character Assessment<sup>18</sup>. The Assessment indicates that Tytherington Quarry is located within Landscape Character Area (LCA) 17 Rudgeway and Tytherington Ridge. The LCA is described as:

*“The Rudgeway and Tytherington Ridge area is a rural, gently rolling and sloping landscape, its character largely influenced by the ridge/plateau and gentle easterly sloping landform. Land cover of pasture within regular fields defined by clipped or intermittent hedgerows, infrequent hedgerow trees and frequent dispersed copses or areas of woodland, produces a textured, simple, open to semi-enclosed landscape. This rural character remains largely intact, but is influenced variously by roads, a quarry and small settlement clusters.”*

- 5.2.18. The assessment references Tytherington Quarry as follows:

*“Tytherington Quarry occupies an extensive area to the north, comprising a plant area and areas of excavation which have been worked sequentially southwards, parallel to the M5. The edge of the site is largely contained by hedgerows and hedgerow trees, supplemented in places with earth mounds, and a developing woodland structure.”*

- 5.2.19. Beyond the M5 motorway to the south-east of the Site, the landscape lies within LCA 10 Earthcott Vale.

<sup>17</sup> Natural England. (2013). NCA Profile 118: Bristol, Avon Valley and Bridges (NE400). [online]. Available at: <https://publications.naturalengland.org.uk/publication/4646942?category=587130> Last accessed 14/08/2023.

<sup>18</sup> South Gloucestershire Council. (2014). South Gloucestershire Landscape Character Assessment. Available online at: <https://beta.southglos.gov.uk/static/8603250558cfa3f10d7a0893a6e853bf/LCA-A-Section-1.pdf> [Accessed 11 July 2023].

## Landscape Designations

### National landscape designations

- 5.2.20. The southern part of Tytherington Quarry, including the soil storage area, is located within the Green Belt. However, as recognised in *Draft Technical Guidance Note 05/23 Notes and Clarifications on aspects of the 3rd Edition Guidelines on Landscape and Visual Impact Assessment (GLVIA3)*<sup>19</sup>, Green Belt is a planning policy designation and compliance with policy will be addressed separately to the LVIA.
- 5.2.21. There are no other national landscape designations located near to Tytherington Quarry. The closest national landscape designations are the Cotswold Area of Outstanding Natural Beauty (AONB) located ~9.6km to the east, and the Wye Valley AONB located ~13.6km to the north-west across the Severn Estuary.

### Local landscape designations

- 5.2.22. There are no local landscape designations within South Gloucestershire.

## Visual baseline

- 5.2.23. The visibility and landscape influence of Tytherington Quarry is primarily determined by its position on the plateau landform, distribution of visual receptors and the perimeter vegetative screening around the quarry. This includes a wooded linear bund along the south-eastern edge of the quarry, running parallel with the M5. This containment is recognised in the South Gloucestershire Landscape Character Assessment<sup>17</sup> which notes.

*“Tytherington Quarry is largely well integrated, given the containment of views in this locality as a result of the plateau landform, intervening hedgerow structure with occasional trees and mound/planting mitigation measures along the quarry’s site boundary.”*

- 5.2.24. The presence of Tytherington Hill to the east of the M5 motorway, descending landform to the south-east and a cluster of small woodlands and copses around Tytherington, also contribute to a reduced visual envelope.

## SCOPE OF THE ASSESSMENT

### Study area

- 5.2.25. The EIA scoping exercise for the LVIA has been based upon a Study Area of a 1km offset from the site boundary. It has been defined to ensure that the LVIA concentrates upon receptors that are most likely to be significantly affected by the Proposed Scheme, in accordance with guidance set out in Sections 5.2 and 6.2 in *GLVIA3*<sup>20</sup>. The LVIA Study Area is shown in **Figure 5.1**.

<sup>19</sup> Landscape Institute (2023). Draft Technical Guidance Note 05/23 Notes and Clarifications on aspects of the 3rd Edition Guidelines on Landscape and Visual Impact Assessment (GLVIA3). (online). Available at: <https://www.landscapeinstitute.org/technical-resource/notes-and-clarifications-on-aspects-of-the-3rd-edition-guidelines-on-landscape-and-visual-impact-assessment-glvia3-consultation/> Last accessed 14/08/2023.

<sup>20</sup> Landscape Institute (2023). Draft Technical Guidance Note 05/23 Notes and Clarifications on aspects of the 3rd Edition Guidelines on Landscape and Visual Impact Assessment (GLVIA3). (online). Available at: <https://www.landscapeinstitute.org/technical-resource/notes-and-clarifications-on-aspects-of-the-3rd-edition-guidelines-on-landscape-and-visual-impact-assessment-glvia3-consultation/> Last accessed 14/08/2023.



- 5.2.26. The temporal scope of the LVIA is consistent with the period over which the Proposed Scheme would be carried out and therefore covers both the operational phases of the development (sub-divided into phases where appropriate) as well as the landscape and visual effects from the proposed restoration scheme.

### **Landscape assessment**

- 5.2.27. The approach to the landscape assessment will involve the detailed consideration of the effects on three types of landscape receptors as follows:
- The first category of landscape receptors relates to the landscape elements that are located within the site boundary. The assessment will focus on the potential effects on the hedgerow, woodland, and other key landscape elements within site boundary that may be subject to direct physical effects. The assessment will consider the effects of the temporary or permanent removal and/or introduction of landscape elements as part of the operational phases and the restoration;
  - The second group of landscape receptors relates to landscape character which can be defined at national and local level through the definition of LCAs. In accordance with paragraph 5.14 of *GLVIA3*, it is proposed that the local South Gloucestershire LCAs are taken forward as landscape receptors on the basis that they represent much smaller, discrete areas that are more appropriate for use as landscape character receptors in LVIA. Landscape sensitivity assessments would be undertaken as part of the LVIA (to determine landscape value and susceptibility to the type of development proposed) in accordance with *GLVIA30*; and
  - The third group of landscape receptors to be considered are the landscape designations whose special qualities may be directly or indirectly affected by the operational and restoration phases at Tytherington Quarry. As set out in the Summary of Baseline Conditions, there are no national or local landscape designations within the proposed LVIA Study Area and effects on the Green Belt will be considered separately from the LVIA.

### **Visual assessment**

- 5.2.28. The Proposed Scheme has the potential to affect the views of visual receptors within the study area. A review of OS mapping and aerial photography indicates that the following groups of receptors are likely to be included in the visual assessment:
- Recreational users of the Celtic Way/Jubilee Way;
  - Recreational users of the Hobblers Way (Coast to Coast - Wash to Severn);
  - Recreational users of the local RRoW network to the west of the Site;
  - Drivers and their passengers travelling along the M5 motorway; and
  - Drivers and their passengers travelling along Itchington Road.
- 5.2.29. Other visual receptor groups may also be considered in the LVIA following a field survey.



- 5.2.30. The visual assessment will be supported by annotated baseline photographs from agreed viewpoint locations, which will be presented as Type 1 visualisations in accordance with the *Technical Guidance Note 06/19 Visual Representation of Development Proposals*<sup>21</sup>. The preliminary viewpoint selection is included in **Table 5.4** and illustrated in **Figure 5.1**.

**Table 5.4 - Preliminary Viewpoint Locations**

Reference	Location	Reason for selection
1	Itchington Road to the west of the Site	Closest publicly accessible location to the Proposed Scheme
2	Celtic Way/Jubilee Way and local PRow (footpath) OTY/24/20, close to the junction with Itchington Road to the south-west of the Site	Promoted recreational route. Selected to represent views of north-bound walkers.
3	Celtic Way/Jubilee Way and local PRow (footpath) OTY/24/20, to the north-west of the Site	Promoted recreational route. Selected to represent close distance views of south-bound walkers.
4	Junction between local PRows (footpaths) OTY/27/30, OTY/27/40 and OTY/28/10 to the west of the Site	Local PRow network. Selected to represent middle distance views of walkers
5	Celtic Way/Jubilee Way and local PRow (bridleway) OAN/42/10, to the north-west of the Site	Promoted recreational route. Selected to represent middle distance views of south-bound walkers.
6	Hobblers Way (Coast to Coast - Wash to Severn) / A38 west of Grovesend, to the north of the Site	Slightly elevated position on a promoted recreational route. Selected to demonstrate the screening role of the perimeter vegetation around Tytherington Quarry.

#### Potential effects not requiring further assessment

- 5.2.31. Potential landscape and visual effects not requiring further consideration are summarised in the following paragraphs.
- 5.2.32. Landscape effects – National Character Areas:
- Whilst reference to the NCAs provide landscape context, they are too extensive and generalised to potentially experience significant landscape effects. This approach is advocated by paragraph 5.14 of *GLVIA3* and the smaller local authority LCAs are to be taken forward as receptors in the LVIA. NCA 118 will therefore not require further assessment and is scoped out of the LVIA.

<sup>21</sup> Landscape Institute. (2019). Technical Guidance Note 06/19 Visual Representation of Development Proposals. [online]. Available at: <https://www.landscapeinstitute.org/visualisation/> Last accessed 14/08/2023.

#### 5.2.33. Landscape effects – Landscape Character Areas:

- LCA 10 Earthcott Vale extends to the south-east of the Site, beyond the M5 motorway. The landform, which descends in a south-easterly direction away from the Site together with the perimeter tree belt which follows the south-eastern edge of the quarry, and which would be retained as part of the Proposed Scheme, substantially reduces any potential visual effects pathway. It is recognised that effects upon LCAs are not entirely dependent on the presence of a visual effects pathway and can also be generated by changes to other perceptual characteristics impacting upon landscape qualities such as tranquillity. The South Gloucestershire Landscape Character Assessment<sup>22</sup> notes that “*the M5, crossing the side slopes of this landform, is evident from within occasional glimpsed views from around Itchington, with some audible influence within this area.*” Significant effects upon this receptor as a consequence of the Proposed Scheme are therefore considered unlikely and LCA 10 is scoped out of the LVIA.

#### 5.2.34. Visual effects – residential receptors:

- A review of the distribution of residential visual receptors, landform, and installation of effective screening landforms and vegetation indicate that there are no residential receptors who would sustain the necessary magnitude of change to their views to give rise to significant visual effects as a consequence of the Proposed Scheme. Residential visual receptors (both private views from isolated properties and people in their communities) will therefore not require further assessment and are scoped out of the LVIA.

## ASSESSMENT METHODOLOGY

### Overview

- 5.2.35. The assessment of the significance of landscape and visual effects is, according to GLVIA3 “*an evidence-based process combined with professional judgement.*” All assessments and judgements must be transparent and capable of being understood by others. Levels of landscape and visual effects are determined by consideration of the nature or ‘sensitivity’ of each receptor or group of receptors and the nature of the effect or ‘magnitude of change’ that would result from the proposed extension at Tytherington Quarry and its restoration.

### Landscape assessment

- 5.2.36. The sensitivity of a landscape receptor e.g., a LCA, to a particular development is determined by the susceptibility of that landscape receptor to the changes identified as the result of a particular proposed development and its value. The methodology describes landscape sensitivity as high, medium or low.
- 5.2.37. Landscape value is determined by taking into consideration a range of attributes including: the presence or absence of landscape designations; landscape and scenic qualities; rarity and representativeness; conservation interests; recreational value; perceptual qualities; and historic and cultural value. It is also concerned with landscape quality and the physical state of a landscape receptor which could include consideration of the landscape receptor’s intactness and the condition of individual landscape elements. The absence of landscape planning designations does not automatically mean that an area or landscape receptor is of low landscape value.

<sup>22</sup> South Gloucestershire Council. (2014). South Gloucestershire Landscape Character Assessment. Available online at: <https://beta.southglos.gov.uk/static/8603250558cfa3f10d7a0893a6e853bf/LCA-A-Section-1.pdf> [Accessed 11 July 23].

- 5.2.38. Landscape susceptibility concerns the ability of a landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline situation. The landscape assessment will include analysis for each landscape receptor of the factors that have been assessed in the determination of its landscape value and the assessment of its susceptibility to the operation and restoration of the Proposed Scheme. These will be set out in a proforma that will show how the assessment of the landscape value and landscape susceptibility have been combined to determine that landscape receptor's sensitivity.
- 5.2.39. The magnitude of landscape change resulting from the operation and restoration of the proposed extension at Tytherington Quarry will be assessed as high, medium, low or very low. In accordance with *GLVIA3* the magnitude of landscape change takes into account: the size and/or scale of the change that would result from each identified landscape effect acting upon a landscaped receptor; the geographical extent over each identified landscape effect would be experienced; and the duration and reversibility of each identified landscape effect.

### Visual assessment

- 5.2.40. The sensitivity of visual receptors will consider the susceptibility of the visual receptor to the visual change identified and the value that is likely to be attributed by the visual receptor to their baseline view. These are described as high, medium or low. The main influencing factors are:
- The occupation or activity of the visual receptor at each location;
  - The extent to which the visual receptors' attention or interest is focused upon the available views;
  - The importance and/or popularity of the view;
  - The typical numbers of visual receptors to whom that view is available;
  - In a link with landscape considerations, the context of a viewpoint in terms of landscape value and quality within a view; and
  - Any indication of a view being valued such as the presence of interpretation boards, parking and seating facilities, it being referenced in a guidebook or marked on a published map.
- 5.2.41. The nature of visual effects or their magnitude of change resulting from the operation and restoration of the proposed extension at Tytherington Quarry will be assessed as high, medium, low or very low. The magnitude of visual change will be described by reference to the scale of visual change; the contrast with the baseline view; separation distance; the duration over which a view is available; the angle of view; levels of screening; and whether new visual elements are seen on a skyline or against a background.

### Evaluating and explaining the significance of landscape and visual effects

- 5.2.42. The level of landscape and visual effects will be determined with reference to landscape or visual sensitivity and the magnitude of landscape or visual change likely to be experienced. For each receptor, the evaluation process will be informed by use of a matrix as outlined in **Table 4.1**.

- 5.2.43. Likely significant landscape and visual effects arising from the operation and restoration of the proposed extension at Tytherington Quarry would be effects that are assessed as being likely or certain to result in effects that would be ‘major’. Effects assessed as being ‘moderate’ would have the potential to be significant and whether they are assessed as significant or not significant will be justified in the detailed assessment for the relevant landscape or visual receptor. In line with the emphasis placed in *GLVIA3* upon application of professional judgement, the adoption of an overly mechanistic approach through overreliance upon a matrix will be avoided. This will be achieved by the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor over and above the outline assessment provided by use of the matrix. Wherever possible cross references will be made to the baseline photography from the proposed viewpoints (to be agreed with consultees) and figures to support and explain the rationale.

## 5.3 NOISE

### RELEVANT POLICIES AND THEIR IMPLICATIONS FOR SCOPING

- 5.3.1. **Table 5.5** lists the planning policy guidance and policies that are relevant to noise and sets out the implications of the guidance and policies for the scope of the EIA.

**Table 5.5 - Relevant Policies and Their Implications (Noise)**

Policy Reference	Implications
<b>National Policy:</b>	
<b>Noise Policy Statement for England, 2010 (NPSE)</b>	NPSE sets out the vision and aims for dealing with noise (except for workplace/occupational noise). NPSE requires that noise and vibration assessments identify impacts that would result in significant adverse impacts on health and quality of life from a proposed development. The aims of NPSE include avoiding significant adverse impact on health and quality of life; mitigating adverse impacts on health and quality of life; and to contribute to the improvement of health and quality of life.
<b>National Planning Policy Framework, 2023 (NPPF)</b>	The NPPF states that new development should contribute to and enhance the environment by preventing new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.
<b>National Planning Practice Guidance, 2019 (NPPG)</b>	The NPPG relates in terms of a noise hierarchy the levels of perception to noise exposure with expected outcomes and required actions.
<b>National Planning Practice Guidance (Minerals), 2014</b>	The online National Planning Practice Guidance (NPPG), published in March 2014, state that the principal environmental issues of minerals working that should be addressed by mineral planning authorities, include (among others) noise associated with the operations. The main noise guidance from the NPPG (Paragraph: 021) states that: <i>“Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background noise level (LA90,1h) by more than 10dB(A) during normal working hours (0700-1900). Where it will be difficult not to exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the</i>

Policy Reference	Implications
	<p>operations should not exceed 55dB LAeq, 1h (free field). For operations during the evening (1900-2200) the noise limits should not exceed the background noise level (LA90,1h) by more than 10dB(A) and should not exceed 55dB LAeq, 1h (free field). For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42dB LAeq, 1h (free field) at a noise sensitive property”.</p> <p>The NPPG also acknowledges that mineral operations can often incorporate some particularly noisy short-term activities, which may not meet the limits described above. Such activities may include soil-stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of new permanent landforms and aspects of site road construction and maintenance. For such activities, the NPPG (Paragraph: 022) states that:</p> <p><i>“Increased temporary daytime noise limits of up to 70dB LAeq 1h (free field) for periods of up to eight weeks in a year at specified noise-sensitive properties should be considered to facilitate essential site preparation and restoration work and construction of baffle mounds where it is clear that this will bring longer-term environmental benefits to the site or its environs. Where work is likely to take longer than eight weeks, a lower limit over a longer period should be considered. In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits. Within this framework, the 70 dB LAeq 1h (free field) limit referred to above should be regarded as the normal maximum”.</i></p>
<b>Local Policy:</b>	
<b>South Gloucestershire Local Plan: Policies, Sites and Places Plan (adopted November 2017)</b>	Policy PSP21 – Environmental Pollution and Impacts. This policy supports development proposals where they demonstrate that development has been designed to prevent unacceptable risks and avoids unacceptable levels of pollution including noise and vibration. Criteria C of this policy requires proposals to provide a scheme of noise mitigation through design where proposals would lead to significant adverse effects.
	Policy PSP8 – Residential Amenity. This policy supports development proposals where they do not create unacceptable living conditions or have unacceptable impact on the residential amenity of occupiers of the development or nearby properties.

## LEGISLATION

### 5.3.2. Relevant legislation includes:

- The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended) (EIA Regulations);
- The Control of Pollution Act 1974 (particularly Sections 60 and 61) (CoPA);
- The Environmental Protection Act 1990 (as amended by the Noise and Statutory Nuisance Act 1993) (particularly Section 79) (EPA);
- The Noise Insulation Regulations 1975 (NIR); and
- The Noise Act 1996 (NA).

## TECHNICAL GUIDANCE

- 5.3.3. Standards and guidance have been used to define the scope of the noise assessment. The main Standards and Guidance are summarised in **Table 5.6** below.

**Table 5.6 - Summary of Standards and Technical Guidance for Noise**

Technical Guidance	Summary
<b>BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise</b>	Standard for construction noise magnitude of impact and threshold of sensitivity.
<b>Operational road traffic noise – The Department of Transport Calculation of Road Traffic Noise, 1988 (CRTN)</b>	Provides a calculation methodology for road traffic noise, which will be used if any increase in HGV numbers is likely to result in an increase of more than 1 dB(A) in road traffic noise.
<b>Operational road traffic noise – Transport and Road Research Laboratory – Converting the UK traffic noise index LA10,18hr to EU noise indices for noise mapping, 2002 (TRL PR/SE/451/02)</b>	A method for converting the road traffic noise indexes described in CRTN to produce outputs in the form of European Union indices, in particular TRL Method 2 which outlines the conversion of the LA10, 18hr noise indices to the LAeq, 16hr and LAeq,8hr indexes.
<b>Operational road traffic noise - Highways Agency Design Manual for Roads and Bridges, 2011 (DMRB)</b>	Presents a methodology for determining impacts upon noise sensitive receptors from changes in road traffic noise due to road projects.
<b>Operational sound - Acoustics – Attenuation of sound during propagation outdoors: Part 2 General Method of Calculation, 1996 (ISO 9613-2)</b>	Defines a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at distances from a source.
<b>Institute of Environmental Management and Assessment Guidelines for Environmental Noise Impact Assessment, 2014 (IEMA)</b>	Presents guidelines on how the assessment of noise effects should be presented within the Environmental Impact Assessment (EIA) process. The IEMA guidelines cover aspects such as scoping, baseline, prediction and example definitions of significance criteria.
<b>Extant Planning Consents</b>	Cognisance of the extant planning consent conditions would also be made. Particularly relevant is planning consent ref NA-IDO-002 -A conditions 3 and 11 to 18.

## BASELINE CONDITIONS

### Data Sources

- 5.3.4. The assessment scope has been based upon the results of a desk study. The desk study has involved reviewing Ordnance Survey mapping and Google Earth imagery of the site and surroundings.



## Summary of Baseline Conditions

- 5.3.5. Review of the Google Earth imagery indicates that the main source of noise for Tytherington would be from the existing workings at Tytherington Quarry. The existing planning consent (ref: NA/IDO/002/A) requires that existing operations at the quarry are compliant under conditions 11, 12, and 13 of that permission. The conditions identified the noise criteria for residential receptors in addition to criteria for all residential receptors.

## Predicted Trends

- 5.3.6. It is envisaged that without the proposed scheme, sound contributions would continue as per existing operation of Tytherington Quarry, in line with the extant planning permission.

## SCOPE OF THE ASSESSMENT

- 5.3.7. The proposed scope of the assessment will cover the following aspects:
- Description of the site and the main sound emitting sources;
  - Identification of the appropriate sound criteria for the assessment;
  - Identification of the nearest noise sensitive receptors (NSRs);
  - Unmanned long-term background sound surveys at locations (the NRSs if practically possible) around the development site;
  - Determination of the ambient and background sound levels at each NSR;
  - Evaluation of the predicted sound and vibration levels against the relevant criteria as agreed with South Gloucestershire Council Environmental Health Professionals; and
  - Outline appropriate mitigation measures if required.

## ASSESSMENT METHODOLOGY

- 5.3.8. WSP will undertake appropriate surveys to quantify the baseline acoustic environment in the vicinity of the receptors. Subject to instrument and personnel safety, this is likely to entail as a minimum:
- Long-term sound level survey at the nearest noise sensitive locations, using an appropriate and calibrated Class 1 sound level meter (SLM) in an environmental protection case. Sound levels would be logged continuously in 15-minute periods over a full 24 hours for at least a period of 4-5 days including a weekend. This monitoring will form the basis of the background sound level for the assessments.
  - Monitoring of parameters such as  $L_{Aeq,T}$ ,  $L_{A90,T}$ ,  $L_{A10,T}$  and  $L_{Amax}$  as a minimum would be captured and detailed notes of significant sound sources around each monitoring location would be made on deployment and collection of this instrument. In addition, a weather station would be installed capable of logging weather details in the same 15-minute periods as the SLM.
- 5.3.9. A noise monitoring plan will be provided to the Environmental Health Officer (EHO) at South Gloucestershire Council for comment.
- 5.3.10. An ES chapter will be produced detailing the results of the above against relevant noise criteria, and an assessment of potential effects undertaken to determine the significance of any effects on identified receptors. An outline of any mitigation measures deemed necessary as a result of the assessment would also be provided.



