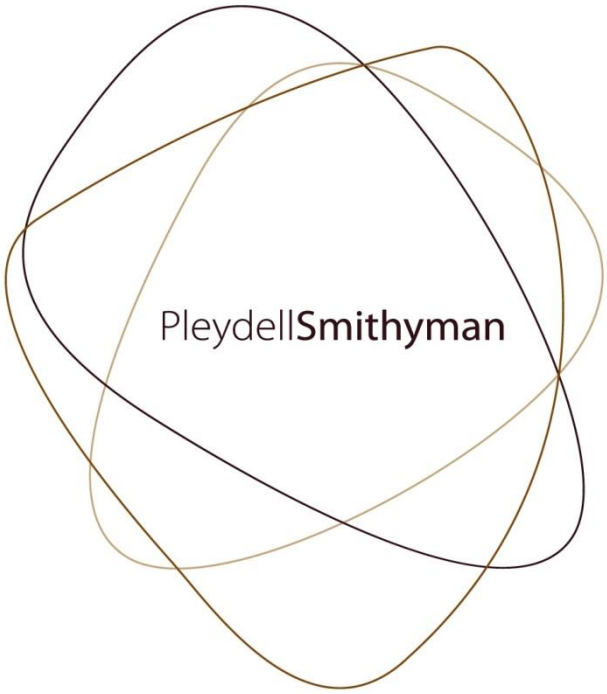

DENBIGH QUARRY,

PLAS CHAMBRES ROAD, DENBIGH, DENBIGHSHIRE LL16 3YE

CONSOLIDATING APPLICATION FOR THE EXTENSION OF WINNING AND WORKING OF LIMESTONE, IMPORTATION OF INERT RESTORATION MATERIAL AND RESTORATION TO AMENITY

VOLUME 2

ENVIRONMENTAL STATEMENT

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1. INTRODUCTION

1.1. Background to Application

1.1.1. Breedon Southern Limited is the operator of Denbigh Quarry, also known as Graig Quarry situated to the north of the town of Denbigh in Denbighshire. The site has the benefit of planning permission for the winning and working of limestone granted on 15th March 2010 (Reference Number: 01/2009/1424). That permission expires on 14th March 2020 and a planning application has been submitted (01/2019/0757) for the variation of condition 1 to allow for the continuation of winning and working in the existing quarry until 31st August 2028.

1.1.2. That application received a resolution to grant planning permission, subject to amendment of the legal agreement applying to the land which allows for the continued extraction of the reserve that already exists within the consented boundary. The applicant is now also seeking, through a consolidating application, a lateral extension to mineral working operations that would release a further 4.4 million tonnes of mineral and would allow working to continue, at current extraction rates for a further 22 years. At current rates the combined period would expire in 2046 and the planning application is requesting an end date, including restoration operations of 31st December 2047.

1.1.3. This Environmental Statement has been produced in accordance with the provisions of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 ("the Regulations"). It is submitted alongside the planning application as a complete and thorough examination/assessment of the likely impacts of the proposed development in order to allow the Mineral Planning Authority to determine the Planning balance.

1.2. Screening and Scoping

1.2.1. The proposed development is an extension of approximately 5ha which exceeds the threshold in Schedule 2 of the Regulations as "a change to or extension of development of a description listed in Schedule 1 where that development is already authorised, executed or in the process of being executed". The development already being 'executed' is the existing quarry use.

1.2.2. The applicant accepts that the threshold is exceeded and that the development has the potential to generate significant impacts. On this basis, a request for a formal Scoping Opinion was submitted on 1st July 2019 and that Opinion, having taken into account the consultation responses, was adopted on 14th August 2019.

1.2.3. That request for a Scoping Opinion outlined a greater quantity of mineral than is now being applied for. This change has been brought about by allowing a greater standoff from the Crest Mawr SSSI, maintaining bench widths for safety purposes and the modelling of different levels of unusable clay content in the extension area. The main consequence of this design process is that the overall life of the proposed development is reduced. The reduced period would still involve the review of planning conditions after fifteen years.

1.2.4. Suggested changes to the methodologies expressed in the Scoping Opinion included;

- An assessment of the amount of Ash trees in the existing screening belt to the south of the existing quarry
- The inclusion of geophysical survey as a means of informing the archaeological content of the site.
- An assessment of the impact of the development on registered historic landscape using the ASIDOHL process.
- The heritage survey area is increased from 2km to 3km.
- The noise sensitive receptors used for the previous application should be used for this application.
- A Flood Consequence Assessment is not required.
- Any ALC report must be validated by the Land, Nature and Forestry Division of Welsh Government.
- Reference to the Regional Technical Statement should be made in any argument regarding the need for the development.

1.2.5. These changes have been accepted and the methods adjusted accordingly. All studies and assessments have been carried out by appropriately experience and qualified, competent personnel.

1.3. Purpose and Structure of Environmental Statement

1.3.1. The purpose of this Environmental Statement (ES) is to provide robust, well-researched data to inform the understanding of the effects of the development upon the environment. In accordance with the Regulations the ES aims to understand the effects and whether they are significant or not significant bearing in mind their magnitude, the sensitivity of the receptors, the temporary or permanent nature of the effects and its reversibility.

1.3.2. Each discipline/subject is measured in a different way but there are similarities in the way the process determines the baseline, identifies the receptors with their level of sensitivity, identifies the impacts with their magnitude, applies the in-built mitigation and establishes the residual impact of the proposal. Additional mitigation is then identified and the assessment concludes with the assessment of whether the impacts are 'significant' or not 'significant'.

2. DESCRIPTION OF THE DEVELOPMENT

2.1. Location

2.1.1. Denbigh Quarry is an active limestone quarry, north of the town of Denbigh in Denbighshire. See Figure M18.155.D.001 within Appendix 1 of this report.

2.1.2. The existing site comprises 28.3 hectares and is located within the administrative area of Denbigh Town Council.

2.1.3. The permitted site comprises approximately 28 hectares of land and the proposed extension area is approximately 5ha in extent. To the north, west and south the contiguous land is rural, predominantly agricultural fields and woodland comprising pasture and a mix of ancient and more recent woodland. Craig Mawr Wood to the north of the proposed extension site is a Site of Special Scientific Interest (SSSI) and another SSSI (Graig Quarry) is situated 150m to the southeast of the proposed extension area. Part of the woodland within the consented site, outside the extraction area and to the south of the existing site, is the subject of a Tree Preservation Order

2.1.4. Further to the south, at a distance of approximately 250m from the southern boundary of the application site is the northern boundary of the town of Denbigh. The eastern boundary of the proposed extension is the existing quarry which is, itself, bounded on the east by Graig Road, with the Colomendy Industrial Estate further to the east.

2.1.5. The existing quarry is accessed off Graig Road via a purpose-built access road that is owned by the applicant Company and all access to the extension area would be via the existing site. Use of this access includes a separate operator of the concrete batching plant but access to the quarry is exclusive to Breedon Southern Limited and dedicated to its operations at Denbigh quarry.

2.1.6. The proposed extension area consists of agricultural fields in use for pasture, to the west of the existing working area but also within the administrative area of Denbigh Town Council and to the south of the Crest Mawr woodland. The surrounding area comprises pasture and arable fields.

2.1.7. The existing quarry operations have been established in the local landscape over the last 70 years. The context is described in the Historic Landscape Characterisation Assessment as part of the Heritage Statement in Appendix 3.

2.1.8. The residential dwellings closest to the proposed extension are located at the northern end of Bryn Seion approximately 250 to the south of the application boundary. The amenity of these and other local properties would be safeguarded through mitigation measures including standoff areas and the use of temporary landscape screening landforms within the application boundary i.e. more than 250m from the edge of these properties.

2.1.9. There is one public footpath within the application site boundary (footpath ref: 508/6) which helps to connect Denbigh to the northern rural area. At the point where footpath 508/6 departs the development envelope of Denbigh another footpath (508/5) departs in a north-westerly direction passing within 50m of the proposed extension. Footpath 508/6 is on the boundary between the existing quarry and the proposed extension running north to south.

2.2. Operations and Phasing

2.2.1. This is a consolidating application that covers the operations in both the existing quarry and the extension area. The combined existing and extension areas will release approximately 5.0 million tonnes of saleable mineral giving an overall life of mineral extraction of 25 years. To allow for market fluctuations and the completion of restoration an end date of 31st December 2048 is requested.

2.2.2. The predicted/proposed phasing of the extraction, from both the existing quarry and progressing through the extension, is shown on Drawings M18.155.D.024 to 027 and 040. Minor amendments may be required, from time to time, under other regulatory processes to take account of geological changes. However, the general sequence and location of phases will follow those shown on the drawings.

2.2.3. In the existing quarry the stone will continue to be drilled and blasted before being moved to the mobile plant for processing where it is crushed and sorted by size. These techniques will be continued into the extension area. Processed, saleable product is loaded onto road-going HGV transport which then proceed to the public highway via the weighbridge adjacent to the site office.

2.2.4. The first operation in the extension area will be to install the footpath diversion along the approved route. Pre-commencement screen planting, in the first available planting season following the grant of planning permission, would take place along the southern application boundary to allow for a period of maturation before soils are disturbed.

2.2.5. Subsequently, the soils would be stripped from the whole extension area and used for one of three purposes – peripheral screening mounds, immediate placement to complete restoration phases or storage within the base of the quarry for use in later restoration. All soils would be handled when they are dry and friable in accordance with the MAFF Good Practice Guide for Handling Soils (April 2000). The external toe of the screening/attenuation bunds has been moved from the position as described in the Scoping Report to a distance of 30m from the boundary of the Crest Mawr SSSI.

2.2.6. The peripheral bund, as shown on Drawing Ref. M18.155.D.024 – Phase 1, which has been increased in height to approximately 3m on the southern boundary, will be grass seeded in the first available season following the formation of the bunds. Screen planting will also be carried out in order to break up the straighter lines of the bunds. Surplus overburden will be directly placed in the next restoration phase in the main quarry.

2.3. Restoration

2.3.1. The proposed extension occupies agricultural land to the west of the existing Denbigh Quarry operations, currently used for pasture. The proposed restoration for the extension area would adopt the principles expressed in the scheme as shown on drawing M18.155.D.007. Those are;

- Creation of a Priority Habitat (Calcareous Grassland) along the quarry floor with a gentle slope to allow for natural drainage;
- Creation of a large waterbody which reflects the naturally fluctuating groundwater level;
- Natural regeneration of trees and shrubs assisted by the addition of soil forming materials on quarry benches.
- Lower cliffs, benches and predicted waters' edge blasted in selected areas to form areas of scree at the base of the quarry and variation in substrate/shallows depths.
- Retention of a water attenuation feature near the existing entrance that functions in the same way as the current water attenuation lagoon but is shaped and landscaped in a more sympathetic manner than the current 'industrial' feature.
- The importation of up to 100,000 tonnes of inert restoration material to achieve graded restoration in the northern end of the site from 2022.

2.3.2. The adoption of an overall restoration strategy at the time of application for long-term sites with detail submitted at completion of individual phases is an approach advocated by Planning Practice Guidance. In addition, south-facing slopes that are visible from Denbigh may be hydroseeded in order to encourage vegetation growth and reduce the contrast of the rock with the adjacent vegetation.

3. ENVIRONMENTAL IMPACTS

3.1. Introduction

3.1.1. For any change to occur there will be impacts on a scale of magnitude and severity; they can be temporary, reversible or permanent. For an impact to be relevant it must have a receptor of some description and different receptors have differing levels of sensitivity.

3.2. Scoping

3.2.1. Types of development are described in the first and second Schedules to the EIA Regulations. If the development fits a description that is included in Schedule 1 then the development is automatically EIA development and going through the process of assessment and submitting an Environmental Statement (ES) is mandatory.

3.2.2. The Screening process determines whether proposed development is Schedule 2 development by first establishing whether the development matches one of the descriptions and exceeds the stated thresholds. Secondly the likely significant effects of the proposal are considered against the criteria in Schedule 3

3.2.3. The applicant is applying for a 'consolidating' planning permission that incorporates the proposed extension and the operations of the existing quarry. This mechanism is being used because the intention is to use the existing plant site for the processing of mineral derived from the extension area. The combined area of these operations, including those areas where only restoration is due to take place, exceeds the specified threshold in Schedule 1.

3.2.4. The applicant submitted a request for a formal Scoping Opinion of the Mineral Planning Authority in July 2019 and received in August 2019. That Scoping Opinion is included at Appendix 2 of this ES. The description of the proposed development and the site are unchanged from that date and this formal document is considered to remain valid.

3.2.5. The Scoping Opinion sets out those areas of the environment which are considered to warrant investigation and confirms or amends the methodologies that had been submitted with the request. Some additions to the receptors have been made and the topic of 'transport' has been scoped out of the EIA process.

3.2.6. The Scoping Opinion also makes reference to the submission of information regarding Public Rights of way, Need for the development and a Waste Planning Assessment, all of which are more appropriately dealt with in the Planning Supporting Statement.

4. LANDSCAPE AND VISUAL IMPACT

4.1. Introduction and Methodology

4.1.1. A Landscape and Visual Impact Assessment was undertaken in accordance with best practice guidance by a Chartered Landscape Architect, with the principal sources of guidance being:

- 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA, 3rd edition) 2013; and
- Photography and photomontage in Landscape and Visual Impact Assessment. Technical Guidance Note 06/19 (The Landscape Institute, 2019).

4.1.2. A full methodology is included at Appendix 4.1. The study area extends to 3km in all directions from the edge of the Site, as beyond this distance it is predicted that there would no potential for any potentially Significant landscape and visual effects.

4.1.3. A number of documents were used to inform the baseline character and sensitivity of the local area. These include:

- LANDMAP – Online resource – Natural Resource Wales;
- Supplementary Planning Guidance Note: Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB); and
- Cultural Heritage ES Chapter (6)prepared by Andrew Joseph Associates with reference to the Historic Landscapes Register: Registered Historic Landscape of The Vale of Clwyd.

4.1.4. A broad area of search for potential viewpoint locations was carried out using specialist digital terrain modelling and analysis software which was used to calculate a Zone of Theoretical Visibility (ZTV) of the Proposed Development. The ZTV is based on the current landform of the Site and surrounding area, including the main blocks of woodland and settlements as visual barriers (see Figure 4.3). The ZTV should be interpreted as indicative of a maximum effect situation, since it covers large tracts of the surrounding landscape where the Proposed Development would in reality be filtered or screened by other intervening elements (e.g. hedgerows, individual trees and scattered buildings).

4.2. Proposed Development

4.2.1. The Proposed Development is described in Chapter 2 of the ES. The permitted site comprises approximately 28.3 hectares of land and the proposed extension area is approximately 5 hectares in extent. The proposed extension area consists of parts of three agricultural fields comprising improved grassland. The Site lies to the north of Denbigh, approximately 250m from the edge of the town at the closest point. Removal of mineral from the site would take place via the existing access point onto Plas Chambres Road.

4.2.2. The potential for the greatest adverse effects upon landscape character would occur within the Extraction Area with external effects upon landscape character and visual amenity restricted due to the landform characteristic, presence of nearby woodland blocks and formation of a screening earth bund around the perimeter of the extension area prior to extraction of the mineral, designed to minimise landscape and visual effects.

4.2.3. The Development Plan policies that are relevant to landscape and visual matters were reviewed within the Planning Statement accompanying the application and, in summary, need for extraction of the mineral should be found to outweigh the environmental impacts of the development.

4.3. Landscape Baseline

4.3.1. No part of the Site or Study Area lies within a statutorily designated landscape. The Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB) is located approximately 5km broadly east of the Site. The Site does lie within the non-statutorily Registered Historic Landscape: The Vale of Clwyd. The designation washes over a large tract of rural and urban land including the existing quarry and the industrial estates to the east as well as the built up area of Denbigh which comprises modern post-war residential development beyond the historic core.

4.3.2. There are a number of ecological and cultural heritage designations within the wider study area that contribute to an assessment of landscape value, most notably the Scheduled Monument and Listed status of Denbigh Castle and the wider Denbigh conservation area that includes a number of listed buildings. The immediate landscape/townscape context of these designations would, however, remain unaffected by the Proposed Development and setting is assessed in detail within the Cultural Heritage Chapter of the ES.

4.3.3. The proposed extension area and adjoining land is not subject to any Tree Preservation Orders (TPO). A woodland TPO (ref W9) is located ~100m to the south of the proposed extension at the closest point.

4.3.4. In 2007 the Countryside Council for Wales (now Natural Resources Wales NRW) at a national level produced a Landscape Character Map for Wales. This document locates the Site at the eastern edge of NLCA 09 'Rhos' which abuts NCLA 11 'Vale of Clwyd' that covers the majority of the built-up area of Denbigh and land in the eastern part of the study area. The published assessment highlights a number of key characteristics including the limestone outcrop, an undulating landform and mixed field patterns.

4.3.5. LANDMAP, the Welsh approach to landscape assessment, is a Geographical Information System (GIS) based landscape resource where landscape characteristics, qualities and influences on the landscape are recorded and evaluated into a nationally consistent data set.

4.3.6. The LANDMAP resource defines overall values for the five Aspect Areas (AA) in which the proposed extension area is located:

- Visual and Sensory: Moderate
- Landscape Habitats: Moderate
- Cultural Landscape: High
- Historic Landscape: High
- Geological: Outstanding

4.3.7. The overall characteristics of the landscape are therefore made up of a combination of physical, environmental, cultural and sensory factors. However, in the case of landscape and visual impact assessment it is the visual and sensory layer that is of primary importance.

4.3.8. The proposed extension area and rural land to the west and south within the study area are located within the Limestone Plateau – Denbigh/Henllan aspect area, described as:

'Rolling countryside dominated by wooded estate - gently undulating pastoral farmland with a patchwork of medium sized mostly improved grassland fields enclosed by managed hedgerows with scattered trees & woodland'

4.3.9. The proposed extension area consists of parts of three agricultural fields of improved grassland to the west of the existing quarry and to the south of the Crest Mawr woodland. The existing quarry lies to the east of the extension area, including current working area at the northern end of the Site, centrally located extraction and stocking areas, and a Plant Site, Office and Weighbridge at the southeastern end of the Site.

4.3.10. The closest residential properties lie within the town of Denbigh circa 250m to the south of the proposed extraction limit at the northern end of Bryn Seion.

4.3.11. Public Footpath 508/6 crosses through the proposed extension area, running north to south and to the west of the existing quarry.

4.3.12. The field survey confirmed that the characteristics of the Site and adjacent landscape broadly comply with the published Landscape Character Assessments.

4.4. Visual Baseline

4.4.1. Photography was obtained from 15 publicly accessible viewpoints located at a range of distances and directions from the Site (see Figure 4.4). An additional viewpoint outside the main study area from the Clwydian Hills and Dee Valley AONB was selected. Viewpoint selection was guided by a Zone of Theoretical Visibility (see Figure 4.3) and micro-sited in the field. All viewpoint photography and computer generated visualisations were presented in accordance with current best practice guidance – TGN 06/19 published by the Landscape Institute (see Photoviews 1-16 and Viewpoint 8 Photomontages).

4.4.2. In summary, as a result of field analysis and with reference to the ZTV at Figure 4.3, it is concluded that there are a limited number of viewpoints from publicly accessible areas where the Proposed Development has the potential to have a Significant effect upon visual amenity.

4.4.3. Public footpaths 508/6, 508/5 and 508/3 would afford users close range views towards the Proposed Extension Area. Representative views from the closest paths to the Site where views of the site would be screened by a perimeter earth bund that would be planted, have been selected.

4.4.4. Views from transport corridors include fleeting glimpses from the A543, B4501 and minor roads surrounding the Site. Views from other public rights of way throughout the Study Area at varying distances are predicted to be limited with the highest magnitude of effect impacting footpaths within close range of the Site.

4.4.5. Denbigh is the closest settlement to the quarry and there are limited views of the upper faces of the existing quarry workings from parts of the town. Views of the proposed extension would be typically limited due to intervening buildings and planting.

