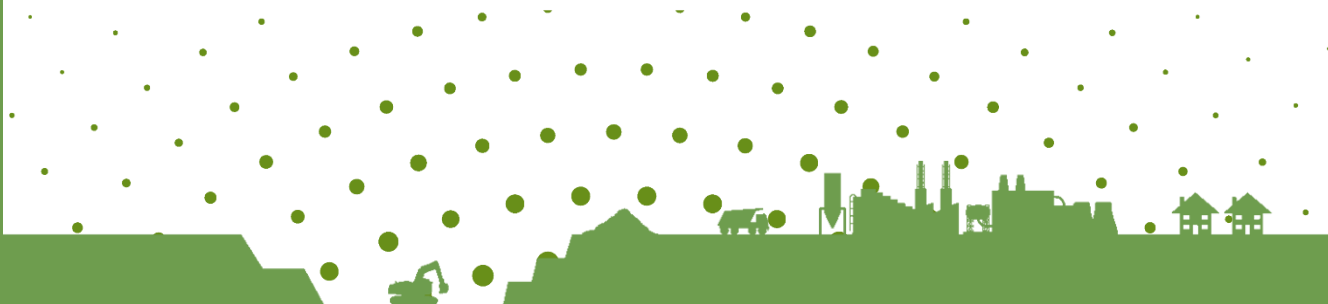




Air Quality and Dust Assessment for Victory Quarry

August, 2017

Barry Woods Plant Hire Ltd



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1 Introduction

1.1 Overview

Barry Woods Plant Hire Limited (BWPH) is seeking consent for the continued use of Victory Quarry construction and demolition materials recycling for 10 years until 2027. The former limestone quarry is located at Batham Gate, southeast of Dove Holes village and approximately 4 km north-northeast of Buxton.

An air quality and dust assessment was undertaken by DustScanAQ (DS) for submission with the application.

Whilst Victory Quarry is not a mineral extraction operation or active quarry, many of the on-site operations are similar, such as the crushing, screening and stockpiling of materials. This report was therefore prepared with reference to the current minerals industry best practice guidance, including the National Planning Policy Framework and associated Planning Practice Guidance relating to Air Quality¹ and recent guidance regarding dust assessment, produced by the Institute of Air Quality Management (IAQM)² and Environmental Protection UK (EPUK) in conjunction with IAQM³.

The following activities were carried out for the assessment:

- Site visit to the planned working area and application site;
- Installation of dust monitoring equipment for 12 weeks dust monitoring;
- Walkover of the surrounding area;
- Assessment of impacts from dust, fine particulate matter (PM₁₀⁴ and PM_{2.5}⁵) and Heavy Goods Vehicle (HGV exhaust emissions (as NO_x)⁶);
- Review of standards and controls; and
- Recommendations for dust mitigation and management.

The assessment concentrates on potential air quality and dust impacts arising from the ongoing operation of the site.

1.2 Objective

The objective of the assessment is to consider potential impacts to air in relation to the pollutants identified below and potentially arising from the operations at Victory Quarry.

¹ <http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/>

² Institute of Air Quality Management's (2016) *Guidance on the Assessment of Mineral Dust Impacts for Planning*

³ Environmental Protection UK and the Institute of Air Quality Management (2015) *Land-Use Planning & Development Control: Planning For Air Quality*

⁴ Essentially particles less than 10 µm (micron) aerodynamic diameter

⁵ Essentially particles less than 2.5 µm (micron) aerodynamic diameter

⁶ Oxides of nitrogen (essentially NO and NO₂)

1.3 Key Pollutants

The key pollutants considered in this assessment are NO₂, PM₁₀, PM_{2.5} and disamenity dust and are discussed below.

1.3.1 Nitrogen dioxide (NO₂)

NO₂ is largely associated with exhaust emissions, especially HGV traffic.

The national Air Quality Objective (AQO) for NO₂ is currently 40 µg/m³ (micrograms per cubic metre) for the annual mean and 200 µg/m³ for the hourly mean, which is not to be exceeded 18 times per year.

It is generally accepted that NO₂ levels approach background levels within 50 m from the road and at 100 m or more, the difference between the total concentration and the background concentration should be as close to zero as will make virtually no difference⁷.

1.3.2 Fine particulate matter (PM₁₀ and PM_{2.5})

PM₁₀ essentially refers to particles less than 10 µm in aerodynamic diameter and PM_{2.5} refers to particles less than 2.5 µm in diameter.

The AQO for PM₁₀ is currently 50 µg/m³ for the 24-hour mean, not to be exceeded 35 times per year, and 40 µg/m³ for the annual mean. There is no AQO for PM_{2.5}; however there is a target value of 25 µg/m³ as an annual mean, to be achieved by 2020.

PM₁₀ and PM_{2.5} are also largely associated with HGV exhaust emissions and re-suspended dust but can also arise from a wide range of sources other than traffic.

1.3.3 Disamenity dust

'Dust' is generally regarded as particulate matter up to 75 µm (micron) diameter and in an environmental context can be considered in two categories, according to size: coarser dust (essentially particles greater than 10 µm) and fine particulate matter (PM₁₀ and PM_{2.5}) as set out above.

Coarser dust (essentially particles greater than 10 µm) is generally regarded as 'disamenity dust' and can be associated with annoyance, although there are no official standards (such as AQO) for dust annoyance⁸. Disamenity dust is more readily described than defined as it relates to the visual impact of short-lived dust clouds and the long-term soiling of surfaces.

Although it is a widespread environmental phenomenon, dust is also generated through many human activities including industrial and materials handling sites, construction and demolition sites and roads. Dust is generally produced by mechanical action on materials and is carried by moving air when there is sufficient energy in the airstream. More energy is required for dust to become airborne than for it to remain suspended.

⁷ Air Quality Consultants (2008) *NO₂ Concentrations and Distance from Roads* (report for Defra)

⁸ Note that the expression 'nuisance dust' refers here to 'generally visible particulate matter' rather than specifically and in a legal sense to statutory nuisance, as defined in Section 79 of the Environmental Protection Act 1990.

Dust is removed through gravitational settling (sedimentation), washout (for example during rainfall or by wetting) and by impaction on surfaces (e.g. on vegetative screening). Dust can be re-suspended where conditions allow, such as from bare ground. Dust generation, its propagation and potential impacts can be considered in terms of 'source-pathway-receptor' relationships. Dust can arise from a variety of processes and locations within a site and can be difficult to quantify or attribute, especially when there are many other potential dust sources in the same locality.