5.3.11. Appropriate sound power level data for plant to be used for operational activities will be used for modelling of sound propagation from the proposed development to the agreed NSRs. The modelling will involve prediction of:

- **Operational sound levels** – predictions will be made using methodologies identified in BS 52281:2009+A1:2014. The predictions will be based upon the available data regarding the method of working the main phases of the quarry including any working method statement plans, scaled sections, plant type and numbers, vehicle movement details, etc. as provided by Heidelberg. These sound levels would be assessed against criteria derived from NPPG(M) 2014 and agreed with the relevant Environmental Health Professional. Any sound reduction measures deemed necessary would be outlined; and
- **Operational traffic noise** – predictions of the relative increase in traffic noise levels would be undertaken where data indicates that there will be an increase of 25% or decrease of 20% in existing traffic levels or if there is an increase of more than 1 dB(A) due to HGV traffic increases on the main route(s) to the development. Any increase would be assessed in terms of the criteria given in DMRB. However, it is understood at this stage that the production rate at the quarry will remain unchanged as part of the proposed scheme.

## 5.4 VIBRATION

### RELEVANT POLICIES AND THEIR IMPLICATIONS FOR SCOPING

5.4.1. **Table 5.7** lists the planning policy guidance and policies that are relevant to vibration and sets out the implications of the guidance and policies for the scope of the EIA.

**Table 5.7 - Relevant policies and their implications (vibration)**

Policy Reference	Implications
<b>National Policy:</b>	
<b>National Planning Practice Guidance (Minerals), 2014</b>	Blast vibration is referred to as one of “the principal issues that planning authorities should address” (Paragraph: 013). No further detail is provided.
<b>Local Policy:</b>	
<b>Gloucestershire County Council Minerals Local Plan (adopted March 2020)</b>	Policy DM01 Amenity states that mineral development proposals will be permitted only where it can be demonstrated adverse impacts on the amenity of local communities within Gloucestershire and those of neighbouring administrative areas will be avoided, strictly controlled or mitigated so as to ensure unacceptable impacts will not arise in respect of noise, vibration, air pollution and visual intrusion.
<b>South Gloucestershire Local Plan: Policies, Sites and Places Plan (adopted November 2017)</b>	Policy PSP21 Environmental Pollution and Impacts supports proposals where they demonstrate that development has been designed to prevent unacceptable risks and avoids unacceptable levels of pollution including vibration. Criteria B of this policy supports proposals that are sensitive to vibration where they do not threat operational constraints for reasons of safeguarding, economic or wider social needs.
	Policy PSP23 Mineral Working and Restoration requires new mineral workings to demonstrate that permitted operations will not have

Policy Reference	Implications
	unacceptable adverse impacts on the natural and historic environment, human health, or local amenity. Proposals will be expected to comply with other development plan policies and provide consideration with respect to blasting and vibration.

## LEGISLATION

5.4.2. Relevant legislation includes:

- The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended) (EIA Regulations); and
- The Control of Pollution Act 1974 (particularly Sections 60 and 61) (CoPA).

## TECHNICAL GUIDANCE

5.4.3. Standards and guidance have been used to define the scope of the vibration assessment. The main Standards and Guidance are summarised in **Table 5.8**.

**Table 5.8 - Summary of Standards and Technical Guidance for Vibration**

Technical Guidance	Summary
<b>BS 7385-2:1993 “Evaluation and Measurement for Vibration in Buildings, entitled Guide to Damage Levels from Ground borne Vibration”</b>	This standard gives guide values to prevent cosmetic damage to property. Between 4 Hz and 15 Hz, a guide peak particle velocity (PPV) value of 15 - 20 mms <sup>-1</sup> is recommended, whilst above 40 Hz the guide value is 50 mms <sup>-1</sup> . These vibration criteria reconfirm “damage criteria” published by the US Bureau of Mines.
<b>BS 6472-2:2008 “Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration”</b>	BS 6472-2:2008 deals with the particular problems associated with periodic blasting within range of occupied buildings: the guidance is a formalization of established widely recognized techniques common in industry. The Standard gives guidance on human exposure to blast-induced vibration in buildings. It is primarily applicable to blasting associated with mineral extraction.
<b>Construction (vibration) British Standards Institution 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration, 2014 (BS5228-2:2009+A1:2014)</b>	Provides guidance on the assessment of ground-borne vibration associated with activities such as demolition and construction. Annex E BS 5228- 2:2009+A1:2014, describes methods of estimating vibration emanating from proposed open site activities.
<b>Department of Transport and Regions (DETR) research report on “The Environmental Effects of Production Blasting at Surface Mineral Workings”. 1998</b>	Government guidance on this subject is given within this document which also proposes example blasting conditions for planning consents.

Technical Guidance	Summary
Extant Planning Consents, e.g., Ref: 109122/002	In terms of blasting this includes Condition 34 which places restrictions on the maximum peak particle velocity of 9mm per sec at a 95% confidence level.

## BASELINE CONDITIONS

### Data Sources

- 5.4.4. The assessment scope has been based upon the results of a desk study and professional judgement based on knowledge of the site and surrounding area. The desk study has involved reviewing Ordnance Survey mapping and Google Earth imagery of the site and surroundings.

### Summary of Baseline Conditions

- 5.4.5. There is no information available to quantify the blasting vibration environment at locations surrounding the quarry. Review of Google Earth imagery indicates that the main source of vibration would be from the operation of the existing Tytherington Quarry.

### Predicted Trends

- 5.4.6. It is envisaged that the only activity that could potentially increase the magnitudes/frequency of blasting vibration would be due to increased activities at the consented Tytherington Quarry in terms of either frequency of blasting or the closer proximity of blasting operations to existing receptors. However, this is not considered likely as the soil storage area is located further from residential properties than anywhere else quarried within Tytherington and the deepening of the quarry is unlikely to have an effect on vibration levels other than those existing.

## SCOPE OF THE ASSESSMENT

- 5.4.7. The accepted method of prediction is to plot measured peak particle velocities against a scaled distance value for each measurement location. When a number of such values are plotted on logarithmic axes a straight-line relationship is observed. This is the so-called blasting regression line. In almost all cases, a certain amount of data scatter would be evident, and so statistical confidence levels are also calculated by least squares regression analysis techniques and the best fit or mean (50%) line as well as the upper 95% confidence level are plotted. The latter forms the basis of most vibration regulations. WSP would collect any historic data from Heidelberg regarding vibration measurements from production blasting including the results of any test blasts. A regression line for Tytherington Quarry would be produced.
- 5.4.8. The regression line would be used to predict the vibration impact for blasting operations on the quarry on nearby properties in terms of the peak particle velocity (PPV). These PPV levels would be assessed against the latest Government guidance on the subject as well as Condition 34 of the extant planning consent (ref: 109122/002) which states:

*“All blasting operations in the area hereby permitted shall be designed not to exceed a peak particle velocity of 9mm per sec at a 95% confidence level at the nearest residential property.”*

- 5.4.9. It is assumed that any data from any ongoing blast vibration monitoring that has already been undertaken around the site will be made available to aid in the production of a regression line for the quarry.

## POTENTIAL EFFECTS NOT REQUIRING FURTHER CONSIDERATION

- 5.4.10. Comprehensive investigations into the nature and effects of air overpressure with particular reference to its damage potential have been undertaken by the United States Bureau of Mines (USBM), which has reviewed the relevant other published data on this subject. The research has concluded that the weakest parts of most structures that are exposed to air overpressure are windows.
- 5.4.11. With respect to determining what constitutes significant effects in terms of air overpressure, specific levels have not been identified in the relevant UK Government guidance (e.g., NPPG). This is mainly to do with the influence of weather conditions (very variable in the UK) on air overpressure, but also due to very high levels that would need to occur to cause structural damage.
- 5.4.12. In addition, British Standard (BS) 6472-2:2008, indicates in section 5.3 that the prediction of air overpressure is “almost impossible” and goes on to state that “control of air overpressure should always be by its minimisation at source through appropriate blast design”.
- 5.4.13. A numerical assessment of air overpressure effects has therefore been scoped out of the assessment.

## 5.5 WATER ENVIRONMENT

### RELEVANT POLICIES AND THEIR IMPLICATIONS FOR SCOPING

- 5.5.1. **Table 5.9** lists the planning policy guidance and policies that are relevant to the water environment and sets out the implications of the guidance and policies for the scope of the EIA.

**Table 5.9 - Relevant Policies and Their Implications (Water Environment)**

Policy Reference	Implications
<b>National Policy:</b>	
<b>National Planning Policy Framework, 2023 (NPPF)<sup>23</sup></b>	NPPF Para 153 states that “Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply”.
	NPPF Para 174 states that “development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.”
<b>National Planning Practice Guidance, 2019 (NPPG)<sup>24</sup></b>	This sets out guidance regarding the need for and scope of assessments on the impact of developments on water quality.

<sup>23</sup> National Planning Policy Framework (NPPF) [online] available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) (Last accessed 14/09/2023)

<sup>24</sup> National Planning Practice Guidance (NPPG) Water supply, wastewater and water quality [online] available at: <https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality> (Last accessed 17/08/2023)

Policy Reference	Implications
<b>National Planning Practice Guidance, 2022 (NPPG)<sup>25</sup></b>	This sets out the guidance regarding how to take account of and address the risks associated with flooding in the planning process
<b>Local Policy:</b>	
<b>South Gloucestershire Council Core Strategy Policy (adopted December 2013)<sup>26</sup></b>	As part of Policy CS1 – High Quality Design, development proposals will be required to take account of the South Gloucestershire Strategic Flood Risk Assessment and provide, where appropriate, measures to manage flood risk and prepare surface water management plans.
	Policy CS9 - Managing the Environment and Heritage. This policy seeks to protect and manage the natural environmental and its resources in a sustainable way and requires development proposals to protect the quality and quantity of water and its margins in an efficient and sustainable way.
<b>South Gloucestershire Local Plan: Policies, Sites and Places Plan (adopted November 2017)<sup>27</sup></b>	Policy PSP21 Environmental Pollution and Impacts supports proposals where they demonstrate that development has been designed to prevent unacceptable risks and avoids unacceptable levels of pollution including water pollution. Criteria A of this policy requires proposals which have potential to have adverse impacts and are justified for their economic and wider social needs to provide an appropriate scheme of mitigation including measures to avoid pollution of the ground, groundwater and atmosphere.

## LEGISLATION

5.5.2. Key legislative drivers relating to the water environment that have been considered are detailed below:

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017<sup>28</sup>: focuses on delivering an integrated approach to the protection and sustainable use of the water environment on a river basin scale;
- Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154)<sup>29</sup>, as amended: includes requirements for the prevention of hazardous substances entering groundwater and the control of non-hazardous pollutants to avoid pollution of groundwater (from revoked the Groundwater (England and Wales) Regulations 2009);

<sup>25</sup> National Planning Practice Guidance (NPPG) Flood risk and coastal change [online] available at: <https://www.gov.uk/guidance/flood-risk-and-coastal-change>. (Last accessed 17/08/2023)

<sup>26</sup> South Gloucestershire Local Plan Core Strategy (2006-2027) [online] available at: <https://www.southglos.gov.uk/documents/cleanversionforinterimpublishation2.pdf> (Last accessed 17/08/2023)

<sup>27</sup> South Gloucestershire Local Plan: Policies, Sites and Places Plan 9adopted 2017). [online] available at: <https://beta.southglos.gov.uk/static/90efa5d673f208a3109ed111ba963a01/PSP-Plan-Nov2017.pdf> (Last accessed 14/09/2023).

<sup>28</sup> Water Framework Directive (WFD) [online] available at: <https://www.gov.uk/government/publications/river-basin-planning-process-overview/river-basin-planning-process-overview> (Last accessed 13/09/2023)

<sup>29</sup> Environmental Protection, England and Wales, The Environmental Permitting (England and Wales) Regulations 2016 (2016 No. 1154) [online] available at: <https://www.legislation.gov.uk/uksi/2016/1154/contents/made> (Last accessed 17/08/2023)

- Water Resources Act 1991<sup>30</sup>: states that it is an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter controlled waters. The Act was revised by the Water Act (2003) which sets out regulatory controls for water abstraction, discharge to water bodies, water impoundment and protection of water resources;
- The Land Drainage Act 1991<sup>31</sup> & 1994<sup>32</sup>: places responsibility for maintaining flows in watercourses on landowners and gives Local Authorities powers to serve a notice on landowners to ensure works are carried out to maintain flow of watercourses; and
- Floods and Water Management Act, 2010<sup>33</sup>: sets out the Government's proposals to improve flood risk management, water quality and ensure water supplies are more secure. In December 2009, the Flood Risk Regulations were published, which transpose the EU Floods Directive into UK law, and these cover the flood issues from the Floods and Water Management Bill.

## BASELINE CONDITIONS

### Data Sources

5.5.3. The key data sources used to inform this part of the Scoping Report are listed in **Table 5.10**.

**Table 5.10 - Sources of Information (Water Environment)**

Topic	Aspect	Source of information
Geology	Solid and drift geology	British Geological Society Geology Viewer <a href="https://geologyviewer.bgs.ac.uk/?_ga=2.183890150.1118913404.1689246479-1740039380.1689246478">https://geologyviewer.bgs.ac.uk/?_ga=2.183890150.1118913404.1689246479-1740039380.1689246478</a>
Hydrology	River Network	Bing OS Maps <a href="https://www.bing.com/maps/?cp=51.593194%7E-2.49582&amp;lvl=14.5&amp;style=s">https://www.bing.com/maps/?cp=51.593194%7E-2.49582&amp;lvl=14.5&amp;style=s</a>
	Abstraction Licensing Strategies	Bristol Avon and North Somerset Streams WFD Management Area Abstraction Licensing Strategy <a href="https://www.gov.uk/government/publications/bristol-avon-and-north-somerset-abstraction-licensing-strategy">https://www.gov.uk/government/publications/bristol-avon-and-north-somerset-abstraction-licensing-strategy</a>
	Surface Water Quality	Catchment Data Explorer <a href="http://environment.data.gov.uk/catchment-planning/">http://environment.data.gov.uk/catchment-planning/</a>
	River Flow and Catchment Descriptions	Centre for Ecology and Hydrology (CEH, 2018b) - National River Flow Archive On-line <a href="http://nrfa.ceh.ac.uk/">http://nrfa.ceh.ac.uk/</a>

<sup>30</sup> The National Rivers Authority Water Resources Act 1991 [online] available at: <https://www.legislation.gov.uk/ukpga/1991/57/contents> (Last accessed 17/08/2023)

<sup>31</sup> Land Drainage Act 1991 [online] available at: <https://www.legislation.gov.uk/ukpga/1991/59/contents> (Last accessed 17/08/2023)

<sup>32</sup> Land Drainage Act 1994 [online] available at: <https://www.legislation.gov.uk/ukpga/1994/25/contents> (Last accessed 17/08/2023)

<sup>33</sup> Flood and Water Management Act 2010 [online] available at: <https://www.legislation.gov.uk/ukpga/2010/29/contents> (Last accessed 17/08/2023)



Topic	Aspect	Source of information
		Monthly stream flow data from the Tytherington Quarry hydrometric monitoring network.
	Flood Risk	Flood Map (Environment Agency, 2018a) <a href="https://flood-map-for-planning.service.gov.uk/">https://flood-map-for-planning.service.gov.uk/</a>  Flood Estimation Handbook (FEH) Web Service (CEH, 2018a) <a href="https://fehweb.ceh.ac.uk/GB/map">https://fehweb.ceh.ac.uk/GB/map</a>
Hydrogeology	Aquifer Status	Environment Agency / British Geological Survey Aquifers Bedrock Designation map <a href="https://magic.defra.gov.uk/MagicMap.aspx">https://magic.defra.gov.uk/MagicMap.aspx</a>
	Groundwater Levels	Hourly groundwater level data from two boreholes at Tytherington Quarry.
	Groundwater Protection Zones and Groundwater vulnerability	Magic Maps <a href="https://magic.defra.gov.uk/MagicMap.aspx">https://magic.defra.gov.uk/MagicMap.aspx</a>
	Groundwater Quality	Severn River Basin District River Basin Management Plan <a href="https://www.gov.uk/guidance/severn-river-basin-district-river-basin-management-plan-updated-2022">https://www.gov.uk/guidance/severn-river-basin-district-river-basin-management-plan-updated-2022</a>

## Geology

5.5.4. Gloucestershire is one of the most geologically and scenically diverse counties in England, with rocks from the Precambrian through to the Jurassic represented. The BGS online geology mapping<sup>34</sup>, as illustrated in **Figure 5.2**, indicates that the quarry predominantly contains carboniferous mudstones and limestones from the following groups:

- Gully Oolite Formation (limestone and ooidal);
- Mercia Oolite Formation (marginal Facies);
- Clifton Down Mudstone Formation (Dolomite-mudstone);
- Blackrock Limestone Subgroup (Limestone); and
- Avon Group (Mudstone and limestone).

5.5.5. With the site-specific area including additional:

- Penarth Group (mudstone); and
- Cromhall Sandstone Formation (Sandstone).

<sup>34</sup> BGS Geology Viewer [online] available at: [https://geologyviewer.bgs.ac.uk/?\\_ga=2.222322331.1455909940.1688979673-1322936737.1688979673](https://geologyviewer.bgs.ac.uk/?_ga=2.222322331.1455909940.1688979673-1322936737.1688979673) (Last accessed 17/08/2023)



## Hydrology

### Water Courses

- 5.5.6. There are no natural watercourses within the Site boundary. Hydro-geologically the Site lies within the boundary of both the Laddon Brook to the east and the Oldbury Naite Rhine to the west. A tributary to the main Laddon Brook rises in the centre of Tytherington village ~0.75km east of the Site, and also near Dodsmoor 0.5km south-west of the Site, both flow to the east, before joining the southwards flowing Laddon Brook (tributary to the Bristol Frome/Avon). A headwater of the Oldbury Naite Rhine lies to the north-west of the Site and flows westwards to join the Severn Estuary at Oldbury Pill.
- 5.5.7. River Basin Management Plans (RBMPs) have been drawn up by the Environment Agency for the ten river basin districts in England and Wales as a requirement of the WFD. The Laddon Brook to the east and the Oldbury Naite Rhine to the west of the Site are covered by the RBMP for the Severn River Basin District<sup>35</sup>. A summary of the local WFD river water bodies and their associated status definitions is provided in **Table 5.11**.

**Table 5.11 - Summary of local WFD River Water bodies and their associated status definitions**

WFD Water / Body	Oldbury Naite Rhine	Laddon Bk – source to conf R Frome (Brist) Water Body
Water Body Identifier	GB109054026670	GB109053027590
Heavily Modified Water Body (HMWB)	No	No
Overall Current (2022) Status	Moderate	Poor
Predicted 2027 Status	Good	Good

- 5.5.8. In terms of surface water run-off, the quarry's plant area comprises a hard surface of compacted crushed aggregate or surfaced with asphalt laid to a fall, consequently runoff is collected and channelled through an oil intercept prior to entering the site's approved discharge consent easement in the existing lagoon in Grovesend Quarry, prior to discharge off site to the springs and streams located to the south-east of the quarry. These springs and rivers eventually flow into the Laddon Brook.
- 5.5.9. Regarding foul water, sewerage from mess and toilet facilities are contained within a sealed cess pit and prevented from discharging to either surface water or groundwaters.

<sup>35</sup> Severn River Basin District River Basin Management Plan: Updated 2022 [online] available at: <https://www.gov.uk/guidance/severn-river-basin-district-river-basin-management-plan-updated-2022> (Last accessed 17/08/2023)

## Flood Risk Consideration

- 5.5.10. The EA Historic Flood Map<sup>36</sup> does not show any previous flood events as affecting the site. The South Gloucestershire Strategic Flood Risk Assessment (SFRA)<sup>37</sup> (2021) does not mention that there has been any historical flooding near the Proposed site.
- 5.5.11. The EA Map for Planning<sup>38</sup> indicates that the entire Tytherington Quarry site is situated in Flood Zone 1, along with the proposed site, indicating a low probability of fluvial flooding (see **Figure 5.3**). Surface water flooding occurs when the intensity of rainfall is greater than the local drainage and infiltration capacity, causing water to flow overland. Where low-points or barriers to flow are present, particularly deep areas of surface water flooding may occur as a result of ponding. These areas are not limited to river corridors or floodplains. The areas of surface water flooding within and around the Proposed site are illustrated in **Figure 5.4**. Areas of surface water flooding are visible, but very limited within and along the boundary of the proposed site for the low-risk scenario. These consist of areas of surface water flooding along the north-west boundary of the proposed site, associated with the disturbed area of the south-western corner of the current quarry pit, near the woodland divide. The volume of this surface water flooding is below 300mm for the low-risk scenario.
- 5.5.12. The EA Map for Planning<sup>38</sup> also indicates that flooding from reservoirs and groundwater are also unlikely in this area. Although some groundwater may be encountered during excavations in the Proposed site area, groundwater is unlikely to be a significant potential flood risk, considering the site is located at 100mAOD. In addition, dewatering during excavation will form part of onsite dewatering, and will assist in managing the impacts from groundwater and direct rainfall flooding of the pit area within the proposed site boundary.