4.5. Landscape and Visual Impact Assessment

4.5.1. The methodology outlining the assessment process in detail is set out at Appendix 4.1. The planning application represents a continuation of existing and long-established operations. In the absence of the current proposals, the future baseline planning position is assumed to involve the ceasing of all quarry operations when the current consent expires and cessation of associated vehicle movements. All plant and associated infrastructure would be removed from the Site. It is assumed that the partly worked void would be restored as closely as possible to the permitted restoration plan.

4.5.2. The assessment of the Operational Phase includes the continuation of quarrying operations including extraction of permitted reserves and including for the maintenance of all plant on the Site and continued vehicle movements at a similar volume to the current operations with importation of restoration materials. The restoration scheme would follow some of the principles established as part of the permitted scheme.

4.5.3. The development would require the removal of the following landcover to accommodate the quarry extension.

- 4ha of improved grassland (best and most versatile agricultural land);
- 0.9ha of low quality semi-mature tree groups/woodland (Ref G3, G4, G5 and G6) with the majority planted on an existing overburden mound);
- 380m combined length of existing hedgerows of medium to low quality (Ref parts of H2, H3 and H4 - see Appendix 4.2); and
- 25 No. scattered trees (predominantly of low quality – See Appendix 4.2 for full details).

4.5.4. The loss of 4 hectares of improved grassland within the context of the surrounding agricultural landscape would not be significant. The removal of ~380m of hedgerows, less than 1 hectare of woodland and 25 No scattered trees, which are all typically of Low to Medium value and Medium susceptibility, would represent a Small magnitude in the context of the surrounding landscape which includes substantial tracts of woodland and field boundary hedgerows. The overall effect of this loss during the operational phase would be Moderate/Minor adverse and Not Significant.

4.5.5. Approximately 1.6 hectares of native broadleaf tree and shrub planting would be established on the peripheral mound during Phase 1 following the partial strip of the extension area and this beneficial effect is described as part of the assessment of the restoration scheme below.

4.5.6. It is proposed to restore parts of the extraction area to priority habitat (i.e. broadleaved woodland, marsh grassland and calcareous/neutral grassland) along the restored quarry floor and some of the reprofiled slopes. The steeper retained quarry benches and faces may be hydroseeded in order to encourage vegetation growth and reduce the contrast of the rocks with surrounding vegetation.

4.5.7. It is proposed to restore the extension area and main site as follows:

- 13.7 ha of grassland overall. This is to largely comprise priority habitat;
- 5.0 ha of broadleaf woodland planting;
- At least 50 No. scattered trees; and
- An ephemeral water feature at the low point in the quarry that would vary in size over the seasons.

4.5.8. Overall, once the planting has established there would be a net gain in broadleaf tree cover relative to the current baseline and a substantial increase in priority habitat grassland, representing a medium magnitude. Consequently, the residual effect on landscape features of the Site would represent a Moderate beneficial effect that is Not Significant.

4.5.9. In accordance with the methodology at Appendix 4.1, the landscape character of the Site is assessed as having a Medium Susceptibility to change to the expanded quarrying activity and when combined with a Medium Landscape Value, resulting in an overall Medium Landscape Sensitivity.

4.5.10. The magnitude of change at a site level arising from proposed extension would be Medium to High. This assessment takes into account the context of the adjoining quarry that incorporates visual change as well as activity associated with the extraction including vehicle movements and periodic impacts on tranquillity from blasting. The overall effect on landscape character would be Moderate adverse during the operational phase that is Not Significant. Following restoration, the magnitude of effect upon the Site would be of a Medium magnitude, although the change would be Neutral given that both positive and adverse elements would be present i.e. beneficial effects from the establishment of semi-natural native vegetation in the re-profiled void and adverse landform effects from a permanent and partially restored quarry void landform (but at a Site level only).

4.5.11. The landscape sensitivity of the wider Limestone Plateau – Denbigh/Henllan area beyond the Site and immediate context is assessed as Medium (comprising Medium Value and Medium susceptibility). There is no appreciable change in value or susceptibility of the area where the scheme may be perceived (see ZTV at Figure 4.3), compared with the Site and immediate landscape context assessed above. There would be very limited visibility of the operations and reduction in tranquillity from blasting and vehicle movements would be very localised within the landscape. The magnitude of change experienced within the Aspect Area in the Study Area, beyond the Site and immediate vicinity, during the operational phase would be Very Low and the overall effect Minor adverse and Not Significant. Following restoration, including the growth of the proposed native planting around the periphery of the extension, the residual effect would be Neutral and not Significant.

4.5.12. The assessment of indirect effects upon the Denbigh Aspect Area recognises the historic character of the elevated conservation area and Denbigh Castle, however any changes to the townscape context would be perceived in the context of the built development on the northern edge of the town that includes post war cul-de-sac development and large-scale industrial units. The assessment has focussed on the historic core of the aspect area as the ZTV indicates that it is from these elevated areas that the greatest theoretical intervisibility with the Site would occur. The Value is assessed as High and the Susceptibility Medium, resulting in an overall Medium-High Sensitivity.

4.5.13. There would be very limited intervisibility of the operations with the quarry faces of the existing quarry being much more visible than the uppermost face of the proposed extension. The magnitude of change experienced within the aspect area in the Study Area, beyond the Site and immediate vicinity, during the operational phase would be Very Low and the overall effect Minor adverse and Not Significant. Following restoration, including the growth of the proposed native planting around the periphery of the extension, the residual effect would be Neutral and not Significant.

4.5.14. Close range views are defined as those being located within 500m of the Site, Medium range views between 500m and 1.5km and long-range views over 1.5km from the boundary of the Site.

4.5.15. Public footpath 508/6 currently passes through the extension area and would be redirected around the perimeter of the extension area. Views of the extraction area would be largely restricted by a perimeter earth bund up to 3m high, with new tree and shrub planting.

4.5.16. All assessed effects upon visual amenity are summarised in the table below.

VP No.	Location	Distance / direction to the Site	Sensitivity (Value/ Susceptibility)	Magnitude (maximum)	Effect at Yr 1 Operational Phase	Effect at Yr 15 Operational Phase (residual effect)
CLOSE RANGE						
1	View from public footpath close to northern boundary of Site	15m north	High (High/High)	Medium to Low	Moderate adverse	Minor adverse
2	View from public footpath close to southern boundary of Site	Within the Site	High (High/High)	Medium to Low	Moderate adverse	Minor adverse
3	View from public footpath to the south-west of the Site	100m northeast	High (Medium to High/High)	Low to Very Low	Moderate/ Minor adverse	Neutral
4	View from public footpath to the south of the Site	150m northeast	High (Medium to High/High)	Low to Very Low	Moderate/ Minor adverse	Neutral
5	View from public footpath to rear of dwellings on Bryn Seion, Denbigh	290m north	Medium (Medium to Medium/High)	Very Low	Minor adverse	Neutral
MEDIUM RANGE						
6	View from Burgess Gate at Leicester Terrace	970m north	Medium (High/Medium to Low)	Very Low	Minor adverse	Neutral
7	View from Ffordd Newydd at junction with Castle Hill	990m northwest	Medium (Medium High/Medium Low)	Very Low	Minor adverse	Neutral
8	Views from battlements on Denbigh Castle	1.1km northwest	High (High/ High)	Very Low	Moderate/ Minor adverse	Neutral
9	View from Southwestern edge of Denbigh Castle	1.15km northwest	High (High/High)	Very Low	Moderate/ Minor adverse	Neutral
10	View from A543 on edge of Denbigh	980m north	Low (Low/Low)	Very Low	Minor/ Negligible adverse	Neutral
11	View from B4501	1.16km	Low	Very Low	Minor/	Neutral

VP No.	Location	Distance / direction to the Site	Sensitivity (Value/ Susceptibility)	Magnitude (maximum)	Effect at Yr 1 Operational Phase	Effect at Yr 15 Operational Phase (residual effect)
	near Council Offices	north	(Low/Low)		Negligible adverse	
12	View from public footpath at junction with B4501	1.17km north	Low (Low/Low-Medium)	Very Low	Minor/ Negligible adverse	Neutral
13	View from layby on A543 near junction with public footpath	1.19km northeast	Medium (Medium High/ Medium-Low)	Very Low	Minor adverse	Neutral
LONG RANGE						
14	View from public footpath on Balch Hill	1.67km North northeast	High (High/High)	Very Low to None	Minor adverse	Neutral
15	View from public footpath north of A543 and Broadleys Covert	1.67km northeast	High (Medium/High)	Very Low to None	Minor adverse	Neutral
16	View from Offa's Dyke National Trail on Penycloddiau	8km west	High (High/High)	Very Low to None	Minor adverse	Neutral

4.5.17. It is an established planning principle that there is 'no right to a private view'; however, the impact upon private visual amenity where new development has the potential to result in overbearing and/or unacceptable effects on living conditions is a material planning consideration.

4.5.18. As part of the visual baseline, photography was taken at public locations close to a range of dwellings within Denbigh. Representative views from public locations include the following:

- The nearest dwellings to the Site off Bryn Seion (see Viewpoint 5);
- Elevated dwellings within the Conservation Area of Denbigh (see Viewpoints 6 and 7); and
- Dwellings on higher ground within the western suburbs of the town dominated by post-war development (see Viewpoints 11, 12 & 13).

4.5.19. Views of the proposed development from the aforementioned dwellings, even at upper floor level, would be no greater than the very low magnitude recorded from Viewpoint 8 and consequently it is predicted that there is no potential for any Significant effects. This conclusion is based on a high sensitivity for receptors resulting in an overall Moderate/Minor effect at Year 1 (i.e. Not Significant) and a Neutral effect by Year 15.

4.6. Cumulative Landscape and Visual Assessment

4.6.1. There are no existing quarries within the Study Area or wider landscape. The Proposed Development would, therefore, have no potential for any Significant cumulative landscape or visual effects.

4.7. Overall conclusions

4.7.1. In conclusion, due to the mitigation design the impact of the operational phase of the Proposed Development upon landscape and visual receptors would be minimised and no Significant effects are predicted.

4.7.2. Upon full restoration of the Site, the residual landscape and visual impact upon the identified receptor groups have been assessed to range from Moderate beneficial in terms of landcover elements (native planting) to Minor adverse in terms of close-range visual effects from very localised parts of the public right of way network, which in all cases are Not Significant.

5. ECOLOGY, BIODIVERSITY AND NATURE CONSERVATION

5.1. Introduction

5.1.1. As this is a consolidating application consideration has been given to the effects upon the ecological assets or proposed assets of the existing quarry and the surveys have been undertaken in respect of the area that would be directly affected by the extension operations. The changing nature of the approved restoration as a consequence of the larger area and importation of inert material has been taken into account.

5.1.2. The assessment process has been iterative commencing with a preliminary Ecological Appraisal (PEA), the undertaking of additional surveys relating to habitats and fauna as recommended by the PEA and an Ecological Impact Assessment (EcIA). The PEA and EcIA are included in Appendix 5 along with the non-confidential survey reports that have informed them. Owing to the age of the original surveys some were undertaken a second time more recently.

5.1.3. The scope of the EcIA, collection of baseline data, evaluation of ecological resources, description and assessment of the significance of impacts all follow guidelines set out by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2019) and references therein, as well as BS42020: 2013 Biodiversity Code of Practice for Planning and Development.

5.2. Baseline

5.2.1. The ecological baseline has been established via the PEA which has been undertaken by experienced and qualified ecologists. Information was obtained from Cofnod, the North Wales Environmental Information Service and a second update request, to establish any changes, was made in 2021.

5.2.2. The PEA classifies the habitats present on the site according to the Phase 1 habitat survey methodology (JNCC, 2010) and establishes the potential of the site to support protected and notable species. It recommended detailed surveys for;

- Great Crested Newt
- Bat Roost and Bat Activity
- Badger
- Breeding Birds
- Dormouse.

5.2.3. The most recent revision of the PEA considers the validity of the surveys as a consequence of the passage of time but concludes that the habitats and circumstances have not changed such that the results, recommendations and conclusions can be relied upon.

5.3. Impact Assessment

5.3.1. The ecological impact assessment has been carried out by the author of the PEA which provides continuity to the process. The EcIA sets out the surveys that have been undertaken and the full methodologies for the individual surveys are in the individual Technical Appendices.

Table1: Ecological Surveys undertaken

Survey Type	Dates Completed	Coverage of Presented Data	Technical Appendix
Extended Phase 1 Habitat	April 2019	The Site	1
Breeding Bird including peregrine	May – July 2019	The Site	2
Bat Roost Presence/Absence	July – August 2019	The proposed extension only	3
Bat Activity Transect	May - September 2019	The Site	4
Great Crested Newt	May – June 2019	The proposed extension only	5
Dormouse Presence/Absence	May – November 2019	The proposed extension only	6
Badger	September 2019	The Site	7 (Confidential)

5.3.2. The survey limitations and constraints are detailed in the relevant species reports in the appendices to the EcIA.

5.3.3. An assessment of impacts on Important Ecological Features is required at specified geographical levels in accordance with CIEEM (2019) as follows: international and European; national; regional; metropolitan, county, vice-county or other local authority-wide area; and local.

5.3.4. The records search identified two sites of national importance (Sites of Special Scientific Interest) and ten County Wildlife Sites within the search area as well as 30 areas of Ancient Woodland. The sites that are relevant to the development are listed in Table 3 of the EcIA.

5.3.5. Habitats identified in the Site or close to the site include;

- Broad leaved Semi-natural woodland;
- Broad-leaved Plantation Woodland;
- Scattered Scrub;
- Scattered Trees;
- Improved Grassland;
- Standing Water;
- Quarry;
- Ephemeral/Short perennial;
- Species-Poor defunct Hedgerow; and
- Buildings

5.3.6. The fauna that may be affected by the proposals were determined to be roosting bats, dormouse, Great Crested Newt, badger and birds.

5.3.7. The importance of the ecological features in relation to the site vary from National to 'Site' and 'negligible' and the importance of the site for fauna ranges from 'local' to negligible'. The assessment of impact does not take into account the embedded mitigation which includes the creation of the bunds and screen planting. It assumes that the current best practice measures for minimising environmental effects that already take place within the quarry will be extended to working in the extension area. Current best practice measures are also outlined in other chapters of this ES.

5.3.8. The assessment also assumes that a British Standard Landscape and Ecological Management Plan will be put in place to guide the current proposals. The 30m stand-off from the SSSI to the northeast of the site, for all operations, is acknowledged along with the presence of the perimeter bund that will vary between 2m and 3m in height. The potential impacts are;

- Direct impact - Habitat loss;
- Indirect impact – Noise disturbance;
- Indirect impact - dust deposition; and
- Indirect impact - Hydrological changes.

5.3.9. Habitat loss occurs at the beginning of the development and removes types of habitat that are considered to be of 'site' importance. The noise and disturbance caused by the operations could cause some species to move away as, although these impacts are already occurring, they would be moving closer to new areas, increasing in

magnitude. The Hydrological and Hydrogeological Impact Assessment is referenced by the EcIA where it states that the surrounding important ecological features are not groundwater dependent so significant impacts 'are not anticipated'.

5.3.10. Without mitigation the impacts on Statutorily designated, non-Statutorily designated sites and the deciduous woodland/unimproved grassland Priority Habitats have been determined as 'medium-term, temporary, reversible **negative impacts** significant at the site level' as a consequence of changes in the noise and dust that could occur. The noise and dust impacts would be at their worst when the workings are at the highest elevation. As the quarry deepens the faces act as a barrier to noise and the wind that carries dust is impeded.

5.3.11. The impacts on fauna are considered to be long term negative, temporary, reversible and significant at a site or local level. The impacts are set out at Table 5 of the EcIA as;

Important Ecological Feature	**Impact in the absence of Mitigation**
Crest Mawr Wood SSSI	Medium-term negative, temporary, reversible, and significant impact at the site level
Coed Park-Pierce CWS	Medium-term negative, temporary, reversible, and significant impact at the site level
Priority habitats – deciduous woodland	Medium-term negative, temporary, reversible, and significant impact at the site level
Priority habitat – unimproved grassland	Medium-term negative, temporary, reversible, and significant impact at the site level
Broad-leaved semi-natural woodland	Medium-term negative, temporary, reversible, and significant impact at the site level
Foraging/commuting bats	Long-term negative, temporary, reversible, significant impact at the site level
Great crested newts	Long-term negative, temporary, reversible, significant impact at the site level
Breeding Birds	Long-term negative, temporary, reversible, significant impact at the site level
Peregrine	Long-term negative, temporary, reversible, significant impact at the local level
Invertebrates	Long-term negative, temporary, reversible, significant impact at the site level

5.4. Mitigation

5.4.1. The embedded mitigation includes the peripheral bunding, screen planting and the restoration proposals which will create additional woodland and connectivity between existing woodland areas. The 30m standoff between the Crest Mawr SSSI and the operations also reduces the impacts that would be experienced by this feature as a consequence of noise, dust and surface water drawdown impacts.

5.4.2. In addition the EcIA acknowledges the mitigation measures in the remainder of the ES and further recommends soft felling techniques for trees that are to be removed, a non-licensed protocol for the protection of Great Crested Newt, appropriate seasonal timing for the prevention of disturbance to breeding birds and the installation of bird nesting and bat boxes.

5.4.3. The design of the ephemeral water feature to provide suitable habitat for Great Crested Newts and the retention of habitat for peregrine falcons are recommended as enhancement of the proposals.

5.5. Cumulative and in-combination effects

5.5.1. The effects of development permitted or planned to be carried out within the study area are identified in the EcIA and the potential interaction of the effects of those developments with the current proposal. The addition of industrial units at the Colomendy Industrial Estate will remove improved grassland which is prevalent in the area. The distance between the proposed quarry extension and the residential developments is considered, given the type of habitat, to not demonstrate an important inter-relation between the habitats at the different sites.

5.6. Residual Impact

5.6.1. Following the implementation of the mitigation measures the impacts on all Important Ecological Features is considered to be negligible and Not Significant.

5.7. Conclusions

5.7.1. Following the implementation of the proposed mitigation there are not considered to be significant effects of the proposed development.

6. ARCHAEOLOGY AND CULTURAL HERITAGE

6.1. Introduction

6.1.1. The heritage assessment has been undertaken by Andrew joseph Associates on behalf of the applicant and has been carried out by qualified and experienced personnel. The assessment method has been amended in accordance with the terms set out in the Scoping opinion at Appendix 2 and contains, as requested, a determination of the impacts of the development on the registered historic landscape in accordance with 'A Guide to Good Practice on using the Register of Landscapes of Historic Interest Wales in the Development Process (2007)'.

6.1.2. The full Heritage Statement is included at Appendix 3 to this Environmental Statement and this Chapter is a synopsis of the information in that Statement. The opinions and judgements of the authors have been transferred here.

6.2 Baseline

6.2.1 The baseline has been established through a blend of desk-based and field-based research. A variety of sources were consulted including the Clwyd-Powys Historic Environment Record, Cadw's database for the locations of designated sites, Coflein (the online catalogue of archaeology, buildings, industrial and maritime heritage in Wales), reports of previous archaeological investigations, maps and readily available local history materials.

6.2.2 All work has been undertaken in accordance with Standard and Guidance for Archaeological Desk-Based Assessment (Chartered Institute for Archaeologists 2008, revised 2012).

6.2.3 A site visit was undertaken in August 2019 to determine whether any aspects of specific archaeological interest could be identified. A photographic record of the current state and use of the land was taken.

6.2.4 Visits were made to designated cultural heritage receptors in the study area to assess indirect effects. A field evaluation in the form of a geophysical survey was undertaken by Tigergeo in October 2019 (Appendix B to the Heritage Statement).