The common pathway for dust propagation is by air. Dust propagation depends on particle size, wind energy and disturbance activities. Large dust particles generally travel shorter distances than small particles although dust dispersion in the vicinity of the site will be affected by local factors such as weather conditions.

IAQM (2016) states that for 'soft rock' quarries, dust impacts may extend up to 250 m from the source and it is commonly accepted that the greatest impacts from disamenity dust will occur within 100 m for the source. There are a number potential dust receptors within 250 m of the development which are discussed below.

1.4 Site setting

Victory Quarry is located in an open location at Batham Gate, south east of Dove Holes village and approximately 4 km north-northeast of Buxton. The site is 2.5 ha in size and comprises a 0.5 ha partially infilled, steep sided former limestone quarry that is approximately 6 - 7 m deep.

The site is situated within open farmland and the nearest residential receptors are Peak House and Peak House Cottage approximately 160 m south east of the closest part of the site.

Access to the site is via a haul road that runs south along field boundaries towards the farmhouse located on site, approximately 200 m to the south. From there, vehicles use a private road towards Batham Gate Road to the south. Other nearby properties include those on Batham Gate Road which are approximately 200 m south of the end of the haul road and 450 m south of the site.

The site is located outside the Peak District National Park with the nearest boundaries approximately 1 km to both the east and west.

1.5 Ongoing works

Full details of the ongoing development are set out elsewhere but in brief, BWPH recycle imported inert construction and demolition materials at Victory Quarry. This involves the crushing and screening of materials for export as recycled aggregates, crushed hardcore and screened soils and subsoils.

The site has operated since 1999 with approximately 25,000 tonnes per annum of predominantly soils and hardcore brought onto the site for processing. Incoming material is often supplied by both High Peak Borough Council and Derbyshire County Council.

Operations are not carried out continuously throughout the year, and there are regular periods of low activity on site. Screening is typically undertaken for 2 to 3 weeks in spring with additional operational periods of 2 days as required. Crushing often takes place for two periods of one-week in the summer, and additional periods of two days throughout the year. In winter, material is bucket riddled by excavator on the quarry floor for one day per week. In total, crushing and screening operations on site are therefore undertaken for approximately 20% of the year.

2 Legislation, Policy and non-statutory guidance

2.1 Overview

This section of the report sets out the relevant legislative, policy and guidance context for the assessment of Victory Quarry.

2.2 National Air Quality Strategy (NAQS)

The Air Quality Regulations (AQR) prescribes National AQOs to be achieved for a range of pollutants. These include NO₂, PM₁₀ and PM_{2.5} as set out above.

New guidance for the minerals industry⁹ includes a Site Assessment Flow Chart (reproduced at Figure 2.1) to determine the potential impact of developments in relation to the AQO.

Consequently, where residential properties or other sensitive land uses are within 1 km of the actual source of emission, the potential for emissions to cause a breach of AQO should be assessed.

Where emissions from site activities are unlikely to cause a breach of AQO the site should apply good practice measures in dust management to avoid causing dust annoyance, such as set out in PGN 3/08(12)¹⁰.

⁹ IAQM (2016) *Guidance on the Assessment of Mineral Dust Impacts for Planning*

¹⁰ Process Guidance Note (PGN) 3/08(12) *Statutory guidance for quarry processes*

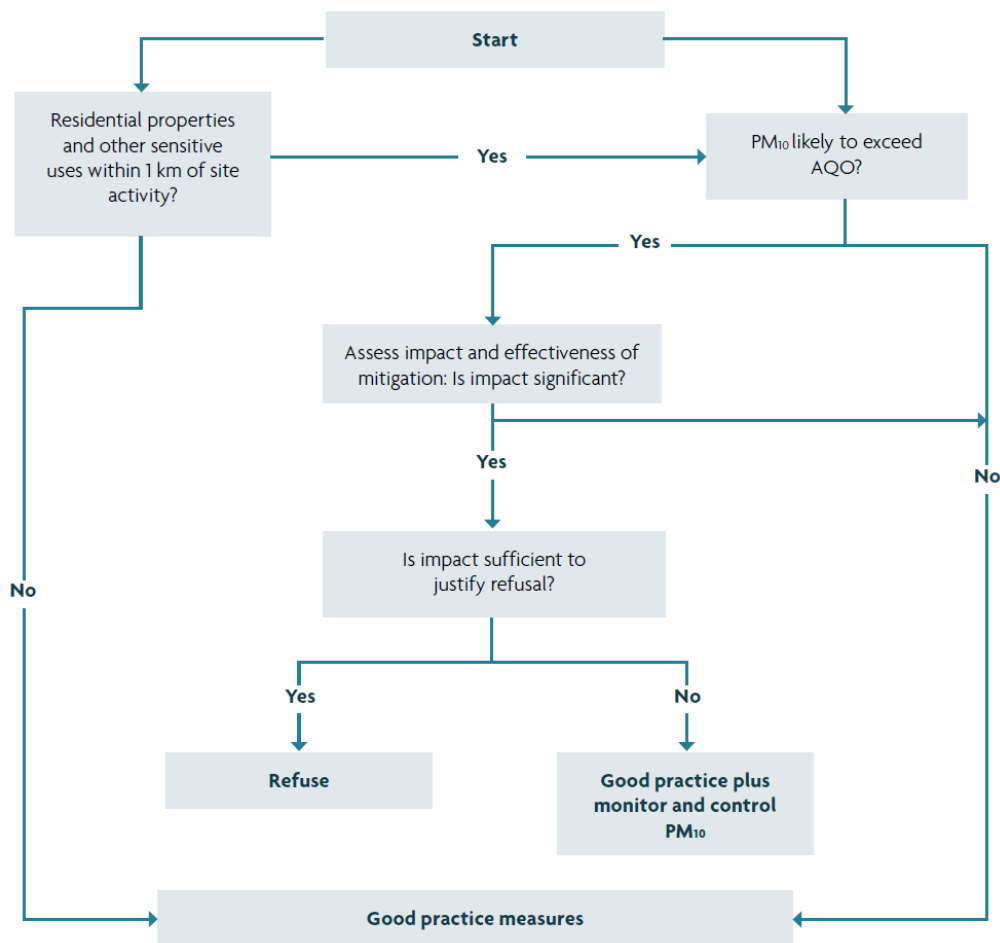


Figure 2.1: Site assessment flow chart (from IAQM Minerals Guidance)

Under AQR, local authorities are required to review the existing and projected airborne concentrations of these pollutants and compare them with the AQO. If an exceedance of any AQO appears likely, an Air Quality Management Area (AQMA) is to be designated with the aim of achieving the objective by the due date.