## Hydrogeology

- 5.5.13. The Environment Agency's aquifer designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply), but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation maps show the various aquifer types for both superficial deposits and the bedrock. These are accessible on-line and have been reviewed in order to correlate the geologic strata identified around the quarry from the geology maps with the various aquifer types.
- 5.5.14. The Magic Map<sup>39</sup> application indicates that the proposed site boundary is half located over a Principal aquifer and half over a Secondary undifferentiated aquifer. 'Principal aquifers' are defined as *"layers of rock or drift deposits that have a high intergranular and/or fractured permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale"*. 'Secondary Undifferentiated aquifers' are defined as *"cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this*

<sup>36</sup> Environment Agency Historic Flood Map [online] available at: <https://www.data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map> (Last accessed on 17/08/2023)

<sup>37</sup> South Gloucestershire Level 1 Strategic Flood Risk Assessment (SFRA) (2021) [online] available at: [https://beta.southglos.gov.uk/static/777cfdc6b8907d8ab9e1e4f97e59474e/Main-Report-Level\\_1\\_SFRA-2021-1.pdf](https://beta.southglos.gov.uk/static/777cfdc6b8907d8ab9e1e4f97e59474e/Main-Report-Level_1_SFRA-2021-1.pdf) (Last accessed 17/08/2023)

<sup>38</sup> Environment Agency Flood Map for Planning [online] available at: <https://flood-map-for-planning.service.gov.uk> (Last accessed on 17/08/2023)

<sup>39</sup> Magic Map Aquifer Designations [online] available at: <https://magic.defra.gov.uk/magicmap.aspx> (Last accessed 17/08/2023)

*means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type”.*

- 5.5.15. The Magic Map<sup>40</sup> shows that the Groundwater Vulnerability is High with Soluble Rock Risk. The soluble rock risk indicates that the area may have solution features that enable rapid movement of a pollutant. Overall, this indicates that the groundwater within the proposed site boundary is at a high risk from pollution if a pollution activity were to occur. The Magic Map<sup>40</sup> also shows that the proposed site boundary is not located within a source protection zone, thus if a pollution activity were to occur within the proposed site boundary, despite the high vulnerability to the local groundwater, no drinking water abstraction source will be impacted.
- 5.5.16. At the base of the workings is a reservoir which maintains a saturated zone in the upstream section of this part of the aquifer. Dewatering from the quarry is pumped into the springs and streams to the south-east of the Quarry. These will then flow into the Laddon Brook.

### **Predicted Trends**

- 5.5.17. The effects of climate change are expected to alter the baseline over time. As a result of climate change, it is predicted that there will be an increase in peak rainfall intensities and resulting flood flows over time. This will, of course, have implications for river flows and groundwater levels, although these effects are difficult to quantify at present. The guidance on climate change allowances to be applied in England was last updated in May 2022<sup>41</sup> and provides guidance on the potential enhanced rainfall seasonality, with wetter winters and drier summers. The guidance provides a range of allowances dictated by the design life of the Proposed Development and an assessment of the application of either the Central or Upper End banding as appropriate. For the Avon Bristol and North Somerset Streams Management Catchments, peak rainfall allowances for a development with a lifespan of up to 5 years (as is the case of this extension) is that of 25% at the central allowance, and 40% at the Upper end allowance for a 1% annual exceedance rainfall event.
- 5.5.18. In addition, the location and rate of surface and groundwater abstractions in the area could vary over time, and increased understanding of the groundwater flow regime may result in changes to the aquifer status and SPZ designations.

### **SCOPE OF THE ASSESSMENT**

- 5.5.19. Based on available data, and consultation with the Environment Agency and South Gloucestershire Council as Lead Local Flood Authority (LLFA), the assessment will achieve the following:
- Further develop the baseline description of the hydrology and hydrogeology in the Tytherington Quarry area;
  - Consider the potential effects of the Tytherington Quarry proposals on surface water and groundwater; and
  - Consider mitigation measures required to address these and other water-related concerns.

<sup>40</sup> Magic Map Groundwater Vulnerability [online] available at: <https://magic.defra.gov.uk/magicmap.aspx> (Last accessed 17/08/2023)

<sup>41</sup> Flood risk assessments: climate change allowances (2022), Environment Agency, [online] available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> (Last accessed: 15/08/2023)

- 5.5.20. In accordance with existing requirements, a standalone Flood Risk Assessment (FRA) would also be and appended to the EIA.

## ASSESSMENT METHODOLOGY

- 5.5.21. The significance of an effect resulting from the proposals at Tytherington Quarry will be primarily determined by the sensitivity (or value) of a given water feature and the magnitude of the effect. This approach provides a mechanism for identifying areas where mitigation measures are required and to identify the most appropriate measures to alleviate the risk presented by the development. The residual effects of the proposed development on the water environment will be evaluated assuming that identified mitigation are fully implemented.
- 5.5.22. In terms of hydrology and hydrogeology, the key determinants of magnitude relate to water quantity (level and flow), and groundwater quality. However, depending on the effects of surface water flows, there may also be indirect effects on downstream morphology and sediment dynamics, river water quality and flood risk.

### Potential effects not requiring further assessment

- 5.5.23. At this stage, it is not proposed to scope out any potential effects.

## 5.6 BIODIVERSITY

### RELEVANT POLICIES AND THEIR IMPLICATIONS FOR SCOPING

- 5.6.1. **Table 5.12** lists the planning policy guidance and policy issues that need to be considered when defining the scope of the Ecological Impact Assessment (EclA).

**Table 5.12 - Relevant Policies and their Implications (Biodiversity)**

Policy Reference	Implications
<b>National Planning Policy:</b>	
<b>NPPF Paragraph 180</b>	NPPF Paragraph 180 sets out the principles that local authorities should apply when determining applications. It states that applications should be refused if significant harm to biodiversity cannot be avoided, adequately mitigated or compensated for (as a last resort); land within or outside SSSIs should not normally be permitted.
<b>NPPF Section 17. Facilitating the sustainable use of minerals NPPF Paragraph 210</b>	NPPF Paragraph 210 states that planning policies should (inter alia) set out criteria to “ <i>ensure that permitted and proposed operations do not have unacceptable adverse impacts on the natural ... environment ... taking into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality</i> ”.
<b>NPPF Paragraph 211</b>	NPPF Paragraph 211 states that mineral planning authorities should (inter alia) “ <i>ensure that there are no unacceptable adverse impacts on the natural ... environment... and take into account the cumulative effect of multiple impacts from individual sites and/or from a number of sites in a locality</i> ”.
<b>Local Planning Policy:</b>	

Policy Reference	Implications
<b>South Gloucestershire Council Local Plan: Core Strategy (2013)</b> <b>Policy CS1-High Quality Design</b>	As part of Policy CS1, development proposals should ensure soft landscape proposals form an integral part of the design for the site and seek to make a net contribution to tree cover in the locality (particularly in urban areas) and prioritise biodiversity objectives and local food cultivation where possible.
<b>Policy CS9- Managing the Environment and Heritage</b>	As part of Policy CS9, development proposals should conserve and enhance natural environment, avoiding and minimising impacts on biodiversity and geodiversity.
<b>Policy CS34- Rural Areas</b>	As part of Policy CS34 development proposals should protect, conserve and enhance rural areas' distinctive character, beauty, wildlife, landscape biodiversity and heritage.
<b>South Gloucestershire Local Plan: Policies, Sites and Places Plan (2017)</b> <b>Policy PSP18 – Statutory wildlife sites: European Sites and Sites of Specific Scientific Interest (SSSIs)</b>	Policy PSP18 seeks the protection of European Sites including the Severn Estuary Special Protection Area (SPA), Special Area of Conservation (SAC), and SSSIs from significant and or adverse effect. Development will not be acceptable where any adverse effects on the European features of interest arise, unless the effects: 1. are avoided; 2. where an adverse impact cannot be avoided, the impact will be adequately mitigated; or 3. have imperative reasons of overriding public interest
<b>Policy PSP19 – Wider Biodiversity</b>	Development Proposals resulting in the loss or deterioration of irreplaceable habitats, including unimproved grassland (lowland hay meadows), ancient woodland, and ancient trees will be refused unless the need for, and benefits of, the development in that location clearly outweigh the loss.  Where appropriate, biodiversity gain will be sought from development proposals. The gain will be proportionate to the size of the scheme and be secured through an appropriate planning condition or legal undertaking.

## LEGISLATION

5.6.2. The following legislation is relevant to the assessment of the effects on biodiversity receptors:

- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019<sup>42</sup>- The Habitat Regulations transpose the Habitats Directive into English law. The regulations provide for the designation and protection of European sites, the protection of certain species (referred to as European Protected Species or EPS) and the adaptation of planning and other controls for the protection of European Sites.

<sup>42</sup> UK Government (2019) The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 [Online] Available at: <https://www.legislation.gov.uk/ukxi/2019/579/contents/made> Last accessed 22/08/2023.

- The Wildlife and Countryside Act 1981 (as amended)<sup>43</sup> (WACA) - consolidates and amends existing national legislation to implement the Bern Convention<sup>44</sup>. This piece of legislation remains the primary UK mechanism for statutory site designations (e.g. Sites of Special Scientific Interest (SSSI)) and the protection of individual species listed under Schedules 5 and 8 of the Act, each subject to varying levels of protection.
- The Natural Environment and Rural Communities (NERC) Act (2006), Section 40(1) imposes a duty to conserve biodiversity. The duty applies to all local authorities and extends beyond just conserving what is already there, to carrying out supporting, and requiring actions that may also restore or enhance biodiversity. Section 41 (S.41) of the Natural Environment and Rural Communities (NERC Act 2006) requires the Secretary of State to publish a list of habitats and species that are of principal importance for the conservation of biodiversity in England. The list (including 56 habitats and 943 species) has been drawn up in consultation with Natural England. These habitats and species are often referred to as S.41 or Priority habitats and species.
- Countryside & Rights of Way Act 2000<sup>45</sup> (CROW) - details further measures for the management and protection of SSSIs and strengthens wildlife enforcement legislation.
- The Hedgerows Regulations 1997<sup>46</sup> - protects important countryside hedges from damage or destruction.
- Protection of Badgers Act 1992<sup>47</sup> - provides protection to badgers and their places of shelter (setts).

## **BASELINE CONDITIONS**

### **Data Gathering Methodology**

5.6.3. Given the potential for the Proposed Development to affect biodiversity resources located off- as well as on-site, a desk study was undertaken in June 2023 to obtain the following data:

- Statutory designated biodiversity sites of international importance (Ramsar, Special Protection Areas (SPA) and Special Areas of Conservation (SAC)) within 10km of the Site;
- Statutory designated biodiversity sites of national or local importance within 5km of the Site;
- Non-statutory designated biodiversity sites within 2km of the Site;
- Section 41 habitats and ancient woodland within 2km of the Site;
- Records of legally protected/ important species within 2km of the Site; and
- European Protected Species Mitigation Licences (EPSMLs) within 2km of the Site.

<sup>43</sup> UK Government (1981) The Wildlife and Countryside Act (as amended) [Online] Available at: <https://www.legislation.gov.uk/ukpga/1981/69> Last accessed 22/08/2023.

<sup>44</sup> The Convention on the Conservation of European Wildlife and Natural Habitats, 1982

<sup>45</sup> UK Government (2000) The Countryside and Rights of Way Act [Online] Available at: <https://www.legislation.gov.uk/ukpga/2000/37/contents> Last accessed 22/08/2023.

<sup>46</sup> UK Government (1997) The Hedgerows Regulations [Online] Available at: <https://www.legislation.gov.uk/uksi/1997/1160/contents/made> Last accessed 22/08/2023.

<sup>47</sup> UK Government (1992) The Protection of Badgers Act. [Online] Available at: <https://www.legislation.gov.uk/ukpga/1992/51/contents> Last accessed 22/08/2023.



- 5.6.4. Additionally, a field survey of the Site was completed, comprising an Extended Phase 1 habitat survey, undertaken on 28<sup>th</sup> June 2023. During the survey, distinct habitats were identified, and any features of interest subjected to a more detailed description were target noted (TN)<sup>48</sup>. As the standard Phase 1 habitat survey methodology is mainly concerned with vegetation communities, the survey was extended<sup>49</sup> to allow for the provision of information on other ecological features, including identification of the presence or potential presence of legally protected and otherwise notable species.

### Summary of Baseline Conditions

- 5.6.5. The Study Area comprises the land within the Site and search areas based on best practice guidance, and a high level overview of the types of ecological features present and potential effects that could occur. The search areas were defined on a precautionary basis to ensure that the Zone of Influence (Zoi) relevant to each ecological feature was covered during baseline collection activities.
- 5.6.6. Habitats recorded on Site comprise semi-improved grassland, deciduous broadleaved woodland, scattered scrub, hedgerow with trees and a dry pond.

### Statutory and Non-Statutory Designated Sites

- 5.6.7. There is one European site within 10km:
- Severn Estuary Ramsar, SPA and SAC, approximately 7.4km north-west of the Site. The estuary has the second highest tidal range in the world and consists of extensive intertidal mudflats, sand banks, saltmarsh, shingle, and rocky platforms. The site holds populations of tundra swan (*Cygnus columbianus*), greater white-fronted goose (*Anser albifrons*), common shelduck (*Tadorna tadorna*), gadwall (*Mareca strepera*), dunlin (*Calidris alpina*) and common redshank (*Tringa tetanus*) of international importance.
- 5.6.8. There are 10 Sites of Nature Conservation Interest (SNCI) within 2km:
- Ramsoak Cottage Field SNCI;
  - Tytherington Tunnel SNCI;
  - Tytherington Castle Quarry SNCI;
  - Common Alm/ Gypsies Platt SNCI;
  - Land at Tytherington Quarry SNCI;
  - Tytherington Church Quarry SNCI;
  - Tytherington Common SNCI;
  - Cleeve Wood SNCI;
  - Tytherington Hill and Baden Hill Woods SNCI; and
  - Filnore Woods SNCI.

<sup>48</sup> Joint Nature Conservation Committee (2010). Handbook for Phase 1 habitat survey- a technique for environmental audit. JNCC, Peterborough.

<sup>49</sup> Institute of Environmental Assessment (1995). Guidelines for Baseline Ecological Assessment. E&FN Spon, London.



## Habitats

- The Site is dominated by an area of overburden mound that was constructed between 2006 - 2008 and seeded with a commercial wildflower mix. This has developed into semi-improved grassland on raised topography, bounded to the south by planted broadleaved woodland and to the north and east by hedgerow with trees, formed from mature oak and ash trees with lower level hedging of hawthorn and blackthorn. Scrub is scattered through the grasslands and towards the western and southern boundaries adjoining the woodland. There is also a dry pond towards the north-western corner of Site.
- Hedgerow with trees is the only habitat on Site which is considered to fall under the S41 criteria.
- Priority habitat lowland calcareous grassland is located 91m east of the Site (separated by the M5 motorway), a little further away (404m east) is deciduous woodland, traditional orchard (900m north-west) and coastal and floodplain grazing marsh located 1.14km south-east.

## Species

### Badger

- 5.6.9. Six records of badger were returned in the desk study, the closest less than 500m from the Site.
- 5.6.10. No signs of badgers or badger setts were recorded during the Phase 1 survey. However, the Site does have suitability for sett creation, given its undulating nature.
- 5.6.11. A walkover survey should be undertaken two months prior to work or if six months elapses between the current survey and planning to confirm any badger activity.

### Bats

- 5.6.12. Records of at least eight bat species were returned in the desk study (brown long-eared, common pipistrelle, Leisler's bat, lesser horseshoe, *Myotis* spp, noctule, serotine and soprano pipistrelle). The closest of these was *Myotis* spp. located 282m east of the Site.
- 5.6.13. Records of two European Protected Species (EPS) licences were returned in the desk study, one for common pipistrelle and one for brown-long eared bats. The closest was 820m north of Site.
- 5.6.14. The majority of trees on Site were planted and only semi-mature hence lack suitable roosting features for bats at this present time. However, the Site contains one tree suitable for roosting bats. This was an ash tree with several suitable roosting features. There were no buildings on Site with bat roost potential.
- 5.6.15. The scrub through the Site and the tree lines around the edges of Site could be used for commuting through. The grasslands and scrub could provide foraging habitat. The habitats on Site are also connected in the wider landscape to suitable habitats for commuting and foraging bats.
- 5.6.16. A bat roost assessment should be undertaken on the ash tree via a tree climb or accessing the features using a ladder and an endoscope. If bats roosts are found present an EPS licence will be required.
- 5.6.17. Activity surveys are not recommended due to the limited extent of the area involved and because the loss of this small area of habitat is considered unlikely to result in a change in the status of bat species in the vicinity.

### **Birds**

- 5.6.18. The Site has potential to support a breeding bird community comprising common and widespread species that are typical of the habitats in the area (primarily grassland, woodland and hedgerows).
- 5.6.19. There was no evidence to indicate that the Site is used by important numbers of wintering birds, or by qualifying species of Severn Estuary SPA/ Ramsar site.
- 5.6.20. No surveys are recommended for birds due to the limited extent of the Site and hence small amount of suitable habitat present.

### **Dormouse**

- 5.6.21. No records of dormouse were returned in the desk study.
- 5.6.22. The habitat on Site is of low suitability for dormice with the hedges around north of Site isolated between the Quarry, bare tracks and M5 motorway. In addition, the woodland on Site lacks a good understorey and complexity of native plants suitable for dormice. The Phase 1 survey did not reveal any signs of indicative dormouse presence.
- 5.6.23. For these reasons, no surveys are proposed.

### **Great Crested Newts**

- 5.6.24. Data records were returned for GCN from NBN Gateway<sup>50</sup>, however these were a distance away (1km). No EPS licences for GCN were returned within 2km of the Site.
- 5.6.25. The terrestrial habitats on Site such as scrub and woodland provide some foraging habitats for GCN however there is no suitable aquatic habitat on Site given the pond was dry at the time of survey. Whilst there are two further ponds mapped south-west of the Site, roughly 450m away, these are separated by a road and several grazed fields and as such the potential for GCN to be present on Site is considered to be extremely low.
- 5.6.26. No further surveys for GCN are recommended.

### **Riparian mammals (otter and water vole)**

- 5.6.27. No records of otter or water vole were returned from BRERC.
- 5.6.28. There was no suitable habitat such as ditches or rivers on Site for otter or water vole.
- 5.6.29. No further work in respect of these species is proposed.

### **Reptiles**

- 5.6.30. Three records of slow worm were returned from 470m east of the Site. No records of any other reptile species were returned during the desk study.
- 5.6.31. The habitats within Site have potential for reptiles such as the grassland and scrub providing suitable hibernation and foraging potential.
- 5.6.32. No reptile surveys are recommended.

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<sup>50</sup> National Biodiversity Network Trust (2023). Online [<https://nbn.org.uk/the-national-biodiversity-network/archive-information/nbn-gateway/>] Last accessed 12/8/2023.

## SCOPE OF THE ASSESSMENT

### Potential ecological features

- 5.6.33. The starting point for defining which ecological features<sup>51</sup> will be taken forward to the detailed assessment stage will be using the baseline data collected through the desk study and field surveys to determine which if the identified ecological features are ‘important’ at the level of the Proposed Development. Following CIEEM (2019) guidance, the importance of ecological features will be determined using a geographic scale and described in relation to UK legislation and policy, and with regard to the extent of habitat or size of population that may be affected.
- 5.6.34. The importance of ecological features can therefore differ from that which would be conferred solely by legislative protection or identification as a conservation notable species. For example, a small length of hedgerow (which may be a Priority Habitat), even if deemed to be ‘important’ with regards to the Hedgerow Regulations 1997, is unlikely to be considered to have greater than ‘local’ importance due to the extent of this habitat type across a given county.
- 5.6.35. Wherever possible, information regarding the extent and population size, population trends and distribution of the ecological features will be used to inform the categorisation and determine importance at the project level. Where detailed criteria or contextual data are not available, professional judgement will be used to determine importance. A justification of all determinations of importance are provided in **Table 5.13**.

**Table 5.13 - Importance of the Proposed Development for Ecological Features**

Geographic Context of Importance	Description
International or European	<p>European sites including SPAs, candidate SACs and Sites of Community Importance (SCI). Potential SPAs (pSPA), and Ramsar sites (designated under international convention).</p> <p>Areas of habitat or populations of species which meet the published selection criteria based on discussions with Natural England and field data collected to inform EclA for designation as a European site, but which are not themselves currently designated at this level.</p>
National (UK context)	<p>Nationally designated sites including SSSIs and National Nature Reserves (NNRs).</p> <p>Areas (and the populations of species which inhabit them) which meet the published selection criteria guidelines for selection of biological SSSIs but which are not themselves designated based on field data collected to inform EclA, and in agreement with Natural England.</p> <p>Section 41 habitats and species (also known as Priority Habitats and Priority Species) listed under the NERC act, red listed (IUCN, 2023) and legally protected species that are not addressed directly in Part 2 of the “Guidelines for Selection of Biological SSSIs” but can be determined to be of national importance using the principles described in Part 1 of the guidance.</p>

<sup>51</sup> The Chartered Institute for Ecology and Environmental Management (CIEEM) refer to biodiversity receptors within technical guidance as ecological features. This term is therefore used in this chapter in place of ‘receptors’ but for the purposes of the assessment they are the same.

Geographic Context of Importance	Description
	Areas of Ancient Woodland e.g. woodland listed within the Ancient Woodland Inventory and ancient veteran trees
County	Local Nature Reserves (LNRs) and Non-Statutory Designated sites including SNCIs. Area which based on field data collected to inform the EcIA meet the published selection criteria for those sites listed above (for habitats or species, including those listed in relevant Local Biodiversity Action Plans (LBAP)) but which are not themselves designated.
Local	Section 41 habitats and species listed under the NERC Act Red listed (IUCN, 2023) <sup>20</sup> and legally protected species that based on their extent, population size, quality etc. Are determined to be at a lesser level of importance that the geographic contexts above. Common and widespread semi-natural habitats occurring within the Study Area in proportions greater than may be expected in the local context. Common and widespread native species occurring within the Study Area in numbers greater than may be expected in the local context.
Negligible	Common and widespread semi-natural habitats and species that do not occur in levels elevated above those of the surrounding area. Area of heavily modified or managed land uses (e.g. hardstanding used for car parking, as roads etc.).

5.6.36. Where protected species are present and there is the potential for a breach of the legislation, those species will be considered as ‘important’ features. With the exception of such species receiving specific legal protection, or those subject to legal control (e.g. invasive species), all ecological features determined to be important at negligible level will be scoped out of the assessment. Furthermore, ecological features of local importance, where there is a specific technical justification, will also be scoped out. This is because effects on these ecological features would not influence the decision-making about whether or not consent should be granted for the development (in other words a significant effect in EIA terms could not occur). This approach is consistent with that described in CIEEM (2019).

5.6.37. All legally protected species and ecological features that are of sufficient importance will then be taken through to the next stage of scoping assessment.

## LIKELY SIGNIFICANT EFFECTS

5.6.38. The likely significant biodiversity effects that will be taken forward for assessment in the ES are summarised in **Table 5.14**.