6.2.5 The search area for the assessment was set as 3km from the extension area and Cadw identified over 250 Listed Buildings, 17 Scheduled Ancient Monuments, 44 Registered Historic Parks and Gardens and one registered Historic Landscape. A large number of these were then scoped out of the assessment due to Planning Policy and Guidance incorporated in 'The Setting of Historic Assets in Wales'[1].

[1]Cadw, May 2017 , Welsh Government

6.2.6 The Clwyd-Powys Historic Environment Record (CPHER) was consulted (HER reference number E6479) for sites within a 1km radius of the proposed extension area. The data comprised a mixture of find spots, sites and documentary references. There is a very low background of earlier Prehistoric material, represented by four stray finds of flint flakes and implements ranging from the Mesolithic through to the Bronze Age but no actual sites.

6.2.7 The Iron Age and Roman periods are similarly sparse represented mainly by stray metal finds found through detecting which may reflect occupation in the broader landscape although no specific sites have been identified. The pieces are however concentrated to the immediate northwest of the PEA some way from the Roman road running between St Asaphs and Corwen, the projected course of which runs across the eastern part of the search area.

6.2.8 The medieval period is well represented in the records search. The majority of the entries relate to the urban area of the town although isolated features such as a medieval cellar, kiln and a possible motte are also recorded. Denbigh Quarry (Graig Quarry 121579) is known to have been operational from at least the thirteenth century when it was the source of stone for Leicester's church and the tower of St Hilary's as well as Bodfari church. It is probable that the quarry also provided the stone for the castle.

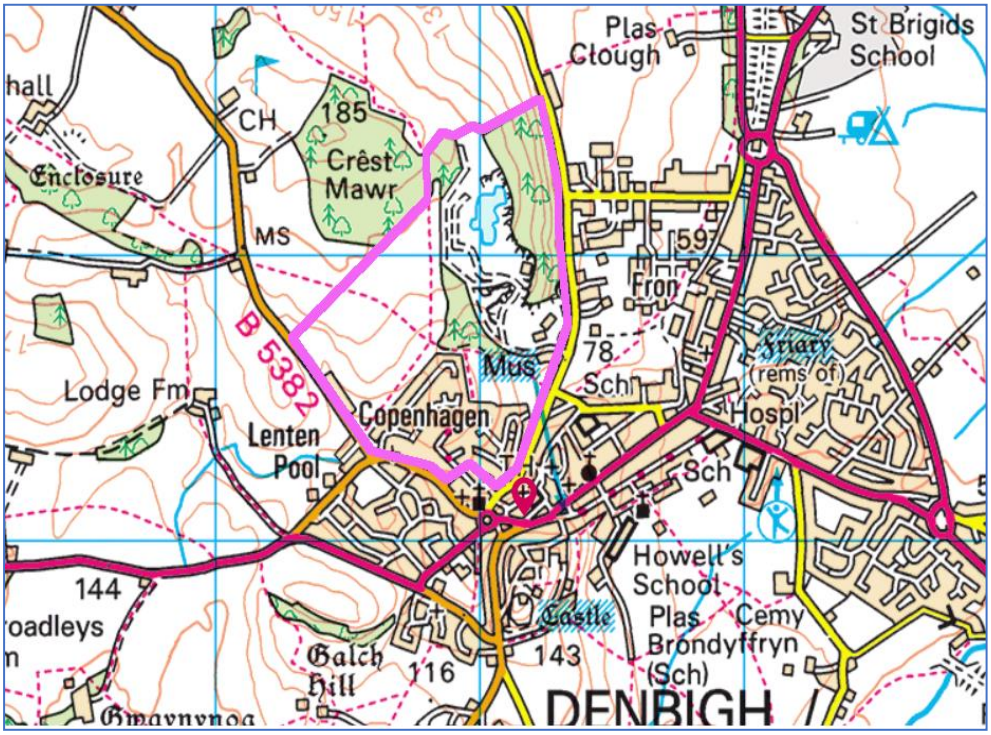
6.2.9 The geophysical survey is reported in full at Appendix B of the Heritage Statement with the field work having been undertaken in October 2019. The geology of the site lends itself to this type of investigation and the survey presented good quality results. There is little direct evidence for past land use although there are some examples of cultivation reminiscent of narrow ridge and furrow, with a 4 – 5 m separation rather than the more common 6 – 7 m. This does not obviously relate to the present field boundaries so may predate these.

6.2.10 No obvious former field boundaries are apparent within the data and none are known to have been removed since the 1890s OS map edition. A spread of debris might indicate the former site of a small hollow, e.g. a pond or similar. There is little conclusive evidence for features of archaeological interest but there are hints at former systems of enclosure. Seen against a strongly variable background, a wide (3 – 4 m) two separate bands of reduced magnetic intensity might be interpreted as a stony bank with a possible entrance. If so, its southeast flank would run along the contour. There are no direct indications of date but such a construction could be medieval or earlier. However, such an anomaly can also be generated by discontinuities in the limestone bedrock and hence there is a degree of ambiguity.

6.2.11 Elsewhere there are possible narrow ditch fills, although these are uncertain and one in particular could relate to adjacent cultivation. There may be a small diameter ring ditch, no more than 4 – 5 m across, however, this is as likely to be an artefact of juxtaposition of other anomalies including cultivation. Further, less distinct, linear enhanced intensity anomalies may be natural in origin but there remains a small possibility that they could be ditch or gully fills.

6.3 Heritage landscape Setting

6.3.1 The setting of the site has been characterised using the agreed (ASIDHOL2) method which has provided the following output;



Sloping land forming the western side of the Vale of Clwyd with far reaching views to the south, containing a substantial working and historic stone quarry, and large housing development adjoined by improved pasture and some arable land.

Historic background

The landscape area falls lies on the boundaries of the medieval ecclesiastical parishes of Denbigh and Henllan, in the commote of Is Aled, in the ancient cantref of Rhufoniog.

The majority of entries in the Historic Environment Record are of 19th century and later date with only stray finds representative of the pre-medieval era. The north of the HLCA is dominated by quarrying, and Graig Quarry is known to have been operational from at least the thirteenth century when it was the source of stone for Leicester's church and the tower of St Hilary's, as well as Bodfari church. It is probable that the quarry also provided the stone for the castle.

Key historic landscape characteristics

Sloping land forming the western side of the Vale of Clwyd (130-80m AOD, west to east). Far reaching views mainly over Denbigh town and to Ffrith Fawr beyond, framed by woodland that restricts views east and west. Defined by the B5382 to the south west and Ffordd y Graig to the east.

Substantial working and historic stone quarry formerly known as Graig Quarry covering an area of approximately 160 ha set within mixed woodland (now known as Denbigh Quarry)

Gently sloping improved pasture, with some arable land on the western boundary with occasional field trees, stone-walled and hedged boundaries.

Large housing development of 1970s and modern date on lower slopes near Denbigh town in area known as Copenhagen, with occasional isolated cottages of 19th century and earlier date along the B5382 and now absorbed by later housing.

Single farmstead – Coppy Farm – with good range of stone outbuildings forming an enclosed courtyard (the farmhouse being more recent) under slate roof and situated on the northern side of the B5382. Set amongst improved pasture and some arable fields and former small stone quarry (probably the source of the stone for the farm) to the north-west.

6.4 Impact Assessment

6.4.1 Four criteria have been applied in evaluating the significance of the effects of the proposed development. These are;

- Type of impact;
- Likelihood of the impact occurring;
- Sensitivity of the receptor; and
- Magnitude.

6.4.2 Once these criteria have been established they are combined through accepted methodology and using the professional judgement of the assessor(s) to determine the residual impact once mitigation has been applied

6.4.3 The nature of mineral extraction results in the total loss of the archaeological resource wherever extraction takes place, and the potential loss or damage in other areas associated with infrastructure and landscaping.

6.4.4 Quarry extraction would mean the destruction of any archaeological resource in the area to be stripped and quarried. In this context, the geophysical points to a modest potential for archaeology within the extension area and ploughing will also have truncated that same archaeology.

6.5 Effects upon Setting

6.5.1 The ASIDOHL2 assessment included consideration of the effects upon Dinbych (Denbigh) historic character area, including to and from Denbigh Castle. Site-specific assessment of individual assets within Denbigh are discussed in Section 4.3 of the ASIDHOL2 assessment.

6.5.2 The ASIDOHL2 assessment concludes that the proposed development will have a direct impact and slight indirect physical impact on one of the Vale of Clywd registered historic landscape's thirty-eight Historic Landscape Characterisation Areas. This is Graig, characterised as part of this EIA, which includes the current Denbigh quarry, agricultural land, woodland and modern housing. This impact includes the loss of small part of the character area (about 3.4%) and changes in land-use (from pasture and woodland to quarry and woodland).

6.5.3 The proposed development will not have a direct or indirect physical impact on the other five historic landscape character areas located within a 3km radius: Dinbych, Lleweni, Meusydd-brwyn, Ystrad and Penpalmant.

6.5.4 The proposed development will slightly change views to and from the Dinbych historic character area, including to and from Denbigh Castle. The ASIDOHL2 process has graded the related reduction in value as 'low' and the significance of the overall impact of the proposed development on the Dinbych HLCA as 'moderate'. This 'moderate' grading is strongly influenced by the very high value of the historic character area, rather than the scale of direct and indirect impacts of the proposed development.

6.5.5 The proposed development has the potential to change distant views from a number of locations within the Lleweni, Meusydd-brwyn, Ystrad and Penpalmant historic character areas. As a result, it will have a slight indirect visual impact on high value historic character areas. The ASIDOHL2 process has graded the significance of the overall impact of the proposed development on these four historic character areas as 'moderate'. Again these 'moderate' gradings are strongly influenced by the very high value of the historic character areas, rather than the scale of direct and indirect impacts of the proposed development.

6.6 Assessment of Indirect Effect upon Designated Assets

6.6.1 Although a number of designated assets lie within 3km of the Site, as set out in Section 2, based upon the ZTV and field assessment the following have been identified as potentially sensitive to change:

- Denbigh Castle and Medieval Town (DE156)
- Denbigh Medieval Town NE Corner (DE225)
- Leicester's Church (DE044)
- St Hilary's Chapel Tower (DE005)
- Denbigh Town Wall (DE002)

6.6.2 The methodology used for the assessment follows the approach set out in PPW TAN 24 (2017) Setting of Historic Assets in Wales. The settings of the medieval assets are tightly defined by their immediate surroundings, both historic and relatively modern. Other than the Castle, that sits high above the other assets, the medieval assets are to be found amongst and absorbed by later development. Views out and towards the PEA are largely blocked or filtered by development or trees.

6.6.3 The Castle is imposingly situated and dominates the town and approaches to it. It has clear views over the surrounding countryside, including towards the proposed extension and existing quarry, although the quarry itself and the extension area are well screened by tree and topography. Its' setting is largely unencumbered by later development and there is a significant greenspace between the Castle and late 19th century development below it. There are some recent intrusions into its broader setting, including a new supermarket 225m to the north west.

6.6.4 The potential impact is demonstrated graphically by photomontages prepared by Pleydell Smithyman (Figures 19A-D of the Heritage Statement). The conclusion is that there is a slight adverse visual effect in Year 1, though one that is barely perceptible to a visitor to the Castle, and no effect upon the setting overall. At some point before Year 15, the woodland is established to a point where there is no effect upon visual appreciation or setting.

6.7 Mitigation

6.7.1 Although the geophysical survey located only a handful of possible anomalies that could be representative of archaeology, a precautionary approach has been adopted. Planning Policy Wales proposes that an appropriate approach to mitigation is to ensure preservation by record through archaeological excavation, recording, analysis and publication appropriate to significance of the archaeological resource.

6.7.2 It is not considered that specific mitigation is required for the potential impact on the Historic Landscape Characterisation Area.

6.8 Cumulative and in-combination effects

6.8.1 Although the existing quarry is a substantial industrial feature, it is completely hidden within the landscape due to long-established planting and screening. The PEA would have similar screening, that is predicted to be sufficiently matured within 15 years to completely screen the extension from external views and have no cumulative or combined effect.

6.8.2 There are no other planned developments within the vicinity of the PEA, nor in the eyeline between Denbigh's historic core and the proposed extension area.

6.9 Residual Impact

6.9.1 The heritage assessment considers that there will be two factors which are subject to a 'moderately significant' residual impact. These are the direct effects upon the historic landscape of the Vale of Clwyd and the indirect effects upon the setting of the historic landscape of the Vale of Clwyd.

6.10 Conclusions

6.10.1 This assessment considers both direct and indirect effects upon cultural heritage. Direct effects are those that physically affect a cultural heritage asset. Indirect effects can occur as a result of significant changes to the setting of a cultural heritage landscape or asset, whether permanent or temporary. This is particularly relevant to designated assets such as Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Parks and Gardens and Registered Historic Landscapes.

6.10.2 Desk-based research, a site walkover and visits to designated heritage assets were carried out. A geophysical survey was undertaken of the whole extension area.

6.10.3 The extension lies within an area modest in pre-modern archaeology, although this could be a reflection of a lack of development within the rural landscape and therefore a lack of archaeological investigation. Historic ploughing will have truncated the archaeology.

6.10.4 On the whole, the geophysical survey bore out the low expectations. There is however evidence for possible former enclosures, associated with areas of ridge and furrow-like former cultivation. A ring ditch is also tentatively suggested. In accordance with planning policy, loss of archaeology needs to be offset by a programme of mitigation.

6.10.5 An appropriate approach to mitigation is to ensure preservation by record through archaeological excavation, recording, analysis and publication appropriate to the significance of the archaeological resource.

6.10.6 Having regard to the baseline conditions, the nature of the proposed development and the proposed measures that would be effective in mitigating the impacts of the scheme, there would be no significant residual effects (direct, indirect, cumulative or combined) upon known cultural heritage assets. The longer-term visual effect on the setting of the historic landscape will revert to 'neutral'. The proposed development therefore fully accords with both local and national cultural heritage policy.

7.0 NOISE AND VIBRATION

7.1 Scope of Assessment

7.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of noise and vibration and is supported by Appendix 8.

7.1.2 The chapter describes: the assessment methodology; the baseline conditions currently existing at the Application Site and in the surrounding area including receptors; the likely significant environmental effects; any mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Proposed Development in combination with other developments within the vicinity.

7.1.3 Operations for blasting to release rock, large plant machinery to process the rock and HGVs to carry away the resulting aggregate are already underway and in use at the existing quarry, and the same operations and plant will arise in the proposed extension. Whilst these operations at the current quarry take place without significant adverse effects occurring the same at the extended quarry has the potential, if not appropriately controlled, to result in adverse noise impacts at residential and other noise sensitive locations close to the quarry. Consequently, noise and vibration are material considerations in the determination of the application for extension of the quarry.

7.1.4 This chapter assesses the potential impact of noise and vibration from the Proposal on the closest receptors as these are likely to be the most affected and identifies those mitigation measures that may be required so that significant adverse effects are not likely to occur.

7.1.5 An assessment of the potential impact of the Proposal at identified noise and vibration sensitive premises in the vicinity of the site has been undertaken by comparison of measured noise and vibration levels from the existing operation of the quarry extrapolated to the context of the proposed extension of the quarry, using relevant guidance and criteria. Where necessary, suitable mitigation measures are recommended to control noise emissions from the Proposal.

7.1.6 The Proposed Development has the potential to impact on prevailing local noise and vibration conditions due to increased traffic arising from the development/quarry/extension as well as arising from operation of the extension to the quarry. However, the quarry currently only contributes, to a minor degree, to existing traffic flow rates and composition on the local road network. Consequently, overall traffic noise and vibration levels on local roads are controlled by non-quarry related traffic. In the event of the operation of the extended quarry at similar production levels this would not change i.e. quarry related traffic would still not be a controlling factor for traffic noise and vibration on local roads or lead to a meaningful increase in traffic noise and vibration. As a result, it has therefore been agreed with the local planning authority through the EIA scoping process that this ES does not need to consider noise and vibration impacts from traffic related to an extended quarry as it is unlikely to cause significant adverse effects on the environment.

7.1.7 The development/quarry/extension is not located within or near a formally declared Quiet Area. However, the Denbighshire County Council Local Development Plan Open Space Audit and Assessment Report designates land to the North-east and East of the quarry as "Natural and Semi Natural Greenspace" (NSNG) as defined by Technical Advice Note 16: Sport and Recreation (2009) (TAN 16). The Council's document describes such spaces as "Popular with communities for educational purposes and dog walking and recreation." However, these sites are bordered by industrial estates where activities which generate noise are much closer than the quarry with little acoustic screening unlike activities in the quarry (notwithstanding blasting). Furthermore, the proposed extension will take some noise generating activities to the west of the quarry thereby increasing the separation distance to these NSNGs and therefore further reducing already the negligible noise impacts of activities at the quarry. Consequently, it is considered that the proposed extension is unlikely to result in adverse noise and vibration effects on the environment in these areas.

7.1.8 Further explanation of the terminology used within this chapter is provided in the Glossary at Appendix 8.

7.2 Key Legislation, Policy and Guidance Considerations

Legislation and Regulation

Planning Policy Wales (PPW)

7.2.1 Planning Policy Wales sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW.

7.2.2 The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

PPW - Minerals

7.2.3 The role of the planning authority in relation to mineral extraction is to balance the fundamental requirement to ensure the adequate supply of minerals with the protection of amenity and the environment. The key principles are to:

- provide positively for the safeguarding and working of mineral resources to meet society's needs now and in the future, encouraging the efficient and appropriate use of high quality materials;
- protect environmental and cultural characteristic of places, including those highly cherished for their intrinsic qualities, such as wildlife, landscapes, ancient woodlands and historic features, and to protect human health and safety and general well being;
- reduce the impact of mineral extraction and related operations during the period of working by ensuring that impacts on relevant environmental qualities caused by mineral extraction and transportation, for example air quality and soundscape, are within acceptable limits; and
- achieving, without compromise, a high standard of restoration and aftercare so as to avoid dereliction and to bring discernible benefits to communities, heritage and/or wildlife, including beneficial after uses or opportunities for enhancement of biodiversity and the historic environment.

PPW - Noise

7.2.4 Mineral workings should not cause unacceptable adverse environmental or amenity impact. Where this is not possible working needs to be carefully controlled and monitored so that any adverse effects on local communities and the environment are mitigated to acceptable limits. Any effects on local communities and the environment must be minimised to an acceptable standard.

7.2.5 Development plans should set out clearly the criteria that will be applied to minerals proposals to ensure that they do not have an unacceptably adverse impact on the environment and the amenity of nearby residents. Issues that must be addressed include noise, in terms of limits, type and locations.

PPW - Extensions

7.2.6 Extensions to existing mineral working, whether they be time, lateral or depth extensions should be considered in the same manner as applications for new sites. Each application will need to consider the impact on the site as a whole and the wider surroundings and will need to be considered on its own merits.

7.2.7 The presence of an existing quarry should be a material consideration when considering a proposal for an extension. There may be benefits to extending a site in terms of shared infrastructure, for instance, as opposed to working a new greenfield site.

Minerals Planning Guidance Note 11: The Control of Noise at Surface Mineral Workings

7.2.8 This guidance published in April 1993 remains applicable in Wales, provides advice to mineral planning authorities and the industry on how the environmental performance of the industry can be improved by the control of noise from operations.

7.2.9 The advice contained within this document regarding the monitoring and assessment of noise levels is still largely applicable, however, paragraphs 31 to 42 have been superseded by Mineral Technical Advice Note 1 (MTAN-1).

Minerals Technical Advice Note (Wales) 1: Aggregates (MTAN1)

7.2.10 This guidance sets out detailed advice on the mechanisms for delivering policy for aggregates extraction by mineral planning authorities and the aggregates industry.

7.2.11 In terms of noise, the guidance states that where aggregates extraction and related operations occur close to areas that are sensitive to noise, particularly residential areas, noise impact must be minimised to acceptable levels.

7.2.12 Mineral planning authorities should have regard to the background noise levels and the threshold at which significant effects are likely at noise sensitive properties when considering the acceptability of proposals or setting noise limits in a planning condition.