The local authority responsible for assessing air quality in the locality of Victory Quarry is High Peak Borough Council.

2.3 High Peak Borough Council Regional/Local policy

The Annual Status Report (2013)¹¹ for High Peak Borough Council states that in 2012, the AQOs would be met throughout the Borough with the exception of the A628 at Tintwistle, approximately 21 km north from Victory Quarry.

2.4 Non-Statutory Guidance

There is no standard method for carrying out a dust assessment for minerals sites although IAQM (2016) and others provide guidance, as noted above.

¹¹ High Peak Borough Council 2013 Air Quality Progress Report (2014)

This assessment has been carried out with reference to the new minerals guidance from IAQM, which states: “The assessment approach described here requires a degree of professional judgement from a competent and suitably experienced air quality professional in order to reach a conclusion on the overall significance of the effect. This guidance is based on the judgement of the IAQM Minerals Guidance Working Group. The IAQM does not expect practitioners to follow the suggested approach in all circumstances.”

The assessment has also been carried out with reference to previous guidance for the minerals industry and other sectors including, but not limited to Arup Environmental (1995)¹², AEA Technology (2010)¹³ and EPUK and IAQM (2015)¹⁴.

3 Methodology

3.1 Overview

This section of the report sets out the methodology followed for the assessment, which considers potential impacts arising from the key pollutants and residual source emissions (i.e. after mitigation) set out above.

3.2 Scope of Assessment

This section outlines the temporal and spatial aspects of the assessment.

3.2.1 Temporal scope

The effects of the operation at Victory Quarry have been considered until 2027.

3.2.2 Spatial scope

The site area covers approximately 2.5 ha and also includes the private haul road that heads south towards Batham Gate Road. This can be seen in Drawing No. A1 in Appendix A.

3.3 Meteorological Data

Weather conditions can have a significant effect on the potential for dust propagation from a recycling or minerals site. Wind speed (and direction) and precipitation are of particular importance and dust can be carried from a source towards receptors (such as nearby homes and other businesses) according to the strength and direction of wind.

Precipitation is recognised to suppress dust and 0.2 mm of antecedent rainfall is considered sufficient to suppress windblown dust for a number of hours.

¹² Arup Environmental (1995) *The Environmental Effects of Dust from Surface Mineral Workings*

¹³ AEA Technology (2010) *Management, mitigation and monitoring of nuisance dust and PM₁₀ emissions arising from the extractive industries: an overview*

¹⁴ EPUK and IAQM (2015) *Land-Use Planning & Development Control: Planning For Air Quality*

3.4 Receptors

Dust receptors can be within or beyond a site boundary. Whilst dust generation within a site such as Victory Quarry is primarily of concern to its operator, staff and visitors, dust can propagate beyond the site boundary to affect people and properties beyond, unless adequate control measures are in place. It is important to recognise that there may be other dust sources in the vicinity of a site (such as road traffic or arable farmland).

As IAQM (2016) states above, adverse impacts from 'soft rock' operations are uncommon beyond 250 m. Victory Quarry, whilst neither a 'soft rock' (e.g. sand and gravel) or 'hard rock' (e.g. granite) quarry, can be grouped with 'soft rock' operations due to the similarity in terms of site operations (e.g. crushing and screening). Consequently, relevant receptors within 250 m of the site have been considered for this assessment as summarised in Table 3.1 below. Full details are set out in Table A 1 in Appendix A.

Table 3.1: Receptor locations potentially affected by dust from operations at Victory Quarry

Receptor	Easting	Northing
Peak House Cottage	408019	376633
Peak House	408029	376642
Batham Gate Road Properties 130 - 160	407964	376233

There are no Sites of Special Scientific Interest (SSSI) in close proximity of Victory Quarry, with borders of the Peak District National Park over 1 km to both the east and west. Local Wildlife Site HP068 (Victory Quarry), a habitat for grass snakes, is immediately to the north of the site and is not deemed sensitive to dust impacts. Consequently, ecological receptors have been scoped out of this assessment.

3.5 Assessment Criteria

The assessment has been carried out with reference to relevant guidance, including IAQM (2016). Key tables and figures from that guidance are reproduced below.

3.5.1 NO₂

Current guidance¹⁵ suggests that a change in traffic movements of 100 HGV movements per day (or 25 within or adjacent to an AQMA) can be an indicative trigger level for when the operational traffic of a development could have a significant effect on air quality. In effect, NO₂ can be scoped out of the assessment if vehicle movements are below the indicative threshold.

In addition, NO₂ can be associated with exhaust emissions from Non-Road Mobile Machinery (NRMM). Guidance for the construction industry states that these are unlikely

¹⁵ Environmental Protection UK (EPUK) 2012 Development Control: Planning for Air Quality (2010 Update)

to make a significant impact on local air quality, and in the vast majority of cases will not need to be quantitatively assessed¹⁶.

3.5.2 PM₁₀

From above, PM₁₀ can be associated with HGV and NRMM exhaust emissions but, as with NO₂, can be scoped out of this assessment if there is a change of less than 100 HGV movements per day (or 25 within or adjacent to an AQMA).

With regard to PM₁₀ emissions from the site, one approach is that the potential impacts on AQO can be determined by comparing the total predicted environmental concentration (PEC) of PM₁₀ estimated to arise from the site with the annual mean objective. The PEC can be determined by combining the existing background ambient concentration (AC) and the expected process contribution (PC).

The AC for PM₁₀ can be determined from publicly available monitoring data or, where this is not representative, site-specific monitoring data. For the purposes of this report, the publicly-available data are considered representative; these include the Defra national annual estimated average background concentrations, which are determined for every local authority in the UK at 1 × 1 km grid square resolution¹⁷.

The new IAQM guidance states at Section 5.2: *'If the long term background PM₁₀ concentration is less than 17 µg/m³ there is little risk that the Process Contribution (PC) would lead to an exceedance of the annual-mean objective and such a finding can be put forward qualitatively, without the need for further consideration, in most cases.'*

The PC for Victory Quarry, the consequent PEC and resultant impacts on the AQO for PM₁₀ arising from the site are considered further below.

3.5.3 PM_{2.5}

From above, PM_{2.5} can be associated with HGV and NRMM exhaust emissions but, as with NO₂ and PM₁₀, can be scoped out of this assessment if there is a change of less than 100 HGV movements per day (or 25 within or adjacent to an AQMA).

3.5.4 Disamenity dust

From above, it is recognised that dust impacts reduce with distance. IAQM suggest that dust assessments are carried out in relation to 3 distance criteria, as reproduced in Figure 3.1. These criteria have been applied to this assessment.