**Table 5.14 - Likely Significant Biodiversity Effects**

Activity	Effect	Receptor
<b>Construction</b>		
<b>Permanent or temporary land-take/ changes to habitats</b>	<p>Degradation and / or loss of habitat.</p> <p>Reduction in the availability of foraging and commuting habitat and resting or breeding sites.</p> <p>Killing or injury of fauna through the removal of occupied resting or breeding sites.</p> <p>Loss of ecological connectivity through severance of habitats resulting in fragmentation.</p> <p>Introduction or spread of invasive species.</p>	Terrestrial flora (Hedgerow with trees) and fauna, comprising bats
<b>Use of temporary lighting for security purposes or to illuminate construction working areas</b>	<p>Disturbance and displacement of fauna sensitive to lighting resulting in indirect loss of foraging and commuting habitat or resting or breeding sites.</p> <p>Disruption of the physiology of species reliant on natural day / night and seasonal light level changes resulting in loss of fitness and reduction in survival rates.</p> <p>Loss of ecological connectivity through severance (due to introduction of light) of habitats resulting in fragmentation.</p>	Terrestrial fauna (bats)
<b>Production of aural and visual stimuli and vibration from construction activities such as vehicular movements, piling or site personnel</b>	<p>Disturbance and displacement of species susceptible to noise / visual disturbance resulting in a reduction of energy intake and / or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.</p>	Terrestrial fauna (bats)
<b>Temporary hydrological changes (changes to sub surface and surface water flows)</b>	<p>Changes to local hydrology resulting in changes or loss of surrounding habitats with subsequent effects on the fauna they support.</p>	No ecological receptors
<b>Creation of airborne particles (e.g. dust) during construction activities and vehicle movements</b>	<p>Loss or damage of sensitive flora through smothering resulting in effects on habitat composition and the fauna that it supports.</p>	Terrestrial flora (Hedgerow with trees) and fauna, comprising bats
<b>Contamination of site run-off</b>	<p>The introduction of toxic pollutants or sediments into the environment</p>	Terrestrial flora (Hedgerow with trees)

Activity	Effect	Receptor
	resulting in changes, loss or damage to terrestrial environments and the fauna they support.	
<b>Increase in vehicle movements and changes in movement patterns and timings during construction activities</b>	Potential killing or injury of fauna through road traffic collisions.	Terrestrial fauna (bats)
<b>Operation</b>		
<b>Vehicle movements</b>	Potential disturbance of fauna through increased vehicle traffic movements  Potential killing or injury of fauna through road traffic collisions.	Terrestrial fauna (bats)
<b>Temporary hydrological changes (changes to sub surface and surface water flows)</b>	Changes to local hydrology resulting in changes or loss of surrounding habitats with subsequent effects on the fauna they support.	No ecological receptors
<b>Use of lighting for security or aviation safety purposes</b>	Disturbance and displacement of fauna sensitive to lighting resulting in indirect loss of foraging and commuting habitat or resting or breeding sites.  Disruption of the physiology of species reliant on natural day / night and seasonal light level changes resulting in loss of fitness and reduction in survival rates.  Loss of ecological connectivity through severance (due to introduction of light) of habitats resulting in fragmentation.	Terrestrial fauna (bats)

5.6.39. The effects scoped out from further assessment in the ES are:

- Statutory and non-statutory designated sites (The Severn Estuary SPA/ SAC/ Ramsar and the SNCIs within 2 km of the Site boundary). The distance between these and the Site, and the lack of hydrological connectivity, means that there is a lack of a clear effecting pathways with regard to the habitats and / or species for which these sites have been designated. Therefore, it is not considered there will be significant effects on the ecological interest of these designated sites (alone or cumulatively) as a result of the Proposed Development.
- Badger. Although there are badger records within 500m of the site, no sign of badger presence was recorded during the survey and the Site is therefore considered unlikely to be of significant value to badgers. Therefore, no significant effects would be predicted, and badger is scoped out of further assessment. However, as indicated in paragraph 5.6.11, it is recommended that a walkover should be undertaken two months prior to works being undertaken to confirm no badger activity is present.



- Dormouse. No records of dormouse were identified during the desk study nor were any signs recorded during the Phase 1 survey. The habitats on Site such as deciduous woodland lack a good understorey and range of species such as hazel, bilberry and honeysuckle which all provide important food resources for dormice. The hedges around Site also lack a complexity of native flora species and are somewhat isolated between the quarry, quarry tracks made of bare ground and the M5 motorway. Therefore, it is concluded dormice are likely absent from Site and no significant effects would be predicted. Therefore, dormouse is scoped out of further assessment. However, to minimise any residual risk, site clearance and construction works should follow an Ecology Method Statement.
- Great crested newt. The waterbody on Site was unsuitable for GCN (dry). Whilst there are two further ponds mapped south-west of the Site, roughly 450m away, these are separated by a road and several grazed fields and as such the potential for GCN to be present on Site is considered to be extremely low. Therefore, no significant effects would be predicted and effects on great crested newt are scoped out of the further assessment. However, to minimise any residual risk, site clearance and construction works should follow an Ecology Method Statement.
- Reptiles. The habitats within Site have potential for reptiles such as the grassland and scrub providing suitable hibernation and foraging potential however, they are of such limited extent, and the surrounding habitats remain suitable, that no significant effects would be predicted from the loss of the habitats on site. However, to minimise any residual risk, site clearance and construction works should follow an Ecology Method Statement.
- Breeding birds. As indicated in paragraph 5.6.18, the Site has potential to support a breeding bird community comprising common and widespread species that are typical of the habitats in the area (primarily grassland, woodland and hedgerows). The habitats on site are unsuitable for species for which Severn Estuary SPA and Ramsar is designated. Therefore, due to the small amount of habitat present on-site, and the likely low conservation value of the species present, the Site is considered unlikely to be of significant value to breeding birds and no significant effects would be predicted. Breeding birds are therefore scoped out of further assessment. However, to safeguard any breeding birds present on-site, the works should follow an Ecology Method Statement detailing working measures to be followed. Wherever possible, any works should be completed outside of the breeding bird season (March to August inclusive). Should any vegetation clearance or management be required during this period, a suitably qualified ecologist should inspect the vegetation prior to the work commencing in order to check for the presence of any active nests. If an active nest is found, it should be left undisturbed, using an appropriate buffer, until the young birds have fledged. Where possible all suitable habitat such as woodland to the South and hedgerows around the north and east should be retained during the quarry extension works.
- Otter and water vole. No records of otter or water vole were identified during the desk study nor were any signs of otter or water vole identified during the field surveys as the habitats on site are unsuitable for these species. Therefore, it is concluded that otter and water vole are likely absent from the Site and are scoped out from further assessment.



- Other Priority species. Whilst the habitats on-site are suitable for Priority species identified within the desk study, such as hare and hedgehog, due to the limited extent of the Site, and hence the likely limited, if any, presence of Priority species, the Site is considered unlikely to be of significant value to these and no significant effects would be predicted. Other Priority species are therefore scoped out of further assessment. However, to minimise any residual risk, site clearance and construction works should follow an Ecology Method Statement.

## ASSESSMENT METHODOLOGY

- 5.6.40. The assessment will be based upon not only the results of the desk study and field surveys, but also relevant published information (for example on the status, distribution, sensitivity to environmental changes and ecology of the features scoped into the assessment, where this information is available), and professional knowledge of ecological processes and functions.
- 5.6.41. For each scoped-in ecological feature effects will be assessed against the predicted future baseline conditions for that feature during construction and operation.
- 5.6.42. Throughout the assessment process, the initial results of the assessment regarding potentially significant effects will be used to inform whether additional baseline data collection is required, together with the identification of environmental measures that should be embedded into the development proposals to avoid or reduce adverse effects or to deliver enhancements.
- 5.6.43. For species that occur within the Zone of Influence (Zol), the assessment will consider the total area that is used by the affected individuals or the local population of the species (e.g. for foraging or as breeding territories).

## OVERVIEW

- 5.6.44. CIEEM (2019)<sup>52</sup> defines a significant effect as one “that either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general”.
- 5.6.45. When considering potentially significant effects on ecological features, whether these be adverse or beneficial, the following characteristics of environmental change are taken into account:
  - Extent – the spatial or geographical area over which the environmental change may occur;
  - Magnitude – the size, amount, intensity or volume of the environmental change;
  - Duration – the length of time over which the environmental change may occur;
  - Frequency – the number of times the environmental change may occur;
  - Timing – the periods of the day / year etc. during which the environmental change may occur; and
  - Reversibility – whether the environmental change can be reversed through restoration actions.

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<sup>52</sup> The Chartered Institute for Ecology and Environmental Management (CIEEM) refer to biodiversity receptors within technical guidance as ecological features. This term is therefore used in this chapter in place of ‘receptors’ but for the purposes of the assessment they are the same.

## MAGNITUDE OF CHANGE

- 5.6.46. Although the characteristics described above are all important in assessing effects by using information about the way in which habitats and species are likely to be affected, a scale for the magnitude of the environmental change, as a result of the Proposed Development, has been described in **Table 5.15** to provide an understanding of the relative change from the baseline position, be that adverse or beneficial changes.

**Table 5.15 - Guidelines for the Assessment of the Scale of Magnitude**

Scale of Change	Criteria and Resultant Effect
<b>High</b>	The change permanently (or over the long-term) affects the conservation status of a habitat / species, reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area. Relative to the wider habitat resource / species population, a large area of habitat or large proportion of the wider species population is affected. For designated sites, integrity is compromised. There may be a change in the level of importance of the receptor in the context of the project.
<b>Medium</b>	The change permanently (or over the long term) affects the conservation status of a habitat / species reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area. Relative to the wider habitat resource / species population, a small-medium area of habitat or small-medium proportion of the wider species population is affected. There may be a change in the level of importance of this receptor in the context of the project.
<b>Low</b>	The quality or extent of designated sites or habitats or the sizes of species' populations, experience some small-scale reduction or increase. These changes are likely to be within the range of natural variability and they are not expected to result in any permanent change in the conservation status of the species / habitat or integrity of the designated site. The change is unlikely to modify the evaluation of the receptor in terms of its importance.
<b>Very Low</b>	Although there may be some effects on individuals or parts of a habitat area or designated site, the quality or extent of sites and habitats, or the size of species populations, means that they would experience little or no change. Any changes are also likely to be within the range of natural variability and there would be no short-term or long-term change to conservation status of habitats / species receptors or the integrity of designated sites.
<b>Negligible</b>	A change, the level of which is so low, that it is not discernible on designated sites or habitats or the size of species' populations, or changes that balance each other out over the lifespan of a project and result in a neutral position.

## DETERMINING SIGNIFICANCE - ADVERSE AND BENEFICIAL EFFECTS

- 5.6.47. Adverse effects are assessed as being significant if the favourable conservation status of an ecological feature would be lost as a result of the Proposed Development. Beneficial effects are assessed as those where a resulting change from baseline improves the quality of the environment (e.g. increases species diversity, increases the extent of a particular habitat etc., or halts or slows down an existing decline). For a beneficial effect to be considered significant, the conservation status would need to positively increase in line with a magnitude of change of "high" as described in **Table 5.15**.

5.6.48. Conservation status is defined as follows (as per CIEEM 2019):

- “For habitats, conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and typical species within a given geographical area;
- For species, conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area”.

5.6.49. The decision as to whether the conservation status of an ecological feature would alter has been made using professional judgement, drawing upon the information produced through the desk study, field survey and assessment of how each feature is likely to be affected by the Proposed Development.

5.6.50. A similar procedure is used where designated sites may be affected by the Proposed Development, except that the focus is on the effects on the integrity of each site. The integrity of a site is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was designated.

5.6.51. The assessment of effects on integrity draws upon the assessment of effects on the conservation status of the features for which the site has been designated.

## **APPROACH TO MITIGATION AND COMPENSATION**

5.6.52. The mitigation hierarchy will be applied to biodiversity (CIEEM 2019) to ensure designs first seek to avoid significant harm, to mitigate where it is unavoidable, and, as a last resort, to compensate for residual effects that remain after avoidance and mitigation measures are implemented. This is being considered through the design process, and potential mitigation measures associated with notable and legally protected species will also be considered.

5.6.53. These measures include determining the extent and distribution of suitable habitats required within the Proposed Development to account for the likely effects on legally protected (e.g. reptiles, bats etc.) and other notable species, the types of habitats that they may require and how these can be incorporated within developing designs. As the Proposed Development design and construction phase plans develop, mitigation plans will evolve.

## **Biodiversity Net Gain**

5.6.54. Section 4 of the Government’s response to the consultation paper on BNG Regulations and Implementation (Jan 2022)<sup>53</sup> indicates new mandatory provision of BNG would not be applicable to Section 73 applications where the original planning permission pre-dates BNG requirements. Notwithstanding this, the Proposed Development will identify potential ecological enhancements where necessary, that would be proportionate to the Proposed Development, and which would deliver ecological benefits.

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<sup>53</sup> UK Government’s consultation paper on BNG Regulations and Implementation (Jan 2022) and the Government response and summary of responses (February 2023). [Online]. Available at <https://www.gov.uk/government/consultations/consultation-on-biodiversity-net-gain-regulations-and-implementation/outcome/government-response-and-summary-of-responses#introduction-and-context> Last accessed 14/08/2023.

## 5.7 SOCIO-ECONOMICS

### RELEVANT POLICIES AND THEIR IMPLICATIONS FOR SCOPING

- 5.7.1. **Table 5.16** lists the planning policy guidance and policies that are relevant to socio-economic effects and sets out the implications of the guidance and policies for the scope of the EIA.

**Table 5.16 - Relevant Policies and their Implications (Socio-Economics)**

Policy Reference	Implications
<b>National Policy:</b>	
<b>National Planning Policy Framework, 2023 (NPPF) Section 6. Building a strong, competitive economy NPPF Paragraph 80</b>	The NPPF at Paragraph 80 states that “Planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt. Significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development.”
<b>NPPF 2021 Paragraph 84.</b>	Under the ‘Supporting a prosperous rural economy’ section, The NPPF at Paragraph 83 states that “planning policies and decisions should enable: the sustainable growth and expansion of all types of business in rural areas.”
<b>NPPF Section 17. Facilitating the sustainable use of Minerals Paragraph 209.</b>	States that it is essential that there is sufficient supply of minerals to provide the infrastructure, buildings, energy and goods to support the country’s needs and best use needs to be made of mineral resources.
<b>NPPF Paragraph 211.</b>	Paragraph 205 states that great weight should be given to the benefits of mineral extraction, including to the economy when determining planning applications.
<b>Local Policy:</b>	
<b>South Gloucestershire Local Plan: Core Strategy (2013) Policy CS11 – Distribution of Economic Development Land</b>	This policy seeks to maintain a supply of economic development land through safeguarded and allocated areas across South Gloucestershire.
<b>Policy CS15 – Distribution of Housing</b>	This policy seeks the provision of at least 28,355 new homes between 2006 and 2027. The policy estimates 4,180 homes will remain to be built between 2023-2027.

### LEGISLATION

- 5.7.2. There is no specific legislation pertaining to the assessment of socio-economic effects that will require consideration in the EIA.

### BASELINE CONDITIONS

#### Data Sources

- 5.7.3. The assessment of socio-economic issues will draw upon information from the following data sources:

- The existing and emerging development plan and its associated evidence base;
- The Somerset Economic Assessment (2016) and any associated updates; and
- Statistics (where required) provided by the NOMIS and ONS websites.

### **Summary of Baseline Conditions**

- 5.7.4. Heidelberg is a well-established company who currently employ over 3,500 people across the UK. The company's existing operations at Tytherington Quarry mean that Heidelberg is already an important local employer, currently directly supporting 14 full-time employees at Tytherington, plus many more in their supply chain of contractors and support staff.

### **Predicted Trends**

- 5.7.5. Whilst there are not expected to be any 'external' changes which would affect the baseline conditions, in the absence of the proposed development, materials needed for key national and local infrastructure projects wouldn't be provided from Tytherington and alternative supplies would need to be developed.

### **SCOPE OF ASSESSMENT**

- 5.7.6. Although it is not envisaged that the extension into the consented soil storage area at Tytherington Quarry would result in the creation of significant additional employment opportunities, it is recognised that the proposed development would ensure the long-term security of the site, enabling job retention, which could have an effect on employment and inward investment in the wider area.
- 5.7.7. In addition to securing direct employment opportunities at the site, it is envisaged that a number of indirect and induced jobs will continue to be supported, because of the need to service the site. Typically, these relate to the provision of a wide variety of goods and services, including specialist engineering assistance for plant maintenance and contractors for services such as the provision of mobile plant etc.
- 5.7.8. It is recognised that the extension of Tytherington Quarry into the soil storage area could have an effect on the local employment and inward investment. The socio-economic assessment will therefore be concerned with:
- Change in the local employment structure and effect on the local employment market;
  - Employment opportunities and displacement; and
  - Increased local expenditure.

- 5.7.9. The receptors to be assessed will include existing residents and local employers.

### **ASSESSMENT METHODOLOGY**

- 5.7.10. The assessment will follow the best practice guidelines for undertaking socio-economic assessments (including The Green Book: Appraisal and Evaluation in Central Government, HM Treasury 2003 and A Standard Approach to Assessing the Additional Impact of Projects, English Partnerships, 2nd edition 2004).

## 5.8 CLIMATE CHANGE – RESILIENCE

### RELEVANT POLICIES AND THEIR IMPLICATIONS FOR SCOPING

- 5.8.1. This section identifies the relevant legislation, national and local policy and guidance which has informed the scope of the assessment relevant to Climate Change Resilience. A summary of the relevant policy and legislation are given in **Table 5.17**.

**Table 5.17 - Relevant Policies and Their Implications (CCR Assessment)**

Policy Reference	Implications
<b>Legislation:</b>	
<b>UK Climate Change Act 2008 (as amended)</b>	The Climate Change Act 2008 requires the Government to lay before Parliament five-yearly climate change risk assessments (CCRA) detailing current and predicted impacts of climate change in the UK. The Act requires a Climate Change Risk Assessment to be used to assess the risks from the impact of Climate Change to the UK. The third Climate Change Risk Assessment (CCRA) was published in 2022. The overall aim of the CCRA is to assess the urgency of further action to tackle current and future risks, and realise opportunities, arising for the UK from climate change. The Act also requires the production of a National Adaptation Plan for the UK Government to be ready for the challenges of climate change.
<b>International Policy:</b>	
<b>The United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement</b>	The UNFCCC is the major international body responsible for managing climate change and carbon emissions. In 2015, it adopted the Paris Agreement, the aims of which are stated as: <i>“This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: ...(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production.”</i>
<b>The United Nations Framework Convention on Climate Change (UNFCCC) Glasgow Climate Pact</b>	The Glasgow Pact emphasised the urgency of the scaling up of action and support to “enhance adaptive capacity, strengthen resilience and reduce the vulnerability to climate change”.
<b>National Policy:</b>	
<b>National Planning Policy Framework (NPPF) 2023</b>	The NPPF sets out the Government’s planning policies for England. The planning process aims to achieve sustainable development following three overarching objectives: economic, social and environmental including adapting to climate change. Paragraph 153 of the framework suggests plans should take a proactive approach to adapting to climate change. <i>Paragraph 154 states “New Development should be planned for in ways that: avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks</i>



Policy Reference	Implications
	<i>can be managed through suitable adaptation measures, including through the planning of green infrastructure.”</i>
<b>National Adaptation Programme (NAP)</b>	The NAP sets out the actions that government and others will take to adapt to climate change in England over a five-year period. The third NAP runs from 2023 to 2028.
<b>25 Year Environment Plan</b>	This plan sets out how government action will help the natural world and how we will tackle the effects of climate change.
<b>Local Planning Policy:</b>	
<b>South Gloucestershire Local Plan: Core Strategy 2006-2027 (adopted 2013). Policy CS1 – High quality design</b>	This policy seeks the highest possible standards with respect to design. It also requires development proposals to assist in meeting climate change objectives which include achieving energy conservation, protection of environmental resources and renewable and low carbon energy installations and infrastructure. Proposals will be expected to take account of Strategic Flood Risk Assessments and provide measures to manage flood risk include surface water management plans.

## TECHNICAL GUIDANCE

5.8.2. A summary of the relevant technical guidance is given in **Table 5.18** for the CCR assessment.

**Table 5.18 - Technical guidance relevant to CCR Assessment**

Technical Guidance	Implications
<b>UK Climate Projections 2018 (UKCP18)<sup>54</sup></b>	UKCP18 has been produced by the Met Office and provides the latest set of climate change projections for the UK. It includes projections of how key climate parameters could change in the coming decades, through absolute values or anomalies from the baseline.  UKCP18 projections will be used in the CCR assessment. Should a new version of UK Climate Projections be produced during the assessment period, they would be used instead of UKCP18.
<b>UKCP18 technical notes including: Science Overview Report UKCP18 Land projections: Science Report UKCP18 Factsheets</b>	The UKCP18 technical notes provide qualitative information on projections for future time periods. These technical notes will be used in the CCR assessment when relevant quantitative projections are not available.
<b>State of the UK Climate 2022<sup>55</sup></b>	The report provides a summary of the UK’s weather and climate during 2022 alongside the historical context for a number of climate variables.

<sup>54</sup> UKCP18 UK Climate Projections Data (Online). Accessed from: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/download-data>

<sup>55</sup> Kendon, M., McCarthy, M., Jevrejeva, S., Matthews, A., Williams, J., Sparks, T., & West, F. (2023). State of the UK Climate 2022. International Journal of Climatology, 43(S1), 1–82. <https://doi.org/10.1002/joc.8167>

Technical Guidance	Implications
<b>ISO14091:2021 Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment</b> <sup>56</sup>	This international standard provides guidelines on approaches to assessing climate change-related risks. It states that “ <i>risk assessments improve planning of adaptation to climate change and inform the implementation and monitoring of climate change adaptation activities</i> ”.
<b>Commission Notice – Technical guidance on the climate proofing of infrastructure in the period 2021 - 2027</b> <sup>57</sup>	This note gives technical guidance on the climate proofing of infrastructure, which includes the adaptation to climate change (climate resilience). The note contains guidance on the methodology of assessments, include the role within EIAs.
<b>Institute of Environmental Assessment and Management (IEMA) EIA Guide to: Climate Change Resilience and Adaptation (2020)</b> <sup>58</sup>	This IEMA guidance provides a framework for the effective consideration of climate change resilience and adaptation in the EIA process, including a robust methodology.
<b>UK Climate Change Risk Assessment 2022</b> <sup>59</sup>	The Climate Change Risk Assessment (CCRA) fulfils the requirement under the Climate Change Act 2008 for the Government to produce a five-yearly assessment of the risks for the UK of the current and predicted impacts of climate change. It reports the key areas and urgency of climate risk.
<b>Climate Change Adaptation Manual (NE751)</b> <sup>60</sup>	The Climate Change Adaptation Manual (NE751) has been updated in 2020. It is designed to support practical and pragmatic decision-making on considering climate change adaptation for impacts on habitats, green infrastructure, geology and geomorphology, and access and recreation.