MTAN1 - Noise Limits

7.2.13 In relation to noise limits, MTAN-1 offers the following specific advice.

- *"Noise limits should relate to the background noise levels (L), subject to a maximum daytime noise limit of 55 dB(A) [LAeq,T] where background noise levels exceed 45 dB(A). 55 dB(A) is the lower limit of the daytime noise levels where serious annoyance is caused.*
- *Where background noise is less than 45 dB(A), noise limits should be defined as background noise levels plus 10 dB(A) [LAeq,T] .*
- *Night-time working limits should not exceed 42 dB(A) [LAeq,T] at noise sensitive properties.*
- *Daytime working is defined as 07:00 – 19:00 hours and night-time as 19:00 – 07:00 hours. Noise limits should be set in terms of LAeq,T over a 1-hour measuring period. LAeq, is the noise index used to describe the "average" level of noise that varies with time (T) and should be measured "free-field" that is, at least 3.5m away from a façade to prevent reflection of noise by any façade that faces the noise source.*

- *During temporary and short-term operations higher levels may be reasonable but should not exceed 67 dB(A) [LAeq,T] for periods of up to 8 weeks in a year at specified noise sensitive properties."*

MTAN1 - Vibration Limits

7.2.14 Planning conditions relating to the control of blasting should only: relate to those aspects of environmental management that are under the control of the operator; should be directly relevant to environmental issues; and, should not be in conflict with existing health and safety legislation. Consequently, planning conditions should provide for the:

- acceptable days for blasting operations: unless there are exceptional circumstances such as a safety emergency, blasting should take place at regular times within the working week, that is, Mondays to Fridays. Blasting on Saturday mornings should be a matter for negotiation between the operator and the MPA taking into account the views of any nearby residents. No blasting should take place at any other time, that is, Saturday afternoons, Sundays, Bank or National holidays;
- acceptable times of blasting operations: blasting should only take place between the hours of 10.00am and 16.00pm, except when there is an emergency in the interests of safety;
- maximum level of ground vibration at vibration sensitive locations: ground vibration as a result of blasting operations should not exceed a peak particle velocity of 6 mms-1 PPV in 95% of all blasts measured over any 6 month period, and no individual blast should exceed a peak particle velocity of 10 mms-1 PPV;
- approval of a scheme by which air overpressure is managed and mitigated through careful design of blasting operations; approval of a scheme of vibration monitoring so that compliance within set limits can be adequately demonstrated by the operator at any time.

Denbighshire County Council Local Development Plan

7.2.15 The Denbighshire County Council Local Development Plan[2] was adopted in June 2013.

7.2.16 Policy PSE 17 – Future mineral extraction states:

- "Applications for the extraction of aggregate minerals will only be permitted where it is necessary to maintain stocks of permitted reserves having regard to the Regional Aggregate Working Party apportionment figures, or, where no figure exists, the demonstrated need of the industry concerned."

[2] Denbighshire County Council Local Development Plan 2006-2021, June 2013.

- "Applications for the extraction of up to 1 million tonnes of sand and gravel will be permitted in Preferred Areas (identified on the proposals maps); taking into account the above criteria."
- "Applications that accord with the above criteria will be permitted provided that all the following criteria are met:
    - An appropriate buffer is included, within which no mineral working, or sensitive development will be allowed;
    - Noise is kept to an acceptable level;
    - Suitable blasting controls are implemented;"

The Policy then goes on to reference Planning Policy Wales: Minerals Planning Policy Wales and Technical Advice Notes Minerals Technical Advice Note 1: Aggregates

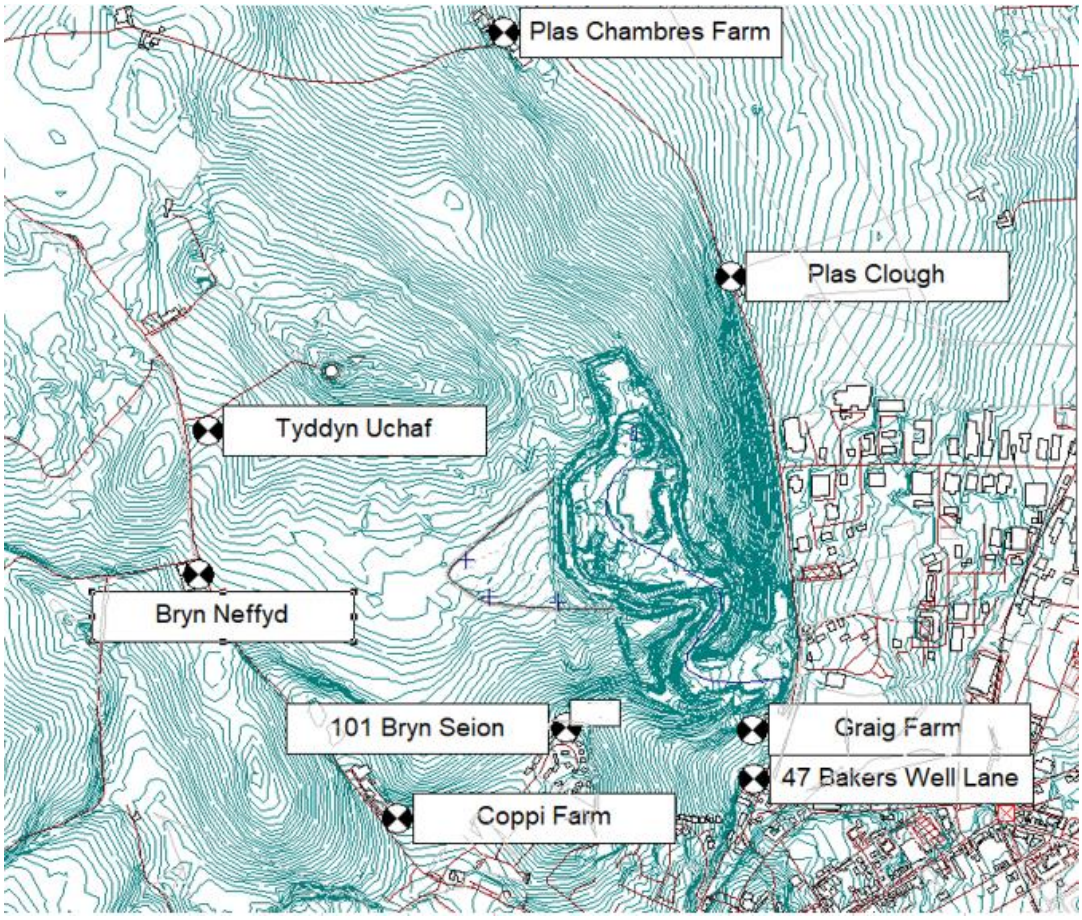
7.3 Assessment Methodology

7.3.1 The policy, guidance and standards described above set noise guidelines based on the underlying background noise levels subject to upper limits and for vibration based on fixed values. These are considered to represent appropriate thresholds for the onset of significant adverse effects on the environment for the purposes of this ES.

7.4 Study Area

7.4.1 The study area for both the site preparation and operational phases of the scheme extends from approximately 250 metres to 900 meters from the quarry. This is the distance to the closest noise and vibration sensitive receptors specified in the scoping opinion, as shown in Figure 1 in order to maintain consistency of assessment with existing monitoring records.

Figure 1: Site and surroundings showing location of noise and vibration sensitive receptors



7.5 Determination of Baseline

7.5.1 The baseline includes noise and vibration conditions with and without the current quarry operations underway.

7.5.2 Existing noise and vibration levels with the current quarry in operation have been determined using information from compliance noise and vibration surveys carried out as required by the existing planning permission from the site. These data have been supplemented by a baseline and source noise survey for this ES.

7.6 Prediction Methodology

Noise

7.6.1 Future noise and vibration levels from activities in an extended quarry have been predicted based on data from the compliance surveys, the supplementary baseline and source measurements of noise, and modelling of the propagation of noise based on source measurements and databases of noise and vibration for the plant and operations likely to take place at the extended quarry in BS 5228.

7.6.2 The level of noise in the local environs that arises from a site will depend on several factors. The more significant of which are:

- the sound level output of the plant or equipment used on site;
- the periods of operation of the plant on site;
- the distance between the source noise and the receiving position;
- the presence of screening due to barriers (including buildings and earth bunds);
- the reflection of sound;
- soft ground attenuation.

7.6.3 The noise index that is in general use and is recommended internationally for the description of environmental noise is the A-weighted equivalent continuous sound pressure level, LAeq,T (expressed in decibels, dB).

7.6.4 The $L_{eq,T}$ describes the total amount of acoustic energy measured but does not take any account of the ear's ability to hear certain frequencies more readily than others. Instead an A-weighting is applied to the frequency spectrum to form the L_{Aeq} (expressed in dB(A)) as this is found to relate better to the loudness of the sound heard.

7.6.5 In order to assist in the calculation of noise levels from the operation of the site CadnaA noise modelling software has been used. The noise prediction software has been configured to undertake the noise calculations in accordance with the statutorily approved British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites: Part 1: Noise (BS 5228). This guidance details methods to estimate noise from 'open sites' which can include quarries, waste disposal sites and long-term construction projects.

7.6.6 Whenever blasting is carried out, energy is transmitted from the blast site in the form of airborne pressure waves. These pressure waves comprise energy over a wide range of frequencies, some of which are higher than 20 Hz and therefore perceptible as sound, whereas the majority are below 20 Hz and are not normally audible but can be sensed as a change of air of pressure on the chest and ear. It is the combination of the sound and changes in pressure that is known as air overpressure. In addition, the very low frequency elements of air overpressure can induce vibration in lightweight building elements e.g. window rattle.

7.6.7 This ES reports blasting sound pressure levels monitored during the compliance surveys required by the planning permission for the existing quarry in the blasting vibration reports in Appendix 8. As similar blasting methods and charge sizes as used currently are expected to be used in the operation of any extended quarry, it is considered likely there will be little, if any, change in sound pressure level and air overpressure for existing receptors in the case of blasting at the quarry extension.

7.6.8 Point sources have been used to represent stationary activities such as excavation, loading, drilling and rock breaking by fixed plant such as crushers and screens. HGV movements in the quarry, loading shovels and dump truck movements have been modelled as moving point sources. Haul roads at the quarry site have been modelled as per the method in BS 5228.

7.6.9 The noise and vibration assessment has been undertaken within the context of the existing planning permission for the quarry and relevant planning policies, guidance documents and legislative instruments. These are summarised below.

7.7 Operational Effects

Existing Planning Permission

7.7.1 Noise and vibration levels from permitted operations at the site are currently controlled via the planning permission for the existing quarry approved by Denbighshire County Council.

7.7.2 The table below summarises the relevant noise and vibration limits in the existing planning permission

Table 7.1: Planning noise and vibration limits for the operation of the existing quarry

	Assessment Location	Limit
Noise	Rear of 99/100 Bryn Seion	46 dB $L_{Aeq,\ 1\ hr}$ (derived from a day time background noise level of 36 dB $L_{A90,T}$ measured in 2017)
Vibration	Any sensitive receptor	6mm/second Peak Particle Velocity (derived from Minerals Technical Advice Note (Wales) 1: Aggregates)

7.7.3 A plan showing the location of the nearest noise sensitive properties is provided in Figure 1.

7.8 Vibration

7.8.1 This ES considers the effects of vibration from blasting with reference to advice on blast vibration limits set out in MTAN1 and in the current planning conditions regulating the quarry.

7.8.2 BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites: Part 2: Vibration advises that for any particular site, a number of measurements of vibration at different distances from the blast can be used to produce a scaled distance graph. The scaled distance graph can then be used as an indication of likely vibration magnitudes at various distances. Consequently, reference has also been made in the production of this ES to results of blast monitoring vibration records from recent blasts in 2018 and 2019, reproduced in Appendix 8.

7.8.3 In general terms, the quarry is worked by drilling a row, or rows, of boreholes (often referred to as shot holes) into the bench above the working face. Predetermined quantities of explosive are placed into each hole and the holes are then filled in ("stemmed"), usually with 10mm aggregate. The explosives are fired one after the other using millisecond delay detonators to produce many relatively small sequential detonations thereby reducing noise and ground vibration compared to an equivalent much larger single explosion if all the small chares were grouped together and detonated at the same time. The fragmented material is then loaded and transported from the working face to the processing plant using excavators and dump trucks for crushing and sorting to the desired aggregate size.

7.8.4 Ground vibration from blasting is calculated in terms of 'peak particle velocity' (PPV) and is measured in millimetres per second (mms-1) in three separate planes of movement.

7.8.5 Detailed research as summarised in BS 7385 has determined that substantial vibration levels are required to affect buildings and structures with typically levels in excess of 15 to 50 mms-1, at different frequencies, necessary to produce cosmetic structural damage to various type properties. The table below reproduces from BS7385 part 2. the levels which represent guide values for the onset of cosmetic damage in buildings e.g. hair line cracks in plaster

Table 7.2: Table from BS7385 Part 2 – Transient vibration guide values for cosmetic damage

Type of Building	**Peak component particle velocity in frequency range of predominant pulse**	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures industrial and heavy commercial buildings	50mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s at 4 Hz increasing to 20mm/s at 15 Hz	20mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
Note 1 Values referred to are at the base of the building Note 2 for unreinforced, at frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) should not be exceeded		

7.8.6 In respect of human perception, Welsh Government advice in MTAN1 is that vibration levels should be set in the range of 6 to 10 mms-1 i.e. well below the BS 7385 thresholds for minor cosmetic effects on buildings.

7.8.7 MTAN1 gives advice on suitable planning conditions to control the environmental impact of blasting operations at quarries. This includes the advice that:

"Maximum level of ground vibration at sensitive locations: ground vibration as a result of blasting operations should not exceed a peak particle velocity of 6 mms -1 PPV in 95% of all blasts measured over any 6 month period, and no individual blast should exceed a peak particle velocity of 10 mms-1 PPV".

7.8.8 The current planning permission at Denbigh Quarry imposes a limit of not exceeding a peak particle velocity of 6 mms-1 i.e. aimed at providing reasonable protection with regard to human perception. This threshold is substantially below the higher levels required to cause even cosmetic damage to ordinarily vibration sensitive structures. Consequently, treating a vibration peak particle velocity of 6 mms-1 as the threshold for Significant adverse effect on humans and controlling vibration to this value automatically eliminates the risk of significant adverse effects on ordinary structures and buildings.

7.8.9 All vibration measurements recorded in the monitoring reports in Appendix 8 during blasting events in 2018 and 2019 were below 6 mms-1 PPV. Therefore, the guidance of MTAN 1 and the more stringent requirements of the extant planning permission with regards to suitable vibration limits are currently being achieved.

7.9 Construction Effects

Noise from Site Preparation

7.9.1 Construction noise effects will be assessed through comparison of predicted noise levels with the impact threshold levels set out below.

Noise Level Predictions

7.9.2 To quantify potential construction noise impact, typical worst-case construction activity noise levels, LAeq,T, from the assumed construction activities will be predicted in accordance with methods in BS5228 Part 1 at the relevant receptor. Calculations were based on anticipated soil/overburden handling methods and the mechanical plant likely to be used. The predictions include corrections for angle of view, any appropriate screening and likely percentage on times for the plant.

Residential Receptors Impact Thresholds

7.9.3 Welsh Policy in MTAN 1 advises that during temporary and short-term operations e.g. construction works and drilling of shot holes for blasting, higher noise levels may be reasonable but should not exceed 67 dB(A) for periods of up to 8 weeks in a year at specified noise sensitive properties.

7.9.4 Where construction noise may continue after 8 weeks the thresholds for residential receptors can vary depending on the existing ambient noise environment characterised by the existing ambient noise level as well as other factors such as the type of noise sources present.

Significant adverse effect criteria are given in Table 7.3 below. These criteria are based on the ABC method criteria in BS5228: Part 1. Table 3: Thresholds of potential significant effect at dwellings

Assessment category and threshold value period	**Threshold Value, in decibels (dB) ($L_{Aeq,T}$)**		
	Category A [A)]	**Category B [B)]**	**Category C [C)]**
Night time (23:00 – 07:00)	45	50	55
Evening and Weekends [D)]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
NOTE 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. *NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise* *NOTE 3 Applied to residential receptors only.* *NOTE 4 The acoustic character of the area will be considered along with the ambient noise level when assigning a category.*			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

7.10 Non-Residential Receptors Impact Thresholds

7.10.1 For all non-residential receptors, noise levels generated by site activities will be deemed to be significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB LAeq,T from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in a significant effect. Other factors such as the use and construction of the receptor building will be considered when determining if a significant effect is likely.

7.11 Vibration from Site Preparation

7.11.1 The separation distance to the nearest vibration sensitive receptors to the site preparation areas is approximately 240 metres or greater. The BS 5228 data base indicates that at such a distance vibration from site preparation activities is unlikely to be perceptible. Consequently, site preparation related vibration (excepting blasting) is not considered further in this ES.

7.12 Noise from Off-Site Preparation Traffic

7.12.1 During the site preparation phase traffic on the surrounding road network is not predicted to result in an increase in traffic flow of 25% of more. This is the threshold that the Design Manual for Roads and Bridges advises is broadly equivalent to a slightly less than 1 decibel increase in the LA10,18hr traffic noise level, and under normal circumstances this is unlikely to be perceptible, even in the short term. Consequently, construction traffic noise is unlikely to have a significant adverse effect on the environment and is therefore not considered further in this ES.

7.13 Limitations and Assumptions

7.13.1 The following limitations and assumptions apply to the noise and vibration section of this ES.

- The baseline vibration levels are based on compliance monitoring between August 2018 and June 2019.
- The future operation of the quarry will be broadly similar to currently.
- Ecological significant noise and vibration effects were not included in the scoping opinion and are assumed will be no worse for the extension of the quarry compared to the operation of the current quarry.

7.14 Consultation

7.14.1 Consultation with Denbighshire County Council via the request for a scoping opinion included discussion of potential noise and vibration effects of the proposal. Section 6 of the scoping opinion considers noise and vibration as summarised in the table below

Table / Figure Title Scoping Opinion Comments and Response

Topic / Section	Summary of Comment	Location within the ES where comments are addressed
Traffic Noise and Vibration	To be scoped out as unlikely to have a significant adverse effect on the environment. Due to existing traffic flows on local roads and no substantive change due to quarry traffic being likely.	N/A
Noise and vibration impacts on nearest receptors to be considered	Construction activities to be assessed include: • Stripping of top soil • Creation of new bund around the perimeter of the extension to the quarry. Operational activities to be assessed to include: • Blasting. • Rock processing and stock piling. • Movement of vehicles in the quarry.	This chapter.
Noise and Vibration Assessment Locations	To be consistent with noise and vibration locations approved under planning permission 01/2009/1424 i.e. • Tyddyn Uchaf • Bryn Neffyd • Coppi Farm • 101 Bryn Seion • 47 Barkers Well Lane • Graig Farm • Plas Chambres Farm • Plas Clough	This chapter.

7.15 Baseline Assessment and Identification of Key Receptors

Site Description

7.15.1 A description of the site and the proposed scheme is provided in Chapter 2.

7.15.2 To be consistent with noise and vibration locations approved under planning permission 01/2009/1424, as stated in the scoping opinion, the key noise and vibration receptors agreed with Denbighshire County Council are shown in Figure 1 and are as follows:

Table 7.4: Noise and vibration assessment locations

Location Name	Co-ordinates	
	X	Y
Tyddyn Uchaf	304097.14	367291.65
Bryn Neffyd	304099.56	366978.03
Coppi Farm	305514.20	366456.09
101 Bryn Seion	304866.56	366978.03
47 Barkers Well Lane	305259.73	366538.85
Graig Farm	305259.99	366642.45
Plas Chambres Farm	304737.07	368137.10
Plas Clough	305209.39	367615.15

7.16 Overall Baseline

Noise

7.16.1 Noise measurements were made on the 10th of October 2019 at all the assessment locations shown in Figure 1.

7.16.2 Measurements were made with a Rion NL52 Class 1 sound level meter field calibrated with a Rion NC-75 Class 1 Acoustic Calibrator. Both the sound level meter and the field calibrator were subject to a certificate from an accredited calibration laboratory of periodic validation traceable to British and International standards within the last 12 months

7.16.3 Noise measurements were made 1.25 to 1.5 metres above ground level in free-field conditions on publicly accessible land as close as practicable to the assessment location.