¹⁶ IAQM (2014) *Guidance on the assessment of dust from demolition and construction*

¹⁷ <http://iaqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

Category	Criteria
Distant	Receptor is between 200 and 400m from the dust source
Intermediate	Receptor is between 100 and 200m from the dust source
Close	Receptor is less than 100 m from the dust source

Figure 3.1: Categorisation of receptor distance from source (from IAQM, 2016)

In addition from above, wind speed and frequency are recognised to affect dust propagation. The IAQM guidance (2016) suggests a range of wind frequency criteria, as reproduced in Figure 3.2. These criteria have been applied to this assessment.

Frequency Category	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on all days are less than 5%
Moderately frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Figure 3.2: Categorisation of frequency of potentially dusty winds (from IAQM, 2016)

IAQM (2016) suggest that the ‘risk’ of dust impact may be assessed by considering the pathway effectiveness (from Figure 3.2) in combination with the residual source emissions. This approach has been followed for this assessment; the residual source emissions for the identified operations at the site are set out below.

As stated by IAQM (2016), estimation of residual source emissions is a matter of professional judgement based on knowledge of the site and its locality, the processes involved and how these might relate to corresponding activities at other sites.

Consequently, it should be recognised that these are wide ranging and therefore not prescriptive criteria and, as with all other aspects of dust assessment, rely on professional judgement based on the experience of the assessor.

IAQM (2016) suggest that the pathway effectiveness and residual source emissions may be combined to determine the dust risk, as shown in Figure 3.3.

		Residual Source Emissions		
		Small	Medium	Large
Pathway Effectiveness	Highly effective pathway	Low Risk	Medium Risk	High Risk
	Moderately effective pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective pathway	Negligible Risk	Negligible Risk	Low Risk

Figure 3.3: Estimation of dust impact risk (from IAQM, 2016)

From this, the magnitude of dust impacts may be evaluated by combining the dust risk with the receptor sensitivity (noted above), as shown in Figure 7. This approach has been followed for this assessment.

		Receptor Sensitivity		
		Low	Medium	High
Dust impact risk	High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
	Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
	Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
	Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

Figure 3.4: Descriptors for magnitude of dust effects (from IAQM, 2016)

Consequently, from the IAQM (2016) guidance an assessment of the potential severity of dust impacts associated with the operation may be determined.

As stated above, there are no official standards (such as AQO) for disamenity dust. In the absence of standards a range of methods has been developed to assess visible dust. The two principal approaches are based either on measurement of the mass of settled dust or the assessment of change in the properties of a surface such as its loss of reflectance or discolouration ('soiling') on a glass microscope slide or adhesive 'sticky pad'.

'Custom and practice' thresholds for dust annoyance are commonly applied to these methods and minerals industry guidance recommends that site-specific thresholds should be agreed between the site operator and the regulator, as these will be appropriate for both the site and its surroundings¹⁸.

The results of the assessment for disamenity dust are set out in Section 5.3 below.

¹⁸ AEA Technology (2010). *Management, mitigation and monitoring of nuisance dust and PM₁₀ emissions arising from the extractive industries: an overview*

3.6 Uncertainties, limitations and assumptions

As stated above, there is no standard method for carrying out a dust assessment at a construction and demolition recycling site, and new guidance for the minerals industry (IAQM, 2016) recognises the need for professional judgement in carrying out such an assessment. Consequently, an uncertainty associated with any minerals dust assessment is that the assessor's judgement is appropriate.

A limitation of this assessment is that it has been carried out with reference to weather data from beyond the site boundary. This is in accordance with the IAQM (2016) guidance. The weather data used for the assessment were provided by a recognised supplier, from the nearest available location to the site, and as recommended by the supplier.

It is assumed that the site will continue to be operated as described for the purposes of this assessment.

It is assumed that the dust mitigation measures outlined herein will be formally adopted into a Dust Management Plan (DMP) if planning consent is granted, and that the mitigation measures will be applied as recommended, and consequently that the residual source emission values determined in this assessment are realistic estimates of dust emissions associated with the operations described.

4 Baseline Conditions

4.1 Overview

This section sets out local air quality data and weather for the current site and the initial 4 weeks of baseline dust data collected from the site.

4.2 Defra Background Concentrations

4.3 Local Air Quality

The local background concentrations have been taken from Defra¹⁹ with 2013 as the baseline and up to 2027 used for future predicted concentrations.

4.3.1 NO₂

The estimated NO₂ concentrations for 2013, 2017, 2020 and 2027 for the grid square nearest to Victory Quarry are set out in Table 4.1 below. The table shows background levels are well below the AQO for NO₂.

Table 4.1: Defra background NO₂ concentrations

Grid Reference		NO ₂ Concentration (µg/m ³)			
Easting	Northing	2013	2017	2020	2027
407500	376500	12.98	11.00	9.35	8.07

4.3.2 PM₁₀

The estimated PM₁₀ concentrations for 2013, 2017, 2020 and 2025 for the grid square nearest to Victory Quarry are set out in Table 4.2 below. The table shows background levels are below the AQO for PM₁₀.

Table 4.2: Defra background PM₁₀ concentrations

Grid Reference		PM ₁₀ Concentration (µg/m ³)			
Easting	Northing	2013	2017	2020	2027
407500	376500	12.66	11.95	11.65	11.46

4.3.3 PM_{2.5}

Table 4.3 sets out the estimated PM_{2.5} concentrations for the grid square nearest to Victory Quarry. The table shows background concentrations are well below the government target level for PM_{2.5} to be achieved by 2020.

¹⁹ <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013>

Table 4.3: Defra background PM_{2.5} concentrations

Grid Reference		PM _{2.5} Concentration (µg/m ³)			
Easting	Northing	2013	2017	2020	2027
407500	376500	9.21	8.61	8.34	8.16

4.4 On-site baseline data

Site specific data has been used to assess disamenity dust emissions from the works at Victory Quarry.

4.4.1 PM₁₀

From above, where the background PM₁₀ concentrations are below 15 17 µg/m³, it is considered that there is little risk that the annual mean would be exceeded. Consequently, works at Victory Quarry are very unlikely to have any significant impact on the AQO for PM₁₀ and can be scoped out of further assessment.

4.4.2 PM_{2.5}

From above, PM_{2.5} Defra background levels were well below the annual average target (20 µg/m³) to be achieved by 2020. Consequently, the operations at Victory Quarry are very unlikely to have any significant effect on the AQO for PM_{2.5} and can be scoped out of further assessment.

