Environmental Statement

Section 73 Planning Application for proposed deepening of the existing quarry and an extension of time for mineral extraction and restoration operations through the variation of conditions 1 (timescales), 2 (approved plans), 4 (depth of mineral extraction), 6 (phasing plans), 41 (final restoration scheme) and 43 (water level timescales) of planning permission 01/09/0360

at

Back Lane Quarry, Back Lane, Carnforth, Lancashire, LA6 1EA

on behalf of

AGGREGATE INDUSTRIES

by

Heatons

Planning Environment Design

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Statement of Competence for the Preparation and Management of Planning Applications Subject to Environmental Impact Assessment

The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Part 5, 18(5) states '*In order to ensure the completeness and quality of the environmental statement—*

(a) the developer must ensure that the environmental statement is prepared by competent experts; and
(b) the environmental statement must be accompanied by a statement from the developer outlining the relevant expertise or qualifications of such experts.'

The list below identifies the qualifications of those involved in undertaking the Environmental Impact Assessment and compiling the Environmental Statement:

EIA Coordination (Core ES Chapters including Alternatives and Climate Change) – Heatons

Spencer Warren BSc(Hons) DipTP MRTPI

Clive Saul BEng(Hons) MSc MRTPI

Selena Gaskarth BSc(Hons) MRTPI MCIWM PIEMA

Georgina Illsley BA(Hons) MA MRTPI

Heatons is a consultancy with specialist planning knowledge of the minerals, waste, energy, commercial and housing development sectors. The Company was established in 1999 and currently employs ten appropriately qualified planners. Heatons has undertaken and managed Environmental Impact Assessments, prepared and submitted Environmental Statements and Non-Technical Summaries since 1999.

The following identifies the individual authors of ES Chapters and their qualifications or expertise:

Landscape and Visual – Kedd Ltd

Robin Smithyman BSc (Hons), PG DipLA CMLI PG DipTP PG DipUD PG Dip SI MIQ

Robin has over 25 years' experience working with operators and planning authorities on minerals extraction and restoration schemes, their landscape and visual assessment, mitigation and enhancement.

Ecology and Biodiversity

Tamsin Douglas MSc MCIEEM

Tamsin has been working as a professional ecologist in Cumbria for 18 years, 10 of which have been as a partner of South Lakes Ecology. Tamsin has an MSc in Biological Recording, is a full member of CIEEM and has extensive experience in habitat surveying and protected species surveys in Cumbria and surrounding areas.

Amy Tose BSc (Hons) Qualifying Member of CIEEM

Principal Ecologist with several years of consultancy experience. Managing projects and coordinating with clients and different disciplines on a variety of projects. Excellent botanical ID for plants and grasses. Experience leading and conducting a variety of protected species surveys including great crested newt, bats, badgers, nesting bird surveys, reptile, water vole, otter and white-clawed crayfish.

Alicja Kordula BSc(Hons) MSc

Senior Ecologist with several years of consultancy experience with experience conducting a variety of surveys and reports. Holds a GCN Level 1 Class Licence CL08 Holder and is also River Condition Assessment Certified. Ecological Clerk of Works (ECoW) on a variety of sites for species including Great Crested Newts and Badgers.

Rhia McBain BSc(Hons) MCIEEM

Director of Ecology at Heatons, with nearly 20 years experience in the ecology sector including managing ecology on everything from small scale projects to large infrastructure projects. She has extensive experience leading on Phase 1 and NVC surveys, and on species surveys including bat, dormouse, GCN, reptile and badger in addition to providing Ecological Clerk of Works (ECoW) support on a range of projects. Rhia has Great Crested Newt Survey Licence (Level 1), Bat Survey Licence (Level 2) and Hazel Dormouse Survey Licence.

<u>Transport – Focus Transport Planning</u>

Mike Hughes BEng(Hons) MCIHT

Mike has over 20 years professional experience in Transport Planning and Engineering, acting for a range of public and private sector clients. Mike's experience includes acting as an expert witness at public inquiries, informal planning appeal hearings and public consultation exercises; project management of medium to large scale development related Transport Assessments; leading on major development related transport studies; input to Environmental Impact Assessments; supporting candidate sites through the Local Plan allocation process including production of representations; involvement in site search exercises for local plan developments; appraisal of Masterplan schemes and production of detailed scheme drawings; He has provided planning and design related advice for a wide range of schemes including education, healthcare, industrial, minerals and waste, energy, commercial, residential and mixed-use sites.

<u>Noise and Groundborne Vibration – Advance Environmental</u>

Dr Robert Storey BEng(Hons) PhD Member of Institute of Acoustics

Robert has significant experience in carrying out Environmental Noise Impact Assessments for quarries and related development gained through over 15 years of working in consultancy.

Kevin Gough

Kevin worked on a number of environmental monitoring projects within local government before moving to the mineral extractive industry in 1986. He founded Advance Environmental Consulting Limited and has managed environmental monitoring and assessment projects and contracts for clients throughout the UK and Europe. His principal areas of expertise are the monitoring and assessment of environmental noise and ground borne vibration from blasting, which have been developed through over 40 years' practical experience in the field. He served as a regional steering group member and Chairperson of the Institute of Environmental Management and board member. Currently an Honorary Fellow of the Institute of Quarrying where most recently he served as a director and executive board member.

Air Quality – Advance Environmental

Ian Stone BSc(Hons) Member of Institute of Environmental Sciences and Institute of Air Quality Management

Ian is a Principal Scientist specialising in air quality monitoring, analysis and associated impact assessments, primarily in relation to the extractive industries. He has worked as an air quality researcher and consultant for over 30 years both within the UK and overseas, initially with the University of Exeter and latterly with Advance Environmental Consulting Limited. He has been on a number of steering groups and committees associated with air quality. The most pertinent is the Minerals Industry Research Organisation's publication 'Good Practice Guide: Control and Measurement of Nuisance Dust and PM_{10} from the Extractive Industries' (2011) and its associated document: 'Management, Mitigation and Monitoring of Nuisance Dust and PM_{10} Emissions Arising from the Extractive Industries: An Overview' (2011). He was also one of the authors of the Institute of Air Quality Management 'Guidance on the Assessment of Mineral Dust Impacts for Planning', 2016.

In addition to providing Environmental Impact Assessments for mineral site planning applications Ian has extensive experience in monitoring and characterisation of PM_{10} / $PM_{2.5}$ and 'nuisance' dust associated with the extractive industries. These have been undertaken on behalf of both industrial clients and regulatory authorities.

Health – Savills

Tara Barratt BSc(Hons) MSc (DIC) Associate of IEMA

Tara has 8 years' experience undertaking health impact assessments, including assessing population and human health within EIA, is an Associate of the Institute of Environmental Management and Assessment (IEMA), and contributing author to IEMAs guidance on "Determining Significance For Human Health In EIA" and "Effective Scoping of Human Health in EIA.

Water Environment – Hafren Water

Chris Ainscow BSc

Rosie Morrant BSc MSc FGS

Charlotte Hale BSc(Hons) MCIWEM

Chris Leake BSc MSc FGS

Hafren Water has been involved with environmental water management issues within the vicinity of the site for more than 20 years and therefore have a detailed understanding of the local water environment.

Land Stability – KeyGS

Simon Railton – BSc Earth Sciences MSc Engineering Rock Mechanics Chartered Geologist Chartered Engineer

Simon has 30 years' experience in geotechnical engineering predominantly within the minerals industry.

Heatons Document Management

Revision	Author	Checked by	Date
FINAL	CS/SG/GI	CS/SG	07/06/2024

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1 INTRODUCTION

1.1 Background

1.1.1 This Environmental Statement (ES) has been prepared by Heatons on behalf of Aggregate Industries UK Limited (the Applicant), the owner and operator of Back Lane Quarry, Back Lane, Carnforth, Lancashire (the site).

1.1.2 Planning permission is being sought for the deepening of the existing quarry and an extension of time to allow mineral extraction to continue until 31 December 2077, with restoration being completed a year later, by 31 December 2078.

1.1.3 This planning application is submitted under Section 73 of the Town and Country Planning Act 1990 and proposes to vary conditions 1 (timescales), 2 (approved plans), 4 (depth of mineral extraction), 6 (phasing plans), 41 (final restoration scheme) and 43 (water level timescales) of planning permission 01/09/0360.

1.1.4 Back Lane Quarry has been operating for many years and is one of a very limited number of quarries able to meet the carboniferous limestone aggregate demand of the north-west England market.

1.1.5 The site is a strategic supplier of high-grade aggregates, asphalt and concrete products, all of which are essential for the repair, maintenance and improvement of the built environment in the region.

1.1.6 Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation. Carboniferous limestone resources are extremely limited within Lancashire and the northwest of England, being confined to the Carnforth area in the north of the county and the Clitheroe area to the south. Further afield, carboniferous limestone resources are generally very heavily constrained by designations such as National Parks and National Landscapes.

1.1.7 It is considered preferable for the existing quarries to seek permission to extract additional minerals from a deeper depth, rather than to pursue a lateral extension to the existing workings.

1.1.8 It is therefore essential that the long-term plans for the site are considered at an early stage to ensure that the resource available is not unnecessarily sterilised or compromised.

1.1.9 The working of Back Lane Quarry is coordinated with the development of Tarmac's

adjoining Leapers Wood Quarry which also proposes to deepen the extraction area to the same depth. It is important that the working and restoration of both quarry operations are closely coordinated as the site is essentially a single void.

1.1.10 Details of the proposed development and a site description are outlined within this ES, along with a broad assessment of any potential environmental effects and their significance. Comprehensive assessments and other background information are contained within the accompanying technical assessments.

1.2 Applicant

1.2.1 Aggregate Industries UK Limited (Aggregate Industries) are at the frontline of the construction and infrastructure industries, producing and supplying an array of construction materials. With over 200 sites and around 3,700 dedicated employees, Aggregate Industries are home to everything from aggregates, asphalt, ready-mixed concrete and precast concrete products. In addition, they produce, import and supply construction materials, export aggregates and offer national road surfacing and contracting services. A full range of products is available which help customers work sustainably, safely, professionally and profitably.

1.2.2 Aggregate Industries UK Limited are also a proud member of Holcim, which is the leading global building materials and solutions company with around 70,000 employees in over 80 countries. It holds leading positions in all regions with a balanced portfolio of developing and mature markets.

1.2.3 Operating divisions of the company are committed to managing their businesses to minimise impacts on the surrounding environment and on local communities. Aggregate Industries has accredited all of its sites to the Environmental Management System ISO 14001, which underlies the company's commitment to positive environmental stewardship.

1.2.4 Further information on the Company can be obtained via the website www.aggregate.com

1.3 Community Involvement

1.3.1 In accordance with good practice and the advice within the National Planning Policy Framework (NPPF), all developers proposing to submit planning applications for major development are encouraged to undertake an element of community involvement prior to submitting their application. Community involvement is an important part of the planning process and ensures that the views of the local

community are considered by the Applicant. In consultation with the Back Lane Quarry liaison committee, Public Exhibitions are being held at Over Kellet, Nether Kellet and Carnforth.

1.4 Information Availability

1.4.1 Electronic copies of all the documents submitted to Lancashire County Council in respect of the planning application are available at:

https://planningregister.lancashire.gov.uk/Search/Advanced

1.4.2 Paper format copies of the planning application, Environmental Statement and supporting information are available on request at the following prices:

- Paper Copy - £250
- Electronic (pdf) – no cost (also downloadable via Public Access)

1.4.3 All requests for hard copy information should be addressed as follows:

Heaton Planning Ltd
The Arc
6 Mallard Way
Pride Park
Derby
DE24 8GX

2 SITE APPRAISAL

2.1 Site Location

2.1.1 The site location is shown on drawing D.006. The current situation at the site is shown on drawing D.010 and the proposed extraction depths and consented extraction area are shown on drawings D.011 to D.015.

2.1.2 Back Lane Quarry is located within Lancaster City Council authority area, lying to the south-east of Carnforth in Lancashire. The site is bounded to the north by the adjoining Leapers Wood Quarry operated by Tarmac Trading Ltd, to the east by woodland, to the south by agricultural land and to the west by woodland, with the M6 beyond.

2.1.3 Carnforth is the nearest major settlement to the site, the town centre of which lies around 1.5km west of the site. Further afield, Lancaster city centre lies 8.5km to the south of the site.

2.1.4 Access to Back Lane Quarry is via Back Lane to the west of the quarry. Back Lane crosses the M6 and then travels north along the eastern edge of Carnforth to a junction with Kellet Road. From here the wider strategic highway network can be accessed.

2.2 Site Description

2.2.1 The site entrance is located to the west of the quarry off Back Lane. To the east of the entrance road is an electricity substation, associated with the 78m tall wind turbine on site, the site offices and workshop buildings. A weighbridge is located directly north of the site offices, with a second weighbridge to the east. Further to the north of the site offices is a lagoon and, further north, HGV parking bays. The site car park is located east of the HGV park, alongside the wind turbine compound.

2.2.2 Further south-east of the site entrance is the plant site, containing an asphalt plant, primary and secondary crushers, primary and secondary screens and associated control room. A laboratory is located to the north-west of the asphalt plant. An asphalt tip is located to the north-east of the primary crusher, close to the northern boundary separating the site from Leapers Wood Quarry.

2.2.3 Within the south-eastern extent of the site is a concrete blockworks and stocking area with associated site offices which are part of the High Roads Quarry.

2.3 Site Setting

2.3.1 To the south of the site there are agricultural fields leading down to Back Lane, Main Road and the village of Nether Kellet. Hawthorns Caravan Park lies to the south-east of the quarry. To the west of the site is a belt of woodland screening the site from the M6 which runs in a north / south direction past the site. To the east of the quarry is Kit Bill Wood, an Ancient and Semi-Natural Woodland covering 4.86 ha.

2.3.2 The nearest residential areas to the extraction area lie around 400m to the north-west on the edge of Carnforth, beyond the M6. Over Kellet village lies around 700m to the north-east and Nether Kellet village lies around 550m to the south of the quarry at its nearest point.

2.3.3 A Public Footpath (PROW ref: 1-24-FP 7) runs north to south along the eastern side of Kit Bill Wood (to the east of the quarry), reaching Main Road. Here it runs parallel with Main Road before heading east to west (PROW ref: 1-22-FP 5) across the agricultural fields to the south of the quarry.

2.3.4 There are a number of Listed Buildings within 2km of the site, the closest of which is Grade II* listed 'Church of St Cuthbert' approximately 500m to the east. The nearest cluster of listed buildings are within the village of Over Kellet around 800m north-east of the site.

2.3.5 There are two Sites of Special Scientific Interest (SSSI) within 2km of the site. Crag Bank SSSI is a 3.7ha biological designation located around 1.5km to the west of the site. Thwaite House Moss SSSI is a 7.25ha biological designation approximately 1km to the south-west of the site.

2.3.6 The Forest of Bowland National Landscape and the Arnside and Silverdale National Landscape lie around 1.7km to the east and 1.8km to the west respectively.

2.4 Background and Planning History

2.4.1 Back Lane Quarry is a long established limestone quarry which benefits from a number of planning permissions granted since the 1940's, inter alia, an extension to the quarry and erection of a crushing plant approved in 1948 (ref: 2/5/9), and erection of a coating plant and emission stack approved on 7th March 1983 (ref: 01/82/1118).

2.4.2 The mineral operations are covered by an Environment Act 1995 Review of Old Mineral Permission (ROMP) granted in 2006 (ref: 1/03/1186) which permits

working until 2048. The ROMP was varied by planning permission reference 1/09/360 in July 2009 which allowed the controls on stockpile heights to be amended.

2.4.3 Planning permission for the siting of a modular office block and associated car parking on land south-east of Back Lane Quarry was granted in 2004 (ref: 1/03/1591). Planning permission to vary condition 2 of planning permission 1/13/0700 to allow the existing office block to be retained until 7th March 2030 was granted on 30th January 2014 (ref: 01/13/0700).

2.4.4 Installation of a 78m high wind turbine (including blade length) on a former spoil mound within the north-western extent of the site with associated transformer container and substation container was approved on 1st March 2013 (ref: 01/12/0782). A non-material amendment was granted on 8th April 2014 (ref: 01/12/0782NM1) to reduce the size and amend the appearance of the transformer container associated with the wind turbine. A retrospective application for the installation of a sub-station and below ground cable associated with the wind turbine was approved on 17th April 2014 (ref: LCC/2014/0040).

2.4.5 Planning permission for a change of use application for recycling of road planings and road base within an area of the site that has previously been quarried was granted on 9th June 2014 (ref: LCC/2014/0043).

3 DESCRIPTION OF PROPOSED DEVELOPMENT

3.1 Introduction

3.1.1 The proposed development comprises a deepening of the currently permitted mineral extraction operations and an extension of time to allow the mineral reserves to be fully worked and the site restored.

3.2 Existing Operations

3.2.1 Back Lane Quarry comprises an operational limestone quarry, a concrete block works, an asphalt plant which supplies up to 120,000 tonnes of coated road stone products per year, areas of stockpiling, site offices and associated car parking. The wider site also accommodates a wind turbine which helps meet a proportion of the site's demand for electricity.

3.2.2 The site is accessed from Back Lane and currently sells approximately 1.1 million tonnes per annum (mtpa) of high quality limestone aggregate. This is an average figure which will fluctuate depending upon demand and the wider economy.

3.2.3 The current permission for the site restricts working to a maximum depth of 38mAOD via planning condition.

3.2.4 The existing permission also limits the timescales for extraction and restoration of the site to 29 April 2048 and 29 April 2049 respectively.

3.2.5 The existing theoretical reserve remaining on site in January 2024 has been calculated to be 19.4 million tonnes (mt). However, only 6.8mt is currently accessible due to reserves being constrained by plant and machinery, buildings and historic mineral waste tips.

3.3 Description of Proposed Development

3.3.1 This planning application is submitted under Section 73 of the Town and Country Planning Act 1990 and proposes to vary conditions 1 (timescales), 2 (approved plans), 4 (depth of mineral extraction), 6 (phasing plans), 41 (final restoration scheme) and 43 (water level timescales) of planning permission 01/09/0360.

Reserves and output

3.3.2 Back Lane Quarry extracts a high-grade limestone aggregate, the supply of which is critical in facilitating the construction of strategic projects throughout the region. A significant proportion (around 15%) of the aggregate won from the site is used as feedstock in the site's asphalt plant.

3.3.3 This application seeks permission for the deepening of the current quarrying operations in order to extract the limestone reserves to a depth of -37mAOD (i.e. an additional depth of 75m). Allowing for the joint working of the boundary between Back Lane Quarry and Leapers Wood Quarry, the proposed changes would secure the future of this strategic site and potentially release a further 40 million tonnes (mt) of limestone, providing an overall resource of around 60mt, including the existing workable reserves and those reserves currently constrained.

3.3.4 The existing annual sales from the site of approximately 1.1mt would remain unchanged.

Phasing

3.3.5 The mineral would be extracted in 5 phases (phases A to E).

Phase A

3.3.6 Mineral extraction would continue within the permitted limit of extraction, working southwards to extract rock down to a level of 38mAOD, with subsequent deepening to 23mAOD within the Phase period.

3.3.7 Extracted mineral would be processed on site at the Back Lane Quarry processing plant, temporarily stocked and transported off-site by HGV to point of sale.

3.3.8 Phase A would release approximately 12.455mt of mineral.

Phase B

3.3.9 Phase B would comprise the partial removal of the existing quarry tip, to enable the extraction of mineral below. Tip material would be temporarily stored within the Phase A area, which would also become the 'active tip'.

3.3.10 Mineral extraction would continue within the permitted limit of extraction, with deepening to a depth of 23mAOD within the Phase period.

3.3.11 Extracted mineral would be processed on site within the Back Lane processing plant, temporarily stocked and transported off site by HGV to point of sale.

3.3.12 Phase B would release approximately 6.964mt of mineral.

Phase C

3.3.13 Phase C would comprise the continuation of mineral extraction within the permitted limit of extraction, with the deepening to a depth of 23mAOD within the Phase period, together with the extraction of rock beneath the existing stockyard.

3.3.14 Extracted mineral would be processed on site within the Back Lane processing plant, temporarily stocked and transported off site by HGV to point of sale. Any additional quarry waste rock material would be placed within the temporary tip within Phases A and B.

3.3.15 Phase C would release approximately 5.318mt of mineral.

Phase D

3.3.16 During Phase D, the Back Lane processing plant would be decommissioned and removed from the site. During and after its removal, a temporary mobile processing plant would be used within the quarry void to ensure the processing of rock and to avoid the sterilisation of the mineral resource.

3.3.17 During this phase, the temporary placement / active tip would require relocating within the quarry void (to access the mineral resource).

3.3.18 Mineral extraction would continue within the permitted limit of extraction, with deepening to a depth of 8mAOD and -7mAOD within the Phase period, together with the extraction of rock beneath the existing stockyard and processing plant areas.

3.3.19 Extracted mineral would be processed on site using mobile plant, to be located adjacent to the extraction face. Material would be temporarily stocked within the quarry void and transported off site by HGV to point of sale.

3.3.20 Phase D would release approximately 17.204mt of mineral.

Phase E

3.3.21 Mineral extraction would continue during Phase E with deepening to a depth of -37mAOD within the Phase period.

3.3.22 Extracted mineral would be processed on site using mobile plant, to be located adjacent to the extraction face. Material would be temporarily stocked within the quarry void and transported off-site by HGV to point of sale.

3.3.23 Post mineral extraction, processing and sale of stock, all quarry plant and machinery would be decommissioned and removed from the site. This would include the High Roads Concrete Block Works.

3.3.24 Phase E would release approximately 18.237mt of mineral.

Timescales

3.3.25 In order to efficiently extract the additional reserves within the site, it is necessary to extend the currently permitted timescales. Assuming the existing extraction rates are maintained, this would require an extension from 29 April 2048 to 31 December 2077 for mineral extraction and from 29 April 2049 to 31 December 2078 for restoration.

Employment

3.3.26 The site currently directly employs 112 full time equivalent staff. This comprises 25 staff at the quarry, 3 at the laboratory, 6 at the asphalt plant, 16 at the concrete products factory and 62 at the High Roads regional office. In addition to this there are a significant number of hauliers and contractors reliant upon the continued operation of Back Lane Quarry. No changes are proposed to the current number of staff employed on the site, albeit the proposals would be likely to result in additional jobs being created in the future.

Hours of Operation

3.3.27 Condition 13 and 14 of the site's extant planning permission (ref: 01/09/0360) specify the operating hours for the site, as follows:

Condition 13

- 'The use of explosives shall only take place between the hours of 1000 and 1700 Mondays to Fridays (except Public Holidays) and between 0830 and 1200 on Saturdays and at no other time, except in emergency situations. In such emergency situations the operator shall inform the County Planning Authority prior to blasting or within 48 hours of a blast having taken place'.

Condition 14

- 'Notwithstanding the hours of working contained in condition 13 above, no soils or overburden shall be stripped or re spread from any part of the site nor shall construction of storage, landscape or baffle mounds take place on any part of the site before 0730 hours or after 1800 hours on Monday to Fridays (except Public Holidays) or before 0730 hours of after 1300 on Saturdays or at any time on Sundays or Public Holidays.'

3.3.28 Due to the critical need for flexible working to enable the on-site roadstone coating plant to service specific overnight road construction projects, no restrictions are placed on hours of operation of the mineral extraction activities within the quarry or the coating plant located within the site.

3.3.29 No changes are proposed to the above established operating hours.

Traffic & Access

3.3.30 The access to the quarry is from Back Lane, to the west of the site. This access is used by all quarry traffic, the roadstone coating plant traffic and all HGV traffic from the concrete products plant. There is also an access from Main Road to the south of the site. However, this southern access to the site is restricted to use only by cars and light goods vehicles from the concrete products plant and offices.

3.3.31 No changes are proposed to the existing site access arrangements.

Lighting

3.3.32 No changes are proposed to the current lighting arrangements within the site.

Restoration

3.3.33 The restoration of Back Lane Quarry would be undertaken as a combined restoration scheme which would be achieved through the restoration and after-use for both Back Lane Quarry and the adjacent Leapers Wood Quarry. An approved restoration scheme exists for the restoration of these sites, as shown on Drawing Number BLQ 5/1 'Combined Conceptual Restoration Scheme'. The scheme is based on the mineral reserves being worked to a depth of 38mAOD. This planning application seeks permission to extract mineral to -37mAOD and therefore, a revised restoration scheme has been prepared.

3.3.34 Given its location close to two Natural Landscapes, the Lake District National Park and attractive rural parts of the north-west of England, as well as its proximity to the M6 motorway network, the resultant void at the two quarries would be well

situated for recreational and amenity after-uses. As with the approved restoration scheme, the proposed restoration scheme recognises the potential for a multi-purpose after-use consisting of water and land-based recreational activities centered on and around a central lake, supplemented by discrete areas of nature conservation habitat, generally located on the quieter outer fringes.

4 PLANNING POLICY CONSIDERATIONS

4.1 Introduction

4.1.1 Section 38(6) of the Planning and Compulsory Purchase Act 2004 states that determination by the relevant MPA, in this instance, Lancashire County Council, must be made in accordance with the Development Plan unless material considerations indicate otherwise.

4.1.2 In reaching a decision on this application, the first consideration is therefore whether the proposals accord with the Development Plan. Having done this, it is then necessary to have regard to all other material considerations, which include all relevant policy considerations contained in the emerging development plan as well as National Planning Policy and guidance.

4.2 The Development Plan

4.2.1 The Development Plan for the application comprises the following documents:

- Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD (Adopted February 2009);
- Joint Lancashire Minerals and Waste Local Plan - Site Allocation and Development Management Policies (Adopted September 2013);
- Lancaster Local Plan Part One: Strategic Policies & Land Allocations DPD (Adopted July 2020); and
- Lancaster Local Plan Part Two: Development Management DPD (Adopted July 2020).

4.2.2 Material considerations include:

- National Planning Policy Framework (last amended 2023);
- Planning Practice Guidance; and
- Review of the Minerals and Waste Local Plan (Emerging).

Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD (February 2009)

4.2.3 The Core Strategy was adopted in February 2009 as part of the Local Development Framework for Lancashire. The document sets out the future for minerals and waste development in Lancashire until 2021 and outlines the strategic policies required to deliver the vision. However, it should be noted that the DPD is now considered out of date and therefore proposals now fall to be considered against national policy. Notwithstanding this, policies of relevance within the Core Strategy are set out below.

4.2.4 The Core Strategy has the following objectives:

- To identify and safeguard mineral resources for specific purposes which meet a proven and sustainable need, recognising their environmental, cultural and landscape value and their potential for future working;
- To provide a sustainable supply of locally sourced minerals, sufficient to meet our local, regional, and national needs;
- To provide certainty for businesses, operators and the public by identifying sites and areas for new mineral extraction, whilst seeking to conserve and enhance Lancashire's environmental assets and ensure a high quality of life for all;
- To support high standards of working practices and environmental protection and take an integrated and innovative approach to enhancing the quality of land and our landscapes during extraction and in restoration for beneficial after-use, including potential benefits to biodiversity, amenity and access to the countryside; and
- To encourage and enable local communities, businesses and local authorities to work together in coming to decisions and delivering solutions for sustainable resource management.

4.2.5 Policy CS1 (Safeguarding Lancashire's Mineral Resources) states that minerals will only be extracted where they meet a proven need for materials with those particular specifications. Mineral resources are to be conserved where they have an economic, environmental or heritage value. Mineral Safeguarding Areas will be used to identify mineral resources with the potential for extraction. The site is identified as a limestone site with 'Long-Term Strategic Provision' on the Key Diagram, situated within a 'Limestone Resource Area'.

4.2.6 Policy CS2 (Minimising the Need for Mineral Extraction) requires new developments to maximise the use of recycled and secondary materials.

4.2.7 Policy CS3 (Meeting the Demand for New Minerals) sets out the provision of 57.8 million tonnes of limestone between 2001 – 2021 to be met through a combination of rolling forward and identifying a minimal range of new sites and relying on secondary and recycled aggregates. No additional land was allocated for limestone extraction for aggregate use before 2021.

4.2.8 Policy CS5 (Achieving Sustainable Minerals Production) encourages alternatives to the bulk transportation of minerals by road. Criteria for site identification will be developed in order to ensure new sites identified for minerals development are sustainable. Concurrent mineral working is encouraged where it will maximise the recovery of materials worked.

Joint Lancashire Minerals and Waste Local Plan – Site Allocation and Development Management Policies – Part 1 (2013)

4.2.9 The Site Allocation and Development Management Policies Local Plan (Part 1) provides site specific policies and allocations and detailed development management policies for minerals and waste planning in the areas covered by the Councils of Lancashire, Blackpool and Blackburn with Darwen. Policies of relevance within the Core Strategy are set out below.

4.2.10 Policy NPPF 1 (Presumption in Favour of Sustainable Development) states that when a planning application accords with the policies in the Local Plan, it will be approved without delay, unless material considerations indicate otherwise.

4.2.11 Policy DM1 (Management of Waste and Extraction of Minerals) supports the extraction of mineral provision as set out in the Core Strategy and management of waste capacity as set out in Policy WM1.

4.2.12 Policy DM2 (Development Management) sets out the parameters for minerals and waste management operations. Minerals and waste developments will be supported that can demonstrate a positive contribution to the:

- Local and wider economy;
- Historic environment;
- Biodiversity, geodiversity and landscape character;
- Residential amenity of those living nearby;
- Reduction of carbon emissions; and

- Reduction in the length and number of journeys made.

4.2.13 Policy DM3 (Planning Obligations) states that where planning obligations are required to make a development acceptable in terms of its social, economic and environmental impacts, the MPA / WPA will seek to ensure the provision of, where appropriate:

- Access or road improvements;
- Long term aftercare or management;
- Provision of new or diverted footpaths;
- Public access to restored sites;
- Compensatory provision elsewhere for ecological mitigation;
- Wider transport improvements highlighted in the development's travel plans;
- District heating infrastructure sought under Policy DM4;
- Time limiting the development; and
- Ensuring full site restoration by a fixed date.

4.2.14 Policy WM 4 (Inert Waste Recycling) supports aggregate recycling facilities within operational quarries and landfill sites, providing they do not compromise the restoration or after uses.

4.2.15 Policy SA2 (Safeguarding of Land for Access Improvements) safeguards land for the 'haulage route through Back Lane and Leapers Wood Quarries', identified as route 'MRT14' on the policies map.

4.2.16 Policy M1 (Managing Mineral Production) states that development will not be supported for any new extraction of sand and gravel, limestone, gritstone or brickshale. If permitted reserves are unable to maintain the required production levels (identified in the latest sub-regional apportionments), increasing the working depth at existing limestone quarries and extraction at Dunald Mill Quarry will be supported.

4.2.17 Policy M2 (Safeguarding Minerals) states that development within Minerals Safeguarding Areas as outlined on the Policies Map will not be supported if it is incompatible by reason of scale, proximity and permanence with working the minerals. The policy also sets out exemptions to this, such as in areas where mineral has no value or where prior extraction can take place.

Lancaster District Council Local Plan Part One: Strategic Policies & Land Allocations DPD (Adopted July 2020)

4.2.18 The Strategic Policies & Land Allocations DPD was adopted on 29th July 2020 and allocates land for housing, employment, services and new investments within Lancaster District.

4.2.19 Policy SP1 (Presumption in Favour of Sustainable Development) echoes guidance contained within the NPPF. The Council are required to take a positive approach when considering development proposals. Planning applications that accord with the Development Plan should be approved without delay.

4.2.20 Policy SP8 (Protecting the Natural Environment) seeks to ensure that the natural environment is protected, in particular biodiversity and geodiversity. Development should address any potential flood risk issues, taking into consideration the effects of climate change. The district's biodiversity and geodiversity should be maintained and enhanced through the appropriate location of uses, sympathetic design, sustainable construction techniques and appropriate mitigation measures.

4.2.21 Policy SP10 (Improving Transport Connectivity) states that, where appropriate, development proposals will be expected to contribute to the delivery of important transport infrastructure.

4.2.22 Policy EN3 (Open Countryside) requires development proposals in the open countryside to have due regard to the relevant policies contained within the Local Plan, in particular the Development Management DPD. The site is located within the open countryside.

4.2.23 Policy EN7 (Environmentally Important Areas) requires development proposals which may impact upon regionally designated sites to have due regard to Policy DM44 of the Development Management DPD. Part of the site is designated as a regionally important area.

Lancaster District Council Local Plan Part Two: Development Management DPD (Adopted July 2020)

4.2.24 Policy DM29 (Key Design Principles) seeks to ensure that development responds to its environment, having regard to the existing character and quality of the area. The Council will expect development to, inter alia:

- Contribute positively to the identity and character of the area through good design, having regard to local distinctiveness, appropriate siting, layout, palate of materials, separation distances, orientation and scale;
- Ensure there is no significant detrimental impact to amenity in relation to overshadowing, visual amenity, privacy, overlooking, massing and pollution;
- Create buildings and spaces that are adaptable to changing social, environmental, technological and economic conditions.

4.2.25 Suitable and safe access to the existing highway network should be provided to ensure highway safety. Landscaping should be provided to protect adjoining sensitive users and the open countryside. Potential sources of air quality, noise and light pollution should be minimised.

4.2.26 Policy DM31 (Air quality Management and Pollution) seeks to ensure that development proposals do not negatively impact upon air quality in the district. Proposals must demonstrate how they have sought to minimise polluting emissions and, where necessary, incorporate on-site and/or off-site mitigation measures. Air Quality Assessments may be required for relevant development proposals.

4.2.27 Policy DM33 (Development and Flood Risk) requires development proposals to take a sequential approach which directs development to the areas of lowest risk of flooding.

4.2.28 Policy DM34 (Surface Water Run-off and Sustainable Drainage) requires surface water to be managed sustainably. Sustainable drainage systems should be implemented unless it is inappropriate or impractical. A drainage strategy is required for all major development proposals.

4.2.29 Policy DM35 (Water Supply and Waste Water) seeks to ensure that new development does not have a detrimental impact on surface water and groundwater quantity and quality and the quality and standard of bathing water in the locality. Waste-water must be disposed of efficiently and effectively. Proposals should seek to increase water availability and protect and improve the quality of rivers or groundwater where possible.

4.2.30 Policy DM44 (The Protection and Enhancement of Biodiversity) requires proposals to protect and enhance biodiversity and/or geodiversity and minimise both direct and indirect impacts. Where possible, a net gain of biodiversity assets should be delivered. Where harm is identified, developers must demonstrate how the harm will be mitigated or compensated for in line with the mitigation hierarchy.

4.2.31 Developments affecting environmentally sensitive sites and species will not be permitted where there is an adverse effect, unless the benefits of the proposal outweigh the potential adverse effects. If the adverse effects are unavoidable a development proposal will be required to demonstrate that:

- Adverse effects are minimised;
- Provision is made for mitigation and compensation measures, such as on-site landscape works, off-site habitat creation, species relocation and ongoing management as appropriate, such that there is a clear net gain for biodiversity; and
- The biodiversity value of the site is not compromised, both on its own and as part of the wider network of sites.

4.2.32 Development should protect and enhance the district's soil resource and avoid the use of best and most versatile agricultural land.

4.2.33 Policy DM45 (The Protection of Trees, Hedgerows and Woodland) states that the council will protect ancient trees and ancient woodland. New development should positively incorporate trees and hedgerows, unless justification is provided as part of an Arboricultural Implications Assessment (AIA). Replacement trees will be sought where there are losses. Opportunities to plant new trees, hedgerow and woodland will be supported.

4.2.34 Policy DM45 (Development and Landscape Impact) requires a Landscape and Visual Impact Assessment to be prepared for development that has the potential for significant landscape or visual impact. Development proposals should be designed to avoid negative landscape and visual effects and, where unavoidable, mitigation measures and compensatory measures should be implemented.

4.2.35 Policy DM47 (Economic Development in Rural Areas) supports economic development in rural areas, providing the rural vitality and character of the area is maintained. Proposals will need to demonstrate the community benefits of the scheme. Sites in rural area which are allocated for particular purposes through the Development Plan will be supported in principle.

4.2.36 Policy DM57 (Health and Well-being) requires development in the district to promote health and well-being and contribute to addressing health inequalities. Measures to achieve this include, inter alia, ensuring that development does not have an adverse impact on the environment through air, noise and water pollution.

4.2.37 Policy DM60 (Enhancing Accessibility and Transport Linkages) seeks to ensure that development generating significant footfall and / or motorised vehicle journeys is located where sustainable travel patterns can be achieved. Development proposals should, inter alia, include measures that address matters of highway safety to the satisfaction of the local highway authority and ensure that the proposal site can be accessed safely both during the construction and occupation phases of development. Any significant impacts must be addressed through the preparation of a Travel Plan. Where highway capacity is insufficient, provision of new transport and highway infrastructure will be sought.

4.2.38 Policy DM62 (Vehicle Parking Provision) requires development proposals to provide car and cycle parking in accordance with the levels and layout requirements set out in Appendix E of the DM DPD.

4.2.39 Policy DM63 (Transport Efficiency and Travel Plans) supports proposals that maximise sustainable modes of transport. Appropriate contributions should be made via development proposals to improve transport infrastructure. A Transport Assessment may be required to assess the likely impacts of a development proposal on the local highway network.

4.3 Material Considerations

National Planning Policy Framework

4.3.1 The National Planning Policy Framework (NPPF) has been subject to several amendments since it was first published in 2012, the latest being in December 2023. The NPPF sets out the principle of a presumption in favour of sustainable development. Where a proposal satisfies the requirement of NPPF i.e. being sustainable and in accordance with the development plan, planning authorities are directed to grant planning permission without delay unless material considerations indicate otherwise.

4.3.2 Paragraph 7 of the NPPF defines the objective of sustainable development, which can be summarised as meeting the needs of the present without compromising the ability of future generations to meet theirs.

4.3.3 Paragraph 8 states that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways. These are:

- An economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
- A social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
- An environmental objective – to protect and enhance our natural, built and historic environment; including making effective use of land, helping to improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy'.

4.3.4 So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development (paragraph 10). Paragraph 11 sets out that decision taking should apply the presumption in favour of sustainable development which means that development proposals that accord with an up-to-date development plan should be approved without delay, and in instances where there are no relevant development plan policies, or policies important for decision making are out of date, permission should be granted unless:

- the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or
- any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.

4.3.5 Paragraph 38 states that decision-makers at every level should seek to approve applications for sustainable development where possible.

4.3.6 The bulk of the Framework contributes to the definition of sustainable development and includes the following paragraphs which are of particular relevance to this development, following the order of the NPPF document.

A Strong, Competitive Economy

4.3.7 Building a strong, competitive economy, paragraphs 85-89 state that the planning system should operate to create conditions in which businesses can invest, expand and adapt, with significant weight placed on the need to support economic growth and productivity.

Sustainable Transport

4.3.8 Paragraphs 114-117 relate to the approach taken towards considering development proposals in a transport context. Proposals should ensure that safe and suitable access to an application site can be achieved for all users and that significant impacts on the transport network (including highway safety) can be cost effectively mitigated to an acceptable degree.

4.3.9 Paragraph 115 states that development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.

Conserving and Enhancing the Natural Environment

4.3.10 Paragraph 180 states that determining planning applications should contribute to and enhance the natural and local environment. Measures to achieve this include, inter alia:

- protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils;
- minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; and
- preventing new and existing development contributing to unacceptable levels of soil, air, water, or noise pollution or land instability.

4.3.11 Paragraph 186 advises that in decision making, refusal of permission should be issued only if adequate mitigation for proposals where significant harm to

biodiversity cannot be avoided, cannot be achieved, or, as a last resort, compensated for.

4.3.12 Paragraph 188 advises that 'the presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site'.

Conserving and Enhancing the Historic Environment

4.3.13 Paragraphs 195-214 outline the approach to the conservation and enhancement of the historic environment. The NPPF seeks to ensure that in decision making, local planning authorities aim to avoid or minimise any conflict between the conservation of a heritage asset and a development proposal.

4.3.14 Paragraph 200 advises that: 'In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance'.

Facilitating the sustainable use of minerals

4.3.15 Chapter 17 of the NPPF relates specifically to minerals and facilitating the sustainable use of mineral assets. Minerals are stated as being essential to supporting sustainable economic growth and the Framework prioritises their long-term conservation.

4.3.16 Paragraph 215 makes it clear that, 'it is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs. Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation.'

4.3.17 Paragraph 216 of the NPPF states that mineral resources should be safeguarded by defining Mineral Safeguarding Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance (such as aggregates) are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked).

4.3.18 Paragraph 216 also states that policies should encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place.

4.3.19 Paragraph 217 emphasises that that *'great weight should be given to the benefits of mineral extraction, including to the economy'* and that when determining planning applications for mineral extraction, local planning authorities should:

- As far as practical, provide for the maintenance of landbanks of non-energy minerals from outside National Parks, the Broads, National Landscapes and World Heritage Sites, scheduled monuments and conservation areas;
- Ensure that there are no unacceptable adverse impacts on the natural and historic environment, human health or aviation safety, and take into account the cumulative effect of multiple impacts from individual sites and nearby sites;
- Ensure that any unavoidable noise, dust and particle emissions are controlled, mitigated or removed at source and noise limits are established where appropriate;
- Provide for restoration and aftercare at the earliest opportunity to be carried out to high environmental standards through appropriate conditions. Bonds or other financial guarantees should only be sought in exceptional circumstances.

4.3.20 NPPF Paragraph 219 sets out Government planning policy on the provision of construction aggregates in England and advises on a minimum landbank for crushed rock of 10 years in each mineral planning authority area.

Planning Practice Guidance

4.3.21 The National Planning Practice Guidance (NPPG) is a web-based resource which brings together planning guidance on various topics into one place. It was launched in March 2014 and gives guidance on many aspects of planning. The PPG has been reviewed and the topics of particular relevance are as follows:

- Design;
- Noise;
- Travel Plans, Transport Assessments and Statements;
- Minerals;
- Natural Environment;

- Flood risk and Coastal change;
- Open spaces, sports and recreation facilities, public rights of way and local green space;
- Planning Obligations;
- Use of Planning Conditions;
- Water Supply, Wastewater and Water Quality.

Joint Lancashire Local Aggregate Assessment (LAA) (2023 with 2022 data)

4.3.22 The LAA (2023) provides an overview of the sand and gravel, limestone and gritstone reserve position for the joint councils of Lancashire, Blackpool and Blackburn with Darwen.

4.3.23 The latest sub-regional apportionment figure for crushed rock set by the North West Aggregate Working Party was in 2011 and equates to 2.54 mt per annum. The rolling 10 year sales average is 2.25 mt (2013 – 2022) whereas the rolling 3 year sales average is 2.52 mt per annum (2020 – 2022).

4.3.24 The LAA includes housing delivery forecasts for the District which have been calculated using Lancaster City Council's Local Plan forecast. This figure, 3mt, indicates that although permitted reserves and annual outputs are sufficient at present, there may be a need to consider the permitted reserves' ability to meet the forecast demand.

4.3.25 The LAA concludes that the assessment of supply and demand for crushed rock, together with a consideration of the economic and local circumstances, indicates that there is potential for a shortfall towards the end of the forecast demand period of 15 years (i.e. 2021 – 2036).

North West Aggregates Working Party (NWAWP) Annual Monitoring Report 2021 (including data from 2019 and 2020)

4.3.26 The NWAWP Annual Monitoring Report (AMR) provides sales and reserve data for the period 1st January to 31st December 2020. The report also contains data for 1st January to 31st December 2019, which has been taken from the Government's Aggregate Minerals Survey 2019 (AM2019) undertaken by the BGS.

4.3.27 The AMR provides information on aggregates in the North West of England so that the NWAWP can contribute to the monitoring of the Managed Aggregate Supply System (MASS) and assess whether the North West of England is making a full contribution towards meeting both national and local aggregate needs.

Review of the Minerals and Waste Local Plan

4.3.28 A review of the adopted Minerals and Waste Local Plan (MWLP) is currently in preparation. A Scoping consultation was carried out in November 2014 and the responses were published in May 2018. Consultation on the Publication version of the emerging MWLP was anticipated in Summer 2019 as per the latest Local Development Scheme (LDS) (August 2018). A revised LDS is anticipated to be published which will provide an updated timetable for preparation of the emerging MWLP.

4.4 Planning Policy Conclusions

4.4.1 Minerals and Waste Core Strategy Policy CS1 (Safeguarding Lancashire's Mineral Resources) safeguards minerals of economic, environmental or heritage value from permanent sterilisation through designating Mineral Safeguarding Areas (MSAs). Policy M2 (Safeguarding Minerals) of the Minerals and Waste Local Plan (Site Allocation and Development Management Policies) (MWLP) states that development within Minerals Safeguarding Areas as outlined on the Policies Map will not be supported if it is incompatible by reason of scale, proximity and permanence with working the minerals. The site is identified within a MSA on 'Policies Map 2' of the MWLP (2009). The site is also identified as a limestone site with 'Long-Term Strategic Provision' on the Key Diagram, situated within a 'Limestone Resource Area'.

4.4.2 MWLP Policy M1 (Managing Mineral Production) states that development will not be supported for any new extraction of sand and gravel, limestone, gritstone or brickshale. The proposals seek to deepen and extend the timescales of an existing permitted limestone quarry. Therefore, the proposed development should not be considered as new extraction.

4.4.3 MWLP Policy DM2 (Development Management) supports mineral operations that can demonstrate a positive contribution to, inter alia, the economy, biodiversity and geodiversity, landscape character and the reduction of carbon emissions. The site currently operates under a Biodiversity Management Plan and employs best practice measures, which will both be continued. The approved restoration scheme is shown on Drawing Number BLQ 5/1 'Combined Conceptual Restoration Scheme'. The approved restoration scheme combines economic and biodiversity gains through development of a 42 hectare lake for water and land-based recreational activities with designated areas of nature conservation habitat.

4.4.4 MWLP Policy NPPF 1 (Presumption in Favour of Sustainable Development) states that when a planning application accords with the policies in the Local Plan, it will be approved without delay, unless material considerations indicate otherwise. The proposals are considered to accord with the Development Plan and other material considerations.

4.5 Key Policy Considerations

4.5.1 Having regard to the location, nature, scale and extent of the proposed development at Back Lane Quarry, the Development Plan and other material considerations identify the following key considerations that must be taken into account:

- Need and benefits of the proposal;
- Alternatives to the proposal;
- Potential for landscape and visual impact;
- Potential for impact on nature conservation and ecology;
- Potential for impact on water resources and flood risk;
- Potential for impact upon amenity and health, in terms of noise, air quality and dust;
- Potential for impact on heritage assets and/or designations;
- Potential for impact on highway capacity and safety;
- Potential for impact on Public Rights of Way; and
- Carbon management and potential climate change implications.

4.5.2 The key policy considerations set out above are addressed in detail throughout the subsequent chapters of this ES, which collectively provide information to demonstrate the acceptability of the proposed development in planning terms, and to assess the technical acceptability of the proposed development in the context of EIA.

5 ENVIRONMENTAL IMPACT ASSESSMENT

5.1 Introduction

5.1.1 The need for an Environmental Impact Assessment is considered under the terms of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as the 'EIA Regulations').

5.1.2 The proposal falls within the description of Category 24 of Schedule 1 of the EIA Regulations, 'Any change to or extension of development listed in this Schedule where such a change or extension in itself meets the thresholds, if any, or description of development set out in this Schedule', as the proposed development comprises an extension of an EIA development listed in Schedule 1.

5.1.3 In accordance with Part 4, Paragraph 15 of the EIA Regulations, in September 2021 the Applicant requested that LCC provides a Scoping Opinion as to the information to be provided in the Environmental Statement. To assist LCC in the formulation of the Scoping Opinion a report was submitted which provided an outline of the development proposal and a broad outline of potential environmental effects and technical considerations, as well as the potential benefits and other relevant considerations.

5.1.4 LCC responded to this request on 20th December 2021 where it was confirmed that the proposals constituted EIA development and set out their formal Scoping Opinion which included responses from the consultation exercise with a number of statutory consultees. In summary, the topics to be assessed within the Environmental Impact Assessment are:

- Landscape and visual impact;
- Ecology;
- Water environment;
- Traffic;
- Noise;
- Dust, Air Quality and Health;
- Blasting vibration;
- Climate change;
- Land stability;
- Alternatives; and
- Cumulative impacts.

5.1.5 LCC confirmed that a Non-Technical Summary would also be required.

5.1.6 The Scoping Opinion stated that the ES should consider cumulative impact issues and other environmental impacts that may occur due to other adjacent similar development. In particular this relates to the operation of Leapers Wood Quarry particularly in relation to the topics of noise, air quality, blasting and hydrological impacts.

5.2 The Environmental Statement

5.2.1 An Environmental Impact Assessment has been carried out to determine the likely impacts of the proposed development with regard to the EIA Regulations 2017. In accordance with the Scoping Opinion received by LCC in December 2021, the matters detailed in Section 5.1.4 have been assessed through the EIA process. This ES assesses the main or significant environmental effects to which the development is likely to give rise and has been prepared on an iterative basis.

5.2.2 In preparation of the ES, consultation with statutory bodies on the main issues has been undertaken and has informed the relevant environmental assessment work. Details of such consultations are included within the individual technical assessment reports. The technical reports for the EIA are contained within Technical Appendices to this ES. The main findings and conclusions of the technical reports are summarised within this ES. These findings demonstrate the most potentially significant environmental effects of the proposed development.

5.2.3 In preparing the ES, the EIA team of consultants has had regard to the contents of Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Specifically, the ES has addressed the main elements of the proposals that have the potential to impact (positively and/ or negatively) on:

a) *population and human health;*
b) *biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC(a) and Directive 2009/147/EC(b);*
c) *land, soil, water, air and climate;*
d) *material assets, cultural heritage and the landscape; and*
e) *the interaction between the factors referred to in sub-paragraphs (a) to (d).*

5.2.4 This ES and accompanying Planning Statement have been prepared by Heatons alongside several technical appendices prepared by the Applicant's team of technical consultants, all of whom are suitably qualified and benefit from an understanding of the site and significant experience of similar proposals to that contained within the

scope of this planning application.

5.2.5 The appointed team of technical specialists is as follows:

- Landscape and Visual Impact – Heatons;
- Ecology and Biodiversity – South Lakes Ecology / Heatons;
- Transport – Focus Transport Planning;
- Noise Assessment – Advance Environmental Limited;
- Air Quality and Dust Assessment – Advance Environmental Limited;
- Groundborne Vibration and Air Overpressure Assessment – Advance Environmental Limited;
- Health – Savills;
- Geotechnical/Stability – KeyGS;
- Groundborne Vibration and Air Overpressure Assessment – Advance Environmental Limited; and
- Water Environment – Hafren Water.

5.3 Main Environmental Considerations

5.3.1 Within the Development Plan and Government guidance notes there are numerous policies that seek to ensure development proposals protect the environment and, where appropriate, make contributions to enhance the environmental assets of the area within which they are proposed. The environmental policies of relevance to this planning application are those focused on the following:

- Landscape and visual impact – ensuring that the proposed deepening of the working area does not cause an unacceptable impact upon the landscape or have an impact upon the visual amenity of nearby residents or users of the area;
- Impact upon ecology – including the protection of habitats and the protection of species;
- Protection of amenity – ensuring that levels of noise, dust and vibration are kept to within acceptable levels;
- The promotion of an appropriate land use following mineral extraction;
- Protection of the water environment – ensuring that there is no pollution of groundwater or surface water resources and ensuring that there is no increase in flood risk;
- Impact of transport – ensuring that the highway network can accommodate HGVs associated with the quarrying operations;

- Impacts on Public Rights of Way and their users; and
- Managing the effect of climate change.

5.3.2 All of the above are explored in further detail in the following sections.

6 ALTERNATIVES

6.1 Introduction

6.1.1 As set out in paragraph 041 (Reference ID: 4-041-20170728) of the Planning Practice Guidance, the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 do not require an applicant to consider alternatives.

6.1.2 Notwithstanding this, where alternatives have been considered, Schedule 4 (Part II) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the Regulations) provides that the information for inclusion in Environmental Statements should include 'A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effect'. In accordance with Schedule 4, the main alternatives to the scheme, as studied by the Applicant, are considered below.

6.1.3 The assessment of alternatives has considered the environmental assessment work undertaken by the team of technical consultants and indicates where the assessment work has influenced the ultimate design of the scheme having regard to the potential for environmental effects.

6.2 Approach and Methodology

6.2.1 The assessment of alternatives has had regard to relevant Development Plan policy, Government planning guidance and the EIA Regulations 2017 together with its corresponding Circular and good practice guide.

6.2.2 In terms of an overall approach, it is considered to be neither practical nor necessary to look at every single alternative option. Instead, and in accordance with Government guidance, consideration of 'main alternatives studied by the applicant' is detailed below.

6.3 Do Nothing

6.3.1 The first consideration in terms of an alternatives assessment is the 'do nothing' option. Whilst the extant permission for the quarry allows mineral extraction to continue until 2048, with restoration to be completed by 2049, in practical terms, the 'do nothing' option would involve the continuation of mineral extraction operations until the unconstrained mineral reserves have been fully exhausted.

This is predicted to be by approximately 2030. The mineral contained within the higher working benches within the quarry void would be removed, along with the internal haul roads, in order to ensure that all workable mineral is extracted. As the site does not have permission to work the mineral beneath the land which currently accommodates the concrete block works and the storage yard in the south of the quarry, the mineral in this part of the site will be left in situ. Furthermore, without having a scheme in place to work the shared boundary between Back Lane Quarry and Leapers Wood Quarry beyond the permitted 38mAOD, the remaining boundary would have to be left unexcavated, sterilising additional significant reserves of mineral within this part of the site. Taken together, this would result in some 12.6mt of the current limestone reserve being sterilised at the site.

6.3.2 Once the permitted unconstrained mineral reserves have been fully extracted, the site would be restored in accordance with the currently approved restoration scheme. Whilst this phase of the site would require a small number of staff for landscaping, planting and operating mobile plant and machinery, the majority of site-based staff and haulage jobs would be transferred to other Aggregate Industries sites or lost through redundancy.

6.3.3 The 'do nothing' option is not the preferred option for Aggregate Industries as it would result in the loss of both direct and indirect jobs with the associated input to the local economy and effectively sterilise mineral reserves that have a significant economic value.

6.3.4 The 'do nothing' approach would not allow for the site to be worked at some point in the future from an operational perspective, as it would have removed the higher level working areas and internal haul roads. Furthermore, from an economical perspective, recommencing operations at the site would require the reinstatement of plant and processing equipment etc. The capital investment required for this would not make the mineral economically viable to extract.

6.4 Alternative Crushed Rock Sources

6.4.1 The number of quarries within Lancashire which have current planning permissions will reduce in 2022 and 2028. Dunald Mill Quarry continues to be mothballed but a planning application was submitted in September 2021 to extend the life of mineral extraction from February 2022 until February 2034. This application is yet to be determined. Ribblesdale Lanehead Quarry and Ribblesdale Cement Bellman

Quarry, operated by Hanson UK, primarily supply cement raw materials but a proportion of the reserve is not suitable for this and is sold as aggregate. The sites have permission until 2027. Leapers Wood Quarry adjacent to Back Lane Quarry, which is operated by Tarmac Trading Limited, has permission until 2048 but if the shared boundary with Back Lane Quarry is not able to be worked, the remaining reserves of approximately 6.8mt would be exhausted well before 2030. A planning application is being submitted by Tarmac to extend the operational life of the Leapers Wood Quarry to allow for the deepening of the mineral extraction within the site and to allow the extraction of mineral within the joint boundary with Back Lane Quarry to a depth of -37mAOD.

6.4.2 Lancashire's 2023 Local Aggregates Assessment addresses the supply of aggregate within the Plan Area and the ability of the existing and permitted sites to deliver the required volumes of material. It states that in 2022 there were 45.39 million tonnes of limestone reserves with planning permission, held in 5 quarries. However, of these permitted reserves, around 12.6mt of reserves held at Back Lane Quarry are constrained by site infrastructure, plant and machinery and are unlikely to be worked without planning permission for the deepening of the working area.

6.4.3 Beyond the Plan Area, there are a number of limestone quarries within Cumbria, including the Lake District National Park (LDNP), although five crushed rock quarry permissions within the Plan Area will expire before 2030 and none have permission beyond 2042.

6.4.4 It is acknowledged that in the short term there are alternative sources of crushed rock. However, beyond 2030 there will be a significant reduction in the number of permitted sites within Lancashire and the surrounding authorities. The 2023 LAA states that the landbank of at least 10 years is expected to be begin to be eroded in 2031 (using 10 year sales average) or 2029 (using 3 year sales average), although this does not take account of mineral reserves which are permitted and therefore included in the calculated landbank, but are constrained by site infrastructure etc and therefore may not be worked. In order to secure the long term supply of limestone resources within Lancashire, it is necessary to consider development options at an early stage. As stated in Section 6.3.4, if permission is not granted for the deepening of the working area of the quarry, it would not be feasible to work the constrained mineral at a later date as access to these parts of the site would be effectively cut off.

6.4.5 If the deepening of working at Back Lane Quarry is permitted, it would facilitate the extraction of around 60mt (including the existing reserves), which would be worked until the end of 2077. In conclusion, whilst short term alternatives sources of crushed rock do exist within the Plan Area, the proposed development is required in order to maximise the available mineral within the quarry and secure the supply of limestone over the longer term. Since minerals are a finite natural resource, and can only be worked where they are found, it is important to make best use of them to secure their long-term conservation.

6.5 Alternatives to Primary Aggregates

6.5.1 There are two alternatives to primary aggregates – recycled aggregates and secondary aggregates.

6.5.2 Recycled aggregates: derived from reprocessing materials previously used in construction. Examples include recycled concrete from construction and demolition waste material (C&DW) and railway ballast.

6.5.3 Secondary aggregates: usually by-products of other industrial processes not previously used in construction. Secondary aggregates can be further sub-divided into manufactured and natural, depending on their source. Examples of manufactured secondary aggregates are pulverised fuel ash (PFA) and metallurgical slags. Natural secondary aggregates include china clay sand and slate aggregate.

6.5.4 In 2002, the WRAP (Waste & Resources Action Programme) Aggregates Programme funded by DEFRA was launched to minimise the demand for primary aggregates through promoting greater use of recycled aggregates.

6.5.5 To ensure demolition waste could be processed into recycled aggregate which was of an appropriate quality and conformed to the appropriate European Aggregate Product Standard, WRAP worked with the industry to formulate a Quality Protocol (QP). This QP, entitled 'The Quality Protocol for the production of aggregates from inert waste', was first published and implemented in 2004. It was reviewed and reprinted in 2008 to produce the current edition.

6.5.6 In summary, the Quality Protocol provides recycled aggregate suppliers with the following:

- A procedure to control the quality of recycled aggregates for sale as construction materials, or as constituents in a product, e.g. concrete, asphalt and unbound mixtures; and

- Recommended minimum frequencies of inspection and testing conforming to the requirements of the European Standards for Aggregates (See references below).
- The means for suppliers to provide adequate assurance that their products conform to relevant technical specifications and certified characteristics.

6.5.7 The aggregates market supplied from recycled and secondary sources has risen to 29%. This 29% market share is nearly three times higher than the European average of 10%, highlighting the fact that the use of recycled and secondary materials in Britain is close to full potential. (Source: Profile of the UK Mineral Products Industry - 2018 Edition)

6.5.8 The use of recycled and secondary aggregates is widely supported. However, they will never be able to wholly replace primary aggregates as there can never be a guarantee of supply of material of an appropriate quality to meet a specific demand. Therefore, there still remains a need for the provision of primary aggregate and this is reflected in the continuation of apportionment figures for primary aggregate and the provision of a landbank.

6.6 Alternative Restoration Options

6.6.1 Alternative options have been considered by Aggregate Industries in relation to the restoration of the site once mineral extraction operations have ceased. The preparation of the proposed development scheme, including the restoration proposals, has been an iterative process. The Company has given careful consideration to the findings of the EIA work and the Development Plan. The overall aim of the restoration strategy is to create a site with a variety of habitats of both nature conservation and amenity value whilst reflecting the local landscape character.

6.6.2 The proposed scheme would be delivered in conjunction with the adjacent Leapers Wood Quarry and would comprise a central lake feature with areas of lakeside shallows to support fringe reedbed of predominantly Common Reed with some emergent and aquatic plants around the shore. In the west of the Back Lane Quarry part of the restored site, the scheme includes potential car and boat trailer parking, a slipway into the lake and a possible car viewpoint and platform in addition to the existing viewpoints. It is proposed that the controlled water level would be maintained at approximately 44.8mAOD. As the mineral, under the proposed

scheme, would be excavated to a depth of -37mAOD, this would equate to a water depth of approximately 82m.

6.6.3 The proposed restoration scheme has been developed taking account of the three dimensions to sustainable development (NPPF, para 8). The restoration proposes a balance of environmental and economic considerations. The proposed end uses would enable the site to be developed for leisure and recreation but would also provide significant long-term enhancements to ecology and nature conservation.

6.6.4 Alternatives considered include leaving the site as it is following mineral extraction and letting it fill up with water naturally, which could present health and safety issues due to the sheer and steep quarry faces. Another alternative considered involved infilling the quarry void to create a shallower restoration profile. However, the significant scale of the quarry void would require vast quantities of restoration materials to make measurable changes to the profile of the void and it was considered that importing waste or recovered material would not provide significant environmental or economic benefits. Furthermore, as the site is not rail linked, all fill material would need to be imported by road, which may have traffic and highway implications. It was therefore, decided that available on-site mineral waste would be used to create a shoreline with areas of shallows around the periphery of Back Lane Quarry and a 2m wide shallow water margin would be created within Leapers Wood Quarry, which would provide health and safety benefits as well as creating valuable habitats for aquatic plants and wildlife.

6.6.5 The restoration proposals therefore provide a balanced range of economic, social and environmental benefits to deliver beneficial after uses securing economic value for the Company as well as ecological/biodiversity enhancement and providing opportunities for recreation and leisure.

6.7 Conclusions

6.7.1 Whilst alternative options have been considered by the applicant, the proposed development was considered to represent the best option for the reasons set out below.

6.7.2 The ‘do nothing’ option is not the preferred option for Aggregate Industries. It would require the site to continue to operate in accordance with the extant planning permission and would involve the continuation of mineral extraction operations at Back Lane Quarry until the unconstrained mineral reserves have been fully exhausted. This is predicted to be well before the permitted end date of 2048

(around 2030 at current extraction rates). The mineral contained within the higher working benches within the quarry void would be removed, along with the internal haul roads. As the site does not have permission to work the mineral beneath the land which currently accommodates the concrete block works and the storage yard in the south of the quarry, the mineral in this part of the site will be left in situ, effectively sterilising around 12.6mt of limestone from this area. The 'do nothing' approach would not allow for the site to be worked at some point in the future from an operational perspective, as it would have removed the higher level working areas and internal haul roads. From an economical point of view, it would require the reinstatement of plant and processing equipment etc. The capital investment required for this would not make the mineral economically viable to extract. The 'do nothing' approach would also result in the loss of both direct and indirect jobs with the resulting effect on the local economy.