7.16.4 The weather during the noise measurements was cool with light winds and variable cloud cover, with intermittent light precipitation during the last two measurements which did not appear to influence the measured values.

7.16.5 The results of the noise survey and of a baseline survey in 2017 and the MTAN 1 derived noise limits are reproduced below.

Table7. 5: Baseline noise measurements

Time	Location	$L_{Amax,}$	$L_{A10,}$	$L_{Aeq,\ 15}$ dB	$L_{A90,\ 1}$	Comment	MTAN1 Derived Operational Noise Limit Threshold of Significant effect $L_{Aeq,\ 1\ hr}$ dBA	MTAN1 Derived Construction and Temporary Noise Limit Threshold of Significant effect $L_{Aeq,\ 1\ hr}$ dBA
1000 to 1500 hrs	Bryn Seion (2017)	71.0	45.0	42.0	36.0	Bird song, rustling of leaves, occasional faint noise from quarry (not affecting measurements)	46.0	67.0
1215 hrs	Tyddyn Uchaf	79.3	65.4	62.1	53.8	Intermittent but frequent road traffic. Bird song and rustling of leaves	55.0	67.0

Time	Location	$L_{Amax,}$	$L_{A10,}$	$L_{Aeq,\ 15}$ dB	$L_{A90,\ 1}$	Comment	MTAN1 Derived Operational Noise Limit Threshold of Significant effect $L_{Aeq,\ 1\ hr}$ dBA	MTAN1 Derived Construction and Temporary Noise Limit Threshold of Significant effect $L_{Aeq,\ 1\ hr}$ dBA
1240 hrs	Bryn Neffyd	80.9	66.6	64	54.5	Intermittent but frequent road traffic. Bird song and rustling of leaves	55.0	67.0
1300 hrs	Coppi Farm	78.7	64.9	62.6	52.7	Intermittent but frequent road traffic. Sheep, bird song and rustling of leaves	55	67
1405 hrs	101 Bryn Seion	59.2	44.1	41.2	36.2	Bird song, rustling of leaves, occasional faint noise from quarry (not affecting measurements)	46.0	67.0
1425 hrs	47 Barkers well Lane	79	60.5	56.9	47.2	Intermittent but frequent road traffic. Bird song and rustling of leaves	55.0	67.0
1442 hrs	Graig Farm	78.2	59.7	55.9	46.8	Intermittent but frequent road traffic. Sheep, bird song and rustling of leaves	55.0	67.0
1503 hrs	Plas Chambres Farm	81.3	62.6	59.3	49.4	Intermittent but frequent road traffic. Bird song and rustling of leaves	55.0	67.0
1522 hrs	Plas Clough	75.2	61.5	58.2	48.5	Intermittent but frequent road traffic.	55.0	67.0

Time	Location	$L_{Amax,}$	$L_{A10,}$	$L_{Aeq,\ 15}$ dB	$L_{A90,\ 1}$	Comment	MTAN1 Derived Operational Noise Limit Threshold of Significant effect $L_{Aeq,\ 1\ hr}$ dBA	MTAN1 Derived Construction and Temporary Noise Limit Threshold of Significant effect $L_{Aeq,\ 1\ hr}$ dBA
						Bird song and rustling of leaves		

Vibration

7.16.6 The effects of vibration from blasting at the extended quarry are considered the only vibration effects potentially to have a significant effect on the environment.

7.16.7 Blasting takes place at the existing quarry on a relatively infrequent basis i.e. at 1 to 2 month intervals and will continue to do so in the extension. Each blast is carefully designed and executed to minimise noise and vibration, which are monitored and recorded. A summary of the results of this monitoring between August 2018 and June 2019 are shown in the table below.

Table 7.6: Summary of blasting vibration data (80 Kg charge)

Location	Axis (PPV mms^{-1})			Estimated Distance to Receptor m	Sound Pressure Level dB
	X	Y	Z		
Accar Y Forwyn	0.54	1.016	0.984	800	110
Bryn Seion	3.81	3.27	5.207	400	117
Ind Estate	2.477	1.683	1.778	550	118
Quarry Gate	2.699	2.54	2.096	500	114
Denbigh	0.508	1.334	1.334	900	110
Ind Estate	1.365	1.207	1.715	550	119

7.17 Identification and Description of Changes Likely to Generate Effect

7.17.1 There follows a brief textual description of the changes likely to generate an effect for:

- Site Preparation Phase
  - Site Preparation – Stripping of top soil and its use in the construction of a new perimeter bund
- Operational Phase
  - Mineral Extraction – Blasting to release rock from the quarry face.
  - Materials Handling – Movement of unprocessed rock to processing plant location
  - Mineral processing – Processing of rock to produce various grades of aggregate e.g. 20-40 mm stones and "dust".
  - On site transportation – Movement of processed aggregates to stockpiles and loading of off-site transportation and movement off site.

7.18 Assessment of Likely Significant Effects

Embedded Mitigation Measures

7.18.1 The following are mitigation measures embedded in the design or standard practice / legislative / permitting requirements.

- The site preparation works will be timed to minimise adverse effects e.g. weekday and Saturday morning only for noisy works.
- The plant and machinery used on site typically comes under the Construction Plant and Equipment Noise Emission Regulations which sets maximum noise output limits for such equipment.
- The Code of Practice approved under the Quarries Regulations 1999 requires that blast design minimises the risk of "fly rock" beyond the site perimeter, which in turn caps the resulting vibration and overpressure from blasting
- The nature of a quarry i.e. a large hole in the ground, means that receptors at ground level normally benefit from substantial noise reduction due to the screening effect of the quarry perimeter acting as a diffracting edge.

- The use of the stripped topsoil to bund around the perimeter of the extension to the quarry acting as an additional noise barrier. The bund across the south boundary of the extension to the quarry will be at least 3m above existing ground level. Due to the initial topsoil strip, works within the extension will be operating at a level approximately 1m lower than existing ground level. Hence the top of the bund will be at least approximately 4m above the ground level where operational activities are being undertaken.

Anticipated Effects

Noise

7.18.2 The assessment of construction and operational effects are shown in Table 7 below. The table shows the highest noise level predicted from each operation and construction activity and the location where the highest noise level has been predicted. The same activity is shown more than once as noise levels have been predicted in a number of representative locations which may be worst case for different receptors.

7.18.3 The table shows no predicted exceedances of the relevant MTAN-1 derived temporary or operational noise limit at any receptors. Therefore, no significant noise effect is likely for the operation of the quarry extension or for temporary construction works (topsoil strip and construction of bund).

Table 7.7: Operational and temporary noise effects and construction noise effects

Activity	Activity Location	Is activity temporary or operation?	Highest Predicted $L_{Aeq,1\ hr}$ dB from activity	Receptor with highest predicted noise level	Relevant (temp or operational) noise limit $L_{Aeq,1\ hr}$ dB at receptor	Exceedance of limit, dB
Drilling rig C.9.2	South Boundary	operation	49	Bryn Neffyd	55	-7
Drilling rig C.9.2	West boundary	operation	51	Bryn Neffyd	55	-4
Drilling rig C.9.2	North Boundary	operation	49	Tyddyn Uchaf	55	-6
Haul rd C.10.19	Existing setup	operation	17	Graig Farm	55	-38
Haul rd C.10.19	West part of proposed extension	operation	17	Graig Farm	55	-38
Haul rd C.10.19	South part of proposed extension	operation	31	47 Bakers Well Lane	55	-24

Activity	Activity Location	Is activity temporary or operation?	Highest Predicted $L_{Aeq,1\ hr}$, dB from activity	Receptor with highest predicted noise level	Relevant (temp or operational) noise limit $L_{Aeq,1\ hr}$ dB at receptor	Exceedance of limit, dB
Powerscr+ crusher	Existing setup	operation	43	Plas Clough	55	-12
Powerscr+ crusher	West part of proposed extension	operation	39	Bryn Neffyd	46	-7
Powerscr+ crusher	South part of proposed extension	operation	42	101 Bryn Seion	46	-4
Dumper+ Excavator	Bund Construction	temporary	61	101 Bryn Seion	67	-6

Note1: a negative exceedance value indicates that the MTAN-1 derived threshold of significant effect is not likely to be exceeded.

Note 2: The same receptor can appear more than once in the above tables as the predictions for the noise from the quarry extension are for the closest and typical separation distances.

7.18.4 Table 7.8 below summarises the MTAN-1 derived operational and temporary noise limits for each receptor and the the highest predicted operational temporary noise levels at the receptors. No exceedance of the noise limits is predicted.

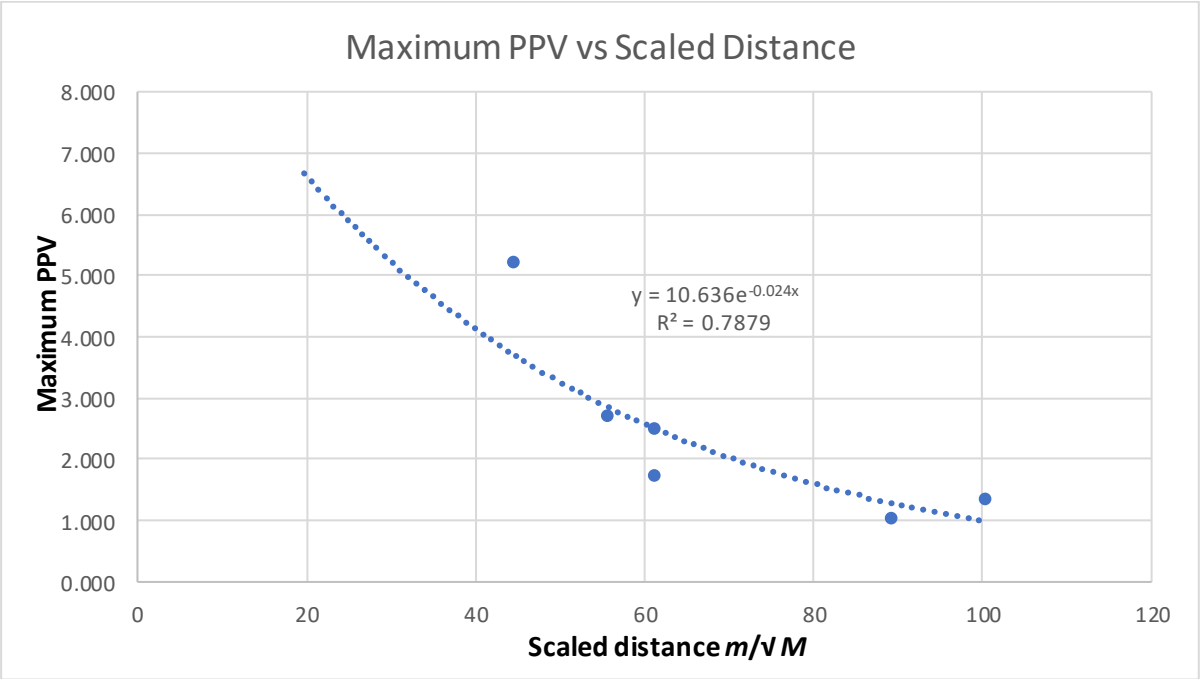
Table 7.8: Summary of noise effects

Location	MTAN-1 derived Operational Long Term Limit $L_{Aeq,1\ hr}$ dBA	Highest Predicted operational noise level $L_{Aeq,1\ hr}$, dB at receptor	MTAN-1 derived Temporary Limit $L_{Aeq,1\ hr}$ dBA	Highest Predicted temporary noise level $L_{Aeq,1\ hr}$, dB at receptor
Plas Chambres Farm	55	41	67	47
Tyddyn Uchaf	55	50	67	55
Plas Clough	55	45	67	50
101 Bryn Seion	46	43	67	61
Bryn Neffyd	55	51	67	56
47 Bakers Well Lane	55	40	67	51
Coppi Farm	55	39	67	52
Graig Farm	55	41	67	52

Vibration

7.18.5 BS 5228 Pt 2 advises that for any particular site a number of measurements of vibration at different distances from the blast can be used to produce a scaled distance graph. An example of such a graph is shown in Figure 2 below. This plots the largest single component vibration from Table 6 against the distance in metres (m) from the blast, divided by the square root of the maximum instantaneous charge (M - 80 Kg for each of the blasts recorded in the table above). Vibration limits are commonly expressed as a statistical average to take account of the inherent variability of blasts e.g. MTAN-1 provides a guideline of 95% being no more than 6 mms-1, and non above 10 mms-1. A scaled distance graph can be used as an indication of likely vibration magnitudes at various distances.

Figure 2: Blasting Vibration PPV vs Scaled Distance (80 Kg charge)



7.18.6 The above figure indicates the trend line crosses the 6 mms-1 limit from MTAN -1 used in this ES as the threshold of significant effect on the environment, at a scaled distance of around 25. BS 5228 advises the scaled distance can be converted to the predicted distance in metres that the blasting vibration reaches 6 mms-1, by multiplying the scaled distance of 25 by the square root of the charge size i.e. 80 Kg, to give a distance of approximately 225 metres.

7.18.7 No vibration sensitive premises will be less than 250 metres from the perimeter of the extended quarry. For example, the properties at and near 99/100 Bryn Seion will be closest to the quarry at around 250 metres from the perimeter bunds and it will be these properties that will experience the highest vibration levels from blasting, although predicted to be below the guideline of 6 mms-1 from MTAN-1 and the existing planning permission.

7.18.8 Broadly the changes in blasting vibration based on the change in separation distance from the extended quarry to the receptor, considered in the context of the relatively infrequent occurrence of this activity during weekdays, are expected to be as follows:

- The nearest properties to the west of the quarry may experience a minor increase in vibration of approximately up to PPV 0.25 to 0.5 mms-1, to a level likely to be typically less than 3 mms-1.
- The nearest properties to the south of the quarry on Bryn Seion are likely to experience no meaningful change in vibration i.e. levels are likely to remain typically around PPV 3 to 5 mms-1.
- The nearest properties to the east and north east of the quarry may experience a minor decrease in vibration of approximately up to 0.25 to 0.5 mms-1, to levels likely to be typically less than 2 mms-1.

7.18.9 Consequently, as no vibration sensitive properties are predicted to experience blasting related vibration of 6 mms-1 PPV or more it is considered that significant vibration effects on the environment are unlikely.

Health effects

7.18.10 The above assessment of noise and vibration impacts and their effects has been carried out based on the residual emissions from the development taking account of the controls that are incorporated into the design of the submitted scheme. The outcome of the assessment is that significant adverse effects of noise or vibration on the environment are not likely and therefore no further assessment or controls are required in regard to health. Significant adverse effects of noise or vibration on health are not likely either as the criteria used to assess significant noise and vibration effects are derived from guidance and policy that seeks to protect human health and safety and general well-being.

7.19 Scope for Additional Mitigation Measures

7.19.1 In the absence of any significant adverse noise and vibration effects being predicted from the construction or operation of the Proposed Development no further additional mitigation measures are considered necessary.

7.20 Residual Effects

7.20.1 No significant residual noise effects are likely for the operation of the quarry extension or for temporary construction works (topsoil strip and construction of bund).

7.20.2 No vibration sensitive premises are predicted to experience vibration from blasting greater than the MTAN-1 derived threshold of significant adverse effect.

7.20.3 Table 7.9 provides a summary of the residual effects resulting from the Proposed Development after effective implementation of the embedded mitigation measures proposed above.

Table 7.9: Significant Residual Noise and Vibration Effects

Phase	Resource or Receptor affected	Residual Effect
Construction	Human	No significant adverse effect
	Ecological	See Ecology chapter
Operation	Human	No significant adverse effect
	Ecological	See Ecology chapter

7.21 Cumulative Effects

7.21.1 Cumulative effects are the combined effects of several development schemes (in conjunction with the Proposed Development) which may, on an individual basis not be significant but, cumulatively, have a significant effect.

7.21.2 The ES has given consideration to 'Cumulative 'Effects' for schemes located within approximately 3 km radius from the boundary of the Application Site.

7.21.3 The proposed scheme is sufficiently distant from any other noise and vibration source or sensitive receptor that cumulative impacts are not anticipated. Consequently, significant adverse cumulative noise and vibration effects are unlikely.

7.21.4 The mineral development is an extension of an existing site, but is not close to another mineral site, or other noise and vibration generating sources, consequently the cumulative significant adverse impacts are not considered likely.

7.22 Summary and Conclusions

7.22.1 The proposal is for the extension of an existing quarry which is subject to planning controls that limit its operation to weekdays and restrict noise and vibration to below limits from Welsh Government policy and guidance. It is anticipated that these controls will apply to the extension of the quarry.

7.22.2 When considered using established methods and thresholds of effect the construction and operation of the extended quarry is not likely to result in significant changes in traffic noise and vibration on the local road network.

7.22.3 Existing baseline daytime noise levels without any contribution from the current quarry operations at noise sensitive receptors around the quarry and the proposed extension are moderate, with levels at the closest noise sensitive receptors being lowest.

7.22.4 Noise and vibration from blasting, rock crushing and processing, stockpiling and transport at and from the existing quarry are routinely monitored and recorded as being below limits approved by Welsh Government policy and guidance.

7.22.5 Using information on the likely construction plant and methods, and measurements of noise and vibration produced by activities at the existing quarry, coupled with established and Government approved methods; noise and vibration levels from similar operations at the proposed extension to the quarry have been predicted at sensitive receptors around the quarry.

7.22.6 The noise predictions show that the below ground level nature of the quarry means that noise sensitive receptors are screened to a substantial degree from noise generated within the quarry.

7.22.7 The prediction of vibration from blasting at any extended quarry shows receptors to the west may experience a minor increase, receptors to the south no change and receptors to the east and north east of the quarry a minor reduction in vibration. In no case is any receptor predicted to experience vibration above the limits designed to provide reasonable protection of human response approved by the Welsh Government.

7.22.8 The vibration limits approved by the Welsh Government are substantially below vibration levels recognised in British and International guidelines and standards which might cause even minor cosmetic damage to buildings e.g. hairline cracks in plaster.

7.22.9 The predictions show that noise and vibration at all of the sensitive receptors will typically be below levels that are likely to result in significant adverse effects. Consequently, significant adverse noise and vibration effects are considered unlikely for most receptors for most of the time.

7.22.10 Due to the substantial separation distances involved significant cumulative adverse effects from combination of noise and vibration from the extended quarry with the same from other developments are not considered likely.

7.22.11 Table 7.10 summarises the topic effects resulting from the Proposed Development.

Table 7.10: Summary of Residual Effects

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Construction								
99/100 Bryn Seion (closest residential receptor)	High	Dumper truck and excavator	Controls on plant noise emission Day time weekday working only	Minor Direct Local Temporary Likely	Minor Adverse	None	Minor	Minor Adverse (not significant)
Plas Chambres Farm Tyddyn Uchaf Plas Clough Bryn Neffyd 47 Bakers Well Lane Coppi Farm Graig Farm	High	Dumper truck and excavator	Controls on plant noise emission Day time weekday working only	Minor Direct Local Temporary Likely	Minor Adverse	None	Minor	Minor Adverse (not significant)
Operation								
99/100 Bryn Seion (closest	High	Noise from drilling shot holes at	Screening from quarry "lip" as depth	Minor Direct Local Temporary	Minor Adverse	None	Minor	Minor Adverse (not significant)

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
residential receptor)		ground level	of quarry increases.	Likely				
		Blasting vibration	Screening from Perimeter bund Infrequent and only on weekdays					
Plas Chambres Farm Tyddyn Uchaf Plas Clough Bryn Neffyd 47 Bakers Well Lane Coppi Farm Graig Farm	High	Noise from drilling shot Blasting vibration	Screening from "lip" as depth of quarry increases. Infrequent and only on weekdays	Minor Direct Local Temporary Likely	Minor Adverse	None	Minor	Minor Adverse (not significant)
Cumulative Effects – Construction								
Plas Chambres Farm Tyddyn Uchaf		Not applicable as no noise						No adverse Effect

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Plas Clough Bryn Neffyd Bryn Seion 47 Bakers Well Lane Coppi Farm Graig Farm		and vibration generating developments underway or proposed sufficiently close for "overlap" of effects to be likely.						
Cumulative Effects - Operation								
Plas Chambres Farm Tyddyn Uchaf Plas Clough Bryn Neffyd Bryn Seion 47 Bakers Well Lane Coppi Farm Graig Farm		Not applicable as no noise and vibration generating developments underway or proposed						No adverse Effect

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
		sufficiently close for "overlap" of effects to be likely.						