## BASELINE CONDITIONS

### Data Sources

- 5.8.3. A review of published current and historical regional weather data in the location of the Proposed Development was completed to establish the baseline for the CCR and adaptation assessment. The following desk-based sources were utilised:

<sup>56</sup> ISO14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment (Online). Accessed from: <https://www.iso.org/standard/68508.html>

<sup>57</sup> Commission Notice – Technical guidance on the climate proofing of infrastructure in the period 2021 – 2017. 2021 (Online). Official Journal of the European Union 2021/C 373/01 pp. 1 – 92. Accessed from: <https://op.europa.eu/en/publication-detail/-/publication/23a24b21-16d0-11ec-b4fe-01aa75ed71a1/language-en>.

<sup>58</sup> IEMA EIA Guide to: Climate Change Resilience and Adaptation (Online). Accessed from: <https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020>

<sup>59</sup> HM Government (2022)) UK Climate Change Risk Assessment 2022 (online). Accessed from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1047003/climate-change-risk-assessment-2022.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf)

<sup>60</sup> Natural England and RSPB, 2019. Climate Change Adaptation Manual - Evidence to support nature conservation in a changing climate, 2nd Edition. Natural England, York, UK (Online). Accessed from: <http://publications.naturalengland.org.uk/publication/5679197848862720>

- State of the UK Climate 2022<sup>61</sup> used to inform the current baseline.
- Met Office Climate Averages<sup>62</sup>, providing local, regional and national climate trend data to inform the current baseline.
- Met Office Midlands: Climate<sup>63</sup>. This document describes the main features of the climate over a 30-year average period of 1981 – 2010;
- Met Office Past Weather Events<sup>64</sup>, used to inform the current baseline.
- UKCP18 probabilistic climate change regional projections<sup>65</sup>; and
- Climate Risk Indicators<sup>66</sup>.

### Current Baseline Conditions

- 5.8.4. The current baseline describes the climate trends over the past three decades (1991-2020) for temperature, precipitation (rain and snow), wind, humidity and solar radiation. Sea level rise has been excluded due to the location of Project being over 7km from the River Severn and at an elevation of approximately 100m above sea level.
- 5.8.5. The current baseline conditions provide an understanding of how recent climate trends have impacted the Study Area. Climate trend data is presented for both the UK context as well as the local climate, as represented by Filton weather station (approximately 9km north east of the Study Area)<sup>67</sup>.

### UK Context

- 5.8.6. According to the latest State of the UK Climate Report<sup>68</sup>, the UK's climate is changing, with recent decades warmer, wetter and sunnier than the 20th century. The Report highlights that the UK has warmed at a broadly consistent (but slightly higher) rate than the observed change in global mean temperature. The key findings from the latest 2022 report are:
- The observations show that in the UK extremes of temperature are changing much faster than the average temperature.
  - 40°C was recorded in the UK for the first time during a heatwave which exceeded previous records by a large margin. The UK's record warm year of 2022 and unprecedented July heatwave were both made more likely by climate change.

<sup>61</sup> Kendon, M., McCarthy, M., Jevrejeva, S., Matthews, A., Williams, J., Sparks, T., & West, F. (2023). State of the UK Climate 2022. International Journal of Climatology, 43(S1), 1–82. <https://doi.org/10.1002/joc.8167>

<sup>62</sup> Met Office UK Climate averages (online). Available from: <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gc9q6c2v>

<sup>63</sup> Met Office Midlands: Climate (online). Available from: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/regional-climates/midlands-climate---met-office.pdf>

<sup>64</sup> Met Office. Past Weather Events Available from: <https://www.metoffice.gov.uk/weather/learn-about/past-uk-weather-events>

<sup>65</sup> Met Office. UK Climate Projections Available from: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp>

<sup>66</sup> Nigel Arnell. (2021). The Climate Risk Indicators. Available at: <https://uk-cri.org/>

<sup>67</sup> Met Office UK Climate averages (online). Available from: <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gc9q6c2v>. (Accessed 18 July 2023).

<sup>68</sup> Kendon, M., McCarthy, M., Jevrejeva, S., Matthews, A., Williams, J., Sparks, T., & West, F. (2023). State of the UK Climate 2022. International Journal of Climatology, 43(S1), 1–82. <https://doi.org/10.1002/joc.8167>

- 2022 was the warmest year in the UK series from 1884, 0.9°C above the 1991–2020 average. It was the first year to record a UK annual mean temperature above 10°C. All the top-10 warmest years for the UK in the series from 1884 have occurred in this century.
- Cooling degree days<sup>69</sup> are dominated by annual variability; however, for England, the most recent decade (2013–2022) has had 7 more CDD than 1991–2020 and 15 more than 1961–1990 – the latter representing a doubling over this period.
- For the most recent decade (2013–2022) UK winters have been 10% wetter than 1991–2020 and 25% wetter than 1961–1990.
- In recent years, widespread and substantial snow events have occurred in 2021, 2018, 2013, 2010 and 2009, but their number and severity have generally declined since the 1960s.
- The UK annual mean wind speed from 1969 to 2022 shows a downward trend, consistent with that observed globally.
- Over the past 30 years (1993–2022) the sea level has risen by 11.4cm. The rate of sea-level rise is increasing.
- The most widespread storm surges of 2022 came with storm Eunice on 18 February, with the northern Irish Sea witnessing over 1m skew surges.
- The period January–August was the driest across England and Wales since 1976, with drought status declared across parts of England and all of Wales.

## Local Climate

### PRECIPITATION - RAINFALL

- 5.8.7. Average seasonal rainfall at Filton weather station, within the Midlands region, and for the UK – for the period 1991–2020 – is presented in **Table 5.19**. It shows that the weather station received less rainfall than both the region and the UK average in summer. In winter, the weather station receives more rainfall in winter in comparison to the region but experiences less rainfall than the UK average.

**Table 5.19 - Long Term Average Seasonal Rainfall (mm) (1991–2020) for Filton Weather Station, the Midlands Region, and the Rest of the UK**

Season	Filton Weather Station	District: Midlands	UK
Summer (June, July, August)	190.1	200.9	253.4
Winter (December, January, February)	230.1	214.5	344.9

<sup>69</sup> Day-by-day sum of number of degrees by which the mean temperature is more than 22°C

- 5.8.8. The Project is located in Flood Zone 1<sup>70</sup> which has a low probability of flooding from rivers and the sea. Surface water flooding<sup>71</sup> is low across the site, where there is a chance of flooding of less than 0.1% each year. However, there are areas at high risk of surface water flooding (a chance of flooding of greater than 3.3% each year) adjacent to the Project boundary.

### Precipitation – snow and ice

- 5.8.9. Snowfall is closely linked with temperature, with falls rarely occurring if the temperature is higher than 4°C. In the local area, snowfall is normally confined to the months from November to April, but upland areas may have brief falls in October and May. Snow rarely lies outside the period from December to March.

### Temperature

- 5.8.10. **Table 5.20** shows the long-term average seasonal mean temperature for Filton weather station, the Midlands region, and the UK between 1991-2020. It shows that the weather station is warmer than both the region and UK average, during summer and winter.

**Table 5.20 - Long Term Average Mean Seasonal Temperature (°C) (1991–2020) for Filton Weather Station, the Midlands Region, and the Rest of the UK**

Season	Filton Weather Station	District: Midlands	UK
Summer (June, July, August)	16.8	15.7	14.6
Winter (December, January, February)	5.44	4.4	4.1

### Wind

- 5.8.11. The Midlands area is one of the more sheltered parts of the UK, the windiest areas being in western and northern Britain, closer to the Atlantic. The strongest winds are associated with the passage of deep areas of low pressure close to or across the UK. The frequency and strength of these depressions is greatest in the winter, especially from December to February, and this is when mean speeds and gusts (short duration peak values) are strongest.

### Humidity

- 5.8.12. The annual average relative humidity for the Study Area is 80-82%.

### Solar Radiation

- 5.8.13. Average seasonal sunshine hours at Filton weather station, the Midlands region, and the UK for the period 1991–2020 is presented in **Table 5.21**. The table shows that the weather station receives greater sunshine than the region during summer and the UK during both seasons, but slightly less than the regional average in winter.

<sup>70</sup> Environment Agency (2021) Flood map for planning. Available at: [https://flood-map-for-planning.service.gov.uk/flood-zone-results?polygon=\[\[365676,187907\],\[365853,188076\],\[365681,188250\],\[365563,188075\],\[365676,187907\]\]&center=\[365708,188078\]&location=GL12%25208UW](https://flood-map-for-planning.service.gov.uk/flood-zone-results?polygon=[[365676,187907],[365853,188076],[365681,188250],[365563,188075],[365676,187907]]&center=[365708,188078]&location=GL12%25208UW)

<sup>71</sup> Environment Agency (2019) Check your long term flood risk. Available at <https://check-long-term-flood-risk.service.gov.uk/map?easting=365647.07&northing=188728.61&map=SurfaceWater>

**Table 5.21 - Long Term average Seasonal Sunshine (hours) (1991–2020) for Filton Weather Station, the Midlands Region, and the Rest of the UK**

Season	Filton Weather Station	District: Midlands	UK
Summer (June, July, August)	629	546	507
Winter (December, January, February)	196	180	162

### Past major events

- 5.8.14. Flood events in the region have occurred, with news reports noting road closures around Tytherington in March 2016<sup>72</sup> and Thornbury in April 2023<sup>73</sup>. Storm Alex occurred in October 2022<sup>74</sup> and storm Noa in April 2023<sup>75</sup> and saw strong winds and heavy rain causing travel disruption and power cuts to south west England.
- 5.8.15. In February 2022, Storm Eunice led to wind speeds reaching gusts of 52 knots (approximately 60 mph) in the area of the Project. Across the UK and Ireland, fallen trees resulted in four deaths, the Humber bridge and both Severn bridges were closed for the first time in their history, and buildings were damaged<sup>76</sup>.
- 5.8.16. In July 2022, the UK experienced a brief but unprecedented extreme heatwave from 16 to 19 July 2022, as hot air moved north from the near continent, with extreme temperatures recorded on both 18 and 19 July. This heatwave marked a milestone in UK climate history, with 40°C being recorded for the first time in the UK, with a large part of England exceeding 37°C. Nationally, the heat brought challenging conditions for the NHS with a spike in 999 calls, and care services supporting the elderly and vulnerable were put under increased stress. Many schools remained open but ran a shorter day in parts of the country. There were several fatalities associated with open water swimming. Several fire services declared major incidents after multiple fires broke out. The UK Health Security Agency (UKHSA) published analysis of deaths during heat-periods in 2022 and which suggests that the 5-heat periods in the summer of 2022 resulted in a total of 2,803 excess deaths (excl. COVID-19) in people aged 65 and over across England as a whole<sup>77</sup>.

<sup>72</sup> Gazette (2016) Flooding causes chaos on the region's roads. Available from <https://www.gazetteseries.co.uk/news/14331057.flooding-causes-chaos-on-the-regions-roads/>

<sup>73</sup> Gazette (2023) Thornbury road floods again despite South Glos council 'repairs' Available from <https://www.gazetteseries.co.uk/news/23447849.thornbury-road-floods-despite-south-glos-council-repairs/>

<sup>74</sup> Met Office (2020) Storm Alex and heavy rain 2 to 4 October 2020. Available from [https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2020/2020\\_09\\_storm\\_alex\\_1.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2020/2020_09_storm_alex_1.pdf)

<sup>75</sup> Met Office (2023) Storm Noa, 12 April 2023. Available from [https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2023/2023\\_02\\_storm\\_noa.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2023/2023_02_storm_noa.pdf)

<sup>76</sup> Met Office (2022) Storms Dudley, Eunice and Franklin. Available at: [https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022\\_01\\_storms\\_dudley\\_eunice\\_franklin\\_r1.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_01_storms_dudley_eunice_franklin_r1.pdf)

<sup>77</sup> Met Office (2022) Unprecedented extreme heatwave, July 2022. Available from [https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022\\_03\\_july\\_heatwave.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_03_july_heatwave.pdf)



- 5.8.17. December 2022 saw a week of cold temperatures and snow. The 12 December was recorded as the coldest day in the UK since December 2010, according to provisional data from the Met Office. A Level 3 Cold Weather Alert was issued from 9-16 December by the UKHSA, with concerns for serious health consequence, particularly for the elderly and those with heart or lung conditions. The prolonged spell of low temperatures resulted in ice forming on many inland lakes and waterways. Widespread snow and icy conditions made difficult driving conditions<sup>78</sup>.

### Future Baseline

- 5.8.18. The UKCP18 probabilistic projections for RCP8.5<sup>79,80</sup> (high emission scenarios) have been used to infer future changes in a range of climate variables that may affect the vulnerability of the Proposed Scheme to climate change. The Climate Risk Indicators (CRI), developed as part of the UK Climate Resilience Programme has been used to infer this assessment. The CRI utilises the UKCP18 projections and allows for a range of climate related indicators (including but not limited to, Met Office Heatwaves and heat stress). The CRI data for the local authority area of South Gloucester has been used to inform this assessment.
- 5.8.19. The future climate has been presented for the 2030s (2020-2049), the 2050s (2040-2069) to identify the anticipated climate conditions relevant to the extant permission for the site (2042). These projections are provided against the baseline period of 1981-2010 (based on model data), and 1991-2020 (current climate) as an indication of change from the baseline period.
- 5.8.20. Climate change is projected to lead to warmer, wetter winters and hotter, drier summers, with an increase in the intensity and frequency of extreme events such as heatwaves, drought, extreme rainfall leading to flash flooding, storms and wind events. The information presented below illustrates how the climate may evolve at the site of the Proposed Scheme by the end of the century.
- 5.8.21. **Table 5.22** provides an overview of current and projected summer and winter temperature and rainfall for the location of the Proposed Scheme.

**Table 5.22 - Future Climate Projections for the Model Reference (1981-2010), Current (1991-2020) and Future Climate (2030s, 2050s) for RCP8.5 (Anomalies), the Table Shows the 50th Percentile (10th Percentile to 90th Percentile) Values**

Climate Variable	Model Reference (1981-2010)	Current Baseline (1991-2020)	RCP8.5		Trend (50 <sup>th</sup> percentile)
			2030	2050	
Mean Annual Temperature (°C)	10.6°C	10.9°C	+1.1°C (0.5°C to 1.8°C)	+2.0°C (1.0°C to 3.1°C)	↑

<sup>78</sup> Met Office (2022) Prolonged spell of low temperatures, December 2022. Available from [https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022\\_04\\_december\\_low\\_temperatures\\_v1.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_04_december_low_temperatures_v1.pdf)

<sup>79</sup> Representative Concentration Pathways (RCPs) specify concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to pre-industrial levels. Radiative forcing targets for 2100 have been set at 2.6, 4.5, 6.0 and 8.5 W m<sup>-2</sup> named RCP2.6, RCP4.5, RCP6.0 and RCP8.5, respectively.

<sup>80</sup> RCP8.5 (high emission scenarios) is used to ensure a suitable conservative approach in line with IEMA guidance.

Climate Variable	Model Reference (1981-2010)	Current Baseline (1991-2020)	RCP8.5		Trend (50 <sup>th</sup> percentile)
			2030	2050	
Mean Summer Temperature (°C)	16.6°C	16.8°C	+1.4°C (0.6°C to 2.3°C)	+2.6°C (1.1°C to 4.2°C)	↑
Mean Winter Temperature (°C)	5.0°C	5.4°C	+0.9°C (0.1°C to 1.8°C)	+1.7°C (0.7°C to 2.8°C)	↑
Maximum Summer Temperature (°C)	20.8°C	20.9°C	+1.6°C (0.6°C to 2.7°C)	+2.9°C (1.1°C to 4.9°C)	↑
Minimum Winter Temperature (°C)	2.2°C	2.5°C	+0.9°C (0.0°C to 2.0°C)	+1.7°C (0.5°C to 3.0°C)	↑
Mean Annual Rainfall	802mm	819mm	+0.6% (-4.2% to +5.4%)	-0.6% (-7.2% to +6.5%)	↑
Mean Winter Rainfall	222mm	230mm	+6.3% (-2.1% to +15.0%)	+11.7% (-0.3% to +25.4%)	↑
Mean Summer Rainfall	174mm	190mm	-12.9% (-28.0% to +3.0%)	-24.5% (-43.7% to -3.6%)	↓
Met office heatwave <sup>*81</sup> (events per year)	0.58	0.66	1.19 (0.77 to 1.80)	2.12 (1.00 to 3.75)	↑
Heat stress <sup>*82</sup> (days per year)	0.07	0.14	0.45 (0.19 to 0.95)	1.14 (0.34 to 3.54)	↑

<sup>81</sup> A UK heatwave threshold is met when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold. The threshold for the local area is 25°C.

<sup>82</sup> Days with shade Wet Bulb Globe Temperature (WBGT) above 25°C

Climate Variable	Model Reference (1981-2010)	Current Baseline (1991-2020)	RCP8.5		Trend (50 <sup>th</sup> percentile)
			2030	2050	
<b>Frost days<sup>*83</sup></b> (days per year)	41.70	39.86	30.32 (23.19 to 37.77)	23.13 (15.94 to 32.13)	↓
<b>SPEI Drought<sup>*84</sup></b> (proportion of time)	0.067	0.072	0.13 (0.07 to 0.22)	0.22 (0.10 to 0.33)	↑
<b>Relative Humidity (%)</b>	80-82%	--	-1.9% (-3.3% to -1.3%)	-3.1% (-4.7% to -2.7%)	↓
<b>Wildfire events<sup>*85</sup></b> (days per year)	19.7	21.3	31.1 (20.4 to 46.6)	45.5 (24.3 to 72.7)	↑
<b>Soil Moisture<sup>*86</sup> (%)</b> change) – Winter / Summer	0	-0.5% / -2.6%	-3.0% (-4.8% to +0.4%) / -13.4% (-25.3% to -10.8%)	-4.2% (-6.2% to -1.6%) / -22.3% (-33.1% to -17.8%)	↓
<b>Sea level rise (m)<sup>*87</sup></b>	--	--	+0.16 (+0.12 to +0.20)	+0.29 (+0.23 to +0.37)	↑

\*absolute values

## Flood Risk

- 5.8.22. The future climate projections indicate an increased winter rainfall (as described in **Table 5.22**) of 25.4% in the 2050s under the 90th percentile. Increased rainfall will lead to additional volumes of surface water runoff into watercourses which can also exacerbate fluvial and pluvial flood risk.

<sup>83</sup> Days with minimum temperature below 0°C.

<sup>84</sup> Time in drought defined as precipitation and potential evaporation. Standardised Precipitation Evaporation Index.

<sup>85</sup> Days with Met Office Wildfire Index at the Very High Fire Severity level or above

<sup>86</sup> Potential soil moisture deficit measured by the maximum difference between accumulated rainfall and potential evaporation

<sup>87</sup> At the closest data point 11.5km west of the scheme

### Soil erosion and degradation:

- 5.8.23. There are many factors which cause or worsen soil erosion, both natural and anthropogenically induced. These include slope angle, precipitation, soil texture, organic matter content of the soil, vegetation cover, human activity (e.g., construction, deforestation, agriculture), wind speed and intensity and flood events. It was estimated in 2017 that every year, approximately 36 billion tonnes of fertile soil is lost due to erosion<sup>88</sup>. To put this into perspective, another study estimated this loss to be approximately 1% of the world's topsoil every year<sup>89</sup>.
- 5.8.24. The British Geological Survey (BGS) identifies that the increased risk of clay shrink-swell at the site due to climate change is highly unlikely for both the 2030s and the 2070s<sup>90</sup>.

### Wind and Storms

- 5.8.25. UKCP18 depicts a wide spread of future changes in mean surface wind speed, however, there is large uncertainty in projected changes in circulation over the UK and natural climate variability contributes to much of this uncertainty. It is therefore difficult to represent regional extreme winds and gusts within regional climate models. Central estimates of change in mean wind speed for the 2050s are small in all ensembles runs ( $<0.2\text{ms}^{-1}$ ). A wind speed of  $0.2\text{ms}^{-1}$  (approximately 0.4 knots) is small compared with the typical magnitude of summer mean wind speed of about  $3.6\text{--}5.1\text{ms}^{-1}$  (7 – 10 knots) over much of England. Seasonal changes at individual locations across the UK lie within the range of  $-15\%$  to  $+10\%$ .

## SCOPE OF THE ASSESSMENT

### Study Area

#### Spatial Scope

- 5.8.26. The spatial scope of the CCR assessment is reflected within the spatial extent of the Project when considering the receptors. The interdependencies of the climate change resilience of supporting infrastructure external to the spatial scope of the Project will also be considered.

#### Temporal Scope

- 5.8.27. The temporal scope of the CCR assessment will inform the analysis of the climate variables of the future climate. It is anticipated that the release of the additional 6mt from the soil storage area and deepening of the Woodleaze area will be undertaken until the end of 2042. Therefore, the temporal scope is reflected in the climate periods analysed: the 2030s (2020 – 2049), and the 2050s (2040 – 2069).

#### Potential Receptors

- 5.8.28. Receptors for consideration within the CCR assessment can be grouped into the following:
- Building and infrastructure receptors i.e., the Project assets, both temporary and permanent, throughout the lifecycle of the Project;

<sup>88</sup> Pasquale Borrelli, David A. Robinson, Larissa R. Fleischer, Emanuele Lugato, Cristiano Ballabio, Christine Alewell, Katrin Meusburger, Sirio Modugno, Brigitta Schütt, Vito Ferro, Vincenzo Bagarello, Kristof Van Oost, Luca Montanarella, Panos Panagos. An assessment of the global impact of 21st century land use change on soil erosion. *Nature Communications*, 2017; 8 (1) DOI: [10.1038/s41467-017-02142-7](https://doi.org/10.1038/s41467-017-02142-7)

<sup>89</sup> Montgomery, DR. *Dirt: The Erosion of Civilizations*, 2nd Ed. (University of California Press, 2012)

<sup>90</sup> BGS (2020) GeoClimate UKCP18 Open Available at: <https://mapapps2.bgs.ac.uk/geoindex/home.html>

- Human health receptors, i.e. operational staff; and
- Environmental receptors, i.e. habitats and species associated with any landscaping and biodiversity planting.

5.8.29. The Project description contained within **Chapter 2** has identified the following receptors to be considered within the CCR assessment, as shown in **Table 5.23**.