6.7.3 Alternative sources of crushed rock have been considered. It is acknowledged that in the short term there are alternative sources of crushed rock. However, beyond 2030 there will be a significant reduction in the number of permitted sites within Lancashire and the surrounding authorities. The 2023 LAA states that the landbank of at least 10 years is expected to be eroded in 2031 (using 10 year sales average) or 2029 (using 3 year sales average), although this does not take account of mineral reserves which are permitted and therefore included in the calculated landbank but are constrained by site infrastructure etc and therefore may not be worked. In order to secure the long term supply of limestone resources within Lancashire, it is necessary to consider development options at an early stage, to prevent them from becoming sterilised and to plan for their extraction.

6.7.4 The important contribution that recycled and secondary aggregates make in industry is acknowledged. However, they will never be able to wholly replace primary aggregates as there can never be a guarantee of supply of material of an appropriate quality to meet a specific demand. Therefore, there still remains a need for the provision of primary aggregate.

6.7.5 Whilst consideration was given to leaving the site unrestored, following the cessation of mineral extraction, and allowing the void to fill with water, this option was discounted as the sheer quarry faces would potentially have health and safety implications. Given the significant scale of the void, the importation of restoration materials was also discounted as it was considered that there would be little economic or environmental benefit unless vast quantities of material were

deposited. The use of relatively small quantities of mineral waste available within the site was therefore proposed to create areas of shallows around a lake shoreline. This approach would have both health and safety as well as ecological benefits and enable the site to be used for recreational and leisure purposes.

6.7.6 The proposals, as submitted, represent the best scheme from both sustainability and commercial viability points of view, as well as being the most environmentally acceptable.

7 LANDSCAPE AND VISUAL

7.1 Introduction

7.1.1 A Landscape and Visual Impact Assessment (LVIA) has been prepared to support this planning application. Accompanying plans and viewpoints are provided at Technical Appendix C.

7.1.2 The aim of the LVIA is to understand the baseline landscape and visual resources and receptors within the Site and the local area and to assess their value and sensitivity to change resulting from the proposed development type. From this baseline position, to then assess the specific magnitude of effect of the detailed development proposed on identified landscape and visual resources / receptors and to determine the Level of Significance of Effect on Landscape and Visual matters (which could be potentially adverse/ or beneficial). The report also considers the potential for cumulative effects which could arise from the Proposed Development in combination with either existing and / or potential other development / activities.

7.1.3 The report has taken into account the comments received during the Scoping process from Lancashire County Council's (LCC) County Landscape Advisor. The report follows guidelines for Landscape and Visual Impact Assessment (GLVIA3), produced by the Landscape Institute and Institute of Environmental Management and Assessment. (TGN) 06/19 – The Visual Representation of Development Proposals – Photography and Photo Montage Guide (01-11) being followed.

7.1.4 Back Lane Quarry is located within Lancaster City Council authority area, lying to the south-east of Carnforth in Lancashire. The site is bounded to the north by the adjoining Leapers Wood Quarry operated by Tarmac Trading Ltd, to the east by woodland, to the south by agricultural land and to the west by woodland, with the M6 beyond.

7.1.5 The report assesses the potential for Landscape Character and Visual Change / Effects between the baseline of the permitted development against the proposed development changes. It is noted at the start of the report that as the nature of the application is principally for deepening, the existing operational disturbance / effect of the quarry activities are already present in the landscape. These effects have been assessed and in essence there is Neutral Change between the Current Situation / permitted site and the Proposed Development. What will change is the time element with development taking a further 29 years. This has been considered

along with the potential for cumulative effects.

7.2 Methodology

7.2.1 "*LVIA is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource, in its own right, and on people's views and visual amenity"* GLVIA.

7.2.2 Data collation and assessment has been carried out utilising both desktop and Site survey works to identify the baseline landscape character and visual nature and condition of the Site and its local area. Initial desk top survey analysis helped to identify the potential areas the Proposed Development may influence / change in respect of character and viability. A 1:25,000 Ordnance Survey map was used to identify potential areas of visibility from roads, properties, public rights of way and open access land. Utilising Site and Site context topographical 3D data the Zone of Theoretical Visibility (ZTV) of the existing Site and the potential Proposed Development was undertaken. See Drawing Numbers KD.BKLN.D.1.030, for the site's Current ZTVI, KD.BKLN.D.1.031 for the ZTVI associated with the Proposed Development and KD.BKLN.D.1.032 for the ZTVI post restoration within Technical Appendix C. Please note there is no discernible change in either the geographical spread or levels of magnitude of impact between 3No. ZTV's. These were then used to inform and help define a study area within which the Proposed Development could influence / change both Landscape Character and Visual Amenity. It is worth noting that the ZTVs are a worst-case scenario in assessing the geographical land area from where the existing / proposed Site development could be observed / influence Landscape Character as this method of analysis does not account for existing built form or vegetation structure which would affect / could screen views towards the Site from landscape and visual receptors.

7.2.3 The desktop appraisal helped form the basis for Site survey works which were carried out in September 2023. Based upon these models the study area for the assessment was set at 5km^2.

7.2.4 A description of the full Methodology and Assessment Process used is detailed within Technical Appendix C.

7.2.5 In summary and in highlighting the main assessment process the GLVIA states that when undertaking an LVIA, this should consider:

- Landscape effects i.e. the effects on the landscape as a resource; and

- Visual effects i.e. the effects on views and visual amenity.

7.2.6 It also states that; *"LVIA must deal with both and should be clear about the difference between them"*. GLVIA3 para 2.2.2 para 21.

7.2.7 The Guidelines explain that both landscape and visual effects are dependent upon the sensitivity of the landscape resource or visual receptors and the magnitude of impact.

Sensitivity – is the term applied to specific receptors, combining judgements of the susceptibility of the receptor to the type of change or development proposed and the value related to that receptor.

Susceptibility – is the ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences.

Landscape Value – being the relative value that is attached to different landscape by society. A landscape may be valued by different stakeholders for a whole variety of reasons. Value attached to views – The recognition of the value attached to particular views e.g. in relation to heritage assets or through planning designations.

Magnitude (of effect) – the term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration.

Assessed Overall Level of Significance of Effect – this term relates to the final judgement about whether each effect identified is significant or not. It is a measure of the importance or gravity of the environmental effect, defined by the significance criteria specified within Technical Appendix C.

7.3 Development Proposals

Existing Operations

7.3.1 The site is accessed off Back Lane and currently sells approximately 1.1mt per annum of limestone aggregate. The current permission for the site restricts working to a maximum depth of 38mAOD via planning condition. The extant permission also limits the timescales for extraction and restoration of the site to 29th April 2048 and 29th April 2049 respectively.

Proposed Operations

7.3.2 The proposed development seeks permission for extraction of limestone to a depth

of -37mAOD. The proposed changes would release a further 40mt of limestone, assuming joint working of the boundary between Back Lane and Leapers Wood Quarries.

7.3.3 The existing annual sales from the site of approximately 1.1mt would remain unchanged. It would therefore also be necessary to seek permission for an extension to the extraction period and final restoration date of the site. Assuming that the existing extraction rate is maintained, this would require an extension to the extraction period until 31 December 2077, with restoration by 31 December 2078.

7.3.4 A current Section 106 Agreement (2006) requires HGVs to leave the quarry via Back Lane before turning west, crossing over the M6 and then travelling to the junction with Kellet Road. This is to remain in place.

7.3.5 The annual output of the quarry (and therefore the average daily HGV movements) would be maintained as existing. Existing hours of operation would also remain as approved. No new infrastructure is proposed on site as part of the proposals and access arrangements would remain as permitted. No other changes are proposed as part of the application.

7.3.6 Please note that to allow the extraction of rock from within the western area of the quarry, the existing Plant Site will be decommissioned and removed from Site. To allow for continued processing, a mobile plant will be erected within the quarry void.

7.3.7 Phase A - See Drawing No. KD.BKLN.D.1.011. Proposed Phase A Operations include:

- Strengthening and species diversification for Site peripheral hedgerows and the production of a long term woodland and hedgerow management plan.
- Mineral extraction to continue within the permitted limit of extraction, working southwards to extract rock down to a level of 38mAOD, with subsequent deepening to and 23mAOD within the Phase period.
- Extracted mineral to be processed on site at the Back Lane Quarry Plant Site, temporarily stocked and transported off-Site by HGV to point of sale.

7.3.8 Phase B – See Drawing No. KD.BKLN.D.1.012. Proposed Phase B Operations include:

- Partial removal of existing quarry tip, to enable extraction of rock below.
- Mineral extraction to continue within the permitted limit of extraction, with deepening to a depth of 23mAOD within the Phase period.
- Extracted mineral to be processed on site at the Back Lane Quarry Plant Site, temporarily stocked and transported off-Site by HGV to point of sale.

7.3.9 Phase C – See Drawing No. KD.BKLN.D.1.013. Proposed Phase C Operations include:

- Continued removal of existing quarry tip, to enable extraction of rock below.
- Mineral extraction to continue within the permitted limit of extraction, with deepening to a depth of 23mAOD within the Phase period, together with the extraction of rock beneath the existing stockyard.
- Extracted mineral to be processed on site at the Back Lane Quarry Plant Site, temporarily stocked and transported off-Site by HGV to point of sale.

7.3.10 Phase D – See Drawing No. KD.BKLN.D.1.014. Proposed Phase D Operations include:

- Removal of Back Lane Quarry Plant Site to enable extraction of rock below.
- Mineral extraction to continue within the permitted limit of extraction, with deepening to a depth of 8mAOD and -7mAOD within the Phase period, together with the extraction of rock beneath the existing stockyard and Plant Site areas.
- Extracted mineral to be processed on site utilising mobile plant, to be located at adjacent to the extraction face. Material to be temporarily stocked within the quarry void and transported off-Site by HGV to point of sale.

7.3.11 Phase E – See Drawing No. KD.BKLN.D.1.015. Proposed Phase E Operations include:

- Mineral extraction to continue, with deepening to a depth of -37mAOD within the Phase period.
- Extracted mineral to be processed on site utilising mobile plant, to be located adjacent to the extraction face. Material to be temporarily stocked within the quarry void and transported off-Site by HGV to point of sale.

7.3.12 Concept Restoration – See Drawing No. KD.BKLN.D.1.016. The aim of the Concept Restoration Scheme and associated Objectives are as follows:

Aim – *To restore and establish landform and habitats to support wildlife and leisure land uses, set and integrated within the local landscape setting.*

Objectives:

- Retain the two separate controlled access points into Back Lane entrance leading to a public, principally wildlife enhanced / leisure walk area / car park, with viewpoints over both the restored quarries.
- A linking public multi-user path / track running along the eastern boundary of the restored Site to connect into two sections of PROW, from Helks Wood to Over Kellet, via the existing Leapers Wood viewpoint, and south west to Nether Kellet.
- The second access to be retained to the south east of the site off Nether Kellet Road. The access to lead into an area of land for Outline Leisure Use. The leisure use to be determined once quarry activities have ceased. The use of the existing flat platform of ~1.25Ha could be a hotel, touring caravan / campsite, recreational activity centre or wellness retreat.
- To establish a long term aftercare and management plan, to ensure the quality and maintenance of the Site's restored land uses.
- To establish and maintain a permanent lake water level discharge point.
- The provision and implementation of detailed habitat plans and protected species enhancement measures.

7.3.13 The currently permitted Concept Restoration Scheme is illustrated on approved drawing No. BLQ 5/1.

7.4 Landscape Orientated Designations and Planning Policies

7.4.1 The site is not located within a nationally designated landscape e.g. National Park or National Landscape. However, the site is located approximately 1.8km to the south and east of Arnside / Silverdale National Landscape and around 1.7km to the west of the Forest of Bowland National Landscape. Given a combination of positioning and elevations, the site has the potential to fall within the visual envelope of the designated National Landscape areas. Please see Drawing No. KD.BKLN.D.002B Landscape Orientated Designations and KD.BKLN.D.1.031 for the Proposed Development ZTVI included within Technical Appendix C.

Sites of Special Scientific Interest (SSSI)

7.4.2 Thwaite House Moss SSSI is located around 1km to the south-west of the quarry and Crag Bank SSSI is approximately 1.5km to the west (Morecambe Bay SSSI is located further afield some 2.3km to the west).

Listed Buildings

7.4.3 There are approximately 65 Listed Buildings within 2km of the application site. They are present largely within four distinct clusters in the settlements of Over Kellet (~580m north), Nether Kellet (~620m south), Carnforth (~920m north west) and the A6 corridor (~1.07km west). There are a total of 60 Grade II, four Grade II* listings and one unclassified.

7.4.4 The closest Listed Building is the Grade II* Church of St Cuthbert located ~500m east of the site.

Ancient Woodland

7.4.5 There are ten areas of Ancient Woodland present within the site as well as to the north and east of the site. They consist of eight Ancient & Semi Natural Woodland and two Ancient Replanted Woodland blocks. There are four blocks located at least partly within the application boundary for Back Lane, these being; two unnamed wooded blocks to the south and south west of the site, Hells Wood (designated under Kit Bill Wood) and another block of Kit Bill Wood on the eastern boundary.

7.4.6 No further landscape orientated designated sites or assets were identified as falling within the study area.

7.4.7 There are several areas within the vicinity of the wider site that are subject to Limestone Pavement Orders. Areas of Leapers Wood, Bowman Stout Wood and Slacks Wood are also protected by a Tree Preservation Order.

Landscape Related Planning Policy

7.4.8 The Site is located within the administrative boundaries of Lancashire County Council. The designation and policy information used as a baseline for this report has come from:

- Joint Lancashire Minerals and Waste Core Strategy Development Plan (February 2009)
- Joint Lancashire Minerals and Waste Site Allocation and Development Management Plan (September 2013)
- A Local Plan for Lancaster District Part One: Strategic Policies and Land Allocations DPD (July 2020)
- A Local Plan for Lancaster District Part Two: Review of the Development Management DPD (July 2020)
- National Planning Policy Framework (2023)

7.4.9 Lancashire County Council are currently reviewing the Minerals and Waste Local Plan. At present there are no policies to consider as part of this assessment. Lancaster City Council are reviewing the Strategic Policies and Land Allocations DPD through preparation of the Draft Climate Emergency review of the Strategic Policies & Land Allocation Development Plan Document (March 2022).

7.4.10 Relevant landscape orientated policies associated within the above documents, are outlined below.

National Planning Policy Framework (2023)

7.4.11 In accordance with previous national planning guidance the NPPF maintains the primary importance of the development plan and confirms that planning decisions should be in accordance with policy outlined in the latest development plan documents unless material considerations suggest otherwise. The purpose of the planning system is to contribute to the achievement of sustainable development. The policies in the NPPF, constitute the Government's view of what sustainable development in England means in practice for the planning system.

Joint Lancashire Minerals and Waste Core Strategy Development Plan (February 2009)

7.4.12 The Joint Lancashire Minerals and Waste Core Strategy Development Plan (February 2009) remains the extant Local Plan for Lancashire despite the plan period only covering to 2021. The Local Plan Review is underway, however at present it has not been adopted. The Core Strategy sets strategic objectives and vision for waste development in Lancashire across the Plan period.

Policy CS5 – *The policy provides for a number of criteria which applications will be tested against. In relation to landscape;*

- Proposals for mineral workings incorporate measures to conserve, enhance and protect the character of Lancashire's landscapes; and,
- Sensitive environmental restoration and aftercare of sites take place, appropriate to the landscape character of the locality and the delivery of national and local biodiversity action plans. Where appropriate, this will include improvements to public access to the former workings to realise their amenity value.

Joint Lancashire Minerals and Waste Site Allocation and Development Management Plan (September 2013)

Policy DM2: *Development for minerals or waste management operations will be supported where it can be demonstrated to the satisfaction of the mineral and waste planning authority, by the provision of appropriate information, that all material, social, economic or environmental impacts that would cause demonstrable harm can be eliminated or reduced to an acceptable levels. In assessing proposals account will be taken of the proposal's setting, baseline environmental conditions and land uses, together with the extent to which its impacts can be controlled in accordance with best practice and recognised standards.*

Proposals should make a positive contribution to the biodiversity, geodiversity and landscape character. This is to be achieved through quality of design, layout, form, scale and appearance of buildings amongst other criteria, such as; restoration within agreed time limits, to a beneficial afteruse and the management of landscaping and tree planting.

A Local Plan for Lancaster District Part One: Strategic Policies and Land Allocations DPD (July 2020)

7.4.13 The Part One plan of the Lancaster Local Plan contains the strategic policies relevant to the spatial vision and plan for delivery of development across the plan period to 2031.

Policy SP8: *Protecting the Natural Environment - Development proposals will be expected to protect, maintain and enhance the district's biodiversity and geodiversity through the appropriate location of uses, sympathetic design, sustainable construction techniques and appropriate mitigation measures.*

A Local Plan for Lancaster District Part Two: Review of the Development Management DPD (July 2020)

7.4.14 The Part Two plan provides for the detailed development management policies which proposed development is tested against.

Policy DM44: *The protection and enhancement of biodiversity - The Council will support proposals where the primary objective is to conserve or enhance biodiversity and/or geodiversity or where development proposals provide better opportunities to secure management for the long-term biodiversity and geodiversity enhancement. The policy seeks to protect and enhance sites of ecological / biological value, as well as protect soils and land of agricultural value.*

Policy DM45: *Protection of Trees, Hedgerows and Woodland - The Council will support the protection of trees and hedgerows that positively contribute, either as individual specimens or as part of a wider group, to the visual amenity, landscape character and/or environmental value of the location.*

Policy DM46: *Development and Landscape Impact – In determining planning applications the Council will attach great weight to the protection of nationally important designated landscapes. The Council will require proposals that are within, or would impact upon the setting of, designated landscapes to be appropriate to the landscape character type and designation. In relation to proposals within Areas of Outstanding Natural Beauty (AONBs) they should be sustainable, consistent with the primary purpose of the AONB designation and support the special qualities of the AONB as set out in the AONB Management Plans.*

7.4.15 Criteria is also provided for consideration of proposed development both within, and outside, protected and designated landscapes. Additionally, specific guidance is provided for the delivery of Landscape and Visual Impact Assessments:

A Landscape and Visual Impact Assessment (LVIA) will be required where the proposal is for a Schedule I EIA development; the proposal is for wind turbines, pylons, telecommunication masts and solar farms; the proposal involves significant landscape or visual impact by virtue of the sensitivity of the location within or adjacent to an AONB or National Park or the proximity of the proposal to a heritage asset where it is likely to affect the assets setting.

The LVIA should systematically assess the effects of change on the landscape character and visual amenity, including cumulative impacts, as a consequence of the development proposal. Through such an assessment, development proposals should be designed to avoid negative landscape effects and where this is not possible negative landscape effects should be reduced or offset through appropriate mitigation/compensatory measures.

Draft Climate Emergency review of the Strategic Policies & Land Allocation Development Plan Document (March 2022) – Submission Version

7.4.16 In light of Lancaster declaring a climate emergency in 2019, the City Council made the decision to review the Local Plan to seek better environmental outcomes for the district and assist in achieving net zero carbon ambition of the Council.

Policy SP8: *Policy wording is updated to include for proposals considering the resilience of development against climate change.*

7.5 Landscape Character and Assessment

7.5.1 The assessment of an area's landscape character and its ability to accommodate change is initially based on the identification, understanding and categorisation of landscapes features and elements that combine to create the distinctive character of an area. Landscape character comprises a description and assessment of the distinct and recognisable pattern of elements and features that occur consistently in a particular type of landscape and how this is perceived. The character of a landscape is a combination of geology, landform, soils, vegetation, land-use and human activities. In addition, character is identified through characterisation, which classifies, maps and describes areas of similar character.

7.5.2 In order to assess potential landscape effects resulting from the Proposed Development a baseline study of the landscape character of the Site and its

surroundings was carried out. The study involved desk-based analysis and Site survey to determine landscape character of the area including an examination of aesthetic and perceptual aspects of the landscape that contribute to local distinctiveness.

7.5.3 The baseline study has taken account of, and describes, relevant national, regional, and local landscape character assessments, important individual landscape receptors including landscape and nature conservation designations and individual elements of the landscape fabric that are present and that contribute to local landscape character.

7.5.4 The assessment has built upon information provided within the 'National Character Assessment', (NCA) produced by Natural England to provide landscape character profiles for the whole of England which follow natural lines in the landscape rather than administrative boundaries.

7.5.5 Assessment of the landscape within which the Site is situated at a regional level has been informed by 'A Landscape Strategy for Lancashire – Landscape Character Assessment (2000). This defines landscape character within the county at a smaller scale than the National Character Areas, breaking this down into Landscape Character Types which reflect some of the broad variations discernible to the county's landscape that weren't accounted for in some of the larger national units.

7.5.6 Information gathered as part of the study of national, regional, and local character areas will inform an understanding of the quality and condition of the landscape which will be considered alongside on-site identified forces for change present in the local area. Based on a consideration of these aspects, an assessment of significance of effect will be made.

Description of Landscape Character at a National Scale

7.5.7 The site is located largely within the Morecambe Bay Limestones National Character Area 20. However, the south western corner of the site is located within the neighbouring Morecambe Coast and Lune Estuary NCA 31, as defined by Natural England. The characteristics of both NCA's will be considered.

Morecambe Bay Limestones NCA

7.5.8 There are four Statements of Environmental Opportunity relevant to the Morecambe Bay Limestones NCA:

- SEO 1: Protect and enhance the extensive mosaic of high-quality limestone habitats, including pavement, woodland, scrub and grassland, to create a coherent and resilient ecological network, retain a sense of place and maintain the strong relationship between the landscape and its underlying geology.
- SEO 2: Ensure the long-term sustainable management of the nationally and internationally designated coastal zone by conserving and managing its habitats, including the extensive sand flats, salt marshes, estuarine landscapes and limestone cliffs, for their wildlife, strong sense of place, inspiration and tranquillity, their diverse range of species, their traditional fisheries, and for their ability to mitigate the effects of climate change through carbon sequestration and coastal flood mitigation.
- SEO 3: Ensure the long-term sustainable management of the nationally, and internationally designated wetland landscape and its linking, non-designated, habitats by conserving and restoring the lowland raised bogs, fens, rivers and reedbeds for their strong sense of inspiration and tranquillity, their diverse range of species, and for their ability to mitigate the effects of climate change through carbon sequestration.
- SEO 4: Conserve and enhance the wider landscape of the NCA as the supporting framework to its distinctive attributes, including features of the drumlin landscape, the settlement character, orchards, recreational identity and heritage features, for their individual importance and the complementary role they play in supporting the local visitor economy and providing enjoyment and education to visitors and residents alike.

7.5.9 Key characteristics of this area include:

- A flat lowland landscape, dominated by conspicuous, often steep-sided, hills of Lower Carboniferous Limestone, many of which include exposures of limestone pavement. Between the hills the landform is geologically recent, including areas of drumlin field, fluvial and estuarine sediment and peat bogs.
- Wide expanses of shifting intertidal sand flats and expanses of salt marsh

arcing round the head of Morecambe Bay, backed by low cliffs with windswept trees, or grassed embankments defending reclaimed grazing marshes.

- The rivers Kent and Leven enter Morecambe Bay via dynamic estuary systems. The smaller rivers Winster, Bela and Keer lie predominantly within this NCA and have relatively extensive flood plain areas before flowing into the channel of the River Kent as they enter Morecambe Bay.
- The limestones support a mixed pastoral farming and woodland landscape, often in tight mosaics, with orchards surrounding the farmsteads and fields bounded by limestone drystone walls.
- A winter climate ameliorated sea which, as well as the exposed south facing slopes of the limestone outcrops allows a number of temperature sensitive species to make this the northernmost fringe of their range.
- Strong contrasts between the rectilinear enclosures of reclaimed valley bottoms and coastal fringes, and the older enclosures associated with farmsteads and ancient woodland, bounded by limestone drystone walls, on the limestone escarpments.
- Extensive areas of native broadleaved woodland on limestone areas, particularly on the steeper slopes and thinnest soils.
- An abundance of high-quality semi-natural habitats of national and international importance, including limestone pavements, herb-rich grasslands with juniper, species-rich scrub, ancient limestone woodlands, peaty fenlands, marl tarns, reedbeds, lowland raised bogs, salt marshes and intertidal mud and sand flats.
- An exceptional range of species associated with the diverse range of seminatural habitats, many with populations of national importance, including a suite of limestone butterflies, bittern, marsh tit and lady's-slipper orchid.
- Sheep and cattle graze the pastures and salt marshes, with rough grazing a feature of the higher grounds on unimproved limestone grassland.
- Extensive areas of reclaimed land on the coastal fringe and in the Lyth Valley have large fields bounded by ditch-flanked hedgerows. Lowland raised mires surrounding the limestone outcrops have been reclaimed for agriculture.
- Several stately homes set in parkland landscapes with well-maintained

gardens.

- A vernacular building style common to all settlements and farmsteads based on the use of local limestone for walls and Lake District slate.
- Settlements are generally dispersed and rural in character, having usually grown around large farmsteads. Larger centres include Grange-over-Sands, Arnside, Silverdale and Milnthorpe, some of which have a seaside resort character, reflecting the growth in the use of the area for recreation from the 18th century onwards.
- A range of visible heritage features including burial mounds, stone circles, prehistoric settlements and enclosures, medieval field patterns, the Lancaster Canal and Second World War airfields.
- An extensive rights of way network, particularly on areas of limestone geology, integrated with areas of permissive access land.

7.5.10 The NCA supporting document contains a number of landscape changes experienced within the Character Area. A number of these are relevant to the landscape at the development site.

- By 2003 the area of woodland covered by England Woodland Grant Scheme management agreements was about 19 per cent of the eligible area. About 49 per cent of the woodland cover is on an ancient woodland site, and the proportion of these sites covered by a Woodland Grant Scheme agreement increased from 12 per cent in 1999 to 27 per cent in 2003.
- Local changes in the distribution of different woodland types have arisen as a consequence of programmes restocking harvested non-native plantations and plantation ancient woodland sites with native trees species, and the restoration of non-native plantations to open habitats, particularly on Sites of Special Scientific Interest (SSSI).
- Decline in woodland condition has occurred outside of Arnside and Silverdale National Landscape as a result of inadequate management and problems with grazing by deer that have prevented natural regeneration in places.
- Through the latter half of the 20th century many species associated with the managed agricultural landscape have declined in the NCA particularly those associated with wet grasslands and pastures, such as curlew, redshank and yellow wagtail. This decline is associated with incremental intensification in agricultural management with development such as silage

production, slurry spreading, and reseeding of grasslands affecting bird breeding success.

- The area of SSSI is significant at 18 per cent of land cover. Of this there has been an increase from 57 per cent in 2003 to 85 per cent in 2011 of the SSSI area in favourable or recovering condition. In addition to national designated sites there has been a considerable increase in the extent of other priority habitat under agri-environment or English Woodland Grant schemes.
- Historically there has been a significant loss in the extent of limestone pavement due to quarrying or removal for ornamental garden features. However, since the early 1980s this loss has largely been halted through Limestone Pavement Order protection.
- Invasive non-native species are an issue in some areas, for example cotoneaster invasion of limestone habitats, and Himalayan balsam along riparian corridors.
- Although the total number of sites has declined over time, quarrying continues to be a local industry with three large scale active sites, at Sandside, Over Kellet, and Holme, all quarrying limestone.
- Except where open habitat is being maintained for biodiversity or geological interest, former quarry sites, which are present on all the main limestone outcrops, are generally developing into woodland communities.

Morecambe Coast and Lune Estuary NCA

7.5.11 There are four Statements of Environmental Opportunity relevant to the Morecambe Bay Limestones NCA:

- SEO 1: Maintain and enhance the historic and landscape character and the internationally significant habitats of the coastal environment, including the mudflats, salt marsh, sand dunes, vegetated shingle and the Lune Estuary, to support its key features, reflect the dynamic nature of the coastal systems, and ensure that the area remains able to regulate coastal flooding and sequester and store carbon, while providing access and recreation that is sensitive to the character of the coastal zone.
- SEO 2: Enhance the mainly pastoral, rural landscape by supporting land managers to adopt long-term sustainable land management practices on both the organic soils of the coastal plain and reclaimed land from the Lune

Estuary to Knott End-on-Sea, and the mineral soils of higher ground, seeking outcomes which deliver both economic and environmental benefits.

- SEO 3: Working with land managers, seek opportunities to enhance the historic character of the rural landscape, including heritage assets, boundary features and habitats, to protect the character of the rural landscape and restore the ecological condition and connectivity of these features.
- SEO 4: Promote the social, economic and cultural value of a healthy natural environment and embed wide understanding of sustainable management, building on the close proximity of areas of exceptional environmental value, particularly the coastal zone, to areas of high population density.

7.5.12 Key Characteristics of this area include:

- Broad and relatively flat lowlands enclosed by escarpments which open out dramatically into the undulating landscape of the coastal strip with substantial drumlin features.
- The sheltered expanse of the Lune Estuary with its salt marshes and tidal channels overlooked by low ridges on the Heysham peninsula and around Lancaster.
- Panoramic vistas across Morecambe Bay from Lancaster and higher ground, to backdrops of the Cumbrian Fells and across the Lune Estuary from Sunderland Point and the Heysham peninsula towards the Bowland Fells.
- Range of coastal landscape features including extensive salt marshes backing extensive sand and mud flats, particularly around the Lune Estuary; reclaimed mosses and marshland; a small area of intact remnant mossland at Heysham; sand and shingle beaches north of the Lune Estuary; and Millstone Grit sandstone cliffs at Heysham.
- Intensively managed pastoral landscape bounded by ditches in the lowest-lying reclaimed areas, hedges with mature trees in low-lying areas and grading into stone walls on drumlin fields and upland foot slopes with limited extent of semi-natural habitats away from the coastal strip.
- Low woodland cover throughout with woodland largely restricted to the sides of the Lune Valley on the boundary of the NCA and small copses on farmland.
- Presence of Heysham power station, which is a dominant feature on the visual profile of the coastal strip and is widely visible from adjacent NCAs,

as well as the associated infrastructure such as power lines which are also widely visible.

- The cathedral city of Lancaster, market town and former administrative capital of Lancashire. Mainly built from Millstone Grit sandstone, the city overlooks a former fording point at the head of the Lune Estuary with a castle, cathedral, neo-Georgian town hall, canal and Victorian parks.
- Rural architecture, including farmsteads, that mostly results from rebuilding in brick and stone in the late 18th and 19th centuries, with fragments of earlier timber frame, sandstone, Millstone Grit and earth constructions, with fields subject to high levels of boundary change since the mid-19th century.
- Coastal developments that reflect a long history of a visitor economy and associated recreation, including the sea front facade at Morecambe with hotels, amusements and a promenade, and a range of caravan sites and golf courses along the more rural parts of the coastal strip from Heysham north to Carnforth.
- Traversed north–south by the west coast transport network including the M6, the West Coast Main Line railway and the Lancaster Canal, which pass between the Bowland Fells and Morecambe Bay.

7.5.13 The NCA supporting document contains a number of landscape changes experienced within the Character Area. A number of these are relevant to the landscape at the development site.

- Woodland is not a major feature of the NCA with only about 3 per cent coverage. Of this less than 1 per cent is ancient woodland. Woodland is a feature of some designed landscapes such as Williamson Park in Lancaster and Ashton Hall, at Conder Green near Glasson. There is limited evidence of recent change.
- Of the area designated as SSSI, 94 per cent is in favourable condition with a further 5 per cent recovering (Natural England 2011 data) indicating that these areas have seen little change in recent years, and that the limited changes have been positive. In the NCA most of the SSSI resource consists of coastal habitats, in particular salt marshes, including some of the best quality ungrazed marshes in the north-west, which grade into unvegetated intertidal communities.
- Some of the most distinctive species in the NCA appear to have shown

recent declines, which are likely to be linked to a decline in habitat extent and/or quality including natterjack toad and purple-ramping fumitory.

- There is limited evidence to detail landscape change for historic features. However, only about 50 per cent of historic farm buildings remain unconverted, indicating an ongoing usage but in a changed context. Most are intact structurally.

Description of Landscape Character at a Regional Scale

A Landscape Strategy for Lancashire – Landscape Character Assessment

7.5.14 At a regional level, A Landscape Strategy for Lancashire - Landscape Character Assessment (2000) defines the site as being located within Landscape Character Area 12a: Low Coastal Drumlins – Carnforth-Galgate-Cockerham. Partially within Landscape Character Area 13c: Drumlin Field - Docker-Kellet-Lancaster, and in proximity to 12b Low Coastal Drumlins – Warton-Borwick; and as such it is considered that the proposed development may influence these defined character areas.

Landscape Character Area 12a: Carnforth-Galgate-Cockerham – The site is located within this character area but has many of the elements and features of LCA13c

7.5.15 This character area is described as comprising, *"The Low Coastal Drumlins, on or near which Lancaster and Morecambe Cockerham are built, extend along the coast behind Morecambe Bay from Cockerham in the south to Carnforth in the north. This landscape supports an extremely high proportion of built development including the large settlements of Lancaster and Morecambe and recent built development along the A6. The Low Coastal Drumlins provide a convenient transport corridor; the Lancaster Canal, M6, A6 and mainline railway run side-by-side in a north-south orientation. The canal, which weaves through the drumlins, is an important reminder of the area's industrial heritage; a branch emerges into the Lune at Glasson Dock. To the west of Cockerham settlement is sparse and dominated by scattered large scale farmsteads in contrast to the towns and large villages further north. Fields are largely of post medieval pattern, however there are areas of older enclosure and settlement, notably at Cockersand Abbey. The drumlins provide elevated points from which there are views over the salt marshes to Morecambe Bay. Near Thurnham there is a significant area of mossland lying between the drumlins, allowing long distant views towards the coast. Traditional farmsteads and older settlement cores are built of stone but the modern development is often built*

using red brick. Buildings on top of the drumlin hills are particularly visible. Woodland is limited to small plantations, woods associated with former estates and rarely, fragments of ancient woodland in unusual hilltop or hillside settings."

Landscape Character Area 13c: Drumlin Field - Docker-Kellet-Lancaster

7.5.16 This Drumlin Field character type is described as being "a distinctive landscape type characterised by a `field' of rolling drumlins. The consistent orientation of the hills gives the landscape a uniform grain, which is sometimes difficult to appreciate from within the field. The regular green hillocks are between about 100m and 200m high with steep sides and broad rounded tops. However, there are often solid rock outcrops within the field where the underlying bedrock is exposed. Drumlin Fields occur inland, on higher land than the Low Coastal Drumlins. They are found on the edges of upland areas where the retreating ice sheets left moulded boulder clay deposits in their paths. Low Coastal Drumlins are found on the north-west coast of the study area where the last retreating ice sheets left a series of rounded boulder clay hills in their paths."

7.5.17 In more detail Character Area 13c is described as a drumlin field having, "a distinctive north-east, south-west grain and runs from the edge of Lancaster northwards into Cumbria. The area is underlain by limestone and is distinguished by large scale undulating hills of pasture, some formed from glacial till and others which are outcrops of limestone, or reef knolls. These are particularly evident around Over and Nether Kellet where the limestone is exposed; significantly by the extensive quarries where limestone extraction is ongoing. The smooth rolling scenery is emphasised by the network of stone walls. Greater variety of texture is provided by the isolated areas of moorland which protrude from the field, for example at Docker Moor, and the River Lune which cuts a gorge through the hills at Halton. This gorge provides a major transport route through the hills with a number of parking, picnic and camping sites scattered along its length. Woodlands are often associated with designed landscapes and built development takes advantage of views from the hill tops, for example the Ashton Memorial on the edge of Lancaster which sits atop a drumlin and is a landmark for miles around. The drumlins create a setting for the city of Lancaster and its university."

Landscape Character Area 12b: Warton-Borwick

7.5.18 This character area is described as follows: "The Low Coastal Drumlins around Warton are more rural in character than those immediately to the south. Large pastures are divided by low clipped hedgerows or stone walls, some of which are degraded or missing. There are areas of waterlogged, rushy pasture and standing water in the low lying areas between the drumlins. The River Keer winds its way between the low drumlins, draining into Morecambe Bay at Carnforth. Historic Halls and estates are associated with the River Keer at Capernwray and Borwick. Gravel extraction has had an impact on this landscape in the creation of open water bodies which attract wildfowl. The largest of these is Pine Lakes. There is considerable development associated with the M6, A6 and railway such as motels and a lorry park. Parking areas and caravan sites are also features of coastal parts of this area."

Landscape Character Area 18b: Hest Bank-Silverdale Marshes

7.5.19 This character area is described as follows: "These marshes are on a raised platform backed by cliffs of sand and clay from Hest Bank to Carnforth and by the steep limestone cliffs of the Arnside and Silverdale wooded limestone hills further north. The front edge of the platform is eroding significantly at the point where it meets the sea. The marshes are open areas of sea-washed turf, grazed by cattle and sheep, and patterned by narrow rills, winding muddy creeks and brackish pools. Traditional turf cutting activities take place resulting in a patchwork of stripped and naturally regenerating areas on the southern half of the marsh. There are a number of access points to the marsh and it is visited by many people who walk, park and picnic upon the marsh. There is a recent landfill site on the edge of the marsh at Cote Stones, as well as remnant slag heaps from the historic iron workings at Carnforth."

Description of Landscape Character at a Local Scale

7.5.20 Areas of historic extraction and ongoing operations occupy the majority of the current site, which is now disturbed to near its full permitted extent. This internal quarry landscape comprises a combination of quarry benches and faces, access ramps and haul routes, operational water bodies / lagoons and ancillary built structures and quarry plant / machinery, along with mineral stocks and waste tips.

7.5.21 The site, whilst situated on elevated ground, is generally well contained by surrounding existing landform and mature structural boundary woodland belts

which occupy the rising limestone slopes, beyond which the surrounding landscape is typically agricultural (pastoral), topographically representing a distinctive rolling drumlin landscape before become flatter as land falls northward and westwards towards the coastline. Immediately local field parcels are typically irregular, being defined by a combination of hedgerows, stone walls and occasional small mixed woodland blocks.

7.5.22 The M6 motorway corridor dissects the landscape north to south close to the western boundary of the site. Elsewhere, local roadways serve the settlements of Carnforth, Over Kellet and Nether Kellet.

7.5.23 Both operational and historic mineral workings are typical features within the surrounding landscape. Dunald Mill Quarry lies to the south of Nether Kellet and a number of other historic workings in the area have been restored to leisure / recreation afteruses.

7.5.24 The local landscape is well served by public rights of way and cycles routes - the closest being footpaths 1-24-FP-7 and 1-22-FP 5 which run along sections of the eastern and southern boundaries of the site.

7.5.25 The site is relatively discrete set and contained within its previously extracted void. The majority of the site being operational ground with landforms comprising extraction, disturbed ground / previously extracted land, tracks, tips, stocks, Plant Site and associated activities, an active blockworks and two access roads / site entrances. There is generally a strong vegetation structure around the western, southern, and eastern site boundaries which combines with landform to contain the landscape unit at this scale.

7.5.26 Please note that based upon desktop and site survey works we consider that the site and land to the east of the M6 corridor should actually be considered as located within the 13c Drumlin Field – Docker – Kellet – Lancaster LCA rather than 12a Carnforth – Galgate – Cockerham area. We have considered the potential effects of the proposed development on both.

Landscape Sensitivity

7.5.27 Based upon the desktop and site survey works undertaken, we consider that the sensitivity of local landscape character areas to a hard rock extraction development are:

- LCA 13c: Drumlin Field – Docker – Kellet – Lancaster – Medium Sensitivity;
- LCA 12a: Carnforth – Galgate – Cockerham – Medium Sensitivity;
- LCA 12b: Warton – Borwick – Medium Sensitivity;
- LCA 18b: Hest Bank – Silverdale Meadows – High Sensitivity;
- The Site and its immediate area – Low Sensitivity

7.5.28 The assessment relates to the condition / quality and robustness of the Landscape Character areas, the elements and features which comprise the areas and the built morphology of landuses. The large scale and size of the existing / proposed development, and its potential effects on character, have also been considered.

Potential Changes to Landscape Character associated with the proposed development

7.5.29 Specifically, in respect to the application under consideration, changes to landscape elements and features that have the potential to temporarily degrade the landscape character during the operational/phased period include:

- lower ground levels (through mineral extraction);
- the creation of temporary areas of disturbed ground;
- the temporary retention and new establishment of waste storage bunds; and
- the continued movement within the landscape / change in local tranquillity, associated with extraction and the transportation of extracted rock to the existing permitted Quarry plant site.
- Rebound of ground water to establish the permitted water body.

7.5.30 Landscape character mitigation/enhancement measures proposed and integrated within the scheme include:

During the operational period

- Maintaining site peripheral vegetation structure which screens the quarry;
- Continuation of management of Site peripheral woodland and associated land;

- Implementation of progressive restoration where possible, including land adjacent to the current block plant area.

Post Restoration

- Creation of a linking public multi-use path along the southern boundary of the site to connect into the local PROW network from Helks Wood to Over Kellet, via Leapers Wood viewpoint and south west to Nether Kellet;
- Creation of new wildlife habitat for which detailed habitat plans and protective species enhancement measures will be implemented;
- Establishment of long-term aftercare and management plan to ensure the quality and maintenance of the Site restored land uses;
- Opportunities post mineral extraction for subsequent leisure and recreational activities to be established (subject to a separate future planning application).

Assessment of the Proposed Development's Impact on Landscape Character

7.5.31 Table 7.1 provides a summary of the local Landscape Character Areas, their assessed sensitivity to a limestone / hard rock mineral development, the specific magnitude of effect associated with the application scheme and the overall level of Significance of Effect during both the operational period and at post restoration.

Landscape Character Area	Assessed Sensitivity to change from the Proposed Development	Assessed Magnitude of Effect during the operational period	Level of Significance of Effect during the Operational Period	Assessed Magnitude of Effect Post Restoration	Level of Significance of Effect during Post Restoration
13c	Medium	Medium	Moderate Adverse	Neutral	Neutral
12a	Medium	Medium	Moderate Adverse	Neutral	Neutral
12b	Medium	Neutral	Neutral	Neutral	Neutral
18b	High	Low	Slight Adverse	Neutral	Neutral
Site/Immediate area	Low	Medium	Slight Adverse	Neutral	Neutral

Table 7.1: Assessment of Proposed Developments Impacts on Landscape

7.5.32 The nature of "effect" (magnitude) is determined by comparing the effect of the Proposed Development on the landscape character of the Site and the surrounding areas. Based upon the detailed operational (construction) proposals including

mitigation measures during the operational period of the Proposed Development, we assess that the magnitude of the proposals impact during the temporary operational period will be Neutral to Moderate Adverse effect on LCA's. Given the nature of local topography/landform and vegetation cover, the Site's location is generally discrete from other local landscape characters. The magnitude of effect resulting from the Proposed Development is "in effect" a continuation of existing permitted activities over an additional 29 years and to include deepening the permitted quarry from 38mAOD to -37mAOD. It is considered that the general nature, scale and form of these activities is consistent with the permitted development in respect of influences on magnitude. The additional length of time to extract and process the material, is however, considered as a "long term" period of time and as such is assessed as a Medium Adverse Level of Effect of Magnitude. We consider that the overall Magnitude of Effect is Not High because of the combined judgements about the size and scale of the effect, and the contained extent of the area over which it occurs; as well as its potential to affect the character areas it is both located within and the other surrounding character areas.

7.5.33 The combined sensitivity of the LCA's with the magnitude therefore results in 12a Carnforth – Galgate – Cockerham and 13c Drumlin Field – Docker – Kellet – Lancaster are predicted to receive a Moderate Adverse Level of Significance of Effect during the operational period of the quarry. Please note this is Not a Significant Adverse Level of Effect.

7.5.34 LCA 18b Hest Bank – Silverdale Meadows appears to include geographical areas of Strickland Wood and Warton Hill. From this higher ground located ~2.5km north west there is an amount of LCA intervisibility which we consider results in a Very Low Magnitude of effect. The combined High Sensitivity of this character areas with the Very Low Magnitude of Effect results in a Slight Adverse Level of Significance of Effect. This is not a Significant Adverse Level of Effect.

7.5.35 The sensitivity to change associated with the deepening is assessed as Low, in respect of the current Site identity and its immediate setting. The magnitude of effect is considered Medium Adverse (principally resulting from the time element). This results in a Slight Adverse Level of Significance of Effect. This is Not a Significant Adverse Level of Effect.

7.5.36 It is assessed that Neutral Levels of Significance of Effect will result from the proposed development on 12b: Warton – Borwick.

7.5.37 At Post Restoration the proposed development will result in a landscape character the same / very similar to the permitted scheme. This will comprise a slightly larger waterbody, quarried faces and benches, retention of strong western, southern and eastern vegetation structure with calcareous grassland and minor areas of shallows. There is a future opportunity to utilise a flat platform, currently utilised by the blockworks, for leisure / recreational infrastructure. We therefore assess that at Post Restoration the proposed development will result in a Neutral Effect on landscape character compared to the permitted scheme.

Summary Conclusions in respect of Landscape Character

7.5.38 We assess that the development proposals will not result in any significant adverse impacts at either the operational or restoration stages of the Proposed Development. Progressive and final restoration offers both reinstatement of locally characterful permitted elements and features as well as an increase in Biodiversity Net Gain (BNG).

7.6 Visual Matters

7.6.1 Desktop and Site survey works have identified the areas of landscape and visual receptor locations from which the existing Site and the Proposed Development may be visible along with the different groups of people who may experience views of the development and its specific elements and features, along with the viewpoints where they will be affected and the nature of the views at these points.

7.6.2 This baseline and assessment work has been carried out by initially mapping the geographical extent of the study area where receptors have the potential to view the current Site and the Proposed Development. This was carried out digitally through the production of Zones of Theoretical Visual Influence (ZTVI).

7.6.3 A Current Situation ZTVI was initially carried out and is illustrated on Drawing Number KD.BKLN.D.1.031. As can be seen from this drawing within Technical

Appendix C, the existing Back Lane Quarry ZTVI is restricted to the north to ~300m by the higher backdrop landform upon which Leapers Wood, Bowman Stout Wood and Slacks Wood are located. To the south the immediate ZTVI occupies ~1.5 to 2.5km. To the east / northeast ~3-4km and to the west / northwest spreading to over 4km from the Site. This drawing also illustrates the areas with higher magnitude of impact are both concentrated within the quarry itself, its immediate boundary and within the adjoining Leapers Wood Quarry. To the east the highest and higher medium levels of magnitude include land between the quarry and Swarthdale, including individual farmsteads. To the south receptors in these higher levels include recreational users of the Hawthorns Caravan Park, residential receptors in the eastern area of Nether Kellet and users of the Nether Kellet Road. To the west geographical areas with a mid to higher magnitude of impact include residential receptors within Carnforth along with users of the local road and PROW networks. Areas of land to the northwest and east of the Site located within the designated Forest of Bowland National Landscape and Arnside / Silverdale National Landscape respectively are also highlighted as receiving a potential mid-level impact from the current quarry and proposed development.

7.6.4 Drawing KD.BKLN.D.1.031 illustrates the Zone of Theoretical Visibility associated with the Proposed Development. This is based upon the proposed deepening extraction down to -37mAOD. As can be seen from this computer model drawing, when compared to the Current Situation ZTVI there is no noticeable difference between the existing and proposed developments ZTVI.

7.6.5 The Post Restoration ZTVI as illustrated on KD.BKLN.D.1.032 again demonstrates no noticeable change in ZTVI when compared to the existing current situation. The consistency of the computer modelled ZTVIs associated with the Current Situation, Proposed Development and Post Restoration demonstrating the proposed development will not result in any additional geographical areas and associated potential receptors receiving views of the quarry and its activities, nor a change in the level of magnitude of effect the receptors currently receive.

7.6.6 The Site survey considered the viewpoints from which the current situation and the Proposed Development will actually be seen by differing groups of people. These groups included:

- Residential visual receptors in private properties;
- Public viewpoints e.g. public rights of way, inland waterways and public open space (POS);

- Places where people work; and
- Transport routes where there may be views from private vehicles and from different forms of public transport.

7.6.7 Based upon the above desktop research and assessment works a detailed visual Site survey took place, being guided by both the current and proposed ZTVIs. Both ZTVI mapping and Site surveys assume that the observers eye height is some 1.6m above ground level, based upon the midpoint of average heights for men and women.

7.6.8 Drawing Number KD.BKLN.D.1.026 also illustrates the location of representative visual receptor location points. These receptor locations have been used to describe the types and levels of potential visual change and effect to local receptors. The visual receptor locations are illustrated looking towards the Site on Photographic Sheets 1 to 9 (see Technical Appendix C). These illustrate representative visual receptor location points of existing and potential views of the Site and the development and site activities.

7.6.9 Table 7.2 summarises the representative visual receptors identified and the effects that have been considered with an assessment of their significance based upon the methodology described within Technical Appendix C.

7.6.10 This is first determined by assessing the Sensitivity of Visual Receptors to change from this type of development proposal (Table 7.2) and then the Magnitude of the visual effect, its size/scale, geographical extent, duration, and reversibility (Table 7.3). A judgement on the sensitivity of visual receptors and magnitude of the effect are then combined to assess the overall significance of visual impact/effects (Table 7.4).

7.6.11 The susceptibility of visual receptors to changes in view and visual amenity is mainly a function of “the occupation or activity of people experiencing the view at particular locations and the extent to which their attention or interest may therefore be focused on the views and visual amenity they experience at particular locations” (GLVIA page 113).

Receptor No	Description of Visual Receptor	Assessed Susceptibility to change of Visual Receptors	Assessed Value of View	Overall Assessment of Sensitivity of Visual Receptor
1	Users of Main Road at office entrance to High Roads, Back Lane Quarry	Low	Low	Low
2	Holiday visitors to Hawthorns Park (Holiday Homes). Located south of Back Lane Quarry southern boundary	High	High	High
3	Residential Receptors within the village of Nether Kellet	High	High	High
4	Users of PROW Ref FP0122005	Medium	Medium	Medium
5	Users of PROW Ref FP124007	Medium	Medium	Medium
6	Residential receptors located within the north of Nether Kellet	High	High	High
7	Users of PROW Ref FP0103018 / FP0122006 over M6	Medium	Medium	Medium
8	Users of Back Lane adjacent to the entrance of Back Lane Quarry	Low	Low	Low
9	Meadow View visitors/ holiday park lodges	High	High	High
10	Users of Dunald Mill Lane	Low	Low	Low
11	Residential receptors at Scargill Farm	High	High	High
12	Users of Main Road to the west of Nether Kellet	Low	Low	Low
13	Residents of Bolton-le-Sands	High	Medium	High
14	Residential receptors off Longfield Drive, Carnforth	Low	Low	Low
15	Users of PROW Ref FP0103005	High	Medium	High
16	Users of PROW Bay Cycle Way	Medium	Medium	Medium
17	Users of PROW Ref FP0135003 off Crag Road	Medium	Medium	Medium
18	Visitors to Warton Crag Quarry Trail and Nature Reserve	High	High	High
19	Visitors to Warton Crag Quarry Trail and Nature Reserve	High	High	High
20	Visitors to Warton Crag Kiln off PROW Ref FP0135004	High	High	High
21	Residential Receptors within Warton	High	Medium	High
22	Residential Receptors off North Road, Carnforth	High	High	High

Receptor No	Description of Visual Receptor	Assessed Susceptibility to change of Visual Receptors	Assessed Value of View	Overall Assessment of Sensitivity of Visual Receptor
23	Residential receptors within Over Kellet	High	High	High
24	Visitors to quarry viewpoint east of Leapers Wood Quarry.	Medium	Medium	Medium
25	Users of PROW Ref FP0124007 walking around the north and north eastern boundaries of the site	Medium	Medium	Medium
26	Users of Capernwray Road	Low	Low	Low
27	Users of Kellet Lane	Low	Low	Low
28	Residential Receptors off Highfield Road and Windermere Road, Carnforth	High	High	High
29	Users of Kirkby Lonsdale Road within National Landscape	High	High	High
30	Users of Kirkby Lonsdale Road within National Landscape	High	High	High
31	Users of PROW Ref FP0115015 within National Landscape	High	High	High

Table 7.2: Susceptibility of Visual Receptors to Change

7.6.12 Each of the potential visual receptor locations were visited to understand the nature and scope of the existing / potential views of the Site and the proposed development.

7.6.13 Local visual receptors have a variety of assessed sensitivities to change resulting from the proposed development within this locality. Residential receptors having the greatest sensitivity to change, i.e. High, with users of the local road network being assessed as having the lowest sensitivity to change i.e. Low as a result of their transient nature and limited time duration of view of the Site/ Proposed Development.

7.6.14 Table 7.3 details the visual nature of the Proposed Development and assesses its general potential for magnitude of change / effect.

Type	Assessment
Development	The proposed development is for the deepening of the existing quarry. Visually the majority of change will be at the base of the existing quarry extraction void. No new fixed or mobile plant will be required. Rock extraction will be carried out over 5No phases. The existing quarry waste tip is at a base of ~60maOD rising to 95maOD. It will be relocated within Phase B, E and D of the proposed development to an area of (part completed and then final deepening) i.e., below the current base elevation of the current tip. As such the tip will always be at a lower elevation than existing and screened behind site peripheral landforms.
Size/scale	The overall visual size and scale of the Proposed Development is large. This mirrors the existing situation. The visual elements and features which comprise the development being engineered quarried faces and benches, engineered form waste tip, build structures of plant, weighbridge and offices and stocks. The overall site area being ~51Ha. Onsite operational mitigation to minimise the potential for adverse visual effects include the natural site peripheral landform and its height, working below the skyline and peripheral woodland.
Geographical extent	The ZTVI associated with the Current Site Situation and the Proposed Development is considered large, however based upon both desktop and site survey work potential geographical influence of the site is much smaller. The main reason for this being associated with the strong vegetation structure located both surrounding the site and within the local area. The urban morphology of local residential dwellings, settlements and industrial areas within Carnforth also prevents / restricts the potential for visual effects from the site, as does local topographical / landform variations. It is noted that there is no noticeable difference between the Current ZTVI of the quarry and that of the Proposed Development.
Duration	Temporary: The Proposed Development will take place progressively over a period of 29 years. Due to the length of this period of operational activity it is considered that the duration is Long Term.
Assessed General Magnitude of effect to local Visual Receptors	It is assessed that the proposed remedial / restoration works will result in mainly neutral effects during the phased operational period with a low number of visual receptors with existing / potential views of the proposed development. At post restoration it is assessed that the receptors will receive a Neutral visual effect compared to the existing current situation / permitted scheme.

Table 7.3 Assessed Magnitude of Effect

Visual Mitigation and Enhancement Measures

7.6.15 It should be noted that the proposed development, is in effect, a continuation of the existing rock extraction, processing, stocking and waste generation process, involving existing fixed and mobile plant and HGV movements. There will be no new fixed or mobile plant structures and no increase in daily HGV movements.

7.6.16 Additional visual and landscape mitigation and enhancement will include:

- Strengthening / species diversification of all existing site boundary planting.
- During Phases B and C the existing quarry tip located within the central / northern areas of the site will be relocated to a lower base of extraction within the quarry void, reducing its potential to be observed.
- On-going management and maintenance of site peripheral vegetation.
- At final restoration / ground water rebound there will be enhancement of the local PROW network with an approximate 1.5km section of new access for public use. This will be located along the southern boundary of the site with areas of calcareous grassland and scrub planting.
- Lakeside shallows, margins and aquatic vegetation will be established around the southern lake periphery.
- Public car parking and viewpoints will be provided.
- Provision of a long-term Aftercare and Management Plan to ensure the visual screening of the Site and its long term visual integration into its local landscape setting.

Assessed Overall Significance of Visual Effects

7.6.17 This is achieved by combining the separate judgements about sensitivity of the visual receptor and the magnitude of the Proposed Development (including any mitigation measures) on visual impacts/effects. See Table 7.4 below.

7.6.18 Significance of visual effects is not absolute and can only be defined in relation to each development and its specific location. In making a judgement about the significance of visual effects it is noted that:

- Effects on people (receptors) who are particularly sensitive to change in views and visual amenity are more likely to be significant.
- Effects on people at recognised and important viewpoints or from recognised scenic routes are more likely to be significant.
- Large-scale changes which introduce new, non-characteristic or discordant or intrusive elements into the view are more likely to be significant than small changes or changes involving features already present within the view.

Ref	Description of Visual Receptor	Receptors Assessed Sensitivity to change	Assessed Magnitude resulting from Proposed Development	Level of Assessed Significance of visual effect from Proposed Development
1	Users of Main Road at office entrance to High Roads, Back Lane Quarry	Low	Medium	Slight Adverse
2	Holiday visitors to Hawthorns Park (Holiday Homes). Located south of Back Lane Quarry southern boundary	High	Very Low Adverse	Slight Adverse
3	Residential Receptors within the village of Nether Kellet	High	None	Neutral
4	Users of PROW Ref FP0122005	Medium	Very Low	Very Slight Adverse
5	Users of PROW Ref FP124007	Medium	Very Low	Minimal Adverse
6	Residential receptors within the north of Nether Kellet	High	None	Neutral
7	Users of PROW Ref FP0103018 / FP0122006 over M6	Medium	None	Neutral
8	Users of Back Lane adjacent to entrance of Back Lane Quarry	Low	Very Low	Minimal Adverse
9	Meadow View visitors/ holiday park lodges	High	None	Neutral
10	Users of Dunald Mill Lane	Low	Very Low	Minimal Adverse
11	Residential receptors at Scargill Farm	High	None	Neutral
12	Users of Main Road to the west of Nether Kellet	Low	None	Neutral
13	Residents of Bolton-le-Sands	High	None	Neutral
14	Residential receptors off Longfield Drive, Carnforth	High	Very Low	Slight Adverse
15	Users of PROW Ref FP0103005	High	None	Neutral
16	Users of PROW Bay Cycle Way	Medium	None	Neutral
17	Users of PROW Ref FP0135003 off Crag Road	High	Very Low	Slight Adverse

Ref	Description of Visual Receptor	Receptors Assessed Sensitivity to change	Assessed Magnitude resulting from Proposed Development	Level of Assessed Significance of visual effect from Proposed Development
18	Visitors to Warton Crag Quarry Trail and Nature Reserve	High	Very Low	Slight Adverse
19	Visitors to Warton Crag Quarry Trail and Nature Reserve	High	Very Low	Slight Adverse
20	Visitors to Warton Crag Kiln off PROW Ref FP0135004	High	Very Low	Slight Adverse
21	Residential Receptors within Warton	High	None	Neutral
22	Residential Receptors off North Road, Carnforth	High	None	Neutral
23	Residential receptors within Over Kellet	High	None	Neutral
24	Visitors to quarry viewpoint east of Leapers Wood Quarry.	Medium	Medium	Moderate Beneficial
25	Users of PROW Ref FP0124007 walking around the north and north-eastern boundaries of the site	Medium	None	Neutral
26	Users of Capernwray Road	Low	None	Neutral
27	Users of Kellet Lane	Low	None	Neutral
28	Residential Receptors off Highfield Road and Windermere Road, Carnforth	High	None	Neutral
29	Users of Kirkby Lonsdale Road within National Landscape	High	None	Neutral
30	Users of Kirkby Lonsdale Road within National Landscape	High	None	Neutral
31	Users of PROW Ref FP0115015 within National Landscape	High	None	Neutral

Table 7.4 Assessed Overall Significance of Visual Effects

Visual Matters Assessment

7.6.19 It is assessed that **No** representative visual receptors will receive a Significant Adverse level of visual effects (i.e., a Severe, Major or Notable Effect) from the

Proposed Development during its operational period. It is also assessed that no receptors will receive a Moderate Adverse effect.

7.6.20 During the operational phase it is assessed that 7No. receptors will receive a Slight Adverse Effect, 1No. receptor will receive a Very Slight Adverse Effect, 3No receptors will receive a Minimal Adverse Effect and 19No receptors will receive a Neutral Effect. 1No receptor will receive a Moderate Beneficial Effect.

7.6.21 The sources of the Slight, Very Slight and Minimal Adverse effects relate to generally wide views of the existing quarry waste tip and boundary distinctive / minor views of Leapers Wood Quarry faces. It is noted that these views are generally from receptor locations that observe the quarry as part of a much wider panoramic view of which the quarry is a very small element. The actual deepening works will not be observed apart from the Back Lane and Leapers Lane Quarry viewpoint (Receptor No. 24). It is this receptor which is judged as receiving a Moderate Beneficial Level of Significance. This is because the location has been specifically created to view the quarry with permissive access. It is considered that receptors who visit this location wish to observe the quarry operations.

7.6.22 From a combination of desktop and site survey works and subsequent assessment it is determined that both the current Back Lane Quarry and the Proposed Development are very well screened within the landscape and its wider setting. The actual potential numbers of visual receptors of the site and proposed development is small. Those receptors with existing and potential views of the Proposed Development include residential, leisure, users of the local public rights of way and road network. The magnitude of effect these receptors receive from the existing quarry / Proposed Development i.e., the combined judgement about the size and scale of effect, the extent of the area over which it occurs, whether it is reversable or irreversible and whether it is short or long term in duration being a maximum of Very Low Adverse. The resulting Adverse Effect on receptors being a maximum of Slight Adverse. The reasons for this are principally that all proposed development works associated with this application are on existing disturbed quarry land / where quarry activities take place. In terms of the deepening of the base of extraction, the existing permitted quarry is already set down and screened within a void. Surrounding higher ground and landform features combine with western, eastern, and southern Site peripheral vegetation to also provide strong screening benefits. The screening benefits of the vegetation being maintained through both additional planting of native species with associated potential for Biodiversity Net Gain and a

commitment to a long-term Aftercare and Management Plan for vegetation within the site.

7.6.23 The Proposed Development is based upon both the retention and continuation of currently permitted on site activities and quarry elements and features in combination with the Proposed development. The assessed effects being a result of the actual visual disturbance and/or change and the increased amount of time associated with the application. If we had assessed the Proposed Development against the Current Situation or the Permitted Back Lane Quarry development (without the increase in time element), the change / effect of visual impact during the operational period would have been Neutral.

7.6.24 The assessed impact upon receptors Post Restoration again will be Neutral when compared to the Current Situation / Permitted scheme (without the increase in time element). Even with the increase in time to complete restoration it is still assessed that due to a combination of the very well screened existing quarry and proposed development that visual restoration benefits will be Neutral to Slight Beneficial.

7.7 Potential for Cumulative Landscape and Visual Effects

7.7.1 As required under EIA Regulations and requested by Lancashire County Council the potential for cumulative impacts has been considered. A definition of cumulative effects being: "the additional changes caused by a proposed development in conjunction with similar development, or as the combined effect of a set of development, taken together" (SNH,2012:4). Cumulative Landscape Effects being defined as effects that "can impact on either the physical fabric or character of the landscape, or any special values attached to it (SNH,2012:10).