8.0 AIR QUALITY

8.1 Scope of Assessment

8.1.1 Alice McLean and Andrew Curry are both members of the Institute of Air Quality Management and the Institution of Environmental Sciences with over 10 and 1 years of experience in conducting air quality assessments respectively. They have both been involved in numerous air quality assessments for both Environmental Impact Assessments and standalone planning applications across the UK.

8.1.2 Dust arising from the Proposed Quarry Extension once it is operational may reduce amenity in the local community due to visible dust plumes and dust soiling. Local ambient concentrations of particulate matter (PM_{10} and to a lesser extent $PM_{2.5}$) may also be affected.

8.1.3 The Proposed Scheme will not change the maximum permitted annual sales of limestone from the quarry (500,000 tonnes), and it is anticipated that during the operational phase quarry output would remain at current levels (200,000 tonnes per annum). Changes in HDV flows during the operational phase of the Quarry Extension are therefore likely to be below the Environmental Protection UK (EPUK) and IAQM screening criteria requiring a detailed assessment. An assessment of operational phase vehicle emissions was therefore scoped out of the air quality assessment.

8.1.4 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of air quality and dust and is supported by **Appendix 6**.

8.1.5 The chapter describes: the assessment methodology; the baseline conditions currently existing at the Application Site and in the surrounding area; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Proposed Quarry Extension in combination with other developments within 1 km of the Site.

8.1.6 The scope and methodology of the air quality and dust assessment was agreed with the relevant stakeholders as part of the consultation process.

8.1.7 This assessment assumes that during the operational phase output from the quarry (extension plus existing) would remain at current levels (200,000 tonnes per annum). It is a qualitative assessment, adhering to the Institute of Air Quality management Mineral Dust *Guidance on the Assessment of Mineral Dust Impacts for Planning*[18] and based on information provided by Breedon Southern Ltd. and PleydellSmithyman.

8.2 Key Legislation, Policy and Guidance Considerations

8.2.1 This assessment was undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.

Legislation and Regulation

Air Quality Strategy

8.2.2 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland[3] (AQS) sets the framework for government policy on air quality in the UK. The AQS sets out air quality standards and objectives to be achieved and introduces a policy framework for tackling fine particles. In setting air quality objectives, due account was taken of health and socio-economic cost-benefit factors, together with consideration of the practicalities of achieving such targets. Air quality objective levels are set out in legislation in the Air Quality (Wales) Regulations 2000[4], as amended[5].

8.2.3 Although achievement of air quality objectives is not a statutory requirement, they reflect statutory limits outlined in The Air Quality Standards Regulations 2010[6] as amended[7], which require the Secretary of State to achieve EU limit values set out in EU Ambient Air Quality Directives[8,9].

Table 8-1 Air quality objectives relevant to the assessment

Pollutant	Air quality objective levels	Measured as
Nitrogen dioxide (NO_2)	200 µg/m^3, not to be exceeded more than 18 times per year	1-hour mean
	40 µg/m^3	Annual mean
Particles (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times per year	24-hour mean
	40 µg/m^3	Annual mean
Particles ($PM_{2.5}$)	25 µg/m^3	Annual mean

[3] Department of the Environment, Food and Rural Affairs, et al, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 1 s.l, s.n.

[4] The Air Quality (Wales) Regulations 2000 (2000 No. 1940).

[5] The Air Quality (Wales) (Amendment) Regulations 2002 (2002 No. 3182).

[6] The Air Quality Standards (Wales) Regulations 2010, (2010 No. 1433).

[7] The Air Quality Standards (Amendment) Regulations 2016 (2016 No. 1184)

[8] The European Parliament and the Council of the European Union, 2008, Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. Official Journal of the European Union L152/1 11.6.2008.

[9] The European Parliament and the Council of the European Union, 2004, Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2014 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air. (Fourth Daughter Directive). Official Journal of the European Union L23/3 26.1.2005.

Disamenity Dust

8.2.4 There are no UK or European statutory standards or guidance that define the point when deposited dust causes annoyance or disamenity.

Clean Air Strategy 2019

8.2.5 The Clean Air Strategy[10] sets out how the UK government will work to achieve ambitious air pollution in England. The Strategy supports the establishment of Clean Air Zones to lower emissions from all sources of air pollution and outlines measures to reduce emissions from transport, homes, agriculture and industry such as the introduction of new legislation, funding for research and innovation and public engagement campaigns.

The Environment Act 1995

8.2.6 The Environment Act 1995[11], specifically Sections 82-84, requires all local authorities to carry out periodic reviews of air quality within their administrative areas. This review and assessment process now follows a phased approach, whereby local authorities only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. The aim of this review process is to assess whether the air quality objectives are likely to be achieved. Areas where objectives are likely to be exceeded are to be declared air quality management areas (AQMAs) by the local authorities.

Planning Policy

8.2.7 Planning Policy Wales Edition 10 of Planning Policy Wales (PPW)[12] was published in December 2018. Chapter 5.14.1 states: "The role of the planning authority in relation to mineral extraction is to balance the fundamental requirement to ensure the adequate supply of minerals with the protection of amenity and the environment. The key principles are to:

"protect environmental and cultural characteristic of places…"

"reduce the impact of mineral extraction and related operations during the period of working by ensuring that impacts on relevant environmental qualities caused by

[10] Clean Air Strategy 2019, Department for Environment, Food and Rural Affairs.

[11] Environment Act 1995, Part IV Air Quality.

[12] Planning Policy Wales, Edition 10 (December, 2018).

mineral extraction and transportation, for example air quality and soundscape, are within acceptable limits"

8.2.8 Chapter 5.14.42 states: "Mineral workings should not cause unacceptable adverse environmental or amenity impact. Where this is not possible working needs to be carefully controlled and monitored so that any adverse effects on local communities and the environment are mitigated to acceptable limits. Any effects on local communities and the environment must be minimised to an acceptable standard."

8.2.9 Chapter 5.14.43 states:

"Development plans should set out clearly the criteria that will be applied to minerals proposals to ensure that they do not have an unacceptably adverse impact on the environment and the amenity of nearby residents. Issues that must be addressed include:

"access and traffic generation including the routes to be used for minerals transportation;"

"the control of air pollution namely dust, smoke and fumes."

8.2.10 Chapter 5.14.47 states: *"Extensions to existing mineral working, whether they be time, lateral or depth extensions should be considered in the same manner as applications for new sites. Each application will need to consider the impact on the site as a whole and the wider surroundings and will need to be considered on its own merits."*

8.2.11 Chapter 6.7.4 concerns air quality stating: *"The planning system should maximise its contribution to achieving the well being goals…by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so."*

8.2.12 Chapter 6.7.5 states: *"Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes."*

Minerals Planning Policy Wales

8.2.13 Minerals Planning Policy Wales 2000[13] sets out general policies for all mining development in Wales. Policy C states *"To reduce the impact of mineral extraction and related operations during the period of working by, for example, ensuring sensitive working practices and improved operating standards."*

"Unitary development plans should set out clearly the criteria that will be applied to minerals proposals to ensure that they do not have an unacceptably adverse impact on the environment and the amenity of nearby residents. Issues that must be addressed include:

access and traffic generation including the routes to be used for minerals transportation;

the control of dust, smoke and fumes."

Minerals Planning Policy Wales Minerals Technical Note 1: Aggregates

8.2.14 Minerals Planning Policy Wales, Minerals Technical Note Wales 1: Aggregates[14] was published in March 2004. The technical advice note sets out advice on the mechanisms for delivering policy for aggregates extraction by mineral planning authorities.

Denbighshire County Council Local Development Plan

8.2.15 The Denbighshire County Council Local Development Plan[15] was adopted in June 2013. Policy PSE 16 – Mineral buffer zones states:

"Extensions to quarries will only be permitted where a suitable buffer can be retained, i.e. where such an extension would not cause other development to become part of a buffer, and where it can be demonstrated that there is no unacceptable impact on the environment or human health.

8.2.16 Policy PSE 17 – Future mineral extraction states:

- *"Applications for the extraction of aggregate minerals will only be permitted where it is necessary to maintain stocks of permitted reserves having regard to the Regional Aggregate Working Party apportionment figures, or, where no figure exists, the demonstrated need of the industry concerned."*

[13] Minerals Planning Policy Wales, December 2000, National Assembly for Wales

[14] Minerals Planning Policy Wales, Minerals Technical Note Wales 1: Aggregates, March 2004.

[15] Denbighshire County Council Local Development Plan 2006-2021, June 2013.

- *"Applications for the extraction of up to 1 million tonnes of sand and gravel will be permitted in Preferred Areas (identified on the proposals maps); taking into account the above criteria."*

- *"Applications that accord with the above criteria will be permitted provided that all the following criteria are met:*

    - *An appropriate buffer is included, within which no mineral working, or sensitive development will be allowed;*

    - *Suitable access and transport routes are identified;*

    - *Measures to reduce the impact of dust, smoke and fumes are implemented."*

North Wales Combined Authority 2018 Air Quality Progress Report

8.2.17 The North Wales Combined Authority[16], which covers Denbighshire County Council, has not declared an Air Quality Management Area (AQMA) and therefore has not published an Action Plan.

Technical Standards and Guidance

8.2.18 Land-Use Planning & Development Control: Planning for Air Quality Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have developed a procedure for assessing the significance of changes in traffic volume on local air quality in their guidance document, 'Land-Use Planning & Development Control: Planning for Air Quality'. The procedure is designed to assess potential impacts resulting from changes in road use, including realignment, expansion and increased traffic flow. It can also be used to assess the potential air quality impacts of future combined heat and power (CHP) plant or boilers.

Local Air Quality Management Technical Guidance LAQM.TG(16)

8.2.19 The Defra technical guidance note LAQM.TG(16)[17] is intended to provide guidance to local authorities undertaking the local review and assessment process. This includes a detailed process for dispersion model verification. They are also used in developing methods for air quality assessments.

[16] North Wales Combined Authority 2018 Air Quality Progress Report, September 2018, LAQM Annual Progress Report 2018.

[17] Local Air Quality Management: Technical Guidance LAQM.TG(16) (January 2018), Department for Environment, Food and Rural Affairs.

Guidance on the Assessment of Mineral Dust Impacts for Planning

8.2.20 The IAQM published guidance on the impacts of mineral dust for planning in May 2016[18]. This guidance uses a simple distance-based screening process to identify those minerals sites where the dust impacts are unlikely to be significant and therefore require no further assessment. Where more detailed assessment is required, a basic assessment framework is presented which employs the Source - Pathway - Receptor approach to evaluate the risk of dust impacts and effects. The guidance suggests appropriate mitigation measures for sites according to the level of risk.

8.3 Assessment Methodology

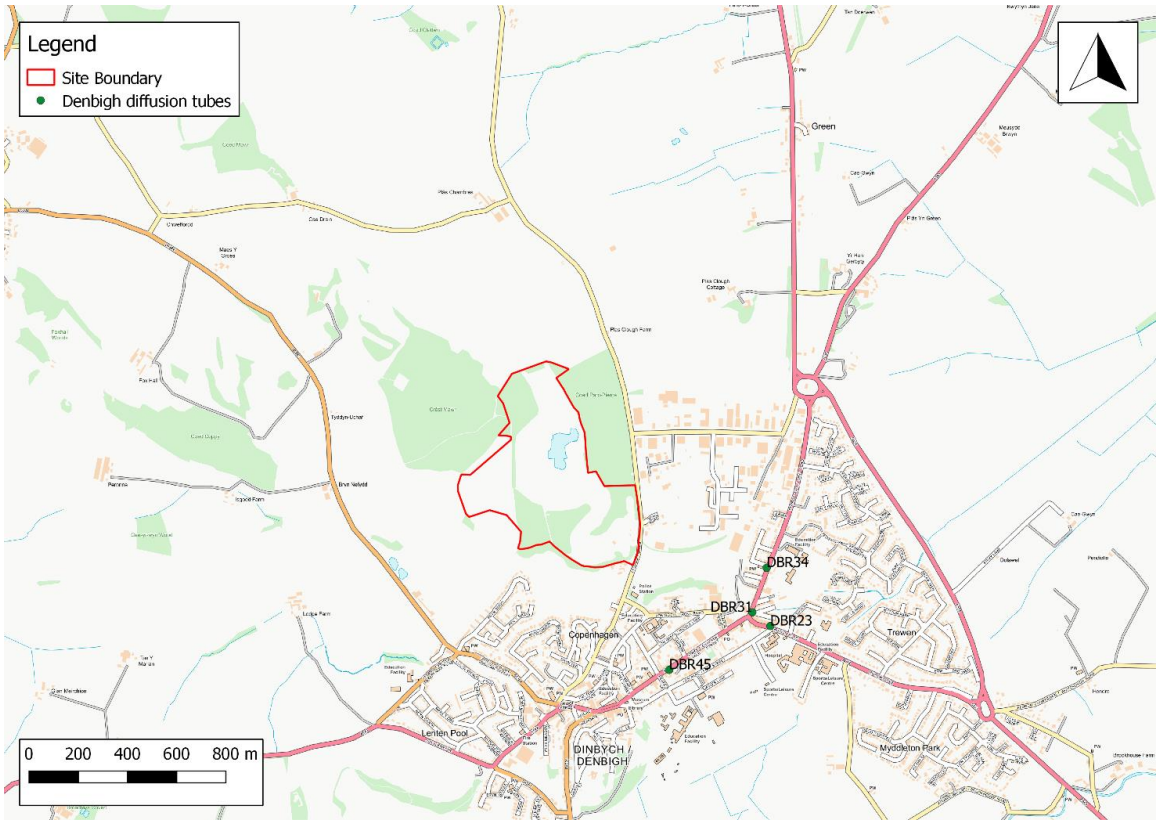
8.3.1 The method adopted for this air quality and dust assessment considers current best practice for assessment of air quality and dust.

Study Area

8.3.2 The study area is shown in *Figure 8 1*. In accordance with IAQM guidance16 impacts were considered at human and ecological receptors up to 400 m from the Proposed Quarry Extension boundary.

Figure 8 1 Study area and local monitoring locations

[18] IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning, May 2016.



Determination of Baseline

8.3.3 North Wales Combined Authority (NWCA) publishes a series of Annual Air Quality Progress Reports (AAQPR) for air quality, in accordance with the local air quality management (LAQM) process. The NWCA 2018 AAQPR (the latest available report at the time of this assessment), and monitoring results were obtained and reviewed to establish the existing conditions at, and in proximity to, the Site.

8.3.4 Background air pollution concentrations corresponding to the 1km x 1km grid squares covering the Proposed Development Site and identified receptor locations were obtained from the LAQM support tools provided by Defra for use in air quality assessment. Background concentrations for all years considered in this assessment were obtained in order to establish baseline air quality concentrations within the study area.

8.3.5 Dust deposition monitoring is not undertaken at the existing quarry or within the study area. Dust mitigation measures implemented at the existing quarry and site Permit conditions were reviewed to determine the likelihood of fugitive dust emissions beyond the existing site boundary.

Prediction Methodology

8.3.6 Potential air quality and dust impacts during the operational phase were considered in line with the IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning16. The method recommended by this guidance is outlined in Appendix 6-1.

8.3.7 The IAQM Guidance is designed for use in England, however it can be adapted for use in the Devolved Administrations of Wales, Scotland and Northern Ireland and was considered appropriate for use in this assessment.

Limitations and Assumptions

8.3.8 Extraction of limestone from the Proposed Quarry Extension will be undertaken in four phases making it difficult to determine where within the Extension dust generating activities may occur. In order to provide a conservative assessment all distances to sensitive receptors were measured from the Proposed Quarry Extension boundary rather than from dust generating activities.

Consultation

8.3.9 A Scoping Report was submitted to Denbighshire County Council on 1st July 2019 with a formal request for an EIA Scoping Opinion in accordance with Regulation 14 of the EIA Regulations. As part of this process, the key statutory and non-statutory consultees were consulted to review the proposed methodology and criteria for assessment. The Council subsequently issued its Scoping Opinion on 14th August 2019 commenting on the proposed scope and methodology of the topics for assessment within the EIA. A copy of the Scoping Opinion is provided in Appendix 2.

8.3.10 In its Scoping Opinion for Air Quality Denbighshire County Council accepted the proposed methodology. The Council requested that a detailed dust mineral assessment be undertaken for two sites of Special Scientific Interest (SSSI) within 400m of the proposed extension: Graig Quarry SSSI and Crest Mawr Woodland SSSI. Both SSSIs were included as sensitive receptors in this assessment (Table 8.5).

8.4 Screening the Need for an Air Quality and Dust Assessment

8.4.1 The Proposed Scheme will not change the maximum permitted annual sales of limestone from the quarry (500,000 tonnes), and it is anticipated that during the operational phase quarry output would remain at current levels (200,000 tonnes per annum). Changes in HDV flows during the operational phase of the Quarry Extension due to mineral extraction and restoration material importation are therefore likely to be below the Environmental Protection UK (EPUK) and IAQM screening criteria

requiring a detailed assessment. An assessment of operational phase vehicle emissions was therefore scoped out of the air quality assessment.

8.4.2 Dust arising from a quarry can reduce amenity in the local community due to visible dust plumes and dust soiling. Smaller dust particles can remain airborne longer, potentially increasing local ambient concentrations of suspended particulate matter (e.g. PM10 and to a lesser extent PM2.5), which is associated with a range of health effects. Emissions of dust to air from minerals sites can occur during the preparation of the land, extraction, processing, handling and transportation of extracted minerals. Emissions can vary substantially from day to day, depending on the level of activity, the specific operations being undertaken, and the weather conditions.

8.4.3 PM10 needs to be assessed if there are sensitive receptors within 1 km from 'dust generating activities' rather than the site boundary. If there are no relevant receptors within 1 km of the operations, then a detailed assessment can be screened out.

8.4.4 If there are relevant human and/or ecological receptors within 250 m or 400 m (depending on the rock type) then a disamenity dust impact assessment will almost always be required.

8.4.5 The proposed quarry extension will result in dust generating activities at sensitive human and ecological receptors within 400 m of the site boundary therefore a detailed dust assessment was undertaken.

8.5 Baseline Assessment and Identification of Key Receptors

Site Description

8.5.1 A description of the Proposed Quarry Extension is provided in the Environmental Statement Volume 2: Main Text Chapter 2.

Application Site Details and Topography

8.5.2 The Proposed Quarry Extension (approximately 5 ha in extent) is located on agricultural land currently in arable use to the west of the existing quarry and to the south of the Crest Mawr woodland (a Site of Special Scientific Interest (SSSI)). The surrounding area comprises woodland, pasture and arable fields.