4.4.3 Disamenity dust

Dust monitoring has been undertaken at Victory Quarry to assess current conditions and the potential impact of disamenity dust on nearby residents.

Directional and deposited dust samples have been collected at two monitoring points over mostly weekly intervals starting from 11 July 2017.

Directional dust is monitored using DustScan (sticky pad) directional dust samplers. Being cylindrical, the samplers collect dust from 360° around the sampling head and are reported in discrete 15° intervals (*i.e.* 0 – 15°, 15 – 30° and so on).

The directional dust monitoring data is reported as %EAC and %AAC over 15° arcs as specified above. Therefore, for each arc a single %EAC value and a single %AAC value is returned. From this, it can be seen that the data are reported as discrete (non-overlapping) values for each arc around the cylinder.

The directional dust monitoring data is assessed in accordance with the 'impact risk' matrix in Figure 4.1 and, if necessary, in relation to community response and complaint records.

Deposited dust is monitored using DustScan 'DustDisc' depositional dust gauges. This sticky pad deposited dust monitoring collects dust depositing from the air onto a horizontal surface. Deposited dust measurements are also reported in %EAC and %AAC and subsequent 'risk' values, and can also be reported in mass per unit area (mg/m²/day).

		AAC: dust coverage				
		Level 0: <80%/interval	Level 1: 80 to <95%/interval	Level 2: 95 to <99%/interval	Level 3: 99 to ≤100%/interval	Level 4: 100% over 45° /interval
EAC: dust soiling	Level 0: <0.5%/day	Very Low	Very Low	Very Low	Low	Medium
	Level 1: 0.5 to <0.7%/day	Low	Low	Low	Medium	High
	Level 2: 0.7 to <2.0%/day	Medium	Medium	Medium	High	High
	Level 3: 2.0 to <5.0%/day	High	High	High	High	Very High
	Level 4: ≥5%/day	Very High	Very High	Very High	Very High	Very High

Figure 4.1: DustScan directional dust ‘impact risk’ matrix

DMP2 was located on the north western boundary of the site for background data with regard to westerly and north-westerly winds. DMP1 was located approximately 100 m south east of the site on a field boundary approximately 60 metres from Peak House and Peak House Cottage. Monitoring locations are shown in Drawing No. A1 in Appendix A.

Dust monitoring results from 11 July to 8 August 2017 are summarised in Tables A2 – A4 in Appendix A. Site activities during this period included crushing and screening from 17 – 21 July and on 24 July. A wind rose from 11 July to 8 August from a weather station located at Victory Quarry is shown in Figure A1 in Appendix A and shows that winds were typically westerly during this period.

Directional dust results during this period showed that most samples had ‘Very Low’ or ‘Low’ risks of disamenity. However, monitoring at both DMP1 and DMP2 from 18 – 25 July had ‘High’ impact risks from the south and south east (120° - 180° at DMP1 and 115° - 180° at DMP2). This indicates that dust levels were already high travelling towards the site from the south east. Monitoring at DMP1 also had a single ‘Medium’ impact risk from towards the site (300° - 315°, *i.e.* the northwest) from 11 – 17 July. A corresponding ‘Low’ can also be seen during this period and from the same direction (300° - 315°) at DMP2, again indicating that dusts were already increased travelling in this direction.

All deposited dust samples from 11 July to 8 August 2017 at both DMP1 and DMP2 had a ‘Very Low’ risk of impact.

Dust monitoring has therefore demonstrated low impacts on the closest receptors to the site. This dust monitoring was undertaken during the summer months of the year, whilst crushing and screening processes were ongoing on site, and during sustained periods of westerly winds. The current management of dust is therefore working well to limit dust propagation towards nearby receptors.

If mitigation and dust management measures continue to be applied at Victory Quarry, based on the initial dust monitoring results, adverse impacts from disamenity dust towards the nearest receptors are therefore anticipated to be negligible.

However, dust monitoring will continue on site for a period of at least 12 weeks to assess conditions over a longer period of time.

4.4.4 Weather

A wind rose for Leek-Thorncliffe (the nearest available reporting station to Victory Quarry with sufficient data), approximately 19 km to the south of the site) for ‘dry’ hours²⁰ winds (for 2012 – 2016) is presented at Figure 4.2.

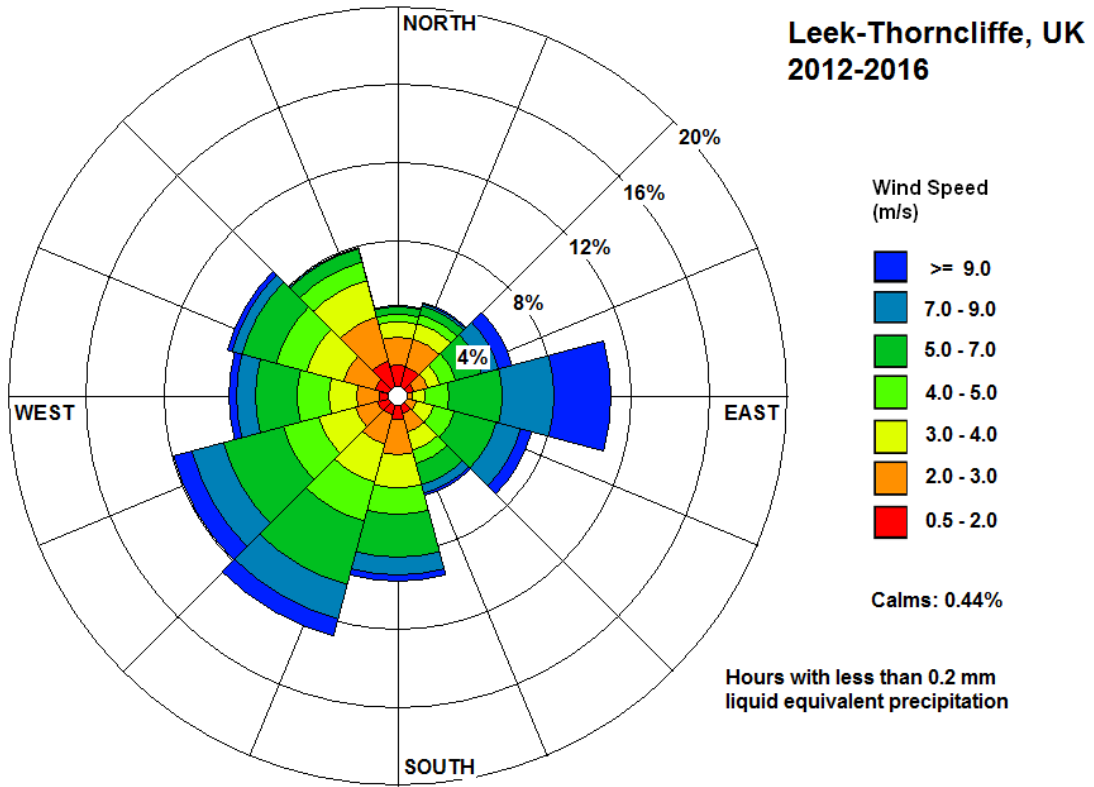


Figure 4.2: 5-year average wind rose, Leek-Thorncliffe, 2012 - 2016

²⁰ ‘Dry’ hours are those with less than 0.2 mm liquid equivalent precipitation and are associated with an increased risk of dust propagation.