7.7.2 In discussions with the client and the project coordinators it is considered that other sites of the same type of development located within the local landscape character setting are: Leapers Wood Quarry (located immediately north of the proposed Back Lane Quarry development), Dunald Mill Quarry (located ~0.5km south of Back Lane Quarry) and adjacent Breedon Carnforth Concrete Plant site / mothballed quarry off Long Dales Lane. Located ~9.2km north of Back Lane is Aggregate Industries Holme Park Quarry, and ~2.3km north is the restored Jackdaw Quarry which now operates as a Lodge Retreat and Diving Centre.

7.7.3 Other developments within the study area which could result in direct or indirect consequences in combination with the above at Back Lane Quarry proposed

development include the large scale industrial complex of Carnforth National Grid Compressor Station. The combined effects of all the past, present and future proposals have been considered. Specifically in respect of the Dunald Mill developments, Jackdaw Quarry Lodge Retreat and Holme Park Quarry, these are assessed as standalone / isolated development within the landscape with no intervisibility within the character areas to Back Lane. Leapers Wood Quarry is contained within the same landscape character land unit as Back Lane Quarry / the proposed development. Proposals for deepening are integrated and intertwined within the contained Site local character. Taking the above into consideration, and in accordance with paragraph 7.5 of GLVIA3, we assess that there will be No likely cumulative significant effects on landscape character receptors as a result of either impacts on the physical fabric of the landscape or the value attached to it, nor on the magnitude of effect of visual receptors.

7.8 Conclusions

7.8.1 The Proposed Development seeks permission to allow for the deepening of the existing Back Lane Quarry from 38mADO to -37mAOD. The proposals will result in the release of ~40mt of limestone, assuming joint working of the boundary between Back Lane and Leapers Wood Quarries. The proposed development will be completed and restored by 31st December 2078.

7.8.2 As stated, the nature of the application is principally for deepening the existing quarry and therefore the operational disturbance / effects of quarrying activities are already present in the landscape. These effects have been assessed and in essence there is a Neutral Change of levels of significance of effect, between the current situation / permitted scheme and the Proposed Development on both landscape character and visual receptors. What will change is the time element with development taking a further 29 years. The effects of this have been considered along with the potential for resulting cumulative impacts. The site is not located within a designated landscape e.g. National Park or National Landscape. It is, however, located approximately 1.8km to the south and east of Arnside / Silverdale National Landscape, and 1.7km to the west of the Forest of Bowland National Landscape. Given a combination of positioning and elevation there is opportunity for intervisibility between these designated areas and the site. Given the proposed deepening nature of the application together with intervening landform and vegetation structure it is assessed that the proposed development will not harm the setting of these National Landscapes.

7.8.3 In respect of Landscape Character, the quarry site is located within the Landscape Strategy for Lancashire – Landscape Character Assessment Character Area – 12a: Low Coastal Drumlins; Carnforth – Galgate – Cockerham, and partially within adjacent 13c: Drumlin Fields; Docker – Kellet – Lancaster LCA. Both the character areas are assessed as medium sensitivity to the type of Proposed Development (including existing quarry activities). It is assessed that during the extended operational period of the Proposed Development that the magnitude of effect will be medium. When combining the judgements on sensitivity and magnitude the resulting level of significance of effect is assessed as Moderate Adverse. This is not a significant level of effect.

7.8.4 At Post Restoration the proposed development will result in a landscape character which is the same / very similar to the permitted scheme. This will comprise a slightly larger waterbody, quarried faces and benches, retention of strong western, southern and eastern vegetation structure with calcareous grassland and minor areas of shallows. There may also be a future opportunity to utilise a flat platform, currently utilised by the blockworks, for leisure / recreational infrastructure. We therefore assess that at Post Restoration the proposed development will result in a Neutral Effect on landscape character compared to the permitted scheme.

7.8.5 Visually, the site is generally very discrete and not observed as a result of localised landform and topography and adjacent local woods / vegetation structure. The visual nature of the development will principally be deepening the existing quarry void.

7.8.6 It is assessed that no representative visual receptors will receive a Significant Adverse level of visual effects (i.e., a Severe, Major or Notable Effect) from the proposed development during its operational period. It is also assessed that no receptor will receive a Moderate Adverse effect.

7.8.7 During the operational stage it is assessed that 7No. receptors will receive a Slight Adverse Effect, 1No. receptor will receive a Very Slight Adverse Effect, 3No. receptors will receive a Minimal Adverse Effect and 19No. receptors will receive a Neutral Effect. 1No. receptor will receive a Moderate Beneficial Effect.

7.8.8 The main sources of the effects are the existing elevated quarry waste tip and minor disturbed faces of Back Lane Quarry. It is noted that potential receptors of these elements are generally from mid to longer distances. Views being panoramic of which the elements of Back Lane Quarry occupy a small visual proportion.

7.8.9 The potential for cumulative adverse effect has been considered in respect of the Proposed Development and other similar local quarries and large scale developments. Taking the above into consideration and in accordance with statutory receptors and good practice guidance we assess that there will be no likely cumulative significant effects on Landscape Character or visual receptors.

7.8.10 Baseline and assessment works have been carried out to provide information to address and comply with National and Lancashire Planning Policies and in conclusion, based upon landscape and visual grounds, the site is a good location for continued mineral extraction and will not result in any significant adverse impacts on landscape or visual receptors during the operational period. At final restoration and post restoration the scheme is considered to have a Neutral effect compared to the permitted scheme's baseline.

8 ECOLOGY AND BIODIVERSITY

8.1 Introduction

8.1.1 This chapter of the ES has been prepared to assess the impact of the proposed development on ecological features of value, including potential effects upon statutory and non-statutory designated sites, habitats of nature conservation interest, legally protected and notable species.

8.1.2 The chapter has been prepared with reference to the Chartered Institute of Ecology and Environmental Management's Ecological Impact Assessment Guidelines (CIEEM, 2018, updated 2022[1]). In accordance with this guidance, the chapter describes the assessment methodology; identifies the baseline conditions; the likely significant environmental effects; the mitigation measures required to prevent, reduce, or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

8.1.3 The site is located to the south-east of Carnforth, Lancashire, found at OS grid reference SD 51166 69137. The site is approximately 61.5 hectares (ha) in size and comprises active quarry, open mosaic habitat, woodland, plantation woodland, calcareous grassland, neutral grassland, bracken, waterbody, scrub, inland rock, hardstanding and scattered trees. The site was initially awarded The Wildlife Trust's 'Biodiversity Benchmark' standard in 2007/08 and has continued to do so on an annual basis.

8.1.4 The site is situated within a predominantly arable / agriculture pasture landscape, with Carnforth town to the north-west and Leapers Wood Quarry (an active limestone Quarry) to the north. The hedgerows were of local value, providing habitat links between woodlands and other semi-natural habitats. However, it is limited due to the M6, A601 (M) and B6254.

8.1.5 Public footpaths (1-22-FP5 and 1-24-FP7) run along part of the southern boundary and the eastern boundary of the existing quarry.

8.1.6 The proposed development includes both a deepening of the existing quarry to -37mAOD and a proposed extension of time for mineral extraction, which would result in the site being restored by 31st December 2078.

8.1.7 The baseline ecological surveys include fieldwork undertaken in 2021/2022. For

1 CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

specific information relating to the baseline information, including the detailed methods, results, mitigation and associated drawings, please see the Preliminary Ecological Appraisal and Breeding Bird Survey Report within Technical Appendix D.

8.2 Policy & Legislative Context

Legislative Context

Introduction

8.2.1 The relevant legislative context includes the following:

- The Conservation of Habitats & Species Regulations 2017[2];
- The EC Habitats Directive (Directive 92/43/EEC)[3] as translated into UK law by The Conservation of Habitat and Species Regulations 2017;
- The EC Birds Directive (Directive 79/409/EEC)[4]; as translated into UK law by The Conservation of Habitat and Species Regulations 2017;
- The Countryside and Rights of Way Act (CRoW) 2000;
- Wildlife and Countryside Act 1981 (as amended) (WCA)[5];
- The Environment Act 2021[6];
- Natural Environment and Rural Communities Act 2006 (NERC)[7];
- The Hedgerow Regulations 1997[8]; and
- The Protection of Badgers Act 1992[9].

Conservation of Habitats & Species Regulation 2017

8.2.2 The Conservation of Habitats & Species Regulations 2017 transposes the European Council Directive 92/43/EEC (EC Habitats Directive) into national law. The purpose of this legislation is to provide protection for natural habitats, wild flora and fauna of international importance. A number of species are afforded wide-ranging protection under Schedule 2 of the Regulations.

8.2.3 Part 2 of the Regulations affords protection to sites of International importance for habitats or species which rely on these habitats, such as: RAMSAR sites; SAC (Special Areas of Conservation), and SPA (Special Protection Areas). Part 3 of the Regulations provides protection for species (plant and animals) as listed on

2 HMSO. The Conservation of Habitats and Species Regulations 2017 – No.1012.

3 EC (1992) Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (The EC Habitats Directive)

4 EC (1979), Council Directive 79/409/EEC on the Conservation of wild birds (EC Birds Directive).

5 HMSO. The Wildlife and Countryside Act 1981 (as amended).

6 UK Government (2021). Environment Act 2021. [Online]. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

7 HMSO. (2006), Natural Environment and Rural Communities Act.

8 HMSO. The Hedgerows Regulations 1997.

9 HMSO. The Protection of Badgers Act 1992 (as amended).

Schedules 2 and 4 that are considered to be of importance. Part 5 of the Regulations provides a mechanism by which a licence can be obtained for operations that would otherwise be unlawful under the Regulations.

The Wildlife and Countryside Act 1981 (as amended)

8.2.4 The Wildlife and Countryside Act 1981 (as amended) provides special protection of selected species. Under Section 1(1) and 1(2), all British bird species, their nests and eggs (excluding some pest and game species) are protected from intentional killing, injury or damage. Under Sections 1(4) and 1(5), special penalties are applied to bird species included in Schedule 1 of the Act and protection is extended for these species to disturbance whilst building, in or near a nest and disturbance to dependent young. Schedule 5 provides special protection to animal species other than birds, which are protected through paragraph 9(4) of the Act, against damage to "any structure or place which any wild animal (included in the schedule) uses for shelter and protection" and against disturbance whilst in such places. The Countryside and Rights of Way Act 2000 (CRoW Act) amends Section 1(5) of the Wildlife and Countryside Act 1981 by introducing a new offence of "reckless" disturbance to protected wildlife and making certain offences punishable by imprisonment.

8.2.5 Invasive species are covered under Schedule 9 of the Act, which makes it illegal to spread any part of a listed plant. Part 2 of the Act provides protection for areas of the countryside recognised for their nature conservation or geological value, including Sites of Special Scientific Interest (SSSIs) and National Parks.

Natural Environment and Rural Communities (NERC) Act 2006

8.2.6 The NERC Act provides protection for habitats or species that are considered to be of principal importance to biodiversity. The legislation requires public authorities, including local planning authorities, to conserve biodiversity when exercising their functions. A list of habitats/species of principal importance, based on the former UK Biodiversity Action Plan (BAP) lists of priority habitats and species, have been produced by the Secretary of State in consultation with Natural England.

The Protection of Badgers Act 1992

8.2.7 The Protection of Badgers Act 1992 provides protection to badgers and their setts. This legislation is primarily concerned with animal welfare issues and the need to protect badgers from activities such as baiting and deliberate harm. The Act makes

it an offence to:

- Wilfully kill, injure, take, possess or cruelly ill-treat a badger (*Meles meles*), or attempt to do so; and
- to intentionally or recklessly interfere with a sett (this includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it).

The Hedgerow Regulations 1997

8.2.8 The Hedgerow Regulations make provision for the protection of important hedgerows in England and Wales. The Regulations apply to hedgerows described in Regulation 3 (in particular to hedgerows which are 20 metres or more long or which meet another hedgerow at each end and which, in each case, are on or adjacent to land used for certain specified purposes).

8.2.9 Before removing any hedgerow, including a stretch of hedgerow, to which these Regulations apply the owner (or in certain cases a relevant utility operator) must notify the local planning authority (Regulation 5). The hedgerow may then not be removed if the local planning authority serves a hedgerow retention notice, which may be done only if the hedgerow is important according to the criteria set out in Regulation 4 and Schedules 1 to 3. The requirement for the owner (or utility operator) to notify the local planning authority does not apply to the permitted work described in Regulation 6 (including for carrying out development for which planning permission has been granted or is deemed to have been granted).

The Environment Act 2021

8.2.10 An Act to make provision about targets, plans and policies for improving the natural environment; for statements and reports about environmental protection; for the Office for Environmental Protection; about waste and resource efficiency; about air quality; for the recall of products that fail to meet environmental standards; about water; about nature and biodiversity; for conservation covenants; about the regulation of chemicals; and for connected purposes (UK Government, 2021).

8.2.11 The Act also targets four key areas for the recovery of habitats. Additionally, it enables ministers to set legally binding long-term targets, the progress of which they are required to report to Parliament (UK Government, 2021).

8.2.12 Under the Act, all planning permissions granted in England (with some exemptions) will have to deliver at least 10% biodiversity net gain by 12th February 2024.

Transitional arrangements have been put in place which means that if planning permission was granted before 12 February 2024 (and that permission was not subject to BNG), then Section 73 applications would also be exempt from mandatory BNG requirements (GOV.UK, 2024).

Policy Context

Introduction

8.2.13 The Environmental Impact Assessment Directive (85/337/EEC) states that the direct and indirect effects of development should be assessed in terms of their impact on specific factors. Based on the factors identified in Article 3 of the EIA regulations, this ecology and biodiversity chapter assesses the direct and indirect effects of the proposal on species and habitats.

8.2.14 The development plan contains policies and text concerning ecological impact issues in connection with development proposals. In particular:

- National Planning Policy (NPPF) (revised December 2023) – Sections 15 and 17;
- Planning Practice Guidance (related to minerals, adopted in 2014);
- The Town and Country Planning Act (1990) – Section 62 and 73;
- Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD (Adopted February 2009);
- Joint Lancashire Minerals and Waste Local Plan – Site Allocation and Development Management Policies (Adopted September 2013);
- Lancaster Local Plan Part One: Strategic Policies & Land Allocations DPD (Adopted July 2020); and
- Lancaster Local Plan Part One: Strategic Policies & Land Allocations DPD (Adopted July 2020).

8.2.15 A full breakdown of the aforementioned policies can be found within the below Policy Audit. These policies are consistent with the advice in NPPF to protect, maintain and enhance nature conservation and biodiversity. The policies seek to protect species and habitats and, through restoration, provide replacement and enhanced habitats.

National Planning Policy Framework

8.2.16 In relation to biodiversity, NPPF (2023) paragraph 180 states that 'Planning policies and decisions should contribute to and enhance the natural and local environment

by:

a) *protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*

b) *recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*

c) *maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*

d) *minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures'.*

e) *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. 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; and*

f) *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

8.2.17 NPPF paragraph 186 advises that the following principles should be applied by the Local Planning Authority when determining planning applications:

a) *if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*

b) *development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site*

that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

c) *development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and*

d) *development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.*

Local Policy

8.2.18 Relevant local policies and text concerning ecological impact issues in connection with development proposals, include:

- Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD (Adopted February 2009) [10];
- Joint Lancashire Minerals and Waste Local Plan – Site Allocation and Development Management Policies (Adopted September 2013) [11];
- Lancaster Local Plan Part One: Strategic Policies & Land Allocations DPD (Adopted July 2020) [12]; and
- Lancaster Local Plan Part One: Strategic Policies & Land Allocations DPD (Adopted July 2020) [13].

8.2.19 A summary of local policies that are relevant to this application can be found below. These policies are consistent with the advice in NPPF to protect, maintain and enhance nature conservation and biodiversity. The policies seek to protect species and habitats and, through restoration, provide replacement and enhanced habitats.

Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD

8.2.20 To guide the vision, the local council have identified a number of core objectives,

10 https://www.lancashire.gov.uk/media/191785/CORE.pdf (part1)
https://www.lancashire.gov.uk/media/191788/CORE2.pdf (part 2)
11 https://www.lancashire.gov.uk/media/228119/Local-Plan-Part-One-website-1-.pdf (part 1)
https://www.lancashire.gov.uk/media/228122/Local-Plan-Part-Two-3-.pdf (part 2)
12 https://www.lancaster.gov.uk/assets/attach/7739/SPLA-DPD-July-2020.pdf
13 https://www.lancaster.gov.uk/assets/attach/7740/DM-DPD-July-2020.pdf

the most relevant being:

- Objective 5: To support high standards of working practices and environmental protection and take an integrated and innovative approach to enhancing the quality of land and our landscapes during extraction and in restoration for beneficial after-use, including potential benefits to biodiversity, amenity and access to the countryside.

8.2.21 Under Policy CS5 'Achieving sustainable minerals production' and CS9 'Achieving sustainable waste management', proposals should ensure that:

- Our natural resources including water, air, soil and biodiversity are protected from harm and opportunities are taken to enhance them; and
- Sensitive environmental restoration and aftercare of sites takes place, appropriate to the landscape character of the locality and the delivery of national and local biodiversity action plans. Where appropriate, this will include improvements to public access to the former workings to realise their amenity value.

Joint Lancashire Minerals and Waste Local Plan – Site Allocation and Development Management Policies

8.2.22 Policy DM2 (Development Management) sets out the parameters for minerals and waste management operations. Minerals and waste developments will be supported that can demonstrate a positive contribution to the:

- Biodiversity, geodiversity and landscape character; and
- Reduction of carbon emissions.

8.2.23 Policy DM3 (Planning Obligations) where planning obligations are required to make a development acceptable in terms of its social, economic and environmental impacts, the MPA / WPA will seek to ensure the provision of, where appropriate:

- Long term aftercare or management; and
- Compensatory provision elsewhere for ecological mitigation.

Lancaster Local Plan Part One: Strategic Policies & Land Allocations DPD

8.2.24 Policy SP8 (Protecting the Natural Environment) seeks to ensure that the natural environment is protected, in particular biodiversity and geodiversity. Development should address any potential flood risk issues, taking into consideration the effects of climate change. The district's biodiversity and geodiversity should be maintained

and enhanced through the appropriate location of uses, sympathetic design, sustainable construction techniques and appropriate mitigation measures.

Lancaster Local Plan Part One: Strategic Policies & Land Allocations DPD

8.2.25 Policy DM44 (The Protection and Enhancement of Biodiversity) requires proposals to protect and enhance biodiversity and/or geodiversity and minimise both direct and indirect impacts. Where possible, a net gain of biodiversity assets should be delivered. Where harm is identified, developers must demonstrate how the harm will be mitigated or compensated for in line with the mitigation hierarchy.

8.2.26 Developments affecting environmentally sensitive sites and species will not be permitted where there is an adverse effect, unless the benefits of the proposal outweigh the potential adverse effects. If the adverse effects are unavoidable a development proposal will be required to demonstrate that:

- Adverse effects are minimised;
- Provision is made for mitigation and compensation measures, such as on-site landscape works, off-site habitat creation, species relocation and ongoing management as appropriate, such that there is a clear net gain for biodiversity; and
- The biodiversity value of the site is not compromised, both on its own and as part of the wider network of sites.

Biodiversity Benchmark

8.2.27 The site has achieved The Wildlife Trusts standard of 'Biodiversity Benchmark', a standard that certifies management of a business landholdings for wildlife. Biodiversity Benchmark complements existing environmental management systems such as ISO14001 and EMAS by fully integrating biodiversity into the systems and operations of an organization.

8.2.28 Biodiversity Benchmark refers to a standard or goal that aims to preserve, conserve, and enhance natural biodiversity. It is a set of quantitative and qualitative measures that evaluate the health and abundance of different species, ecosystems, and habitats. Biodiversity benchmarks are used to establish performance targets and monitor progress towards biodiversity goals. These benchmarks are crucial in establishing a baseline for biodiversity conservation efforts and measuring the effectiveness of conservation interventions. In setting biodiversity benchmarks, factors such as the number of species, genetic diversity, and ecosystem functioning

are considered to ensure the long-term sustainability of biodiversity. See Wildlife Trust (2018) for full detailed requirements to achieve Biodiversity Benchmark.

8.3 Methodology and Scope

Introduction

8.3.1 This assessment has been undertaken in accordance with the latest CIEEM guidelines (CIEEM, 2018). Baseline information and potential impacts have been quantified as far as practical to inform the assessment, supported by professional judgement and experience as appropriate. Where uncertainties exist, a precautionary approach has been adopted and a 'worse case' scenario approach assumed for the purposes of assessing impacts and recommending mitigation.

8.3.2 The significance of ecological impacts in relation to a proposal has been considered in relation to the value/importance of affected ecological features and the predicted magnitude of impact upon them.

8.3.3 The assessment considers all activities associated with the operational and restoration phases of the scheme that are likely to have direct, indirect or cumulative impacts on ecological features (designated sites, habitats and species). This assessment is informed by a suite of ecological surveys that were undertaken in 2021 and 2022, comprising a Preliminary Ecological Appraisal (PEA) and breeding bird surveys. These were undertaken by South Lakes Ecology.

Zone of Influence

8.3.4 The CIEEM guidelines require the identification of a 'zone of influence' (ZoI). This is defined as the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries.

8.3.5 The ZoI for the proposed development considers the following:

- All ecological features occurring within the area to be worked will be affected by changes in land cover caused by vegetation clearance and soil stripping (and associated mounds if placed into storage), excavation and then restoration;
- Noise, dust and changes in human activity associated with the quarrying operations may also affect species in adjacent habitats;
- Dewatering operations may have consequences for water-dependent

habitats and species in the surrounding area;

- The proposed extension of time for the quarry will utilise existing infrastructure (for example access and processing plant) which limits the potential consequences for ecological features from this aspect of the proposals; and
- Consideration of the project in relation to more mobile species, populations and breeding territories (such as birds).

8.3.6 Specific study areas were identified for the desk study and baseline field surveys to inform the valuation of ecological features and the selection of 'key' ecological features material to the assessment.

Desk Study

8.3.7 A desktop study has been undertaken to identify the presence of sensitive ecological receptors at the site and within the surrounding area. Data has been obtained from a range of information sources including:

- Natural England and JNCC websites were used to obtain information regarding the statutory and non-statutory conservation designations within the area; and
- Lancashire Environmental Records Network (LERN) provide further background ecological data for the area, including records for protected species and biological Heritage Sites.

8.3.8 Further inspection of previous survey reports, colour 1:25,000 OS base maps and aerial photographs from Google Earth has also been completed to provide additional context and identify any features of potential importance for nature conservation.

8.3.9 Further consideration of potential zones of influence in relation to statutory designated sites of International and National importance has been carried out. This was through Natural England's SSSI Impact Risk Zone Tool [14] which outlines the likely zone of influence from impacts from a range of development types.

Phase 1 Habitat Survey

8.3.10 As a result of the Preliminary Ecological Appraisal undertaken on the 20th April 2021 and updated survey and Habitat Condition Assessment carried out on 12th

14 https://data.gov.uk/dataset/5ae2af0c-1363-4d40-9d1a-e5a1381449f8/sssi-impact-risk-zones

September 2022 (Technical Appendix D), and in conjunction with current guidance, further detailed surveys were undertaken to assess the likely presence, or otherwise, of protected species including breeding birds.

8.3.11 Where available, all surveys were undertaken following methodologies published in guidelines accepted by statutory and non-statutory agencies, including Natural England and CIEEM. Details of the surveys undertaken, the methodologies used and full results are included in Technical Appendix D of this ES.

8.3.12 The area was surveyed and the habitats within the study area were described and mapped using the standard UK Habitats Classification methodology (UKHab, 2020). The professional edition of the UKHab guidance was followed, and habitats classes to level 5 of the hierarchy were applicable. The minimum mappable unit was 25m², with target notes used to describe smaller features.

8.3.13 Habitats present within the management boundary of the quarry were also assessed for their condition following guidance outlined in DEFRA's biodiversity metric 3.1 (April 2022), and woodland specific guidance from EWBG (England Woodland Biodiversity Group).

Great Crested Newts Surveys

Habitat Suitability Index

8.3.14 Ponds within 500m of the site boundary were assessed for their suitability to support Great Crested Newts, following the methods detailed by Oldham et al. (2000). Additionally, an assessment of the quality of the habitat for foraging and potential hibernation sites was undertaken following the guidance published in the 'Herpetofauna Workers Manual' (Gent and Gibson, 2003).

Reptile Surveys

8.3.15 The site was assessed for its potential to support reptiles such as common lizard, slow-worm and adder, following guidance issued in the 'Herpetofauna Workers Manual' (Gent and Gibson, 2003).

Bats

8.3.16 The site was assessed for its suitability for roosting, foraging and commuting bats. Trees, buildings and other structures were assessed for their likelihood of supporting roosting and/or hibernating bats. Additionally, topographical features of interest to foraging and commuting bats were noted. The assessment was

undertaken following methods described in the Bat Workers Manual (Mitchell-Jones and McLeish, 2004).

Terrestrial Mammals

8.3.17 The site was assessed for the potential to support other protected terrestrial mammals, notably badger (*Meles meles*), following appropriate guidance (Harris, Cresswell and Jefferies, 1989). Evidence of activity such as setts, paths, latrines, droppings / spraints and feeding signs were noted.

Birds

8.3.18 The site was assessed for its potential to support notable bird species, or important assemblages of wintering or passage birds. In particular, the habitats on site were assessed for their potential and likelihood to support cliff breeding birds, and any evidence / sightings noted.

Breeding Birds

8.3.19 To provide a reasonable level of accuracy for determining the population of breeding birds within the survey area, four surveys were undertaken between April 2021 and June 2022. The surveys were conducted by South Lakes Ecology.

8.3.20 The survey methodology employed was broadly based on that of territory mapping as used for the British Trust for Ornithology (BTO) Common Bird Census (CBC). Standard BTO species codes and symbols for bird activities were used to identify birds, and denote activity, sex, and age where appropriate. Dates and weather conditions of the surveys can be found in Table 8.1.

Date	Start Time	Finish Time	Cloud Cover (Octares)	Rain	Wind (Beaufort Scale)	Temperature (°C)
29/04/2022	06:00	08:45	0/8	0	0	1°C – 7°C
24/05/2022	05:40	09:10	7/8	Few light showers	2 – 3	7°C – 12°C
07/06/2022	05:45	09:15	0/8	0	0	8°C – 14°C
22/06/2022	05:35	09:00	0/8	0	1	13°C – 16°C

Table 8.1: Dates and weather conditions of breeding bird surveys

8.3.21 The full methodology for the breeding bird survey can be found within Technical Appendix D.

Other Species

8.3.22 Presence of and potential for other protected and/or notable species was recorded.

8.3.23 Potential of the site to support important invertebrate assemblages was inferred from habitat quality, and any sightings recorded.

Invasive Species

8.3.24 The presence of any invasive species within the site boundary was recorded and mapped.

Impact Assessment Process

8.3.25 The impact assessment process involves:

- Identifying and characterising impacts;
- Incorporating measures to avoid and mitigate (reduce) these impacts;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

8.3.26 The starting point for the assessment of impacts is to determine the value of ecological features and, as such, which should be subject to detailed assessment. Ecological features can be important for a variety of reasons, for example, the quality of designated sites or habitats, habitat / species rarity, or their rate of decline (CIEEM, 2018/2022).

Determining Importance

8.3.27 CIEEM have identified various characteristics that can be used to identify ecological features or features likely to be important in terms of biodiversity. These include:

- Animal or plant species that are rare or uncommon, either internationally, nationally or more locally;
- Ecosystems and their component parts, which provide the habitats required by the above species, populations and/or assemblages;
- Endemic species or locally distinct sub-populations of a species;

- Habitat diversity, connectivity and or/synergistic associations (e.g. networks of hedgerows and areas of species-rich pasture that provide important feeding habitat for a rare species such as greater horseshoe bat);
- Notably large populations of animals or concentrations of animals considered uncommon or threatened in a wider context;
- Plant communities (and their associated animals) that are considered to be typical valued natural/semi-natural vegetation types – these will include examples of natural species-poor communities;
- Species on the edge on their range, particularly where their distribution is changing as a result of global trends and climate change;
- Species-rich assemblages of plants and animals; and
- Typical faunal assemblages that are characteristic of homogenous habitats.

8.3.28 Once an ecological feature has been identified as being important, guidelines promote the use of characterising this feature with the relevant geographic frame of reference. This allows the scale of significance of effects to be presented in a meaningful way and provides a focus of maintaining a feature at an appropriate scale. Table 8.2 below gives examples of how a particular feature might be given a particular geographic frame of reference, however, the examples given should be considered a guide and the specific feature should be considered in context.

Geographic Scale of Reference	Examples
International	An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, pSAC, Ramsar site, Biogenetic Reserve) or an area which meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified. A viable area of a habitat type listed in Annex I of the Habitats Directive or smaller areas of such habitat which are essential to maintain the viability of a larger whole. Any regularly occurring population of an internationally important species, which is threatened or rare in the UK (i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK) or of uncertain conservation status or of global conservation concern. Any regularly occurring, nationally significant population/number of any internationally important species.
National	A nationally designated site (SSSI, NNR, Marine Nature Reserve) or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified. Any regularly occurring population of a nationally important species which is

Geographic Scale of Reference	Examples
	threatened or rare in the region or county (local BAP). A regularly occurring, regionally or county significant population/number or any nationally important species.
Regional	Viable areas of key habitat identified as being of Regional value in the appropriate Natural Area profile. Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK, or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation. A regularly occurring, locally significant number of a regionally important species. Sites which exceed the County-level designations but fall short of SSSI selection guidelines, where these occur.
County [15]	Semi-natural ancient woodland greater than 0.25ha. County sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves and Local Wildlife Sites selected on County ecological criteria (County sites will often have been identified in local plans). A viable area of a priority habitat identified as a habitat of Principal Importance or smaller areas of such habitat which are essential to maintain the viability of a larger whole. A viable area of habitat identified in a County BAP or any regularly occurring, locally significant population of a species which is listed in a County level "red data book" or BAP on account of its regional rarity or localisation. A regularly occurring, locally significant number of a County important species.
Local	Semi-natural ancient woodland smaller than 0.25 ha or replanted Ancient Woodland (PAWS). Areas of habitat identified in a local BAP or in the relevant Natural Area profile. County sites that no longer meet the published ecological selection criteria for designation, including Local Nature Reserves selected on county ecological criteria (County sites, where they exist, will often have been identified in local plans). Sites/features that are scarce within the county or which appreciably enrich the county habitat resource. A diverse and/or ecologically valuable hedgerow network, which may not qualify as being of County BAP quality. A regularly occurring, significant number of a locally important (BAP) species during a critical phase of its life cycle. Areas of habitat considered to appreciably enrich the habitat resource within the context of the local area.

Table 8.2: Geographic frame and reference

15 County hereafter also includes, Metropolitan, District, Borough or City (usually defined by the Local Planning Authority or council area)

8.3.29 If an ecological feature is considered to be important at a negligible or site level only, then the proposed development is not anticipated to have an effect that would be of relevance to the decision maker in terms of the EIA Regulations. Exceptions to this would be if the species, population or habitat in question was identified as having a high social or economic value or if they are afforded legal protection. While the assessment does include protected species that receive statutory protection and are of material consideration at the local level, the presence of such a species does not necessarily infer value in relation to the proposed scheme but only to the level of protection it receives.

8.3.30 As such, the value of the proposed scheme for protected species is considered by the specific ecological feature, taking into account the level of activity, the level of protection it receives and the overall value of habitat to that species within the Site.

Determining Impacts and Effects

8.3.31 The CIEEM guidelines (CIEEM, 2018/2022), define an impact as an influence on an ecological feature. The effect is the outcome of the influence on the ecological feature. As part of the EcIA it is important to assess whether or not an impact is defined as an effect (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of a habitat or species within a given geographical area.

8.3.32 Impacts should be identified and understood to be able to determine the likely effect (consequence) of that impact in relation to the ecological feature.

8.3.33 As part of the process of determining whether there is likely to be an effect on the status of an ecological feature, the following questions are considered:

- Will any site/ecosystem process be removed or changed?
- What will be the effect on the nature, extent, structure and function of component habitats?
- What will be the effect on the average population size and viability of the component species?

8.3.34 A description of parameters that are considered when assessing the degree and type of change are detailed in Table 8.3 below.

Parameter for describing impacts on ecological structure and function	Definition of the parameter
Positive or Negative	Whether the impact has a positive or adverse effect
Extent	The area of which the effect occurs
Magnitude	The size or amount of an effect
Duration	The time for which the effect is predicted to last prior to recovery or replacement of the resource or feature
Reversibility	Whether the effect is permanent (i.e. irreversible) or temporary (i.e. reversible)
Timing and Frequency	How often the effect occurs (e.g. repeated noise from piling work) and when it occurs (e.g. vegetation clearance undertaken outside of the bird breeding season.

Table 8.3: Parameters used to describe effects

8.3.35 In addition to considering the effect on the ecological feature, an assessment of the significance of the residual effect (for the type/nature of change), is provided in Table 8.4 and described with an indication of likelihood.

Impact Classification	Explanation
Significant Adverse Effect	Likely to create a significant negative effect, including loss, or long-term or irreversible damage on the status of the ecological feature.
Not Significant Adverse Effect	Likely to create a negative effect without causing long-term or irreversible damage to the status of the ecological feature.
Neutral	Effects are either absent or such that there is no overall net change to the ecological feature.
Not Significant Positive Effect	Likely to create a beneficial effect on an ecological feature or providing a new lower value ecological feature without improving its conservation status.
Significant Positive Effect	The activity is likely to create a significant beneficial effect, including long-term enhancement and favourable conditions for an existing ecological feature.

Table 8.4: Classification of the significance of the effects

8.3.36 Once an effect is considered to be significant, then the scale of effect is assessed on a geographical scale (i.e. international, national, regional, district, etc.), see Table 8.2 above for details. For example, the effect may not be significant at a county scale, but significant at a more local scale.

Mitigation, Compensation and Enhancement

8.3.37 For the purpose of the ES chapter, impacts on ecological features are generally assessed without mitigation in place. Although, in some situations, it is impossible to separate the mitigation as this is embedded into the scheme. In these situations, it will be acknowledged and just the residual effects considered.

8.3.38 Mitigation or compensation is given for significant effects on features of nature conservation importance. In line with current CIEEM guidelines, the mitigation proposals for the proposed development should aim to:

- Avoid negative ecological effects – especially those that could be significant;
- Reduce negative effects that cannot be avoided; and
- Compensate for any remaining significant ecological effects.

8.3.39 Mitigation measures and compensation within this scheme are heavily intertwined as a result of good site design.

Limitations

8.3.40 The desk study data is third party controlled data, purchased for the purposes of this report only. Heatons cannot vouch for its accuracy and cannot be held liable for any error(s) in these data.

8.3.41 Each survey visit may only reveal a small sample of the population, and the proportion of animals available for survey varies according to weather, migration patterns, etc.

8.3.42 Lack of evidence of a species during a survey does not necessarily preclude it from colonising a site at a later date. For example, badgers are mobile species and may extend territories to occupy adjacent land if it vacant and suitable and the activity level of the identified setts may fluctuate during the year. A survey may only provide a 'snapshot' of the conditions prevailing at the time of the survey.

8.3.43 A summary of ecological constraints and limitations for each survey type undertaken at Back Lane Quarry is detailed in Table 8.5.

Survey	Ecological Constraint and Limitations
PEA	The initial Phase 1 Habitat Survey was undertaken during April 2021, which is within the optimal period for this survey type. However, it was mentioned within the limitations of the PEA report (see Technical Appendix D) that the time of year was not ideal for assessing botanical quality of grasslands, as many plants had just come into leaf which made it difficult to identify species of interest. Woodland ground flora were easier to identify as they were in full flower. Pedestrian access was only permitted outside the main working area of the quarry. Access was limited to the public in Kit Bill, Helk Woods and adjacent habitat as deer fencing has been erected alongside the path to the west. Therefore, binoculars were used to assess the habitats beyond the deer fence. Where habitats could not be directly accessed, other sources of information (previous surveys, reports, etc.) were used to guide the mapping. It is possible that small areas (less than the minimal mapping unit of 25m²) may have been missed, but overall these constraints were not considered to have impacted the conclusions of the PEA report.
Breeding Birds	The bird nesting season had just started, but due to the cool spring many migrant birds had not yet arrived on breeding territory. The likelihood of notable breeding birds being present on the site was inferred from the habitat. The second survey (September 2021) was carried out in warm, calm and wet conditions – and was less suitable for wildlife sightings. The bird nesting season had finished; however, the botanical quality of grasslands was more evident than in the April survey. Weather conditions were suitable during all surveys, and thus it is unlikely that any important breeding species were missed as a consequence of bad weather. A weakness of the methodology is the tendency for inconspicuous, shy and quieter species (for example dunnock *Prunella modularis*) to be under-recorded. Conversely, numbers of species with large territories (for example woodpigeon *Columba palumbus*, carrion crow *Corvus corone* and magpie *Pica pica*) may have been over-recorded as a consequence of double-counting as individuals moved across the site during the survey period. Additionally, the survey method used for the breeding bird surveys concentrated on the dawn period and, therefore, may have missed more nocturnal species, such as owls and woodcock *Scolopax rusticola*.

Table 8.5: Ecological constraints and limitations for each survey undertaken on site

8.4 Baseline Conditions

Designated Sites

8.4.1 There were five international statutory designated sites (Natura 2000 sites) for nature conservation within 10km of the site boundary, the closest being Morecambe Bay (Special Area of Conservation (SAC), Special Protection Areas (SPA), RAMSAR and Sites of Special Scientific Interest (SSSI)) which is located approximately 2.3km to the west of the site boundary. The conservation value of these sites is assessed as being of **International** importance.

8.4.2 10 statutory designated sites were within 5km of the site boundary, the closest being Thwaite House SSSI which is approximately 900m to the west of the site boundary. The conservation value of these sites is assessed as being of **National** importance.

8.4.3 26 non-statutory designated sites (Biological Heritage Sites (BHS)) were located within the 2km search radius of the site, of which 21 were located within 1km. Helks Wood, Kit Bill Wood, Long Riddings Wood and Hawthorns Rocks were all located within the site boundary, with the next nearest being Helks Wodd Farm Pasture being adjacent to the site. The conservation value of these areas is assessed as being of **County** importance.

8.4.4 A summary of the above sites is provided in Table 8.6 below.

Site name	Designation	Interest Features	Distance from site boundary
International Statutory Designated Sites			
Morecambe Bay	SAC, SPA, RAMSAR, SSSI	One of the two largest intertidal estuarine flats in Britain. The saltmarshes have diverse vegetation, supporting number of rare and uncommon plants. The estuarine system of flats and marshes is dynamic with shifting channels and phases of erosion and accretion. On the northern and eastern sides of the Bay sand flats were bordered by extensive areas of saltmarsh which were covered only by the highest tides. International significance for wintering wading birds and national significance for wintering wildfowl.	2.3km west
Leighton Moss	SPA, RAMSAR, SSSI	The largest reedbed in north-west England. Large areas of open water were surrounded by extensive reedbeds in which areas of willow scrub and mixed fen vegetation also occur. A typical and varied fen flora has developed in part, whilst the reedbed shows all stages of seral transition from open water through to woodland.	5km north-west
Morecambe Bay Pavements	SAC	The general character of the area includes: • Inland water bodies (Standing water, Running water); • Bogs, Marshes, Water fringed vegetation, Fens;	5km north-west

Site name	Designation	Interest Features	Distance from site boundary
		• Heath, Scrub, Maquis and Garrigue, Phygrana; • Dry grassland, Steppes; • Broad-leaved deciduous woodland; • Coniferous woodland; and • Inland rocks, Screes, Sands, Permanent Snow and ice.	
Calf Hill and Cragg Woods	SAC	The general character of the area includes: • Broad-leaved deciduous woodland; and • Coniferous woodland.	7.1km south-east
Bowland Fells	SPA	The area supports the largest expanse of blanket bog and heather moorland in Lancashire. International significance for breeding birds.	7.4km to the south-east
Statutory Designated Sites			
Thwaite House Moss	SSSI	The area is a nationally important mosaic of fen habitats, comprising semi-natural fen woodland (displaying transitional succession), species-rich fen meadow and tall-herb fen.	900m west
Crag Bank	SSSI	The area comprised boulder clay ridges and marshy grassland on calcareous peaty soil. The area contains two nationally rare communities and several species which area rare or limited in Lancashire. The area is poorly drained. The area is intersected by a shallow watercourse (the Black Dike). Other habitats found included purple moor-grass.	1.5km west
Morecambe Bay	SAC, SPA, SSSI, Ramsar	Mentioned above.	2.3km west
Warton Crag	SSSI, LNR	The area support best example of limestone grassland in Lancashire, other habitats include limestone pavement, calcareous woodland, neutral grassland. British Red Data Book vascular plant species.	3km north-west
Warton Crag Quarry	LNR	Botanical and butterflies	3km
Burton Wood	SSSI	The area contains good example of deciduous woodland types.	3.2km
Leigthon Moss	SAC, SSSI	Mentioned above.	5km
Cringlebarrow and Deepdale	SSSI	The area consists of calcareous hazel-ash woodland and sessile oak-ash-lime woodland.	5km

Non-statutory Designated Sites			
Helks Wood	BHS	Comprises small semi-natural ancient woodland on limestone. An area of limestone pavement is also found here.	Within site
Kit Bill Wood	BHS	Comprises semi-natural ancient woodland on limestone.	Within site
Long Riddings Wood	BHS	Comprises semi-natural ancient woodland and an active limestone quarry.	Within site
Hawthorns Rocks	BHS	Comprises small area of species-rich semi-natural limestone grassland pasture on limestone outcrops.	Within site
Helks Wood Farm Pasture	BHS	Comprises a field of permanent species-rich limestone grassland pasture lying on limestone. A small area of pasture with limestone crags is also found here.	Adjacent to eastern boundary
Leapers Wood, Bowman Stout Wood and Slacks Wood	BHS	Comprises semi-natural ancient woodland on limestone. An area of limestone pavement is also found here.	200m north
Lundsfield Quarry Central	BHS	Comprises an area of disused sand and gravel workings. The land has colonised slowly by natural regeneration and now supports a complex mosaic of habitats including species-rich grassland, wetland, open ground, scrub and scattered trees. Additional habitats include verge, hedgebank and hedgerows.	250m west
Long Dales Lane Fields	BHS	Comprises a group of fields managed as permanent pasture with hedgerows and scattered trees, where underlying limestone is exposed both as natural outcrops and as a result of former quarrying. A mosaic of neutral grassland with species-rich calcareous grassland occurs.	300m south
Limestone Pavement and Crags, South of Cocks Wood	BHS	Comprises small area of limestone pavement and crags situated in a field adjoining Cock's Wood. A field is also situated here, which is managed as pasture and most of the grassland is improved.	400m east
Kellet Road Verges	BHS	Comprises species-rich roadside verges on either side of Kellet Road bridge across the M6.	500m north
Whorley's Moss	BHS	Comprises of small alder-carr woodland that has developed from a former mossland.	500m south
Cock's Wood	BHS	Comprises a semi-natural woodland which supports a rich herb layer including many species indicative of ancient woodland	500m north
Over Kellet Crags	BHS	Comprises a pond and surrounding habitat, including tall-herb fen vegetation	700m east

Non-statutory Designated Sites			
Lancaster Canal	BHS	Comprises entire length of the Lancaster Canal. The canal is the largest and most species-rich waterbody in the county. Supporting a very rich assemblage of plants and animals characteristic of slow-flowing waterbodies	700m west
Dunald Mill Crags	BHS	Comprises small area of ancient semi-natural limestone grassland associated with a linear outcrop of partially exposed limestone	750m south
Intack Wood	BHS	Comprises small, wet, semi-natural woodland with a stream and numerous small pools	750m south
Lundsfield Quarry North	BHS	Habitat mosaic	750m west
Over Kellet Pond	BHS	Comprises limestone pavement, crags and rock outcrops together with associated grassland, trees and shrubs. The grassland includes a mosaic of neutral grassland and semi-natural calcareous grassland.	800m east
Dunald Mill Hole	BHS	Comprises small linear species-rich neutral grassland field, bisected by a flowing stream. Other habitats found included trees and scrub	800m east
Swantley	BHS	Comprises west facing limestone cliff and disjunct limestone outcrops with some ancient semi-natural limestone grassland, together with a band of acidic sandstone outcrops	800m south
Lundsfield Quarry South	BHS	Habitat Mosaic	800m West
Thwaite End Pasture	BHS	Comprises pasture of semi-natural neutral grassland supporting a rich diversity of grasses, sedges and herbs, indicative of traditional, low intensive management. A stream and a wooded bank provide additional interest	1.3km to the west
Steamtown	BHS	Comprises of semi-natural calcareous and neutral grassland situated alongside old railway tracks. The area supports an exceptionally rich flora with a high diversity of species, many typical of calcareous conditions	1.4km to the west
Carnforth Ironworks	BHS	Comprises slag heaps from the former Carnforth Ironworks and similar habitat alongside the adjoining railway. Areas of species-rich grassland were present on the banks and ridges in glades amidst stands of dense scrub and trees	1.4km to the north-west
Crawstone Wood	BHS	Comprises mainly semi-natural woodland. The ground flora comprises some ancient woodland indicator species	1.7km to the south-west
Hawksheads Woodlands	BHS	Comprises of a large secondary woodland with a shrub layer and ground flora which comprises some ancient woodland indicator species	1.7km to the south-west

Table 8.6: Summary of Designated Sites within the 2km Search Radius

SSSI Impact Risk Zone

8.4.5 MAGIC search identified that the site falls within the SSSI Impact Risk Zone (IRZ) for four SSSI sites, including Thwaite House Moss SSSI (900m to the west), Crag Bank SSSI (1.5km to the west), Morecambe Bay SSSI (2.3km to the west) and Warton Crag SSSI (3km to the north-west). The risk zone citations notes that further consultation with Natural England is required if any development falls within the category minerals, oil or gas and air pollution.

Priority Habitats

8.4.6 The following areas of priority habitat were returned within the 2km search radius, see Table 8.7.

Habitat type	Closest distance to site
Open Habitat Mosaic	Located within the site boundary
Deciduous Woodland	Located within the site boundary
Good Quality Semi-Improved Grassland	Located within the site boundary
Ancient Semi-Natural Woodland	Located within the site boundary
Limestone Pavement	60m to the south
Ancient Replanted Woodland	230m to the north
Traditional Orchard	400m to the north
Lowland Fens	530m to the south-west
Reedbeds	690m to the west
Lowland Calcareous Grassland	770m to the north-east
Lowland Meadows	940m to the south-west
Coastal and Floodplain Grazing Marsh	1.5km to the west

Table 8.7: Summary of the priority habitats within the 2km search radius

8.4.7 The conservation value for all seven traditional orchard sites is assessed as **National** Importance.

Habitats

8.4.8 This section details the major habitats with the site boundary, following UKHab methodology. Table 8.8 below provides the areas of each habitat present within the site boundary.

Habitat Type	Area (Hectares) / Length (Kilometres)
Main Habitat	
Active Quarry	39.24 ha
Lowland Mixed Deciduous Woodland	11.26 ha
Mixed Plantation Woodland	5.26 ha
Dense / Continuous Scrub	0.26 ha
Dense Bracken	0.03 ha
Calcareous Grassland	0.85 ha
Neutral Grassland	0.39 ha
Open Mosaic Habitat	2.13 ha
Inland Rock and Scree	1.1 ha
Hard Standing	2.53 ha
Standing Open Water	0.13 ha
Modified Grassland	4.2 ha
Linear Habitat	
Line of Trees	0.38 km

Table 8.8: Area / length of each habitat present within the site (based on 2022 PEA)

Active Quarry

8.4.9 Back Lane Quarry dominates the site and comprises predominantly bare ground with scattered mounds of material. Within the quarry area, there were site offices and transportation routes which bisect throughout.

8.4.10 The conservation value of the quarry is assessed as **Negligible** importance.

Lowland Mixed Deciduous Woodland

8.4.11 This habitat dominates the periphery of the quarry. Canopy species were predominantly ash (*Fraxinus excelsior*) and sycamore (*Acer pseudoplatanus*) with wych elm (*Ulmus glabra)*, beech (*Fagus sylvatica*), oak species (*Quercus spp.*), small-leaved lime (*Tilia cordata*) and birch species (*Betula spp.*). Shrub species include hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), elder (*Sambucus nigra*), crab apple (*Malus sylvestris*) and hazel (*Corylus avellana*) in varying proportions. These areas have a mixture of ages of trees, with some

regeneration – though mostly of sycamore and ash. There were no truly veteran trees, with one found to have veteran features – providing features suitable for hole nesting birds and roosting bats. There is fallen and standing deadwood present and sites appear to be lightly managed.

8.4.12 There were three areas of ancient woodland (Helks Wood, Kit Bill Wood and Long Riddings Wood – all of which were listed as sites of local interest – BHS). There is also a remnant section of semi-natural woodland to the south of the concrete block plant, and several areas of self-sown and remnant semi-natural woodland to the north and west of the High Roads Quarry offices (linking into Helks and Kit Bill Woods). Limestone outcrops were frequent in the undisturbed sections of woodland. Ground flora is typical of established woodland with bluebell (*Hyacinthoides non-scripta*), primrose (*Primula vulgaris*), dog's mercury (*Mercurialis perennis*), wood anemone (*Anemone nemorosa*), ramsons (*Allium ursinum*) and wild arum (*Arum maculatum*). There is evidence of rabbit grazing and other terrestrial mammal activity in the woods.

8.4.13 Long-Riddings Wood is assessed as being in good condition, losing points on the lack of veteran trees, prominence of beech in the canopy, and presence of ash dieback. Both Helks Wood and Kit Bill Wood were in moderate condition for the reasons above and also for the lack of good age diversity and vertical structure in the woodland.

8.4.14 The conservation value of the lowland mixed deciduous woodland is assessed as **National** importance. This is due to the habitat containing ancient woodland as well as being a UK BAP and local BAP priority habitat of importance. The habitat also provides a high ecological value for various fauna species.

Mixed Plantation Woodland

8.4.15 There were several areas of planted woodland, many of which complement and/or link in with established/ancient woodland areas. Most trees were generally even aged, with some older trees and some scrub regeneration in canopy gaps. Species include ash, sycamore, wild cherry (*Prunus avium*), birch, hawthorn and hazel with some larch and pine in places. Ground flora is variable, with primrose, lesser celandine (*Ficaria verna*), dog's mercury, ramsons and grasses such as false wood brome (*Brachypodium sylvaticum)*.

8.4.16 These woodland areas have been assessed as moderate quality habitats, losing points for not having much deadwood (fallen and standing), no veteran trees,

limited age variation and lack of a good shrub layer. Some areas of woodland also had a prevalence of non-native species (Italian alder (*Alnus cordata*) and beech).

8.4.17 An area of plantation woodland, located along the northern boundary of the site was established on previously cleared ancient woodland and remains part of Long Riddings Wood BHS. It is dominated by grey willow (*Salix cinerea*), goat willow (*Salix caprea*), elder, sycamore, wych elm, birch, ash and hazel. The ground had been significantly disturbed before the shrubs established and no trees have attained canopy height. Regeneration is predominantly of sycamore, and the ground flora is limited – comprising mostly wild strawberry (*Fragaria vesca)* and barren Strawberry (*Potentilla sterilis*), primrose and bryophytes.

8.4.18 One of these areas (target note 21, see Technical Appendix D) appears to have planted over and around some of the Hawthorn Rocks BHS at the south of the quarry.

8.4.19 The conservation value of the mixed plantation woodland is assessed as **County** importance. This is due to the habitat being a UK BAP and local BAP priority habitat of importance. The habitat also provides a high ecological value for various fauna species.

Dense / Continuous Scrub

8.4.20 This category includes all locally native low growing (usually under 5m) shrubs as well as bramble (*Rubus fruticosus*) and gorse (*Ulex europaeus*). Dense scrub can be very important for nesting and feeding birds and, depending on the species present, it can also be of value for invertebrates.

8.4.21 There was one main area of scrub within the site, located around the settling pond near to the quarry offices. The area comprised of willow, hawthorn and buddleia as well as some regenerating sycamore and ash trees. The scrub area was considered to be of moderate habitat quality- failing on age structure, poor regeneration and density of the shrub canopy.

8.4.22 The conservation value of the dense / continuous scrub is assessed as **Local** importance. This is due to the connectivity they provide within the site and the local surrounding areas and the ecological value for various fauna species. The habitat has ecological value for breeding birds, badgers and reptiles as it acts as an ecological corridor and provides foraging opportunities.

Dense Bracken

8.4.23 These areas can provide good foraging for small birds and mammals, and nesting habitat for some bird species. One small area of dense bracken is present on site near to the block factory in the southern end of the quarry. This is spreading slowly into adjacent grassland and along the track margins with the scrub.

8.4.24 The conservation value of the dense bracken is assessed as **Site** importance. This is due to the ecological value for various fauna species within the site boundary.

Calcareous Grassland

8.4.25 The underlying bedrock of the site is limestone, and much of the ground flora reflects this. There is a broad spectrum of grassland quality from species poor tussocky grassland through species rich grassland to thinly vegetated limestone rubble. The best remaining examples of limestone grassland at the site were near the quarry offices and wind turbine at the western end of the site. Part of this area has received limestone grassland translocated from the eastern end of the quarry prior to its loss to extraction. Species were reported to include false oat grass (*Arrhenatherum elatius*), Yorkshire fog (*Holcus lanatus*), false brome (*Brachypodium sylvaticum*), cocksfoot (*Dactylis glomerata*), wild thyme (*Thymus polytrichus*), great burnet (*Sanguisorba officinalis*), eyebright (*Euphrasia sp.*), lady's bedstraw (*Galium verum*), common cats-ear (*Hypochaeris radicata*), fairy flax (*Linum catharticum*), mouse-ear hawkweed (*Pilosella officinarum)* and yellow oat grass (*Trisetum flavescens*) – but most of these were not evident at the time of visit as it was so early in the season. Scattered scrub has established in the grassland, especially around the periphery, which will shade out the finer species if not controlled.

8.4.26 Elsewhere on the site there is species-poor grassland of calcareous origin near to the block factory. This has been left unmanaged and is slowly becoming tussocky and colonised by bramble and bracken, but a careful search can still find some indicator species in the sward, such as sedges (*Carex spp.*), bird's foot trefoil (*Lotus corniculatus*), vetches (*Vicia spp.*), St. Johns wort (*Hypericum perforatum*), meadow vetchling *Lathyrus pratensis*) and orchids.

8.4.27 Calcareous grassland is developing on bare disturbed ground alongside the track along the southern boundary of the quarry where it is not shaded by woodland (see paragraph 8.4.37 (open mosaic habitat) below). Buddleia establishment and spread on the thin soil may prevent a good quality sward from establishing.

8.4.28 An area of calcareous grassland was mapped on the previous survey (2009) between Hawthorns caravan site and the quarry (Hawthorn Rocks), but this was not evident at the time of visit as trees and dense bramble appear to have shaded-out the finer flora.

8.4.29 Depending upon the species composition and structure these limestone grasslands can provide good habitat for invertebrates, small mammals and birds.

8.4.30 Both the main areas of calcareous grassland (compartments 3 and 14) were of moderate quality primarily due to the incursion of scrub. In compartment 3 this is mostly sycamore as well as willow and buddleia. Bramble is encroaching in compartment 14, and the finer species were being lost to the more tussocky grasses.

8.4.31 The conservation value of the calcareous grassland is assessed as **County** importance. This is due to the habitat being a UK BAP and local BAP priority habitat of importance. The habitat also provides a high ecological value for various fauna species.

Neutral Grassland

8.4.32 There is one long area of rough neutral grassland alongside the public footpath running through the woodland to the south of the quarry. This area is unmanaged and ungrazed (except for light rabbit grazing). Species were ruderal and dominated by aggressive species such as common nettle (*Urtica dioica*), coarse grasses, thistle (*Cirsium spp.*) and willowherb (*Epilobium sp.)* (unable to determine species at the early stage of the season). Grass species recorded included cocksfoot, false oat grass and Yorkshire fog.

8.4.33 These areas provide good habitat for small mammals and foraging areas for birds.

8.4.34 This habitat is in poor condition due to the lack of structural diversity, proportion of scrub species, and high proportion of undesirable species, including common nettle, docks (*Rumex spp*.), thistles and creeping buttercup (*Ranunculus repens*).

8.4.35 This area of neutral grassland does not follow the criteria to be considered within the local BAP, due to the poor species diversity and structure (Lancashire County Council, n.d.).

8.4.36 The conservation value of the neutral grassland is assessed as **Site** importance, due to poor species diversity as well as the area being of poor condition.

Open Mosaic Habitat

8.4.37 This is vegetation establishing on recently disturbed ground, such as spoil, gravels and tipped material. A large area of this is present along the southern edge of the quarry (above the working area) between Long Riddings Wood and semi-natural woodlands to the east. There is a patchwork of species present – with pioneer species on some areas, such as colts-foot (*Tussilago farfara*) and mouse-ear hawkweed (*Pilosella officinarum*), sedges in areas where drainage is impeded and buddleia establishing around the periphery of the track and on the steeper quarry edges. In places the habitat is grading into limestone grassland or scrub – but cover of vegetation is still scant.

8.4.38 Areas such as this can be very important for invertebrates, such as mining bee and wasp species, and can provide good habitat for reptiles.

8.4.39 The area of open mosaic habitat satisfies the UKBAP priority habitat description as the area is greater than 0.25ha (2.13 ha), has a known history of disturbance (due to quarrying works), contains some vegetation, contains unvegetated, loose bare substrate and shows spatial variation forming a mosaic of habitats.

8.4.40 This habitat was assessed as being in moderate condition, failing on the lack of pools amongst the habitat mosaic, and prominence of buddleia throughout the area.

8.4.41 The conservation value of the open mosaic habitat is assessed as **National** importance due to the habitat being a UK BAP priority habitat of importance.

Inland Rock and Scree

8.4.42 Surrounding the working area of the quarry were limestone cliffs with varying degrees of vegetation. Most have scrub developing where they were undisturbed (especially willow species and buddleia). The cliffs at the eastern end of the quarry were currently being worked and were bare.

8.4.43 Depending on the level of disturbance, this habitat can be of particular interest for cliff nesting bird species, roosting bats and for bare rock and scree vegetation (especially ferns and bryophytes). At present, none of the eastern cliffs were suitable for any wildlife. The southern cliffs were developing some vegetation, but most areas were not high enough (or undisturbed enough) to appeal to nesting birds such as peregrine falcon (*Falco Peregrinus*). It was noted within the breeding bird surveys that peregrine falcons were nesting on the southern cliff, with full

grown juveniles recorded on the 3rd bird survey (7th June 2022). Other cliff nesting species noted during the bird surveys were jackdaw, which nested in most areas of undisturbed cliff faces. See Technical Appendix D.

8.4.44 The conservation value of the inland rock and scree is assessed as **Local** importance, due to the habitat providing ecological value for various fauna species.

Hard Standing

8.4.45 The entrance to the site, car parking and around the buildings were predominantly comprised of concrete.

8.4.46 The conservation value of the hard standing is assessed as having **no intrinsic value** and therefore has been scoped out of further assessment.

Standing Open Water

8.4.47 These areas can be very valuable for a variety of species – notably amphibians and invertebrates. The open water on site was a settling pond, which has very high turbidity. The water was shallow, and concentrated at the north end of the depression, with deep silts and limestone mud where the water level has dropped. No aquatic life could be seen in the pond.

8.4.48 This habitat was of poor quality due to the turbidity of the water, level of disturbance through quarrying activities and poor-quality surrounding habitat.

8.4.49 The standing open water has been determined as 'non-priority' as it does not meet the criteria of a priority habitat detailed in the UK Hab (JNCC, 2008a). The standing open water does not meet the criteria under Annex 1 of the Habitats Directive, does not support species of high conservation importance, does not support an exceptional assemblage of key biotic groups and was not of high ecological quality.

8.4.50 The conservation value of the standing open water is assessed as **Site** importance, due to the standing open water being non-priority and being of poor condition.

Modified Grassland

8.4.51 This area is located outside the existing Back Lane Quarry area, to the south. The grassland is sheep grazed with low species diversity. Hedgerows were found intersecting and bordering the fields.

8.4.52 The conservation value of the modified grassland is assessed as **Site** importance, due to the area being of poor condition.

Line of Trees

8.4.53 This habitat links some of the woodland tracts in the south-east of the site and forms a short part of the boundary on the south-west corner of the quarry. Species were mixed, and similar to those present in the established woodland. Alongside the quarry road at the southern edge of the working area, trees have established on both sides of the track, especially at the foot of the quarry walls. These lines of young trees were predominantly willow species (*Salix spp.*), birch, ash, hawthorn, sycamore and buddleia (*Buddleja sp*).

8.4.54 They were assessed as being in poor condition due to the presence of ash dieback, absence of veteran trees, and lack of buffer habitat either side of the feature.

8.4.55 The conservation value of the line of trees is assessed as **Site** importance, due to poor species diversity and lack of diverse structure.

Protected species

8.4.56 Records of protected species were obtained from the LERN. A number of species of conservation importance or otherwise notable species were recorded within the 2km search radius of the site. A summary of these records is provided in Technical Appendix D.

Great Crested Newt

8.4.57 LERN data search returned 20 records for Great Crested Newt (GCN) within 2km of the site boundary. The closest record was from a class licence return, located approximately 600m from the site boundary, dated from 2016.

8.4.58 OS mapping was utilised to search for ponds within 500m of the site boundary. A single settling waterbody was identified within the quarry, all other waterbodies within the quarry (see Technical Appendix D) were dry and / or no longer present. There were an additional three waterbodies located outside the site, one of which was found to the south of the site. This was a lagoon located within an existing quarry and was not assessed during the Phase 1 Habitat Survey. The other two were found to the east of the site, one of which was not present at the time of the Phase 1 Habitat Survey and access was not granted for the other so it could not be assessed.

8.4.59 The waterbody located within the site was very turbid with moderate terrestrial habitat within 250m of the waterbody and no evidence of fish or waterfowl

disturbance. A HSI assessment was undertaken on the waterbody, where it was assessed as having 'below average' suitability (score of 0.52) for GCN. See Technical Appendix D for full HSI calculations.

8.4.60 The proposed development involves a time extension and deepening of the existing Back Lane Quarry, which will only require the removal of the active quarry habitat within the site boundary, thereby retaining any suitable GCN terrestrial habitat. Due to lack of records of GCN within 500m of the site boundary and the waterbody within the site providing below average suitability for GCN, GCN were considered to be highly unlikely to be present within the site boundary and therefore have been scoped out of further assessment.

Reptiles

8.4.61 The following reptile records were returned from LERN within 2km of the site boundary:

- Common lizard (*Zootoca vivipara*): four records. Most recent record from 1993. Closest record located approximately 1.6km; and
- Slow worm (*Anguis fragilis*): two records. Most recent record from 1993. Closest record was located approximately 1.3km.