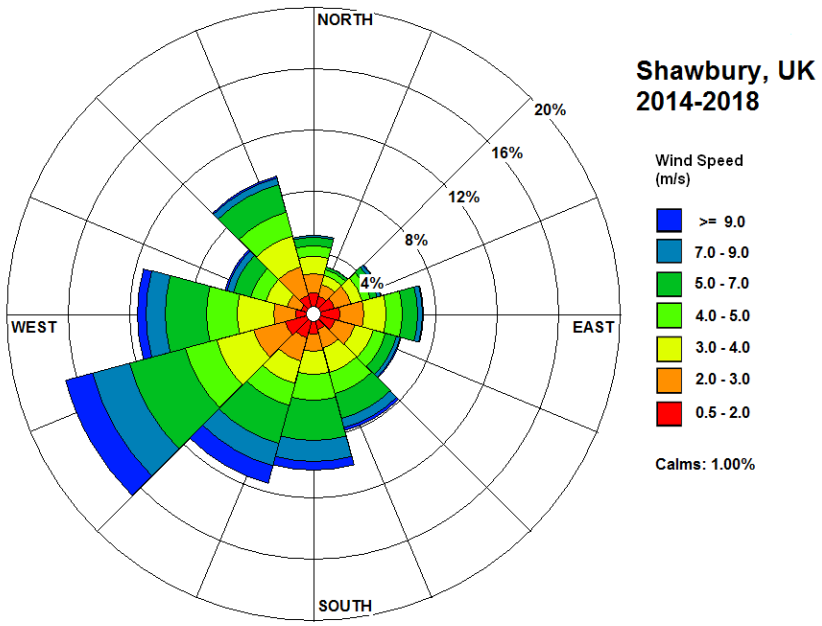
8.5.3 The Extension site and surrounding land is reasonably flat although seeded bunds and tree planting are proposed on the southern and north western boundaries which will inhibit the dispersion of dust from the site.

Weather Conditions

8.5.4 Emissions can vary substantially from day to day, depending on the level of activity, the specific operations being undertaken. Dispersion of these emissions is dependent largely on prevailing weather conditions. The specific meteorological parameters dictating the dispersion of dust are wind direction, wind speed and rainfall.

8.5.5 Annual average wind data for 2014-2018 was obtained from the Shawbury meteorological station 13 km south-east of Denbigh Quarry and is likely to be representative of local site conditions. The wind rose in Figure 1 2 shows that the predominant wind direction is from the south-west.

Figure 1 2 Wind Rose from Shawbury Meteorological Station



8.5.6 Rainfall plays a key role in influences patterns of dust dispersion with greater rainfall inhibiting the raising of dust from quarrying activities, acting as a natural dust suppressant. Table 8.2Error! Reference source not found. shows rainfall data based

on weather reports collected during 2005-2015 from Rhyl, 9 km from Denbigh. Annual average precipitation is t 792.5 mm per annum.

Table 8.2 Showing rainfall averages for Rhyl from 2005-2015[19]

Month	Rainfall (mm)
January	76.3
February	49.9
March	39.5
April	38.6
May	61.5
June	58.6
July	68.8
August	59.2
September	61.8
October	77.6
November	87.3
December	113.3

Site operations

8.5.7 A description of existing and proposed site operations is provided in Environmental Statement Volume 2: Main Text Chapter 1.

Local Authority Review and Assessment Information

8.5.8 North Wales Combined Authority (NWCA) completed its first statutory review and assessment of air quality in 2003. This assessment concluded that no further detailed assessments were required in any Local Authority Area with No AQMA declared in any Local Authority Area.

8.5.9 The most recent Annual Status Report (ASR) available at the time of this assessment confirmed that the NO2 annual and 1 hour mean objectives are still being met at all monitoring locations. The annual and 24-hour mean objective for PM10 and the annual mean objective for PM2.5 are currently being met at all monitoring locations.

Local Air Quality Monitoring

Continuous Monitoring

8.5.10 NWCA undertakes continuous air quality monitoring at 4 locations within its jurisdiction. The nearest monitoring site is 34 km away in Wrexham and monitoring

[19] https://www.timeanddate.com/weather/@7297742/climate

results from this site are not considered representative of the study area (as it is at a roadside location in an urban area) and have therefore not been reported.

Diffusion Tube Monitoring

8.5.11 The results of roadside NO2 diffusion tube monitoring (locations at which concentrations are expected to be highest) at sites nearest to the Application Site are shown in Table 8.3. The results indicate that NO2 concentrations were below the annual mean objective (40 µg/m3) in all reported years at relevant locations.

Table 8.3 Annual mean NO_2 concentrations at roadside diffusion tube sites (µg/m3)

Site name	Location	Site type	2013	2014	2015	2016	2017
DBR 23	31 Ruthin Road, Denbigh	Roadside	19.5	17.3	17.2	18.6	19.1
DBR 31	2 Rhyl Road	Roadside	19.6	18.0	17.0	18.9	17.6
DBR 34	Adjacent Fairyburn, Rhyl Road	Roadside	15.8	14.7	13.6	15.2	14.1
DBR 45	50 Vale Street	Roadside	24.9	23.0	21.6	23.3	22.3
Objective			40.0 (µg/m^3)				

- Source: North Wales Combined Authority Annual Progress Report 2018.

Pollutant Background Concentrations

8.5.12 Background concentrations of NO2, PM10 and PM2.5 were obtained from the UK Air Quality Archive[20] for the 1 km x 1 km grid square centred on OS co-ordinates 305100, 36700, corresponding to the location of the Proposed Quarry Extension. Background NO2, PM10 and PM2.5 concentrations for 2019 and 2020 (the year the extension will start to be developed) are shown in Table 8.4.

Table 8 4 Defra modelled annual background pollutant concentrations at the Proposed Quarry Extension Site from the UK Air Quality Archive (µg/m3)

Pollutant	2019 (µg/m^3)	2020 (µg/m^3)	Objective
NO_2	5.1	4.9	40.0
NO_x			N/A
PM_{10}	8.3	8.2	40.0
$PM_{2.5}$	5.3	5.2	25.0

- All background concentrations obtained from the latest 2017 based background maps.

[20] Defra Background mapping data for local authorities – 2015 https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015.

8.5.13 *Overall Baseline* Monitoring data indicate that the annual NO2 objective is likely to be met at roadside locations in the vicinity of the Proposed Extension.

8.5.14 Defra background maps indicate that the annual NO_2, PM_{10} and $PM_{2.5}$ objectives are all likely to be met at the Application Site in 2020.

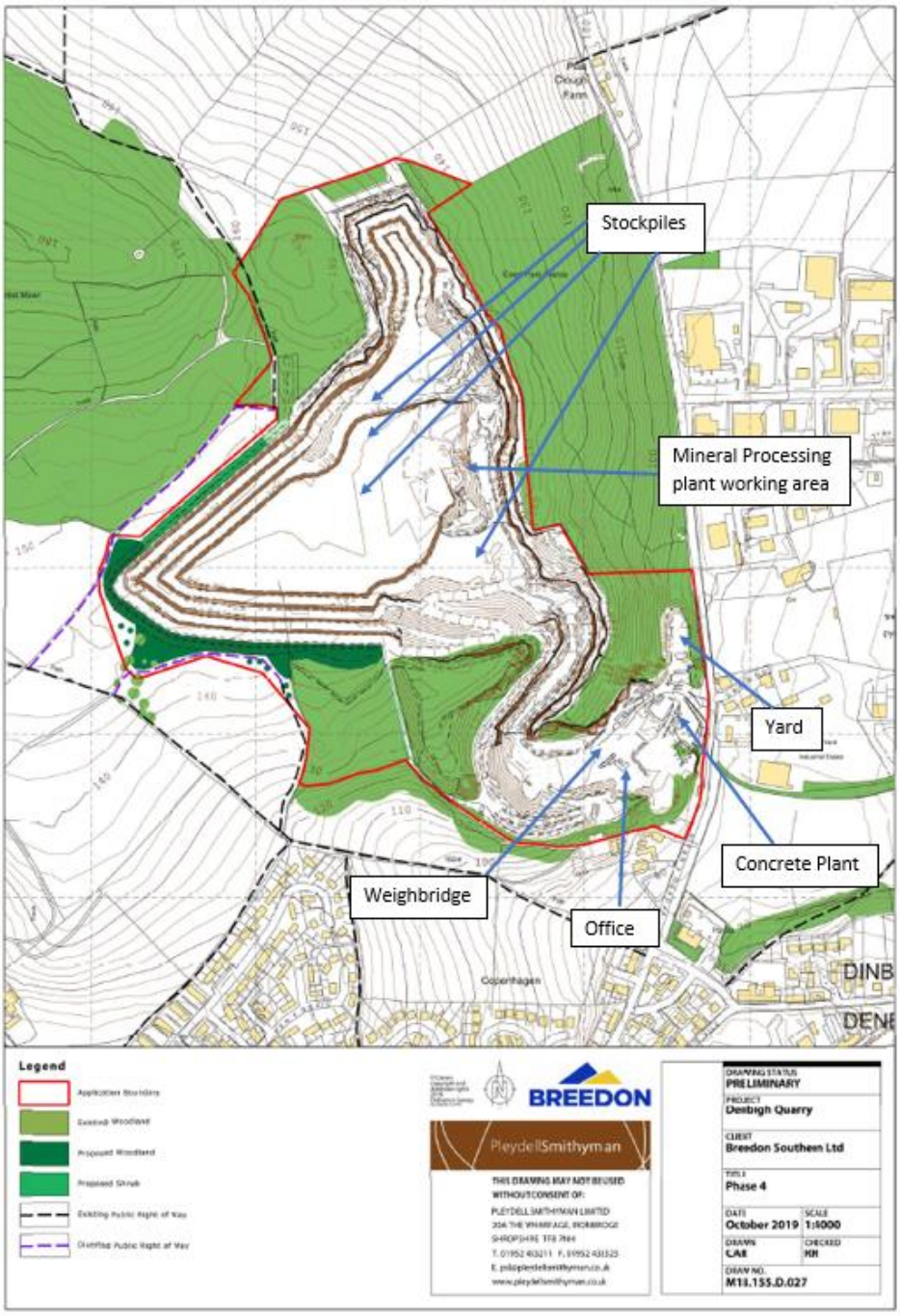
Existing Quarry Dust Emissions

8.5.15 Fugitive dust emissions from existing quarry operations are likely however these are minimised through the effective implementation of good practice dust mitigation measures so that the amenity of the local area is not affected.

8.5.16 The existing quarry includes an onsite concrete batching plant regulated by Denbighshire County Council and a mobile crusher regulated by North West Leicestershire District Council with Environmental Permits which include conditions requiring the mitigation of dust emissions. Dust emissions beyond the site boundary are therefore likely to be infrequent.

8.5.17 The location of dust generating activities at the existing quarry is shown in **Figure 8-1**.

Figure 8-1 demonstrating the existing dust generating activities at Denbigh



Potential Receptors

8.5.18 Adverse dust impacts are uncommon beyond 400 m from hard rock quarries[18] therefore human receptors sensitive to dust soiling and health effects of PM_{10} and receptors sensitive to ecological effects were identified up to 400 m from the Proposed Quarry Extension boundary and are detailed in 8.5.

8.5.19 Distances in 8.**5** are from the Quarry Extension boundary rather than from 'dust generating activities' as the location of dust raising activities within the Proposed Quarry Extension will vary depending upon the operational phase of the quarry.

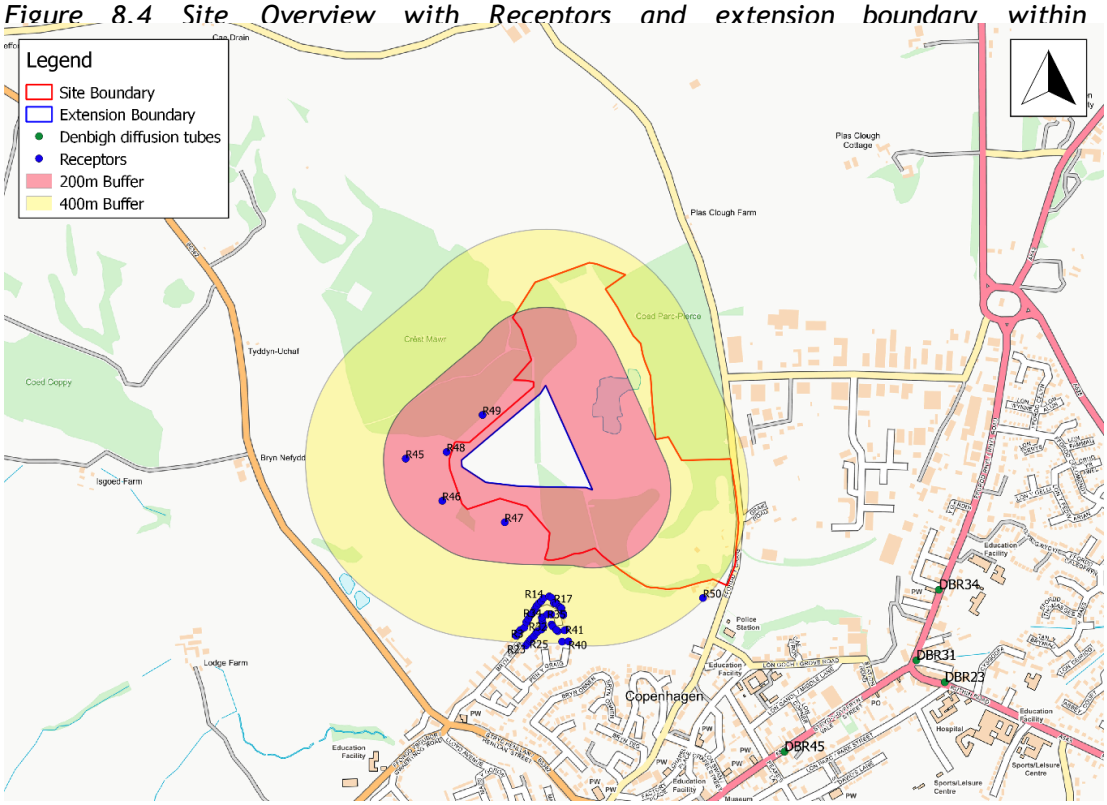
Table 8-5 Sensitive receptors within 400m of the Proposed Quarry Extension boundary

Receptor Reference	x	Y	Description	Distance (m) and Location relative to Quarry Extension Boundary	
R1	304779	366543	Residential Dwelling	390	S
R2	304784	366551	Residential Dwelling	385	S
R3	304790	366558	Residential Dwelling	372	S
R4	304800	366564	Residential Dwelling	365	S
R5	304805	366578	Residential Dwelling	352	S
R6	304810	366586	Residential Dwelling	345	S
R7	304815	366595	Residential Dwelling	335	S
R8	304820	366600	Residential Dwelling	330	S
R9	304824	366606	Residential Dwelling	324	S
R10	304828	366613	Residential Dwelling	316	S
R11	304832	366620	Residential Dwelling	310	S
R12	304837	366626	Residential Dwelling	303	S
R13	304843	366631	Residential Dwelling	295	S
R14	304849	366639	Residential Dwelling	287	S
R15	304864	366644	Residential Dwelling	282	S
R16	304869	366641	Residential Dwelling	284	S
R17	304876	366627	Residential Dwelling	299	S
R18	304882	366625	Residential Dwelling	302	S
R19	304891	366617	Residential Dwelling	308	S
R20	304895	366614	Residential Dwelling	311	S
R21	304899	366601	Residential Dwelling	322	S
R22	304900	366596	Residential Dwelling	331	S
R23	304804	366518	Residential Dwelling	403	S
R24	304809	366524	Residential Dwelling	400	S
R25	304814	366531	Residential Dwelling	395	S
R26	304817	366535	Residential Dwelling	391	S
R27	304825	366542	Residential Dwelling	385	S
R28	304831	366551	Residential Dwelling	375	S
R29	304835	366555	Residential Dwelling	371	S
R30	304844	366559	Residential Dwelling	366	S

Receptor Reference	x	Y	Description	Distance (m) and Location relative to Quarry Extension Boundary	
R31	304849	366565	Residential Dwelling	361	S
R32	304847	366576	Residential Dwelling	350	S
R33	304846	366583	Residential Dwelling	342	S
R34	304845	366590	Residential Dwelling	335	S
R35	304859	366598	Residential Dwelling	328	S
R36	304869	366598	Residential Dwelling	326	S
R37	304870	366572	Residential Dwelling	352	S
R38	304873	366567	Residential Dwelling	358	S
R39	304897	366528	Residential Dwelling	398	S
R40	304913	366529	Residential Dwelling	400	S
R41	304905	366558	Residential Dwelling	366	S
R42	304903	366557	Residential Dwelling	367	S
R43	304886	366555	Residential Dwelling	369	S
R44	304882	366558	Residential Dwelling	367	S
R45	304496	366997	Farmland	142	W
R46	304590	366889	Farmland	100	SW
R47	304750	366834	Farmland	95	S
R48	304601	367014	Footpath	40	W
R49	304693	367109	SSSI*	30	NW
R50	305106	366686	SSSI*	0	S
R51	305258	366640	Residential Dwelling	395	SE

*Site of Special Scientific Interest

Figure 8.4 Site Overview with Receptors and extension boundary within 400 m



Contains OS data © Crown copyright and database right 2018.
Red buffer represents a 200 m around the quarry extension. Yellow represents a 400 m buffer.

8.6 Identification and Description of Changes Likely to Generate Effect

8.6.1 Emissions of dust to air from the Proposed Quarry Extension may occur during activities such as:

- Site preparation
- Mineral extraction
- Materials handling (including deposition of inert restoration materials)
- On site transportation
- Mineral processing
- Stockpiles and Exposed Surfaces
- Off-site transportation

8.6.2 A description of these activities is provided in Chapter 2.

8.6.3 The main potential impact associated with the Proposed Quarry Extension is dust deposition which may lead to disamenity due to the soiling of surfaces. There may

also be an increase in particulate matter (PM10) concentrations local to the site which may affect human health.

8.7 Assessment of Likely Significant Effect

Embedded Mitigation

8.7.1 Pre-commencement planting of trees will take place along the southern application boundary in the first available planting season following the grant of planning permission to allow for a period of maturation before soils are disturbed.

8.7.2 Two new soil bunds will be created along the northern and southern boundaries of the Proposed Quarry Extension which will be 2 m and 3 m high respectively. The bunds will be grass seeded in the first available season following their formation.

8.7.3 There will be a 30 m standoff distance between the Proposed Quarry Extension and Craig Mawr Wood SSSI.

8.7.4 The good practice dust control and mitigation measures implemented at the existing quarry will continue and extend to activities associated with the Proposed Quarry Extension.

8.7.5 The onsite concrete batching plant will remain at its current location and mineral processing will continue to be undertaken within the existing quarry void or within the void of the Proposed Extension.

Dust Impact Risk

Residual Source Emissions

8.7.6 The assessment of residual source emissions took into account embedded mitigation measures outlined in sections 8.7.1 to 8.7.5.

8.7.7 Residual source emissions from each of the main activities associated with the Proposed Quarry Extension were determined using the IAQM guidance16 and are detailed in Appendix 6 - 2 and summarised in Table 8 6.

Table 8.6 Residual Source Emissions

Activity	Dust Risk
Site Preparation and Restoration	Small
Mineral Extraction	Medium
Materials Handling	Small
On site transportation	Medium
Mineral processing	Medium
Stockpiles/Exposed Surfaces	Medium
Off-site transportation	Small

Pathway Effectiveness

8.7.8 Using the IAQM guidance, the pathway effectiveness (distance and direction of receptors relative to the prevailing wind directions) was classified for each sensitive receptor in Table 8.5.

8.7.9 All residential dwellings are located distant from the site at between 200 m and 400 m from the Proposed Quarry Extension boundary. The farmland, footpath and SSSI are all less than 100 m from the Extension boundary. However, all receptors are upwind of the prevailing wind direction where potentially dusty winds (greater than 5 m/s) are infrequent. The effectiveness pathway was therefore classified as ineffective for all receptors as detailed in Appendix 6 - 2.