**Table 5.23 - List of Receptors Considered within the CCR Assessment**

Receptor Group	Receptor	Project Stages Considered
Building and Infrastructure	Plant and machinery	Operation
	Quarry operations and inputs	Operation
	Transport links, including road access and two access/egress points, and the dedicated rail infrastructure	Operation
Human Health	Site operatives	Operation
Environmental	Waterbodies including groundwater and mitigation ponds	Operation
	Restoration and habitat creation	Decommissioning and reinstatement

### Vulnerability Assessment

- 5.8.30. The IEMA Guidance<sup>91</sup> outlines that the scoping stage should identify the key climatic variables relevant to the Proposed Scheme and likely effects; however, it is not prescriptive in how this is undertaken.
- 5.8.31. In order to identify the vulnerable Project elements, an exposure and sensitivity assessment has been undertaken, were:
- Exposure is the nature and degree to which climate variations may pose a risk to the Project receptors. This is rated as high, medium or low based on the current climate and the future projections identified in the baseline information presented in Section 5.3.2 and Section 5.3.3.
  - The typical sensitivity of receptors to climate variables – considers the impact of the climate on the specific receptors, taking into account any existing adaptation measures or preliminary design measures (where available). The assessment is based on literature review and professional judgement and sensitivity is rated as high, moderate or low, where:
    - High sensitivity: The receptor has no ability to withstand / not be substantially altered by the projected climate impacts. It will lose much of its original function and form;

<sup>91</sup> IEMA EIA Guide to: Climate Change Resilience and Adaptation (Online). Accessed from: <https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020>

- Moderate sensitivity: The receptor has some limited ability to withstand / not be altered by the projected climate impacts. It can retain elements of its original function and form; and
- Low sensitivity: The receptor has the ability to withstand / not be altered much by the projected climate impacts. It can retain much of its original function and form.

5.8.32. The vulnerability of receptors to climate variables is considered to be a function of sensitivity and exposure, using the matrix shown in **Table 5.24**.

**Table 5.24 - List of Receptors Considered within the CCR Assessment**

	Exposure		
Sensitivity	Low	Medium	High
Low	Low vulnerability	Low vulnerability	Low vulnerability
Moderate	Low vulnerability	Medium vulnerability	Medium vulnerability
High	Low vulnerability	Medium vulnerability	High vulnerability

5.8.33. On completion of the vulnerability assessment, climate variables to which the Project is likely to have a low vulnerability are scoped out of further assessment. Climate variables to which the Project is likely to have a medium or high vulnerability are taken forward for further assessment at the next stage. This is a qualitative assessment informed by expert opinion and supporting literature.

### Sensitivity assessment

5.8.34. A summary of how the Project may be sensitive to climate variables is presented below, adapted from Environment Agency guidance<sup>92</sup>.

5.8.35. Precipitation: Heavy precipitation could lead to high moisture levels in stockpiled material causing destabilisation and impacts to the extraction and processing techniques. Bunded areas may become flooded, and any drainage infrastructure could become overwhelmed. Extreme downpours and increase surface water runoff may result in flooding and increased movement of sediment, blocking drainage. Flooding may impact roads and other infrastructure resulting in delayed working, access/egress issues and potential health and safety concerns for site operative. Patterns of groundwater recharge will alter impacting groundwater levels resulting in potential for increased pumping of groundwater. Drought conditions may lead to water stress and water shortages impacting dust control measures and other water dependent activities. Groundwater levels may reduce during, and following, drought conditions.

5.8.36. Temperature: Operational equipment will be sensitive to increased temperatures and heatwave conditions, increasing the risk of fire and delays to operation. Fuel storage areas (or other combustible items) will be at greater risk of spontaneous combustion. Working conditions for site

<sup>92</sup> Environment Agency (2023) Cement, lime and minerals: examples for your adapting to climate change risk assessment. Available from: <https://www.gov.uk/government/publications/adapting-to-climate-change-industry-sector-examples-for-your-risk-assessment/cement-lime-and-minerals-examples-for-your-adapting-to-climate-change-risk-assessment>



operatives may become a health and safety concern as exposure to heat and sun increases. Expansion of metallic infrastructure and softening or melting of materials such as rubber, plastic, asphalt is more likely. Increasing summer temperature will increase the potential for wildfires, particularly in rural and agricultural areas. Although winter temperatures are projected to increase, cold waves and extreme cold will still occur, with the potential for freezing liquids in pipes. Increased ice or snow loading can result in damaged equipment and infrastructure.

- 5.8.37. Wind and Storms: Increased intensity and frequency of wind and storm events can result in unsafe working conditions for site operatives. Higher winds can result in wind-blown debris, damage to buildings and increased dust. An increased risk of lightning strike could result in fire and power outages.
- 5.8.38. Humidity: Increases in humidity can affect the moisture content in equipment and infrastructure leading to deterioration and increase maintenance requirements.
- 5.8.39. Solar Radiation: An increase in solar radiation can also cause more rapid deterioration of building and infrastructure materials, and increased exposure for site operatives.

#### Existing Adaptation measures

- 5.8.40. The Project is an extension of the existing quarry, as such, control measures for the existing operations will be incorporated into the operation of the quarry expansion. Monitoring conditions associated with the main planning permission (NA/IDO/002/A)<sup>93</sup> require:
  - All heavy goods vehicles loaded with quarry material to pass through an effective wheel and chassis washing system, reducing dust emissions.
  - All loaded lorries will be sheeted with the exception of those carrying stone in excess of 500 mm.
  - Drill rigs will be operated in conjunction with dust suppressant.
  - The site access road between the wheel wash and main access to the public highway will remain in a good state of repair and kept clean of mud and debris.
  - Equipment for suppressing dust will be available for use during all permitted operating hours.
  - Handling, movement and placement of soil, overburden and quarry waste will not take place during any adverse weather conditions which would increase potential dust generation.
  - All vehicles, plant and machinery operated at the site shall be maintained in accordance with the manufacturers' specifications.
  - Surface water drainage from the site and any pumped water from the excavation area shall be passed through the existing settlement lagoon prior to discharge off site and all the dewatering pumpage from the quarry shall be distributed to the streams and springs located to the south and east of the quarry in such proportions that the natural flows are maintained.
  - All plant and machinery are protected from rainfall. These are mobile and are attached with trackers, allowing the equipment to be located quickly and moved in the event of a surface water pooling which may adversely impact the equipment.

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<sup>93</sup> Hanson (2019) Tytherington Land & Mineral Resources Planning Appraisal

- Pumping levels can be increased or decreased according to extreme weather events and inform daily water usage.
- The site is dewatered to an onsite lagoon and pumping can be adjusted as and when required.
- Given the site's location on a principal aquifer, in event of a drought, water can be readily accessed.

### Vulnerability assessment

5.8.41. **Table 5.25** presents the assessment of vulnerability the Project. This takes into account the exposure (based on current and future baseline conditions) and sensitivity taking into account any design, mitigation and enhancement measures addressed above.

**Table 5.25 - Vulnerability Assessment**

Receptor	Variable		Exposure	Sensitivity	Vulnerability
Plant and machinery	Precipitation	Change in annual average	High	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Low	Low
	Temperature	Change in annual average	High	Low	Low
		Extreme temperature events	High	Moderate	Medium
	Wind	Gales and high winds	Medium	Moderate	Medium
		Storms and lightning	Medium	Moderate	Medium
	Relative humidity	Changes in annual average	Low	Low	Low
Quarry operation and inputs	Precipitation	Change in annual average	High	Low	Low
		Drought	Medium	Moderate	Medium
		Extreme precipitation events (flooding)	High	Low	Low
	Temperature	Change in annual average	High	Low	Low
		Extreme temperature events	High	Low	Low
	Wind	Gales and high winds	Medium	Moderate	Medium
		Storms and lightning	Medium	Moderate	Medium
	Relative humidity	Changes in annual average	Low	Low	Low

Receptor	Variable		Exposure	Sensitivity	Vulnerability
Transport links	Precipitation	Change in annual average	High	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Low	Low
	Temperature	Change in annual average	High	Low	Low
		Extreme temperature events	High	Moderate	Medium
	Wind	Gales and high winds	Medium	Low	Low
		Storms and lightning	Medium	Low	Low
	Relative humidity	Changes in annual average	Low	Low	Low
Site operatives	Precipitation	Change in annual average	High	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Moderate	Medium
	Temperature	Change in annual average	High	Low	Low
		Extreme temperature events	High	High	High
	Wind	Gales and high winds	Medium	Moderate	Medium
		Storms and lightning	Medium	Moderate	Medium
	Relative humidity	Changes in annual average	Low	Low	Low
Waterbodies and ground water	Precipitation	Change in annual average	High	Low	Low
		Drought	Medium	Moderate	Medium
		Extreme precipitation events (flooding)	High	Low	Low
	Temperature	Change in annual average	High	Low	Low
		Extreme temperature events	High	Low	Low
	Wind	Gales and high winds	Medium	Low	Low
		Storms and lightning	Medium	Low	Low

Receptor	Variable		Exposure	Sensitivity	Vulnerability
	Relative humidity	Changes in annual average	Low	Low	Low
Restoration and habitat creation	Precipitation	Change in annual average	High	Low	Low
		Drought	Medium	High	Medium
		Extreme precipitation events (flooding)	High	High	High
	Temperature	Change in annual average	High	Low	Low
		Extreme temperature events	High	High	High
	Wind	Gales and high winds	Medium	Moderate	Medium
		Storms and lightning	Medium	Moderate	Medium
	Relative humidity	Changes in annual average	Low	Low	Low

### Elements scoped in or out of further assessment

- 5.8.42. The receptors with a medium or high vulnerability to the climate variables will be scoped in for further assessment. These comprise:
- Plant and Machinery which are vulnerable to extreme temperature events, gales and storms;
  - Quarry operations and inputs which are vulnerable to drought, gales and storms;
  - Transport links which are vulnerable to extreme temperate events;
  - Site operatives, which are vulnerable to extreme precipitation events, extreme temperature events, gales and storms;
  - Waterbodies and ground water, which are vulnerable to drought; and
  - Restoration and habitat creation, which is vulnerable to drought, extreme precipitation events, extreme temperature events, gales and storms.
- 5.8.43. All other receptors are considered to have low vulnerability to the climate variables, taking into account the adaptive measures in operation at the existing quarry which will be applied to the Project.

### In-combination climate impacts (ICCI)

- 5.8.44. The receptors for the ICCI assessment are receptors within the surrounding environment that would be impacted by the Project in combination with future climatic conditions.
- 5.8.45. The baseline for an ICCI assessment is based on how identified receptors in the surrounding environment are affected by future climate parameters. The climate parameters relevant to the Project are extreme weather events, temperature and precipitation. Inclusion of an ICCI has been

scoped in, but this will be addressed at ES stage and captured within the other relevant chapters as part of the assessments for other environmental topics.

## ASSESSMENT METHODOLOGY

- 5.8.46. The assessment of impacts will be undertaken using an approach based on the IEMA guidance<sup>94</sup>, and professional judgement.
- 5.8.47. In the ES, the significance of effects of changes in (scoped in) climate variables on receptors will be identified for the operation phase. The significance of effects will be determined by considering the consequence and the likelihood of potential impacts associated with changes in climate variables on Proposed Scheme components occurring. Likelihood and consequence will be qualitatively assessed using the descriptions in **Table 5.26** and **Table 5.27**. These descriptions have been developed using professional judgement, informed by relevant guidance. It should be noted that the IEMA guidance definitions of consequence has been developed for large scale infrastructure specifically, and therefore, the description of the measure of consequence will have regard to the wider Proposed Scheme.
- 5.8.48. The assessment of likelihood and consequence (and therefore significance) will take embedded mitigation into account as an assumed part of the design. Embedded mitigation will be identified through engagement with the design team.

**Table 5.26 - Consequence Definitions**

Measure of Consequence	Description
Very large adverse	Permanent damage. Disruption lasting more than ten days. Early renewal of facility / infrastructure >90%. Severe health effects and / or fatalities. Repairs cost 50% of facility reconstruction cost.
Large adverse	Extensive facility / infrastructure damage. Disruption lasting more than three but less than ten days. Early renewal of 50-90% of infrastructure Severe health effects and / or fatalities. Significant effect on the environment, requiring remediation. Repairs cost 50% of facility reconstruction cost.
Moderate adverse	Limited facility / infrastructure damage with damage recoverable by maintenance or minor repair. Disruption lasting more than one but less than three days. Adverse effects on health and / or the environment. Repairs cost 25% of facility reconstruction cost.
Minor adverse	Localised facility / infrastructure disruption. No permanent damage, minor restoration work required: Facility closure lasting less than one day. Slight adverse health or environmental effects. Repairs cost 2% of facility reconstruction cost.
Negligible	No facility / infrastructure damage, minimal adverse effects on health, safety and the environment. Facility doesn't shut down. No financial loss.

<sup>94</sup> IEMA EIA Guide to: Climate Change Resilience and Adaptation (Online). Accessed from: <https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020>

**Table 5.27 - Likelihood Definitions**

Measure of likelihood	Description
<b>Very High</b>	The event occurs multiple times during the lifetime of the Proposed Scheme e.g. approximately annually.
<b>High</b>	The event occurs several times during the lifetime of the Proposed Scheme e.g. approximately once every five years.
<b>Medium</b>	The event occurs limited times during the lifetime of the Proposed Scheme e.g. approximately once every 10 years.
<b>Low</b>	The event occurs occasionally during the lifetime of the Proposed Scheme e.g. once in 15 years.
<b>Very Low</b>	The event may occur once during the lifetime of the Proposed Scheme.

- 5.8.49. The likelihood and consequence are combined to assess the significance of effects on receptors, as shown in **Table 5.28**. The assessment is qualitative and based on professional judgment, engagement with the design team and a review of relevant literature.

**Table 5.28 - Likelihood Definitions**

Likelihood	Consequence of Hazard Occurring				
Very High	Negligible	Minor adverse	Moderate adverse	Large adverse	Very large adverse
<b>Very High</b>	Not significant	Significant	Significant	Significant	Significant
<b>High</b>	Not significant	Significant	Significant	Significant	Significant
<b>Medium</b>	Not significant	Not significant	Significant	Significant	Significant
<b>Low</b>	Not significant	Not significant	Not significant	Significant	Significant
<b>Very Low</b>	Not significant	Not significant	Not significant	Not significant	Not significant

### Climate change impacts

- 5.8.50. The climate variables considered as part of the future baseline has been analysed and the potential climate impact on the receptors is tabulated within **Table 5.29**. This will be developed and refined during the ES during CCR workshops and is not considered a definite or exhaustive list at this scoping stage.



**Table 5.29 - Potential climate change impacts**

<b>Climate change trend</b>	<b>Potential impact on the receptors</b>	<b>Phase considered</b>
<b>Increased frequency and intensity of heatwaves and extreme temperatures, especially in summer</b>	Overheating of plant and machinery and increased pressure on cooling systems.	Operation
	Deformation or melting of road and rail links	Operation
	Sunstroke and heat exhaustion amongst operational personnel	Operation
	Failure of biodiversity restoration and planting and potential for increased spread of invasive species and disease	Decommissioning and restoration
<b>Increase in mean temperatures and decrease in mean summer rainfall leading to drought conditions</b>	Landscape and biodiversity planting could fail resulting in increased management and associated environmental costs, e.g. water use. Increased potential for spread of invasive species and disease	Decommissioning and restoration
	Decreasing groundwater levels during drought conditions	Operation
	Instability of ground and earthworks through reduction in soil strength and ground movement from changes in soil moisture content	Operation
<b>Increase in heavy rainfall events leading to an increase in the frequency and severity of flood events (from all sources)</b>	Health and safety risks to site operatives	Operation
	Damage to vegetation and habitat creation areas	Decommissioning and restoration
<b>Gale and storm events leading to driving rain, wind, lightning strike and excessive precipitation.</b>	Damage to above ground plant and equipment	Operation
	Quarry operations suspended during gale or storm events	Operation
	Interdependencies of third-party assets such as disruption to electricity supply	Operation
	Health and safety risks to site operatives	Operation
	Damage to vegetation and habitat creation areas	Decommissioning and restoration

## 5.9 CLIMATE CHANGE – GREENHOUSE GAS EMISSIONS

### RELEVANT POLICIES AND THEIR IMPLICATIONS FOR SCOPING

- 5.9.1. This section identifies the relevant legislation, national and local policy and guidance which has informed the scope of the assessment relevant to climate change.
- 5.9.2. A summary of the relevant policy and legislation related to the Green House Gas (GHG) assessment are reported in **Table 5.30**.

**Table 5.30 - Relevant Policies and their Implications (GHG Assessment)**

Policy Reference	Implications
<b>Legislation:</b>	
<b>Climate Change Act 2008<sup>95</sup> (including The Climate Change Act 2008 (2050 Target Amendment) Order 2019)<sup>96</sup></b>	This Act, as amended in 2019, commits the UK to reduce its net GHG emissions by at least 100% below 1990 levels by 2050 (the 'UK carbon target', often referred to as 'net zero') and requires the Government to establish 5-year carbon budgets. The Act also established an independent expert body, the Committee on Climate Change, to advise the Government on the level of those emissions targets and report on progress made to reduce emissions.
<b>The Carbon Budgets Order 2009<sup>97</sup></b>	This legislation implements the carbon budgets set out in the Climate Change Act 2008. The budgets require the UK to continually reduce emissions in line with the carbon reduction commitments established under that Act.
<b>Energy Act 2016<sup>98</sup></b>	The Energy Act 2016 is a UK Act of Parliament relating to UK enterprise law and energy in the UK. It covers three main areas, establishes the new Oil and Gas Authority, sets out the formal powers of the OGA and sets out the closure of Renewables Obligation for onshore wind in England, Wales and Scotland.
<b>Environment Act 2021<sup>99</sup></b>	<p>The Environment Act received Royal Assent in 2021. This Act replaces EU environmental frameworks and has been produced as a result of the UK leaving the EU.</p> <p>The Environment Act 2021 makes provisions about targets, plans and policies for improving the natural environment.</p>
<b>International Policy:</b>	
<b>The United Nations Framework Convention on</b>	The UNFCCC is the major international body responsible for managing climate change and carbon emissions. In 2015, it adopted the Paris Agreement, the aims of which are stated as: <i>"This Agreement, in enhancing the implementation of the Convention, including its objective,</i>

<sup>95</sup> Climate Change Act 2008 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2008/27/contents>

<sup>96</sup> The Climate Change Act 2008 (2050 Target Amendment) Order 2019 [online]. Available at: <https://www.legislation.gov.uk/uksi/2019/1056/contents/made>

<sup>97</sup> The Carbon Budgets Order 2009 [online]. Available at: <https://www.legislation.gov.uk/uksi/2009/1259/contents/made>

<sup>98</sup> UK Government (2016). Energy Act 2016. (online). Available at: <https://www.legislation.gov.uk/ukpga/2016/20/contents> (Accessed August 2023)

<sup>99</sup> UK Government (2021). Environment Act 2021. (online). Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents> (Accessed August 2023).

Policy Reference	Implications
<b>Climate Change (UNFCCC) Paris Agreement<sup>100</sup></b>	<i>aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change</i> ". The agreement sets targets for countries' GHG emissions, but these are not legally binding or enforceable. In December 2020, the UK submitted its first Nationally Determined Contribution (NDC) to the UNFCCC, committing to "at least a 68%" reduction in GHG emissions below 1990 levels (1995 levels for F-gases) by 2030, aligned with the UK's 2050 net-zero GHG emissions target.
<b>UNFCCC Kyoto Protocol (UNFCCC, 1997)<sup>101</sup></b>	The Kyoto Protocol was adopted in December 1997 and there are currently 192 Parties to the Kyoto Protocol. It commits industrialised countries and economies to transition to limit and reduce GHG emissions in accordance with agreed individual targets. These have been strengthened in more recent international agreements culminating in the Paris Agreement (UNFCCC, 2015), as described above.
<b>National Policy:</b>	
<b>Clean Growth Strategy (BEIS)<sup>102</sup></b>	This report, prepared by BEIS, provides the strategy for the UK's future clean growth to allow carbon budgets to be met and support economic growth. It sets out policies and targets out to 2050 for reducing GHG emissions across a number of sectors. Whilst not in itself planning policy it is a material consideration.
<b>The UK's Nationally Determined Contribution (NDC) under the Paris Agreement<sup>103</sup></b>	In December 2020, the UK submitted its first NDC under the Paris Agreement <sup>9</sup> to the UNFCCC, committing to "at least a 68%" reduction in economy-wide GHG emissions below 1990 levels (1995 levels for F-gases) by 2030, aligned with the UK's 2050 net zero GHG emissions target.
<b>Net Zero Strategy: Build Back Greener<sup>104</sup></b>	The Strategy for Net Zero sets out the Government's plan to become net zero carbon by 2050 and to meet the Nationally Determined Contribution (NDC). This includes achieving a fully decarbonised power system by 2035 and delivering 5 GW of hydrogen production capacity by 2030.

<sup>100</sup> UNFCCC (2015). Paris Agreement. (online). Available at: [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf) (Accessed August 2023).

<sup>101</sup> UNFCCC (1998). Kyoto Protocol. (online). Available at: <https://unfccc.int/resource/docs/convkp/kpeng.pdf> (Accessed August 2023).

<sup>102</sup> Department for Business, Energy and Industrial Strategy (2017) Clean Growth Strategy. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/700496/clean-growth-strategy-correction-april-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf) (Accessed August 2023).

<sup>103</sup> Department for Business, Energy & Industrial Strategy (2020). The UK's Nationally Determined Contribution under the Paris Agreement. (online). Available at: <https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc> (Accessed August 2023).

<sup>104</sup> Department for Business, Energy & Industrial Strategy (2021). Net Zero Strategy: Build Back Greener. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1033990/net-zero-strategy-beis.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf) (Accessed August 2023).

Policy Reference	Implications
<b>National Planning Policy Framework (NPPF)<sup>105</sup></b>	<p>The 2021 revision of the NPPF, paragraph 148 states: “<i>The planning system should support the transition to a low carbon future in a changing climate... shape places in ways that contribute to radical reductions in greenhouse gas emissions... and support renewable and low carbon energy and associated infrastructure</i>”.</p> <p>It also requires in paragraph 154 that new development should be planned for in ways that “can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government’s policy for national technical standards”.</p> <p>Furthermore, it is stated in paragraph 155, that local planning authorities should expect new development to:</p> <p>a) “<i>comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.</i>”</p>
<b>Local Planning Policy:</b>	
<b>Gloucestershire County Council Minerals Local Plan</b>	One of the strategic objectives of the Gloucester County Council Local Plan is ‘mitigating and adapting to the impacts of climate change’.