8.4.62 The scrub, bracken, grassland, open mosaic habitat and woodland edges provide some suitable habitat for foraging, refuge and hibernating reptiles. However, the connectivity to the wider landscape was limited due to the presence of the M6 and Kellet Road within close proximity to the site boundary.

8.4.63 The proposed development, involves an extension of time for mineral extraction and deepening of the existing Back Lane Quarry, which will only require the removal of the active quarry habitat within the site boundary, thereby retaining suitable reptile terrestrial habitat. Due to lack of recent records of reptiles, reptiles were highly unlikely to be present within the site boundary, therefore, have been scoped out of further assessment.

Bats

8.4.64 LERN returned numerous records for eight bat species within 2km of the site boundary. Records were found within the site boundary in the south-eastern woodland adjacent to the car park off Main Road. Species found included nathusius' pipistrelle (*Pipistrellus nathusii*) and natterer's bat (*Myotis nattereri*). Other species recorded included Myotis species, daubenton's bat (*Myotis*

daubentonii), natterer's bat, noctule bat (*Nyctalus noctula*), pipistrelle nathusius, common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and brown long-eared bat (*Plecotus auratus*).

Roosting

8.4.65 The buildings onsite were assessed for their suitability to support roosting bats. Due to the lack of suitable roosting features, the majority of the buildings were assessed as providing negligible suitability for roosting bats. However, there was a disused lime kiln located within the car park at High Roads Quarry offices which provides suitable features for roosting bats.

8.4.66 Bats may well use cracks and fissures in the quarry walls to roost during the active season, and possibly to hibernate. However, the faces were recently blasted (approximately three times a month), which also causes dust to be released into the environment, settling within suitable crevices. These factors were considered to substantially reduce the suitability of the quarry faces to support roosting bats.

8.4.67 A number of trees with suitable roosting features were located within the site boundary, particularly in the southern corner of the site and within the Long Riddings Wood. Bat boxes were found in various places in the woodland and have been recorded to be regularly used by pipistrelle species.

8.4.68 LERN also returned a record for a natterer's bat roost within the disused lime kiln in the car park at High Roads Quarry offices. This record was from 2011.

8.4.69 As there were suitable roosting habitats within the site boundary and a confirmed roost in close proximity, the conservation value of the site for roosting bats is assessed as **County** importance.

Foraging / Commuting

8.4.70 The site provides suitable foraging potential for bats around the woodland edges, grassland, scrub, open mosaic habitat and standing open water within the site boundary. Additionally, there were some sheltered flight lines around most of the site. Linear features create corridors, navigational landmarks, and some protection from predators. Bats will utilise these corridors when commuting to and from their roosts.

8.4.71 The majority of the site was considered to provide optimal foraging / commuting habitat for bats and the woodland, scrub, open mosaic habitat, standing water and grassland were to be retained. As a result of this, the conservation importance

value for commuting and foraging bats is assessed as **County** importance.

Badgers

8.4.72 Refer to Technical Appendix D for further details on badgers.

8.4.73 No suitable badger habitat will be directly impacted by the proposed works. It is considered highly likely that the species are currently disturbed on occasion by blasting and ongoing quarrying activities. Thus, the proposals are not considered to increase the current levels of disturbance on site. However, mitigation is provided below to ensure the risk of harm to badgers is minimised throughout the works.

8.4.74 The conservation importance value for this species is assessed as **Local** importance.

Otters

8.4.75 LERN returned 11 records for otters (*Lutra lutra*) within 2km of the site boundary. The closest record was located approximately 600m to the south-west of the site boundary and the most recent record was dated from 2019.

8.4.76 Limited suitable habitat for otters was noted within the site boundary, or within close proximity to the site boundary. It is considered highly unlikely that the species will be present within the site and therefore, has been scoped out of further assessment.

Water voles

8.4.77 LERN returned no records for water voles (*Arvicola amphibius*) within 2km of the site boundary.

8.4.78 Limited suitable habitat for water voles was noted within the site boundary, or within close proximity to the site boundary. It is considered highly unlikely that the species will be present within the site and therefore has been scoped out of further assessment.

Other Mammals

8.4.79 The following other mammal records were returned from LERN within 2km of the site boundary:

- Hedgehog (*Erinaceus europaeus*): 17 records. Most recent record from 2019. Closest record located approximately 100m to the south-west; and
- Polecat (*Mustela putorius*): 2 records. Most recent record from 2013. Closest record located approximately 700m.

8.4.80 A stoat (*Mustela erminea*) was noted within the site boundary, along the defunct wall boundary within Long Riddings Wood, during the Phase 1 Habitat Survey.

8.4.81 The woodland, grassland, scrub and open mosaic habitat provide some suitable habitat for foraging, refuge and hibernation. However, the connectivity to the wider landscape is limited due to the presence of the M6 and Kellet Road within close proximity to the site boundary. The proposed mineral extraction will be restricted to existing quarry, which is considered to be largely unsuitable for various mammal species. Therefore, it is considered that there will be a negligible impact to other mammal species, thus they have been scoped out of further assessment.

Birds

8.4.82 LERN returned 64 bird species records found within the 2km search radius surrounding the site. This included 15 red listed Birds of Conservation Concern (BoCC) and 21 amber listed BoCC. Additionally, MAGIC identified that the site contains two grassland assemblage farmland birds. Additionally, MAGIC identified several specific farmland birds, including curlew (*Numenius arquata*), lapwing (*Vanellus vanellus*) and tree sparrow (*Passer montanus*).

8.4.83 LERN also returned records for peregrine falcon that were located within the site boundary, the most recent record was dated from 1990.

8.4.84 One Important Bird Area was identified in MAGIC within 2km of the site boundary, Bowland Fells, which was located 1.7km to the south-east of the site boundary.

8.4.85 The woodland, scrub, standing waterbody, grassland, open mosaic habitat provides suitable habitat for a variety of common and opportunistic nesting species. Species observed on site during the Phase 1 Habitat Survey, predominantly within the Long Riddings Wood, included willow warbler (*Phylloscopus trochilus*), chiffchaff (*Phylloscopus collybita*), song thrush (*Turdus philomelos*), jay, buzzard, dunnock, wren (*Troglodytes troglodytes*), blackbird (*Turdus merula*), great tit (*Parus major*), blue tit (*Cyanistes caeruleus*) and chaffinch (*Fringilla coelebs*).

Breeding Birds

8.4.86 Breeding bird surveys were undertaken between 29th April 2022 and 22nd June 2022. Technical Appendix D details the full breeding bird survey results, highlighting all the breeding bird activity detected throughout. The total number of species observed during the surveying effort was 29. Amongst the 29 species, 11 species were found to be confirmed breeding on site and 17 were noted to

possibly/probable breeding on site. 10 species of the 29 were notable species, designated on the red / amber Birds of Conservation concern (BoCC) or schedule 1 of WCA (1981, as amended) or section 41 status.

8.4.87 Almost all of the 29 breeding species came from the wooded areas around the edges of the quarry. The composition of the avifauna – one dominated by chiffchaff, blackcap and other woodland species, shows that these wooded areas were dominated by taller trees, with little associated scrub.

8.4.88 Peregrines bred successfully at the southern cliff of the quarry in 2022 and a county data search (see SLE report No. 0922/5) suggested a similar breeding location (SD514 680) as far back as 2003. If any future development is likely to affect this area, consideration should be given to alternative nest sites for this species.

8.4.89 Due to the species recorded within the site during the Phase 1 Habitat Survey and breeding bird survey and the mosaic of habitat present within the site, the conservation importance value for this species group is assessed as **Local** importance.

Invertebrates

8.4.90 The following invertebrate records were returned from LERN within 2km of the site boundary:

- Dingy skipper (*Erynnis tages*): 52 records. Most recent record from 2019. Closest record located approximately 700m;
- Ringlet (*Aphantopus hyperantus)*: five records. Most recent record from 2016. Closest record located approximately 700m;
- Small heath butterfly (*Coenonympha pamphilus*): 35 records. Most recent record from 2013. Closest record located approximately 700m;
- Northern brown argus (*Aricia Artaxerxes*): one record. Most recent record from 2004. Closest record located approximately 2km;
- Wall butterfly (*Lasiommata megera*): 15 records. Most recent record from 2009. Closest record located approximately 700m; and
- Wall mason bee (*Osmia parietina*): 16 records. Most recent record from 2001. Closest record located approximately 1.5km.

8.4.91 The woodland, scrub, grassland, open mosaic habitat, bare ground and standing waterbody provide some suitable habitat for foraging, refuge and hibernation. However, the connectivity to the wider landscape was limited due to the presence

of the M6 and Kellet Road within close proximity to the site boundary.

8.4.92 Only widespread species were observed during the Phase 1 Habitat Survey, including white tailed bumble bee (*Bombus lucorum*), orange tip butterfly (*Anthocharis cardamines*), speckled wood butterfly (*Pararge aegeria*), small tortoiseshell (*Aglais urticae*) and dark-edged bee-fly (*Bombylius major*). A dingy skipper was seen just south of Long Riddings Wood during the breeding bird survey.

8.4.93 Some targeted planting for pollinators (notably butterflies) has been done on the grassland near to the quarry offices, but no species records have been found.

8.4.94 Due to the suitable habitats onsite and that the records of notable NERC invertebrate species were within close proximity to the site, indicating that they were likely to be utilising the site, the conservation importance value for invertebrates is assessed as **Local** importance.

Invasive Species

8.4.95 No invasive species were noted during the Phase 1 Habitat Survey. The data search from LERN provided records for invasive and non-native species within 2km of the site boundary. Most of these were botanical, and all were outside of the quarry aside from one record for cotoneaster within Kit Bill Woods in 2015.

8.4.96 Due to the likely absence of invasive species within the site boundary, they have been scoped out for further assessment.

Nature Conservation Evaluation

8.4.97 Table 8.9 provides a summary of the ecological features identified within the respective zones of influence, together with the geographic context of their importance.

Ecological Feature	Frame of Reference
Morecambe Bay (SAC, SPA, RAMSAR, SSSI)	International
Leighton Moss (SPA, RAMSAR, SSSI)	International
Morecambe Bay Pavements (SAC)	International
Calf Hill and Cragg Woods (SAC)	International
Bowland Fells (SPA)	International
Thwaite House Moss (SSSI)	National

Ecological Feature	Frame of Reference
Open Habitat Mosaic (MAGIC)	National
Deciduous Woodland (MAGIC)	National
Good Quality Semi-Improved Grassland (MAGIC)	National
Ancient Semi-Natural Woodland (MAGIC)	National
Limestone Pavement (MAGIC)	National
Ancient Replanted Woodland (MAGIC)	National
Lowland Mixed Deciduous Woodland (Site habitats)	National
Open Habitat Mosaic (Site habitats)	National
BHS	County
Mixed Plantation Woodland (Site habitats)	County
Calcareous Grassland (Site habitats)	County
Roosting Bats	County
Foraging / Commuting	County
Dense/ Continuous Scrub (Site habitats)	Local
Inland Rock and Scree (Site habitats)	Local
Badgers	Local
Breeding Birds	Local
Invertebrates	Local

Table 8.9: Summary of ecological features requiring detailed assessment

8.5 Integrated Mitigation

8.5.1 Environmental elements have been considered during the development of the restoration scheme, to avoid and reduce potential impacts on biodiversity. This approach has led to a range of mitigation measures capable of reducing the magnitude of impacts being embedded within the restoration design or captured within the proposed operational practices. Measures specifically related to the protection of ecological sites, habitats and protected species were detailed in the following sections.

Proposed Restoration

8.5.2 The following mitigation measures have been incorporated into the proposed restoration.

Woodland Habitats (including lowland mixed deciduous woodland and mixed plantation woodland)

8.5.3 The creation of new woodland blocks will include species such as oak species, birch species, rowan (*Sorbus aucuparia*), holly (*Ilex aquifolium*), hazel, hawthorn and elder. In wetter areas species recommended include ash, wych elm, alder and bird cherry (*Prunus padus*). All species chosen were in keeping with the character assessment of the area and included within the local BAP (Lancashire County Council, n.d.).

Grassland Habitats (including calcareous grassland and neutral grassland)

8.5.4 The loss of calcareous grassland will be mitigated through the creation of calcareous grassland around the southern, eastern and western boundary of the site. The grassland will be seeded with a local, native, appropriate seed mix. See Lancashire County Council (n.d.) for list of species local to the area.

Reedbeds

8.5.5 The restoration scheme includes the plantation of reedbeds in blocks along the southern boundary of the proposed waterbody within the centre of the site. The created reedbeds will include the planting of native species in keeping with the local character. See Lancashire County Council (n.d.) for list of species local to the area.

Inland Rock and Scree

8.5.6 The current works involve the deepening of the existing quarry operations by an additional depth of 75m. During the mineral extraction, a number of the existing rock faces and shelves will be removed and then replaced as the works progress. As part of the restoration proposals the void will then be infilled with water to create a large lake. A number of faces and shelves will be retained around the periphery and left to naturally generate replacing the habitats lost during extraction.

Bats

8.5.7 The proposed restoration has been designed to retain areas of open quarry faces to ensure that suitable bat roosting habitat is available on site.

8.5.8 In addition, suitable foraging habitat has been incorporated within the restoration proposals through the creation of open water, calcareous grassland and woodland blocks.

Birds

8.5.9 The proposed restoration has been designed to retain areas of open quarry faces to ensure that suitable nesting habitat is available for raptors, such as peregrine falcon, kestrel and raven.

8.5.10 In addition, lakeside shallows have also been incorporated into the proposed restoration design to provide suitable oystercatcher (*Haematopus Ostralegus*) habitat.

Invertebrates

8.5.11 The proposed restoration has been designed to ensure that a complex topography is maintained on site, with a variety of different habitat types. Scattered trees and scrub, calcareous grassland, sparsely vegetated slopes, loose rock, bare cliffs, and slopes provide a wide range of niches providing suitable foraging habitat, sources of nectar and pollen and also nesting sites for a variety of invertebrates.

8.5.12 Additionally, areas of optimal invertebrate habitat, such as the open mosaic habitat will be retained and appropriately managed as part of the restoration proposals.

<u>Essential Mitigation – Operational Phase of Mineral Extraction</u>

Habitats

8.5.13 The operational phase would be subject to measures and procedures as set out within a Biodiversity Management and Action Plan (BMAP). The BMAP will include a range of measures to mitigate potential impacts on ecological habitats, protected species and the water environment, which accord with legal compliance and good practice guidance. The BMAP would include measures to minimise dust, deposition, air pollution, pollution incident, light spillage, and noise and vibration which would all assist in minimising impacts upon biodiversity receptors, in particular priority and notable habitats within the zone of influence.

Species

8.5.14 The following mitigation measures would be in place to reduce the effect of potentially significant operational impacts on ecological species.

Bats (Roosting, Foraging and Commuting)

8.5.15 Measures would be implemented during the operational phase to minimise impacts on foraging and commuting bats. This includes:

- Keeping lighting to a minimum with limited night-time working, where possible, and reducing lighting within or adjacent to habitats of value to bats. Any lighting used would be directional and positioned sympathetically to minimise light spill.
- Additional further nocturnal surveys ahead of impacts to potential or confirmed roosts – i.e. before any buildings are demolished or undergo significant refurbishment works, especially to the lime kiln. Also, if works directly or indirectly impact the features on new or recently undisturbed areas of the quarry and/or any trees, it is recommended that further nocturnal surveys are undertaken prior to any works within those areas.

Badgers (And Other Terrestrial Mammals)

8.5.16 Mineral extraction areas, soil storage and access roads would be managed to take account of any active existing setts and commuting routes. The protection of badgers during the mineral operations would also include the provision of ramps within open excavations to avoid badger entrapment, reduction in speed limit, and appropriate storage methods for potentially harmful chemicals.

Birds

8.5.17 Peregrines typically nest in hard rock quarries, above quarry workings. They are a schedule 1 listed species which under the Wildlife and Countryside Act 1981/ Schedule 1 – Part 1 states: 'It is illegal for any person to intentionally or recklessly disturb any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or disturb dependent young of such a bird'.

8.5.18 Back Lane Quarry has an abundance of nesting options for cliff nesting species, including peregrines (see paragraph 8.4.88 for further information). As a result, any proposed increase in quarry blasting activity or blasting of new areas not active within the last 6 months, including along the southern face should be accompanied

by a nesting bird check if blasting is undertaken between March – August, inclusive. During the nesting bird check, a toolbox talk will be delivered to all relevant staff on site, outlining suitable nesting sites, and ID features of peregrines and other raptors.

Invasive Flora Species

8.5.19 There was no report of invasive plant species within the application area. However, this is important to maintain and manage long term.

Enhancements – Biodiversity Net Gain

8.5.20 Enhancements have been incorporated within the restoration proposals to ensure that a net gain is achieved. The Natural England Metric 4.0 has been utilised to determine the following results:

FINAL RESULTS		
Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	10.08
	Hedgerow units	0.63
	Watercourse units	0.00
Total net % change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	2.87%
	Hedgerow units	50.82%
	Watercourse units	0.00%
Trading rules satisfied?	Yes ✓	

Table 8.10: Results from the BNG Calculations

8.5.21 This includes incorporating:

- Standing open water – an area of open water is located to the west of the current mineral extraction. As part of the proposed restoration the area is set to be enhanced from poor condition to good condition. Providing opportunities for a variety of species, such as foraging bats, amphibians and invertebrates;
- Woodland – an area of woodland to the south of the current mineral extraction (Long Riddings wood). As part of the proposed restoration plan the area would be enhanced to woodland, providing opportunities for a variety of species, such as roosting bats, nesting birds, badgers and invertebrates; and
- Open Mosaic Habitat - An area of partially restored land is located to the

south of the current mineral extraction. However, due to the area being previously worked, and the substrate beneath an area of open mosaic habitat has formed. Due to this providing a mosaic of periphery habitat types, in an area dominated by woodland habitat, it is considered to enhance the site by providing various different habitat types and ecotones.

8.5.22 In addition to the enhancements above, there will be the creation of the following habitats:

- Woodland – upon completion of mineral extraction, scattered woodland blocks were set to be created on the peripheries of the existing quarry workings. This will include the planting of locally sourced, where possible, native species;
- Marl lake – upon completion of mineral extraction, a waterbody will form within the quarry void due to ingress from rainfall, groundwater and fissure / cave systems;
- Reedbeds – upon completion of mineral extraction, small areas of reedbed will form around the peripheries of the lake;
- Open Mosaic Habitat – upon completion of the mineral extraction, an area west of the created marl lake and extending partially south, will be left and managed to form open mosaic habitat;
- Scrub – upon completion of the mineral extraction, scattered blocks of scrub will be created within the created calcareous grassland and open mosaic habitat;
- Calcareous grassland – upon completion of the mineral extraction, an area south-east of the created marl lake and extending partially south, will be created calcareous grassland; and
- Other inland rock and scree – upon completion of mineral extraction, exposed quarry benches will be retained and left to naturally regenerate.

8.5.23 New habitat creation will provide opportunities for species within the site. In addition to these enhancements, which were embedded into the proposed works, a range of additional ecological enhancement measures will be delivered as part of the proposed development, as identified below. Further details will be set out in a Biodiversity Management and Action Plan (BMAP) at the detailed design stage, however as an indicative guide:

- Inclusion of plant species of known wildlife value within the landscaping

scheme, including night-scented varieties to benefit bats, fruit bearing varieties to benefit birds and nectar-rich varieties for invertebrates;

- Provision of new bat roosting opportunities (i.e. bat boxes). These will be a purpose built, durable and long-lasting variety such as Schwegler or 'Habibat' or equivalent;
- Provision of new bird nesting opportunities (i.e. nesting boxes). These will be a purpose built, durable and long-lasting variety such as Schwegler or 'Habibat' or equivalent; and
- Creation of log piles and / or brash piles to provide hibernacula for reptiles and amphibians.

8.6 Assessment of Environmental Effects

Assumptions

8.6.1 The following assumptions have been made during the assessment of potential effects of the proposed development on important ecological features. Although 'assumed' and therefore taken as part of the pre-mitigation scenario, these measures were referenced in the proceeding sections which were integral to the mitigation strategy.

8.6.2 It is assumed that a BMAP will be prepared at the detailed design stage. In addition to the extraction phase impact avoidance and mitigation measures identified in the following sections, the BMAP will detail standard environmental control measures, including, though not limited to, the following:

- Implementation of protection measures for the root protection areas of retained trees and hedgerows, in accordance with BS5837:2012;
- If a protected / notable species is uncovered or becomes entrapped during the works, a suitably qualified ecologist should be contacted for further advice;
- Standard best practice operational phase pollution prevention and control measures; and
- Sensitive working methods and timing to avoid direct impacts to protected and notable species.

8.6.3 It is assumed ongoing groundwater monitoring will be undertaken to allow for continued assessment of any potential impact from dewatering, especially regarding Thwaite House Moss (SSSI) (Hafren Water, 2023).

8.6.4 It is assumed that the habitats retained and created as part of the proposed works will be managed in keeping with the Biodiversity Management Plan (BMAP) created for the site.

Potential Impact and Ecological Effects

8.6.5 The prediction of impacts and the assessment of effects has taken account of the mitigation measures and the compensation measures identified above.

International Statutory Designated Sites

8.6.6 The site supports suitable habitats, including grassland and quarry (rocky areas) which favour the qualifying bird species for Morecambe Bay (SAC, SPA, RAMSAR and SSSI). Out of the qualifying list, three birds were noted during the breeding bird survey effort 2022 (oystercatcher, lesser black-backed gull (*Larus fuscus*) and herring gull (*Larus argentatus*)). It is considered that the species mentioned were currently disturbed, on occasion, by blasting and general quarrying activities. With the proposed works being an extension of time, it is considered unlikely that any additional disturbance will occur. Additionally, there is sub-optimal connecting habitat between the site and Morecambe Bay (SAC, SPA, RAMSAR and SSSI).

8.6.7 As part of the proposed works, the suitable habitats were set to be retained for the duration of the mineral extraction works. Additionally, as part of the proposed restoration plans calcareous grassland and standing water with shallow margins and reedbed habitats is set to be created. Provided that the mitigation measures outlined within the BMAP were also implemented during mineral extraction, it is considered that the proposals would have a **negligible** impact.

8.6.8 Hydrological assessments were undertaken to determine impacts to Morecambe Bay (SAC, SPA, RAMSAR and SSSI). The designated site is partially supported by the River Keer, River Leven and the River Kent, all of which are supported by regional-scale surface water catchments. The contribution of groundwater baseflow from the limestone bedrock to the catchment of the River Keer is considered to be **negligible** in the scale of the overall catchments which supports flows into Morecambe Bay (SAC, SPA, RAMSAR and SSSI) (Hafrenwater, 2023).

8.6.9 As the current proposed works involve the deepening of the existing quarry, it is assumed that no further dust will be created than what is currently being produced. Therefore, it is considered to be that dust pollution towards Morecambe Bay (SAC, SPA, RAMSAR and SSSI) during the proposed extraction is considered to be

negligible.

8.6.10 During the proposed works the maximum dB produced from the proposed works is approximately 55dB (Advance Environmental Limited, 2023). Following the information provided in Cutts, et al. (2013), the distance between the site and Morecambe Bay (SAC, SPA, RAMSAR and SSSI) is predicted to create an "acceptable 'dose' level". Therefore, the impact from noise towards Morecambe Bay (SAC, SPA, RAMSAR and SSSI) during the proposed extraction is considered to be **negligible**.

8.6.11 The remaining four international Statutory Designated Sites (Leighton Moss (SPA, RAMSAR and SSSI), Morecambe Bay Pavements (SAC), Calf Hill and Cragg Woods (SAC) and Bowland Fells (SPA)) are located a minimum distance of 5km. Due to distance and significant barriers (M6 and A683), direct and indirect impacts (such as changes in human activity and pollution) are **not anticipated**.

Statutory Designated Sites

8.6.12 The proposals do not necessitate direct change in habitats and features to Thwaite House Moss SSSI. As a result of monitoring conducted down-stream of Thwaite House Moss SSSI, it was considered that the SSSI is not supported by groundwater from the limestone bedrock beneath the quarry (Hafrenwater, 2023). Therefore, as long as the assumptions detailed above are followed and the trends do not alter, it is considered that in terms of hydrology the proposals would have a **negligible** impact on this SSSI.

8.6.13 As stated within the Noise Assessment report produced by Advance Environmental Limited (2023), other than the deepening of the mineral extraction working, no changes are proposed to the current site operations and the works would not be any closer to the nearest noise sensitive receptors. With the only change from the current situation being the ground height, the distance from the ongoing operations to the nearest receptors will only increase (Advance Environmental Limited, 2023). As a result, in terms of noise, the proposals would have a **negligible** impact on the SSSI.

8.6.14 However, it is considered that indirect impacts may arise. Therefore, best practice measures suitable to mitigate for dust and air emissions will be identified and set out in the BMAP.

8.6.15 The remaining seven SSSIs were located a minimum 1.5km from the site boundary. Due to significant barriers (M6 and A683) and distance, it is considered that adverse

impacts on the other SSSIs are not anticipated.

Non-Statutory Designated Sites

8.6.16 Helks Wood (BHS), Kit Bill Wood (BHS), Long Riddings Wood (BHS) and Hawthorns Rocks (BHS) are all located within the site boundary. The proposals do not necessitate a direct change to the land cover, habitats and features of any of the BHS within the site boundary. However, without appropriate mitigation measures, it is likely that indirect impacts are anticipated, due to changes in air quality (including dust). Therefore, best practice measures suitable to mitigate for dust and air emissions will be identified and set out in the BMAP.

8.6.17 Helks Wood Farm Pasture (BHS) is located adjacent to the eastern boundary. Current proposed works do not necessitate the direct change to the land cover, habitats and features of the Helks Wood Farm Pasture (BHS). However, without appropriate mitigation measures, it is likely that indirect impacts are anticipated, due to changes in air quality (including dust). Therefore, best practice measures suitable to mitigate for dust and air emissions will be identified and set out in the BMAP.

8.6.18 Leapers Wood, Bowman Stout Wood and Slacks Wood (BHS) are located 200m to the north of the site boundary. Current proposed works do not necessitate the direct change to the land cover, habitats and features of the Leapers Wood, Bowman Stout Wood and Slacks Wood (BHS). However, without appropriate mitigation measures, it is likely that indirect impacts are anticipated, due to changes in air quality (including dust). Therefore, best practice measures suitable to mitigate for dust and air emissions will be identified and set out in the BMAP.

8.6.19 Due to significant barriers (M6 and A683) and distance, an adverse impact is not anticipated on the other 23 non-statutory designated sites.

Priority Habitats

8.6.20 Multiple priority habitats were noted within the site boundary, with an additional eight located within 2km from the site boundary. The proposed works involve the loss of 1.62 ha of open mosaic habitat. Due to the area being designated as a priority habitat, they have been assigned high strategic significance under the designation ‘formally identified in local strategy’ within the BNG metric, which accounts for the habitat’s high ecological value. 0.51ha of open mosaic habitat is set to be retained and enhanced as part of the proposed restoration. Additionally,

4ha of created open mosaic habitat within the site is proposed after the completion of the works. It is considered that in the short-term the proposed works will result in an adverse impact on a receptor of national value. However, once the proposed open mosaic habitat has reached its desired condition and satisfies its UKHab criteria (JNCC, 2008b), it is considered that in the long-term the proposal will result in a beneficial impact on a receptor of **National** value.

8.6.21 The proposed deepening of the quarry will not result in the direct land taking of any other priority habitats within the site boundary. However, indirect impacts may arise, due to changes in air quality (including dust), therefore, best practice mitigation measures will be identified and set out in the BMAP.

Habitats

8.6.22 The operational impacts of the proposed works result in a loss of existing quarry habitat only. Table 8.11 details the impacts of the habitats outside the mineral extraction boundary as part of the proposed works.

Ecological Feature	Direct Impact	Indirect Impact	Proposed Restoration
Lowland Mixed Deciduous Woodland	No direct impacts anticipated as works set to be restricted to current mineral extraction boundary only	Any indirect impacts noted will be managed through the implementation of a BMAP. Therefore, an **adverse impact is not anticipated**	Set to be retained throughout the works and managed as lowland mixed deciduous woodland. 3.35 ha of retained woodland to be enhanced and 0.13 ha of woodland is set to be created
Calcareous Grassland			Retained, further creation of naturally regenerated grassland on exposed rock benches. 1.84 ha of calcareous grassland is set to be created

Table 8.11: Summary of the impacts of proposed works on the habitats noted within the site boundary

8.6.23 The mineral extraction boundary is restricted to existing quarry habitat only and all other habitats within the site boundary will be retained and implemented into the proposed restoration plan. Additionally, all indirect impacts will be managed through implementation of a BMAP. Therefore, it is considered that the works would have a **negligible** impact on receptors up to **National** value.

Mixed Plantation Woodland

8.6.24 The operational impacts of the proposed works result in a minor loss of mixed plantation woodland (0.31ha). The retained woodland will have a suitable buffer of approximately 15m. In total, 16.21ha of woodland is set to be retained throughout the proposed works, with 3.35ha being enhanced. Additionally, 0.13ha of woodland planting within the site is proposed after the completion of the works. All woodland species planted will be in keeping with the local character assessment. It is considered that in the short-term the proposed work will result in an **adverse** impact on a receptor of **County** value.

8.6.25 However, once the proposed woodland has matured and reached its desired condition, it is considered that in the long-term the proposal will result in a **beneficial** impact on a receptor of **County** value.

Dense / Continuous Scrub

8.6.26 The operational impacts of the proposed works result in a loss of mixed plantation woodland (0.26ha). 0.94ha of scrub planting within the site is proposed after the completion of the works. Additionally, 16.21ha of woodland is set to be retained throughout the proposed works, with 3.35ha being enhanced and 0.13ha being created. All woodland and shrub species planted will be in keeping with the local character assessment. It is considered that in the short-term the proposed work will result in an **adverse** impact on a receptor of **Local** value.

8.6.27 However, once the proposed woodland and shrub has matured and reached its desired condition, it is considered that in the long-term the proposal will result in a **beneficial** impact on a receptor of **Local** value.

Open Mosaic Habitat

8.6.28 See paragraph 8.6.20 for further details.

Inland Rock and Scree (Active Quarry)

8.6.29 The operational impacts of the proposed works result in a loss of existing quarry habitat only. All mineral extraction will be restricted to existing working area of the quarry. The majority of the quarry habitat will be lost as part of the proposals and replaced with standing water with shallow margins and reedbed habitat. The quarry habitat is considered to largely provide limited ecological value due to it being regularly blasted and works as part of the existing permissions on site. The quarry faces, and shelves were considered to largely provide some ecological value

as they have become partially vegetated. A number of these faces will be retained and created as part of the restoration proposals. Therefore, the loss of this habitat will result in a **beneficial** impact to a receptor of **Local** value due to the retention of more ecological valuable parts of the habitat and the creation of wetland.

Protected species

Roosting Bats

8.6.30 The quarry face, which would be subject to further mineral extraction, has been blasted at least three times a month over recent years. Each blast results in significant levels of noise (up to 3.8dB) and vibration across both the exposed face and across the site itself. Due to the level of frequent disturbance across the site, it is considered that the suitability of these cracks and fissures for bats is largely reduced. Therefore, with the above conclusion and as long as measures detailed in paragraph 8.5.15 are followed, it is considered that an adverse impact is not anticipated on a receptor of **County** value.

8.6.31 As part of the restoration scheme habitats lost will be replaced with suitable habitats for bats, such as calcareous grassland, woodland, open mosaic habitat and scrub. Furthermore, some of the retained habitats on site are set to be enhanced once the works have been completed. Therefore, once the proposed calcareous grassland, woodland, open mosaic habitat and scrub have matured and/or reached their desired condition, it is considered that in the long-term the proposal will result in a **beneficial** impact on a receptor of **County** value.

Badgers

8.6.32 No suitable badger habitat will be directly impacted by the proposed works. It is considered highly likely that the species are currently disturbed on occasion by blasting and ongoing quarrying activities. Therefore, the proposed deepening of the quarry is considered unlikely to result in any additional disturbance. Provided that the mitigation measures outlined within the BMAP are also implemented during the mineral extraction, it is considered that the proposals would have a **negligible** impact on a receptor of **Local** value.

Breeding Birds

8.6.33 Most of the quarry cliffs were deemed suitable for nesting raptors, such as peregrines, falcon, kestrel and ravens. Peregrine falcons were noted to be breeding within the site. Additionally, the rubble quarry floor and buildings within the site

were deemed suitable for notable species such as oystercatcher, herring gull and lesser black-backed gull. Without mitigation, there is the potential for direct mortality of nesting / breeding birds throughout the mineral extraction phases. Provided the mitigation measures detailed within the BMAP were followed during the mineral extraction, and suitable habitat is retained / created as part of the restoration proposals, it is considered that the works would have a **negligible** impact on a receptor of **Local** value.

Invertebrates

8.6.34 The active quarry habitat provides limited suitability for invertebrate species; therefore, the proposed deepening of the quarry is considered highly unlikely to impact invertebrates. Additionally, the proposed restoration has been designed to ensure that a variety of different habitats were created and retained across the site, providing significant sources of nectar and pollen throughout the year. Therefore, it is considered that the works would have a **beneficial** impact on a receptor of **Local** value.

8.7 Additional Mitigation

8.7.1 Provided the design and mitigation measures outlined in Section 8.5 were implemented, significant effects range from **negligible** to **beneficial**. Therefore, no further additional mitigation measures have been identified.

8.8 Residual Environmental Effects

8.8.1 Table 8.12 below summarises the assessment of the potential impacts on each important ecological features, proposed mitigation and assessed residual effects.

Important Ecological Feature	**Potential Impacts**	**Initial Classification of Effect (with embedded mitigation)**	**Additional Mitigation**	**Residual Effect Significance**
International Statutory Designated Sites	No direct impact. **Potential for indirect impact due to changes in air quality (dust)**	Negligible. **Implementation of BMAP**	No additional mitigation required	Negligible
Statutory Designated Sites	No direct impact. Potential for indirect impact due to changes in air quality (dust)	Negligible. Implementation of BMAP	No additional mitigation required	Negligible

Important Ecological Feature	Potential Impacts	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation	Residual Effect Significance
Non-Statutory Designated Sites	No direct impact. Potential for indirect impact due to changes in air quality (dust).	Negligible. Implementation of BMAP	No additional mitigation required	Negligible
Priority Habitats	Direct impact (open mosaic habitat only). Potential for indirect impact due to changes in air quality (dust)	Adverse impact (open mosaic habitat only). Creation of open mosaic habitat, calcareous grassland, woodland, wetland habitat and naturally generated benches and faces as part of the restoration proposals. Implementation of BMAP	No additional mitigation required	Beneficial effect
Lowland Mixed Deciduous Woodland	No direct impact. Potential for indirect impact due to changes in air quality (dust)	Negligible. Some retained areas enhanced. Creation of woodland as part of the restoration proposals. Implementation of BMAP	No additional mitigation required	Beneficial effect
Mixed Plantation Woodland	Direct impact. Potential for indirect impact due to changes in air quality (dust)	Adverse impact. Some retained areas enhanced. Creation of woodland as part of the restoration proposals. Implementation of BMAP	No additional mitigation required	Beneficial effect
Dense / Continuous Scrub	Direct impact. Potential for indirect impact due to changes in air quality (dust)	Beneficial impact. Creation of scrub as part of the restoration proposals. Implementation of BMAP	No additional mitigation required	Beneficial effect
Calcareous Grassland	No direct impact. Potential for indirect impact due to changes in air quality (dust)	Negligible. Creation of calcareous grassland and further creation of naturally regenerated benches and faces as part of the restoration proposals. Implementation of BMAP	No additional mitigation required	Beneficial effect

Important Ecological Feature	Potential Impacts	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation	Residual Effect Significance
Open Mosaic Habitat	Direct impact. Potential for indirect impact due to changes in air quality (dust)	Adverse impact. Creation of open mosaic habitat, wetland habitat and naturally generated benches and faces as part of the restoration proposals. Implementation of BMAP	No additional mitigation required	Beneficial effect
Inland Rock and Scree (Active Quarry)	Loss of existing quarry habitat through deepening	Beneficial impact. Creation of wetland habitat and naturally generated benches and faces as part of the restoration proposals	No additional mitigation required	Beneficial effect
Bats (Roosting)	Loss of suitable habitat. Potential for direct and indirect impacts from blasting, dust, light, vibration and noise	Negligible. Mosaic of suitable habitat habitats created as part of the restoration proposals (woodland, grassland, wetland and naturally generated benches and faces). Implementation of BMAP	Further surveys and mitigation if required	Beneficial effect
Badgers	No direct impact. Indirect impacts through general quarrying processes	Negligible. Suitable habitat incorporated into restoration proposals (woodland and grassland). Implementation of BMAP	No additional mitigation required	Beneficial effect
Breeding Birds	Loss of nesting habitat / disturbance during nesting season	Negligible. Mosaic of suitable habitat habitats created as part of the restoration proposals (woodland, grassland, wetland and naturally generated benches and faces). Implementation of BMAP	No additional mitigation required	Beneficial effect
Invertebrates	Loss of suitable habitat	Negligible. Mosaic of suitable habitat habitats created as part of the restoration proposals (woodland, grassland, wetland and naturally generated benches and faces)	No additional mitigation required	Beneficial effect

Table 8.12: Assessment of potential impacts on each important feature

8.9 Conclusions

Compensation

8.9.1 No significant residual negative effects on important ecological features were anticipated to result from the proposed works, following the inclusion of impact, avoidance and mitigation measures described above. As such, no compensatory measures are proposed.

Climate Change

8.9.2 The baseline surveys identified that, in general, the majority of species and habitats were not isolated within the landscape or at the edge of their range or threatened to a level where climate change may act on their wider population status / distribution.

Monitoring

8.9.3 A monitoring strategy will be developed during the life of the project. The monitoring strategy should be detailed within the BMAP. The contributions of experts to the development of the strategy will be used to ensure that the most appropriate system of monitoring is implemented. This system will be regularly reviewed when it is managing the site post completion.

8.10 References

1) *Aggregate Industries and South Lakes Ecology (2021). Biodiversity Management Plan 2019-2029.*

2) *ARG UK (2010). Great Crested Newt Habitat Suitability Index. [Online]. Available at: https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file*

3) *Argus Ecology (2012). Proposed Single Wind Turbine at Aggregate Industries Back Lane Quarry, Carnforth. [Online]. Available at: https://planningdocs.lancaster.gov.uk/NorthgatePublicDocs/00780917.pdf*

4) *Bat Conservation Trust (2018). Bats and Artificial Lighting in the UK: Bats and the Built Environment. [Online]. Available at: https://cdn.bats.org.uk/uploads/pdf/Resources/ilp-guidance-note-8-bats-and-artificial-lighting-compressed.pdf?v=1542109349*

5) *CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management: Winchester.*

6) *Cutts, n., Hemingway, K. and Spencer, J. (2013). Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning & Construction. [Online]. Available at: https://qat04-live-1517c8a4486c41609369c68f30c8-aa81074.divio-media.org/filer_public/8f/bd/8fbdd7e9-ea6f-4474-869f-ec1e68a9c809/11367.pdf*

7) *Freshwater Habitats Trust (2015). Creating ponds and lakes for stoneworts. [Online]. Available at: https://freshwaterhabitats.org.uk/wp-content/uploads/2013/09/Stonewort_V2-Feb15.pdf*

8) *Gent, T. and Gibson, S. (2003). Herpetofauna Workers Manual. [Online]. Available at: https://data.jncc.gov.uk/data/9d7da8c4-9d76-4b65-8263-6b925b3433a4/Herpetofauna-Workers-Manual-2003.pdf*

9) *Hafrenwater (2023). Hydrological Impact Assessment.*

10) *JNCC (2008a). UK Biodiversity Action Plan Priority Habitat Descriptions: Ponds. [Online]. Available at: https://data.jncc.gov.uk/data/dec49c52-a86c-4483-90f2-f43957e560bb/UKBAP-BAPHabitats-42-Ponds.pdf*

11) *JNCC (2008b). UK Biodiversity Action Plan Priority Habitat Descriptions: Open Mosaic Habitat. [Online]. Available at: https://data.jncc.gov.uk/data/a81bf2a7-b637-4497-a8be-03bd50d4290d/UKBAP-BAPHabitats-40-OMH-2010.pdf*

12) *Lancashire County Council (n.d.). Lancashire Biodiversity Action Plan. [Online]. Available at: https://www.lancashire.gov.uk/lern/services/*

13) *Mitchell-Jones, A.J. and McLieish, A.P. (2004). Bat Workers' Manual. [Online]. Available at: https://data.jncc.gov.uk/data/e5888ae1-3306-4f17-9441-51a5f4dc416a/Batwork-manual-3rd-edn.pdf*

14) *Rural Payments Agency and Natural England (2021). WN5: Pong management (less than 10 square meters). [Online]. Available at: https://www.gov.uk/countryside-stewardship-grants/pond-management-first-100-sq-m-wn5*

15) *SLR (2014). Planning Application for the Importation and Recycling of Road Base and Road Plannings. [Online]. Available at: https://planningdocs.lancaster.gov.uk/NorthgatePublicDocs/00817828.pdf*

16) *Wildlife Trust (2018). The Wildlife Trusts Biodiversity Benchmark – Requirements. [Online]. Available at: https://www.wildlifetrusts.org/sites/default/files/2018-06/BBOM4%20Biodiversity%20Benchmark%20Requirements.pdf*

17) *Woodland Trust (2022). Types of Woodland Management. [Online]. Available at: https://www.woodlandtrust.org.uk/plant-trees/managing-trees-and-woods/types-of-woodland-management/#:~:text=Thinning%20is%20done%20gradually%2C%20removing,the%20row%20are%20thinned%20later*

9 TRANSPORT

9.1 Introduction

9.1.1 This chapter of the ES assesses the effects of the proposed development on traffic and access. In particular, it considers the anticipated environmental effects of the proposed development on existing traffic conditions in the immediate area to the site and over a wider network study area.

9.1.2 The chapter describes:

- the methods used to identify and assess any likely significant traffic related effects;
- the baseline conditions currently existing at the site and its surroundings;
- the potential direct and indirect effects arising from development related traffic movements (including heavy goods vehicle (HGV) trips);
- any mitigation measures required to prevent, reduce, or offset any identified significant effects; and,
- the likely residual effects.

9.1.3 The chapter has been prepared by Mike Hughes (BEng, MCIHT) of Focus Transport Planning. The author has over 20 years' experience of working in the transportation planning sector and has been responsible for the preparation of ES chapters and formal Transport Assessment (TA) reports to support a range of public and private sector projects, including commercial development, residential development, leisure projects and waste and energy schemes.

9.1.4 Detailed highways and transport network operational assessment work, including the identification of development trip generation and assignment, link and junction capacity analysis, review of general site accessibility by sustainable travel modes and detailed construction traffic effects has been considered in a formal Transport Assessment (TA) document submitted in support of the planning application. This TA report is included as Technical Appendix E to this ES. Section 2.3 of the TA report includes a full review of Transport Policy relevant to the Proposed Development, including reference to national and local planning policy and relevant Local Transport Plan policies and schemes. The following paragraphs represent a summary of key relevant transport policy matters.

9.2 Policy & Legislative Context

National Planning Policy Context

9.2.1 The National Planning Policy Framework (NPPF) encourages development which accords with the sustainable transport objectives of minimising the need for travel, particularly road journeys, and promoting the efficient delivery of goods and supplies. Paragraph 108 of the NPPF indicates that transport issues 'should be considered from the earliest stages of plan making and development proposals, so that the potential impacts of development on transport networks can be addressed…'. It also indicates that this approach would allow the environmental effects of transport issues to be "identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects and for net environmental gains".

9.2.2 Paragraph 109 states that:

'significant development should be focused on locations which are, or can be, made sustainable, through limiting the need for travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, which should be taken into account in both plan-making and decision-making.'

9.2.3 Paragraphs 114 - 117 of the NPPF provide guidance on the nature and detail of transport appraisal to be carried out to assess the impacts of development proposals and identifies the key matters to be considered when determining the suitability of development proposals. This includes the need to provide opportunities to promote sustainable transport, delivering safe and secure access for all users and ensuring that any significant impacts from development on the transport network can be cost effectively mitigated to an acceptable degree. Paragraph 115 of the NPPF states that ***"****Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe"*.

9.2.4 The NPPF therefore clearly identifies that development should only be refused in those cases where the highways impact would be severe *(our emphasis)* - which is typically understood to mean situations where development is likely to result in a material detrimental step change in circumstances when compared to predicted Baseline "Do Nothing" or "Do Minimum" conditions. Should the operational

effects, as a consequence of development traffic, be marginal in nature, then highway authorities are directed not to seek to prohibit development on highways and traffic grounds.

9.2.5 The NPPF does not seek to define the nature of what is considered to represent a severe impact. This provides some flexibility to reflect site specific circumstances. What is clear is that the guidance sets a high bar for planning and highway authorities in terms of their ability to identify and successfully sustain objections to planning applications on highways grounds. The very nature of the wording of NPPF paragraph 115 inherently suggests that some measure of highways impact can be viewed as being acceptable, and that it is only when detrimental impacts are assessed as being severe that refusal of planning permission on such grounds is appropriate.

9.2.6 With this in mind, it is considered important that any review of future "with development" network performance is comprehensive and considered both in the context of relevant baseline circumstances, in order to fully understand the effects of the Proposed Development. In the case of the Back Lane Quarry site, this Baseline position is considered to comprise a "Do Minimum" scenario, whereby other existing uses on the site (with their own planning consents) remain operational, but where the quarry use itself is not included. In practice, the extant quarry consent means that quarry related traffic impacts would continue up to the cessation date defined in that consent (29 April 2048), which is well beyond the typical assessment periods adopted for the assessment of traffic-related effects. Accordingly, the "Do Minimum" scenario is a somewhat artificial scenario which wouldn't occur in practice but, crucially, it enables the assessment of the quarry's traffic-related environmental effects in isolation.

<u>Local Waste Planning Policy and Development Plan: Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD</u>

9.2.7 The Core Strategy was adopted in February 2009 as part of the Local Development Framework for Lancashire. The document sets out the future for minerals and waste development in Lancashire until 2021 and outlines the strategic policies required to deliver the vision. Policies of relevance within the Core Strategy are set out below.

9.2.8 Policy CS1 (Safeguarding Lancashire's Mineral Resources) states that minerals will only be extracted where they meet a proven need for materials with those

particular specifications. Mineral resources are to be conserved where they have an economic, environmental or heritage value. Mineral Safeguarding Areas will be used to identify mineral resources with the potential for extraction. The site is identified as a limestone site with 'Long-Term Strategic Provision' on the Key Diagram, situated within a 'Limestone Resource Area'.

9.2.9 Policy CS2 (Minimising the Need for Mineral Extraction) requires new developments to maximise the use of recycled and secondary materials.

9.2.10 Policy CS3 (Meeting the Demand for New Minerals) sets out the provision of 57.8 million tonnes of limestone between 2001 – 2021 to be met through a combination of rolling forward and identifying a minimal range of new sites and relying on secondary and recycled aggregates. No additional land was allocated for limestone extraction for aggregate use before 2021.

9.2.11 Policy CS5 (Achieving Sustainable Minerals Production) encourages alternatives to the bulk transportation of minerals by road. Criteria for site identification will be developed in order to ensure new sites identified for minerals development are sustainable. Concurrent mineral working is encouraged where it will maximise the recovery of materials worked.

Infrastructure and Planning – Annex 1 Highways

9.2.12 The Infrastructure and Planning (Annex 1 Highways) sets out Lancashire County Council's approach to considering the potential impact of proposed developments upon the highways infrastructure within the local area of development.

9.2.13 The document states that developments should:

- Ensure safe access and egress;
- Minimise development-related impacts such as traffic congestion.

Application Site Planning Status & Relevant Planning History

9.2.14 A detailed review of relevant planning history directly associated with the existing Back Lane Quarry site operations is set out in the Planning Statement and Chapter 2 of this ES.

9.2.15 The quarry benefits from a number of planning permissions granted since the 1940s, inter alia, an extension to the quarry and erection of a crushing plant approved in 1948 (ref: 2/5/9), and erection of a coating plant and emission stack was approved on 7th March 1983 (ref: 01/82/1118). The mineral operations are

covered by an Environment Act 1995 Review of Old Mineral Permission (ROMP) granted in 2006 (ref: 1/03/1186) which permits working until 2048. The ROMP was varied by planning permission reference 1/09/360 in July 2009 which allowed the controls on stockpile heights to be amended.

9.2.16 In addition to the quarry related operations at the site, an asphalt production facility and a concrete block manufacturing facility are also situated on the Back Lane Quarry site.

Other Relevant Local Planning Applications/Consents

9.2.17 Leapers Wood Quarry is a long-established limestone quarry supplying high grade limestone aggregate to the region. The quarry lies immediately adjacent to Back Lane Quarry, with the two quarries sharing a jointly worked boundary. Planning permission for mineral extraction at Leapers Wood Quarry was granted in 1988 (ref. 1/86/760). The permission was subject to an Environment Act review in 2003 (Application reference: 1/03/1185).

9.2.18 Planning permission was granted for the construction of a western embankment at Leapers Wood Quarry in 1995 (ref 1/94/582). The embankment provided a location for the tipping of overburden and waste material from the adjacent quarry and improved the screening of the quarry when seen from Carnforth and surrounding areas to the west. Condition 1 of the planning permission required the embankment to be completed by 30th June 2012 with restoration completed within a further one year.

9.2.19 Planning permission to vary condition 1 of planning permission 01/94/0582 to extend the time period for the completion of the western embankment to 30 June 2022 was permitted on 28th September 2012 (ref. 01/12/0662).

9.3 Assessment Methodology and Scope

Potential Impacts

9.3.1 Transport-related environmental effects are typically associated with changes in local traffic demand, both in terms of the total number of development vehicles and the type of vehicles generated i.e. the proportion of larger HGV service vehicles. Key impact types to be considered in traffic related environmental assessment are as follows:

- Changes in development traffic levels impacting on prevailing highway operating conditions, such as accident risk and network congestion and

delay on key links in the immediate vicinity of the proposal site and further afield;

- Changes in development traffic levels impacting on other local road network users and the immediate community, resulting in reduced amenity (e.g. community severance, pedestrian delay / intimidation, etc.);
- Changes in development traffic levels resulting in noise effects at surrounding and frontage properties to key access road corridors (see also Chapter 10 of this ES); and
- Changes in development traffic levels and congestion resulting in local air quality effects at key local network links and junctions (see also Chapter 11 of this ES).

9.3.2 Transport-related environmental effects also vary over the different stages of the development lifetime. Typically, a full assessment of transport environmental effects considers the following:

- Construction Traffic Impact – i.e., the extent of vehicle movements that would take place to and from the site during the construction phase and any effects of physical construction works on the operation of the immediate highway network e.g., temporary access points, lane closures, etc. It should be noted that any environmental effects associated with construction are generally only temporary in nature and are rarely constant over the full construction period.
- Operational Traffic Impact – i.e., the day-to-day transport impact of the operation of the proposal site associated with typical staff, visitor and operational HGV trip demand and the impacts of the implementation of permanent new access junction features and other related off-site highway improvements.

Assessment Scope and Consultation

9.3.3 The scope and nature of the assessment work set out within this ES chapter reflects the extent of matters which are understood to be of material interest to key highways stakeholders i.e., Lancaster City Council (Local Planning Authority), Lancashire County Council (Local Highway Authority and Mineral Planning Authority) and National Highways (Strategic Route Network Authority). Scoping consultation with officers was undertaken during late 2021 and identified that the assessment of key highways and transport issues should be concentrated on

understanding future predicted HGV and car traffic levels associated with the Proposed Development and the anticipated changes in future highway network conditions that could be expected to occur as a result of the proposals.

9.3.4 In accordance with best practice, the assessment of the transport-related effects of the Proposed Development has been undertaken in line with advice set out in the following documents:

- "Guidelines for the Environmental Assessment of Road Traffic" produced by the Institute of Environmental Assessment (March 1993) (now Institute of Environmental Management and Assessment (IEMA);
- "The Design Manual for Roads and Bridges", produced by the Department for Transport (DfT); and
- National Planning Practise Guidance (NPPG) "Travel Plans, Transport Statements and Travel Plans" (Ref: 42-014-20140306).

9.3.5 This guidance identifies that impact assessment can generally be classified as follows:

- Operational Issues – i.e. does the study area of the highway network offer sufficient capacity to accommodate development traffic movements and what improvements might be required to ensure suitable future year operational performance?
- Environmental Issues – i.e., what are the environmental effects of predicted development related traffic movements and what mitigation measures might be required in order to manage these effects, to ensure that they fall within appropriate thresholds?

<u>Transport Network Operational Assessment Approach</u>

9.3.6 Development related network operational impact has been considered via reference to the following key operational performance indicators:

- Link flow impact assessment – percentage change in Baseline (Do Nothing/Do Minimum) traffic conditions associated with the operation of the Proposed Development under any new planning permission (Do Something); and
- Detailed junction capacity modelling - using appropriate industry standard computer modelling software.

9.3.7 A detailed review of this highway network operational performance analysis is

provided in the TA report (see, in particular, section 9 of the formal TA report). The TA document sets out the detailed appraisal methodology for highway network link and junction impact and draws appropriate conclusions as to the ability of the network to accommodate development traffic flows from a transport safety and capacity perspective.

9.3.8 The TA report considers the following extent of study network, the nature of which has been established via formal scoping discussions with the key highway stakeholders:

Link Flow Impact Assessment (Percentage Change)

- Back Lane (North of Back Lane Quarry Access)
- Back Lane (South of Back Lane Quarry Access)
- Back Lane
- B6254 Kellet Road (East of Back Lane)
- B6254 Kellet Road (West of Back Lane)
- B6601
- B6254 Kellet Road (East of B6601)
- B6254 Kellet Road (West of B6601)
- B6254 Kellet Road (East of Leaper's Wood Quarry Access)
- B6254 Kellet Road (West of Leaper's Wood Quarry Access)

Junction Operational Assessment (PICADY Models)

- Site Access/Back Lane priority T-junction;
- Back Lane/B6254 Kellet Road priority T-junction; and,
- B6254 Kellet Road/B6601 priority T-junction.

9.3.9 In line with industry standard methodology, the TA report concentrates on the operation of the highway network under the worst case "Do Something" Cumulative Development scenario i.e. including for future year traffic growth, the impact of the completion of all committed local development and the effects of the Proposed Development.

<u>Transport-Related Environmental Assessment Approach</u>

9.3.10 This chapter of the ES concentrates on the potential environmental effects of development related traffic, in terms of the effects of changes in traffic movements on local amenity and sensitive users and receptors, which will influence key

environmental criteria such as noise, air quality and vibration.

9.3.11 IEMA guidelines have been used as the core reference document to inform the environmental appraisal of development related road traffic effects. These guidelines suggest the following general rules of thumb when considering the initial screening of traffic related environmental effects and the identification of where more detailed analysis of specific effects might be required:

- "Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)
- Rule 2: Include any other specifically sensitive areas where traffic flows have increased by 10% or more".

9.3.12 An important consideration as part of the review of likely traffic-related environmental effects of the Proposed Development is that the proposal site is an existing operational facility with a number of different uses and, as demonstrated later in this chapter, will not propose any changes to the daily operation of the existing quarry and therefore will not give rise to any changes in current operational quarry traffic on the highway network. The existing operations at the site (concrete block manufacturing, asphalt production etc.) therefore effectively represents baseline "Do Minimum" highway network conditions for the assessment of the Proposed Development.

9.3.13 With respect to the core Rule 1 (30%) threshold, IEMA guidance notes that traffic forecasting is not an exact science and that it is generally accepted that accuracies of greater than 10% are not achievable. Day-to-day variation of traffic on a route corridor is frequently at least some +/– 10% of data recorded on a single survey date. The IEMA guidelines therefore suggest that, at a basic level, projected changes in total traffic of less than 10% would create no discernible environmental impact.

9.3.14 IEMA guidance further notes that the most discernible environmental effects of road traffic are considered to be noise and vibration, severance, and pedestrian delay and intimidation. In terms of these potential impacts, IEMA guidance states the following:

- In general, people are unable to perceive a change in noise nuisance for changes in noise levels of less than 3dB(A), such changes require a "doubling or halving in the level of traffic".
- At low flows, increases in traffic of around 30% can double the delay

experienced by pedestrians attempting to cross a road.

- Severance (community disruption) and intimidation are much more sensitive to traffic flow and DfT suggests 30%, 60% and 90% changes in traffic levels should be considered as 'slight', 'moderate' and 'substantial' impacts respectively.

9.3.15 Other environmental impacts (e.g., pollution, ecology, etc.) are considered to be less sensitive to traffic flow changes, and IEMA guidelines recommended that, as a starting point, a 30% change in traffic would represent a reasonable threshold for the need to undertake a more detailed assessment of environmental conditions (our emphasis). Where there are major changes in the composition of the traffic flow, for example a much greater flow of HGVs, the IEMA guidance identifies that a lower percentage change threshold might be appropriate, and the assessor should use their professional judgement as to whether additional detailed assessment is required on any specific route corridor.

9.3.16 Guidance with respect to Rule 2 (10% threshold) identifies that the assessor should consider the inclusion of any other locations or network links where a 10% change in traffic demand is predicted in specific environmentally sensitive areas (our emphasis). The IEMA guidelines suggest a sensitive receptor could include accident blackspot locations, conservation areas, routes outside hospitals, links with high pedestrian flows, etc. IEMA guidance notes that it would not normally be appropriate to consider links where total traffic flows have changed by less than 10% unless there are significant changes in the composition of traffic e.g., an unusually large increase in the number of heavy goods vehicles. Ultimately the assessor is charged with utilising professional judgement to determine whether further assessment is necessary in such cases. In coming to such a judgement, the assessor will also need to reflect the cumulative effects of a combination of new development schemes against background conditions, which is typically inherent to good practice future year network demand modelling.

9.3.17 In the case of the immediate study network to the Proposed Development site, comprising the key local routes of Back Lane, the B6254 Kellet Road and the B6601, such routes are not considered to be of a sensitive nature. Whilst a limited section of Back Lane does include for elements of residential frontage, it is considered that these routes do not represent particularly sensitive links as defined by the IEMA guidelines, due to their more strategic local and district distributor road roles.

9.3.18 For clarity, the assessment work set out below has been prepared on the industry standard IEMA approach i.e. that a projected change in total traffic or HGV traffic levels of less than the relevant IEMA screening threshold (30%) on each link would not be likely to give rise to a discernible traffic related environmental effect and, in such cases, further detailed assessment would not be required. As noted above, IEMA guidance identifies that traffic effects, including air pollution, are typically less sensitive to traffic flow changes and that a 30% change in total traffic flow represents a reasonable threshold for perceptible impact and thus the inclusion of a link as part of more detailed assessment to determine the extent of effects. The above IEMA guidance, however, does not apply to links that fall within designated Air Quality Management Areas (AQMAs), where more stringent thresholds have been identified by recent guidance produced by the Institute of Air Quality Management (IAQM). For those links that fall within designated AQMAs, IAQM guidance identifies a threshold level for new development traffic on a link of 100 two-way light vehicle movements per day or 25 two-way HGV movements. The choice of links for detailed traffic related Air Quality assessment is considered in more depth in Chapter 11 of this report.

9.3.19 Paragraphs 9.3.10 – 12.3.18 to this ES chapter set out the broad methodology to be adopted for the assessment of any likely significant transport-related environmental effects of the Proposed Development. This includes reference to the preliminary IEMA screening approach for road traffic effects, based on the core 10% and 30% screening thresholds. In those cases where these relevant screening thresholds would be exceeded, Column 3 in Table 2.1 of the IEMA guidelines sets out a list of environmental effects that are appropriate for consideration in further detail.

9.3.20 Definitions of each of the traffic-related environmental effects identified in the IEMA guidelines are summarised below, along with explanatory text relating to assessment criteria. Paragraph 2.4 of the IEMA guidelines notes that not all of the effects listed in column 3 of Table 2.1 to the IEMA guidance are applicable to every development. In the case of the surrounding highway network to the Proposed Development it is considered that the following matters represent the relevant traffic environmental factors suitable for further review, should preliminary IEMA screening thresholds be exceeded:

- *Pedestrian Delay:* Delay occurring to pedestrians as a result of traffic demand impacting upon their ability to cross the carriageway. The

provision of crossing facilities, the geometric characteristics of the road and the traffic volume, speed and composition are all factors that can determine delay. The IEMA Guidelines advise that quantitative thresholds should be avoided when assessing pedestrian delay impacts, with professional judgment to be used in its place.

- *Pedestrian Amenity:* The term pedestrian amenity is described broadly as the relative pleasantness of a journey. It is considered to be affected by traffic flow, speed and composition as well as footway width and the separation/protection from traffic. It encompasses the overall relationship between pedestrians and traffic. There are no commonly agreed thresholds for quantifying the significance of changes, although the IEMA guidelines tentatively suggest that where traffic flows double, a significant effect is likely to be experienced.

- *Severance:* The perceived division that can occur within a community when it becomes separated by a major traffic artery. Severance is difficult to measure and by its subjective nature is likely to vary between different groups within a single community. In addition to the volume, composition and speed of traffic, severance is also likely to be influenced by the geometric characteristics of a road, the demand for movement across a road and the variety of land uses on either side. In general terms, according to the IEMA guidelines, changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance respectively. DfT guidance also notes that any severance effects at at-grade crossing points of routes experiencing daily traffic demand levels of less than 8,000 vehicles per day are likely to be 'slight'.

- *Driver Delay:* Delay generally occurs at junctions where there are opposing movements and where vehicles are required to either give or receive priority. Delay for non-development related traffic can be expected to occur at; a) new site access junctions where main road priority is changed; b) at key intersections within the immediate catchment where the proposal site might contribute significant additional traffic demand, and; c) at existing junctions where side road traffic already struggles to access the mainline, thereby potentially increasing such side road delays. In practice, delay is only likely to be significant at those junction locations

when combined background + development traffic levels exceed or approach capacity i.e., the Ratio of Flow to Capacity (RFC) value approaches or exceeds 1.0.

- *Road Safety:* Assessments should incorporate a review of collision data and the local prevailing conditions, in particular traffic speed, flow and composition as well as vehicle conflict and pedestrian activity. Professional judgment is used to determine the significance of the effect;
- *Air Quality and Dust:* The air quality effects arising from new traffic flow and the environmental implications of dust and dirt generated by such traffic movements. As noted above, IEMA guidance identifies that pollution effects are typically less sensitive to traffic flow changes and that a 30% change in total traffic flow represents a reasonable threshold for perceptible impact and thus the inclusion of a link as part of more detailed assessment to determine the extent of effects. The relevant effects associated with air quality impacts are considered in more detail in the dedicated air quality chapter of this ES (Chapter 11), the key findings of which are identified in this chapter where relevant.
- *Noise and Vibration:* The environmental implications of noise and vibration arising from changes in traffic flow and additional movements. Research suggests that generally people cannot perceive a change in noise nuisance for changes in noise levels of less than 3dB(A) – such changes require a doubling or halving in the level of traffic. Notwithstanding this, traffic-related noise matters are considered separately and in more detail in the dedicated noise and vibration Chapter of the ES (Chapter 10).