5 Potential Impacts

5.1 Overview

This section outlines the potential impact on air quality of individual operations at Victory Quarry along with the cumulative impact of existing dust sources in the locality.

5.2 AQO

The potential impact of the operations at Victory Quarry on the AQO for NO₂, PM₁₀ and PM_{2.5} are considered below.

5.2.1 NO₂

From above, background NO₂ levels are well below the AQO. The development generates a maximum of approximately 10 HGV movements (5 in, 5 out) per working day, with a monthly average of approximately 5 HGV movements per day. Consequently, the effect of HGVs from the ongoing works at Victory Quarry on the NO₂ AQO will be negligible.

Therefore, on the basis that NO₂ emissions from Victory Quarry would be very unlikely to have a significant impact on the AQO for NO₂ for High Peak Borough Council, NO₂ impacts are not considered to be significant and are not considered further in this assessment.

5.2.2 PM₁₀

From above, where the background PM₁₀ concentrations are below 17 µg/m³, it is considered that there is little risk that the annual mean would be exceeded. Therefore, PM₁₀ impacts are not considered to be significant and are not considered further in this assessment.

5.2.3 PM_{2.5}

From above, PM_{2.5} Defra background concentrations were well below the 2020 target level for PM_{2.5}. Therefore, PM_{2.5} impacts are not considered to be significant and are not considered further in this assessment.

5.2.4 Disamenity dust

From above, there are potential receptors within 250 m of the working area and haul road at Victory Quarry. Therefore, disamenity dust has been assessed in this report.

There is a potential for dust emissions to occur at various stages of the operation, but these can generally be controlled by good practice measures, formalised in a dust management plan (DMP). The potential dust sources from operations where mitigation is presumed to have been applied is known as residual dust emissions. Sources or site activities that may give rise to dust at Victory Quarry are:

- Materials handling, tipping and loading into dump trucks;
- Material processing;
- Mobile plant (both on-site and off-site vehicle movements), and
- Wind scouring of exposed surfaces and stockpiles.

The dust sources at Victory Quarry are considered below, setting out both the potential for emissions and recommended mitigation methods further below. From these, the determined residual source emissions are stated per activity and are set out in Table 5.1 below.

Table 5.1: Residual source emissions

Activity	Residual source emission
Materials handling, tipping and loading into dump trucks	Medium
Material processing	Medium
Mobile plant (both on-site and off-site vehicle movements)	Small
Wind scouring of exposed surfaces and stockpiles.	Small

The results of the assessment for disamenity dust are set out in Section 5.3.

Materials handling, tipping and loading into dump trucks

There is a moderate risk of airborne dust emissions from material handling, tipping and loading into dump trucks if mitigation measures are not imposed. Dust may be generated when materials are transferred into and from HGVs and when materials are relocated around the quarry floor.

As set out in Table 5.1, and the residual source emissions are therefore considered to be Medium.

Material processing

In general, the risk of airborne dust propagation from material processing depends on the process involved. Without mitigation, there can be significant dust emissions from crushing and screening and there is also a high risk of dust emissions from associated conveyors, transfer points and at conveyor discharge points onto stockpiles.

However, material screening at Victory Quarry is mostly limited to a period of 2 to 3 weeks in April and May, with crushing undertaken for two periods of just one week in the summer and 3 periods of two days spread throughout the year.

The residual source emissions from material processing are therefore considered to be Medium.

Mobile plant and on-site and off-site haul roads

The greatest risk of dust from sites such as Victory Quarry is often considered to be associated with site traffic. The site is accessed through a haul road comprised of hardcore road planings which runs from south of the site and connects to Batham Gate and subsequently Batham Gate Road. There is a significant risk of dust emissions from transport on haul roads unless appropriate mitigation measures are applied.

The haul road is currently equipped along its length with a sprinkler system for wetting down during dry periods, and traffic is limited to, at most, fewer than 10 vehicle trips per day.

As set out in Table 5.1, the residual source emissions from mobile plant and on-site and off-site haul roads are therefore considered to be Small.

Wind-whip from bare ground and exposed surfaces

There is a moderate risk of wind-blown dust propagation from dry surface layers, stockpiles of materials and from bare ground. Stockpiles are stored on the quarry floor to a maximum permitted height of 3.5 m and, in addition to the quarry floor, are well surrounded by higher ground levels encapsulating the site.

As set out in Table 5.1, the residual source emissions for wind-whip from bare ground and exposed surfaces are considered to be no greater than Medium.

5.3 Potential Impacts

This section sets out the potential impacts of the operation which have been determined by means of the method outlined by IAQM (2016).

The potential impacts for each dust source are set out in Table A 1. Dust sources have been considered for potential receptors within 250 m of any part of the operation.

Table A 1 shows that all of the receptors identified would experience a 'Negligible Risk' and 'Negligible Effect' with regard to the 'Magnitude of Dust Effects'.

Consequently, the assessment shows that provided the mitigation measures proposed are applied, there would be no adverse impacts at any offsite receptor from disamenity dust associated with this development.

With reference to the IAQM (2016) minerals dust guidance the overall impact of the development is therefore considered to be not significant.

5.4 Cumulative Impacts

Other sources of dust or air quality pollutants in the locality could increase the magnitude of effects through cumulative impacts.

There are no other significant activities within 500 m of the site boundaries and as such cumulative impacts on the AQO for High Peak Borough Council and disamenity dust impacts are considered unlikely to be significant.

6 Mitigation

6.1 Overview

This section sets out the mitigation plan for each of the dust sources assessed above.

6.2 Dust Management Plan (DMP)

As set out above, there is a potential for dust emissions to occur at various stages of the operation, but these can generally be controlled by good practice. The mitigation for the potential dust sources and activities identified above are set out in the section below.