5.9.3. All carbon budgets that have been legislated will be considered in the GHG assessment. The timescale of these budgets covers the construction period and the operational period of The Project. The total UK budgets, expressed in the form of million tonnes of carbon dioxide (CO<sub>2</sub>) equivalent (million tCO<sub>2</sub>e), are detailed in **Table 5.31**.

**Table 5.31 - UK Carbon Budget**

Budget	Carbon budget level (million TCO <sub>2</sub> e)	Reduction below 1990 levels	Legal Status
3rd Carbon Budget (2018 – 2022)	2,544	37% by 2020	Statute
4th Carbon Budget (2023 to 2027)	1,950	51% by 2025	Statute
5th Carbon Budget (2028 to 2032)	1,725	57% by 2030	Statute
6th Carbon Budget (2033 -2037)	965	78% by 2035	Statute
Net Zero Target	0	100% by 2050	Statute

<sup>105</sup> Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) (Accessed August 2023).

## TECHNICAL GUIDANCE

5.9.4. A summary of the relevant technical guidance is given in **Table 5.32** for the GHG assessment.

**Table 5.32 - Technical Guidance Relevant to GHG Assessment**

Technical Guidance	Implications
<b>Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance<sup>106</sup></b>	<p>The Institute of Environmental Management and Assessment (IEMA) provides guidance on GHG emissions assessment, mitigation and reporting within an EIA context and this is the primary source of guidance for assessing GHG emissions. The 2022 guidance further builds upon the 2017 guidance, with key changes including an emphasis on mitigation at the project outset and throughout its lifetime, and more nuanced levels of GHG emissions significance. It provides detail on the application of the five IEMA Principles on Climate Change Mitigation and EIA<sup>107</sup>:</p> <ol style="list-style-type: none"> <li>1. “The GHG emissions from all projects will contribute to climate change, the largest inter-related cumulative environmental effect.</li> <li>2. The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g., human health, biodiversity, water, land use, air quality).</li> <li>3. The UK has legally binding GHG reduction targets – EIA must therefore give due consideration to how a project will contribute to the achievement of these targets.</li> <li>4. GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant.</li> <li>5. The EIA process should, at an early stage, influence the location and design of projects to optimise GHG performance and limit likely contribution to GHG emissions.”</li> </ol>
<b>Publicly Available Standard (PAS) 2080: 2023 – Carbon management in infrastructure<sup>108</sup></b>	PAS 2080:2023 provides an approach to reducing GHG emissions from infrastructure projects including working with stakeholders throughout the project lifecycle.
<b>The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (GHG Protocol)<sup>109</sup></b>	GHG Protocol provides standards and guidance for preparing a GHG emissions inventory.

<sup>106</sup> IEMA (2022). Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition. (online). Available at: <https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions> (Accessed August 2023).

<sup>107</sup> IEMA (2010). IEMA Principles Series: Climate Change Mitigation & EIA.

<sup>108</sup> The Green Construction Board, Construction Leadership Council (2023). PAS 2080:2016 Carbon Management in Infrastructure [online]. Available at: <https://www.bsigroup.com/en-GB/standards/pas-2080/>

<sup>109</sup> World Resources Institute and World Business Council for Sustainable Development (2004). The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard [online]. Available at: <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>



Technical Guidance	Implications
<b>BS EN ISO 14064-1110 and 14064-2<sup>111</sup></b>	ISO 14064 sets out guidance for quantification and reporting of GHG emissions and removals. The methodology for quantification of GHGs follows this guidance and the stated guidance on reporting will be taken into account as part of this assessment.
<b>Methodology to calculate embodied carbon 1st edition and 2<sup>nd</sup> edition consultation document<sup>112113</sup></b>	The Royal Institution of Chartered Surveyors (RICS) guidance note represents best practice on how to estimate carbon emissions associated with product and construction process stages. The aim of the guidance is to provide a framework of practical guidance on how to calculate embodied carbon emissions associated with projects.
<b>Net Zero – The UK’s contribution to stopping global warming<sup>114</sup></b>	This report prepared by the CCC to the UK Government reassesses the UK’s long-term emission target. In the UK, the report recommends a net zero date of 2050 achieved through known technologies, improvements in people’s lives and policy updates. As a result of this report, emission targets in the UK were updated in the Climate Change Act 2008 <sup>115</sup> .
<b>2022 Progress Report to Parliament<sup>116</sup></b>	This CCC annual report sets out the UK’s progress for 2022 against emissions reduction targets to 2050. One of the CCC’s key recommendations is funding and support for extra hydrogen production capacity. The UK Government is yet to respond to the CCC’s recommendations.
<b>Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6): Climate Change 2021 - The Physical Science Basis<sup>117</sup></b>	In August 2021 the contribution of Working Group I to AR6 was published by the IPCC. The publication reinforces the evidence presented in the previous IPCC report (AR5) and, through the utilisation of updated climate model simulations and analyses, states that “it is unequivocal that human influence has warmed the atmosphere, ocean and land”. It is highlighted that “global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO <sub>2</sub> and other greenhouse gas emissions occur in the coming decades”. The publication states that “limiting human-induced global warming to a specific

<sup>110</sup> BSI (2019). BS EN ISO 14064-1: 2019 Greenhouse gases. Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.

<sup>111</sup> BSI (2019). BS EN ISO 14064-1: 2019 Greenhouse gases. Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.

<sup>112</sup> RICS. (2012). Methodology to calculate embodied carbon 1st edition.

<sup>113</sup> RICS (2023). Whole-life carbon assessment consultation. (online). Available at: <file:///C:/Users/UKAXD779/Downloads/Whole%20Life%20Carbon%20Assessments%20PS%20Consultation%20Draft%20March%202023.pdf>

<sup>114</sup> CCC (2019). Net Zero – The UK’s contribution to stopping global warming. (online). Available at: <https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf> (Accessed 01 August 2022).

<sup>115</sup> Climate Change Act 2008 <https://www.legislation.gov.uk/ukpga/2008/27/contents>.

<sup>116</sup> CCC (2022). 2022 Progress Report to Parliament. (online). Available at: <https://www.theccc.org.uk/publication/2022-progress-report-to-parliament/> (Accessed 01 August 2022).

<sup>117</sup> IPCC (2021). The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)). Cambridge University Press.



Technical Guidance	Implications
	level requires limiting cumulative CO2 emissions, reaching at least net zero CO2 emissions, along with strong reductions in other greenhouse gas emissions” and it is this assertion which will underpin the international response to global warming.
<b>IPCC AR6: Climate Change 2022 – Mitigation of Climate Change<sup>118</sup></b>	The IPCC finalised the third part of AR6, the Working Group III contribution, in April 2022. It provides an updated global assessment of climate change mitigation progress and pledges and examines the sources of global emissions. It explains developments in emission reduction and mitigation efforts, assessing the impact of national climate pledges in relation to long-term emissions goals.
<b>CCC Sixth Carbon Budget Report Sector Summaries – Fuel Supply<sup>119</sup></b>	This document contains a summary of content for the fuel supply sector from the CCC’s Sixth Carbon Budget Advice. The key messages include the important role that low carbon hydrogen plays in displacing emissions from fossil fuels. The CCC’s recommended carbon budget sector allocations for fuel supply are: <ul style="list-style-type: none"> <li>■ Remaining third carbon budget, 2022 only, 35MtCO2e;</li> <li>■ Fourth carbon budget, 2023 to 2027, 148MtCO2e;</li> <li>■ Fifth carbon budget, 2028 to 2032, 85MtCO2e; and</li> <li>■ Sixth carbon budget, 2033 to 2037, 42MtCO2e.</li> </ul>

## BASELINE CONDITIONS

### Data Sources

- 5.9.5. Data sources which have been gathered to inform the baseline for the GHG assessment scoping material includes data relating to the UK carbon budgets, as reported in **Table 5.32**. Data sources that will be used for the GHG assessment at ES stage are discussed within the GHG assessment section of the Assessment Methodology for this section of the Scoping Report.

### Summary of Baseline Conditions

- 5.9.6. The 4th carbon budget reported in **Table 5.31** can be considered as the current baseline for the GHG assessment. The current baseline can be referred to as a ‘Business as usual’ (BaU) since as per the IAQM guidance, the baseline can be either the GHG emissions but without the Proposed Development, or the GHG emissions arising from an alternative project design or BaU for a project of this type. For this GHG assessment, the BaU case will consider the current consented mining operations where the quarry is operating at 2 mtpa.

<sup>118</sup> IPCC (2022). Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)). Cambridge University Press.

<sup>119</sup> CCC (2020). *The Sixth Carbon Budget - Fuel supply*. (online). Available at: <https://www.theccc.org.uk/publication/sixth-carbon-budget/> (Accessed 01 August 2022).

- 5.9.7. As indicated by the carbon budgets in **Table 5.31**, GHG emissions are required to reduce in the future. By 2025, GHG emissions are required to reduce by 51%, and the government has set a net zero target which requires the UK to reduce GHG emissions by 100% by 2050. The future baseline considers a number of the carbon budgets in **Table 5.31** as future Project activities coincide with a number of carbon budgets.

## SCOPE OF THE ASSESSMENT

### Study Area

- 5.9.8. The spatial scope of the GHG assessment will be informed by the spatial extent of the mineral extraction activities of the Project. This will therefore equate to the planning application boundary as shown in **Figure 2.1**.
- 5.9.9. The temporal scope of the GHG assessment will be consistent with the period over which the Quarry would be in operation if granted permission to operate at 6 mtpa. This is based on a timescale of 8.5 years, from 2023 – 2032, since the updated operational activity of 6 mtpa will allow for an extra 3 years of operation. Current operations are estimated to continue for 5.5 years. A start date of 2023 will be used since the Proposed Development seeks to allow for a change to currently approved working methods within Tytherington Quarry (it is therefore assumed that if granted, activities will commence immediately).

### Potential Receptors

- 5.9.10. GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global climate is therefore the only receptor for the GHG assessment.

## LIKELY SIGNIFICANT EFFECTS

- 5.9.11. The overall scope of the GHG assessment is considered to include:
- The GHG emissions associated with the operational vehicles, machinery and equipment used for all mining activities. On-site vehicles, machinery and equipment will have associated exhaust GHG emissions which will be calculated as part of the GHG assessment;
  - The GHG emissions associated with the mineral extraction activities. An embodied carbon amount will be associated with the materials extracted, and the associated GHG emissions will be calculated as part of the GHG assessment; and
  - The GHG emissions associated with the despatching of material via road and rail.

## ASSESSMENT METHODOLOGY

- 5.9.12. Consideration of a 'With Development' and 'Without Development' case ensures that the methodology is in line with the IEMA guidance 2022106. The 'With Development' case will consider the current consented mining operations plus the proposed mining operations. The 'Without Development' case will only consider the current consented mining operations and can also be noted as the BaU case.
- 5.9.13. The approach to the GHG assessment is to quantify and contextualise the GHG emissions of a Project. As discussed in Scope of the Assessment, the GHG assessment of the Project will consider the GHG emissions associated with the operational vehicles, machinery and equipment, the embodied carbon of the raw materials mined, and the dispatching movements.

## Quantification of GHG emissions

- 5.9.14. The approach to quantifying the GHG emissions associated with the Project will consider the whole infrastructure life cycle of the Project. The infrastructure life cycle phases as described within the PAS 2080: Carbon Management in Infrastructure<sup>108</sup> will be used. These phases will allow for the identification of the GHG emission sources associated with the Project. This methodology is in line with the IEMA guidance<sup>106</sup>.
- 5.9.15. GHG emissions associated with the Project emission sources will be calculated by gathering associated activity data and combining this data with associated emission factors.
- 5.9.16. For transport GHG emissions and GHG emissions from machinery and equipment on site, emission factors will be gathered from the Department for Energy Security and Net Zero (DESNZ): greenhouse gas reporting: conversion factors 2023<sup>120</sup>. For transport emissions arising from mobile vehicles, activity data will consist of average distances travelled and fuel usages. Activity data will consist of diesel usage for GHG emissions arising from machinery and equipment on site.
- 5.9.17. For GHG emissions associated with the mined materials, embodied carbon figures reported by the Inventory of Carbon & Energy database<sup>121</sup> will be used. These will be combined with extraction amounts of the materials.

## Contextualisation and determination of significance of GHG emissions

- 5.9.18. The GHG emissions quantified for the GHG assessment will be reported in the form of tCO<sub>2</sub>e, which will allow the emissions of the seven key GHGs from the Kyoto Protocol Reference Manual to be accounted for: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF<sub>6</sub>) and nitrogen trifluoride (NF<sub>3</sub>).
- 5.9.19. IEMA guidance<sup>106</sup> outlines that the context of the magnitude of GHG emissions should be established by drawing from guidance, policy and scientific evidence. Part of contextualising the magnitude of the GHG emissions and their impacts is to determine their significance.
- 5.9.20. For determining the significance of GHG emissions, the GHG assessment will follow the methodology outlined within the IEMA guidance<sup>106</sup>. This guidance refers to the need for consideration towards a Proposed Development's contribution to reducing GHG emissions relative to a comparable baseline when considering the significance of its GHG emissions. This comparable baseline must be consistent with a trajectory towards net zero by 2050.
- 5.9.21. The goal of the Paris agreement is to limit global warming below 2°C, and to aim for 1.5°C temperature rise compared with pre-industrial levels. According to the CCC, the UK's 2050 target and each interim target are compatible to meet the requirements of the Paris agreement. The GHG emissions calculated will be evaluated to determine whether and how the 'With Development' case contributes or jeopardises the achievement of these targets.

<sup>120</sup> Department for Energy Security and Net Zero, 2023. Greenhouse gas reporting: conversion factors 2023. [Online]. Available from: <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

<sup>121</sup> Circular Ecology. The Inventory of Carbon and Energy (ICE) database. [Online]. Available from: Embodied Carbon Footprint Database - Circular Ecology

- 5.9.22. The current IEMA guidance<sup>106</sup> state that due to the combined environmental effect that GHG emissions have, any GHG emissions (either positive or negative) from a Proposed Development might be considered to be significant. Therefore, the assessment methodology will aim to determine the relative scale of the impact of the Proposed Development on global climate change by considering the sensitivity (or value) of the receptor, its impacts and the magnitude of that impact. The only receptor for the climate assessment is the global climate and this receptor is considered highly sensitive.
- 5.9.23. Determining the magnitude of the impacts of the GHG emissions will involve concluding the significance of the GHG emissions. This will follow the IEMA guidance<sup>106</sup>, where consideration will be made towards the Proposed Development's impact on:
- Relevant UK carbon budgets and targets at a national and local level;
  - Science-based targets (1.5°C trajectory); and
  - Compliance with up-to-date policy and good practice measures.
- 5.9.24. Significance criteria reported in the IEMA guidance will be used to determine the significance of the GHG emissions estimated for the Proposed Development. These are reported below in **Table 5.33**.

**Table 5.33 - Significance Criteria**

Significance	Significance Criteria
<b>Major Adverse</b>	The Proposed Development's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A Proposed Development with major adverse effects is locking in emissions and does not make meaningful contribution to the UK's trajectory towards net zero.
<b>Moderate adverse</b>	The Proposed Development' GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for Proposed Developments of this type. A Proposed Development with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
<b>Minor Adverse</b>	The Proposed Development's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for Proposed Developments of this type. A Proposed Development with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
<b>Negligible</b>	The Proposed Development's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for Proposed Developments of this type, such that radical decarbonisation or net zero is achieved well before 2050. A Proposed Development with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
<b>Beneficial</b>	The Proposed Development's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-Development baseline. A Proposed Development with

Significance	Significance Criteria
	beneficial effects substantially exceeds net zero requirements with a positive climate impact.

## 5.10 CUMULATIVE EFFECTS

- 5.10.1. There is a requirement under Schedule 4 of the EIA Regulations for the ES to include a description of the likely significant effects of a development on the environment, which should cover, amongst others, cumulative effects. As such, an assessment of potential cumulative effects will be undertaken for the proposed development. The assessment will consider two aspects:
- **Inter-project cumulative effects:** A qualitative assessment considering potential cumulative effects with other existing, permitted and proposed mineral developments in the area; and
  - **Intra-project cumulative effects:** A qualitative assessment as to whether any of the individual effects of the proposed development would combine to create a cumulative effect greater than the sum of the individual effects.
- 5.10.2. We will seek to agree the other developments to be scoped into the assessment of inter-development cumulative effects with SGC, however at this stage it is proposed that the following active quarry sites are included in the assessment:
- Chipping Sodbury Quarry; and
  - Wickwar Quarry.
- 5.10.3. According to the West of England Local Aggregates Assessment 2012-2021, there are currently three active quarries (including Tytherington Quarry) in South Gloucestershire. As no additional vehicle movements are associated with the proposed development, cumulative impacts on the environment as a result of the development are unlikely.
- 5.10.4. In terms of intra-project cumulative effects, typically, the main focus of such an assessment relates to amenity topics, such as those that affect human receptors, i.e. noise, vibration, traffic, air quality and visual amenity, although it can also relate to other topics where a receptor can be subject to effects from more than one environmental topic, e.g. biodiversity and hydrology.

## 5.11 TOPICS SCOPED OUT FROM DETAILED ASSESSMENT

### TRANSPORT AND TRAFFIC

- 5.11.1. The proposed scheme does not seek to increase output rates from the quarry from that which already exists. The proposed scheme seeks to access an extra 3 years of reserves. Using the latest IEMA guidance, EATM, determination of receptors requiring detailed assessment of likely significant traffic and transport effects would be based upon the proportional increase in traffic levels on the study area roads. As the proposed scheme does not seek to increase the peak traffic generation it will be in line with the conditions of the extant planning permission.

- 5.11.2. Additionally, recent accident data does not indicate any accident hotspot in the vicinity of the quarry access (Tytherington Road between the quarry access and the A38) between 2017 and 2021 the latest available published data<sup>22</sup>. This section of Tytherington Road does not have an associated receptors that are highly sensitive to traffic and transport effects based on the guidance within EATM relating to the likely presence of vulnerable groups, level of footway provision and adjacent land uses.
- 5.11.3. Therefore, no detailed assessment of traffic and transport effects is proposed in the EIA and it is proposed that traffic and transport is scoped out of the EIA.

## **AIR QUALITY**

- 5.11.4. Based on the available project information, the proposed additional activities will take place within the existing boundaries and will not significantly alter the current site characteristics from an air emission prospective. Main criteria followed to determine whether an air quality impact assessment should be performed are:
- A change in process activities that are likely to generate dust (such as blasting, excavation and drilling) that are not already covered by the current extraction permissions;
  - A change in the site extension that could bring sources of dust closer to sensitive receptors;
  - A change in traffic associated with the quarry activities;
  - A change in the Dust Mitigation Plan.
- 5.11.5. As none of the aforementioned criteria seem to be triggered, the need to perform a new air quality impact assessment is not deemed necessary. The dust mitigation measures reported in the original permission should continue to be adhered to.

## **CULTURAL HERITAGE**

- 5.11.6. No new land take is required as part of the proposed development. An archaeological desk study has been completed and this has identified that soil stripping previously undertaken within the under the original permission (NA/IDO/002/A) required archaeological assessment and investigation, involving the completion of an archaeological watching brief. This identified that any archaeological remains which may have been present will have been removed and there is a negligible potential for the presence of archaeological remains within the Site boundary. Indirect effects arise where a development harms heritage asset without causing direct disturbance; primarily arising from change in the setting of heritage assets. The nature of the proposed development (a deepening with no lateral extension) means that there will be no indirect effects. Therefore, no detailed assessment is proposed in the EIA.

## **LAND AND SOILS (INCLUDING AGRICULTURE)**

- 5.11.7. The proposed development will extend the working area of the existing quarry into an area currently used as a store for soils. The existing soil storage area will be relocated to allow new quarrying to take place and the relocated soils retained onsite for use in landscaping and future restoration.
- 5.11.8. Historical mapping available from the National Library of Scotland<sup>44</sup> shows that prior to the current use, the area of the proposed development has comprised solely agricultural fields (back to the earliest mapping in the 1800s). Consequently, land contamination would not be expected to be encountered when the quarrying extends into this area.



- 5.11.9. Since the area of the proposed development is no longer in agricultural use (having been removed from that use as part of the currently permitted operations) there would also be no new effects on agricultural land as a result of the proposed development.
- 5.11.10. There is the potential for the soils within the existing stockpile, and any virgin soil beneath the stockpile, to be damaged as a result of the requirement to relocate the stockpile and extend quarrying into the area of the proposed development. However, the applicant is committed to managing soils in line with existing soil management plans (which includes retention of soils for use in landscaping and future restoration) and the *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*<sup>45</sup>. Consequently, the potential effects on soils (such as loss of, or damage to soils and soil structure as a result of inappropriate handling and storage) will already have been mitigated as far as reasonably practicable.
- 5.11.11. Taking into account the above points, land and soils (including agriculture) has therefore been scoped out from detailed assessment.

## **MAJOR ACCIDENTS AND DISASTERS**

- 5.11.12. The proposed development will take place at an existing operational site which is heavily regulated under health and safety and quarry regulations. The proposed development is not located in an area anticipated to be at risk of major accidents or disasters. The vulnerability to flood risk will be assessed in the Flood Risk Assessment and the Water Environment ES chapter. It is therefore proposed that major accidents and disasters are scoped out of the EIA.