Significance Criteria

9.3.21 The assessment of likely significant environmental effects associated with the Proposed Development takes into account transport effects associated with the day-to-day operational impacts of the development – in the case of the Back Lane Quarry there would be no prior construction stage and therefore no requirement to consider potential construction stage effects. The significance level attributed to each impact identified has been assessed based on the magnitude of traffic and transport-related changes expected to take place as a consequence of the Proposed Development or cumulative effects including other local schemes, and the sensitivity of the affected receptor or receiving environment to any such

changes.

9.3.22 The approach to the assessment of the significance of effects has been based on the following definitions, which have been adapted from relevant guidance notes.

- Major Beneficial;
- Moderate Beneficial;
- Minor Beneficial;
- Negligible;
- Minor Adverse;
- Moderate Adverse; and,
- Major Adverse.

9.3.23 For guidance the above impact significance criteria should be considered as follows:

- Major impact: where the Proposed Development would have a substantive impact (either positive or negative), resulting in a loss of resource and/or the quality and integrity of a resource or location via a major impact on key characteristics, features or elements;
- Moderate impact: where the Proposed Development would have a noticeable impact (either positive or negative), resulting in a loss of resource, but not adversely affecting the integrity (partial impact on key characteristics, features or elements);
- Minor impact: where the Proposed Development would result in a small, barely noticeable impact (either positive or negative), resulting in some measurable changes in attributes or one or more key characteristics, features or elements; and,
- Negligible: where no discernible impact is predicted as a result of the Proposed Development.

9.3.24 Impacts classified as Major or Moderate are considered as being potentially 'Significant' in environmental assessment terms. Typically changes in baseline traffic levels of less than 30% due to development are not anticipated to result in clearly discernible traffic-related environmental effects and thus form the basis for the screening of potential significant effects. As noted above, a secondary 10% screening threshold has been identified for specific 'sensitive' locations, however, in general this secondary threshold is not considered as being appropriate to the majority of routes forming the local study network to the Proposed Development (see paragraphs 9.3.17 & 9.3.18).

Assumptions/Limitations

9.3.25 Comparative assessment work set out within this chapter has been undertaken for the assessment years of 2024 (effective First Year of operations based on the anticipated date of any planning approval) and 2033 (Future Year of operations in line with National Highways' requirements).

9.3.26 Assessments of link impact are typically undertaken for the anticipated opening year (in this case 2024, the first year of any new consent – see Para 9.3.30 below), which should provide the maximum proportional impact of the development proposals. Assessments consider the change in traffic flows arising in the "Do Something" scenario against the "Do Minimum" scenarios which represent the effective future baseline traffic flow conditions across the study area highway network.

9.3.27 Assessments of study area network junction capacity are typically undertaken for both the anticipated opening year (2024 as the First Year in this instance) as well as a future "design" year (Future Year – in this instance 2033 - see Para 9.3.30 below) for all scenarios. Future Year traffic flow forecasts represent the worst-case assessment conditions for junction capacity when compared to Opening Year/First Year conditions (future year conditions would see a higher total volume of traffic assessed at each junction that opening year conditions).

9.3.28 All network assessment work set out in this chapter has been based on bespoke 24hr traffic survey information collected at key junction locations within the local network study area during September 2022. This survey data was undertaken during local school term time conditions. This data ensures for a robust estimate of prevailing local traffic conditions and allows for the direct calculation of 12hr, 18hr and 24hr traffic estimates.

9.3.29 The forecasting of future Baseline traffic conditions includes for the modelling of both underlying network traffic growth (through the use of locally adjusted TEMPRO traffic growth estimates) and the direct modelling of development traffic associated with local consented "committed" development as identified by the LPA in their EIA Scoping Opinion. The estimation of traffic volumes associated with this committed development has been carried out based on data taken from transport submissions prepared in support of the relevant historical planning consents (see section 7 of the TA included as Technical Appendix E).

Assessment Years and Reference Time Periods

9.3.30 The consideration of the day-to-day operation of the Proposed Development has been carried out for the following assessment years:

- 2024: Representing likely 'First Year' of the facility i.e. the first year of operation of the facility based on the anticipated timescales for securing planning approval;
- 2033: Representing a 'Future Year' horizon, 10 years post-registration of the planning application - in line with National Highways' policy which requires future year assessments either 10 years post-registration or at the final year of the Local Plan period, whichever is the later. As the Joint Lancashire Mineral and Waste Development Framework Core Strategy DPD period ran to 2021, the later assessment year of 2033 has been utilised.

9.3.31 The consideration of such future year network conditions reflects good practice set out in NPPG and as outlined at the assessment scoping stage and ensures a robust appraisal of future local highway network operation.

9.3.32 In order to provide a robust assessment of the anticipated traffic-related effects of the operation of the Proposed Development, this ES Chapter considers both the time periods of maximum potential combined network traffic demand on the local network, as well as core daytime (12h) traffic levels. On this basis, reference to the following time periods has been included:

- Weekday AM Network Peak Period: 08:00-09:00
- Weekday PM Network Peak Period: 16:45-17:45
- Weekday Core 12-Hour Day Time Period: 07:00-19:00

9.3.33 Based on the experience of the operation of other quarry facilities across Lancashire and the remainder of the UK, which sees the majority of operational quarry traffic movements take place during core weekday periods, the analysis in this chapter focuses on working weekday highway network operation, with no traffic analysis work carried out for weekend periods.

9.3.34 As noted above, for the purposes of traffic-related environmental assessment, the core future operational scenarios have been referenced in detail within the remaining sections of this ES chapter:

- Baseline "Do Minimum" Scenario: Baseline traffic including for all relevant local committed developments and including for other existing operational

uses at Back Lane Quarry e.g. asphalt production and concrete block manufacturing facilities, but specifically excluding the operation of the quarry itself. As outlined earlier in this chapter, the "Do Minimum" scenario is a somewhat artificial scenario which wouldn't occur in practice due to the extant quarry consent that runs to April 2048. Crucially, however, it enables the assessment of the quarry's traffic-related environmental effects in isolation.

- Baseline + Proposed Development "Do Something" Scenario: Baseline traffic including for all relevant local committed developments, plus delivery of the revised quarry scheme which comprises the Proposed Development at the Back Lane works site.

9.4 Baseline Conditions

Local Highway Network: Background Traffic Conditions

9.4.1 A detailed description of the highway network to the Proposed Development site is set out in section 3.1 to the Transport Assessment report. This description includes for the layout of the immediate sections of Back Lane, the local T-junction connection to the B6254 Kellet Road and the T-junction connection between the B6254 Kellet Road and the B6601, which provides onward connectivity to J35 of the M6 motorway.

9.4.2 Background traffic levels on key sections of the immediate highway network to the application site have been identified via the undertaking of bespoke weekday traffic surveys during September 2022. These surveys were carried out for a 24hr period and recorded both traffic demand levels and observed queuing.

9.4.3 Review of the 2022 background traffic survey information identifies the following weekday AM and PM peak hours.

- AM Peak: 08:00 – 09:00
- PM Peak: 16:45 – 17:45

9.4.4 Review of the 2022 background traffic data derived from this survey exercise (see Figures TA6a-c within the TA) demonstrates the following key background trends:

- Existing traffic demand on the Back Lane approach to the Quarry site access is generally low with a maximum of c220 vehicles on the southbound approach during the PM peak period, and between 150-170 vehicle movements in each direction during the AM peak. Two-way traffic levels

past the site frontage during each peak period total just over 300 movements - such traffic levels represent approximately just 5 vehicle movements per minute past the site access during the busiest periods.

- Peak hour traffic flow on the B6254 Kellet Road at the junction with Back Lane is not especially high, with levels recorded at c740 and 870 two-way vehicle movements per hour in the AM and PM peaks respectively. HGV demand on this route is also generally low, at less 2-5% of total traffic levels on each approach during both peak periods, save for the eastern approach during the AM peak when HGV levels increase to c10% of total traffic – some of these HGV movements will relate to existing operational activity at the Back Lane Quarry site.
- Further to the east – east of the B6601 – traffic levels on the B6254 Kellet Road are notably lower than those to the west on the route. Recorded peak hour traffic levels on the eastern arm of the junction with the B6601 stand at just 337 and 320 two-way movements during the AM and PM periods respectively.
- Background traffic demand on the B6601 to the north of the B6254 Kellet Road is also relatively low, particularly for a key connection to the SRN, with levels recorded at 711 two-way vehicle movements in the AM peak increasing to 840 in the PM peak. Such traffic levels are similar to those observed on the B6254 Kellet Road at the junction with Back Lane.

Local Highway Network: Highway Safety

9.4.5 An appraisal of the operational safety of the immediate local highway network to the application site has been carried out in section 3.3 of the TA, through a review of historical Personal Injury Accident (PIA) data for the most recently available 5.5-year search period (2017-2021).

9.4.6 This review has identified a generally low frequency of incidents across the study area highway network junctions (only 1-2 incidents per site). All of the five incidents involved cars, with two of the five involving right turning junction entry or exit movements, and two involving drivers hitting slowing/stopped vehicles on junction approaches. All of the incidents were of slight injury classification. Given that these incidents occurred at junctions where visibility to or from the side road access point is generally good, it is considered that there are no clear junction geometry or layout factors that may have contributed to these incidents – the majority appear to be linked more to driver inattention and/or failure to observe

other road users.

9.4.7 Given the generally limited accident record of the immediate local highway network to the Proposed Development site, and the low frequency of incidents recorded at wider network junctions with no clear common contributory factors, the TA concludes that there are no prevailing material road safety issues that would call the Proposed Development scheme into question.

Local Highway Network: Site Accessibility

9.4.8 Section 4 of the TA provides a detailed appraisal of the general accessibility of the site by alternative travel modes to the private car. It is noted that, whilst the site is well-related to the anticipated main catchment areas for quarry materials, therefore providing good opportunities for sustainable management practices, it is also recognised that the site's location within a relatively rural area means that is it located some distance from significant centres of population. Accordingly, and given the shift patterns worked by many of the operatives based at the site, opportunities for staff and visitor access via sustainable travel modes such as walking, cycling and public transport are anticipated to be potentially relatively modest.

9.4.9 Notwithstanding the above, it is also recognised that quarry facilities may be operated by a number of staff who would travel to and from the site on a daily basis, some of whom could potentially live in nearby settlements or could be encouraged to utilise more sustainable travel modes for all or part of their journey. The TA therefore goes on to consider the extent to which practical local travel connections are available to access the quarry facility at Back Lane.

9.4.10 The conclusions of the accessibility audit are that the application site represents a reasonable location for ongoing quarry development in transport sustainability terms, being located in close proximity to the Strategic Route Network and surrounding product markets. The site location also lies within a practical walk and cycle catchment of the nearby local settlement of Carnforth and its environs. Such locational characteristics should assist in meeting the key sustainable planning objectives of promoting opportunities for the use of alternative travel modes to the private car and managing the overall traffic impact associated with the Proposed Development.

Future Baseline "Do Minimum" Conditions

9.4.11 As outlined in section 9.3 it is anticipated that, based upon current forecasts planning approval for the Proposed Development could be secured in 2024, with the new permission becoming operationally effective immediately – this would effectively represent the "First Year" of any new permission. In addition to a "First Year" for assessment of 2024, a future assessment year of 2033 has been identified for the assessment of Future Year conditions in line with National Highways policy.

9.4.12 Estimates of Baseline traffic for the assessment of development related impact are outlined in Section 7 of the TA. This section outlines a series of steps to the derivation of Baseline "Do Minimum" traffic flow conditions as follows:

- Future year "Background" traffic: Application of regional growth factors derived from the National Transport Model (NTM) and adjusted by local TEMPro factors to reflect local traffic trends (as well as local growth forecasts which include Local Plan forecasts of employment and residential growth). This calculation step "factors" surveyed 2022 data to each of the assessment years outlined above to create background traffic flows for each assessment year. As part of this process traffic associated with the other existing uses at Back Lane (asphalt and concrete block production facilities) is removed before application of growth factors to the remaining background network traffic; and
- Future year "Baseline" traffic: Traffic associated with the other existing Back Lane uses (see above) is added, along with addition of committed development traffic forecasts associated with the following schemes identified in the Lancashire CC EIA Scoping Opinion;
    - Carnforth Brow Residential Development (Planning Ref: 16/00335/OUT)
    - Scotland Road Residential Development (Planning Ref: 18/00365/OUT)
    - Kellet Road Commercial Development (Planning Ref: 19/00545/HYB)

9.4.13 In addition to the above traffic associated with the operation of the nearby Leaper's Wood Quarry is also added, to derive the overall future year Baseline traffic flows across the study area highway network.

9.4.14 The above process gives rise to the determination of Baseline "Do Minimum" traffic

flow conditions across the study area highway network for each of the assessment year time periods.

9.5 Assessment of Effects

Predicted Levels of Development Operational Traffic Demand

9.5.1 The proposed deepening of the Back Lane Quarry would not result in any change in daily operational activity in terms of export quantities, and therefore HGV traffic. Rather, the proposals would ensure the continued operation of the facility at the same extraction rates as present, up to a cessation date of 2077.

9.5.2 With the above in mind, the proposed development would therefore give rise to the same levels of traffic as current operations. Section 5 of the TA report (see Technical Appendix E) includes for a review of current site operations, based on weighbridge information supplied by the site operators for the week in which traffic surveys were undertaken on the local highway network – week commencing the 5th September 2022. Section 8 of the TA goes on to provide a detailed review of the anticipated trip generation of the Proposed Development.

Operational HGV Traffic

9.5.3 Assessment of the potential typical daily traffic generation associated with the proposed deepening of the quarry has been based simply on the continuation of observed existing typical site operations. As already noted in this ES, extraction rates at the quarry under the proposed operations would remain the same as have been recorded historically. Assessment has therefore been undertaken by simply re-applying the observed quarry development traffic to the 2024 and 2033 assessment year baseline traffic flows.

9.5.4 In order to inform this assessment, therefore, historical weighbridge data has been supplied by the Applicant which has enabled a detailed review of materials exports and related HGV traffic levels on the study area highway network specifically associated with quarrying operations. Data has been provided for the following periods:

- Total annual weighbridge records for the period 2016-2021;
- Total monthly weighbridge records for the period January 2016 – September 2022; and,
- Daily weighbridge records for the week commencing 5 September 2022 (covering the traffic survey period).

9.5.5 This data includes for all material sales, including those direct to the other on-site operations such as the asphalt production plant and the concrete block manufacturing facility. Crucially, the data includes for all movements associated with quarry export vehicles, which are able to be separated from those sales relating to internal transfers of materials between site operations.

9.5.6 Figure TA12 illustrates the profile of export tonnages from the Back Lane Quarry site for the period 2016-2022 inclusive – this includes not only for deliveries from the quarry, and collections, but also includes for internal sales of product to the on-site asphalt and concrete block production facilities i.e. this represents the total tonnage of product extracted from the quarry. Review of the profile of historical annual export tonnages identifies that, on average, between 1.0-1.2m tonnes per annum of product are typically produced – the average across the seven-year period 2016-2022 stands at 1.1mtpa.

9.5.7 Further to the historical annual export tonnage totals, Figure TA13 illustrates the profile of average monthly export tonnages from the quarry operations for the same period of 2016-2022 inclusive. Review of Figure TA13 highlights seasonal variation in exports is limited, albeit exports do fall away to a degree during December, when exports stand at c72,000t vs. typical monthly tonnages of c93,000t.

9.5.8 Peak monthly exports are noted as occurring in March, when an average of approximately 106,000 tonnes of product are produced/exported from the quarry facility. Monthly export levels during September – the month in which traffic surveys were undertaken – are observed to average c94,700t which corresponds broadly with the average monthly input tonnage across the 6-7year period (93,000t).

9.5.9 In order to provide a review of the typical daily and hourly profile of trips to/from the quarry operations, weighbridge data has been provided by AI for the week commencing 5 September 2022, which coincides with the week in which network traffic surveys were undertaken, as outlined at Section 3.2 of this report. The data includes such information as date/time of weigh out, net weight, and the vehicle destination. The data also specifically outlines those product exports which take place to the other Back Lane Quarry site operations – the asphalt and concrete block production facilities. Accordingly, in order to identify the profile of typical daily and hourly trips, these “internal” sales have been removed from the weighbridge data. The resulting data comprises purely deliveries and collections of

product from the site. A plot of the total daily export trips (HGVs) for the week is illustrated at Figure TA14, whilst Figure TA15 illustrates the daily export tonnages for the week.

9.5.10 Review of Figures TA14 and TA15 serves to highlight that export levels throughout the week are generally constant, at approximately 4,000t per day and between 170-190 HGV export movements. The peak daily demand is noted as occurring on the Wednesday of the period supplied, with a total daily flow of 191 HGV export trips (191 in / 191 out) and associated tonnage of 4,296t. On the day that traffic surveys were undertaken, a total of 171 HGV export trips are recorded (171 in / 171 out) with an associated export tonnage of 3,902t. The average number of HGV export trips per day is noted as 179 (179 in / 179 out) with an associated average daily tonnage of 3,983t.

9.5.11 Based on the average export tonnages outlined above, and the average number of HGV loads per week, the overall average payload of vehicles transporting product from the site is 22.25t. On the day of the surveys, the average payload of HGVs was recorded at 22.8t. Quarry HGVs predominantly comprise rigid 8-wheel tippers with a payload of approximately 20t (Gross Vehicle Weight (GVW) 32t), and articulated tippers with a payload of c29-30t (GVW 44t).

9.5.12 Table 9.1 below, along with Figure TA16, illustrates the daily profile of export HGV trips recorded on the day of the traffic surveys, 6 September 2022, whilst Figure TA17 illustrates the daily profile of exports by weight on the day of the surveys. It should be noted that in terms of HGV arrival movements the supplied weighbridge information only identifies vehicle loads on departure from the quarry. Once on-site dwell times have been accounted for, as well as the length of the quarry access road between Back Lane and the weighbridges, there would likely be some difference between hourly arrival and departure flows as some vehicles arrive in one period but depart in another. With this in mind the recorded HGV weighbridge data has been reviewed in terms of hourly crossover times and the arrival and departure profiles derived from that exercise. Comparison against observed HGV turning movements across the daytime period within the survey data has identified that these derived profiles accord.

9.5.13 Review of Table 9.1 demonstrates peak HGV numbers of 56 two-way movements per hour, recorded in the hour 06:00-07:00 (25 in / 31 out). This level of demand equates to just less than 1 HGV movement every minute. During the AM network peak hour of 08:00-09:00 33 two-way HGV movements are noted (18 in / 15 out),

which equates to approximately 1 HGV movement every 2 minutes. No HGV movements are noted during the network PM peak hour of 16:45-17:45 (review of the detailed weighbridge records identifies the last HGV departure from the quarry at 16:30 on the day of the surveys).

Hour Beginning	Arrival*	Departure	Total
00:00	0	0	0
01:00	0	0	0
02:00	0	0	0
03:00	0	0	0
04:00	1	0	1
05:00	16	11	27
06:00	25	31	56
07:00	15	15	30
08:00	18	15	33
09:00	11	12	23
10:00	12	11	23
11:00	12	13	25
12:00	13	13	26
13:00	18	19	37
14:00	19	19	38
15:00	6	7	13
16:00	5	5	10
17:00	0	0	0
18:00	0	0	0
19:00	0	0	0
20:00	0	0	0
21:00	0	0	0
22:00	0	0	0
23:00	0	0	0
12Hr (07:00-19:00)	**129**	**129**	**258**
18Hr (06:00-00:00)	**154**	**160**	**314**
24Hr	**171**	**171**	**342**

Table 9.1 – Recorded HGV Export Traffic - 6 September 2022

Staff/Visitor Movements

9.5.14 As would be expected, it should be noted that additional staff and visitor trips are not identified within the weighbridge data. In order to identify staff/visitor movements associated with the quarry operations, information has been provided by the operator in respect of staff shift timings and numbers (detailed in Section 5.2 of the TA). On the basis of this information, Table 9.2 below illustrates the

profile of typical total staff and visitor traffic movements throughout the day.

Hour Beginning	Arrival	Departure	Total
00:00	0	0	0
01:00	0	0	0
02:00	1	2	3
03:00	0	0	0
04:00	0	0	0
05:00	29	0	29
06:00	3	0	3
07:00	1	0	1
08:00	1	1	2
09:00	1	1	2
10:00	1	1	2
11:00	1	1	2
12:00	1	1	2
13:00	1	1	2
14:00	0	1	1
15:00	0	5	5
16:00	0	20	20
17:00	2	7	9
18:00	0	0	0
19:00	0	0	0
20:00	0	0	0
21:00	0	0	0
22:00	0	0	0
23:00	0	1	1
12Hr (07:00-19:00)	**9**	**39**	**48**
18Hr (06:00-00:00)	**12**	**40**	**52**
24Hr	**42**	**42**	**84**

Table 9.2 – Typical Quarry Staff & Visitor Traffic Profile

Total Quarry Traffic Movements

9.5.15 On the basis of the above analysis, Table 9.3 below illustrates the typical daily profile of total car/LGV and HGV movements associated with the operation of the existing Back Lane Quarry.

Hour Beginning	Arrival	Departure	Total
00:00	0 (0)	0 (0)	0 (0)
01:00	0 (0)	0 (0)	0 (0)
02:00	1 (0)	2 (0)	3 (0)
03:00	0 (0)	0 (0)	0 (0)
04:00	1 (1)	0 (0)	1 (1)
05:00	45 (16)	11 (11)	56 (27)
06:00	28 (25)	31 (31)	59 (56)
07:00	16 (15)	15 (15)	31 (30)
08:00	19 (18)	16 (15)	35 (33)
09:00	12 (11)	13 (12)	25 (23)
10:00	13 (12)	12 (11)	25 (23)
11:00	13 (12)	14 (13)	27 (25)
12:00	14 (13)	14 (13)	28 (26)
13:00	19 (18)	20 (19)	39 (37)
14:00	19 (19)	20 (19)	39 (38)
15:00	6 (6)	12 (7)	18 (13)
16:00	5 (5)	25 (5)	30 (10)
17:00	2 (0)	7 (0)	9 (0)
18:00	0 (0)	0 (0)	0 (0)
19:00	0 (0)	0 (0)	0 (0)
20:00	0 (0)	0 (0)	0 (0)
21:00	0 (0)	0 (0)	0 (0)
22:00	0 (0)	0 (0)	0 (0)
23:00	0 (0)	1 (0)	1 (0)
12Hr (07:00-19:00)	**138 (129)**	**168 (129)**	**306 (258)**
18Hr (06:00-00:00)	**166 (154)**	**200 (160)**	**366 (314)**
24Hr	**213 (171)**	**213 (171)**	**426 (342)**

Total vehicles (HGVs)

Table 9.3 – Total Back Lane Quarry Traffic Profile

9.5.16 Review of Table 9.3 identifies that over the course of the daytime 12-hour period, Back Lane Quarry operations typically give rise to approximately 300 two-way vehicle movements, of which c260 comprise HGV movements. During the AM peak hour period two-way movements of c40 vehicles are typical, of which the majority comprise HGVs. Quarry related traffic levels during the PM peak hour are typically fairly low at c10 movements of which none are HGVs. This level of traffic would equate to less than 1 vehicle movement per minute during the AM peak hour, and just 1 vehicle movement every 6 minutes during the evening peak period. It is considered that such traffic levels would not give rise to any material operational highway related effects across the study area.

Development Traffic Routing

9.5.17 Given that the proposed extension of time for the quarry would effectively ensure that enough mineral reserves are available to work at the site, such that existing quarry operations could continue up to a revised cessation date of 2077, operational site traffic would continue to distribute across the highway network on the same basis as current operations, which are outlined further below.

9.5.18 Loaded HGVs travelling to and from the quarry are currently subject to a routing restriction. This routing restriction is identified within the S106 Legal Agreement associated with the extant planning permission for the Quarry facility, albeit it also includes for vehicles travelling to and from the on-site asphalt production facility. However, the agreement does not include for vehicles associated with the on-site block manufacturing facility.

9.5.19 Loaded HGVs travelling to and from the site, and unloaded HGVs travelling towards the site, are required to do so via the route of Back Lane to the north of the Back Lane Quarry access, and up to its junction with the B6254 Kellet Road. Loaded HGVs are not permitted to travel via the route of Back Lane, to the south of the access. Exceptions to the above HGV routing agreement are defined within the S106 Agreement and include for exceptional circumstances such as local deliveries or road closures affecting the HGV route.

Network Operational Assessment

9.5.20 Assessment of the impact of the development proposals has been carried out through the consideration of both link flow impact and junction operational capacity across the study area as summarised below:

- Site Access/Back Lane priority T-junction;
- Back Lane/B6254 Kellet Road priority T-junction; and,
- B6254 Kellet Road/B6601 priority T-junction.

9.5.21 In line with the typical assessment approach outlined at Para 9.3.6, and the assumptions/limitations outlined from Para 9.3.25, assessments of link impact have been undertaken for the anticipated “First Year” of 2024, which should experience the maximum proportional impact of the development proposals under any new planning permission – proportionally the impact of development will reduce over time as general network traffic grows. Assessments consider the change in traffic flows arising in the “Do Something” scenario against the “Do Minimum” scenario

which represents the effective future baseline traffic flow conditions across the study area highway network.

9.5.22 Similarly, assessments of study area network junction capacity have been undertaken for both the anticipated 2024 First Year as well as the Future Year of 2033, for all scenarios ("Do Minimum" and "Do Something"). These 2033 Future Year traffic flow forecasts would represent the worst-case assessment conditions for junction capacity when compared to the 2024 First Year conditions (future year conditions would see a higher total volume of traffic assessed at each junction than opening year conditions). Accordingly, this ES only presents and considers the results of the worst-case future year assessment scenarios (full results of all scenarios are included in the Appendices of the supporting TA (Technical Appendix E).

Link Flow Impact: "Do Minimum" v "Do Something" Analysis – All Vehicles

9.5.23 Table 9.4 below illustrates the anticipated changes in 2024 First Year Baseline "Do Minimum" traffic flows (all vehicles) when compared to predicted 2024 "Do Something" Baseline + Proposed Development traffic levels.

Two-way Link Flow	Proportional Impact (%)		
	AM Peak Period (08:00-09:00)	PM Peak Period (16:45-17:45)	12-Hour Period (07:00-19:00)
Back Lane/Back Lane Quarry Access			
Back Lane (N)	11.6%	1.1%	11.7%
Back Lane (S)	0.1%	1.6%	0.6%
B6254 Kellet Road/ Back Lane			
B6254 Kellet Road (E)	4.5%	0.2%	3.9%
Back Lane	12.1%	1.1%	12.0%
B6254 Kellet Road (W)	0.1%	0.2%	0.2%
B6254 Kellet Road/B6601			
B6254 Kellet Road (W)	4.5%	0.2%	3.9%
B6601	3.9%	0.2%	3.5%
B6254 Kellet Road (E)	1.4%	0.3%	0.9%
B6254 Kellet Road/Leapers Wood Quarry Access			
B6254 Kellet Road (E)	1.5%	0.3%	1.0%
B6254 Kellet Road (W)	1.4%	0.2%	0.9%

Two-way traffic flows

Table 9.4: Predicted 2024 First Year Link Impact – "Do Minimum" vs. "Do Something" (All Vehicles)

9.5.24 Review of the above table identifies that across the study area highway network traffic levels associated with the operation of the Back Lane Quarry do not give rise to any material increases in overall traffic. During all assessed periods traffic quarry related traffic on all links would lie below the key IEMA Rule 1 (30%) threshold when compared to a scenario without any operation of the quarry. Indeed, for the majority of highway network links and for most assessment periods, traffic flow increases as a result of the Proposed Development associated with the Quarry operations falls below even 10% of forecast baseline traffic levels.

9.5.25 With the above in mind, it is therefore concluded that the effects across the study area highway network of operating Back Lane Quarry under the Proposed Development scheme would be negligible. There should therefore be no requirement to consider the environmental effects of the proposals in any greater detail, nor should there be any requirement for mitigation measures to be implemented.

Link Flow Impact: "Do Minimum" v "Do Something" Analysis - HGVs

9.5.26 Table 9.5 below illustrates the anticipated changes in 2024 First Year Baseline "Do Minimum" HGV traffic flows when compared to predicted 2024 "Do Something" Baseline + Proposed Development HGV traffic levels.

Two-way Link Flow	Proportional Impact (%)		
	AM Peak Period (08:00-09:00)	PM Peak Period (16:45-17:45)	12-Hour Period (07:00-19:00)
Back Lane/Back Lane Quarry Access			
Back Lane (N)	251.2%	0.0%	161.2%
Back Lane (S)	0.0%	0.0%	0.0%
B6254 Kellet Road/ Back Lane			
B6254 Kellet Road (E)	104.4%	0.0%	84.8%
Back Lane	181.0%	0.0%	148.7%
B6254 Kellet Road (W)	0.0%	0.0%	0.0%
B6254 Kellet Road/B6601			
B6254 Kellet Road (W)	104.4%	0.0%	85.1%
B6601	48.2%	0.0%	42.9%
B6254 Kellet Road (E)	12.9%	0.0%	9.6%
B6254 Kellet Road/Leapers Wood Quarry Access			
B6254 Kellet Road (E)	40.9%	0.0%	17.1%
B6254 Kellet Road (W)	12.9%	0.0%	9.3%

Two-way HGV traffic flows

Table 9.5: Predicted 2024 First Year Link Impact – "Do Minimum" vs. "Do Something" (HGVs)

9.5.27 Review of the above table identifies that HGV traffic levels associated with the operation of the Quarry result in increases in HGV traffic, across the majority of the local study area highway network, that would exceed the IEMA Rule 1 (30%) threshold when compared to a scenario whereby no quarry operations take place.

9.5.28 Whilst such increases may appear high it is considered that prevailing low levels of HGV traffic across the local highway network, in combination with those associated with the operation of the Quarry, combines to result in such increases. In reality, the volume of Quarry HGV traffic actually remains relatively modest e.g. a total of 33 Quarry HGV movements (total two-way) would occur during the AM peak hour, resulting in a proportional increase of 180-250% on Back Lane, and over 100% on the section of B6254 Kellet Road between Back Lane and the B6601. However, 33 two-way Quarry HGV movements equate to just 1 two-way HGV movement every 2 minutes during this peak network period, which is not considered significant in typical transport assessment terms. Accordingly, it is considered that these forecast increases in HGV traffic are unlikely to have a material impact upon local environmental and operational conditions.

9.5.29 Nevertheless, even with the above in mind, it is concluded that the operational effects of HGV traffic associated with the Proposed Development – the continued operation of the Quarry on the same basis as current operations - could lie anywhere between Negligible on some links (e.g. Kellet Rd east of the B6601), to Minor Adverse on a small number of other links (e.g. B6601), and potentially Moderate to Major Adverse on those links closest to the application site (e.g. Back Lane and the B6254 between Back Lane and the B6601). Whilst it is considered that, in practice, the additional traffic volumes would be modest, it is nonetheless considered appropriate that the environmental effects of the proposals should be considered in further detail, with a view to determining the likely detailed level of effect as well as whether there should be any requirement for mitigation measures to be implemented. This more detailed assessment is included below from Para. 9.5.43.

Junction Operational Assessment

9.5.30 The assessments of Quarry traffic related operational effects above identify that quarry-related HGV traffic across local routes is forecast to be proportionally above the IEMA Rule 1 (30%) threshold, albeit in terms of quantum these levels are considered to be modest. It has therefore been concluded that further detailed

assessment should be undertaken of the potential environmental effects of the Proposed Development. In order to inform the further detailed analysis, which is provided from Para.9.5.43, junction capacity modelling has been undertaken of all junctions within the study area. These assessments should provide further clarification as to whether the Proposed Development would give rise to any measurable effects on the local highway network in terms of driver delay.

9.5.31 Assessments of junction capacity have been undertaken using industry standard analysis software for give way junctions – TRL JUNCTIONS9 – PICADY module (T-junctions & crossroads). The JUNCTIONS software considers junction performance with regard to the Ratio of Flow to Capacity (RFC) and associated traffic queuing. RFC values for approach arms between 0.00 and 0.85 are generally considered to represent stable and acceptable operating conditions. Values between 0.85 and 1.0 represent variable operation i.e. possible substantive queues building up at the junction during the period under consideration and increases in vehicular delay moving through the junction. RFC values in excess of 1.0 represent overloaded conditions i.e. congested conditions. Forecasts of queuing within the assessment modelling process are output in Passenger Car Units (PCUs) which represents a standardised vehicle unit e.g. 1 private car/LGV is equivalent to 1 PCU, whereas a standard HGV is equivalent to 2 PCUs.

9.5.32 Assessments of junction capacity have been undertaken for the AM and PM peak hour periods (08:00-09:00 and 16:45-17:45) at each of the highway network junction locations identified above at Para 9.5.19. Results have been summarised for the "Do Minimum" and "Do Something" scenarios. As outlined at Para. 9.3.27, assessments have been undertaken for both the 2024 First Year and 2033 Future Year, albeit this chapter only summarises the results of the 2033 Future Year assessments, as these represent the worst-case traffic demand conditions when considering junction capacity. For reference the assessments also include for 2022 Survey conditions, which include for the existing operation of the Quarry facility.

Back Lane/Back Lane Quarry Access T-Junction

9.5.33 Tables 9.6a-b below summarise the results of the Junctions9 capacity assessments of the priority-controlled T-junction of the Back Lane Quarry site access route with Back Lane, for each of the assessment scenarios.

AM Peak	2022 Survey		2033 Baseline		2033 Baseline + Quarry	
	RFC	Queue (Veh)	RFC	Queue (Veh)	RFC	Queue (Veh)
Back Lane Quarry Left Turn	0.00	0.0	0.00	0.0	0.00	0.0
Back Lane Quarry Right Turn	0.08	0.1	0.00	0.0	0.08	0.1
Back Lane Right Turn	0.00	0.0	0.00	0.0	0.00	0.0

Table 9.6a: Back Lane/Back Lane Quarry Access Junction – AM Peak

PM Peak	2022 Survey		2033 Baseline		2033 Baseline + Quarry	
	RFC	Queue (Veh)	RFC	Queue (Veh)	RFC	Queue (Veh)
Back Lane Quarry Left Turn	0.01	0.0	0.00	0.0	0.01	0.0
Back Lane Quarry Right Turn	0.02	0.0	0.00	0.0	0.02	0.0
Back Lane Right Turn	0.01	0.0	0.01	0.0	0.01	0.0

Table 9.6b: Back Lane/Back Lane Quarry Access Junction – PM Peak

9.5.34 Review of the above results identifies that the junction is forecast to operate with significant levels of spare capacity during all assessment periods. Quarry-related traffic has only a negligible impact upon junction operation, with a maximum RFC recorded of 0.08 during both the 2022 Survey and 2033 Baseline + Quarry AM peak, with queuing of just 0.1 vehicles.

B6254 Kellet Road/Back Lane T-Junction

9.5.35 Tables 9.7a-b below summarise the results of the Junctions9 capacity assessments of the priority-controlled T-junction of Back Lane with the B6254 Kellet Road, for each of the assessment scenarios.

AM Peak	2022 Survey		2033 Baseline		2033 Baseline + Quarry	
	RFC	Queue (Veh)	RFC	Queue (Veh)	RFC	Queue (Veh)
Back Lane Left Turn	0.15	0.2	0.15	0.2	0.17	0.2
Back Lane Right Turn	0.29	0.4	0.25	0.3	0.33	0.5
B6254 Kellet Road Right Turn	0.19	0.4	0.21	0.5	0.21	0.5

Table 9.7a: B6254 Kellet Road/Back Lane T-Junction – AM Peak

PM Peak	2022 Survey		2033 Baseline		2033 Baseline + Quarry	
	RFC	Queue (Veh)	RFC	Queue (Veh)	RFC	Queue (Veh)
Back Lane Left Turn	0.09	0.1	0.10	0.1	0.10	0.1
Back Lane Right Turn	0.17	0.2	0.19	0.2	0.20	0.2
B6254 Kellet Road Right Turn	0.20	0.4	0.23	0.5	0.24	0.5

Table 9.7b: B6254 Kellet Road/Back Lane T-Junction – PM Peak

9.5.36 Review of the above results identifies that the junction of the B6254 Kellet Road with Back Lane currently operates with significant levels of spare capacity and is anticipated to continue to do so during all future year assessment scenario conditions. Quarry-related traffic has only a negligible impact upon junction operation, with a maximum RFC recorded of 0.33 during the 2033 Baseline + Quarry AM peak, with queuing of just 0.5 vehicles.

B6254 Kellet Road/B6601

9.5.37 Tables 9.8a-b below summarise the results of the Junctions9 capacity assessments of the priority-controlled T-junction of the B6254 Kellet Road with the route of the B6601, for each of the assessment scenarios.

AM Peak	2022 Survey		2033 Baseline		2033 Baseline + Quarry	
	RFC	Queue (Veh)	RFC	Queue (Veh)	RFC	Queue (Veh)
B6601 Left Turn	0.20	0.2	0.25	0.3	0.31	0.4
B6601 Right Turn	0.64	1.7	0.68	2.0	0.76	2.9
B6254 Kellet Road Right Turn	0.21	0.3	0.24	0.3	0.25	0.3

Table 9.8a: B6254 Kellet Road/B6601 T-Junction – AM Peak

PM Peak	2022 Survey		2033 Baseline		2033 Baseline + Quarry	
	RFC	Queue (Veh)	RFC	Queue (Veh)	RFC	Queue (Veh)
B6601 Left Turn	1.03	5.7	1.18	11.1	1.18	11.1
B6601 Right Turn	1.02	18.9	1.17	50.1	1.17	50.2
B6254 Kellet Road Right Turn	0.11	0.1	0.12	0.1	0.12	0.1

Table 9.8b: B6254 Kellet Road/B6601 T-Junction – PM Peak

9.5.38 Review of the above results identifies the priority-controlled T-junction of the B6254 Kellet Road with the B6601 currently operates with reasonable levels of spare capacity during the AM peak hour period and is anticipated to continue to do so during all future year assessment scenario conditions for this period. Maximum RFCs during the AM peak are recorded at 0.76 on the B6601 right turn approach, with queuing of just 2.9 vehicles.

9.5.39 During the PM peak hour, the junction is noted to currently operate with the side road arm of the B6601 over capacity – with RFC values of 1.02 and 1.03 recorded for the side road B6601 turning movements, with corresponding queuing of 18.9 vehicles on the right turn approach and 5.7 vehicles on the left turn approach. It should be reiterated that these operational conditions observed in 2022 include for the current operation of the Back Lane Quarry.

9.5.40 Review of the results for the 2033 Baseline and 2033 Baseline + Quarry scenarios identifies increased RFC values of up to 1.18 on the B6601 side road approach. However, it is clear that traffic associated with Back Lane Quarry has a negligible effect upon junction operational capacity, given that the results between the scenarios are virtually indistinct – RFC and queuing values are exactly the same save

for an additional 0.1 vehicle queuing on the B6601 right turn approach.

Summary of Junction Operational Capacity

9.5.41 The results of the assessments above, of junction operational capacity impact, demonstrate that for the majority of the study area that has been considered, the highway network currently operates with reasonable, if not notable, levels of spare capacity with the existing Quarry operational traffic inherent within surveyed conditions. Moreover, the majority of the highway network has been demonstrated to continue to operate with reasonable levels of spare capacity during all future year "Do Minimum" and "Do Something" conditions. With regard to the level of queuing for each of the junctions considered, the assessment results demonstrate that queuing would remain limited and, therefore, that the effect of the Proposed Development upon driver delay would be negligible. Crucially, it is key to note that traffic associated with the operation of the Back Lane Quarry has been demonstrated to have only a negligible effect, when comparing future year Baseline + Quarry to Baseline conditions.

9.5.42 Certain sections of the study area have, however, been demonstrated as currently operating over capacity on some approach arms, with future year conditions only exacerbating such issues. These existing adverse operational conditions appear to be limited to the B6601 approach to its junction with the B6254 Kellet Road. Nevertheless, as with the remainder of the network noted above, comparison of Baseline + Quarry results against the Baseline position identifies that Quarry operational traffic does not have any material impact on the operation of this junction.

9.5.43 On the basis of the above review of anticipated development impact, it is concluded that the Proposed Development scheme at the Quarry would not give rise to a material impact on the local highway network in terms of driver delay.

Further Detailed Assessment of Environmental Effects

9.5.44 As outlined above, the assessment of the operation of the Proposed Development has identified that increases in HGV traffic would exceed the IEMA Rule 1 (30%) threshold at the following locations:

- Back Lane;
- The B6254 Kellet Road between Back Lane and the B6601;
- The B6601 link; and,

- The B6254 Kellet Road to the east of Leaper's Wood Quarry.

9.5.45 Accordingly, whilst it is considered that the actual quantum of quarry-related HGV traffic is modest and unlikely to give rise to any material effects, it remains appropriate that further detailed consideration should be given to the likely specific environmental effects of this HGV traffic across these links.

9.5.46 The nature of three of the four identified links (B6254 Kellet Road between B6001 and Back Lane, the B6601 and the B6254 Kellet Road east of Leaper's Wood Quarry) is such that they are considered to be similar for the purposes of assessment – there is minimal frontage development save for a small number of commercial uses; none pass through any local settlements; none pass through or near to any other specific sensitive receptors. With these aspects in mind, key environmental impact issues are considered for all three of these links effectively as one.

Back Lane

9.5.47 The following provides a review of the detailed environmental effects of the Proposed Development along the route of Back Lane, between the Quarry access and the B6254 Kellet Road:

- Pedestrian Delay: The route of Back Lane between the quarry site access and the B6254 Kellet Road is characterised by limited frontage development for the majority of its length. The route includes for a pedestrian footways to one side of the carriageway (the southern/western side) for its full length between Nether Kellet, to the south, and the B6254 Kellet Road to the north. Along the section of route to the north of the quarry access frontage development is limited to a number of residential bungalows that lie to the west of the route, and just to the north of Windermere Avenue. Some of these properties are served by an access route from Gunner's Howe Walk, off Windermere Avenue, whilst the remainder are served by access from the small cul-de-sac of Hard Knott Rise, which takes direct access from Back Lane. A bus stop is located just to the south of the junction of Hard Knott Rise with Back Lane, and is served by buses every 2 hours towards Lancaster City Centre.
- From the above it is therefore clear that there is some residential development along this more northerly section of Back Lane, and that the presence of a pedestrian footway and a bus stop is likely to mean that there would be a level of pedestrian demand along the western section of

the route in this location. However, it is considered that the level of pedestrian demand along this section of the local highway network is still likely to be relatively low. Moreover, all pedestrian infrastructure is located to the western/southern side of Back Lane, with the movement of quarry related HGV traffic having no impact on the movement of pedestrians i.e. there are no pedestrian movements that would be delayed by quarry related traffic movements. Accordingly, it is considered that the impact of quarry related HGV traffic upon pedestrian delay on this section of highway would be negligible;

- Pedestrian Amenity: As noted above, there is pedestrian infrastructure, a bus stop, and residential development all located to the western frontage of Back Lane, north of Windermere Avenue. Accordingly there would likely be some level of pedestrian demand along this route, albeit this is envisaged to be relatively low. In terms of quarry related HGV demand, during the AM peak period it is anticipated that up to 33 two-way movements could take place over the hour, which equates to 1 vehicle movement every two minutes. With regard to pedestrian amenity it is therefore considered that the level of impact of quarry related HGV traffic is likely to be **minor adverse**;
- Severance: Whilst there is likely to be some level of pedestrian demand along the section of Back Lane to the north of Windermere Avenue, the footway infrastructure and bus stop outlined above are all located to the western side of the carriageway. There is no infrastructure to the eastern side of the carriageway, and nor is there any development to the eastern side. There are therefore unlikely to be any pedestrian cross-movements across Back Lane. Accordingly, it is considered that the level of impact associated with severance on these sections of local highway network would be negligible;
- Driver Delay: Assessments of junction capacity outlined above in Tables 9.6-9.8 have identified that both the Back Lane Quarry/Back Lane T-junction and the Back Lane/B6254 Kellet Road T-junction would operate with notable levels of spare capacity during all assessment time periods and scenarios and, crucially, that quarry related traffic does not give rise to any notable change in operational conditions. With that in mind it is considered that the Proposed Development would not give rise to any

issues of local traffic congestion or delay on these sections of the local highway network. Accordingly, it is considered that the impact of the Proposed Development upon driver delay would be negligible;

- Road Safety: Section 3 of the TA report (see Technical Appendix E) provides a detailed review of recent road safety history over the local highway network. This exercise demonstrates that the local highway network has a low level of Personal Injury Accident incidents and there is no evidence to suggest that quarry related traffic would directly give rise to any highway safety concerns. Accordingly, it is considered that the impact of development related traffic on highway safety would be negligible;
- Air Quality and Dust: The relevant effects associated with air quality impacts are considered in detail in the dedicated air quality chapter of this ES (Chapter 11). The findings of that assessment are that vehicle emissions arising from the Proposed Development would not give rise to any significant effects. The assessment concludes that the Proposed Development would not cause any exceedances of the air quality objectives and, therefore, that it is not necessary to consider any proposed mitigation measures.
- Noise and Vibration: The environmental implications of noise and vibration are considered in detail in the dedicated noise and vibration Chapter of the ES (Chapter 10). The findings of the noise assessment are that there would be no significant effects arising from road traffic from the Proposed Development. Accordingly, there is no specific requirement for mitigation measures in relation to traffic associated with the Proposed Development.

<u>B6254 Kellet Road & B6601</u>

9.5.48 The following provides a review of the detailed environmental effects of the Proposed Development along the links of the B6254 Kellet Road between Back Lane and the B6601, the B6601 itself, and the B6254 Kellet Road to the east of Leapers Wood Quarry:

- Pedestrian Delay: As noted above, all three sections of route are similar in nature, however, only the B6254 Kellet Road sections include for a pedestrian footway to at least one side of the carriageway – the B6601 has no footway provision. There are very few nearby residential properties, and

the routes are characterised by minimal frontage development, the majority of which is commercial in nature. The quantum of pedestrian movements along these sections of the local highway network is therefore likely to be extremely low. HGV traffic levels along the B6254 Kellet Road between Back Lane and the B6601 are anticipated to total 33 two-way movements during the network AM peak hour, which equates to 1 quarry-related HGV movement every 2 minutes. On the B6601 during this time period two-way Quarry related traffic is anticipated to total 28 movements, whilst along the B6254 Kellet Road to the east of Leapers Wood Quarry, just 5 two-way HGV movements are anticipated. Such additional increases are not considered notable in traffic terms and, in light of the pedestrian infrastructure and likely pedestrian demand along these routes, it is considered that the impact of Quarry-related HGV traffic upon pedestrian delay on these sections of highway would be negligible;

- Pedestrian Amenity: As noted above, the level of pedestrian movements along these sections of the local highway network is likely to be extremely low. The B6601 does not include any pedestrian footways whilst, in the case of the B6254 Kellet Road to the east of Leapers Wood Quarry it should be noted that the pedestrian footway is segregated from the edge of carriageway by virtue of a c2.0m grass verge. With these factors in mind, it is therefore considered that the impact of quarry-related HGV traffic on pedestrian amenity on these links would be negligible;
- Severance: The quantum of pedestrian cross-movement along these links is also likely to be extremely low as there are no frontage properties. Moreover, the B6254 Kellet Road does not include footways to both sides, whilst the B6601 has no footways at all. Accordingly, it is considered that the level of impact associated with severance on these sections of local highway network would be negligible;
- Driver Delay: Assessments of junction capacity outlined above in Tables 9.6-9.8 have identified that the majority of junctions within the study area would operate with notable levels of spare capacity during all assessment time periods and scenarios. Whilst one junction – the B6601/B6254 Kellet Road – does operate with some capacity issues during the PM peak, crucially it has been demonstrated that quarry-related traffic has an almost imperceptible level of impact on this junction's operation. With this in mind it is considered that the Proposed Development would not give rise to any

issues of local traffic congestion or delay on these sections of the local highway network. Accordingly, it is considered that the impact of the Proposed Development upon driver delay would be negligible;

- Road Safety: Section 3 of the TA report (see Technical Appendix E) provides a detailed review of recent road safety history over the local highway network. This exercise demonstrates that the local highway network has a low level of Personal Injury Accident incidents and there is no evidence to suggest that quarry related traffic would directly give rise to any highway safety concerns. Accordingly, it is considered that the impact of development related traffic on highway safety would be negligible;
- Air Quality and Dust: The relevant effects associated with air quality impacts are considered in detail in the dedicated air quality chapter of this ES (Chapter 11). The findings of that assessment are that vehicle emissions arising from the Proposed Development would not give rise to any significant effects. The assessment concludes that the Proposed Development would not cause any exceedances of the air quality objectives and, therefore, that it is not necessary to consider any proposed mitigation measures.
- Noise and Vibration: The environmental implications of noise and vibration are considered in detail in the dedicated noise and vibration Chapter of the ES (Chapter 10). The findings of the noise assessment are that there would be no significant effects arising from road traffic from the Proposed Development. Accordingly, there is no specific requirement for mitigation measures in relation to traffic associated with the Proposed Development.

Summary of Operational Traffic Related Environmental Effects

9.5.49 The above reviews of proportional link impact and junction operational impact clearly identify that the operation of the Proposed Development scheme at the existing Back Lane Quarry would give rise to strictly limited effects upon the local highway network that forms the study area, in terms of total traffic.

9.5.50 In terms of HGV traffic, due to forecast levels exceeding the IEMA Rule 1 (30%) threshold on some links and for some time periods, more detailed assessment of the likely environmental effects has been undertaken. The findings of this more detailed assessment are that operation of the Proposed Development scheme would, for the most part, only give rise to a negligible impact on specific environmental factors. In terms of Pedestrian Amenity along the Back Lane

corridor to the north of Windermere Avenue, it is anticipated that Quarry related HGV traffic could give rise to a **minor adverse** impact. Accordingly, it is considered that the traffic related environmental impact of the operation of the Proposed Development scheme at the Back Lane Quarry would not be significant, in environmental assessment terms (ref: para 9.3.24).

9.5.51 On the basis that the traffic related environmental impact of the operation of the Proposed Development is not considered to be significant, there should therefore be no justification for the provision of any additional mitigation measures designed to reduce or minimise the level of environmental effect arising from traffic associated with the operation of the Proposed Development.

9.6 Mitigation

9.6.1 The above review concludes that the traffic-related environmental effects of the operation of the Proposed Development scheme would not be significant, and therefore that no mitigation measures should be required to be implemented. Nevertheless, it should be noted that the operation of the facility currently includes for the day-to-day management of operational traffic to and from the application site, and would continue to do so. In particular, a routing agreement is in place which ensures that all HGV traffic associated with quarry operations routes to and from the site via the route of Back Lane, between the quarry site access and the B6254 Kellet Road. This would continue to be the case in future and these operational measures and restrictions effectively comprise “in-built” development-related mitigation.

9.7 Residual Effects

9.7.1 This chapter of the ES has been prepared to consider the highways and transport-related environmental impact of the Proposed Development scheme at Back Lane Quarry. Further detail relating to the transport operational effects of the scheme can be read in the supporting formal Transport Assessment. The Transport Assessment sets out the detailed appraisal of highway network operational impact in terms of percentage link flow change and local network operational performance (junction capacity).

9.7.2 Link change analysis and junction capacity assessments for the surrounding local highway network indicate that local routes and junctions could be expected to operate with a notable level of spare capacity, even including for future year traffic growth and the operation of the Proposed Development. The continued operation

of the Quarry under the Proposed Development scheme would not generate significant traffic levels during traditional network AM and PM peak hour periods, with quarry related traffic spread relatively evenly across the core working day and maximum hourly development demand taking place during off-peak daytime periods.

9.7.3 There is no evidence of any material local road safety hazards that would call the Proposed Development scheme into question. No additional local network safety or capacity improvements are therefore considered necessary to accommodate relatively low levels of predicted traffic demand.

9.7.4 Reference to IEMA screening guidelines would suggest that overall quarry related traffic levels over the immediate local network associated with the Proposed Development (when compared to "Do Nothing") would fall significantly below the threshold for further, more detailed assessment of environmental effects. Whilst analysis of the change in HGV traffic levels has identified links which may experience changes above IEMA thresholds, further, more detailed, assessment of the likely environmental effects of development related HGV traffic across these links has identified that any level of effect would predominantly be negligible, with just one minor adverse potential effect. Accordingly, it is considered that the traffic-related environmental effects of the continued operation of the Back Lane Quarry under the Proposed Development scheme would not be significant, and therefore no mitigation measures should be required to minimise or further reduce this level of effect.

9.8 Conclusions

9.8.1 Given the review of anticipated future operational highway conditions and reference to appropriate guideline standards, it is concluded that the Proposed Development scheme would not result in a severe impact on operational or environmental conditions over the local transport network. Traffic-related environmental effects are not anticipated to be significant, and so there is no requirement for off-site transport improvement or mitigation works. It is therefore concluded that the Proposed Development would not give rise to any significant long-term residual traffic-related environmental effects.

10 NOISE

10.1 Introduction

10.1.1 A Noise Assessment has been undertaken to accompany the planning application and is provided at Technical Appendix F of this ES. The assessment is summarised and discussed within this ES chapter.

10.1.2 The application boundary is not to increase from the area already permitted under the Review of Old Mineral Permission (ROMP) granted in 2006 (ref: 1/03/1186) and the extant planning permission for the site (ref: 01/09/0360) and therefore the workings will be no closer to the nearest dwellings.

10.1.3 As the operations are to continue in the existing extraction area to a greater depth (a further 75 metres to -37mAOD from the currently permitted floor of 38mAOD), there will be no requirement for soil stripping or bund formation operations that are considered temporary operations (with a higher site noise limit) in Planning Practice Guidance (Minerals).

10.1.4 The mineral extraction operations, processing operations and use of the asphalt plant and concrete block works will not change from the current situation.

10.1.5 The access arrangements will remain as for the current operations on site.

10.1.6 It is not proposed to vary the operating hours of the site from those permitted in the current planning permission for the site (ref: 01/09/0360).

10.1.7 Following completion of the mineral extraction works, the void will be restored as per the proposed revised restoration scheme.

10.1.8 The intention of this assessment is to establish that the noise impact of the continuation of the existing site operations with mineral extraction to a greater depth and for a longer duration, would not be expected to generate noise levels at the nearest noise sensitive properties that would exceed the existing site noise limits as required by extant planning permission conditions.

10.1.9 Site noise monitoring data at the nearest residential locations where monitoring has been undertaken has been reviewed to establish the ongoing compliance of site noise with those limits.

10.1.10 Consideration of the site plans and the topography to explain why there is a potential increase in noise attenuation due to the greater depth of workings has been included in the assessment to demonstrate that site noise levels will not

increase.

10.1.11 A glossary of acoustic terms is included as Appendix A of the Noise Assessment report. Plans showing the application boundary and the phasing (as well as the nearest noise sensitive receptors/dwellings) are included as Appendix B of the report.

10.2 Site Description

10.2.1 A detailed site description is provided in Chapter 2 of this ES. In terms of noise sensitive receptors, the site is relatively isolated.

10.2.2 Carnforth is located to the west of the site and is the nearest substantial residential area with the nearest dwellings on the edge of the town being around 400 metres to the north-west of the extraction area beyond the M6 motorway.

10.2.3 There are a small number of isolated residential properties located within 1 kilometre of the site.

10.2.4 Hawthorns Caravan Park is located approximately 90 metres to the south-west of the southern-most part of the site (southern site entrance) and approximately 280 metres from the mineral extraction area.

10.2.5 Newlands Farm lies approximately 280 metres south-west of the southern site entrance and approximately 500 metres south of the extraction area.

10.2.6 Wayside lies approximately 210 metres to the south-east of the southern site entrance and 350 metres south-east of the extraction area.

10.2.7 Other properties including Kit Bill Lodge, The Helks and an adjacent residential property lie between 280 metres and 340 metres east of the extraction area.

10.2.8 A plan showing the application boundary including the plant site, the extraction area and the nearest residential receptors at which site noise is routinely monitored is included as Appendix B of the Noise Assessment report (Technical Appendix F).

10.3 Existing Site Noise Limits

10.3.1 The site falls within the jurisdiction of Lancashire County Council as the MPA and is currently operated under various planning permissions for the different elements of the site.

10.3.2 The mineral operations on site are covered by an Environment Act 1995 Review of Old Mineral Permission (ROMP) granted in 2006 (ref: 1/03/1186) which permits quarrying operations until 29 April 2048 (with restoration to be completed within

a year).

10.3.3 The ROMP was varied by planning permission reference 1/09/360 in July 2009 which allowed the controls on stockpile heights to be amended.

10.3.4 The extant planning permission contains the following conditions relating to noise including Condition 22 stipulating site noise limits and Condition 26 requiring the site noise monitoring scheme that is the basis for the ongoing site noise monitoring:-

"Noise

21. All plant, equipment and machinery used in connection with the operation and maintenance of the site shall be equipped with effective silencing equipment or sound proofing equipment to the standard of design set out in the manufacturer's specification and shall be maintained in accordance with that specification throughout the development.

22. Noise emitted from the site shall not exceed 55dB LAeq (1 hour) (free field) when measured from any of the following properties at the point closest to the noise source.

a) Wayside NGR 518 686

b) Helks Wood Farm NGR 521 691

c) Hawthorns Caravan Park NGR 514 684

d) 94 Windermere Road NGR 504 697

23. Notwithstanding condition 22, outside of the hours of 0700 to 2100 hours Monday to Friday, 0700 to 1300 on Saturdays and at any time on Sundays and Public Holidays, noise emitted from the site shall not exceed 42 dB LAeq (1 hour) (free field) as defined in this permission when measured from any of the properties listed in condition 22.

24. *The noise limits set out in condition 22 above shall not apply during the stripping of soils or overburden on the site, the construction of storage mounds for these materials and their respreading during restoration of the site or the construction of landscape or baffle mounds. Noise from any of these activities shall not exceed 70dB LAeq (1 hour) (free field), as defined in this permission as measured from any of the properties identified in condition 22 at a point closest to the noise source. This condition shall only apply for not more than 20 days in one calendar year unless otherwise agreed in writing by the County Planning Authority. A Written record shall be made of the dates that these activities are taking place and shall be made available to the County Planning Authority on request.*

25. *The reversing warning systems contained in the scheme and programme approved by the County Planning Authority on 20 August 2007 shall be installed and used on all existing mobile plant and equipment used on the site and to all new plant and equipment before it is used on the site.*

26. *Within six months of the date of this schedule of conditions, a scheme and programme of noise monitoring for the site shall be submitted to the County Planning Authority for approval in writing. The scheme and programme shall provide for the following:*
    a) *A programme of noise monitoring at the properties listed in condition 22 above or any other property from which a noise complaint is received.*
    b) *The equipment to be used and the information to be recorded including weather conditions, activities taking place at the site and the plant equipment being used during the monitoring period.*
    c) *The frequency of monitoring.*
    d) *Details for the reporting of results to the County Planning Authority.*
    e) *Procedures to be adopted if noise levels are recorded above the levels identified in conditions 22 and 23 above.*
    f) *A timescale for the implementation of the monitoring scheme."*

10.3.5 It is not proposed to alter the existing site noise limits and this assessment considers those limits to remain valid and consequently the noise impact of the proposals is assessed in the context of those limits.

10.3.6 The following noise monitoring locations representative of the nearest dwellings are used for site noise monitoring on an annual basis:

- The Hawthorns Caravan Park; and
- Helks Wood Farm.

10.4 Review Of Site Noise Monitoring

10.4.1 Site noise monitoring at the nearest noise sensitive receptors to Back Lane Quarry has been undertaken by Advance Environmental Limited on behalf of the operator for around twenty years.

10.4.2 The aims of the monitoring are to:

- Determine the noise impact of the current site operations at the potentially noise sensitive receptors stated in the approved ES; and
- Compare measured noise impact levels against the permissible noise levels, stated in Planning Permission Ref. 1/86/636 and reproduced in the approved ES.

10.4.3 The measurements were undertaken at the monitoring locations by a suitably trained technician whilst the quarry was fully operational and in accordance with the methods outlined in BS 4142: 2014, 'Method for rating industrial and commercial sound' (British Standards Institution) and BS5228-1:2009 + A1:2014, Code of practice for noise and vibration control on construction and open sites. Annex G (British Standards Institution).

10.4.4 The data from the last three years of noise monitoring has been summarised in the following table for comparison with the site noise limits.

Location	Measured Noise Level dB $L_{Aeq,\ 15\ minutes\ free\ field}$			Site Noise Limit dB $L_{Aeq,\ 1\ hour\ free\ field}$
	August 2020	August 2021	July 2022	
Hawthorns Caravan Park	46	41	49	55
	44	40	45	
Helks Wood Farm	44	42	47	55
	41	44	44	

Table 10.1: Recent Noise Monitoring Data

10.4.5 As can be seen from the table the overall measured noise levels including, extraneous noise (LAeq), are well below the site noise limits during all the measurement periods examined.

10.4.6 The Equivalent Continuous Noise Level, $L_{Aeq, T}$, is the preferred unit for assessing noise sources. It is the value of a continuous level that would have equivalent energy to the continuously varying noise over the specified period 'T'. This unit is recommended internationally for the description of environmental noise and is in general use. It is the chosen unit of BS 5228 for Construction and Open site noise; Planning Practice Guidance for Minerals and BS 7445 for the Description and Measurement of Environmental noise.

10.4.7 Observations made by the technician during the surveys indicated that site noise was inaudible at both locations in 2020, just audible at Helks Wood Farm and inaudible at Hawthorns Caravan Park in 2021 and audible at Helks Wood Farm and generally inaudible at Hawthorns Caravan Park in 2022.

10.4.8 Based on the ongoing site noise monitoring data, site noise is generally inaudible and is demonstrated to be well below the site noise limits stipulated in the latest planning permission for the site (which is in line with current government guidance).

10.5 Consideration of Increased Depth/Barrier Attenuation

10.5.1 The proposed deepening of the mineral extraction area and amended end date of the site operations do not alter the working area of the site. The site operations will not change and those operations will be no nearer to the nearest noise sensitive receptors than is currently the case.

10.5.2 With the only change from the current scenario being the ground height for the mineral extraction operations (i.e. mineral extraction operations will be at greater depth), the distance from the ongoing operations to the nearest receptors will only increase.

10.5.3 As well as a small increase in working distance, there is the potential for greater noise attenuation at the receptors due to the working face of the quarry/topography because of the increased path difference.

10.5.4 The calculation of barrier attenuation is mainly based on the path difference between the direct path from source to receptor and the altered path over the barrier. As the depth of working increases, this difference will also increase

resulting in greater attenuation.