6.2.1 Materials handling, tipping and loading into dump trucks

Unacceptable dust emissions from materials handling can be controlled by minimising working of material in very dry, windy conditions, by reducing drop heights when materials are transferred and controlling vehicle speeds.

Working of materials towards the south east of the site should be minimised and operations should be suspended when wind conditions would be likely to result in visible dust being carried towards off-site receptors.

6.2.2 Material Processing

There is a risk of dust emissions from open conveyors, transfer points and at conveyor discharge points onto stockpiles although dust emissions from the screening plant are minimised by locating the plant in a sheltered location within the quarry void.

Any dust control measures fitted to the processing plant should be kept in good operational order and in accordance with the manufacturers' instructions. Active periods of material processing should take into account the predicted weather conditions at the time.

6.2.3 Mobile plant and on-site haul roads

Dust may be generated from downward-blowing exhausts and cooling fans, so only mobile plant that avoids such risks with upward or sideways exhausts should be used. On site haulage should be kept to designated haul routes where possible.

6.2.4 Off-site haulage

The surface of the access route should be maintained to a high standard and the sprinkler system should be maintained and used in dry periods.

HGVs leaving Victory Quarry should be sheeted before joining Batham Gate Road.

Vehicles should be checked for loose deposits that might fall onto the public highway and spillages should be cleared as quickly as possible.

6.2.5 Wind-scouring of exposed surfaces

Dust emissions from exposed surfaces can be minimised by wetting down with a water bowser as necessary, especially in periods of dry, windy weather.

Where practicable, stockpiles should be managed to maintain a smooth profile to minimise the spreading of loose materials and should be disturbed as little as possible to encourage the formation and stabilisation of a surface crust.

Where possible, conveyor discharge heights should be adjusted to minimise drop heights. It might be necessary to wet down stockpiled materials to reduce the risk of wind-blow from exposed surfaces.

7 Conclusion

Barry Wood Plant Hire Limited is seeking consent for the continuation of operations including the recycling of construction and demolition products at Victory Quarry.

This assessment was carried out by competent professionals and with appropriate reference to relevant policy and guidance.

The assessment considered the potential impacts on the Air Quality Objectives (AQO) and 'nuisance' or 'disamenity' dust arising from the continuation of operations at Victory Quarry.

The assessment found that there would be essentially no adverse impacts on the AQO either from traffic-related emissions or continued site operations from the site, and thus were not significant.

The assessment found that provided appropriate mitigation measures continue to be adopted at Victory Quarry, there would be negligible adverse impact at all nearby receptors. The overall impact of the continued operation is therefore considered to be not significant.

Consequently, this assessment shows that the continued site operations at Victory Quarry can be operated in a manner unlikely to cause adverse air quality or dust impacts in its vicinity.

**DustScanAQ
August 2017**

APPENDIX A

Table A 1: High sensitivity receptors potentially affected by dust at Victory Quarry

Receptor	Dust source location	Minimum distance (m)	Distance category	Direction/s to dust source
Peak House	Site	170	Intermediate	285 - 315
Peak House	Haul road	180	Intermediate	255 - 315
Peak House Cottage	Site	160	Intermediate	285 - 315
Peak House Cottage	Haul road	170	Intermediate	255 - 315
Batham Gate Road Properties 130 - 160	Haul road	230	Distant	315 - 345

Table A 2: Summary of directional dust monitoring at Victory Quarry for DMP1

	Sample start date	11/07/2017	18/07/2017	25/07/2017
	Sample end date	18/07/2017	25/07/2017	08/08/2017
	Sampling duration	7	7	14
Arc	000 - 015	Very Low	Very Low	Very Low
	015 - 030	Very Low	Very Low	Very Low
	030 - 045	Very Low	Very Low	Very Low
	045 - 060	Very Low	Very Low	Very Low
	060 - 075	Very Low	Very Low	Very Low
	075 - 090	Very Low	Very Low	Very Low
	090 - 105	Very Low	Very Low	Very Low
	105 - 120	Very Low	Medium	Very Low
	120 - 135	Very Low	High	Very Low
	135 - 150	Very Low	High	Very Low
	150 - 165	Very Low	High	Very Low
	165 - 180	Very Low	Medium	Very Low
	180 - 195	Very Low	Very Low	Very Low
	195 - 210	Very Low	Very Low	Very Low
	210 - 225	Very Low	Very Low	Very Low
	225 - 240	Very Low	Very Low	Very Low
	240 - 255	Very Low	Very Low	Very Low
	255 - 270	Very Low	Very Low	Very Low
	270 - 285	Low	Very Low	Very Low
	285 - 300	Low	Very Low	Very Low
	300 - 315	Medium	Very Low	Very Low
315 - 330	Low	Very Low	Very Low	
330 - 345	Very Low	Very Low	Very Low	
345 - 360	Very Low	Very Low	Very Low	

Table A 3: Summary of directional dust monitoring at Victory Quarry for DMP2

	Sample start date	11/07/2017	18/07/2017	25/07/2017
	Sample end date	18/07/2017	25/07/2017	08/08/2017
	Sampling duration	7	7	14
Arc	000 - 015	Very Low	Very Low	Very Low
	015 - 030	Very Low	Very Low	Very Low
	030 - 045	Very Low	Very Low	Very Low
	045 - 060	Very Low	Very Low	Very Low
	060 - 075	Very Low	Very Low	Very Low
	075 - 090	Very Low	Very Low	Very Low
	090 - 105	Very Low	Medium	Very Low
	105 - 120	Very Low	High	Low
	120 - 135	Very Low	High	Low
	135 - 150	Very Low	High	Low
	150 - 165	Very Low	High	Low
	165 - 180	Very Low	High	Very Low
	180 - 195	Very Low	Low	Very Low
	195 - 210	Very Low	Very Low	Very Low
	210 - 225	Very Low	Very Low	Very Low
	225 - 240	Very Low	Very Low	Very Low
	240 - 255	Very Low	Very Low	Very Low
	255 - 270	Very Low	Very Low	Very Low
	270 - 285	Very Low	Very Low	Very Low
	285 - 300	Very Low	Very Low	Very Low
300 - 315	Low	Very Low	Very Low	
315 - 330	Very Low	Very Low	Very Low	
330 - 345	Very Low	Very Low	Very Low	
345 - 360	Very Low	Very Low	Very Low	