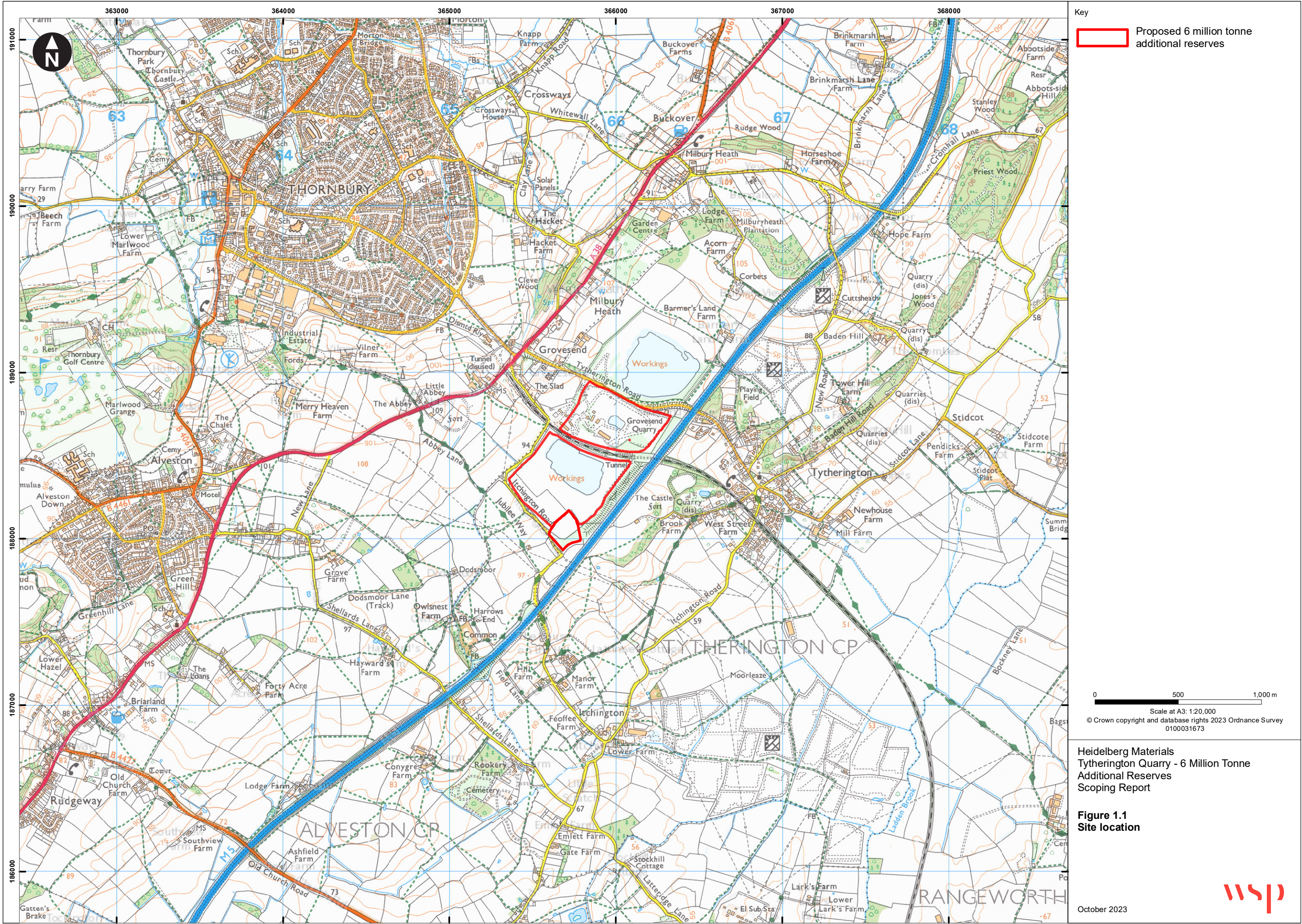


## 6 SUMMARY OF PROPOSED EIA SCOPE

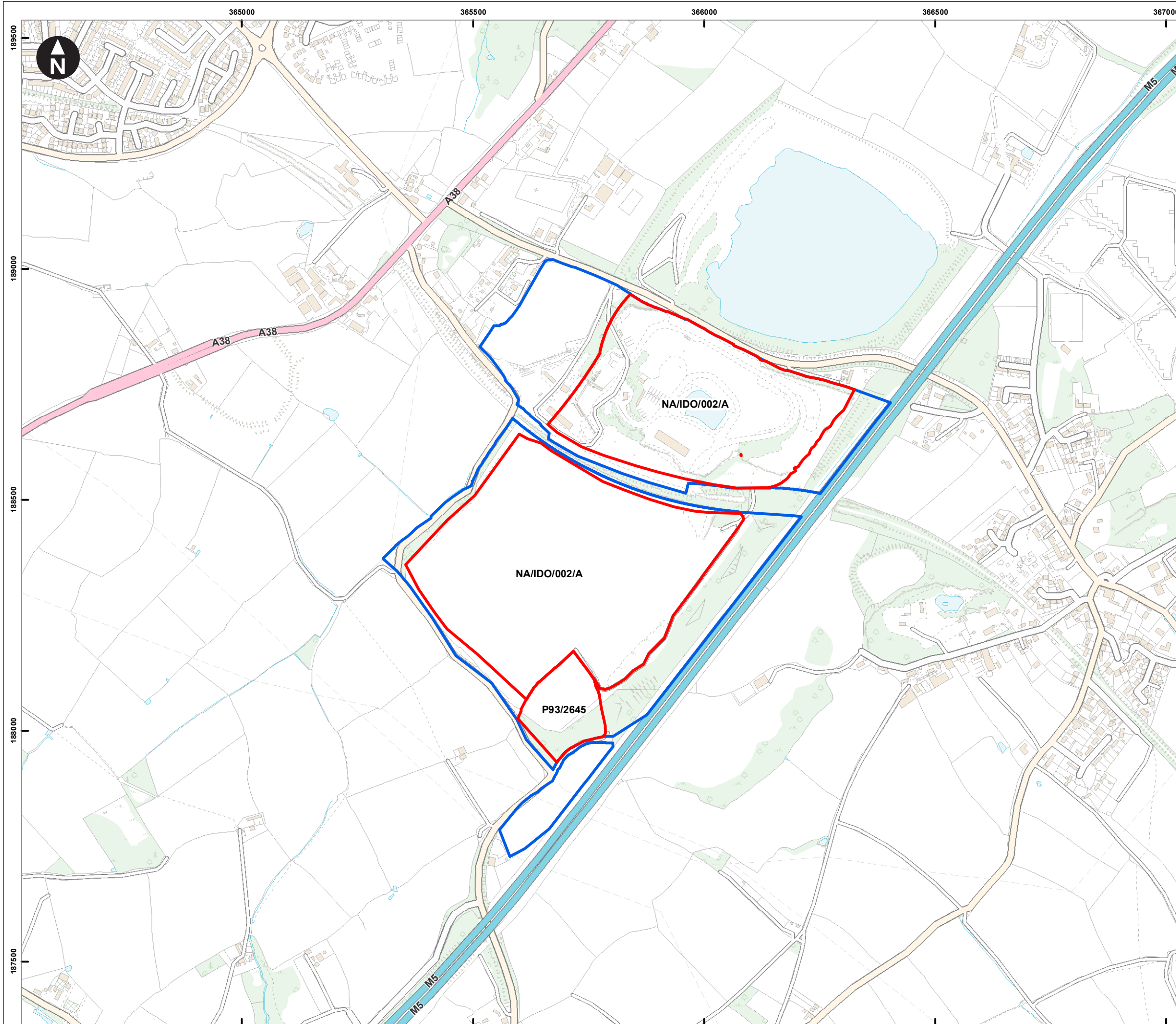
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- 6.1.1. As set out in the preceding sections, the EIA for the proposed extension of Tytherington Quarry into the consented soil storage area will include detailed assessments on the following topics:
- Revised restoration scheme;
  - Landscape and visual;
  - Noise;
  - Vibration;
  - Water environment;
  - Biodiversity;
  - Socio-economics;
  - Climate Change Resilience;
  - Greenhouse Gas Emissions; and
  - Cumulative effects.
- 6.1.2. The ES will consider the significant issues in more detail and will report on further investigations in relation to the above.
- 6.1.3. Heidelberg and WSP would welcome comments on the scope of the EIA and for any suggestions on potential mitigation and enhancement that can be incorporated into the proposed development as we proceed through the EIA process.









Key

- Extant planning permissions
- Heidelberg Materials land ownership

0 100 200 300 400 m

Scale at A3: 1:8,000

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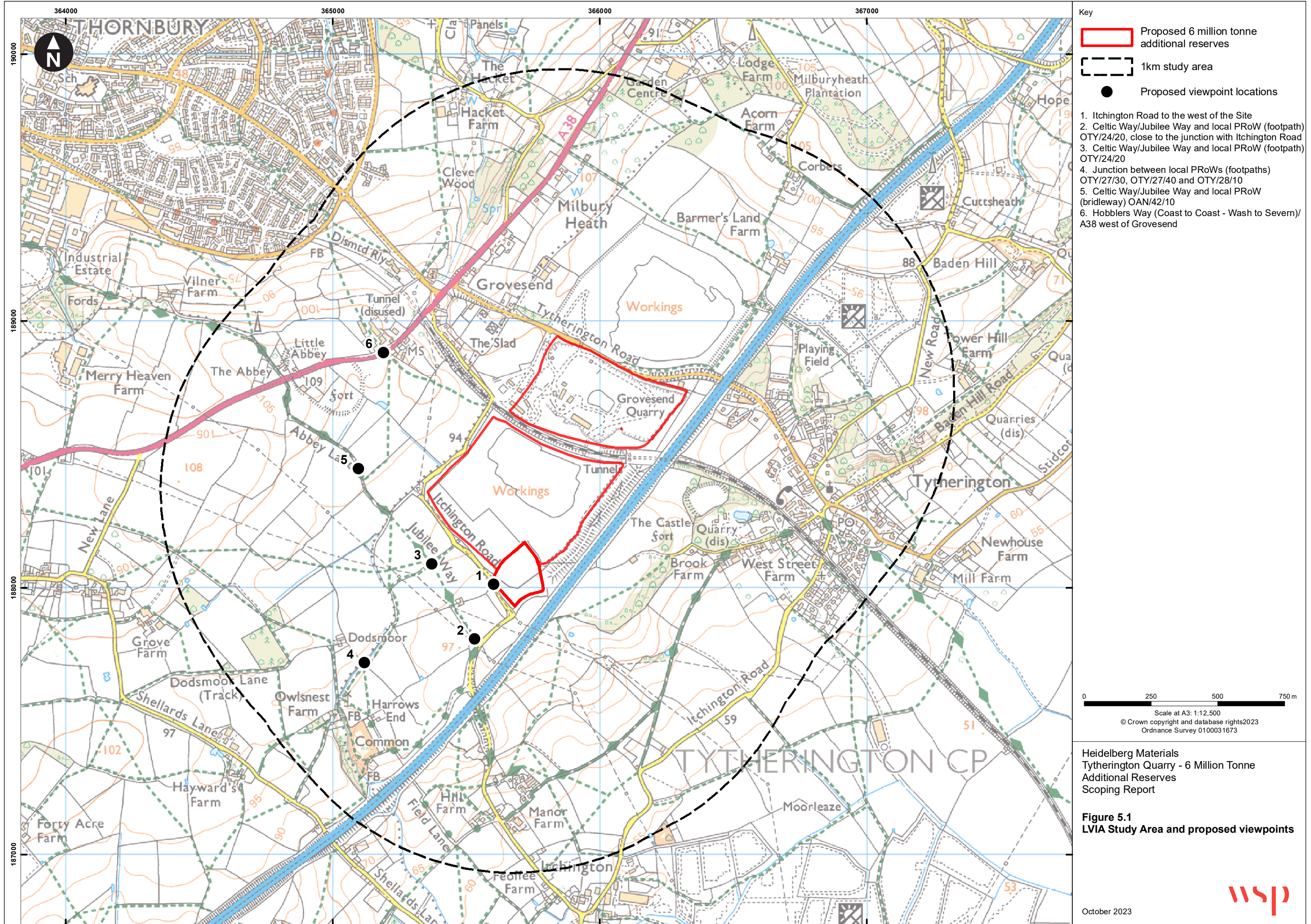
Heidelberg Materials  
Tytherington Quarry - 6 Million Tonne  
Additional Reserves  
Scoping Report

**Figure 2.1**  
**Land ownership and extant planning**  
**consent boundaries**

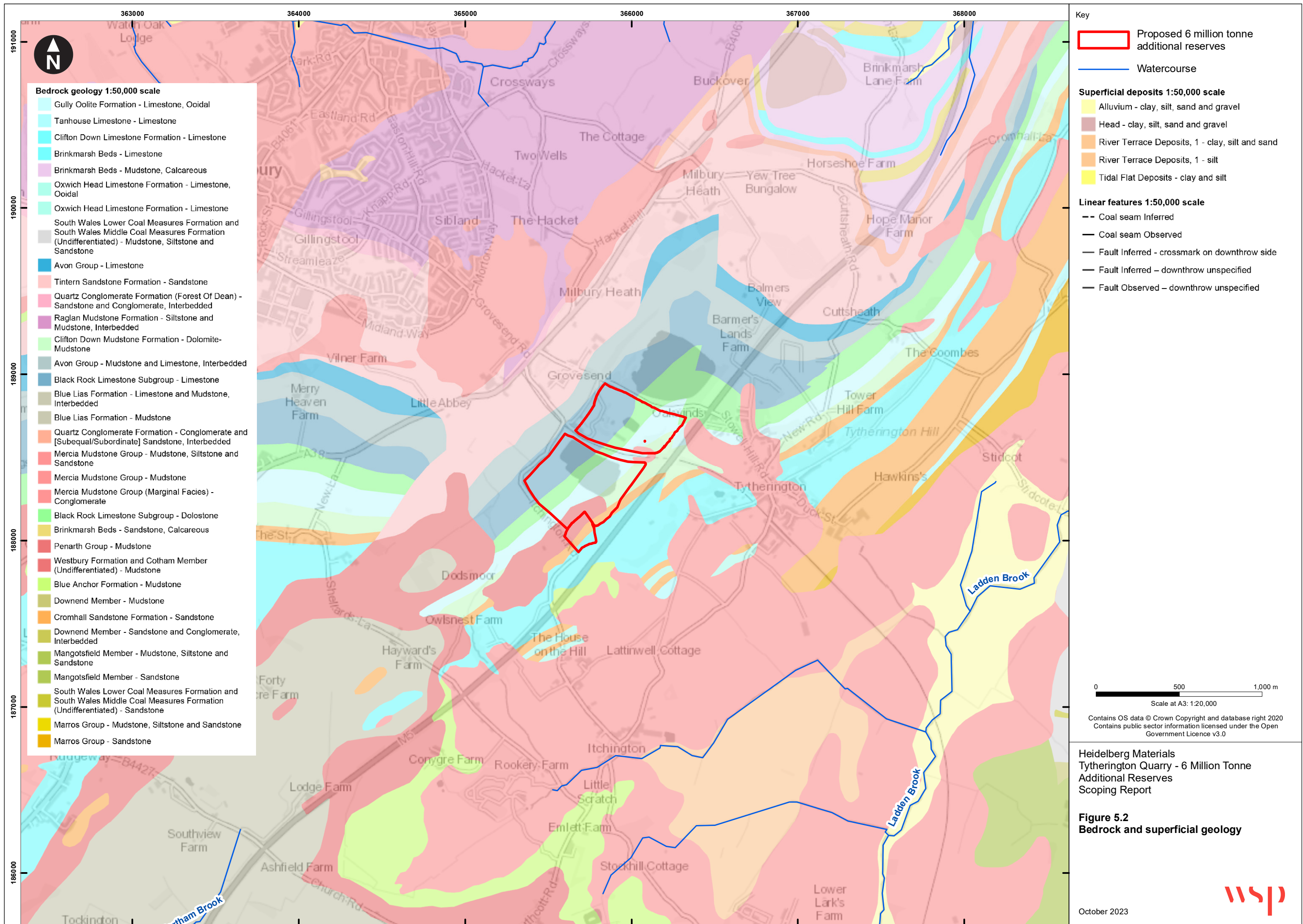
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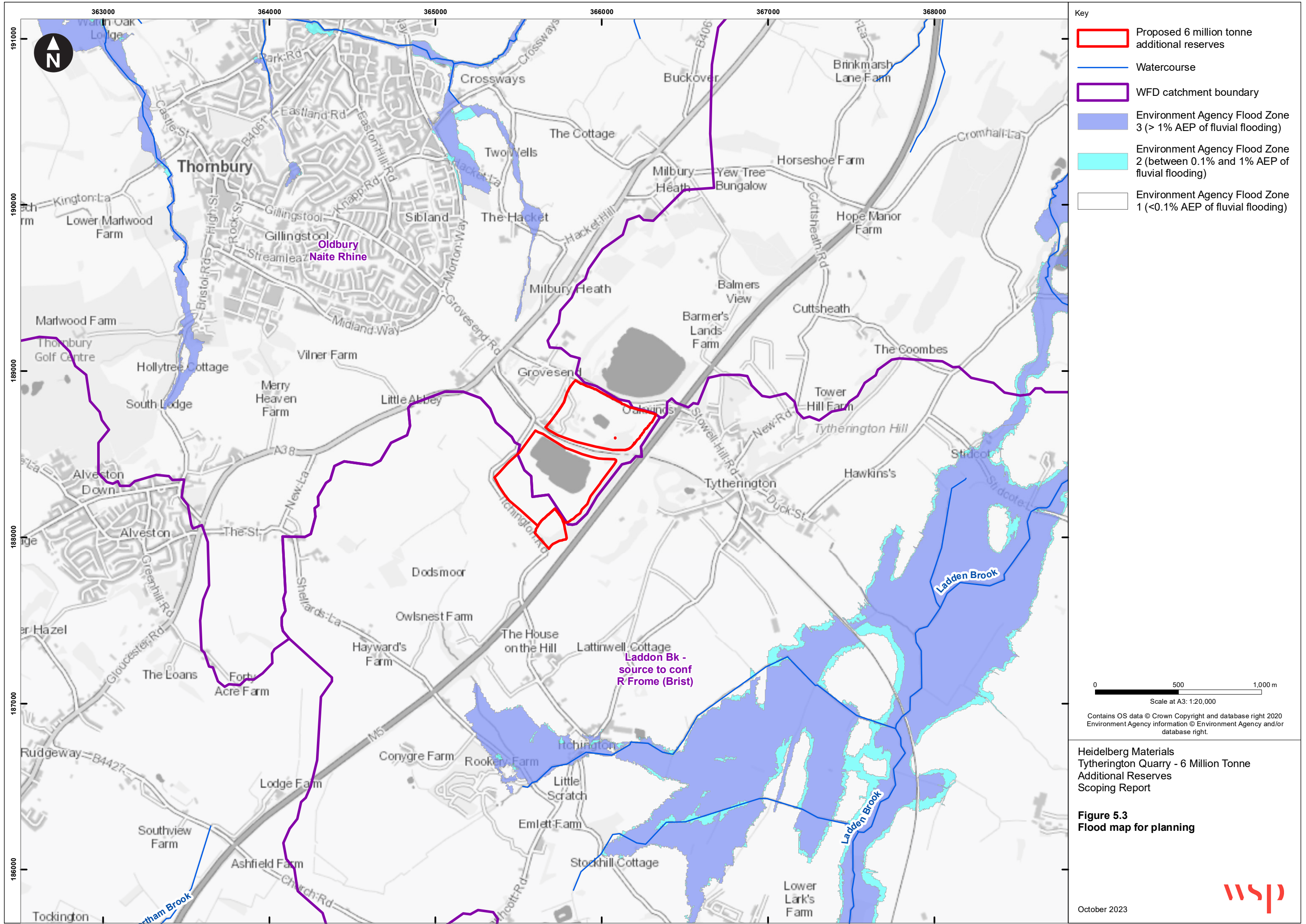




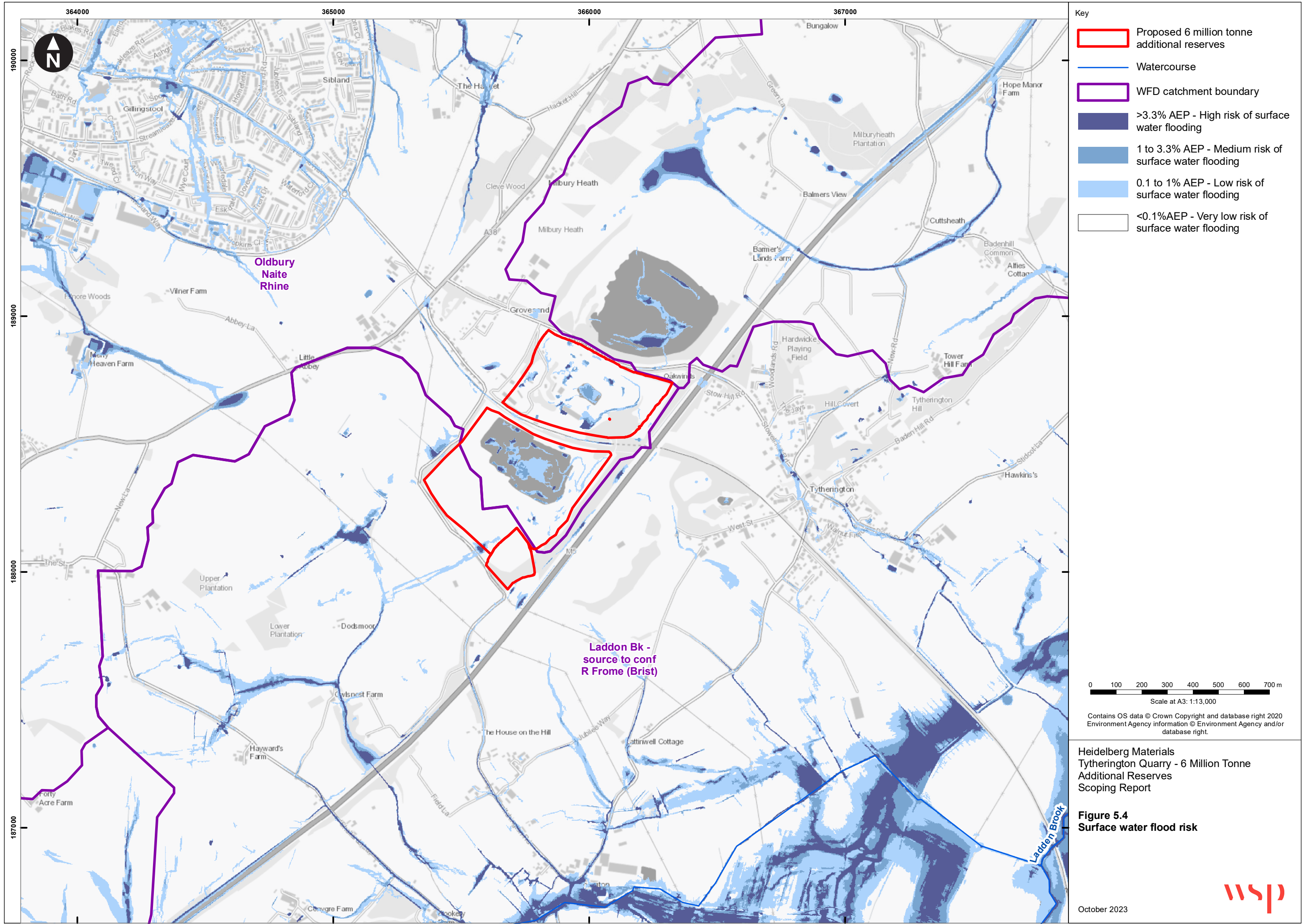




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