10.5.5 The calculation method for external noise propagation in BS5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' calculates the adjustment for screening/barrier attenuation as follows:

$$10\log_{10}(3 + 20 \times \text{PATH DIFFERENCE} \times 2 \times \text{OCTAVE BAND DATA} / 340)$$

or the upper limit as defined in Figure 3 in BS5228 Annex F.

10.5.6 Based on calculations for Hawthorn Caravan Park, the barrier attenuation afforded by the working face of Back Lane Quarry using the current ground heights is close to the limit that is allowed for by the calculation method and therefore this would not be the best means of demonstrating the change due to increasing depth. However, one can examine the influence of an increase in path difference in more general terms.

10.5.7 The path difference is calculated based on Figure 3 in BS5228 Annex F (i.e. the sum of the two slanted distances over the barrier minus the single non-slanted distance without the barrier in place).

10.5.8 The octave band data is that input for the plant item in each band and this is conducted for all bands considered and then summed logarithmically.

10.5.9 Any increase in the depth of working will increase the path difference and result in potentially greater noise attenuation. An increase of up to 75 metres in depth from the permitted floor of the quarry (not the current working level) would result in highly significant barrier attenuation as well as a substantial increase in distance between source and receiver.

10.5.10 As site noise monitoring over the last twenty years has indicated that site noise (even at the top of the mineral) has complied with the site noise limits throughout the life of the site, and working at greater depth will result in potentially greater barrier attenuation for the nearest dwellings to the site, the proposed deepening and continued mineral extraction operations should not result in an increase in site noise levels or an adverse impact on the dwellings.

10.6 Cumulative Noise Impact

10.6.1 The Back Lane Quarry site is located immediately adjacent to the Leapers Wood Quarry that is operated by Tarmac Trading Limited, sharing a common boundary to the north of Back Lane Quarry.

10.6.2 The two sites are separated by a nominal boundary that is proposed to be worked as part of this application and the similar concurrent application by Tarmac for deepening of the workings (and a time extension) at Leapers Wood Quarry.

10.6.3 Both sites are subject to the same site noise limit of 55 dB $_{LAeq,\ 1\ hour\ free\ field}$ and the permissions on noise for the two sites share three common receptors.

10.6.4 Site noise monitoring at Back Lane Quarry demonstrates that those site noise limits have been consistently complied with over the past twenty years.

10.6.5 Site noise monitoring at Leapers Wood Quarry has not been required over this period as there have been no complaints regarding noise at the site.

10.6.6 The site noise monitoring for Back Lane Quarry has shown that the overall measured noise levels (including both sites and extraneous noise such as M6 road traffic noise) are significantly below the noise limits for both sites.

10.6.7 The applications for both sites do not involve any increase in site operations, no changes to the processing plant site and associated plant items, no changes to the access to either site and no alteration to the operating hours.

10.6.8 As such, the only change in the workings will be the depth of working, with an increase in depth only resulting in lower site noise levels at the nearest dwellings to either site.

10.6.9 Both sites are satisfying the noise conditions in the permissions that are in place until 2048. With regard to cumulative noise levels, the deeper workings would increase the barrier attenuation and therefore reduce the site noise levels at the nearest dwellings due to mineral extraction. It is therefore considered that there would be no adverse impact on the nearest noise sensitive receptors to the site from the proposed deepening of both quarries.

10.7 Conclusions

10.7.1 Aggregate Industries is submitting an application for the deepening of existing quarry operations and an extension of time for the quarrying operations to continue until 31 December 2077, with restoration being completed a year later, by 31 December 2078.

10.7.2 The application boundary is not to increase from the area already permitted under the latest ROMP for the site in 2006 (ref: 1/03/1186) and the extant planning permission from 2009 (ref: 01/09/0360) and therefore the workings will be no closer to the nearest dwellings to the site.

10.7.3 As the operations are to continue in the existing extraction area to a greater depth, there will be no requirement for soil stripping or bund formation operations that are considered temporary operations (with a higher site noise limit) in Planning Practice Guidance (Minerals).

10.7.4 The mineral extraction operations, processing operations and use of the asphalt plant and concrete block works will not change from the current situation.

10.7.5 Following completion of the mineral extraction works, the void will be restored as per the proposed revised restoration scheme.

10.7.6 The intention of this assessment is to establish that the noise impact of the continuation of the existing site operations with mineral extraction to a greater depth, would not generate noise levels at the nearest noise sensitive properties that would exceed the existing site noise limits, as required by extant planning permission conditions, or increase the site noise levels at the dwellings from the current levels.

10.7.7 Site noise monitoring data at the nearest residential locations where monitoring has been undertaken has been reviewed to establish the ongoing compliance with those limits.

10.7.8 Consideration of the site plans and the topography to explain why there is a potential increase in noise attenuation due to the greater depth of workings has been included in the assessment to demonstrate that site noise levels will not increase.

10.7.9 Site noise monitoring over the last twenty years has indicated that site noise (even at the top of the mineral) has complied with the site noise limits throughout the life of the site. Allied to this, working at greater depth will result in potentially greater barrier attenuation for the nearest dwellings to the site and therefore the proposed deepening and continued mineral extraction operations should not result in an increase in site noise levels or an adverse impact on the dwellings.

10.7.10 The site can therefore continue to be worked within environmentally acceptable noise levels.

10.7.11 The cumulative impact of the continuing operations at Back Lane Quarry with the operations at the adjacent Leapers Wood Quarry has also been examined and is also shown to be of low impact.

11 AIR QUALITY & DUST

11.1 Introduction

11.1.1 The proposed development is a Section 73 Planning Application for the deepening of the existing quarry and an extension of time for mineral extraction and restoration operations. Both the footprint of the quarry and the output of material will be unchanged by this application. The Application is made in conjunction with Leapers Wood Quarry, to the north, which is operated by Tarmac Trading Limited (Tarmac). The extraction areas of the two operations are connected and form a single quarry void but will continue to operate as two entities.

11.1.2 The current excavations at Back Lane and Leapers Wood Quarries extend to a floor elevation of approximately 55m AOD and 45m AOD respectively. The proposed floor elevation of the final combined excavation will be -37m AOD.

11.1.3 This section of the Environmental Statement assesses the potential impact of dust associated with the extraction of mineral within Back Lane Quarry. This assessment is undertaken in accordance with requirements specified within National Planning Policy Framework 2023, and its supporting document, the Planning Practice Guidance, 2014 (references 1 and 2, section 11.10). The latter requires consideration of potential impacts from deposited dust and PM_{10} associated with mineral sites.

11.1.4 The primary impact from quarry operations is the generation of mineral dusts. Extraction, transportation, stockpiling/tipping and processing activities can produce fugitive emissions of these dusts. There are three separate potential impacts associated with fugitive dust emissions:

- Annoyance due to dust soiling;
- The risk of health effects due to increased exposure to PM_{10}; and
- Harm to ecological receptors.

11.1.5 However, their impact may be minimised by using a number of established mitigation methods. In addition, the local geology, hydrogeology and local topography, along with the physical properties of the extracted material, dictate the potential for a site to generate dust. Consequently, this assessment includes the identification of potential sources of particle pollution and locally sensitive receptors. If mineral dusts rapidly accumulate on a surface they have the potential to cause a statutory nuisance. Therefore, this application assesses potential dust

generation and its possible impact on the local area. It also recommends the implementation of a proactive monitoring scheme in order to demonstrate compliance with appropriate air quality standards and dust deposition criterion.

11.1.6 This chapter has been prepared by Ian Stone (BSc). Ian is a Principal Scientist specialising in air quality monitoring, analysis and associated impact assessments, primarily in relation to the extractive industries. He has worked as an air quality researcher and consultant for over 30 years both within the UK and overseas, initially with the University of Exeter and latterly with Advance Environmental Consulting Limited. He has been on several steering groups and committees associated with air quality. The most pertinent is the Minerals Industry Research Organisation's publication 'Good Practice Guide: Control and Measurement of Nuisance Dust and PM_{10} from the Extractive Industries' (2011) and its associated document: 'Management, Mitigation and Monitoring of Nuisance Dust and PM_{10} Emissions Arising from the Extractive Industries: An Overview' (2011). He was also one of the authors of the Institute of Air Quality Management 'Guidance on the Assessment of Mineral Dust Impacts for Planning', 2016.

11.1.7 In addition to providing Environmental Impact Assessments for mineral site planning applications, Ian has extensive experience in monitoring and characterisation of PM_{10} / $PM_{2.5}$ and 'nuisance' dust associated with the extractive industries. These have been undertaken on behalf of both industrial clients and regulatory authorities. Pertinent professional memberships include the Institute of Environmental Sciences and Institute of Air Quality Management.

11.2 Policy and Standards

11.2.1 The primary guidance on aspects of controlling and mitigating the environmental effects of minerals extraction in respect of dust is set out in the National Planning Policy Framework (NPPF), first published in 2012 with the latest updated version published in 2023. Technical guidance on dust and air quality is provided in more detail in the accompanying online document; Planning Practice Guidance, 2014. This document requires the consideration of deposited dust and PM_{10}. On dust assessment studies specifically, the Minerals section states that:

"There are five key stages to a dust assessment study:

- *Establish baseline conditions of the existing dust climate around the site.*
- *Identify site activities that could lead to dust emissions without mitigation.*
- *Identify site parameters which may increase potential impact from dust.*
- *Recommend mitigation measures.*
- *Make proposals to monitor and report dust emissions to ensure compliance with appropriate environmental standards and enable an effective response to complaints".*

11.2.2 Detailed guidance for describing dust impacts is provided by the Institute of Air Quality Management: Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016. This suggests that the requirements to undertake a detailed assessment may be based on the distance from a mineral site to potential sensitive receptors. It states that adverse dust impacts are uncommon for hard-rock quarries beyond 400 metres from the nearest dust generating activities.

11.2.3 Consideration must also be given to pertinent air pollutants as defined within the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS). This sets objectives for pollutants that have the potential to give cause for concern. The pollutants contained in current regulation include: nitrogen dioxide, particles (PM_{10} and $PM_{2.5}$), sulphur dioxide, carbon monoxide, lead, benzene, 1-3 butadiene, whilst pollutants that have objectives set but are not currently included in regulation include polycyclic aromatic hydrocarbons (PAHs) and ozone. Local authorities are required to periodically review and assess the current and future quality of air in their areas. Where it is determined that an air quality objective is not likely to be met within a relevant time-period, the authority must designate an Air Quality Management Area (AQMA).

Dust deposition

11.2.4 Dust is traditionally defined as particulate matter in the size range of 1 to 75µm (microns). It is generally perceived as being a nuisance when a deposit accumulates and rapidly soils a surface at nearby receptors such as residential properties or business premises. However, the level at which soiling becomes a nuisance is highly subjective. The assessment of nuisance may be left to the discretion of Environmental Health officials, but empirical data derived from dust deposition gauges are more frequently used to assess the level of impact. Deposition gauges

allow the measurement of the mean rate of dust deposition, which may be compared with 'custom and practice' threshold values. These suggest a mean rate of 200 milligrams for a square metre per day (mg/m^2/day) to be adequate criteria on which to base an assessment (Good Practice Guide: Control and Measurement of Nuisance Dust and PM_{10} from the Extractive Industries, Minerals Industry Research Organisation – MIRO - 2011). Values may also be considered against median deposition rates reported from across the UK (reference 5, section 11.10). These are reported as 38mg/m^2/day for 'open country', 56mg/m^2/day for the 'outskirt of town and residential areas' with 90mg/m^2/day being recorded for 'commercial centres'. These figures are based on the frisbee dust deposit gauge.

Fine particles (PM_{10} and $PM_{2.5}$)

11.2.5 Particulate matters with an aerodynamic size equivalent of 10µm (microns) or less have the potential to cause adverse health effects in susceptible individuals. Effects include respiratory morbidity, cardiovascular illness, asthma and mortality. These particles can enter the thoracic region of the respiratory system, and indeed, the fraction smaller than 1µm may penetrate the alveoli of the lung.

11.2.6 Particulate matter may be created through chemical reactions of atmospheric gases, be directly emitted into the air as soot and flyash from combustion sources, be mineral-based particles derived from agricultural, construction and mining activities or may be from non-anthropogenic sources such as sea salt and biological detritus. These particles are collectively termed PM_{10} and can be local, regional and transboundary phenomena.

11.2.7 The current AQS objectives are based on gravimetric analysis or an acknowledged equivalent for the measurement of PM_{10} and are presented in Table 11.1.

Pollutant	Concentration	Measured as
PM_{10}	50µg/m^3 not to be exceeded more than 35 times per year	24-hour mean
	40 µg/m^3	Annual mean

Table 11.1: AQS Objectives for PM_{10}

11.2.8 Additional air quality targets in the Environment Act 2021 include maximum concentration and population exposure reduction targets for $PM_{2.5}$. These are presented below in Table 11.2. However, when considering the impact on PM, the Institute of Air Quality Management: Guidance on the Assessment of Mineral Dust

Impacts for Planning, states: *"For quarries most of this suspended dust will be in the coarse sub-fraction ($PM_{2.5}$ - PM_{10}), rather than in the fine ($PM_{2.5}$) fraction"*.

Pollutant	Concentration	Measured as
$PM_{2.5}$	10 µg/m^3	Annual mean by 2040
		Population exposure reduction target of 35% by 2040 (2018 baseline)

Table 11.2: Air Quality Targets proposed in the Environment Act for $PM_{2.5}$

11.2.9 The Planning Practice Guidance (2014) recommends consideration of PM_{10} if an actual source of emission is within 1000m of potentially sensitive receptors. However, it should be noted that beyond 400 metres, the extracted hard rock is highly unlikely to generate a significant impact on local PM_{10}. Institute of Air Quality Management (IAQM) guidance suggests that where *"receptors are located between … 400m … and 1km of operations (for hard rock sites), it would normally be assumed that a detailed disamenity dust impact assessment is not required"*.

Nitrogen dioxide

11.2.10 Oxides of nitrogen are principally comprised of nitric oxide (NO) and nitrogen dioxide (NO_2). Oxides of nitrogen, termed NO_x, are typically derived from the combination of atmospheric nitrogen and oxygen in the high temperature combustion of fuels such as petrol and diesel. NO_x is therefore frequently associated with emissions from vehicles. The majority of NO_x is emitted from combustion processes as NO (typically over 90%), a relatively innocuous substance that rapidly oxidises to NO_2 in ambient air. However, only NO_2 is associated with adverse health effects such as respiratory morbidity. As a result, NO_2 measurements are included within the NAQS. This currently sets an annual mean of 40µg/m^3 and an hourly mean of 200µg/m^3, not to be exceeded more than 18 times per year.

11.3 Potential Dust Generation and Impact

11.3.1 Dust can be generated by numerous activities associated with mining and quarrying. It can potentially be derived from soil stripping and overburden removal; the extraction of the limestone; transportation of material on-site; material processing; wind erosion from dry, unvegetated surfaces; vehicle movements and their exhaust emissions. The guiding principle in relation to dust and the extractive

industries is presented in NPPF (reference 1, section 11.10) being to "ensure that any unavoidable …. dust and particle emissions ….. are controlled, mitigated or removed at source". The following potential sources are generic and based on information specified within The Environmental Effects of Dust from Surface Mineral Workings, 1995 (reference 6, section 11.10).

Soil stripping and overburden removal

11.3.2 Soil stripping and any overburden removed prior to mineral extraction can generate mineral dust. However, this will be negligible as the Application is for the deepening of limestone extraction rather than any lateral extension to the quarry.

Mineral extraction

11.3.3 Limestone extraction will continue to be undertaken within the curtilage of existing operations. It will represent a progressive deepening of the quarry and an extension of time rather than the physical lateral extension of operations. It is not proposed to modify current working practices which include the mechanical extraction of the limestone undertaken by drilling, blasting and removal of rock from working phases by hydraulic excavators. The total production of limestone from the current and proposed operations is approximately 1.1 million tonnes per annum. The quarry will continue to be worked with benches down to an ultimate depth of -37m AOD. Front end loaders will continue to load the extracted stone into dump trucks. This will be taken to the existing processing plant during Phases A to C, and processed adjacent to the quarry face during Phases D and E. These operations have the potential to generate dust especially from upper bench workings. However, provided the appropriate mitigation measures outlined in section 11.7 are implemented, dust generation should be negligible. Potential fugitive dust emissions from this source will be reduced as the material is extracted at increased depth.

Mineral processing

11.3.4 During development Phases A to C, the extracted mineral will continue to be processed on-site at the Back Lane Quarry Plant Site, temporarily stockpiled and loaded into road going HGVs for transport off site. During Phases D and E, material will be processed using mobile plant in the quarry void adjacent to the active quarry face. Mineral will be temporarily stocked within the void prior to exportation to point of sale using road-going HGVs.

Wind erosion from dry, unvegetated surfaces

11.3.5 There is the potential for roadways and unvegetated surfaces to produce dust emissions during dry, windy conditions. This would require mitigation measures outlined in section 11.7.

Vehicle movements and their exhaust emissions

11.3.6 The transportation of material from the working face to the primary crusher will continue to utilise dump trucks. The movement of these along internal haul roads can be the most significant source of dust generation. Recommendations regarding dust suppression for the haul roads, vehicles and mobile plant are covered in section 11.7. Uncleaned vehicles leaving the Site have the potential to deposit mud and dirt along the access road and public highway. Subsequent vehicle movements have the potential to produce an impact from re-suspended dust. However, wheel cleaning facilities should minimise any impact. Management and mitigation measures are outlined in section 11.7.

11.3.7 The proposed deepening of Back Lane Quarry will not result in any change in current operational activities in terms of the quantities of mineral exported. Therefore, HGV vehicle movements off-site and onto the public highway will remain unchanged. As there will be no additional traffic on the public highway, the impact associated with current vehicle emissions will be neutral in respect of this application. However, during the life of the Site it is proposed that vehicles will be continuously upgraded as standards and technology dictate, which should ensure improved efficiency and a corresponding reduction in both exhaust emissions and the resultant carbon footprint of the operations.

11.3.8 The IAQM provides guidance on indicative criteria for requiring an air quality assessment in their land-use planning development control: planning for air quality (reference 9, section 11.10). For sites that are not located within an Air Quality Management Area (AQMA), these are 500 light duty vehicles (LDVs) annual average daily traffic (AADT) and/or 100 HDVs (HGVs). Where there is an AQMA this is reduced to 100 LDVs and 25 HDVs as the AADT.

11.3.9 The nearest AQMA is the A6 and Market Street in the centre of Carnforth, approximately 1.2 km northwest. This was declared for exceeding annual mean NO_2 and does not represent the major transport link for HGV exports from Back Lane Quarry. There are no AQMAs declared by the Local Authority in the immediate vicinity of the site, and with no increase in vehicle numbers associated with the

proposed scheme, it is not necessary to undertake a traffic related air quality impact assessment.

Restoration of site

11.3.10 The site will ultimately be restored to create a large water body with associated wildlife habitats and leisure land uses. These activities should not result in any notable additional impact upon the local air quality or dust environment.

11.4 Dust Assessment Methodology

11.4.1 Models are frequently used to predict the impact of particles from roads and process stacks. These have been formulated to provide an indication of air quality based on aspects such as vehicle flow, mix and speed, meteorological conditions, height and air flow. However, modelling fugitive emissions of dust from the mineral industries is less accurate. The calculation of emissions is confounded by the type of material being excavated, the potentially large and constantly variable particle size range, and most significantly the effectiveness of dust suppression.

11.4.2 The methodology applied in this assessment to examine the potential impact from fugitive dust emissions is semi-quantitative. It considers the significance of an environmental impact to be determined by both the magnitude of the impact and by the sensitivity of the receptor. Sensitivity criteria are based on IAQM guidance for different receptors to disamenity (dust soiling), human health (PM_{10}) and ecological effects.

11.4.3 Examples of receptor sensitivity for assessing the impact from dust soiling, the impact on human health and ecological effects are presented below in Tables 11.3, 11.4 and 11.5. They are based on recent IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016. These represent updated sensitivity categories and differ from those traditionally used, which were provided in The Environmental Effects of Dust from Surface Mineral Workings (reference 6, section 11.10). The update now categorises the sensitivity of residential receptors as being 'high'.

High Sensitivity	Medium Sensitivity	Low Sensitivity
Residential properties Hi-tech industries Car showrooms Medium and long-term car parking	Offices / places of work Parks Food retailers Glasshouses and nurseries Horticultural land	Farms Playing fields Public footpaths Roads Short term car parks

Table 11.3: Sensitivity to dust soiling

High Sensitivity	Medium Sensitivity	Low Sensitivity
Residential properties Hospitals and clinics Retirement homes Schools	Offices / places of work Parks Warehouses Industrial units	Playing fields Public footpaths Parks Shopping streets

Table 11.4: Sensitivity of people to health effects (PM_{10})

High Sensitivity	Medium Sensitivity	Low Sensitivity
SAC designated for acid heathland adjacent to mineral site releasing alkaline dusts	Nationally designated site that may be affected by dust deposition including SSSI	Local nature reserve with dust sensitive features

Table 11.5: Sensitivities of receptors to ecological effects

11.4.4 The type, size, shape and density of dust particles combined with wind speed, direction, rainfall, local topography and hydrogeology are parameters that can dictate the dispersion of dust emissions. However, in general, smaller particles have the potential to be entrained within airflow for longer, thereby dispersing over a wider area.

11.4.5 Guidance provided by the Institute of Air Quality Management (IAQM) states that "adverse dust impacts from sand and gravel sites are uncommon beyond 250m and beyond 400m from hard rock quarries measured from the nearest dust generating activities" (reference 3, section 11.10).

11.4.6 IAQM guidance continues: "In the absence of other information it is commonly accepted that the greatest impacts will be within 100m of the source and this can be both large (>30µm) and small dust particles. The greatest potential for high rates of dust deposition and elevated PM_{10} concentrations occurs within this distance.

Intermediate-sized particles (10 to 30µm) may travel up to 400m with occasional elevated levels of dust and PM_{10} possible. Particles less than 10µm have the potential to persist beyond 400m but with minimal significance due to dispersion".

11.4.7 However, the distances specified should not be considered to be quantitatively delineated categories. Whilst the greatest impact would be within 100m of the source, the highest levels of dust would be experienced immediately adjacent to the source. Likewise, the concentration of dust will dilute and disperse progressively within any defined categories such as 100 to 200m and 200 to 400m. This effect was described succinctly in former planning guidance for surface mineral sites (reference 6, section 11.10) which stated: "Concentrations (of dust) decrease rapidly on moving away from the source, due to dispersion and dilution".

11.4.8 The above criteria are a key component for assessing the magnitude of potential impacts of the proposed development. They are incorporated in the methodology criteria for assessing magnitudes of impact, presented in Table 11.6.

Magnitude	Description	Examples
Substantial	Impact resulting in a considerable change in environmental conditions with severe undesirable consequences on the receiving environment as a result of the development.	• Area affected is within 100m from an active construction / mineral site with impact decreasing as a function of distance. • Large risk that emissions will generate statutory nuisance complaints, resulting in formal action. • Large risk that emissions will generate exceedances of the air quality criterion.
Moderate	Impact resulting in a discernible change in environmental conditions with undesirable conditions or possibly causing statutory objectives to be exceeded, as a result of the development.	• Area affected is between 100m and 200m of a major active mineral site with impact decreasing as a function of distance. • Medium risk that emissions will generate statutory nuisance complaints, resulting in formal action. • Medium risk that emissions will generate exceedances of the air quality criterion.
Slight	Impact resulting in a discernible change in environmental conditions. Slow accumulation of dust observed on clean surfaces but not substantially greater than area background, i.e. conditions can be tolerated, as a result of the development.	• Area affected is between 200m and 400m of a major active mineral site with impact decreasing as a function of distance. • Small risk that emissions will generate statutory nuisance complaints, resulting in formal action. • Small risk that emissions will generate exceedances of the air quality criterion.

Magnitude	Description	Examples
Negligible	No discernible change in environmental condition, as a result of the development.	• Area affected from only minor construction activity or is over 400m from any major mineral activity. • Little or no cause for nuisance complaints to be made. • Minimal risk that emissions will generate any exceedance of the air quality criterion.

Table 11.6: Methodology for Assessing Magnitude of Impacts on Air Quality

11.4.9 The significance of the relationship between magnitude of impact and the sensitivity of the receptor may be positive or negative. In general, a receptor with a high sensitivity when subject to a high dust impact will experience a major adverse effect and conversely a low sensitivity receptor subject to a low or negligible dust impact will experience a minimal or insignificant effect. Between these extremes are various combinations that will give rise to a gradation of effects for which no descriptor terms have been universally agreed. Impact significance criteria for this assessment are based upon the configuration used in IAQM guidance. These are presented below in Table 11.7.

Magnitude of impact	Sensitivity		
	High	**Medium**	**Low**
Substantial	Major	Intermediate	Slight
Moderate	Intermediate	Slight	Insignificant
Slight	Slight	Insignificant	Insignificant
Negligible	Insignificant	Insignificant	Insignificant

Table 11.7: Impact significance matrix – nuisance criteria

11.5 Locations of Potential Dust Impact

11.5.1 The continued extraction of limestone will be within the current permitted limits at Back Lane Quarry. There is no lateral extension, the proposal is for the deepening of the existing void. This will be undertaken in five phases of extraction followed by final restoration. The most sensitive locations for potential dust impact will, therefore, be the same as for the existing quarry, albeit dependent on the specific operational phase of the development. The nearest sensitive receptors within 400 metres of the boundary of both current proposed quarry operations are presented

below in Table 11.8.

Dust Receptor	Potential Sensitivity	Approximate Distance from Nearest Potential Dust Generating Activity to Nearest Receptor, Compass Direction and Development Phase		
		Development Phase	Distance (m)	Direction
Windermere Road, Carnforth	High	Current - car park & access road - Current -asphalt plant A -E (car park, access road & asphalt plant) A-E extraction	160 180 160 /180 and remains the same for all Phases. All extraction >400m	W NW W / NW W / NW
Helks Wood Farm	High / low	Current A D E	260 260 370 370	E E E E
Wayside	High	Current A D E	350 350 370 400	SE SE SE SE
Hawthorns Caravan Park (nearest mobile home)	High	Current boundary Current rock face A C D E	210 260 260 350 330 360	S S S S S S

Table 11.8: Nearest sensitive receptors within 400m to the potential impact from dust soiling and PM_{10} derived from current and future operations in the vicinity of Back Lane Quarry

11.5.2 There are a number of receptors with a 'high' sensitivity to dust deposition and PM_{10} concentrations identified in the vicinity of Back Lane Quarry. They consist of residential properties and farmhouses. Farm buildings and farmland are also present but are considered to have a 'low' sensitivity, and therefore identified as having an **insignificant** impact from dust.

11.5.3 There are a number of residential receptors within 400m of the operational boundary of the existing quarry footprint. The proposed development of the quarry is to increase its depth and the duration of extraction. As such, the lateral parameters of the quarry will not change and the distance between the quarry and these receptors will also be unchanged.

11.5.4 Residential dwellings in Windermere Road are the nearest receptors in Carnforth. They are approximately located 160m to the west of the car park and access road for Back Lane Quarry and 180m northwest of the asphalt plant, on the opposite side of the M6 motorway. This will remain unchanged by the development. There are a number of residential properties beyond Windermere Road that lie within 400m, including those in Gummers Howe Walk and Highfield Road. Using the impact criteria in Tables 11.3 to 11.7 there is the potential for an **intermediate** impact from dust at these receptors without the application of appropriate mitigation outlined in section 11.7. The extraction of limestone in all the proposed Phases of the development is greater than 400m from the nearest receptor in Windermere Drive and can therefore be screened out. Indeed, the majority of the mineral extraction is considerably greater than 400m, whilst the dominant westerly winds experienced in this part of the United Kingdom, will generally blow any dust away from Carnforth. There is also mature woodland on both sides of the M6, which will help ameliorate any dust. These factors will negate any impact in Carnforth associated with Back Lane Quarry development.

11.5.5 Helks Wood Farm is located 260m east of the perimeter of the existing quarry and will remain at 260m from the perimeter of Phase A of the proposed development. It will also be 370m east of the nearest extraction perimeter of Phases D and E. Using the impact criteria presented in Tables 11.3 to 11.7 there is the potential for a **slight** impact from dust at these receptors without the application of appropriate mitigation. The predominant westerly winds have the potential to disperse any dust in the direction of this receptor. However, there is a high degree of screening by mature woodland on the screening bund between the quarry and receptor, whilst the deepening of the quarry along with the application of appropriate mitigation measures outlined in section 11.7 should effectively ameliorate the impact of dust.

11.5.6 Wayside is located 330m southeast of the nearest perimeter of the existing quarry operational area. This distance will remain unchanged for Phase A and will increase to 370m for Phase D and 400m from Phase E. Using the impact criteria presented in Tables 11.3 to 11.7 there is the potential for a **slight** impact from dust at these receptors decreasing to **insignificant** as the quarry progresses. A high degree of natural dust amelioration will be afforded by mature woodland screening along with the increased depth of mineral extraction. The majority of mineral extraction will be at distances considerably greater than 400m. Notwithstanding this, the application of appropriate mitigation measures outlined in section 11.7 should

effectively ameliorate the impact of dust.

11.5.7 Hawthorns Caravan Park is located 210m south of the current boundary of Back Lane Quarry and 260m south of the current quarry face. The nearest mobile home will be 240m south of the nearest perimeter of Phase A. The nearest quarry face during Phase C will be 350m, whilst Phase D will be 330m and Phase E will be 360m. Using the impact criteria presented in Tables 11.3 to 11.7 there is the potential for a **slight** impact from dust at these receptors without the application of appropriate mitigation. The long-term extraction of limestone will be undertaken at increasing depth and distance during the development of the quarry, which along with a high degree of screening by mature foliage on the screening bund between the quarry and receptor, will help ameliorate impact. Notwithstanding this, the application of appropriate mitigation measures outlined in section 11.7 should effectively negate the impact of dust.

11.5.8 The deposition of dust can also impact agricultural and ecologically sensitive habitats. This can result from the chemical or physical effects of particles on the vegetation surface or from changes in soil chemistry (see reference 8, section 11.10). Chemical effects are usually associated with highly alkaline or highly acid dusts that are typically derived from limestone quarries and coal workings. Physical effects of dust can include abrasion of leaf surfaces, shading and the blockage of stomata.

11.5.9 Experimental values reported to impact on vegetation from caustic and toxic sources range from 70 to 5000 mg/m^2/day for 'road dust' and 600 to 7000 mg/m^2/day for limestone and cement dusts. However, the 'road dusts' levels were derived from purely experimental data, which would probably have been influenced by hydrocarbons and in the period when the research was undertaken, lead-based products derived from vehicle exhaust emissions. These potentially toxic compounds are frequently adsorbed onto ultra-fine particulate matter associated with fuel combustion products. However, these levels will not be pertinent to mineral extraction at Back Lane Quarry as 'road dust' is not a relevant particle type associated with limestone. Nevertheless, the limestone itself and the production of concrete are alkaline materials which have the potential to cause a toxic impact on the surrounding vegetation if the rate of dust deposition is high. However, the rates of deposition for limestone and cement (concrete) dusts that can potentially cause an impact are notably high (600 to 7000 mg/m^2/day) and the likelihood of a significant effect is therefore very low. Notwithstanding this, any

potential impact must be considered.

11.5.10 No statutory or non-statutory designated ecologically sensitive habitats have been identified within a 400m radius of Back Lane Quarry. The nearest ecologically sensitive habitat is Thwaite House Moss SSSI at approximately 1 kilometre to the south-west of the site.

11.5.11 This assessment also considers the impact of the development on local air quality. The nearest Air Quality Management Area (AQMA) is the A6 and Market Street in the centre of Carnforth, approximately 1.2 km northwest. This was declared for annual mean NO_2 and is not on the transport link for HGV exports from Back Lane Quarry. There are no AQMAs identified by the Local Authorities in the immediate vicinity of the application site. With vehicle volumes associated with Back Lane Quarry remaining unchanged from the current position, there will be no undue impact on air quality pollutants along the public highway. This, along with the proposal being within the criteria specified within IAQM guidance for requiring an air quality assessment, signifies that it is not necessary to undertake a detailed traffic related air quality impact assessment (see 11.3.8).

11.6 Assessment of Baseline Conditions

Dust deposition

11.6.1 Baseline monitoring was undertaken at receptors in the vicinity of current operations for both Back Lane and Leapers Wood Quarries. Measurements used frisbee-type dust deposit gauges with foam inserts and bird guards. These gauges are used to establish the mean rate of environmental dust deposition, a technique that examines the potential nuisance caused by the soiling of surfaces. This was undertaken between 26th July 2022 and 18th January 2023 at 4 receptors in the vicinity of the quarries:

- Helks Wood Farm, 260m to the east of both Back Lane and Leapers Wood;
- Hawthornes Caravan Park, 210m to the south of Back Lane;
- Woodland View, 540m to the northeast of Leapers Wood; and
- Raisbeck, 250m to the northwest of Leapers Wood Quarry and 60m northeast of Leapers Wood Quarry exit.

11.6.2 Dust samples were typically collected on a monthly basis. The mean rates of dust deposition are presented below in Table 11.9.

	26/07/22 to 25/08/22 (mg/m²d)	25/08/22 to 22/09/22 (mg/m²d)	22/09/22 to 17/10/22 (mg/m²d)	17/10/22 to 23/11/22 (mg/m²d)	23/11/22 to 18/01/23 (mg/m²d)	Mean 26/07/22 to 18/01/23 (mg/m²d)
1. Helks Wood Farm	59	29	16	43	24	34
2. Hawthorns Caravan Park	45	31	23	29	24	30
3. No. 3 Woodlands View	47	21	23	28	36	31
4. Raisbeck	76	35	38	31	28	42

Table 11.9: Mean rates of dust deposition in the vicinity of Back Lane and Leapers Wood Quarries, 25 August 2022 to 18 January 2023

11.6.3 The gauges recorded generally compatible values at all locations with monthly mean rates of dust deposition that ranged from 16 to 76 mg/m^2/day and overall means of 30 to 42 mg/m^2/day. The first batch of samples recorded the highest values, especially at Helks Wood Farm and Raisbeck. Subsequent batches recorded a maximum value of 43 mg/m^2/day. Overall, these figures correlate with published median levels of deposition experienced from across the United Kingdom for 'open country', which reports 38 mg/m^2/day, based on frisbee-type gauges. The consistently low values indicated that there were no significant inputs of dust from nearby sources at these locations during the baseline monitoring exercise.

11.6.4 To determine if there was any limestone dust present within these samples, a few drops of dilute hydrochloric acid were added to a portion of each filter sample whilst under examination using optical microscopy. If there was any effervescence, this indicated the presence of limestone. A summary of the observations is reported below in Table 11.10. A small quantity of limestone was present in a few samples, although not in the sample from batch 1 at Raisbeck, which recorded the highest rate of dust deposition during the monitoring campaign. The sample which effervesces most vigorously, and therefore had the highest proportion of limestone present, was batch 2 from Raisbeck. However, even this did not represent a notably high component, whilst the rate of dust deposition was low.

	26/07/22 to 25/08/22 Effervescence	25/08/22 to 22/09/22 Effervescence	22/09/22 to 17/10/22 Effervescence	17/10/22 to 23/11/22 Effervescence	23/11/22 to 18/01/23 Effervescence
1. Helks Wood Farm	slight	slight	X	v. slight	X
2. Hawthorns Caravan Park	slight	X	X	X	X
3. No. 3 Woodlands View	slight	v. slight	X	X	v. slight
4. Raisbeck	X	some	v. slight	X	v. slight

Table 11.10: Presence of limestone in samples of deposited dust collected in the vicinity of Back Lane and Leapers Wood Quarries, 25 August 2022 to 18 January 2023

Fine particles (PM_{10} and $PM_{2.5}$)

11.6.5 The measurement of fine particles was undertaken at two locations between 1st July and 23rd September 2021 using an Aeroqual Dust Sentry PM_{10} monitor and an Aeroqual Dust Profiler, which provides simultaneous measurements of TSP, PM_{10}, $PM_{2.5}$ and PM_1. These indicative monitors provide real-time data and may be utilised as a site management tool. Equipment was installed at secure locations that provided access and had a power supply. The Dust Sentry was located at Helks Wood Farm, 260m east of Back Lane Quarry, whilst the Dust Profiler was located at a residential property in Hall Garth Gardens, Over Kellet, approximately 800m northeast of Leapers Wood Quarry and 1 km from Back Lane Quarry. This latter location was selected by the Parish Council as being representative of potential exposure within the Over Kellet community.

11.6.6 Daily mean PM_{10} data derived from the indicative monitors is provided below in graphical format in Figure 11.1. This is compared with data from Automatic Urban and Rural Network (AURN) sites across the area. Although values are not directly compatible due to the 'indicative' nature, it places the data within the context of regional concentrations. AURN sites include Blackpool (an urban background site approximately 35 kilometres south-southwest) and Preston (an urban background site approximately 35 kilometres south). Although the values from Helks Farm and Over Kellet are lower, reflecting the 'indicative' nature of the equipment, they tend to follow the regional fluctuations of PM_{10}. They do not demonstrate any elevated values or patterns that deviate to indicate any measurable local influences. This

implies the quarries did not produce an undue influence at the monitoring location during this period. There were no exceedences of the 50µg/m^3 daily NAQS Objective for PM_{10} at any locations.

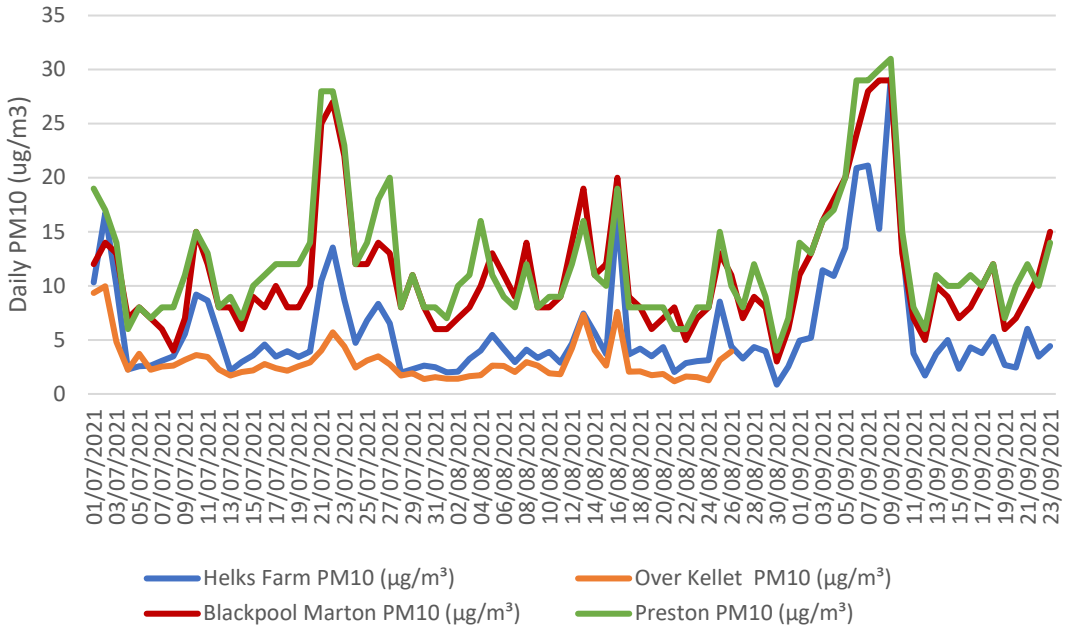

Figure 11.1: Comparison of daily PM_{10} from Helks Farm and Over Kellet with AURN data from Blackpool and Preston

11.6.7 The Aeroqual Dust Profiler, located at a residential property in Hall Garth Gardens, Over Kellet, provided simultaneous measurements of TSP, PM_{10}, $PM_{2.5}$ and PM_1. Successful measurements were undertaken between 1st July and 26th August, after which the equipment malfunctioned, and any data was lost. Results of daily means are presented in graphical format in Figure 11.2 and demonstrate most of the particles occurred within the PM_1 size fraction. Although all recorded values are low, which indicated the air quality to be excellent, it must be emphasised that this is an indicative monitor, with associated limitations on data quantification.

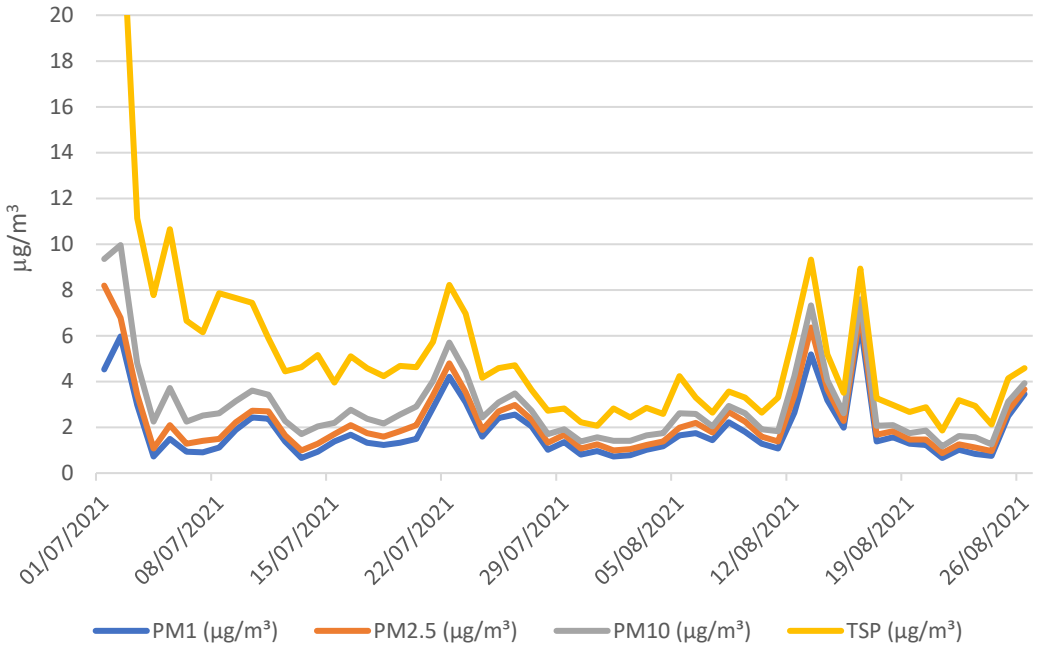

Figure 11.2: Comparison of daily TSP, PM_{10}, $PM_{2.5}$ and PM_1 from Over Kellet

11.7 Mitigation Measures

11.7.1 The following suppression methodologies, which are derived from and are mutual to established documentation, are recommended for the site: (see references 3, 5, 6 and 7, section 11.10).

- The adoption of best practicable means will be implemented to ensure dust and fumes from the site are effectively suppressed.
- Mobile plant should be regularly serviced and equipped with effective exhausts to prevent fume emissions.
- Haul roads should be adequately maintained.
- Water bowsers will be used during dry conditions on the access road and any other trafficked areas.
- Vehicle speed control on access and other trafficked areas will be implemented by the Site Manager and must be adhered to with due regard to weather and ground conditions in order to reduce fugitive dust generation. A maximum speed of 15mph will be implemented.
- The Site Manager shall ensure that all commercial vehicles pass through a wheel washing facility prior to leaving the site to prevent the deposition of material onto the public highway.
- All vehicles leaving the site onto the public highway shall be suitably

sheeted.

- In the unlikely event that dust or mud from the site has been deposited on the public highway, a road sweeper will be employed.
- The Site Manager or instructed site personnel will undertake regular inspections of the public highway in order to identify the need for any cleaning requirements. Observations from all inspections will be logged.
- Loading and unloading of vehicles should ensure drop heights are minimised. This is especially pertinent during the development of the upper benches, and in the vicinity of the quarry plant and stocking area.
- Water sprays or surface binders will be utilised to maintain damp surfaces on exposed tip and stockpile faces and any exposed friable surfaces during dry and windy weather.
- Best practicable means will be used to minimise the impact of dust generated from blasting operations. These include the use of filtration equipment on the exhaust emissions from drill rigs and the removal of any loose material from the area of blast prior to detonation.
- All site employees will receive appropriate training in order to ensure that they are conversant with the site dust control strategy.
- Staff induction will include awareness of track-out of dust or mud from the site and to report signs of materials deposited on the public highway to the Site Manager or instructed site personnel. This will be documented and archived.

11.7.2 In addition to the application of routine mitigation, the specific dust amelioration measures presented will be dependent upon the daily management of the mineral site.

11.8 Human Health

11.8.1 A Scoping Opinion Request was made by the Applicant on 29 September 2021 via preparation of a Scoping Report. Within this, it was proposed that human health will be considered within specific topic chapters as appropriate. A Scoping Opinion was received on 20 December 2021 in response to the Scoping Report prepared by the Applicant.

11.8.2 While the Scoping Opinion did not ask for a separate population and health ES chapter or Health Impact Assessment (HIA), the following points relating to human health were made:

'Given the concerns that have been raised in the local area regarding health impacts of dust, the assessment should also consider health related air quality issues. The Scoping Report only mentions PM_{10} impacts but from the health perspective, $PM_{2.5}$ should also be assessed. Given the small particle size, $PM_{2.5}$ dust particles can potentially be carried over a wider area than the 400m distance quoted in the Scoping Report.

Any assessment of $PM_{2.5}$ should take account of any levels provided in WHO guidance or any levels that may be contained in guidance published pursuant to the Environment Act 2021.'

11.8.3 Consequently, in conjunction with this air quality / dust chapter, a comprehensive Air Quality and Health Impact Briefing Note has been produced. The full technical note is at Technical Appendix G. The Briefing Note explores the concerns raised and provides information to firstly distinguish between potential hazard and risk, explain how and where well-known hazards are addressed through mitigation measures, and offer additional narrative to put potential health risk into context.

11.9 Cumulative and In-Combination Impacts

Air Quality and Dust

11.9.1 The application at Back Lane Quarry is a Section 73 Planning Application for the deepening of the existing quarry and an extension of time for mineral extraction and restoration operations. It is made in conjunction with an application at Leapers Wood Quarry, to the north, which is operated by Tarmac. The Leapers Wood application is submitted under Section 73 of the Town and Country Planning Act 1990 to extend the timescale, phasing, depth of extraction, restoration, and water levels. The extraction areas of the two operations are connected and form a single quarry void but will continue to operate as two entities.

11.9.2 The current excavations at Back Lane and Leapers Wood Quarries extend to a floor elevation of approximately 55m AOD and 45m AOD respectively. The proposed floor elevation of the final combined excavation will be -37m AOD.

11.9.3 The applications are for extraction to be undertaken at increased depths at both quarries with no lateral extensions to the workings. It may therefore be extrapolated that there will be no change in dust impact provided effective mitigation regimes are upheld.

11.9.4 The existing annual outputs of product will also be retained at both quarries. As

such there will be no change in vehicle movements from these operations along the public highway. Therefore, there will be no undue impact on air quality pollutants from vehicle exhaust emissions.

Human Health

11.9.5 The only development considered within the cumulative assessment is Leapers Wood Quarry, which is located to the north of the Back Lane Quarry and operated by Tarmac.

11.9.6 As with the application for Back Lane Quarry, the application at Leapers Wood Quarry would not include any lateral extension to the workings, and the annual outputs of aggregate would remain the same as is currently consented.

11.9.7 As a result, it can be concluded that with implementation of the appropriate mitigation measures already in place, the impact on air quality would be negligible, and the associated impact on health would therefore also be negligible.

11.10 Conclusions

Air Quality and Dust

11.10.1 This Air Quality and Dust Assessment was undertaken as part of a planning application for the deepening of the existing Back Lane Quarry and an extension of time for mineral extraction and restoration operations. Both the footprint of the quarry and the output of material will be unchanged by this application. The Application is made in conjunction with Leapers Wood Quarry, to the north. The extraction areas of the two operations are connected and form a single quarry void but will continue to operate as two entities.

11.10.2 Mineral extraction will continue within the current permitted limit of extraction. The period of baseline measurements for dust deposition and PM_{10} suggested a minimal impact from the quarry at the monitoring locations. As the stand-off distances between mineral extraction and receptors will be unchanged by the development, it may be assumed that the impact from dust will not increase. Indeed, the site will benefit from the extraction of mineral being undertaken at increased depth, which will afford a degree of natural dust mitigation. Therefore, providing correct dust management procedures are enforced, the extraction, processing, stocking, restoration and movement of material on the application site will not generate excessive levels of fugitive dust. Nevertheless, to ensure effective adherence of mitigation, it is recommended that a detailed scheme of dust

management and monitoring be prepared pursuant of planning approval. This will be prepared by the applicant and will set out in further detail the procedures to be employed which will, as a minimum, contain all the measures recommended in this assessment.

11.10.3 The scheme will recommend the implementation of a proactive monitoring strategy for nuisance dust and the measurement of PM_{10} / $PM_{2.5}$ in order to demonstrate compliance with appropriate air quality standards and dust deposition criterion. Monitoring should ideally be undertaken at the nearest / most sensitive receptors to the quarry with the resultant data disseminated to the Regulatory Authorities. PM measurements will utilise equipment that complies with the requirements of the Air Quality Strategy.

11.10.4 The amount of mineral exported from the quarry will also remain unchanged from current volumes. As such there will be no undue impact on air quality pollutants along the public highway from vehicle exhaust emissions.

Human Health

11.10.5 Public health statistics show that respiratory health in the area is good and there is no evidence of any impact from current operations.

11.10.6 There are a range of mitigation measures which are currently being implemented at Back Lane Quarry and contribute to baseline air quality in the local area remaining well within AQS objective thresholds, which are set to protect the environment and human health.

11.10.7 Provided that appropriate mitigation measures continue to be implemented, dust generation from the continuation of activities would be negligible and there would be no change in health risk.

11.11 References

1. National Planning Policy Framework, 2021
Department for Communities and Local Government, 2021

2. Planning Practice Guidance
Department for Communities and Local Government, 2014

3. Institute of Air Quality Management
Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016

4. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland
DEFRA: 2007.

5. Minerals Industry Research Organisation
Good Practice Guide: Control and Measurement of Nuisance Dust and PM_{10} from the Extractive Industries, 2011.

6. The Environmental Effects of Dust from Surface Mineral Workings, *Dept. of Environment Minerals Division, 1995.*

7. MPS2 - Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England, Annex 1: Dust.
Office of the Deputy Prime Minister, 2005

8. Farmer, A.M.: The Effects of Dust on Vegetation and its Consequences for Nature Conservation in Great Britain
Nature Conservancy Council, CSD Note Number 57, 1991).

9. Land-Use Planning & Development Control: Planning for Air Quality, (January 2017)
Environmental Protection UK and Institute of Air Quality Management

12 GROUNDBORNE VIBRATION AND OVERPRESSURE

12.1 Introduction

12.1.1 A Groundborne Vibration and Air Overpressure assessment has been prepared to accompany the planning application and is provided within Technical Appendix H of this ES. The assessment is summarised and discussed within this ES chapter.

12.1.2 The application boundary is not to increase from the area already permitted under the Review of Old Mineral Permission (ROMP) granted in 2006 (ref: 1/03/1186) and the extant planning permission for the site (ref: 01/09/0360) and therefore the workings will be no closer to the nearest dwellings.

12.1.3 The extraction of mineral will continue to be extracted by drilling and blasting and then loaded and hauled by dump trucks to the existing processing plant for processing.

12.1.4 Operations are to continue in the existing extraction area but to a greater depth (a further 75 metres to -37mAOD from the currently permitted floor of 38mAOD).

12.1.5 It is not proposed to vary the operating hours from those permitted in the current planning permission for the site (ref: 01/09/0360).

12.1.6 The intention of this assessment is to establish that the impact of groundborne vibration and air overpressure from blasting operations as a consequence of the continuation of existing site operations would not be expected to result in any additional impact on nearby sensitive properties. Levels of groundborne vibration and air overpressure would be controlled to ensure compliance with extant planning permission conditions.

Competency and Expertise

12.1.7 The author of this chapter is Kevin Gough. Kevin worked on a number of environmental monitoring projects within local government before moving to the mineral extractive industry in 1986.

12.1.8 He founded Advance Environmental Consulting Limited and has managed environmental monitoring and assessment projects and contracts for clients throughout the UK and Europe. His principal areas of expertise are the monitoring and assessment of environmental noise and ground borne vibration from blasting, which have been developed through over 40 year's practical experience in the field. He served as a regional steering group member and Chairperson of the Institute of

Environmental Management and board member. Currently an Honorary Fellow of the Institute of Quarrying where most recently he served as a director and executive board member.

12.2 Site Description

12.2.1 Back Lane Quarry is in the jurisdiction of Lancaster City Council and Lancashire County Council being situated to the south-east of Carnforth in Lancashire.

12.2.2 The site is bounded to the north by the adjoining Leapers Wood Quarry operated by Tarmac Trading Limited, to the east by woodland, to the south by agricultural land and to the west by woodland, with the M6 beyond.

12.2.3 Leapers Wood Quarry is operated by Tarmac Trading Limited and is immediately adjacent to the site with a common nominal boundary separating the two sites. A concurrent application is being submitted on behalf of Tarmac for the deepening of the workings at Leapers Wood Quarry to the same depth to allow for joint working of the boundary between the two quarries.

12.2.4 Carnforth is located to the west of the site and is the nearest substantial residential area with the nearest dwellings on the edge of the town being around 400 metres to the north-west of the current permitted extraction area beyond the M6 motorway.

12.2.5 There are a number of isolated residential properties located within 1 kilometre of the site.

12.2.6 Hawthorns Caravan Park is located approximately 90 metres to the south-west of the southern-most part of the site (southern site entrance) and approximately 350 metres from the current mineral extraction area.

12.2.7 Newlands Farm lies approximately 280 metres south-west of the southern site entrance and over 500 metres south of the extraction area.

12.2.8 Wayside lies approximately 210 metres to the south-east of the southern site entrance and 350 metres south-east of the extraction area.

12.2.9 The site access is from the west on Back Lane.

12.2.10 The properties are already recognised as the closest to Back Lane quarry and as such subject to extant planning conditions and are used for demonstrating compliance with respective groundborne vibration limits.

12.3 Legislative and Policy Context

National Planning Policy Framework (NPPF)

12.3.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England. The latest version was published in December 2023.

12.3.2 At the heart of the NPPF is a presumption in favour of sustainable development.

12.3.3 Section 15 of the NPPF (Conserving and Enhancing the Natural Environment), although not specifically referring to the impacts of blasting and vibration, does refer to other related sensory impacts, in particular noise, in the following paragraphs:

'180. Planning policies and decisions should contribute to and enhance the natural and local environment by…

(e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…'

'191. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason…'

12.3.4 Paragraph 193 refers to the integration of new development with existing businesses and facilities and states:

'*Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on*

new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

National Planning Practice Guidance - Minerals (NPPGM)

12.3.5 The 'Minerals' chapter of the Planning Practice Guidance, under the heading 'Assessing environmental impacts from minerals extraction' refers to blast vibration under the sub heading; 'What are the environmental issues of minerals working that should be addressed by mineral planning authorities?'. However, in contrast to its sensory impact counterparts noise, dust and air quality, no further assessment framework or guidance is provided in the NPPGM.

12.3.6 The chapter therefore refers to guidance contained in British Standards and other research documents and recommends vibration criteria which accords with that provided by Mineral Planning Guidance notes MPG 9 and 14, which were withdrawn in 2014 and not replaced.

12.4 Effects of Blasting

12.4.1 When an explosive detonates within a borehole stress waves are generated causing very localised distortion and cracking. Outside of this immediate vicinity, however, permanent deformation does not occur. Instead, the rapidly decaying stress waves cause the ground to exhibit elastic properties whereby the rock particles are returned to their original position following the passage of the stress waves. Such vibration is always generated even by the best designed and executed of blasts and will radiate away from the blast site attenuating as distance increases.

12.4.2 With experience and knowledge of the factors which influence ground vibration, such as blast type and design, site geology and receiving structure, the magnitude and significance of these waves can be accurately predicted at any location.

12.4.3 Vibration is also generated within the atmosphere where the term 'air overpressure' is used to encompass both its audible and sub-audible frequency components. Again, experience and knowledge of blast type and design enables prediction of levels and an assessment of their significance. In this instance, predictions can be made less certain by the fact that air overpressure levels may be significantly influenced by atmospheric conditions. Hence the most effective method of control is its minimisation at source.

12.4.4 It is important to note that for any given blast it is very much in the operator's

interest to always reduce vibration, both ground and airborne, to the minimum possible as this substantially increases the efficiency and hence economics of blasting operations.

12.4.5 The deepening of workings would be conducted in a similar manner to the existing Back Lane Quarry development. However, the optimum blast design will vary from blast to blast and will be decided by the operator with reference to the site specific conditions and in order to comply with the recommended vibration criteria.

12.5 Blast Vibration Terminology

Ground Vibration

12.5.1 Vibration can be generated within the ground by a dynamic source of sufficient energy. It will be composed of various wave types of differing characteristics and significance collectively known as seismic waves.

12.5.2 These seismic waves will spread radially from the vibration source decaying rapidly as distance increases.

12.5.3 There are four interrelated parameters that may be used in order to define ground vibration magnitude at any location. These are:

- Displacement - the distance that a particle moves before returning to its original position, measured in millimetres (mm);
- Velocity - the rate at which particle displacement changes, measured in millimetres per second (mms^{-1});
- Acceleration - the rate at which the particle velocity changes, measured in millimetres per second squared (mms^{-2}) or in terms of the acceleration due to the earth's gravity (g); and
- Frequency - the number of oscillations per second that a particle undergoes measured in Hertz (Hz).

12.5.4 Much investigation has been undertaken, both practical and theoretical, into the damage potential of blast induced ground vibration. Among the most eminent of such research authorities are the United States Bureau of Mines (USBM), Langefors and Kihlström, and Edwards and Northwood. All have concluded that the vibration parameter best suited as a damage index is particle velocity.

12.5.5 Studies by the USBM have clearly shown the importance of adopting a monitoring approach that also includes frequency.

12.5.6 Thus the parameters most commonly used in assessing the significance of an impulsive vibration are those of particle velocity and frequency which are related for sinusoidal motion as follows:

$$PV = 2 \pi f a$$

where PV = particle velocity

π = pi

f = frequency

a = amplitude

12.5.7 It is the maximum value of particle velocity in a vibration event, termed the peak particle velocity, that is of most significance and this will usually be measured in three independent, mutually perpendicular directions at any one location in order to ensure that the true peak value is captured. These directions are longitudinal (or radial), vertical and transverse.

12.5.8 Such maximum of any one plane measurements is the accepted standard worldwide and as recommended by the British Standards Institution and the International Standards Institute amongst others. It is also the basis for all the recognised investigations into satisfactory vibration levels with respect to damage of structures and human perception.

12.5.9 British Standard 7385-2: 1993 'Evaluation and measurement for vibration in buildings - Guide to damage levels from groundborne vibration'; states that there is little probability of fatigue damage occurring in residential building structures due to blasting. The increase of the component stress levels due to imposed vibration is relatively nominal and the number of cycles applied at a repeated high level of vibration is relatively low. Non-structural components (such as plaster) should incur dynamic stresses which are typically well below, i.e. only 5% of, component yield and ultimate strengths.

12.5.10 All research and previous work undertaken has indicated that any vibration induced damage will occur immediately if the damage threshold has been exceeded and that there is no evidence of long term effects.

Airborne Vibration

12.5.11 Whenever an explosive is detonated transient airborne pressure waves are

generated.

12.5.12 As these waves pass a given position, the pressure of the air rises very rapidly to a value above the atmospheric or ambient pressure. It then falls more slowly to a value below atmospheric before returning to the ambient value after a series of oscillations. The maximum pressure above atmospheric is known as the peak air overpressure.

12.5.13 These pressure waves will comprise of energy over a wide frequency range. Energy above 20 Hz is perceptible to the human ear as sound, whilst that below 20 Hz is inaudible, however, it can be sensed in the form of concussion. The sound and concussion together are known as air overpressure which is measured in terms of decibels (dB) or pounds per square inch (p.s.i.) over the required frequency range.

12.5.14 The decibel scale expresses the logarithm of the ratio of a level (greater or less) relative to a given base value. In acoustics, this reference value is taken as 20 x 10-6 Pascals, which is accepted as the threshold of human hearing.

12.5.15 Air overpressure (AOP) is therefore defined as:

$$\text{AOP, dB} = 20 \text{ Log } \frac{\text{Measured pressure}}{\text{Reference pressure}}$$

12.5.16 Since both high and low frequencies are of importance, no frequency weighting network is applied, unlike in the case of noise measurement when an A - weighted filter is employed.

12.5.17 All frequency components, both audible and inaudible, can cause a structure to vibrate in a way which can be confused with the effects of ground vibrations.

12.5.18 The lower, inaudible, frequencies are much less attenuated by distance, buildings and natural barriers. Consequently, air overpressure effects at these frequencies can be significant over greater distances, and more readily excite a response within structures.

12.5.19 Should there be perceptible effects they are commonly due to the air overpressure inducing vibrations of a higher, audible frequency within a property and it is these secondary rattles of windows or crockery that can give rise to comment.

12.5.20 In a blast, airborne pressure waves are produced from five main sources:

- Rock displacement from the face;

- Ground induced airborne vibration;
- Release of gases through natural fissures;
- Release of gases through stemming; and
- Insufficiently confined explosive charges.

12.5.21 Meteorological factors over which an operator has no control can influence the intensity of air overpressure levels at any given location. Thus, wind speed and direction, temperature and humidity at various altitudes can have an effect upon air overpressure.

12.6 Vibration Criteria

Damage Levels

Ground Vibration

12.6.1 Various authorities around the world have undertaken detailed research into determining the vibration levels necessary for the possible onset of damage to property. The United States Bureau of Mines (USBM) have reviewed all relevant published data, both theoretical and practical, to augment their own considerable research. They are, therefore, considered to be the foremost authority on this subject.

12.6.2 When defining damage to residential type structures the following classifications are used:

- Cosmetic or threshold - the formation of hairline cracks or the growth of existing cracks in plaster, drywall surfaces or mortar joints.
- Minor - the formation of large cracks or loosening and falling of plaster on drywall surfaces, or cracks through bricks/concrete blocks.
- Major or structural - damage to structural elements of a building.

12.6.3 Published damage criteria will not necessarily differentiate between these damage types but rather give levels to preclude cosmetic damage and therefore automatically prevent any more severe damage.

12.6.4 The comprehensive research programme undertaken by the USBM in the late 1970s (R.I. 8507, 1980) determined that vibration values well in excess of 50mms^{-1} are necessary to produce structural damage to residential type structures. The onset of cosmetic damage can be associated with lower vibration levels, especially at very low vibration frequencies, and a limit of 12.7mms^{-1} is therefore recommended for such relatively unusual vibration. For the type of vibration

associated with open pit blasting in this country, the safe vibration levels are seen to be from 19 - 50 mms^{-1}.