Dust Impact Risk

8.7.10 The residual source emissions in Table 8.6 and the pathway effectiveness were combined to predict the dust impact risk which was classified as negligible for assessed activities as detailed in Appendix 6 - 2.

Likely Magnitude of Effect

8.7.11 The likely dust disamenity effect of operations within the Proposed Quarry Extension was determined from the Dust Impact Risk (negligible) and the Receptor Sensitivity (Table 8 5) and found to be negligible for all activities at all receptors. Further details are provided in Appendix 6 - 2.

8.7.12 Overall the Proposed Quarry Extension is considered to have a negligible effect on the surrounding area. This effect is 'not significant' and is based on consideration of the magnitude of effects at individual receptors.

Health Effects

8.7.13 2019 and 2020 annual mean PM10 background concentrations from the UK Air Quality Archive for the 1 km x 1 km grid square centred on OS co-ordinates 305100, 36700, corresponding to the location of the Proposed Development are well below 17 µg.m3

(Table 8 4), therefore in accordance with IAQM guidance16 there is little risk that the Process Contribution from the Proposed Quarry Extension would lead to an exceedance of the annual mean PM10 objective. The effect on PM10 concentrations at sensitive receptors is therefore 'not significant'.

8.8 Scope for Additional Mitigation Measures

8.8.1 The outcome of the assessment is that the air quality effect is "not significant". The designed in mitigation measures together with the operational measures currently implemented which will be continued within the Proposed Quarry Extension are considered appropriate to mitigate potential impacts therefore additional mitigation measures are not required.

8.9 Cumulative Effects

8.9.1 Cumulative effects are the combined effects of several development schemes (in conjunction with the Proposed Development) which may, on an individual basis be insignificant but, cumulatively, have a significant effect.

8.9.2 The ES has considered 'Cumulative 'Effects' for schemes located within a 1 km radius from the boundary of the Application Site. Most of these schemes are located within the Colomendy Industrial Estate to the north of Denbigh and are for employment site redevelopment (B1, B2 and B8 uses), and a Local Authority waste transfer station. Dust generation from these schemes is likely to be minimal and due to their distance from the Application site and sensitive receptors considered in this assessment cumulative effects are likely to be "not significant".

8.9.3 It is anticipated that during the operational phase quarry output from the extension and existing quarry would remain at current levels (200,000 tonnes per annum). The cumulative effect of the Quarry Extension operating in conjunction with the existing quarry is therefore likely to be "not significant".

8.10 Summary and Conclusions

8.10.1 The air quality and dust assessment has determined the following:

8.10.2 Baseline air quality conditions at the Proposed Quarry Extension and within the study area are likely to be well below the NO2 annual mean, NO2 one-hour mean, PM10

and PM2.5 annual mean and PM10 24-hour mean air quality objectives in the operational years.

8.10.3 The dust assessment has identified that the dust disamenity effect of operations within the Proposed Quarry Extension is likely to be negligible for all activities at all receptors.

8.10.4 Overall the Proposed Quarry Extension is considered to have a negligible effect on the surrounding area. This effect is 'not significant' and is based on consideration of the magnitude of effects at individual receptors.

8.10.5 There is little risk that the Process Contribution from the Proposed Quarry Extension would lead to an exceedance of the annual mean PM10 objective. The effect on PM10 concentrations at sensitive receptors is therefore 'not significant'.

8.10.6 Table 8.7 summarises the air quality and dust effects resulting from the Proposed Development.

Table 8.7: Summary of Residual Effects

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Operation								
Human and Ecological Receptors	High	Dust soiling	Good practice site design and dust control measures during operation, tree planting and creation of bunds along site boundary to provide screening.	Negligible Local Transient Unlikely	Negligible	None	N/A	Not Significant
Human and Ecological Receptors	High	Health effects of PM10	See above.	Negligible Local Transient Unlikely	Negligible	None	N/A	Not Significant

9.0 HYDROLOGY AND HYDROGEOLOGY

9.1 Introduction

9.1.1 The site is currently worked 'dry' and the operator intends to continue to work in this manner. This means that when the natural water table is breached in the deepest cut there will need to be a period of dewatering. A hydrological and hydrogeological impact assessment (HIA) has been undertaken by BCL in order to understand the impacts that will occur due to the proposed changes in the water environment. The assessment baseline covers an area extending to 3km from the site boundary. The HIA and its' supporting data are presented in full in Appendix 7 to the ES.

9.1.2 The geology of the area is dominated by the sedimentary basin of the Vale of Clwyd. This features Silurian shales upon the high ground of the Denbigh Moors in the west of the Study area, dipping westwards towards the centre of the basin upon the Clwyd valley, and becoming overlain by successively younger Carboniferous and Triassic strata.

9.1.3 The main watercourse in the area is the River Clwyd and there are several minor watercourses that drain to it. There are a number of springs present to the west of Denbigh, associated with the headwaters of the Afon y Merchion and Henllan Brook. The Clwyd Limestone Group (CLG) and the Kinnerton Sand Stone (KSS) are defined by Natural Resources Wales as Principal Aquifers. Groundwater levels are monitored on a monthly basis by BCL using a series of piezometers that were put in place in 2019. The impact assessment acknowledges the limitations of this period of data collection and the limitations of the historic data from earlier piezometer readings. In response to the statutory Pre-Application Consultation exercise Natural Resources Wales requested that the HIA be revisited to include the datya which had been collected between the original HIA date and the date of the consultation. This data has now been incorporated.

9.1.4 However, the more recent piezometers, with known construction methods and depths demonstrate that groundwater levels range across the site by some 17.39m (90.75maOD to 73.36maOD), falling northeastwards, towards the Denbigh Fault, and in line with flows within the Clwyd Valley and general local topography, at an average gradient of 0.02, this steepening northwards and eastwards.

9.1.5 Consideration of the flood risk associated with the quarry and proposed extension is confined to the provision of a drainage strategy illustrated on Figure 25 for the operational period and Figure 27 for the restoration and beyond.

9.2 Baseline

9.2.1 Information concerning the geology of the Study Area has been obtained from:

· Published geological mapping, including British Geological Survey (BGS) 1:50,000 scale solid and drift mapping (Sheet E107, Denbigh), and 1:63,360 scale mapping (Vale of Clwyd, St. Asaph, Denbigh Lead and Copper Lodes).

· Site investigation drilling and piezometer installation logs.

· Previous geological reports for the Site.

9.2.2 Information concerning the hydrology of the Study Area has been obtained from:

· Findings of BCLS's 2019 walkover field survey.

· The Centre for Ecology and Hydrology (CEH), National Rivers Flow Archive (NRFA) web service.

· Published data sources

. Historic and recent hydrometric data collection.

9.2.3 The hydrology of the Study Area is dominated by the River Clwyd. This watercourse rises in Clocaenog Forest, near the town of Corwen in southern Denbighshire, before flowing north to the Vale of Clwyd, passing 3km to the east of the Site at closest approach, and discharging to the Irish Sea at Rhyl.

9.2.4 There are two significant tributaries of the River Clwyd within the Study Area. This includes the Afon Ystrad, and Afon y Merchion. The Afon Ystrad rises to the south of the Denbighshire village of Nantglyn, before flowing eastwards, to the south of the town of Denbigh (passing 1.6km to the south-west of the Site at closest approach), and discharging to the Clwyd 2km to the east of Denbigh.

9.2.5 The Afon y Merchion rises near the village of Y Groes, before flowing northwards, passing to the east of the village of Henllan, and on to the River Elwy and subsequently the Clwyd to the north of the Study Area. This watercourse passes 2.8km to the northwest of the Site at closest approach. There are a number of minor watercourses within the Study Area, all of which also ultimately drain to the River Clwyd.

9.2.6 There are a number of springs present to the west of Denbigh, associated with the headwaters of the Afon y Merchion (WFS4, Appendix 7 figure 4) and Henllan Brook (WFS5-6, Appendix 7 figure 4). These springs are all underlain by glacial till (GT) and EF, which are assumed hydraulically isolated from the Site.

9.2.7 There is a further spring located upon Alluvium / GT overlying KSS 1.8km to the east of the Site, at WFS7, figure 4 (Appendix 7). This is likely supplied either from the Alluvium or by upwelling groundwaters from the underlying KSS. Direct connection (karstic) to the Site is precluded by the intervening KSS.

9.3 Impact Assessment

9.3.1 The impact assessment has considered the following direct potential impacts;

- Potential for impact upon groundwater levels and flows;
- Potential for impact upon surface water levels and flows;
- Potential for derogation of groundwater quality
- Potential derogation of surface water quality; and
- Potential for exacerbation of flood risk.

9.3.2 It has then considered the following potential indirect impacts;

- Potential for indirect of surface water flow rates and/or waterbodies;
- Potential for indirect impact upon the volume of groundwater and/or surface water available to existing abstractions;
- Potential for indirect impact upon the quality of groundwater and/or surface water available to existing abstractions;
- Potential impact upon floral and/or faunal habitats as a result of flow/quality derogation within surface watercourses/wetland areas.

9.3.3 An initial screening process, taking into account the physical circumstances and geological situation, narrowed down the areas for further investigation owing to the likelihood of the impact. The results are represented in Table 19 of the HIA. These potential impacts were then taken forward for more detailed analysis.

Groundwater

9.3.4 The HIA establishes that within the site the removal of the unsaturated zone is more than compensated by the existing sump in terms of aquifer storage and that 'perched water' does not support any of the ecological features in the vicinity of the development.

9.3.5 The continued extraction of stone may cause connection with groundwater conduits resulting in an increased need for dewatering of the working area but as the likelihood and magnitude of this flow cannot be established additional monitoring is recommended. The discharge of water from the site would still be controlled to the levels required by the discharge licence. As no ecological features have been identified as being groundwater dependent no impact on them is anticipated.

9.3.6 One deregulated abstraction (Abstraction L – Plas Clough Farm) is potentially in hydraulic continuity with the existing site and the impact on it is assessed as being low as it is located 400m from the quarry sump. At the same time ongoing monitoring of this facility, which would require the consent of the landowner, is recommended.

9.3.7 The dewatering of the site will cause a cone of depression beyond the site boundary starting at a maximum of 21m reduction and diminishing to zero change at a point 675m to the west of the site. This distance is approximately 250m to the east, northeast and southeast. The dewatering reduces the amount of flow to the KSS but the surface discharge is to the River Clwyd which is understood to be in partial connectivity with the KSS.

9.3.8 As the groundwater quantity is determined to be 'good' and the consumption and discharge rates are minor the overall impact is considered to be acceptable with appropriate licensing controls through Natural Resources Wales.

9.3.9 The placement of the inert restoration material, particularly if it is of high clay content could provide a barrier to groundwater flows creating an up-gradient (west) 'head of water. However, flows would continue beneath the fill material and the impact is assessed as minor. As the 'average' groundwater levels are very variable it is recommended that the situation continues to be monitored following the completion of restoration such that amelioration measures can be introduced at a later stage.

Surface Water

9.3.10 The removal of the extension area is calculated to remove 12,435 cubic metres of rainfall per annum from the catchment which feeds the Henllan Brook although a significant percentage of this rainfall would be removed from runoff rates due to infiltration. This impact is deemed to be 'not significant' and the Henllan Brook is not known to support any licenced or deregulated abstraction and does not pass through any designated or non-designated ecological sites.

9.3.11 The licensing of both consumption (abstraction) and discharge of water at the site is controlled by Natural Resources Wales and will be managed in accordance with updated controls on quality and quantity on a regular basis.

Flood Risk

9.3.12 The proposed development is considered to have the potential to impact on flood risk in the following ways;

- Potential for the interception of direct groundwater flows;
- Potential to increase surface water flow rates; and
- Use of inert fill in the restoration (raising restoration levels).

9.3.13 The risk of groundwater flooding would be experienced at the site but is considered unlikely to occur and not during dry periods. If this situation did occur then the dewatering level would need to be increased in agreement with NRW as an amendment to the licence or temporary arrangement. These waters would be confined within the quarry before discharge.

9.3.14 Whilst the proposed development is expected to increase the discharge flow rates this has been calculated to be below the acceptance figures as approved by the Environment Agency (precursor to NRW). On this basis, no significant impact is predicted.

9.3.15 The use of imported inert infill materials for the site restoration introduces material of lower permeability than the aquifer material which it replaces. This provides the potential for increased runoff rates and hence, increased flood risk. This water would all be contained within the depression of the proposed landform to an anticipated maximum height of 106m AOD and would gradually dissipate through the margins to the aquifer. Off-site flooding will not occur as the freeboard at the site is 108mAOD before flows could occur to the site entrance.

9.3.16 The elevation of the lake surface should be monitored when restoration is complete.

9.4 Mitigation

9.4.1 A Hydrometric Monitoring Scheme is recommended with the content identified at paras 6.4.1.57 to 6.4.1.59. This includes the analysis of the collected data and ongoing amendment to amelioration measures if required.

9.4.2 At 6.4.2.13 the HIA recommends that the scheme includes monitoring of the Henllan Brook.

9.4.3 A Conceptual Site Model (CSM) has been developed in order to consider the potential for contamination from the Bryn Nefydd historic landfill. Whilst the proposed

development will not physically impact on this location and, as it sits outside the dewatering zone of influence there is negligible potential for impact on the contaminant source. No further mitigation is recommended through the CSM process.

9.4.4 The HIA also recommends the adoption of a fluids handling protocol as set out in Appendix 9.8 to the HIA. This protocol represents current best practice and is already adopted by the applicant.

9.4.5 No significant groundwater concerns are raised regarding the placement of the inert restoration material and it is noted that this will require the granting of an Environmental Permit.

9.5 Cumulative and in-combination effects

9.5.1 Consideration of other pending planning permissions in the area local to the Site, and their potential to result in cumulative impacts when considered along site the Proposed Development, is presented at table 22 below.

Assessment of Potential Cumulative Impact				
Reference	Name	Potential Cumulative Impacts	Note	Requirement for Further Assessment
01/2019/0743	Plot 1 - DCC Waste Depot	Flood Risk, Water Quality	Application of SuDS and requirement for Environmental Permit will negate any risk of cumulative impact.	None
01/2019/0773	Plot 2 - Yard Space Wales	Flood Risk	Application of SuDS will negate any risk of cumulative impact.	
01/2019/0774	Plot 3 Henllan Bread			
01/2019/0775	Plot 4 - Lock Stock			
01/2019/0776	Plot 5 – Emyr Davies			
SuDS: Sustainable Urban Drainage Systems				

9.5.2 Assessment indicates that the potential for cumulative impacts associated with the above planning applications is low, and that no further assessment or mitigation in this regard is required.

9.5.3 Assessment has further considered a number of proposed housing developments in the local area. Developments of this nature are also not expected to result in any cumulative impacts subject to implementation of SuDS.

9.6 Residual Impact

9.6.1 Subject to implementation of the recommendations included in the HIA, significant residual impacts are not anticipated in association with the Proposed Development.

9.7 Conclusions

9.7.1 In view of the findings of assessment and the planned approach to the proposed development, which includes specific measures for the protection of the water environment, and subject to the implementation of recommendation for mitigation within the HIA, there are considered to be no over-riding hydrogeologically or hydrologically based reasons why the planned development should not proceed in the manner described by the Application.

10.0 SOIL RESOURSES

10.1 The impact of the proposals on agricultural land quality and soil resources has been assessed through the survey and classification of the soils to determine the characteristics of the soil and the local climate. A site-specific Agricultural Land Classification (ALC) has been undertaken and subsequently validated by the Welsh Government. The Impact Assessment is included as Appendix 12 to this Statement and the ALC is at Annex D to that document.

10.2 The ALC process concludes that there is one 'Type' of soil which falls within two classifications. There is approximately 1.5 hectares of Grade 2 (very good) land and 2.5 hectares of Grade 3a (good) land. The assessment of significance of the impact is determined by its' character and the sensitivity of the receptor ie the soil resource.

10.3 That character is determined through its magnitude in area and quantity of soils. Less than 5ha of loss is determined to be of low magnitude and the volume of soil is also assessed as being low (between 12,500m3 and 24,999m3). The sensitivity of the Grade 2 land is 'very high' and the Grade 3a land is 'high'.

10.4 It is acknowledged that there will be a loss of 'best and most versatile' land which will not be reversible and, therefore, permanent. The replacement landform and soil structure, whilst valuable as a Priority Biodiversity Action Plan habitat, would only be Grade 4 land for agricultural purposes.

10.5 The assessment concludes, on the basis of the thresholds within the Institute for Environmental Management and Assessment guidelines, that there would be a 'negligible' impact on type 1 soils and a 'minor adverse' on type 2 soils which is categorised as 'not significant'.

11.0 MITIGATION THROUGH DESIGN

11.1 The design of both the operations and the restoration scheme have been iterative, with input from subject matter experts that have influenced the final proposals. Opinions of the environmental team have been sought with each change to determine how a change brought about by one discipline will affect the level or significance of impact on other disciplines. This collaborative approach means that mitigation has been brought forward that takes account of the different aspects of the environment.

11.2 The overall function of the proposal is to exploit the mineral reserve in a sustainable manner i.e. that the development represents the optimum blend of environmental, economic and social factors. The mitigation embedded in the design includes the provision of:-

- Retention of existing screening vegetation;
- Continuation of vehicle routing arrangements;
- New screening bunds and peripheral planting;
- Offset of 30m of all operations from the Crest Mawr SSSI;
- Restricted hours of working;
- Blasting vibration limits;
- fully-maintained, modern equipment

11.3 Maintenance of a 108m AOD freeboard between the main quarry and the historic working area aids flood risk prevention.

12.0 MONITORING

12.1 Monitoring takes different forms including pre-disturbance ecological surveys, the implementation of a Written Scheme of Investigation to record archaeological interest and monitoring of the water environment through boreholes and flow rates for discharge.

12.2 It is anticipated that the monitoring schemes that are in place with regard to noise and vibration will be carried forward to the working of the extension and the operation is subject to regular monitoring visits by the Mineral Planning Authority which are also expected to continue for the life of the working and restoration/aftercare periods.

12.3 In the event that this planning application is successful the site will also be subject to a review of the planning conditions after a period of fifteen years.

13.0 CUMULATIVE EFFECTS

13.1.1 Through the course of the assessment process the subject matter experts have considered the potential for effects to be experienced cumulatively or in combination with the effects from other proposed projects or plans. The nearest developments of note are;

- The construction and operation of additional industrial units on the Colomendy Industrial Estate.

- Further afield there is a major housing development under construction at Cae Topyn (to the south of Whitchurch Road) - comprising 75 dwellings. The Council are anticipating a full application for somewhere in the order of 60 dwellings on allocated land nearby at Brookhouse. However, both of these sites are approximately 1.5km to the south of the quarry.

- Planning permission has been granted for a development of up to 300 dwellings at the former North Wales Hospital site (to the south-west of the town), approximately 1.5 km to the south west of the quarry.

13.1.2 The HyNet development is a hydrogen production and Carbon Capture and Storage project which is due to take place around Chester, North Wales and North West England. It is sufficiently distant that there are no cumulative impacts from the two developments but may produce material that is suitable for the restoration of the site, contributing to the traffic movements of the development.

14.0 CONCLUSIONS

14.1 The scope of this Environmental Statement has been determined through the submission of a Scoping Report and the formal response of the Mineral Planning Authority to that report.

14.2 The EIA process has been undertaken by suitably qualified and experienced professionals using accepted methods which have been confirmed or modifies by the Scoping Opinion of the MPA. The information that can reasonably be collated has been provided and where there are limitations these have been acknowledged.

14.3 This Environmental Statement provides the information that is reasonably required by Schedule 4 of the EIA Regulations and is summarised in a non-technical summary that is submitted with the application as Volume 3.

14.4 Following the implementation of the identified mitigation and the imposition of appropriate planning conditions to set thresholds there are no significant environmental effects that would prevent the development from proceeding.

14.5 Other licensing regimes such as protected species licensing and Environmental Permitting will be required and will include their own thresholds and monitoring requirements.