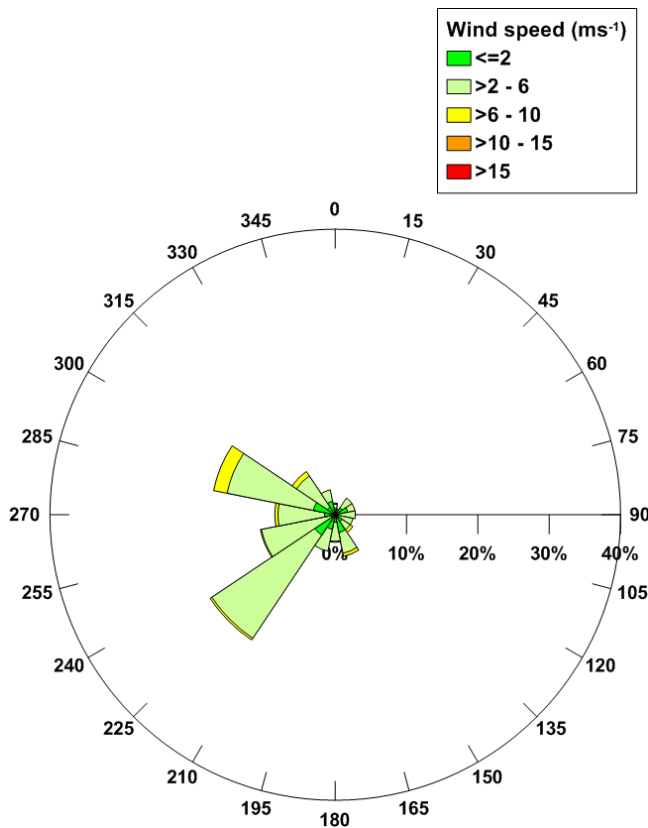
Table A 4: Summary of deposited dust monitoring at Victory Quarry

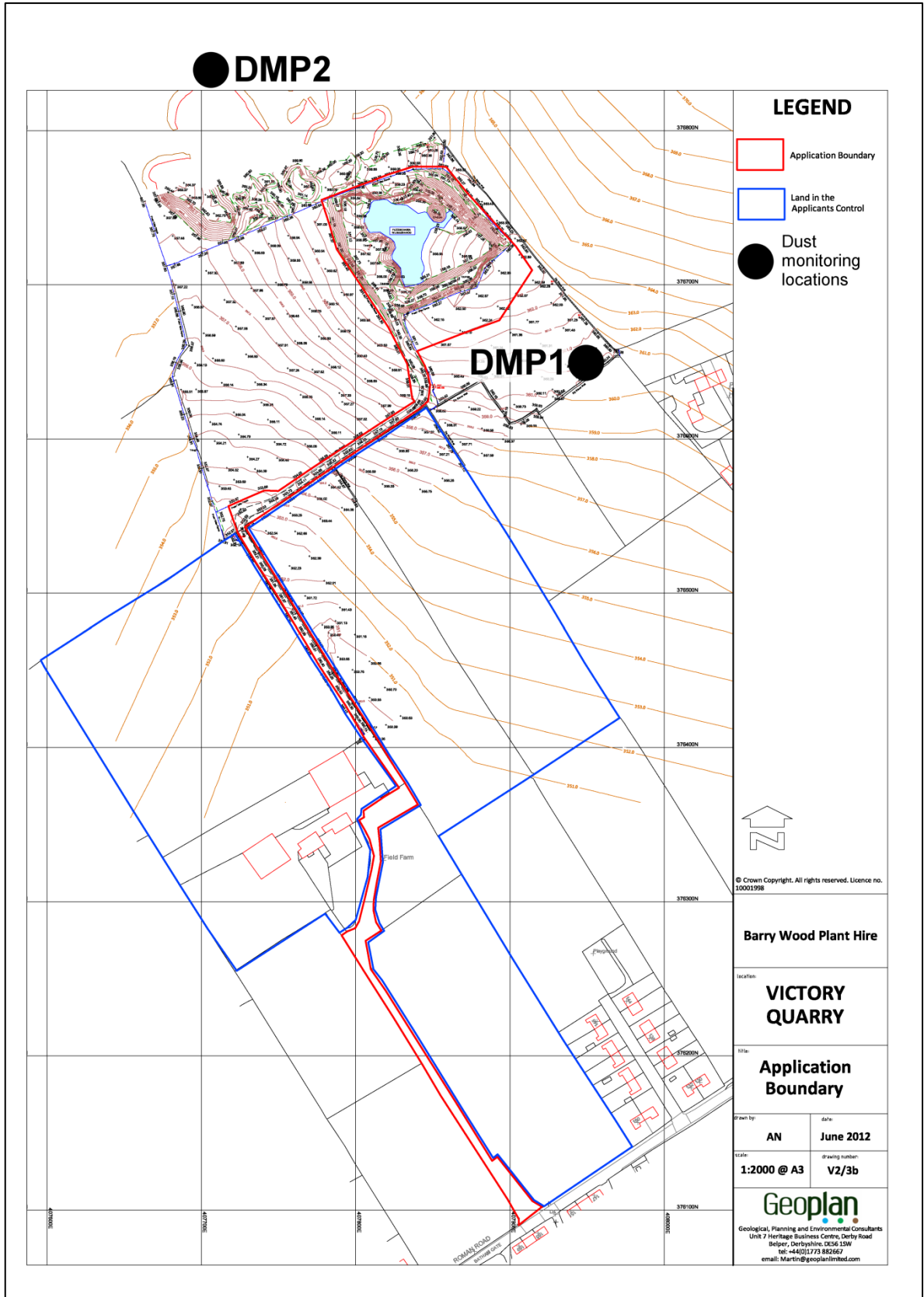
	Sample start date	11-Jul-17	18-Jul-17	25-Jul-17
	Sample end date	18-Jul-17	25-Jul-17	01-Aug-17
	Sample duration	7	7	14
Monitoring Point	1D	Very Low	Very Low	Very Low
	2D	Very Low	Very Low	Very Low

Table A 5: Outcome of dust assessment for receptors potentially affected by dust from Victory Quarry

Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of Dust Effects
Peak House	Site	Ineffective	Negligible Risk	Negligible Effect
Peak House	Haul road	Moderately Effective	Negligible Risk	Negligible Effect
Peak House Cottage	Site	Ineffective	Negligible Risk	Negligible Effect
Peak House Cottage	Haul road	Moderately Effective	Negligible Risk	Negligible Effect
Batham Gate Road Properties 130 - 160	Haul road	Ineffective	Negligible Risk	Negligible Effect

Figure A.1 : Wind rose for Victory Quarry, 11 July – 08 August 2017





Drawing No. A1: Site layout and dust monitoring locations