12.6.5 A further USBM publication (Bureau of Mines Technology Transfer Seminar, 1987) states that these safe vibration levels are '….for the worst case of structure conditions….', and that they are '….independent of the number of blasting events and their durations', and that no damage has occurred in any of the published data at vibration levels less than 12.7 mms^{-1}.

12.6.6 A later publication on this subject (S.E.E. Conference, 1991) reconfirms these safe vibration criteria and states that '… these studies have since been widely adopted by the users and regulators of explosives to develop and demonstrate safe blasting practices.' and that 'In the ten years since their publication, nothing has appeared to replace them or even significantly add to the data base.'

12.6.7 Indeed, within the UK, the Transport and Road Research Laboratory in their Report No. 53 of 1986 recommend the use of these USBM safe vibration criteria for blasting adjacent to residential type structures.

12.6.8 In addition, the British Standards Institution's structural damage committee have investigated blast induced vibration with respect to its damage potential. They contacted some 224 organisations, mainly British, and found no evidence of any blast induced damage at levels less than those recommended by the USBM.

12.6.9 This investigation culminated in British Standard 7385-2: 1993 'Evaluation and measurement for vibration in buildings - Guide to damage levels from groundborne vibration'.

12.6.10 British Standard 7385-2 gives guide values to prevent cosmetic damage to property. Between 4 Hz and 15 Hz, a guide value of 15 - 20 mms^{-1} is recommended, whilst above 40 Hz the guide value is 50 mms^{-1}. These vibration criteria reconfirm those of the USBM.

12.6.11 Any doubt that such low levels of vibration are perfectly safe should be dispelled by considering the strain induced within a residential type property from daily environmental changes and domestic activities. This is confirmed within the 1987 USBM publication which quotes that daily changes in humidity and temperature can readily induce strain of the order that is equivalent to blast induced vibration of from 30 - 75 mms^{-1}. Typical domestic activities will produce strain levels corresponding to vibration of up to 20 mms^{-1} and greater.

12.6.12 It is for this reason that many domestic properties will exhibit cracks that may be wrongly attributed to blasting activities. There are many additional reasons why properties will develop cracks, for example:

- Fatigue and ageing of wall coverings;
- Drying out of plaster finishes;
- Shrinkage and swelling of wood;
- Chemical changes in mortar, bricks, plaster and stucco;
- Structural overloading; and
- Differential foundation settlement - particularly after times of prolonged dry spells.

Air Overpressure

12.6.13 Comprehensive investigations into the nature and effects of air overpressure with particular reference to its damage potential have been undertaken by the USBM who has also reviewed all other published data on this subject (R.I. 8485, 1980).

12.6.14 The weakest parts of most structures that are exposed to air overpressure are windows. Poorly mounted, and hence prestressed windows might crack at around 150 dB (0.1 p.s.i.) with most cracking at 170 dB (1.0 p.s.i.). Structural damage can be expected at 180 dB (3.0 p.s.i.).

12.6.15 The latest recommendations by the USBM are reproduced in Table 12.1. The criteria set is based on minimal probability of the most superficial type of damage in residential-type structures, the single best descriptor being recommended as the 2 Hz high pass system.

Instrument Response	Maximum Recommended Level (dB)
0.1 Hz high pass	**134**
2.0 Hz high pass	**133**
5.0 or 6.0 Hz high pass	**129**
C- Slow	**105 dB (C)**

Table 12.1: United States Bureau of Mines published criteria for air overpressure

Perception Levels

12.6.16 The fact that the human body is very sensitive to vibration can result in subjective concern being expressed at energy levels well below the threshold of damage.

12.6.17 A person will generally become aware of blast induced vibration at levels of around 1.5 mms^{-1}, although under some circumstances this can be as low as 0.5 mms^{-1}. Even though such vibration is routinely generated within any property and is also entirely safe, when it is induced by blasting activities it is not unusual for such a level to give rise to subjective concern. Such concern is also frequently the result of the recent discovery of cracked plaster or brickwork that in fact has either been present for some time or has occurred due to natural processes.

12.6.18 From experience, virtually all complaints regarding blasting arise because of the concern over the possibility of damage to owner-occupied properties. Such complaints are largely independent of the vibration level. In fact, once an individual's perception threshold is attained, complaints can result from 3% to 4% of the total number of blasts, irrespective of their magnitude.

12.6.19 Government guidance was provided on this subject within Minerals Planning Guidance Note No. 9 'Planning and Compensation Act 1991: Interim Development Order Permissions (IDOS) - Conditions. Department of the Environment, Welsh Office, 1992' and Minerals Planning Guidance Note No. 14 'Environment Act 1995: Review of Mineral Planning Permissions. Department of the Environment, Welsh Office, 1995'. The documents suggested a range of between 6 to 10 mms^{-1} at a 95% confidence level as measured over any period of 6 months at vibration sensitive buildings with no individual blast exceeding 12 mms^{-1}.

12.6.20 The documents are still widely referenced despite being withdrawn and, as yet, not replaced.

12.6.21 These same criteria are also recommended within the 1998 Department of the Environment Transport and The Regions (DETR) research publication 'The Environmental Effects of Production Blasting from Surface Mineral Workings'.

12.6.22 This same DETR publication also notes that 'It would appear that over the years conditions have become progressively more stringent. No doubt this is as a result of MPAs seeking to reduce the number of complaints and by operators seeking to resolve issues more quickly. However, a reduction in complaints will not necessarily follow.'

12.6.23 Indeed, one of the principal findings of the study which led to this publication is 'Once the threshold of perception had been crossed the magnitude of vibration seemed to bear little relation to the level of resulting complaint'.

12.6.24 An explanation of the necessity to use explosives and the likely effects as perceived

by a site's neighbours can allay the concern of a significant proportion of those inhabitants of neighbouring property. It is invariably the case that an operator will consider the perception threshold level prior to the design of each and every blast at a particular site.

12.6.25 The British Standards Institution has produced a document relevant to such a discussion entitled British Standard 6472-2: 2008 'Guide to evaluation of human exposure to vibration in buildings – Blast-induced vibration''. This document discusses how and where to measure blast-induced vibration and gives maximum satisfactory magnitudes of vibration with respect to human response. Satisfactory magnitudes are given as 6 to 10 mms^{-1} at a 90% confidence level as measured outside of a building on a well-founded hard surface as close to the building as possible.

12.7 Prediction and Control of Vibration Levels

Ground Vibration

12.7.1 The accepted method of predicting peak particle velocity for any given situation is to use a scaling approach utilising separation distances and instantaneous charge weights. This method allows the derivation of the site specific relationship between ground vibration level and separation distance from a blast.

12.7.2 A scaled distance value for any location may be calculated as follows:

Scaled Distance (SD) = $DW^{-½}$ in $mkg^{-½}$

where D = Separation distance (blast to receiver) in metres

W = Maximum Instantaneous Charge (MIC) in kg

i.e. maximum weight of explosive per delay interval in kg

12.7.3 For each measurement location the maximum peak particle velocity from either the longitudinal, vertical or transverse axis is plotted against its respective scaled distance value on logarithmic graph paper.

12.7.4 An empirical relationship derived by the USBM relates ground vibration level to scaled distance as follows:

$$PV = a\,(SD)^{b}$$

where PV = Maximum Peak Particle Velocity in mms^{-1}

SD = Scaled Distance in $mkg^{-½}$

a,b = Dimensionless Site Factors

12.7.5 The site factors a and b allow for the influence of local geology upon vibration attenuation as well as geometrical spreading. The values of a and b are derived for a specific site from least squares regression analysis of the logarithmic plot of peak particle velocity against scaled distance which results in the mathematical best fit straight line where:

a is the peak particle velocity intercept at unity scaled distance

and b is the slope of the regression line

12.7.6 In almost all cases, a certain amount of data scatter will be evident, and as such statistical confidence levels are also calculated and plotted.

12.7.7 The statistical method adopted in assessing the vibration data is that used by Lucole and Dowding. The data is presented in the form of a graph showing the attenuation of ground vibration with scaled distance and results from log - normal modelling of the velocity distribution at any given scaled distance. The best fit or mean (50%) line as well as the upper 95% confidence level are plotted.

12.7.8 The process for calculating the best fit line is the least squares analysis method. The upper 95% confidence level is found by multiplying the mean line value by 1.645 times 10 raised to the power of the standard deviation of the data above the mean line. A log - normal distribution of vibration data will mean that the peak particle velocity at any scaled distance tends to group at lower values.

12.7.9 From the logarithmic plot of peak particle velocity against scaled distance, for any required vibration level it is possible to relate the maximum instantaneous charge and separation distance as follows:

$$\text{Maximum Instantaneous Charge (MIC)} = (D/SD)^{2}$$

where D = Separation distance (blast to receiver) in metres

SD = Scaled Distance in $mkg^{-½}$ corresponding to vibration level required

12.7.10 The scaled distance approach assumes that blast design remains similar between those shots used to determine the scaling relationship between vibration level and separation distance and those for which prediction is required. For prediction purposes, the scaling relationship will be most accurate when calculations are derived from similar charge weight and distance values.

12.7.11 The main factors in blast design that can affect the scaling relationship are the maximum instantaneous charge weight, blast ratio, free face reflection, delay interval, initiation direction and blast geometry associated with burden, spacing, stemming and subdrill.

12.7.12 Although the instantaneous explosive charge weight has perhaps the greatest effect upon vibration level, it cannot be considered alone, and is connected to most aspects of blast design through the parameter blast ratio.

12.7.13 The blast ratio is a measure of the amount of work expected per unit of explosive, measured for example in tonnes of rock per kilogramme of explosive detonated (tonnes/kg), and results from virtually all aspects of a blast design i.e. hole diameter, depth, burden, spacing, loading density and initiation technique.

12.7.14 The scaled distance approach is also strictly valid only for the specific geology in the direction monitored. This is evident when considering the main mechanisms which contribute to ground motion dissipation:

- Damping of ground vibrations, causing lower ground vibration frequencies with increasing distance.
- Discontinuities causing reflection, refraction and diffraction.
- Internal friction causing frequency dependent attenuation, which is greater for coarser grained rocks.
- Geometrical spreading.

12.7.15 In practice similar rates of vibration attenuation may occur in different directions, however, where necessary these factors should be routinely checked by monitoring, especially on sites where geology is known to alter.

12.7.16 Where it is predicted that the received levels of vibration will exceed the relevant criteria the operator will have to reduce the maximum instantaneous explosive

charge weight. One method of achieving such a reduction is to deck the explosives within the borehole. This technique splits the column of explosives in two, separated by inert material. If blasting is required at closer distances than that where double decking would be a successful strategy, other charge reduction methods would have to be employed. These could be more complex decking strategies or changes to the blast geometry and / or the use of smaller diameter boreholes.

Airborne Vibration

12.7.17 Airborne vibration waves can be considered as sound waves of a higher intensity and will, therefore, be transmitted through the atmosphere in a similar manner. Thus meteorological conditions such as wind speed, wind direction, temperature, humidity and cloud cover and how these vary with altitude, can affect the level of the air overpressure value experienced at a distance from any blast.

12.7.18 If a blast is fired in a motionless atmosphere in which the temperature remains constant with altitude then the air overpressure intensity will decrease purely as a function of distance. In fact, each time the distance doubles the air overpressure level will decrease by 6 dB. However, such conditions are very rare and it is more likely that a combination of the factors mentioned above will increase the expected intensity in some areas and decrease it in others.

12.7.19 Given sufficient meteorological data it is possible to predict these increases or decreases. However, to be of use this data must be both site specific and of relevance to the proposed blasting time. In practice this is not possible because the data is obtained from meteorological stations at some distance from the blast site and necessarily at some time before the blast is to be detonated. The ever changing British weather therefore causes such data to be rather limited in value and its use clearly counterproductive if it is not relevant to the blast site at the detonation time. In addition, it would not normally be safe practice to leave charged holes standing for an unknown period of time.

12.7.20 It is because of the variability of British weather that it is standard good practice to control air overpressure at source and hence minimise its magnitude at distance, even under relatively unfavourable conditions.

12.7.21 Such a procedure is recommended by the Government in their latest publications on this subject; MPG 9 and MPG 14, where it is suggested that no air overpressure limit be defined but rather that methods to be employed to minimise air

overpressure are submitted for approval. This approach is also recommended within the previously mentioned 1998 DETR publication.

12.7.22 Such control is achieved in a well-designed and executed blast in which all explosive material is adequately confined. Thus particular attention must be given to accurate face profiling and the subsequent drilling and correct placement of explosive within any borehole, having due regard to any localised weaknesses in the strata including overbreak from a previous shot, clay joints and fissured ground.

12.7.23 Stemming material should be of sufficient quantity and quality to adequately confine the explosives, and care should be taken in deciding upon the optimum detonation technique for the specific site circumstances.

12.7.24 Although there will always be a significant variation in observed air overpressure levels at a particular site, it is possible to predict a range of likely values given sufficient background information and/or experience. In this respect, past recordings may be analysed according to the cube root scaled distance approach to provide a useful indication of future levels.

12.8 Assessment of Blast Induced Groundborne Vibration Levels

12.8.1 Blasting procedures and protocols currently employed at Back Lane Quarry will be maintained for all future blasting operations to ensure the impact of groundborne vibration and air overpressure criteria is in line with current guidance, British Standards and planning policy.

12.8.2 Blasting operations in quarries can be extremely dangerous if the operation is not carried out correctly. The procedures and protocols currently implemented are designed to minimise health and safety risk whilst also maximising the efficiency and hence economics of blasting. This in turn minimises the environmental impact of blasting operations.

12.8.3 In order to minimise such risks and effects, full attention will be given to pre-profiling and accuracy of burden and spacing, size of blast, drilling accuracy, initiation system (whereby electronic initiation may give a benefit in some instances), initiation sequence, delay between holes (ie duration of blast), MIC etc. Further consideration will be given to the time of blast, the frequency and regularity of blasting and monitoring.

12.8.4 Currently, all blasts at Back Lane Quarry are monitored, generally, at the nearest potentially vibration sensitive property to any blasting event. This practice will

continue.

12.8.5 A review of data collected over the past three years from blasting events at Back Lane Quarry showed that all measured blasts were found to comply with the current permitted blasting limits.

12.8.6 It would be usual to use the measurement data obtained from compliance monitoring of blasting operations over a period of time to generate a regression curve plot for blasting at Back Lane Quarry. The use of the USBM formula to predict vibration levels calls for the maximum peak particle velocity (PPV) to be plotted against scaled distance (SD) in a logarithmic manner. The latter is defined as:

$$\text{Scaled Distance } (mkg^{-½}) = \frac{\text{blast/receiver separation distance (m)}}{\text{(MIC)}}$$

where MIC is the maximum instantaneous charge weight in kg

12.8.7 The measured PPV's would be logarithmically plotted against their respective SD's and the line of best fit (50% confidence) would be drawn and the upper 95 % confidence level calculated. This would enable the predicted maximum MIC's for given distances to be determined. However, much of the data collected has been from monitoring at the same or similar location (from a distance perspective) which would not provide a representative spread of data for regression analysis purposes.

12.8.8 Current blasting practices at the site include predictive modelling which equally ensures that compliance with the recommended vibration criteria is achieved. It is therefore the intention that the current procedures used to predict vibration levels shall be adopted for all future blasts at the site. This includes:

- Identifying and agreeing with the regulatory authorities potentially sensitive properties;
- Utilising the latest blast design software that interfaces with laser profiling scanners;
- Accurately identifying the quarry blast area, undertaking a pre-survey and accurately determining the distance to nearest sensitive property, which shall be accurately determined using the survey data;
- Calculating the scaled distance (SD) value from the measured distance and proposed maximum instantaneous explosive charge weight (MIC);
- Using the SD to predict the expected peak particle velocity (PPV) (expressed

@ 95% confidence) at the identified sensitive property;

- When necessary, accordingly reducing the MIC and recalculating the SD until the predicted PPV is below the permissible levels.

12.8.9 It is therefore concluded that current blasting practices at the site will ensure that compliance with the recommended vibration criteria will be achieved from continued operations at the quarry. Data then obtained by direct measurement of blasting operations in this area will enable the site to update the regression analysis graph, which can then be used to inform all future blast designs. It is therefore considered that no significant effects would result from the proposed development.

12.9 Cumulative Impact

12.9.1 With the implementation of appropriate control, the cumulative impact of blasting as a consequence of the proposed concurrent deepening of both Back Lane and Leapers Wood quarries, will be negligible with maintenance, if not improvement to the current status quo. No significant cumulative effects are therefore predicted.

12.10 Conclusions

12.10.1 In order to regularise a criterion for restricting vibration levels from production blasting whilst addressing the need to protect amenity for nearby residents, it is recommended that the current criterion of 6.0 mm per second (mms^{-1}) for 95% of events is considered a satisfactory magnitude for vibration from blasting at Back Lane Quarry.

12.10.2 All blasts shall be designed to ensure that ground vibration levels arising from blasting shall not exceed a peak particle velocity of $6mms^{-1}$ in any mutually perpendicular plane and calculated with a 95% confidence limit. No individual blast shall exceed a peak particle velocity of 9 mms^{-1} as measured at any vibration sensitive property which is not under the direct control of the Applicant / operator.

12.10.3 All vibration will be of a relatively low order of magnitude and would be entirely safe with respect to the possibility of the most cosmetic of plaster cracks.

12.10.4 All vibration will also be well below those levels recommended for blast induced vibration as being satisfactory within the previously discussed British Standard Guide BS 6472-2: 2008.

12.10.5 With such low ground vibration levels accompanying air overpressure would also be of a very low and hence safe level, although will be perceptible on occasions at

the closest of properties.

12.10.6 If the Applicant / operator accords with the recommendations given, there is no reason for blasting operations resulting from the proposed deepening of Back Lane Quarry to give rise to any adverse or significant impacts due to increased vibration at any of the dwellings or structures in the vicinity. In fact, for blasting operations in the current void, any resultant effects should be lower due to the increased depth of working.

13 WATER ENVIRONMENT

13.1 Introduction

13.1.1 A Flood Risk Assessment and Hydrogeological Impact Assessment have been undertaken to accompany the planning application and are provided as Technical Appendices I and J of this ES. The assessments have been summarised and discussed within this ES chapter.

13.1.2 A combined working scheme for both Leapers Wood and Back Lane Quarries, comprising a single quarry void and working to -37mAOD, is proposed within the planning application.

13.1.3 The characteristics of the water environment and environmental setting were investigated using existing data and reports, walkovers, assessment of site data, field testing, discussion with site personnel and site visits. The potential effects of the proposed development upon the extant water environment have been assessed by reference to baseline data and a series of matrices developed to ensure a rigorous and consistent approach. Mitigation measures have been proposed, where appropriate.

13.1.4 The overall objective of this assessment was to define the hydrological and hydrogeological conditions relating to the site and its environs and to identify potential impacts that may arise due to the proposed, future mineral extraction and associated water management.

13.2 Baseline conditions

13.2.1 The quarry is situated in the western section of an upland area that is bounded by the valleys of the River Lune and the River Keer, some 3.7 km south and 1.5 km north of the site respectively. The eastern limits of the coastal plain, which extends to Morecambe Bay, form the western boundary of the upland area.

13.2.2 The site is located within the surface water catchment of the River Keer, which flows generally westwards and discharges into Morecambe Bay. Land immediately to the southeast of the site is within the catchment of the River Lune. Both the Keer and the Lune are designated as Main Rivers by the Environment Agency (EA).

13.2.3 The closest watercourse to the site, the Nether Beck, is located on the opposite side of the M6 Motorway to the quarry. It flows generally northwards, via several culverts and beneath the Lancaster Canal, ultimately discharging into the River Keer.

13.2.4 Up-catchment, an un-named stream is sourced from seepages from the Pendle Grit Member and Peat deposits. It sinks to ground at a large cave, known as Dunald Mill Hole, located approximately 1.1 km to the south of the site.

13.2.5 Thirty-seven waterbodies exist within a 2 km radius of the site, the three largest of which are Peddar Potts Reservoir, within the dormant Dunald Mill Quarry and within the restored Overhead Quarry.

13.2.6 Data relating to licensed and unlicensed abstractions within a 2 km radius of the centre of the quarry were obtained from the EA and Lancaster City Council. No abstractions from surface water were identified.

13.2.7 The regional bedrock geology comprises a vertically extensive sequence of sedimentary strata of Carboniferous age. The principal lithologies in the immediate vicinity of the quarry comprise limestone, and are sub-divided into the Park and overlying Urswick Formations. The majority of future mineral extraction, both permitted and proposed, will be from the Lower Park Limestone Formation. The majority of vertical and sub-vertical fractures and joints recorded are very small scale (millimetre) and infilled with brown or orange-yellow stained clay.

13.2.8 The Urswick Limestone comprises thick, well-bedded, pale grey grainstones or calcarenites, commonly with darker mottling and a rubbly texture, with thin beds of grey and varicoloured clay. The Park Limestone is an unbedded or poorly bedded, pale grey or pale yellowish grey bioclastic and peloidal grainstone or biocalcarenite.

13.2.9 Geological faults within the region are orientated predominantly northwest to southeast. A regional scale fault, which has a broadly north-south orientation, is located approximately 2 km to the east of the site.

13.2.10 Caves and other palaeokarst features are exposed within quarry faces, a few of which transmit water; however most are clay-filled. They are situated at varying elevations, including some significantly above the current watertable.

13.2.11 On areas of lower elevation to the west of the M6 motorway the bedrock geology is almost completely obscured by extensive superficial deposits. They are highly variable, both horizontally and vertically. The closest such deposits are situated some 50-100 m to the north of the quarry void and extend across the coastal plain. They are overlain by laterally and vertically extensive clayey-silty tidal flats and older marine deposits. The Millstone Grit Group bedrock occurs at depth beneath the coastal plain.

13.2.12 The majority of bedrock units within the vicinity of the site are designated as Secondary 'A' Aquifers by the EA. These are defined as 'permeable layers that can support local water supplies and may form an important source of baseflow to rivers'.

13.2.13 Carboniferous Limestone has a low primary porosity, and groundwater flow occurs mainly via fractures and conduits/caves. On a scale of tens of metres, groundwater flow within the fracture network approximates to that within a porous media and a conformable piezometric surface can be defined.

13.2.14 Observations within the quarry void have not noted significant groundwater seepage from fractures. Mineral investigation boreholes across both quarries, which extend to -55.8mAOD (18 m below the proposed depth of extraction at -37 mAOD), recorded thin, infilled fractures. Fracture apertures are anticipated to decline with increased depth. The limestone at depth was proven to be 'massive', with negligible fracturing or fissuring.

13.2.15 Groundwater levels have been monitored since 1993 to the Present Day within 27 boreholes at Leapers Wood and 8 boreholes within Back Lane Quarry. A comprehensive data set of groundwater levels therefore exists.

13.2.16 Prior to 2012, groundwater elevations were at 75 mAOD in the eastern extremities of the quarries, and 19-35 mAOD towards the western site boundary. Pre-dewatering, the groundwater flow direction within the vicinity of the quarries was west-northwestwards.

13.2.17 Dewatering has been undertaken at Leapers Wood Quarry from a sump in the west of the site since 2002 and at Back Lane Quarry since 2009. The influence of dewatering at both quarries is apparent on post-2012 groundwater levels.

13.2.18 The majority of boreholes exhibit seasonal groundwater level variations of between 2-6 m, however a greater range, typically between 10–20 m, was observed within some historical boreholes.

13.2.19 Tracer testing was undertaken in 1999, 2002, and 2023 as part of groundwater investigations at Leapers Wood and Back Lane Quarries. Fluocapteur monitoring devices and water samples were collected from targeted springs and watercourses before and after the introduction of tracer. During all tests, tracer deployed at the three proposed water discharge locations was conveyed rapidly northwards, taking between 25-72 hours to issue to surface water, 1–1.25 km north of the sites. The

speed of this conveyance and quantity of tracer dye recovered, indicates the presence of a discrete groundwater flow path, or paths, to the resurgence point.

13.2.20 In 2002, dye deployed in the Leapers Wood sinkhole was observed visually in the River Keer and was followed upstream along a tributary watercourse to a spring resurgence adjacent to a property known as Elpha, approximately 1 – 1.5km north of the sites. In the 2023 tracer test, a significant detection of dye from all three discharge locations was also observed immediately down-stream of this spring. The large quantity of dye observed during both tests indicates that the majority of water from all three of the proposed quarry discharge points is conveyed to this spring resurgence.

13.2.21 No tracer was detected at the monitoring locations immediately downstream of the Thwaite House Moss Site of Special Scientific Interest (SSSI), Crag Bank SSSI or close to the Over Kellet Pond Local Nature Reserve. These sites are therefore not supported by groundwater egress connected to the proposed discharge locations. The results from all tracer tests demonstrated that there is no evidence that water discharged into the mass of the limestone, flows to spring resurgences on the coastal plain.

13.2.22 The coastal plain is underlain by marine sediments (clay, silts and sands) and till (micrite/boulder clay). The low hydraulic conductivity of both the superficial deposits and bedrock underlying the coastal plain is such that there is anticipated to be negligible hydraulic connectivity between seawater and groundwater within the bedrock. Consequently, the potential for significant saline groundwater intrusion beneath the coastline is small.

13.2.23 Back Lane Quarry extracts limestone from the Park and Urswick Limestone Formations of the Great Scar Limestone Group. Mineral evaluation boreholes indicate that this formation persists to at least -55.8 mAOD, approximately 18m below the proposed base of the quarry, at -37 mAOD.

13.2.24 Due to the relatively small and elevated nature of the area in which the quarries are situated, the only local source of recharge to the groundwater system is rainfall. Due to the laterally extensive till deposits located to the east of the site, rainfall is considered likely to enter the limestone indirectly, via run-off, infiltrating where bedrock is exposed. Up-catchment stream systems, located to the east of the site, may also provide point sources of recharge to the karst system at locations such as the stream sinking into Dunald Mill Hole Cave system.

13.2.25 A complex karst system exists both locally and regionally. Several previously water-filled conduits have been truncated by mineral extraction. Neither mineral evaluation drilling or downhole geophysical logging has identified water-filled or clay-filled conduits at depth.

13.2.26 The permeability of the limestone estimated from various field tests is expected to be representative of the bulk properties of the limestone within the quarry curtilage. Tracer tracing has indicated that groundwater conveyance within the conduit network is likely to be significantly greater than that of the mass of the limestone.

13.2.27 Long-term groundwater level monitoring indicates that the overall groundwater flow direction within the limestone in the vicinity of the quarries is west-northwestwards, towards the 'trough' of the Nether Kellet Syncline. Tracer tests have demonstrated that the movement of groundwater along the fold axis is driven 'up-plunge' northwards. The groundwater within the limestone is therefore considered to drain to springs to the north of the site, which discharge to tributaries of the River Keer.

13.2.28 The sand and gravel deposits to the west of the quarry comprise a superficial aquifer, which has the potential to store and transmit groundwater. Recharge to this aquifer is by rainfall.

13.2.29 There is no evidence that groundwater within the limestone bedrock flows across the syncline feature within the limestone or to spring resurgences on the coastal plain.

13.3 Water management

13.3.1 Both quarries are currently worked below the piezometric groundwater surface and active dewatering is undertaken to facilitate safe and dry mineral extraction.

13.3.2 It is reported that groundwater was intercepted at Back Lane Quarry at around 60 mAOD in 2009, since when dewatering has been maintained continuously. Currently, only a single sump is utilised within the lowest sinking. Water from the sump is pumped to a lagoon, located to the west of the site, which has an average water level of c43.3 mAOD. The water level within the lagoon is regulated passively by a sink/sinkhole within its southwestern corner, where water egress to ground occurs via gravity at the base of the exposed rock face, situated at approximately 43 mAOD. Dewatering of Back Lane Quarry is permitted under Transfer Licence NW/073/0622/003 at 2,370.6 m^3/day.

13.3.3 The site also holds a discharge consent for the outfall from a French Drain at the western extent of the quarry. It is understood that this French Drain was constructed at the site of a former sinkhole. The discharge consent is for 17,280 m^3/day (720 m^3/hour or 200 l/s). Surface water run-off, which occurs across an area of hardstanding located in the west of the quarry, is conveyed into a sump, located adjacent to the quarry offices. From here water passes through an oil interceptor, prior to discharging to the French Drain.

13.3.4 It is proposed to continue the current water management regime during future mineral extraction. It is envisaged that water management within Leapers Wood and Back Lane Quarries will be combined in the future. Groundwater ingress and incident rainfall across the quarry will collect within one or more sumps within the quarry void. These sumps will provide settlement capacity, reducing the suspended solid content of the water.

13.3.5 The proposed continuation of sub-water table mineral extraction will necessitate dewatering at an increased rate. Three potential sources of water ingress to the quarry void exist: direct rainfall, diffuse inflow from the mass of the limestone and conduit flow.

13.3.6 Within the UK, projections of future climate change indicate that there will be more frequent, short duration, high intensity rainfall events and periods of long duration rainfall. The anticipated duration of mineral extraction and restoration (of the combined void) is until the end of 2078. For development with a lifetime between 2061 and 2100 the central climate change allowance of 35% is applicable. However, for robustness and to ensure the water management has considered the maximum predicted volumes, the 'upper' climate change estimate of 50% allowance has been applied to the estimates of storm rainfall run-off.

13.3.7 The volume of rainfall run-off into the combined quarries has been calculated by multiplying the long-term monthly average rainfall by their catchment area. The various surfaces intercepted in the quarries would intercept some of the incident rainfall, and a conservative approach has been applied by assuming that 80% of rainfall is conveyed to the quarry sump. The maximum run-off is anticipated during December, at 27.4 l/s.

13.3.8 The volumes of rainfall-derived water generated during storm events are significantly greater than those under 'average' rainfall conditions. Although the total volume of water from storm events does not present difficulties in the long-

term, the short-term containment of storm-derived water has been assessed. Water from storm events would not need to be discharged off-site immediately, but would be stored temporarily within the quarry void and subsequently discharged off-site, at a regulated rate.

13.3.9 Pre-dewatering groundwater elevations declined across the quarry void from 75 mAOD in the east, to 35 mAOD in the west. The floor of the quarry void at the proposed final depth of -37 mAOD will, therefore, be up to 90 m below the 'average' groundwater table.

13.3.10 The volume of groundwater ingress has been determined using a standard method, which equates the quarry void to a large diameter well. The Dupuit-Forcheimer (Thiem-Dupuit) equation, for unconfined flow, and a range of aquifer parameters have been used.

13.3.11 The stream sinking into Dunald Mill Hole Cave is considered to represent the entire headwaters of the catchment flowing into the karst system. For the purpose of the 'worst case assessment' it has been assumed that all of this water could potentially be intercepted by deeper quarry workings.

13.3.12 The maximum instantaneous ingress to the quarry void is the sum of the average groundwater and rainfall ingress. As the maximum average monthly rainfall is experienced in December, data from this month value has been used in the calculations.

13.3.13 Climate change will impact the duration and intensity of storm events, therefore this has been considered. The volumes indicated for the greatest storm event calculated (ie 1 in 100-year event) have also been assessed. The dewatering estimate of 3,145 m^3/day for current quarry conditions at 45 mAOD, under average rainfall conditions, does not consider input from the karst system where a cave passage may be truncated. The dewatering estimate at 45 mAOD for storm rainfall conditions is 39,650 m^3/day.

13.3.14 Based on meter readings of dewatering, volumes from Back Lane and Leapers Wood Quarry (with the quarry floor at 45 mAOD) are estimated to be between 1,000-3,500 m^3/day (~11.6–40.5 l/s).

13.3.15 As a 'worst case scenario' of the future maximum dewatering discharge, combining average rainfall, groundwater inflow and inflow from the karst system, with the quarry at its full depth, it has been assumed that all of this water could potentially be intercepted by deeper quarry workings.

13.3.16 Water from storm events would not need to be discharged off-site instantaneously but would be temporarily stored within the quarry void and subsequently discharged off-site at the greenfield run-off rate.

13.3.17 Due to the complexity of the geological and hydrogeological setting, the potential impact of dewatering on the surrounding groundwater elevations is highly unlikely to be radial. The impact from drawdown is likely to be constrained due to the presence of the Nether Kellet Syncline to the west, and the major faults present to the northeast, east and southeast. The Sichardt equation has been used to estimate the potential radius of influence from the location of dewatering.

13.3.18 The magnitude of the estimated radius of impact at the current quarry floor elevation of 45 mAOD is consistent with the current observations of drawdown. The estimate of potential impact, within a distance of 1.3 km of the dewatering sump, at the maximum proposed quarry depth, is therefore considered to be indicative and should be considered within the context of the complex geological and hydrogeological setting.

13.3.19 Progressive restoration will occur with the final landscaping for restoration of the combined site being completed by 2078. Restoration of the majority of the quarry void will be to open water. Once final extraction depths have been reached, dewatering will cease and the workings will start to fill with water. The rate of inflow will be slow and the timescale for filling of the void commensurately long, due to the low hydraulic conductivity of the limestone and the large capacity of the void.

13.3.20 Proposed outfalls will allow the passive egress of water from the restoration waterbody to ensure that a suitable freeboard remains on its margins. The outfalls would be located at the western extent of Back Lane Quarry void and/or the northwestern extent of Leapers Wood Quarry and would essentially represent a passive continuation of the proposed operational water management. The outfalls would convey water to either the Leapers Wood sinkhole, the Back Lane sinkhole located within the existing lagoon, at an elevation of 43 mAOD, or to the Back Lane French Drain, located at ~43 mAOD. A combination of these could potentially be utilised.

13.3.21 Variation in groundwater fluxes, combined with predicted increased storm water inflows due to climate change, is such that it is anticipated that the level of the restoration waterbody will vary by small amounts temporally. However, the

magnitude of such variations will be extremely small, due to the large area of the waterbody in relation to the relatively small volumes of water ingress.

13.4 Flood risk

13.4.1 As the site is over 1 hectare (ha) in size, a Flood Risk Assessment (FRA) has been prepared and is provided at Technical Appendix I of this ES. The FRA is summarised and discussed within this section of the ES and has been completed with due consideration of relevant national and local policies.

13.4.2 The site is located wholly within EA designated Flood Zone 1. This is defined as having less than a 1 in 1000 chance of fluvial flooding in any year. Mineral extraction and processing is designated as being 'Less Vulnerable' in accordance with the NPPF and PPG. According to Table 3 of the PPG, it is considered appropriate for such development to be located within Flood Zone 1. The Sequential Test is therefore considered to be passed and the Exception Test does not need to be applied.

13.4.3 An allowance for climate change has been incorporated into the drainage strategy.

13.4.4 Tracer tests conducted from the existing and proposed quarry discharge locations have demonstrated that the local groundwater flow is dominated by a karst conduit system. The majority of water discharged from all three of the proposed quarry discharges reaches a single spring resurgence close to a property known as Elpha, approximately 1-1.5 km to the north of the sites and, to a lesser extent, the downstream reaches of the Nether Beck. Downstream from the principal egress point the watercourse flows through agricultural land within the floodplain of the River Keer.

13.4.5 The volume of water that would need to be attenuated if the karst system was intercepted, under storm conditions, has been calculated to represent a worst case scenario. The maximum volume of water required to be attenuated within the quarry void at its maximum operational depth, for the 1 in 100-year event (6-hour duration +50% climate change) is approximately 140,000 m^3. The base of the quarry void area at the lowest sinking (-37 mAOD) will be approximately 27.6 ha. This water volume equates to a depth of water in the base of the quarry void of 0.5 m, which could be readily accommodated.

13.4.6 Post-restoration, a control structure would regulate the flow rate off-site passively to the greenfield run-off rate (232 l/s) for the combined quarry catchment area.

13.4.7 The maximum volume of water required to be attenuated by the restoration waterbody for the 1 in 100-year event (6-hour duration +50% climate change) is 76,200 m^3. Across the surface of the restoration waterbody this volume equates to a water depth of 0.1 m. A substantial freeboard of 6.9 m to 9.9 m would remain.

13.4.8 The discharge from the quarries is currently, and will continue to be, via conduits within the limestone which egress to springs and/or surface watercourses. There is thus no potential for the proposed discharges to impact groundwater levels within the mass of the limestone and no potential for groundwater flood risk.

13.4.9 The volume of water discharged during mineral extraction will increase from the current rates due to increased dewatering, however discharge rates off-site will be regulated to be at, or below, the greenfield rate.

13.4.10 In the event of an issue with the water management system, such as pump failure, discharge would be suspended temporarily. Groundwater ingress into the quarry void would be slow and could be readily accommodated within the base of the quarry void until active water management could recommence.

13.4.11 The impact of the proposals on fluvial flooding during mineral extraction and restoration is no greater than during the greenfield scenario and mitigation measures are not required.

13.4.12 The EA's 'Risk of Flooding from Surface Water' map shows that the risk of surface water flooding is confined to minor watercourses in areas to the east, north and south of the quarry boundary.

13.4.13 During mineral extraction, ponding may occur on the floor of the quarry void. It will be directed to sumps where it will be managed by the existing water management system. The overall risk of surface water flooding to the operational site, both existing and proposed, is considered to be very low.

13.4.14 The potential flood risk to and from the site is considered to be low and the anticipated water volumes can be readily attenuated on-site or managed by the continuation of use of the extant water management system. Therefore, no additional mitigation measures are required.

13.4.15 The 'first flush' of rainfall generally has a higher silt load than subsequent run-off. This initial flow will be naturally contained within the site. This will be achieved by intercepting groundwater ingress and incident rainfall and directing it to one or

more sumps within the quarry void. The sumps will provide settlement capacity, reducing the suspended solid content of the water.

13.5 Potential impacts

13.5.1 The investigation discussed herein has produced a detailed understanding of the water environment in the vicinity of both quarries. An assessment of the potential effects of the proposed vertical extension on the water environment within the combined site areas and its surrounds has been undertaken. Operational and post-restoration scenarios have been considered. Mitigation measures and residual impacts have also been identified.

13.5.2 Small watercourses, springs and waterbodies occur within a 2 km radius of the site. The majority of these features are not supported by groundwater from the limestone bedrock. However, tracer testing demonstrated that although some springs are potentially linked to groundwater rising from limestone bedrock, one is connected to the proposed discharge points from the combined sites.

13.5.3 Considering the significant distance of these receptors from the site, in addition to the geological complexity and extensive geological faulting present within the area, drawdown of the local groundwater table and/or reduced baseflow to groundwater supported features is considered to be highly unlikely.

13.5.4 One licensed abstraction at Back Lane Quarry, and three private groundwater supplies at Northside Caravan Park, Stone Bridge Farm, and Elpha House to the north of the site, are made from the limestone bedrock. The supply at Back Lane Quarry is supported by dewatering water and is located within the proposed Planning Boundary, and has therefore not been considered further within this assessment. Considering the considerable distance of the other receptors.

13.5.5 from the site (between 1.6–1.7 km), in addition to the geological complexity and extensive faulting present within the area, drawdown impact on these abstractors is considered highly unlikely.

13.5.6 Dewatering has been undertaken at Back Lane Quarry for over 13 years and considerably longer at Leapers Wood Quarry. There have been no known water-related impacts linked to quarry operation or dewatering and there have been no incidents reported to the site operators. Dewatering, and hence any associated potential impacts, will be time-limited, occurring only over the lifetime of the extractive phase.

13.5.7 The proposed water management will return the majority of dewatering to the aquifer, down-gradient of the site via the Leapers Wood sinkhole, the Back Lane sinkhole and the Back Lane French Drain. This will mitigate any potential reduction in baseflow to groundwater-supported features located along the groundwater flow path within the limestone to the north and northwest of the site.

13.5.8 It is considered that there will be no discernible impacts to any of the identified environmentally sensitive sites, groundwater-supported surface water features or groundwater abstractions as a result of quarry operations.

13.5.9 On-going groundwater monitoring will allow continued assessment of the potential impacts from dewatering.

13.5.10 As with all quarries, their operation can pose a contaminant risk to the water environment through small-scale accidental release of hydrocarbons from mobile plant or chemicals used on-site. Water from dewatering will be discharged off-site. Potential therefore exists for impact on groundwater quality, and groundwater-supported surface water features, from suspended solids and chemical contamination.

13.5.11 Water from dewatering will be settled within a sump in the quarry void prior to discharge off-site. The discharge will be undertaken in compliance with the conditions of an Environmental Permit.

13.5.12 The currently applied spill prevention and emergency spill procedures will remain in place throughout mineral extraction to reduce the risk of hydrocarbons being released into the environment. All fuel and chemicals will be contained within a bunded storage area situated on hardstanding.

13.5.13 Spill kits will be available at key locations on the site and staff trained in their use. Shut-off valves will be installed on the dewatering pipelines, enabling temporary suspension of flow to the lagoons and discharge points until clean-up is achieved.

13.5.14 With the proposed mitigation measures in place, the potential impact on surface water quality due to chemical contamination is considered to be negligible.

13.5.15 Following completion of restoration, dewatering will cease and groundwater levels will recover, forming a waterbody within the quarry void. Its water level will be controlled passively, with discharge off-site limited to the greenfield rate. Groundwater flows within the mass of the limestone will no longer be influenced by dewatering and will revert to pre-dewatering conditions. Excess water at the

passive overflow(s) will be directed to one or more of the off-site discharge locations. The return of groundwater to the aquifer is such that there will be no quantitative impact to groundwater flows post-restoration.

13.5.16 After the completion of restoration works, mobile plant will be removed from the site, thereby removing all associated potential contamination sources.

13.5.17 The water level of the restoration waterbody will be gravity controlled, therefore no pumps or mobile plant will be required on-site post-restoration, and all contamination risk from hydrocarbons will be removed. The size of the proposed restoration waterbody will ensure that there is sufficient settlement to remove suspended solids prior to being discharged off-site.

13.6 Cumulative and In Combination Effects

13.6.1 Cumulative impacts are those which result from incremental changes caused by past, present or future reasonably foreseeable developments. Extraction from the Urswick Limestone Formation was formerly undertaken at Dunald Mill Quarry, located 540 m south of the Back Lane and Leapers Wood combined site. Mineral extraction may recommence in the future, but it is not anticipated that this would be concurrent with the proposed development. Consequently, dewatering would not occur simultaneously at both sites and the potential cumulative impacts do not require consideration.

13.7 Mitigation measures

13.7.1 The existing groundwater level monitoring regime will continue. Boreholes that are damaged or lost will be replaced. Monitoring will be conducted monthly and records held on-site.

13.7.2 As with all quarries, there is a risk of small-scale accidental release of chemicals or hydrocarbons from mobile plant or other chemicals used on-site. Adherence to best practice pollution control measures will continue to be employed, thereby ensuring that any residual risk from hydrocarbon or chemical spills will be removed.

13.7.3 As it is considered that there is no risk posed to the water environment from the site post-restoration, mitigation measures are not required.

13.8 Summary

13.8.1 Future mineral extraction is proposed to -37 mAOD within a single quarry void. The volume of water entering the quarry void will increase with depth and be derived from three sources: direct rainfall, diffuse flow from the mass of the limestone and

conduit flow from truncated karst features. The maximum theoretical volume of water that could occur within the karst system, and that could potentially enter the quarry void, has been calculated. The ingress would be managed via dewatering, with discharge to ground via the Leapers Wood sinkhole, the Back Lane lagoon sinkhole and the Back Lane French Drain, either individually or in combination.

13.8.2 The characteristics of the local groundwater regime within the limestone are influenced principally by topography, geological structure and the hydrogeological characteristics of the different rock types present, including karst features. The overall groundwater flow direction in the immediate vicinity of the quarries is west-northwestwards. The majority of groundwater within the limestone is discharged to a spring located 1.5 km to the north of the site. The resultant water discharges to a tributary of the River Keer.

13.8.3 Dewatering of the quarry void will continue, to permit safe and efficient mineral extraction. This will cause temporary lowering of the groundwater table in the vicinity of the site. By returning the majority of water to the aquifer, down-gradient of the site, any reduction in groundwater levels or baseflow to the north and northwest of the site will be mitigated.

13.8.4 Upon cessation of mineral extraction active water management will cease and the quarry void will start to fill with water. Passive outfall structures will be constructed to convey water to the existing discharge points. The design water level of the restoration waterbody is 45 mAOD.

13.8.5 Based upon the proposed water management and the characteristics of the structural geology, it is considered that there will be no discernible impacts to any of the identified environmentally sensitive sites or groundwater-supported surface water features or groundwater abstractions. Continuation of the existing groundwater level monitoring regime is proposed.

13.8.6 The implications for flood risk associated with the proposed development have been assessed. The current discharge routes will continue to be used for the duration of mineral extraction. Volume calculations, including allowance for climate change effects, indicate that the total discharge can be restricted to the greenfield run-off rate throughout the proposed development. During storm events water would be stored temporarily within the quarry void. The latter provides massive flow balancing capacity, thereby allowing subsequent discharge to be undertaken at a controlled, appropriate flow rate.

13.8.7 During the extractive phase, sumps within the quarry will ensure that there is sufficient settlement provision to remove suspended solids from the discharge. Adherence to pollution control and best practice measures are such there will be no risk of pollution from the accidental release of contaminants. With the proposed controls and mitigation in place, it is anticipated that there would be no discernible impacts to water quality as a result of the proposals.

13.8.8 Future mineral extraction and dewatering may occur at Dunald Mill Quarry but this would not be concurrent with the proposed development at Back Lane and Leapers Wood Quarries. Consequently, dewatering would not occur simultaneously at both sites and cumulative impacts would not arise.

14 CLIMATE CHANGE

14.1 Introduction

14.1.1 The national Planning Practice Guidance explains why it is important for planning to consider climate change and states that effective spatial planning is an important part of a successful response to climate change as it can influence the emissions of greenhouse gases. It urges Planning Authorities to ensure that the protection of the local environment is considered alongside the broader issues of protecting the global environment.

14.1.2 Addressing climate change is now one of the core land use planning principles which the NPPF expects to underpin both plan-making and decision taking. This chapter considers the potential effects of climate change on the proposed development and sets out the mitigation measures proposed to minimise the likelihood of significant environmental effects. It also considers how the proposed development can minimise its contribution towards climate change through, for example, reducing emissions and energy consumption.

14.2 Policy and Legislative Context

14.2.1 The Development Plan contains policies and text relating to climate change adaption and mitigation. Lancaster District Council's Local Plan Part One 2011-2031 (Strategic Policies and Land Allocations DPD) Policy SP8 'Protecting The Natural Environment' states:

'Lancaster District is not immune to the effects of Climate Change, in particular the associated risks from extreme weather events and increasing levels of rainfall. The Local Plan has been prepared in consultation with the Environment Agency, Lancashire County Council (the Lead Local Flood Authority for Lancaster district) and United Utilities to ensure that flood risk issues are clearly considered and flood resilience is addressed. The impacts of future growth will not create new flooding issues or exacerbate existing problems and seeks to reduce flood risk overall……. The Council will continue to work with all relevant partners to address issues of flood risk, whether from river, sea or other sources, to implement schemes that will reduce overall flood risk or better manage the continuing effects of Climate Change. Development proposals in areas of known flood risk will be expected to consider their direct and indirect impacts on flooding and include appropriate mitigation measures to ensure water is managed correctly.'

14.2.2 Paragraph 10.9 of the Local Plan explains:

'Climate change remains a key issue for the Local Plan to address. This can be achieved through supporting schemes that seek to promote more sustainable forms of transport, sustainable construction methods, the delivery of low carbon and renewable energy, increases and enhancements to green infrastructure, and ensuring that development is adequately protected from flood risk……The district has suffered from extreme weather events and flooding – December 2015 saw significant flooding occur along the River Lune especially to property in Lancaster and Halton and further events in the South Lancaster, Galgate and Halton occurred in November 2017. The Local Plan has been prepared with these risks in mind, with allocations made on land that is not vulnerable to future flooding and with an expectation that development should be designed in such a way as to not create new flooding issues in future or exacerbate current problems'.

14.2.3 In terms of the national planning policy position, chapter 14 of the NPPF 'Meeting the challenge of climate change, flooding and coastal change' sets out the policy relating to the need to plan for climate change. Paragraph 157 of the NPPF states that 'the planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience, encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.'

14.2.4 Aggregate Industries' Sustainability Strategy 'Building Progress For A Sustainable Future' sets out the Applicant's intent to accelerate progress towards grounding sustainability in the future of the construction industry. The strategy is structured around the United Nations' Sustainable Development Goals as well as other key policies. With regards to climate change, the strategy acknowledges that this is one of the key global challenges facing our world today. To help address this issue, the Applicant will innovate to eliminate CO_2 from the manufacture of its products and by 2030 at the latest will have a roadmap to net zero in place that covers all the business' operations. Furthermore, the Applicant aims to reduce waste to landfill to zero by 2025, thereby reducing greenhouse gas emissions associated with landfill gas. Key goals are detailed within Section 14.5 'Integrated Mitigation'.

14.3 Baseline Conditions

14.3.1 Back Lane Quarry includes an operational limestone quarry, a concrete block works, an asphalt plant, which supplies up to 120,000 tonnes of coated road stone products per year, areas of stockpiling, site offices and associated car parking.

14.3.2 The site includes a wind turbine which currently provides approximately 50% of the site's energy requirements.

14.3.3 The site lies entirely within Flood Zone 1 which is defined as land with the lowest risk of flooding (i.e. land with less than a 0.1% or 1 in 1,000 annual probability of river or sea flooding).

14.3.4 The current quarry is worked dry and the site is therefore dewatered by pumping groundwater from a sump within the quarry void. The risk to the site from groundwater flooding is therefore considered to be very low.

14.4 Integrated Mitigation

14.4.1 The Applicant, Aggregate Industries UK Ltd, is part of Holcim. Holcim recently joined the Science Based Targets initiative (SBTi). Under SBTi's 'Business Ambition for 1.5°C', Holcim has committed to speeding up the reduction in CO_2 intensity per tonne of cementitious materials by 2030. Within its Sustainability Strategy, the Applicant sets out climate change and environmental goals for 2025 as follows:

- To reduce the specific net CO_2 emissions (kg CO_2 Net per tonne) of cementitious material;
- Reduce the downstream transport carbon intensity by 5% from 3.5kg CO_2 per tonne in 2020 to 3.32kg CO_2;
- 100% zero carbon electricity supply at Aggregate Industries sites, prioritising on-site renewable energy generation; and
- Increase the volume of materials reclaimed or recycled from 1.5 million tonnes to 3 million tonnes and send zero waste to landfill.

14.4.2 Beyond 2025, the Applicant aims to:

- Continue to decarbonise cement reducing the Specific Net CO_2 emissions (kg CO_2/t cementitious) to less than 450kg CO_2 Net/t cementitious by 2030;
- Fully deployed Net Zero Roadmap with emission reduction targets aligned to science based targets;
- Significantly increase the use of lower carbon, alternative fuels to replace fossil fuels; and

- Climate resilience strategy and action plan fully deployed for all sites.

14.4.3 A number of initiatives will be rolled out across Aggregate Industries' UK business, such as recycling 100 million tonnes of waste and by-products for energy and raw materials and accelerating the use of low-carbon and carbon-neutral products. The Applicants are therefore fully committed to their role in tackling climate change.

14.4.4 In terms of vehicles and emissions, since the Euro VI emission standards came into force in 2014, all vehicles supplied after September 2014 must comply with the Euro VI requirements. The Company has been strategically replacing HGVs older than 2014 within the fleet at Back Lane Quarry.

14.4.5 The Applicants have sought to introduce a number of schemes at Back Lane Quarry over recent years to minimise energy and resource use from the on-site processes. The principal component of this strategy is a wind turbine which is located towards the western end of the site, near the asphalt plant, main parking and access area. The turbine has a hub height of 50m, total height of 78m to blade tip and has a rated capacity of 500kW. It is understood that the turbine currently meets around 50% of the site's annual energy demand.

14.4.6 Whilst the site lies within Flood Zone 1 and is therefore at a low risk of flooding from tidal or fluvial sources, there is a need to consider the risk from changes in groundwater levels associated with greater recharge resulting from increased rainfall. The site would continue to be dewatered for the duration of mineral extraction works. This would manage any risks associated with flooding from groundwater sources.

14.5 Assessment of Environmental Effects

14.5.1 Whilst national planning policy states that new development should be located so as to reduce greenhouse gas emissions, minerals are a finite resource that can only be worked where they are found (NPPF).

14.5.2 The proposed development comprises the deepening of the existing mineral extraction operations as well as an extension to the life of the site to allow for the additional extraction activities to be completed.

14.5.3 In terms of carbon emissions and potential effects on climate change, it would be necessary to continue the use of mobile plant to extract the mineral and transport it to the on-site processing facility located in the west of the site. Whilst the proposed development would result in the site being operational for an extended

period of time, it would not intensify in the number of mobile plant movements. Given both the currently permitted and proposed timescales for mineral extraction and restoration of the site, it is considered reasonable to assume that technology relating to the viability and performance of electric mobile plant would remove the need for diesel mobile plant to be used on site. The use of electric mobile plant and equipment would significantly reduce the carbon footprint associated with the use of mobile plant and machinery.

14.5.4 Limestone is currently processed on site using aggregate wash plants and screens which are powered by diesel generators. The proposed development would extend the period of time over which the plant and machinery are used but would not result in any significant changes to the use of the processing plant. As with the mobile plant and machinery described above, it is considered reasonable to assume that during the extended operational period, electric powered static plant and machinery would be introduced and eventually be procured as the industry standard. This would significantly reduce the carbon footprint associated with the processing of limestone on site.

14.5.5 In terms of the transportation of limestone from the site, it is not possible to transport materials to or from the site using sustainable modes of transport, for example rail or water. However, it is proposed that the output rate would continue at approximately 1.1mtpa. Therefore, the proposed development would only extend the period of time for the mineral extraction activities and would not result in an intensification in the number of HGVs entering and leaving the site. As discussed above, given both the currently permitted and proposed timescales for mineral extraction, it is considered reasonable to assume that technology will be developed to enable electric HGVs to be logistically and commercially viable for the Applicant's vehicle fleet. The Applicant is already committed to upgrading its commercial fleet of HGVs to minimise the company's carbon footprint and the use of an electric fleet of vehicles in the future would significantly reduce the carbon emissions associated with the transportation of mineral from Back Lane Quarry.

14.5.6 As the proposals would result in the joint boundary between Back Lane Quarry and Leapers Wood Quarry being worked to a depth of -37mAOD, it has been necessary to prepare a revised restoration scheme which encompasses both quarries. However, the revised scheme would not result in a requirement to import restoration materials and would not result in any significant change to the carbon emissions associated with the restoration of the site. Whilst there would be no

requirement for inert restoration materials to be imported to the site, the proposed planting and landscaping would result in a relatively small number of vehicles delivering landscaping materials and planting specimens to the quarry. However, these vehicles would also be required to deliver materials for the currently approved restoration scheme and would not therefore represent a significant change in the number of vehicles. As far as possible, the use of larger bulk haulage vehicles would be encouraged to deliver restoration materials to the site, in order to minimise the number of vehicle movements and wherever possible, material would be sourced from local projects in order to minimise vehicle mileage. Furthermore, given the proposed timescale for the restoration of the site (i.e by 2078) it is reasonable to assume that electric vehicles would be in commercial use, as standard. This would significantly reduce the carbon emissions associated with the restoration of the site.

14.5.7 In order to minimise emissions associated with their use, all mobile plant and machinery would be regularly serviced and maintained and would be switched off when not in use. Diesel powered mobile plant would be replaced with electric powered plant as soon as the technology and performance allows.

14.5.8 The effects of climate change and the vulnerability of the development proposal to these changes has been considered as part of the preparation of the EIA, particularly in terms of hydrology/ flood risk and ecology (i.e. the impacts of climate change on habitats and species).

14.5.9 The development proposal would not result in any significant impacts with respect to hydrology, hydrogeology or flood risk even when taking account of the predicted likely effects of climate change.

14.5.10 The proposed development would result in the creation of a lake feature with areas of shallows and reedbeds around the periphery. The proposed restoration would provide enhancements to the ecological value of the site, creating new habitats which would be sustainably managed and maintained throughout the aftercare period. As the lake's aquatic vegetation would benefit from occasional inundation by flood water, it is considered that the effects of climate change, for example increased rainfall, an increased risk of flooding or higher ambient temperatures, would not have any significant direct or indirect environmental effects on the restored site which is classed as 'water compatible development' within the NPPF/PPG.

14.5.11 Taking into consideration the extensive mitigation measures which are integrated into both the current and proposed site operations at Back Lane Quarry, it is considered that the proposed development would not have any significant environmental effects in terms of climate change.

14.6 Cumulative and In-Combination Environmental Effects

14.6.1 Leapers Wood Quarry lies immediately adjacent to the application site. Given the nature and scale of the mineral extraction activities within Leapers Wood Quarry, and its proximity to Back Lane Quarry, the potential for cumulative and in-combination effects has been considered.

14.6.2 Leapers Wood Quarry currently has permission to extract limestone to a depth of 38mAOD, with a permitted end date of September 2048 for mineral extraction and of September 2049 for restoration. A planning application has been prepared, and is due to be submitted to the MPA, which seeks permission for the deepening of mineral extraction operations to a depth of -37mAOD with an extension of time for mineral extraction until December 2064 and interim restoration until December 2065. The final restoration of Leapers Wood Quarry would be completed by 2078 in conjunction with the final restoration of Back Lane Quarry. The current activities and proposed development at Leapers Wood Quarry are therefore similar to those at Back Lane Quarry, with the exception of a shorter proposed life of the site at Leapers Wood Quarry.

14.6.3 As with the proposals at Back Lane Quarry, the operations at Leapers Wood Quarry require the use of mobile plant and machinery to excavate limestone and transport it to its on-site processing plant. HGVs transport the processed mineral from the site. Currently the majority of HGVs and mobile plant and machinery (including the processing plant) are diesel operated. The proposed development at Leapers Wood Quarry would result in a deepening of mineral extraction operations and an extension of time over which the quarry would be worked and restored. However, it would not result in any changes to the extraction rate and therefore there would not be an intensification in the use of mobile plant or HGV movements.

14.6.4 It is considered that in the medium to long term, both Back Lane Quarry and Leapers Wood Quarry will be operated using electric mobile plant and machinery as diesel generated plant is phased out. Furthermore, whilst HGVs associated with the sites are currently diesel operated, it is also considered reasonable to assume that electric HGVs will be used as standard in the future. The cumulative and in-

combination effects on climate change associated with the operation of plant and machinery and transporting mineral using HGVs in order to deepen the quarries and operate both sites beyond the currently permitted end dates, are not therefore considered to be significant.

14.6.5 Leapers Wood Quarry also lies within Flood Zone 1 and the quarry is also worked dry through dewatering of the quarry void. The current and proposed site activities within Leapers Wood Quarry would not have any cumulative effects in terms of the risk of flooding at Back Lane Quarry, or off site within the surrounding area.

14.7 Additional Mitigation

14.7.1 Given the level of mitigation which is integrated within the current and proposed site operations at Back Lane Quarry, as well as the applicant's commitment to the continual improvement of its activities across all business units, it is considered that there is no requirement for additional mitigation.

14.8 Conclusions

14.8.1 In terms of the effects on climate change, taking the above considerations into account, it is evident that the proposed development represents an appropriate continued use of the site whilst avoiding increased vulnerability to the range of impacts arising from climate change.

15 LAND STABILITY

15.1 Introduction

15.1.1 This chapter deals with the stability of the proposed vertical extension of Leapers Wood and Back Lane Quarries and drawings and stability analyses are enclosed at Technical Appendix K). The Chapter was prepared by Simon Railton of Key GeoSolutions Ltd (KGS). KGS are a specialist geotechnical consultancy working mainly in the minerals industry. The author, Simon Railton, is a chartered geologist and a chartered engineer, with 30 years' experience in geotechnical engineering predominantly within the minerals industry.

15.1.2 Leapers Wood Quarry is operated by Tarmac and Back Lane Quarry is operated by Aggregate Industries UK Limited and the quarries are worked independently of each other, however, the final design is for a single combined excavation. The quarries extract Carboniferous Limestone and it is proposed to extend both quarries to a depth of -37m AOD.

15.1.3 The M6 Motorway is situated approximately 250m west of the western boundary of both quarries. There is an inactive waste tip situated beyond the crest of the western slope of Leapers Wood Quarry (which is situated approximately 200m to the east of the M6).

15.1.4 The current excavations at Back Lane and Leapers Wood Quarries extend to a floor elevation of approximately 55m AOD and 45m AOD respectively. The proposed floor elevation of the final combined excavation will be -37m AOD, resulting in a maximum overall depth of excavation of approximately 115m.

15.2 Policy and Legislative Context

15.2.1 Regulation 6 of the Quarries Regulations 1999 requires that the operator take the necessary steps to ensure, so far as is reasonably practicable, that the quarry and its plant are designed, constructed, equipped, commissioned, operated and maintained in such a way that persons at work can perform the work assigned to them without endangering their own health and safety or the health and safety of others.

15.2.2 Regulation 30 of the Quarries Regulations 1999 requires that the operator shall ensure that excavations and tips are designed, constructed, operated and maintained so as to ensure that:

a) instability; or

b) movement

which is likely to give rise to a risk to the health and safety of the any person, is avoided.

15.3 Site Overview

15.3.1 The quarries are worked in a series of benches using conventional drill and blast techniques with hydraulic excavators and dump trucks. The proposed final design is shown on Drawing No. 8345-002-01. The excavation profile employed has been used throughout the life of both quarries with only localised modifications necessary from time to time to suit site conditions and with no significant issues relating to instability.

15.3.2 The historical inactive waste Tip No.1 is situated behind the crest of the west slope at Leapers Wood Quarry. The tip has been in existence since the mid 1990's and there has been no recorded evidence of instability associated with the structure. The historical West Tip is situated to the north east of the Back Lane Quarry offices. The tip has been restored since before 2005 and there has been no recorded evidence of instability associated with the structure.

15.4 Proposed Extension Design

15.4.1 A series of phased development designs have been prepared for the combined excavation at Leapers Wood and Back Lane Quarries which are referred to as Phases 1 to 5. Individual LSS models have been provided for each of the phases. The final design phase has been used as the basis of this assessment, see accompanying LSS model entitled: 'Ph5 10 TAC Back Lane 06 Excavation A1 Exhausted and Removal of Tarmac Ramp'.

15.5 Geology

15.5.1 The sites are covered by BGS Geological Map Sheet 59 Lancaster Solid and Drift Edition (1:50,000).

15.5.2 Leapers Wood and Back Lane Quarries extract Urswick and Park Limestone Formations, which belong to the Lower Carboniferous Series. The Urswick Limestone is described by the BGS as a pale, massive, thickly and well-bedded grainstones or calcarenites, with scattered partings and thin beds of grey and varicoloured clay. The Park Limestone is described as unbedded or poorly bedded, pale grey bioclastic and peloidal grainstone or biocalcarenite, which is partially dolomitised.

15.5.3 The geological sheet for the area shows the site to be located within the Leapers Wood Anticline, which has a north – south trending hinge line and a southerly plunge of 5°.

15.5.4 A number of north-west to south-easterly trending faults are also shown on the geological sheet and have been encountered in the mineral excavations, these are generally inclined towards the north at between 60° and 80°. Several of the faults are associated with shatter zones, calcite mineralisation and solution cavities.

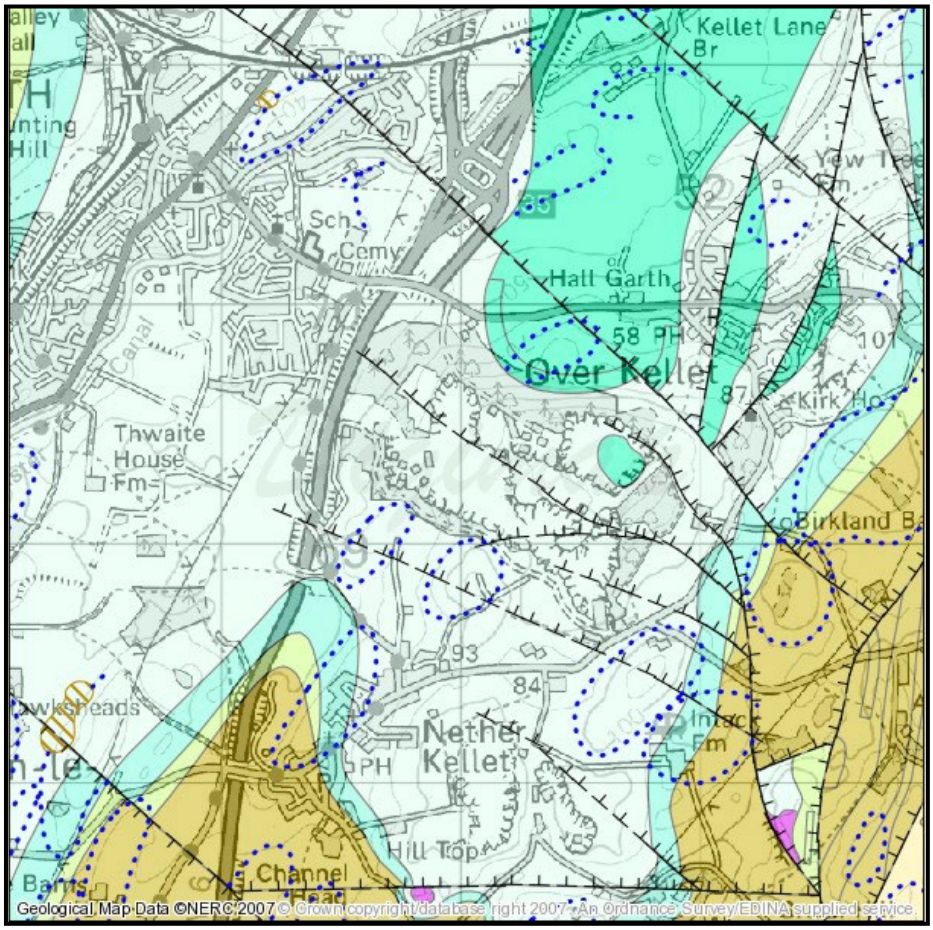

Figure 15.1: Site Geology (C08/027-CSL British Geological Survey. ©NERC. All rights reserved. Reproduced from Sheet 58 by permission of the British Geological Survey. © NERC. All rights reserved)

15.5.5 The north slope of Leapers Wood Quarry follows a line roughly perpendicular to the axis of the North -South trending geological anticline which dominates both sites. The apparent dip of bedding on the western limb of the anticline in the top of the highwall is about 15° to 20° due west-south west. Lower down the highwall slope, an additional component of dip becomes more obvious which averages about 5° due south. This represents the plunge of the anticline.

15.6 Site Investigations

15.6.1 There is a large record of site investigation data that was made available to KGS for the purpose of this assessment for Leapers Wood Quarry and limited amount of data for Back Lane Quarry. A series of exploration boreholes have been drilled at Leapers Wood Quarry, the original phase of drilling was undertaken in 1995, with further phases of drilling being undertaken in 1997 and 2019. The borehole locations are shown on Drawing No. 8345-002-04.

15.6.2 The 2019 boreholes predominantly identified light bluish grey strong medium to coarse limestone with zones of brecciated mottled limestone. The minimum elevation proved by the boreholes was c.-24m AOD (BH05) and the proposed final elevation of the combined quarry excavation floor will be -37m AOD.

15.6.3 It is noted that there are no available borehole records to prove ground conditions below the c.-24m AOD elevation to the proposed base of the final excavation at -37m AOD elevation. However, information from the Aggregate Industries Geology Department indicates that both quarries are located in the Upper Urswick Limestone and a prominent marker horizon, the Woodbine Shale, divides the Upper Urswick Limestone from the Lower Urswick Limestone. No evidence of the Woodbine Shale was observed in BH 4/98 which was terminated at an elevation 0m AOD.

15.6.4 Aggregate Industries work the Lower Urswick Limestone at the nearby Holme Park Quarry and borehole evidence from there suggests there is at least 50m of aggregate quality limestone (Lower Urswick and Park Limestone) below the Woodbine Shale. Thus, for the purpose of this assessment it is assumed that the limestone sequence identified within BH05 will extend to beyond the proposed base of the final excavation at -37m AOD.

15.6.5 Copies of the 2019 borehole logs are presented in Technical Appendix K. A geological characteristic of both sites is the presence of discrete persistent, weak, red clay bands within the overall limestone sequence at Leapers Wood Quarry (identified within the north slope) and shale bands within the north and south slopes at Back Lane Quarry.

15.6.6 Visual observations do not indicate the presence of significant argillaceous horizons within the west quarry faces (much of the limestone sequence which contains these horizons has now been extracted). Furthermore, the 2019 borehole logs do not indicate the presence of such horizons.

15.6.7 The 2019 boreholes were televiewed and discontinuity measurements extracted from the digital data by European Geophysical Services Limited in 2023.

15.6.8 A series of six cored boreholes were carried out at Back Lane Quarry (Nos. 1/98 to 6/98) in February 1998 to primarily determine the degree and extent of dolomitisation of the limestone. The details of the investigation can be found in Scott Doherty Associates Geotechnical Assessment Report dated 2001 (see Drawing No. 10-120-D-001 which shows the borehole locations).

15.6.9 Extensive geological mapping and discontinuity measurement have been carried out at both quarries by KGS for the purpose of Geotechnical Assessment Reporting [16] under the requirements of the Quarries Regulations 1999.

15.6.10 Additionally, 12 trial pits were excavated at the site of the proposed extension at Tip No.1 in 1993, the findings of which are summarised in the Wimpey Minerals Report dated 1994 (see Section 15.9).

15.6.11 Review of British Geological Survey GeoIndex borehole records within the vicinity of the site did not provide any additional relevant ground information.

15.7 Groundwater

15.7.1 The current water table is understood to be located at approximately 45mAOD elevation at the western margin of the excavations at Back Lane and Leapers Wood and de-watering is necessary to maintain a dry excavation. In general a small number of higher face exposures show evidence of seepages along discontinuity planes and within fissure / cavity zones although, where observed, flow rates appear low and irregular. There are no surface watercourses or water bodies within or immediately adjacent to the quarry boundary.

15.8 Geotechnical Structure

Back Lane Quarry

15.8.1 The main structural feature is a shallow dome situated in the north-central part of the Quarry. Measurements taken by Scott Doherty Associates (SDA) in 2001 and 2003 show that the strata are inclined at 5° to 10° (to the horizontal) towards the west, east and south. SDA reported that the strata dip increases to between 15° and 25° (to the horizontal) in the southern part of the Quarry. The two major joint

[16] KGS prepared the 2010 Geotechnical Assessment at Back Lane and continue to prepare the annual Geotechnical Assessment reports for Leapers Wood Quarry.

sets identified by SDA are summarised in Table 15.1.

Joint Set	Dip	Azimuth
1	89°	089° (N – S Strike)
2	82°	005° (E – W Strike)

Table 15.1: Discontinuity Data

15.8.2 Additional discontinuity measurements recorded within the central and eastern parts of the quarry in 2010 by KGS are summarised below in the stereoplot which roughly confirms the SDA findings.

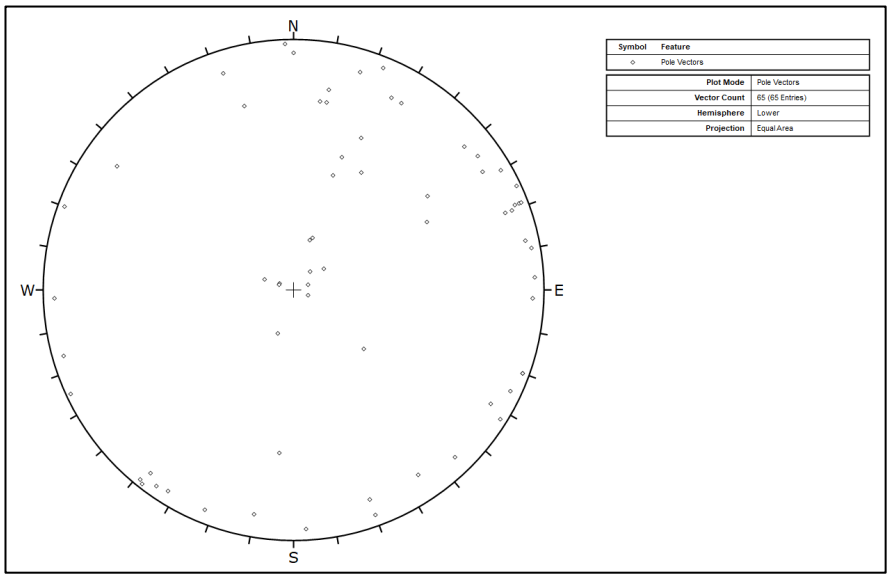

Figure 15.2: Summary Stereoplot of Discontinuity Data (after KGS 2010) Back Lane Quarry

Leapers Wood Quarry

15.8.3 Data shown on stereoplot (Figure 15.3) and Table 15.2 summarise the discontinuity data recorded during previous geotechnical inspections by KGS.

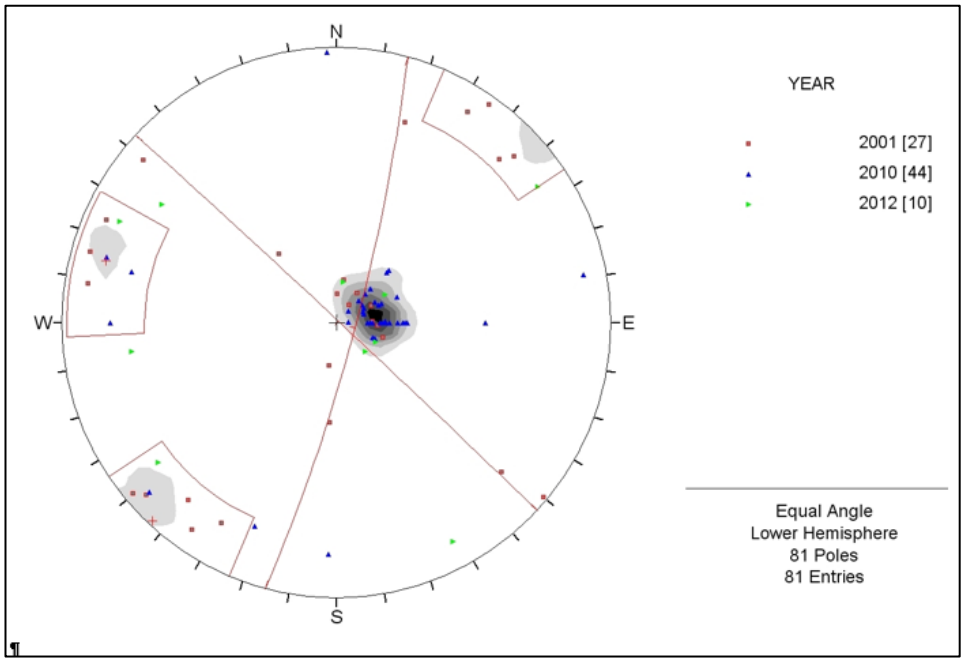

Figure 15.3: Contoured Stereoplot of Discontinuity Data (after KGS 2010) Leapers Wood Quarry

15.8.4 The mean dip and dip directions for the discontinuity sets are summarised in Table 15.2.

Discontinuity	Mean Dip/Dip Direction West Limb (West Quarry)	Mean Dip/Dip Direction West Limb (East Quarry)	Mean Dip/Dip Direction Axis of Anticline	Mean Dip/Dip Direction Eastern Limb
Bedding	18°/267°	15°/332°	12°/181°	12°/086°
Joint Set 1	81°/099°	85°/099°	-	85°/310°
Joint Set 2	84°/233°	77°/011°	89°/218°	89°/218°

Table 15.2: Discontinuity Data Summary Leapers Wood Quarry

15.8.5 The discontinuity data confirms the overall dip of the bedding at the site which dips mainly to the west and southwest within the vicinity of the western slope of the excavation. The rock mass at both quarries is characterized by predominantly sub-horizontal bedding planes bisected by two sub-vertical sets of discontinuities which are orientated approximately perpendicular to each other and result in a generally

blocky structure.

15.8.6 Discontinuities are generally pervasive (often extending for the full height of quarry faces), planar to slightly undulating, rough and slightly dilated with little evidence of infill (apart from locally where argillaceous bands have been noted).

15.8.7 Boreholes BH01 and BH03 drilled in 2019 were televiewed and discontinuity measurements extracted. The borehole log for BH01 does not exist, however, the collar was situated at the upper level of the central part of the North Face. Borehole BH03 was situated at the toe of the west slope (approximate collar elevation 47m AOD).

15.8.8 The following stereoplot (Figure 15.4) summarises the representative discontinuity data recorded from BH01.

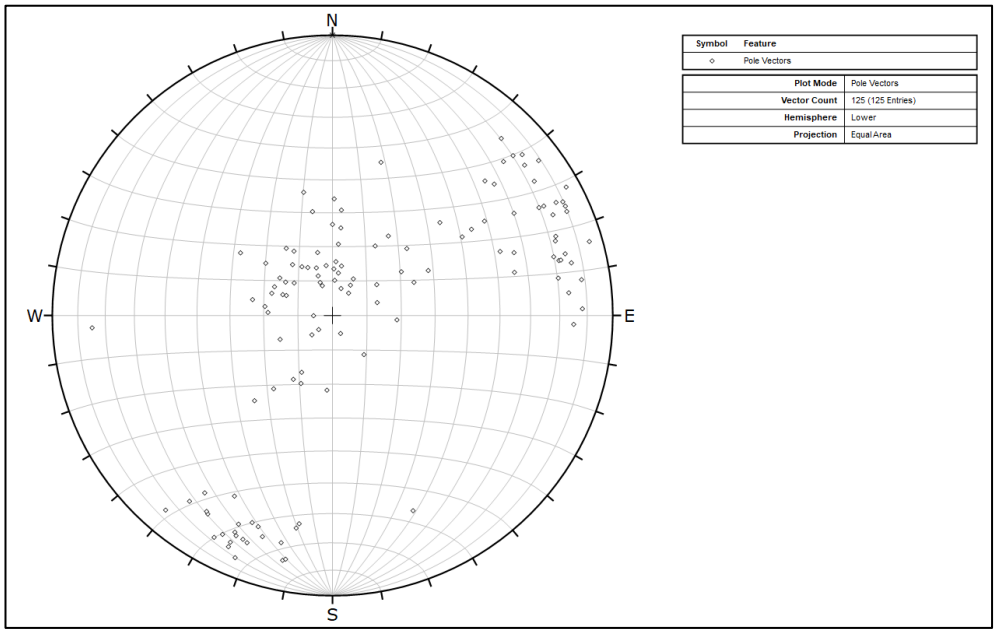

Figure 15.4: BH01 Contoured Stereoplot of Discontinuity Data (after KGS 2023) Leapers Wood Quarry

15.8.9 It can be seen that the pole distribution is not significantly dissimilar to that of the historical KGS data shown in Figure 15.3. The following stereoplot (Figure 15.5) summarises the representative discontinuity data recorded from BH03.

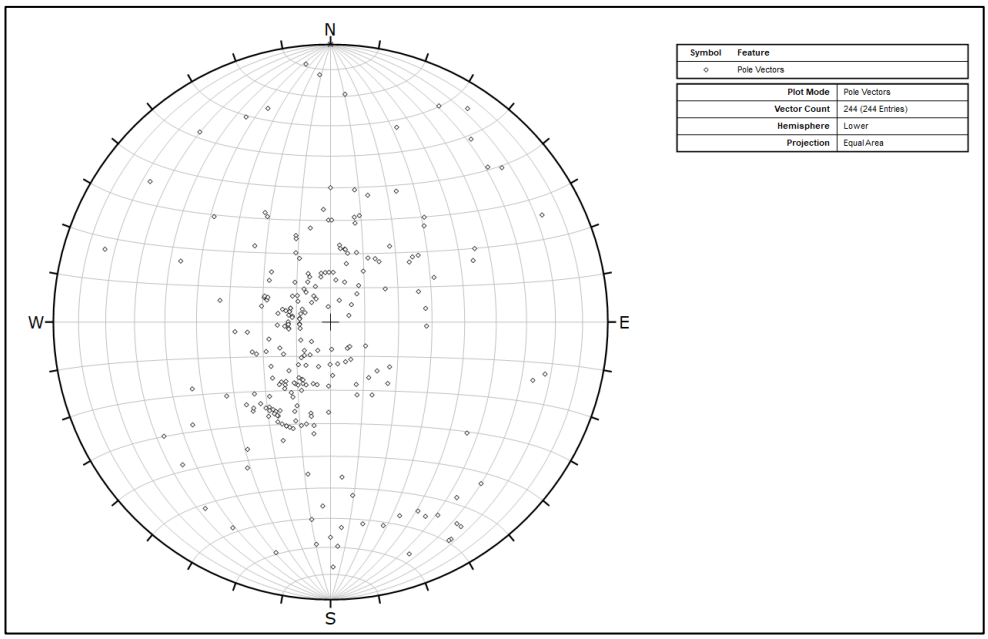

Figure 15.5: BH03 Stereoplot of Discontinuity Data (after KGS 2023) Leapers Wood Quarry

15.8.10 The pole distribution for discontinuities recorded within Borehole BH03 does not closely match the historical data or BH01 shown in Diagram 15.4, however, the variation in the bedding dip direction may be explained by flexural cambering of the bedding along the western limb of the anticline. Furthermore, the discontinuity data shown in Diagrams 15.4 and 15.5 for Boreholes BH01 and BH03 did not identify many high angle discontinuities which are known to exist within the rock mass at both sites. This may be due to the fact that the boreholes were vertically inclined and thus did not intersect many of the sub-vertical discontinuities.

15.8.11 Thus, in order to provide a more representative discontinuity data set measurements from Boreholes BH01, BH03 and the historical data for Leapers Wood Quarry have been combined into a single data set. See Figure 15.6.

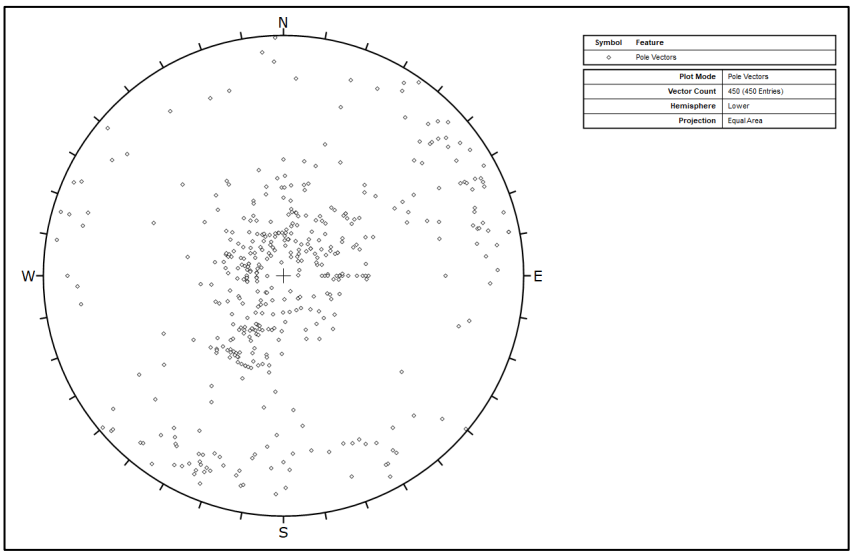

Figure 15.6: Combined Stereoplot of Discontinuity Data (after KGS 2010 and 2023) Leapers Wood Quarry

15.8.12 Given the similarity between the historical discontinuity data recorded at Back Lane and Leapers Wood Quarries and the proximity of the west faces at both excavations, it is considered appropriate to aggregate the above data set (see Figure 15.4) with the Back Lane discontinuity data (see Figure 15.2) for the purpose of the stability assessment of the western slopes. See Figure 15.7 below.

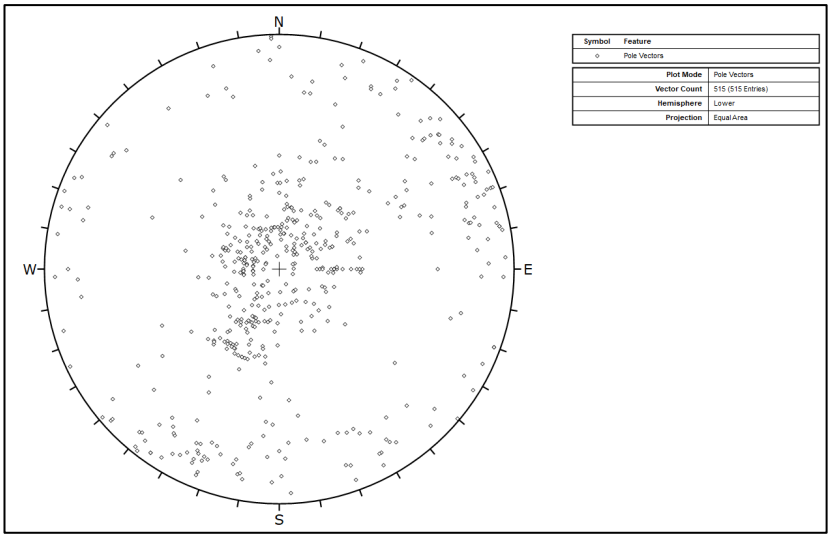

Figure 15.7: Combined Stereoplot of all Discontinuity Data (after KGS 2010 and 2023) Leapers Wood and Back Lane Quarries

15.9 Tip No.1 Ground Conditions

15.9.1 The ground profile on which Tip No.1 has been constructed has been interpreted from information within the 1994 Wimpey Minerals Drawing "Plan of Tip Area showing positions of exploratory holes" Drawing Ref: CBCGEO42/G1[17]. According to the reports, the materials deposited within Tip No.1 prior to 1994 are assumed to be quarry wastes, asphalt filler, concrete and tarmac waste. These were understood to have been tipped onto in situ glacial material (which was proven during a trial pitting exercise in 1994).

15.9.2 The 1994 Wimpey Minerals Report outlined the proposed future extension to Tip No.1 including the creation of an outer bund of competent material to buttress the weaker material placed within the centre of the tip. This design was never undertaken and the material tipped within Tip No.1 since 1994 comprised general quarry waste. The shear strength properties and distribution of the various material types within the body of the tip are not known. There are no boreholes within the area of Tip No.1.

15.9.3 In 1993, 12 trial pits were excavated as part of the ground investigation for the proposed extension to Tip No.1. The positions of these trial pits are located on Drawing No. 12-188-D-004 within Technical Appendix K. According to the 1994 Wimpey Mineral report, the trial pits uncovered glacial deposits of sandy, silty clay with variable gravel and cobbles overlying the limestone bedrock.

15.9.4 There is no information regarding the pore water pressures within the tip, however, given the generally granular nature of the majority of the tipped materials and the age of the tip, drained conditions are assumed to prevail throughout the structure.

15.10 West Tip

15.10.1 The historical West Tip is located to the north-east of the Back Lane Quarry offices and is understood to have been completely restored prior to 2005, see Drawing No. 8345-002-01 within Technical Appendix K. There is little available historical geological information for the West Tip regarding the composition and distribution of the tipped materials and it is not considered feasible to carry out a meaningful stability assessment of the tip currently.

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[17] Mines & Quarries (Tips) Regulations Regulation 9 Report on Active Classified Tip at Wimpey Asphalt Ltd Leapers Wood Quarry and Wimpey Asphalt Ltd – Planning Statement for Extension to Leapers Wood Tip No.1 (April 1994) (MRM Partnership)

15.10.2 The western slope has been graded at between 1v:10h (5°) and 1v:3.5h (16°). Given the age of the tip it is assumed that drained ground conditions will prevail throughout the structure. Evidence from previous inspections indicates the vegetated western flank of the West Tip appears stable. Furthermore, it is understood that there has been no recorded historical instability associated with the tip structure.

15.11 Laboratory Testing

15.11.1 No site specific geotechnical laboratory testing information was available at the time of preparation of this report regarding rock discontinuity, shear strength properties and tip material shear strength parameters.

15.12 Blasting Impact

15.12.1 Blasting is undertaken in order to fragment the limestone at both quarries. Vibration limits are in place and strictly monitored as part of the geotechnical appraisal process and planning consent. Vibrations caused by the blasting have never caused any instability outside of the excavations. Furthermore, given the distance to the M6 Motorway, no allowance has been made for the impact of blasting vibrations on the long-term slope stability of the final combined quarry excavation (west slope) or Tip No.1.

15.13 Stability Assessment

15.13.1 This stability assessment addresses the stability of the west slopes at Back Lane and Leapers Wood Quarries, the stability of historical Tip No.1 at Leapers Wood and how this relates to the nearby M6 motorway.

15.13.2 Kinematic analyses of the rock slopes and limit equilibrium analyses of the tip structure have been carried out.

<u>Kinematic Analyses</u>

15.13.3 The following provides a record of the assumptions relevant to the assessment of ground conditions relating to the stability of the proposed (vertical) extension to the excavation area at Leapers Wood and Back Lane Quarries.

15.13.4 Cross-sections 1-1’ to 4-4’ through the proposed final design for the excavation are shown on Drawing No. 8345-002-02 and are included at the rear of this report. The development proposals include deepening of the existing quarry to a maximum elevation of -37m AOD (approximate minimum current quarry floor elevation

ranges between 58m and 45m AOD).

15.13.5 There are no known mine workings in the vicinity of the quarry. Localised evidence of caves (karstic features) have been recorded at both quarries.

15.13.6 Stability analyses have been undertaken to assess the final proposed west excavation slope orientations at the quarry only[18], these are as shown on the Tarmac LSS model entitled 'Ph5 10 TAC Back Lane 06 Excavation A1 Exhausted and Removal of Tarmac Ramp' 'which indicates the final excavation limits and proposed face azimuths (see Drawing No. 8345-002-02 within Technical Appendix K).

15.13.7 The salient details of the proposed final design for Leapers Wood and Back Lane Quarries are summarised below:

- Maximum final floor level of -37m AOD resulting in overall west slope heights of the order of 115m (maximum);
- Individual face height 15m; and
- 7.5m wide intermediate benches formed at an inclination of 70° and 75° to the horizontal.

15.13.8 It is assumed that all final faces will be left in as clean and stable condition as possible; free of all loose rock debris and with minimal fracturing and dilation of natural discontinuities caused by the effects of blasting and/or mechanical excavation. Furthermore, it is assumed that the faces will not be subject to excessive groundwater pressures.

15.13.9 It is understood that restoration of the combined final excavation will be to open water and when dewatering of the void ceases the excavation will be allowed to flood. It is anticipated that overtopping of the void will occur at the c.52m AOD elevation at this time.

15.13.10 Kinematic analyses have been carried out for the proposed combined final design for Back Lane and Leapers Wood Quarries based on the aggregated discontinuity set described in Section 15.5 (see stereoplot of the aggregated discontinuity data set).

15.13.11 The following final face azimuths have been assessed:

- West Face 1 (azimuth = 077°)
- West Face 2 (azimuth = 095°)

[18] It is considered that the other quarry faces will have no bearing on the stability of the west slope and the M6 Motorway.

- West Face 3 (azimuth = 110°)
- West Face 4 (azimuth = 120°)
- West Face 5 (azimuth = 155°)
- West Face 6 (azimuth = 181°)

15.13.12 The proposed face orientations and final design are shown on Drawing No. 8345-002-03.

15.13.13 The analyses were undertaken using the Dips (Version 8.2) software (developed by Rocscience Inc.). The techniques adopted are presented in Matheson (1985)[19]. The angle of friction acting along the discontinuities has been taken as Ø = 35° (after Matheson 1983[20]). Final face angles of 70° and 75° have been adopted throughout the analyses.

15.13.14 Discontinuity analysis is used as a basis for assessment, to assist in the Engineers' judgement and interpretation of potential failure mechanisms. The results are based upon the general findings of the kinematic analyses and the judgement of the Geotechnical Specialist.

15.13.15 Details of the analyses are included at the rear of the report (Technical Appendix K) and summarised in Table 15.3.

Face	Azimuth	Potential Failure Mechanism			Face Angle
		Plane	Wedge	Toppling	
Northern Extension Area					
West 1	077°	Li	Li	Li-Mi	70°
West 2	095°	Li-Mi	Li	Li	75°
West 3	110°	Li	Li	Li	75°
West 4	120°	Li	Li	Li	70°
West 5	155°	Li	Li	Li	75°
West 6	181°	Li-Mi	Li	Li	75°

Table 15.3: Summary of Kinematic Analyses

Key:

Failure Potential: L = Low
M = Moderate

19 **Matheson, G.D. (1985)** The Stability of Slopes Exposing Rock. Proc. International Symposium on Failures in Earthworks, Institution of Civil Engineers, London.

20 **Matheson, G.D. (1983)** Rock Stability Assessment in Preliminary Investigations – Graphical Methods. Depts. of the Environment and Transport, Transport Research Laboratory, LR 1039.

H = High

Severity (scale of failure): 1 = Major (potential for multi-bench failure)

i = Minor (potential for localised, bench-scale failure)

15.13.16 The findings of the analyses indicate a low potential for wedge and toppling instability from all proposed face azimuths for the western slopes.

15.13.17 The analyses also indicate a generally low to moderate potential for plane failure. However, it is noted that where plane failure is reported, it is anticipated to be associated with moderately steeply inclined discontinuities (and not bedding planes) and that as such, bench scale failures would likely occur during mucking of the blast pile.

15.13.18 Given the assumed ground conditions encountered at the site it is considered that the findings of the kinematic analyses indicate that the proposed structure will be overall stable and that there should be no adverse effect on the National Highways asset (M6).

Tip No.1 Stability Analyses

15.13.19 The Rocscience Inc. SLIDE software package was used to carry out stability analyses for the historical Tip No.1.

15.13.20 Limiting equilibrium theory has been used to assess the stability of the ground model. The theory estimates the resisting forces (for maintaining the stable slopes) and disturbing forces (inducing the slopes to fail) within ground and then calculates the ratio of the resisting over the disturbing forces. This ratio is known as the Factor of Safety (FoS); a ratio greater than 1.0 indicating that the slopes are marginally stable or stable and values of less than 1.0 indicating that the slopes are or could become potentially unstable.

15.13.21 Within the tip structure analysed, rotational failure is considered to be the most likely form of instability. The stability of the relevant slip surfaces have been analysed using vertical slice limit equilibrium methods (using the Bishop simplified method). The Rust Environmental[21] design report indicates that the footprint area of the tip extension was to be benched. Although the waste material were not placed in accordance with the specification, historical records indicate no evidence of translational sliding at the base of the tip and thus this condition has not been

[21] Rust Environmental Report for Leapers Wood Quarry Western Embankment (Nov 1995) Drawing No. ECMBLO33/G/7.

assessed given the relatively shallow topological gradient of the footprint area and the assumed shear strength of the foundation strata and tipped materials.

15.13.22 The following shear strength parameters have been assumed for the analyses:

Material [22]	Cohesion (C) kN/m²	Internal friction (Ø) degrees	Unit weight (ɣ) kN/m³
Tip Material	0	35	22
Glacial Drift	0	28	18
Limestone Bedrock	500	40	22

Table 15.4: Summary of Assumed Shear Strength Parameters

15.13.23 The shear strength and density parameters used have been assumed by KGS, based upon knowledge of similar materials and ground conditions elsewhere and with reference to outline parameters given in the HMSO Tips Handbook[22].

15.13.24 Groundwater conditions are as shown on the cross section 5-5' and 6-6', however, a pore water pressure coefficient of ru = 0.1 has also been assessed.

15.13.25 Stability analyses have been undertaken using Rocscience SLIDE v.6.0 and the results of the analyses are contained within Technical Appendix K and summarised in Table 15.5 below.

Slope Reference (Dwg No. 8535-002-001-002)	Comment	Minimum FoS	Summary Plot
Section 5-5'	Global stability, r_u = 0 and 0.1	1.70, 1.58	Figures 15.1 and 15.2
Section 6-6'	Global stability, r_u = 0 and 0.1	1.69, 1.50	Figures 15.3 and 15.4

Table 15.5: Summary of Stability Analyses Results Tip No.1

15.13.26 The results of the analyses indicate that the tip is overall stable and historical observations confirm this finding. A Factor of Safety value of c.1.50 is usually considered appropriate in such circumstances.

15.13.27 Given the ground conditions encountered at the site it is considered that the

[22] **HMSO (1991)** Handbook on the design of tips and related structures. Geoffrey Walton Practice, HMSO, London

calculated Factor of Safety values are adequate for the as-built tip structure and that there should be no adverse effect on the M6 motorway National Highways asset.

15.14 Monitoring

15.14.1 Daily visual inspections of excavations are undertaken by Tarmac / Aggregate Industries personnel as required by The Quarries Regulations 1999 to identify any evidence of instability or variation in expected ground conditions.

15.14.2 Geotechnical Assessments by a geotechnical specialist would be undertaken throughout the life of extraction at both sites.

16 SOCIO ECONOMIC

16.1 Introduction

16.1.1 This assessment describes current economic and social conditions in the area around Over Kellet as a precursor to considering likely impacts on the local economy and its population if the proposed application is, or is not, approved.

16.1.2 No evaluation has been made of any effects on the existing social infrastructure (e.g. schools, health facilities etc.), which would be expected to be very small.

16.2 Legislation and Policy Context

16.2.1 The NPPF recognises the importance of minerals in paragraph 215 and states that 'it is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs. Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation'. It goes on to state, in paragraph 217, that 'when determining planning applications, great weight should be given to the benefits of mineral extraction, including to the economy'.

16.2.2 Lancaster City Council's adopted Local Plan also acknowledges the economic value of mineral extraction in policy DM47 which supports, inter alia, 'essential operations for agriculture, horticulture, equine related activities, allocated mineral extraction or waste management facilities and essential infrastructure where there is a proven and justified need'.

16.2.3 National and local planning policy supports the sustainable management of minerals, recognising that minerals represent a valuable but finite resource which, in many cases, should be safeguarded to avoid sterilisation from development. The economic and social contribution that minerals provide is thus acknowledged at both a national and local level.

16.3 Description of the Proposed Development Scheme

16.3.1 The proposal comprises a deepening of the currently permitted mineral extraction operations and an extension of time to allow the mineral reserves to be fully worked and the site restored. The proposal is fully described in both the application documents and this ES.

16.4 Geographical scope of assessment

16.4.1 The geographical scope of the assessment concentrates on the area most directly affected by the quarrying activities at Back Lane Quarry, which is located in the North West of England. It is defined by reference to geographical units for which economic and socio-economic data are available.

16.4.2 The quarry is located in the Halton-with-Aughton and Kellet electoral ward which is bordered by the following wards:

- Upper Lune Valley
- Lower Lune Valley
- Warton
- Carnforth
- Bolton and Slyne
- Skerton

16.4.3 Lancashire County forms the upper-tier authority and Lancaster City forms the lower-tier authority for administrative purposes.

16.5 Baseline local economic and socio-economic indicators

16.5.1 Economic and socio-economic data used to describe and understand the conditions around Back Lane Quarry can be gathered from several online sources including Office for National Statistics (ONS) and NOMIS which use Census data. Unfortunately, different sources use different geographical reporting units, and report data from different years. Nevertheless, taken in conjunction they provide a representative picture of the local economy.

16.5.2 Census data from the most recent census (2021) has been used.

16.6 Population and Employment

16.6.1 Halton-with-Aughton and Kellet Ward has a population of approximately 5,000 which represents approximately 9.5% of Lancaster District and 0.4% of the total population of Lancashire County.

16.6.2 Unemployment levels in Lancaster (3.2%) are lower than the UK average (3.5%) (ONS – 2021 Census), however the rates of employment are not consistent across the authority area.

16.6.3 According to the 2021 Census, the percentage of unemployed people aged 16 and over in Halton-with-Aughton and Kellet is 1.1% (ONS – 2021 Census). Looking at the

immediate surrounding area, the unemployment rates are as follows:

- Upper Lune Valley – 1.3%
- Lower Lune Valley – 1%
- Warton – 1%
- Carnforth – 1.7%
- Bolton and Slyne – 1.3%
- Skerton – 3.2%

16.6.4 The area around the site collectively has unemployment rates between 1% and 3.2%. The mean unemployment rate is 1.6%, which is lower than the district and the national average.

16.6.5 The latest ONS Statistical Bulletin (September 2023) shows a national unemployment figure of 4.3%, which is substantially less than the 2011 census records (7.4%). Using this figure, unemployment levels in the area surrounding the site are lower than the national average and the District average.

16.6.6 It should be noted that these latest employment figures are subject to some statistical variation due to operational changes made to the Labour Force Survey as a result of Covid-19 restrictions.

16.7 The role of minerals within the wider economy

16.7.1 It is necessary to turn to national data to obtain a better picture of the relative weight and importance of quarrying in the wider economy.

16.7.2 Table 16.1 below provides data on gross value added (GVA) and employment, by sector of the economy. Gross value added (GVA) is defined by the Office for National Statistics as 'The value generated by any unit engaged in production, and the contributions of individual sectors or industries to gross domestic product. It is measured at basic prices, excluding taxes less subsidies on products.' GVA provides a good measure of economic productivity, together with the calculated GVA per employee. This last column of figures is important for any assessment of the effects of changes in quarrying output.

16.7.3 Employment data in Table 16.1 is based on Labour Market Figures from the Office for National Statistics published in 2023. The GVA figures are latest available and are taken from the 'Regional gross value added (balanced) by industry: all ITL regions' dataset. Employment figures are from the Office of National Statistics dataset 'JOBS02 Workforce jobs by industry (not seasonally adjusted) – Figures for

September 2023'.

16.7.4 The datasets provide current data from 2023 and, therefore, the figures are sufficiently compatible to provide the general impression of the value of GVA and employment market for different sectors.

Industry Sector	GVA at Current Basic Prices (£ Million) ONS Blue Book 2023	Employment (,000) ONS Workforce Jobs by Industry (not Seasonally Adjusted) September 2023	GVA per Employee (£)
Agriculture	16,206	405	£40,015
Production (Include Mining manufacturing and utilities shown in boxes below)	259,522	3,051	£85,061
Mining and quarrying	14,584	53	£275,170
Manufacturing (figures form part of the 'Production' figures)	197,646	2,611	£75,697
Electricity, gas, steam and air conditioning supply / Water supply, sewerage, waste mgmt and remediation (figures form part of the 'Production' figures)	47,292	387	£122,202
Construction	119,920	2,248	£53,345
Distribution, hotels transport and restaurants	335,709	9,358	£35,874
Information and communication	131,244	1,671	£78,542
Financial and insurance	185,434	1,151	£161,107
Real estate	266,136	686	£387,953
Professional and support	264,877	6,601	£40,127
Government, health and education (incl. defence)	405,455	9,537	£42,514
Other Services (incl. Art, entertainment, recreation, Other Service activities et al)	62,133	2,052	£30,279
Totals All Industries	**2,046,636**	**31,055**	**£65,904**

Table 16.1: Structure of the UK Economy

16.7.5 As can be seen, with the exception of real estate, the extractive industries are much more capital intensive than any other sector of the British economy, with very high levels of labour productivity (measured by GVA per employee) as a consequence.

16.7.6 Table 16.2 below shows how the different sectors of the British economy interact with each other. Each column in Table 16.2 shows where the particular sector of the economy spent its money (on both capital investment goods and operating

costs) in order to generate its own outputs. These purchases of goods and services are known as 'intermediate consumption'. Thus, for example, it shows that in order to produce a GVA figure of £14 billion (see Table 16.1), the mining and quarrying sector purchased a total of £5 billion's worth of intermediate consumption, with spending particularly high in the transport and construction sectors.

	Agriculture	Production	Construction	Distrib, transport, hotels etc	Information & communication	Financial and insurance	Real estate	Professional and support activities	Gov, health & education	Other services
PRODUCTS										
Agriculture [A]	6 246	17 458	-	618	-	2	65	-	80	63
Production [B-E]	8 409	367 066	57 463	99 070	16 041	8 583	5 463	26 135	75 138	14 615
Other Mining & Quarry Products	*-*	*3102*	*1873*	*10*	*-*	*1*	*21*	*190*	*5*	*-*
Construction [F]	353	7 816	96 507	5 117	177	4 787	18 953	3 527	7 223	349
Distribution, transp, hotels	1 389	23 737	1 339	76 591	5 697	17 617	684	18 503	15 250	2 254
Information and communicati on [J]	465	8 272	2 641	11 955	34 882	20 785	1 893	11 425	11 123	4 190
Financial and insurance [K]	1 395	18 151	4 514	13 071	2 866	39 145	27 991	9 098	10 320	1 485
Real estate [L]	-	1 875	395	17 849	3 583	4 050	1 914	5 850	8 587	1 489
Professional and support activities [M-N]	1 837	41 941	16 618	55 125	24 720	46 022	8 383	93 386	38 383	14 367
Government, health & education [O-Q]	27	5 325	1 189	6 479	678	2 539	3 124	5 885	32 118	280
Other services [R-T]	71	310	1	196	2 385	1 617	29	773	5 277	7 897
Total consumption	20 192	491 951	180 667	286 071	91 029	145 147	68 499	174 582	203 499	46 989
Taxes *less* subsidies on production	-1 992	4 797	1 232	15 408	342	3 264	- 337	3 256	979	1 263

	Agriculture	Production	Construction	Distrib, transport, hotels etc	Information & communication	Financial and insurance	Real estate	Professional and support activities	Gov, health & education	Other services
Compensation of employees	4 726	133 438	52 432	216 719	74 071	69 040	15 018	146 013	260 973	36 720
Gross operating surplus	10 926	109 750	58 570	89 223	51 875	61 245	236 597	86 612	76 180	28 354
GVA at basic prices	13 660	247 985	112 234	321 350	126 288	133 549	251 278	235 881	338 132	66 337
Output at basic prices	**33 852**	**739 936**	**292 901**	**607 421**	**217 317**	**278 696**	**319 777**	**410 463**	**541 631**	**113 326**

Table 16.2: Structure of the UK Economy

16.7.7 This data is important, since it provides an indication of the indirect effects of quarrying operations, including how the additional expenditure generated from this activity is likely to be distributed across other parts of the local economy, and hence whether jobs could be retained or generated in these sectors.

16.8 Current economic importance

Processes and employment

16.8.1 Back Lane Quarry has been operating for many years and is one of a very limited number of quarries able to meet the carboniferous limestone aggregate demand of the north-west England market. The site currently sells approximately 1.1 million tonnes per annum (mtpa) of high-quality limestone aggregate.

16.8.2 The site has 112 direct employees with significant indirect employment in haulage, goods and services, comprising:

- Up to 4 contractors / day and an additional 1200 hours / month of specialist contractor services (welding, plant maintenance, vehicle maintenance, lifting equipment servicing, road sweeping, etc.);
- 9 employees at the Laboratory and Asphalt Plant;
- 103 employees indirectly linked to Back Lane Quarry at the Area Sales Office and a concrete products factory.

16.8.3 Therefore, the quarry is a significant contributor to the local economy, providing mineral to support the construction industry and job opportunities both within the locality and the wider region.

16.9 Development proposal and future economic and social conditions

16.9.1 This section seeks to estimate the economic impacts of deepening extraction levels and extending the time of quarrying activities at the site. Although no additional jobs will be created above those previously required to operate the site, the Applicants seek to protect existing jobs for approximately an additional number of years if the scheme is approved. The appropriate comparison is therefore between the Proposed Development and doing nothing (eventual cessation of quarrying and associated business activities on site).

16.9.2 As well as the direct benefits to the Applicants and the employment effects which benefit their contracted workforce, there will be a series of spin-off benefits which are referred to as 'indirect effects'.

16.9.3 These arise because the Applicant's and/or operator's expenditure induces their suppliers to sustain their production to meet the needs of the site. In a 'virtuous circle', any sales made by the site's suppliers generate more business for the firms which in turn supply them. These effects are referred to as 'indirect effects' and occur down the supply chain. An example of such use is the individual hauliers that deliver materials from the site.

16.9.4 Finally, there are 'induced effects', which arise from the income earned by local employees being spent on household and personal goods and services within the local economy. The extent of this effect is a matter of some debate and difficult to predict in an accurate way.

16.9.5 In an assessment of purely local effects, it is also important to recognise that some of the benefits (direct, indirect and induced) will not accrue to the local economy by, for example, the Applicants and/or operators purchasing a major item of capital equipment from another region, or by some of the workers and their families spending their wages on holidays in other regions, or abroad. Such effects are referred to as leakage, displacement, and substitution of benefits.

16.9.6 Leakage refers to the proportion of outputs that benefit persons and companies outside the local area. Displacement reflects the degree to which retained production at the site is offset by reduced opportunities for expansion elsewhere. Substitution occurs when a firm substitutes one activity for a similar activity (such

as recruiting a jobless person while another employee loses a job, to take advantage of public sector assistance). These factors should be taken into account when estimating the local impacts of the direct, indirect and induced effects of any development. Guidance provided by English Partnerships in their 'Additionality Guide - Fourth Edition', dated October 2014, is often used to estimate the appropriate factor by which indirect and induced effects should be reduced in order to estimate the local impacts of a development scheme.

16.10 Direct Economic Effects

16.10.1 The Proposed Development at the site will sustain and protect jobs that could otherwise eventually be lost. As the site's employees generally come from the local area, the limestone quarry, concrete block works and asphalt plant comprise an important local employment stream and granting permission for deepening the quarry and an extended operational period will secure and prolong these jobs. The value of the Proposed Development is therefore clear at a local level.

16.10.2 The Applicant, who is also the operator, contributes to spending on external suppliers, goods and services to support the continued operation of the site, as well as contributing to the national and local tax base. The Applicants' spending figure has not been calculated; however, the overall contribution is considered below.

16.11 Indirect Economic Effects

16.11.1 In theory, it would be possible to allocate the Applicant's spending to different economic sectors (manufacturing industry, utility services, construction etc), using a different multiplier for each sector. In practice, because many of the main suppliers span different sectors (by providing design advice and maintenance services as well as hardware), this is potentially misleading. It has been concluded that it would be more appropriate to use an average factor which applies across all economic sectors, namely the figure of £65,904 per employee (Source: ONS Blue Book 2023 and ONS Workforce Jobs by Industry September 2023). This is a lower figure than would apply to manufacturing industry, information and communication, and the financial and insurance sectors, but higher than that applicable to agriculture, construction, government, health and education (including defence), professional and support, and other services.

16.11.2 Using the GVA figures set out in Table 16.1, there is, on average, £275,170.00 in GVA for each employee. The site has 112 direct employees which generates a total of £30,819,040.00 GVA. The simple calculation of £30,819,040.00/65,904.00 per

employee generates a figure of 468 (no.) employees further down the supply chain whose jobs depend to some degree on the site operations. This is not to suggest that the continued closure of the site would lead to the loss of 468 (no.) employees, but at the very least, some disruption to employment would be expected.

16.12 Induced Effects

16.12.1 In the absence of detailed data on the consumption patterns of local employees, it is usual to estimate induced effects by making use of the same guidance from English Partnerships as referred to above. This suggests that an uplift figure of 10% could be applied to existing employment figures to identify an induced employment effect. Hence if the direct employment effect is to retain 112 jobs and the indirect effect is to retain 468 (no.) indirectly affected jobs, then uplifting this total by 10% would provide a reasonable estimate of 58 (no.) jobs for the induced employment benefit.

16.13 Overall Employment Effects

16.13.1 The overall local employment significance of the operation is therefore estimated as 112 plus 468 (no.) plus 58 (no.) = 638 jobs. As explained above, were non-quarrying jobs at the site and other jobs more widely in Lancashire to be lost, the effects of this would be much greater.

16.14 Conclusions

16.14.1 The site contains a large proven saleable resource of limestone to be sold, processed and distributed within the north west region. The mineral resource is therefore of economic value to the local and regional economy of Lancashire.

16.14.2 In combination with retaining existing jobs, new jobs are likely to be directly and indirectly generated by the Proposed Development due to the additional years of operation (30). The proposals will enable employment to be maintained across a range of industries which are supported both directly by limestone extraction and ancillary operations, and in-directly from investment and expenditure from the applicant.

16.14.3 In addition to the direct and indirect benefits of the proposal, it will also induce benefits to the local and wider regional economy through a multiplier effect. The overall contribution to the local economy from the site is significant.

17 ACCIDENTS AND HAZARDS

17.1 Summary

17.1.1 The site operators (Applicants) are committed to achieving the highest standards of health and safety for its operations, sites, workforce, contractors, customers and the general public.

17.1.2 The site operates in accordance with The Quarries Regulations 1999 which controls activities within the quarry to ensure that they are undertaken in a safe manner and the risk to staff, visitors and the community is minimised. Furthermore, a company wide health and safety management system is in place. This helps ensure that the risk of accidents happening is minimised as far as practicably possible.

17.1.3 It is considered that the likely potential impact of the Proposed Development in terms of the risk of accidents will be very low with effects of negligible significance.

17.1.4 The assessments undertaken have not identified any significant potential for accidents. Therefore, no additional mitigation measures are considered necessary over and above those which are inherent within the Proposed Development design.

18 CUMULATIVE AND IN-COMBINATION EFFECTS

18.1 Introduction

18.1.1 This section of the ES addresses the cumulative impacts of the proposed development to examine if any changes would arise from the proposal that, when combined with other developments and activities in the area, would in some way result in the proposed scheme being unacceptable.

18.1.2 Throughout this ES and associated technical appendices, the impacts that the development could potentially have on the site and the surrounding area have been assessed. The technical reports also consider the potential for cumulative effects. This section summarises the conclusions of those reports with respect to the potential for cumulative effects.

18.1.3 Cumulative impacts relate to the way in which different impacts can affect a particular environmental resource or location incrementally. In essence, cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable developments, together with the proposed development. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

18.2 Policy Context

18.2.1 The issue of cumulative impact is addressed within the NPPF which states that when determining applications for mineral development, Local Planning Authorities should take into account the cumulative effects of multiple impacts from individual sites and/or from a number of sites in a locality.

18.3 Methodology and Scope

Methodology

18.3.1 Although the NPPF requires consideration of cumulative effects, there is no national or local guidance as to how this should be carried out.

18.3.2 Schedule 4, Part 1, Paragraph 4 of the EIA Regulations requires the likely effects of the 'development' and the likely effects of other developments in the geographical area of the site to be considered in order to determine the likelihood of cumulative effects, i.e. the cumulative impacts and the impact interactions.

18.3.3 The EIA Regulations require consideration of developments that have been

undertaken recently or are currently under construction, those for which planning permission exists or those which could be reasonably considered to be coming forward.

18.3.4 In that regard this assessment of cumulative effects will have regard to:

- successive effects;
- simultaneous effects from concurrent developments, and
- combined effects from the same development.

18.3.5 Regard will also be had to the potential for the proposal to give rise to a series of benefits (positive impacts) which could potentially offset or outweigh any harm which might be brought about by the proposed development. In this regard the cumulative impact assessment will therefore consider the potential cumulative benefits of the scheme.

18.3.6 A search of developments has been undertaken through a search of:

- planning applications and permissions listed on the Public Access website; and
- designated sites in Local Development Framework and Emerging Local Plan Documents.

18.3.7 The search covered:

- projects that are under construction;
- permitted applications that have not been implemented;
- submitted applications not yet determined;
- projects in the National Infrastructure's programme of projects; and
- projects identified in the relevant Development Plan (and emerging development plans).

18.3.8 Sites within approximately 2km of the site were considered. The search incorporated a 5 year period, which covered projects that received consent over 3 years ago and which have either been implemented but not yet fully constructed, or are yet to be implemented.

18.3.9 The sections below summarise the findings of the technical assessments which have been carried out as part of the EIA in relation to the potential for cumulative effects.

18.4 Landscape and Visual

18.4.1 The potential for cumulative impacts has been considered. A definition of cumulative effects being: "the additional changes caused by a proposed development in conjunction with similar development or as the combined effect of a set of development, taken together" (SNH,2012:4). Cumulative Landscape Effects being defined as effects that "can impact on either the physical fabric or character of the landscape, or any special values attached to it (SNH,2012:10).

18.4.2 In discussions with the client and the project coordinators it is considered that other sites of the same type of development located within the local landscape character setting are: Leapers Wood Quarry (located immediately north of the proposed Back Lane Quarry development), Dunald Mill Quarry (located ~0.5km south of Back Lane Quarry) and adjacent Breedon Carnforth Concrete Plant site / mothballed quarry off Long Dales Lane. Located ~9.2km north of Back Lane is Aggregate Industries Holme Park Quarry and ~2.3km north is the restored Jackdaw Quarry which now operates as a Lodge Retreat and Diving Centre.

18.4.3 Other developments within the study area which could result in direct or indirect consequences in combination with Back Lane Quarry include the large scale industrial complex of Carnforth National Grid Compressor Station. The combined effects of all the past, present and future proposals have been considered. Specifically in respect of the Dunald Mill developments, Jackdaw Quarry Lodge Retreat and Holme Park Quarry, these are assessed as standalone / isolated development within the landscape with no intervisibility within the character areas to Back Lane Quarry. Leapers Wood Quarry is contained within the same landscape character land unit as Back Lane Quarry / the proposed development. Proposals for deepening are integrated and intertwined within the contained Site local character. Taking the above into consideration and in accordance with paragraph 7.5 of GLVIA3 we assess that there will be No likely cumulative significant effects on landscape character receptors as a result of either impacts on the physical fabric of the landscape or the value attached to it, nor on the magnitude of effect of visual receptors.

18.5 Ecology and Biodiversity

18.5.1 No significant cumulative or in-combination ecological effects would result from the proposed development.

18.6 Transport

18.6.1 No significant cumulative or in-combination transport related effects would result from the proposed development.

18.7 Noise

18.7.1 Back Lane Quarry is located immediately adjacent to the Leapers Wood Quarry, sharing a common boundary to the north of Back Lane Quarry.

18.7.2 The two sites are separated by a nominal boundary that is proposed to be worked as part of this application and the concurrent application by Tarmac for deepening of the workings (and a time extension) at Leapers Wood Quarry.

18.7.3 Both sites are subject to the same site noise limit of 55 dB $L_{Aeq,\ 1\ hour\ free\ field}$ and the permissions on noise for the two sites share three common receptors.

18.7.4 Site noise monitoring at Back Lane Quarry demonstrates that those site noise limits have been consistently complied with over the past twenty years.

18.7.5 Site noise monitoring at Leapers Wood Quarry has not been required over this period as there have been no complaints regarding noise at the site.

18.7.6 The site noise monitoring for Back Lane Quarry has shown that the overall measured noise levels (including both sites and extraneous noise such as M6 road traffic noise) are significantly below the site noise limits for both sites.

18.7.7 The applications for both sites do not involve any increase in site operations, no changes to the processing plant site and associated plant items, no changes to the access to either site and no alteration to the operating hours.

18.7.8 As such, the only change in the workings will be the depth of working, with an increase in depth only resulting in lower site noise levels at the nearest dwellings to either site.

18.7.9 As both sites are satisfying the noise conditions in the permissions that are in place until 2048, the deeper workings would increase the barrier attenuation and therefore reduce the site noise levels at the nearest dwellings. There is therefore anticipated to be no adverse cumulative impact on the nearest noise sensitive receptors from the proposed deepening of both quarries.

18.8 Air Quality and Dust

18.8.1 The proposed development at Back Lane Quarry and Leapers Wood Quarry will both be within the current permitted limits of extraction. The applications are for

extraction to be undertaken at increased depths at both quarries with no lateral extensions to the workings. It may therefore be extrapolated that there will be no change in dust impact provided effective mitigation regimes are upheld.

18.8.2 The existing annual outputs of product will also be retained at both quarries. As such there will be no change in vehicle movements from these operations along the public highway. Therefore, there will be no undue impact on air quality pollutants from vehicle exhaust emissions.

18.8.3 No cumulative air quality effects are anticipated from the proposed development of Back Lane Quarry.

18.9 Human Health

18.9.1 The only development considered within the cumulative assessment is Leapers Wood Quarry, located to the north of the Back Lane Quarry.

18.9.2 The proposed development would not include any lateral extension to the workings, and the annual outputs of aggregate would remain the same as is currently consented.

18.9.3 As a result, it can be concluded that with implementation of the appropriate mitigation measures already in place, the impact on air quality would be negligible and the associated cumulative effects on health would therefore also be negligible.

18.10 Groundborne Vibration and Overpressure

18.10.1 With the implementation of appropriate controls, the cumulative impact of blasting as a consequence of the proposed concurrent deepening of both Back Lane and Leapers Wood quarries will be negligible, if not improvement to the current status quo. No significant cumulative effects are therefore predicted.

18.11 Water Environment

18.11.1 Cumulative impacts are those which result from incremental changes caused by past, present or future reasonably foreseeable developments. Extraction from the Urswick Limestone Formation was formerly undertaken at Dunald Mill Quarry, located 540m south of the Back Lane and Leapers Wood combined site. Mineral extraction may recommence in the future, but it is not anticipated that this would be concurrent with the proposed development. Consequently, dewatering would not occur simultaneously at both sites and the potential cumulative impacts do not require consideration.

18.12 Climate Change

18.12.1 Leapers Wood Quarry lies immediately adjacent to the application site. Given the nature and scale of the mineral extraction activities within Leapers Wood Quarry, and its proximity to Back Lane Quarry, the potential for cumulative and in-combination effects has been considered.

18.12.2 A planning application has been prepared, and is due to be submitted to the MPA, which seeks permission for the deepening of mineral extraction operations at Leapers Wood Quarry to a depth of -37mAOD with an extension of time for mineral extraction until December 2064 and completion of interim restoration by the end of December 2065. The final restoration of Leapers Wood Quarry would be completed by 2078 in conjunction with the final restoration of Back Lane Quarry. The current activities and proposed development at Leapers Wood Quarry are therefore the same as those at Back Lane Quarry.

18.12.3 As with the proposals at Back Lane Quarry, the operations at Leapers Wood Quarry require the use of mobile plant and machinery to excavate limestone and transport it to its on-site processing plant. HGVs transport the processed mineral from the site. Currently the majority of HGVs and mobile plant and machinery (including the processing plant) are diesel operated. The proposed development at Leapers Wood Quarry would result in a deepening of mineral extraction operations and an extension of time over which the quarry would be worked and restored. However, it would not result in any changes to the extraction rate and therefore there would not be an intensification in the use of mobile plant or HGV movements. Given the currently permitted and proposed timescales for the mineral extraction and restoration works at Leapers Wood Quarry, it is considered reasonable to assume that the use of electric HGVs and mobile and static plant and machinery will be the 'industry standard' in the medium to long term (i.e. beyond approximately 2030).

18.12.4 It is considered that in the medium to long term, both Back Lane Quarry and Leapers Wood Quarry will be operated using electric mobile plant and machinery as diesel generated plant is phased out. Furthermore, whilst HGVs associated with the sites are currently diesel operated, it is also considered reasonable to assume that electric HGVs will be used as standard in the future. The cumulative and in-combination effects on climate change associated with the operation of plant and machinery and transporting mineral using HGVs in order to deepen the quarries and operate both sites beyond the currently permitted end dates, are not therefore considered to be significant.

18.12.5 Leapers Wood Quarry also lies within Flood Zone 1 and the quarry is also worked dry through dewatering of the quarry void. The current and proposed site activities within Leapers Wood Quarry would not have any cumulative effects in terms of the risk of flooding at Back Lane Quarry, or off site within the surrounding area.

18.13 Conclusions

18.13.1 In accordance with the requirements of the NPPF, an assessment of cumulative effects has been undertaken which has assessed the potential for the Proposed Development to give rise to environmental effects which, when combined with environmental effects associated with other developments within the area, to result in significant cumulative or in-combination effects.

18.13.2 The assessment of cumulative effects has demonstrated that there would be no significant cumulative effects arising from the Proposed Development.

19 CONCLUSIONS

19.1.1 This ES has been prepared in accordance with the EIA Regulations. The ES sets out baseline and background environmental information and also sets out the details of the development having regard to the location, scale and nature of the proposals.

19.1.2 This ES identifies the likely significant impacts and the relevant national and Development Plan policies that will be used in the determination of the application. In this regard the proposal is considered to be compliant with the main planning policy tests set out in the Development Plan and advice set out in national planning policy.

19.1.3 The working of Back Lane Quarry is coordinated with the development of Tarmac's adjoining Leapers Wood Quarry which also proposes to deepen the extraction area to the same depth. It is important that the working and restoration of both quarry operations are closely coordinated as the site is essentially a single void.

19.1.4 The site is a strategic supplier of high-grade aggregates, asphalt and concrete products, all of which are essential for the repair, maintenance and improvement of the built environment in the region.

19.1.5 Minerals are a finite natural resource and can only be worked where they are found. Carboniferous limestone resources are extremely limited within Lancashire and northwest of England, being confined to the Carnforth area in the north of the county and the Clitheroe area to the south. Carboniferous limestone resources are otherwise generally very heavily constrained by National Parks and National Landscapes.

19.1.6 It is considered preferable for the existing quarries to seek permission to extract additional minerals from a deeper depth, rather than to pursue a lateral extension to the existing workings. It is therefore essential that the long-term plans for the site are considered now to ensure that the mineral resource available is not unnecessarily sterilised or compromised and that continuity of supply is secured.

19.1.7 No unacceptable impacts have been identified in relation to residential amenity, air quality, designated nature conservation sites, ecology and biodiversity, the water environment, landscape character or the highway network.

19.1.8 The mitigation of potential impacts through the imposition of planning conditions and appropriate planning agreements is in accordance with Development Plan

policy and national planning advice. No significant residual or cumulative environmental impacts are anticipated to result from the development.

19.1.9 This ES has considered the potential environmental and local amenity effects of the proposal and has concluded that, subject to the imposition of established mitigation measures that can be secured via planning condition, no unacceptable adverse impacts would arise.

19.1.10 In overall conclusion, it is considered that the proposals are environmentally acceptable and support the economic, social and environmental roles of sustainable development required in the NPPF.